

Motivation as a limit to pricing *

Bruno S. Frey **

*Universität Zürich, Inst. für empirische Wirtschaftsforschung, Blümlisalpstr. 10,
CH 8006 Zürich, Switzerland*

Received August 7, 1992; accepted July 16, 1993

A monetary reward offered by a principal tends to crowd out an agent's willingness to perform the task for its own sake (i.e. based on intrinsic motivation) if the agent's sense of recognition, fairness, or self-determination are thereby negatively affected. The *crowding-out effect* of pricing may also spill over into sectors where no pricing is applied (*spillover effect*) if the persons affected find it costly to distinguish their motivations according to sectors. Motivation crowding-out and spillover narrow the scope for successfully applying monetary rewards. These theoretical claims are supported by real-life observations for environmental policy and blood donations.

I. Economists and pricing

Neo-classical economists can fairly be described as people who consider pricing, compared to its alternatives (such as state planning), to be an effective mechanism to influence individuals' behavior and to bring about an efficient allocation of resources. Accordingly, such

* This paper was written while the author was Visiting Professor of Economics at the Graduate School of Business, University of Chicago. I am grateful to Hans Albert, Alan Blinder, Iris Bohnet, Mary Brinton, James Coleman, Harold Demsetz, Reiner Eichenberger, Gebhard Kirchgässner, Karl-Dieter Opp, Sam Peltzman, Werner Pommerehne, Sherwin Rosen, Friedrich Schneider, Adi Schnytzer, Angel Serna, George Stigler, Lester Telser, Burton Weisbrod and Oliver Williamson and, in particular, to Gary Becker for helpful discussions. Psychologists Klaus Foppa, Kurt Stapf and Wolfgang Stroebe guided me from the point of view of their science. A preliminary version of the paper was presented at the Economic and Legal Organization Workshop and at the Rational Choice Seminar, University of Chicago, at the 'Rencontres de Kirchberg', at the 'Interdisciplinary Work Group on Economics, Psychology and Sociology', as well as at the Department of Economics, University of Toronto, University of Basle, University of Constance and Northwestern University. Financial support is gratefully acknowledged to the Richard Büchner-Stiftung at the University of Zürich.

** Tel.: +41 1 257 3730; Fax: +41 1 364 0366.

economists tend to favor expanding pricing to new areas, e.g. by introducing tradeable education vouchers or environmental pollution permits.

This paper argues that while the market certainly is an efficient allocation mechanism, there are important limits to pricing that, up until now, have been disregarded by standard (neo-classical) theory. In particular, monetary rewards may crowd out an individual's willingness to perform a task for its own sake (i.e. for intrinsic reasons). When the crowding-out effect of pricing outweighs the direct (relative) price or disciplining effect, the result is counterproductive: the principal administering a monetary reward makes the agent perform less intensively than when pricing is reduced. Moreover, it normatively suggests that economists should be more careful about the *circumstances* in which the use of monetary incentives leads to beneficial outcomes. The analysis put forward has strong empirical implications which help to explain observed behavior which is otherwise difficult or impossible to account for.

The limits of pricing identified in this paper hinge on two effects concerning intrinsic motivation. They will be called *motivation crowding effect* (pricing influences individuals' incentives to perform a task for its own sake within a given sector) and *motivation spillover effect* (intrinsic motivation is transferred from one sector to another). On the basis of a simple rational choice model of behavior, Section 2 discusses the motivational effects induced by monetary rewards (pricing) in the context of principal-agent-theory (Alchian and Demsetz, 1972; Jensen and Meckling, 1976; Aaron, 1990). Intrinsic motivation is crowded out if the agents perceive the application of prices to reduce the principal's recognition for their performance, the fairness involved, and the extent of self-determination the agents enjoy. The existence of the crowding-out effect makes it rational for principals to apply pricing less than if no such effect, or a motivation crowding-in effect, exists. In Section 3, key conditions for the occurrence of crowding effects are identified. Section 4 analyzes the consequences of individuals transferring intrinsic motivation to another sector, which again influences the principal's optimal use of monetary rewards. In Section 5, the intrinsic motivation effects induced by pricing are applied, by way of example, to environmental policy and blood donation. The theoretical propositions derived are shown to be consistent with empirical observations.

This paper introduces psychological elements not normally considered in standard neo-classical economics. It follows a program similar to Akerlof's (1984, 1989; with Dickens 1982) or Frank's (1985, 1988). The psychological effects considered here are empirically identifiable and rest on extensive experimental and real-life evidence. However, the approach stays within the rational choice framework but tries to merge it with behavioral elements established in psychology.

2. The effect of intrinsic motivation on behavior

2.1. *Intrinsic and extrinsic motivation*

According to the rational choice model (Becker, 1976; Coleman, 1990; Frey, 1992), individual behavior is determined by preferences and constraints. Changes in (generalized) relative prices constitute changes in constraints and induce changes in behavior. Behavioral changes are thus taken as being caused from outside the person involved, i.e. they are extrinsically motivated, and basic preferences are taken to be constant (see Stigler and Becker, 1977). It is argued here that another type of behavioral incentive, intrinsic motivation, should also be considered. According to 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 also responds systematically to the application of prices but does so in a different way from external motivation. From a principal's point of view, agents are endowed with intrinsic motivation when the task set is carried out to the principal's satisfaction without further intervention on his or her part (Wright and Aboul-Ezz, 1988). Fischhoff (1982) sees intrinsic motivation as the primary behavioral motive, while other psychologists (e.g. Porac and Mcindl, 1982) attribute it a lesser role. Intrinsic motivation is firmly established in psychology (and often used in sociology); it goes back to DeCharms (1968) and Deci (1975); further important contributors are, among others, Staw (1976), Arnold (1976), Deci and Ryan (1980, 1985; Deci, 1987), and, more recently, Hirst (1988) or Scott et al. (1988).

Extrinsic incentives in the form of monetary rewards or punishments are combined in the following principal-agent-analysis with the intrinsic motivation effects. Agents' performance is influenced both by

external constraints (explicit prices or wages providing direct monetary rewards, or fines constituting monetary punishment) and *internal* rewards (intrinsic motivation). A higher monetary reward for good performance, and a higher monetary punishment for bad performance, are regarded as identical in neo-classical economic theory because in both cases an agent not complying suffers the same (opportunity) cost. Both can be considered as a relative change in price for the agent, which will induce him or her to perform better. On the other hand, experimental psychologists (e.g. Lepper et al., 1973; Umstot et al., 1978) suggest that reducing intrinsic motivation causes poorer quality work, more wastage, higher turnover and absenteeism, more grievances, and a generally less committed work force. It follows that the higher intrinsic motivation, the better the agents' performance.

2.2. *The agent's behavior*

The monetary reward received from or punishment imposed by the principal for the performance given, as well as the 'inner reward' for performing the work as such, influences an agent's behavior. The corresponding price change is administered by the principal, while the agents are able to choose the extent of intrinsic motivation they care to apply. The amount of intrinsic motivation expended is decided by an agent on the basis of an (internal and implicit) cost-benefit evaluation. He or she derives a benefit from receiving the monetary reward and from the intrinsic motivation applied to performing the task. We can assume, however, that intrinsic motivation is not a free good: it is costly to muster and to maintain the inner forces required. In this sense, it is related to love, which can also be considered a costly resource or force which should not be squandered (Robertson, 1956). As a consequence, agents will consider for what tasks and on which occasions it is worthwhile to act according to inner motivation. They maximize their well-being by choosing the appropriate amount of intrinsic motivation to apply to a particular task. In equilibrium the marginal benefit equals the marginal cost of the intrinsic motivation expended.

Intrinsic motivation is affected by an agent's perception of how well he or she is treated by the principal with respect to the work to be undertaken. When the principal varies the size of the monetary

rewards, an agent responds by adjusting the amount of intrinsic motivation brought to bear on a task. The direction and magnitude in which an agent adjusts his or her intrinsic motivation depends on how pricing affects the marginal benefits of acting in accordance with one's inner motivation. A monetary reward may increase, leave unaffected or decrease intrinsic motivation (see Folger et al., 1978).

Experimental and field research in psychology (for a summary see Deci and Ryan, 1980) has identified three types of cognitive conditions under which increased monetary rewards diminish agents' intrinsic motivation to perform a task. Such diminution will be more likely to happen (i) the lower the perceived recognition received from the principal, (ii) the less fairness is attributed to the relationship with the principal, and (iii) the lower the subjective extent of self-determination which the principal grants an agent. These three conditions will now be discussed in turn.

(i) *Recognition*. A monetary reward offered by a principal which indicates to the agent that his or her performance is appreciated increases the marginal benefit of the agent's intrinsic motivation. If, on the other hand, the agent feels that a higher monetary payment is handed out because the principal mistrusts or undervalues the agent's intrinsic motivation, the agent's marginal utility of applying intrinsic motivation is reduced. He or she will substitute the external motives offered by the principal for inner motives. For example, neo-classical economists would argue that a compensation consisting of a flat sum plus a per unit wage is identical to a (higher) flat sum minus a deduction for units below a given goal because the opportunity cost of working less intensively is the same. However, firms typically specify an employment contract as a flat sum plus a per unit wage (see Lazear, 1991). The reason for this is the crowding-out effect; agents tend to look at the flat sum as given and choose the intensity of intrinsic motivation they want to expend on (further) work according to the variable sum. A positive sum received for additional performance is perceived as a recognition for good work, which bolsters intrinsic motivation. On the other hand, a compensation in the form of deduction from a set goal is perceived by agents as an indication of the principal's dissatisfaction with their performance. This tends to affect intrinsic motivation negatively. Another example is Schumpeter's (1934) 'dynamic entrepreneur' who does not value profit simply as

purchasing power but rather as a signal of success, i.e. as a recognition for his or her achievements.

(ii) *Fairness*. A change in monetary reward which is considered equitable among the agents concerned supports intrinsic motivation while a change considered to be unfair or immoral decreases the agents' inner motivation. For example, managers' intrinsic motivation is undermined if they get a smaller raise than they consider fair relative to other managers. On the other hand, intrinsic motivation is not affected, or is even increased, if all managers' income is reduced (Kahneman et al., 1986; Frey and Pommerchne, 1993.)

(iii) *Self-determination*. A monetary reward raises the intrinsic motivation for performing a job if the agents perceive that the principal recognizes and appreciates the way they go about it. They value positively the possibility of determining for themselves some aspects of the relationship established with the principal. If, on the other hand, pricing is experienced by the agents as an increase in the extent to which one's behavior is determined from the outside, this decrease in self-determination reduces intrinsic motivation.

Whether an increase in monetary rewards offered by the principal to agents increases, leaves unaffected or decreases their intrinsic motivation to perform according to the principal's wishes depends on the exact nature of the psychological processes triggered. A higher price may increase or decrease the perception of recognition, of fairness, and of self-determination depending on the exact circumstances. In order to understand the kind of specific conditions relevant, it is useful to consider an example at this point. Assume that the janitor of a house you live in enjoys doing his work. He readily agrees to work overtime when an urgent extra task crops up. You may thank him by offering him the going wage rate for overtime. The janitor may well consider such a monetary reward for his extra effort an insult. It suggests that you think he 'only' works for money and is not interested in the work as such. The janitor's intrinsic motivation is not being recognized, and he is actually offended by the monetary offer made. In this case, the use of a price by the principal damages the agent's intrinsic motivation; this does not mean that the janitor will stop working overtime, but any future overtime he does will be less for intrinsic than for extrinsic reasons, i.e. because he gets paid for it. Pricing may, in this case, be said to *crowd out* intrinsic motivation. You

would probably have done better by thanking the janitor with a bottle of wine, thus acknowledging his intrinsic motivation. However, he is unlikely to maintain his intrinsic motivation if you expect him to do overtime on a regular basis and keep thanking him with nothing but a bottle of wine; in this case, the reward is expected (see the evidence in Lepper et al., 1973). Consider now a (female) manager who is strongly intrinsically motivated in her job. An increase in salary for performing particularly well is, in this case, perceived by her to be a sign of recognition and tends to raise her intrinsic motivation. In this case, pricing may be said to *crowd in* intrinsic motivation. The two cases serve to show that it is not possible to state *in general* how pricing affects intrinsic motivation, but that the specific conditions have to be kept in mind. There is a marked difference to the disciplining effect of pricing considered exclusively by neo-classical economists: A higher reward or punishment is taken to *always* induce a higher level of performance.

2.3. The principal's behavior

The principal is taken to maximize the agents' performance by setting the monetary reward or punishment, i.e. by changing relative prices in the appropriate way. He or she takes into account that there is a disciplining effect as well as a crowding effect via agents' intrinsic motivation. The reference case analyzed in standard (neo-classical) theory obtains when pricing leaves intrinsic motivation unaffected. In the case of motivation crowding-in, a rational principal raises the monetary rewards more than in the reference case, and when there is motivation crowding-out, he or she uses pricing less intensively. If the damaging effects on intrinsic motivation outweigh the disciplining effect, a rational principal completely refrains from applying prices to influence agents' behavior: he or she would do better by relying completely on the agents' intrinsic motivation. This case applies under many circumstances, in particular among friends and within families, where monetary rewards tend to destroy the willingness to do others a favor for its own sake. Many more examples and experiments supporting this result may be found in the reader by Lepper and Greene (1978) or the surveys by McGraw (1978), Pittman and Heller (1987) and Murray (1988).

The three kinds of crowding effects have been discussed in quite different strands of literature.

(a) *Crowding-in effect*

The fact that pricing *improves* intrinsic motivation was the dominant view from the 16th to the 19th century (see Hirschman, 1977, 1982). The underlying idea is that while passions are uncontrolled and hazardous, pursuing one's material interests raises moral standards and the incentive to work hard for its own sake. The clearest exponent of the idea of 'doux commerce' is Montesquieu, who, in his *Esprit des Lois* (1749, vol. XX) matter-of-factly states that 'commerce ... polishes and softens ways of behavior as we can see every day'. The conventional wisdom in this period, shared by such diverse thinkers as Condorcet (1795) or Kant (1795), was that pricing not only leads to higher productivity than alternative allocation mechanisms such as planning but also 'would generate as a by-product, or external economy, a more "polished" human type ... more honest, reliable, orderly, and disciplined, as well as more friendly and helpful' (Hirschman, 1982, p. 1465). According to Durkheim (1893/1964), the division of labor which results from the application of pricing and the market also makes people more dependent on each other, increases ties among people and makes them act more productively.

A positive effect of pricing on intrinsic motivation is also posited by some present-day psychological theories. According to equity theory (Adams, 1963; Walster et al., 1977), individuals attempt to make their ratios of outcomes equivalent to the corresponding ratios of other people. When feeling overpaid, for example, individuals tend to reduce the inequity by doing a better than average job. The equity literature therefore predicts and empirically shows that higher pay tends to result in higher productivity (for evidence, see e.g. Andrews, 1967; Lawler and O'Gara, 1967). Developmental psychologists who study the emergence of motivations in children have also collected much evidence that external rewards enhance and create intrinsic motivation (e.g. Aronfreed, 1968).

(b) *Crowding-neutral effect*

According to standard (neo-classical) economics, pricing does not affect intrinsic motivation. This view is shared by Adam Smith (see Hirschman, 1977, pp. 93–106) as well as by some psychologists. Thus, Scott et al. (1988, p. 425) find that 'there is little reason to believe that

the design and implementation of a more effective extrinsic reinforcement schedule will destroy one's pride in one's work, the intrinsic worth or meaningfulness of the job, or one's predilection to perform it'.

(c) *Crowding-out effect*

In his book on *The Social Limits of Growth*, which had a great influence on the social sciences outside economics, Hirsch (1976) argues that pricing debases moral values such as 'truth, trust, acceptance, restraint, obligation' (p. 143) and therewith tends to reduce the intrinsic motivation to perform according to the wishes of the principal. The market destroys its own ethical basis through the 'commercialization effect'. Similar views have been put forward by Weber (1920–21), Schumpeter (1942), Bell (1976), and the New Left such as Horkheimer (1952) or Marcuse (1965) (see, more extensively, Hirschman, 1977, 1982). Lawyers (e.g. Michelman 1967) and philosophers (e.g. Singer, 1973) have expressed concern about 'demoralization cost'. These scholars (as well as many lay people) would argue for example that even if the victims of a crime were fully compensated for the damage done by the violators, the imposition of such a fine would not morally condemn the crime committed. Even though the punishment might exert an 'optimal' amount of deterrence, it damages internalized norms to stay within the law.

Some modern economists have also remarked that the use of prices may crowd out people's intrinsic motivation (see Sen, 1982, 1987), but they have done so incoherently and without being aware of the psychological literature (exceptions are Maital, 1988; and Schlicht, 1990, p. 361). Arrow (1970, 1972) stresses the importance of maintaining the ethical bases of human action against purely rationalist pricing. In experimental psychology, the negative effect of monetary (external) rewards on intrinsic motivation has been extensively discussed under the heading of 'the hidden costs of reward' (see Deci, 1971, 1972, 1975; and Lepper and Greene, 1978, with further references). The reason why external rewards decrease intrinsic motivation and corresponding activity has been attributed (DeCharms, 1968; Deci, 1971) to a shift in the 'locus of control' from the agents' self-determined action to an external source which then guides behavior or, similarly, to a change in the concept of why a person works. Combined with the theory of cognitive dissonance (see Festinger,

1957; and Akerlof and Dickens, 1982, for an economic application) which states that people tend to shun conflicting interpretations of reality, it follows that they reduce intrinsic motivation once they are extrinsically guided. One may also speak of 'overjustification' i.e. of being motivated at the same time, and unnecessarily, by two incentives for the same task. The economizing principle makes it rational for individuals, when extrinsically induced, to reduce the type of motivation which is under their own control – intrinsic motivation. A great many experiments support the 'hidden cost of reward': '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. 55–56). This holds, in particular, for work motivation where the crowding-out effect has been widely witnessed (see Notz, 1975; Doeringer, 1991; Frey, 1993). In addition to laboratory experiments, there are real-life observations of the crowding-out effect when Titmuss (1970, last paragraph) argues that 'the commercialization of blood and donor relationships represses the expression of altruism' and therewith of an intrinsic motivation to donate blood (but he does not offer any theoretical rationale; see Arrow, 1972). The (partial) lack of responsiveness to 'token economy' programs (see the surveys by Kazdin and Bootzin, 1972; Kazdin, 1982) may also be explained by the crowding-out effect of paying patients for fulfilling certain tasks. A field experiment with state employees in North Carolina (Jordan, 1986) revealed that the expectation of rewards contingent on performance decreased intrinsic motivation and work effort, whereas rewards not tied to performance increased the individuals' intrinsic motivation. On the other hand, an econometric study of 131 managers of medium sized Dutch firms with between one hundred and more than 30,000 employees and covering a wide variety of industries (Barkema, 1992a) shows that managers' work effort is positively and systematically influenced by the bonuses paid out. This effect is attributed both to a disciplining and a crowding-in effect of the bonuses.

3. Conditions determining crowding effects

The previous sections have discussed the psychological bases of crowding-out and crowding-in effects and have thus mainly been

concerned with the *possibility* that such effects occur. This section now studies the *conditions* favoring a positive or negative influence of pricing on intrinsic motivation. While the psychological research in this area is mainly concerned with individual reactions based on personality characteristics, economics focuses on the circumstances under which these reactions take place. The policy-related question is: When and how should monetary rewards or punishments be applied to raise performance? Little empirical evidence is so far available on this point because the laboratory and field experiments undertaken in psychology have not been designed to answer such institution-oriented questions, while economists, as has been pointed out, have neglected crowding effects altogether.

The first three conditions refer to the *framework* in which monetary rewards and punishment are undertaken. This framework affects the existing level of intrinsic motivation, so that pricing tends to shift the perceived locus of control from intrinsic to extrinsic motivation.

(a) The more *personal* the relationship between principal and agent, the more important intrinsic motivation. A monetary reward or punishment tends to shift the locus of control from intrinsic to extrinsic motivation and a crowding-out effect is more likely to occur.

In industrial relations theory, a personalized relationship between principal and agent has been observed to lead to a 'psychological contract' (Brody, 1980; Lee, 1987). When it is violated, the workers respond by reducing work effort, an effect which is supported by a great deal of empirical evidence (see e.g. Ribeaux and Poppleton, 1978; Beer et al., 1984; Doeringer, 1991).

(b) The more *interesting* a task for the agent, the higher his or her intrinsic motivation to perform well. Increased monetary rewards or punishments then tend to reduce self-determination and self-evaluation of one's competence.

This condition is supported by evidence from psychological laboratory experiments (see Calder and Staw, 1975; and the survey by McGraw, 1978). Deci and Ryan (1985, p. 84) summarize the evidence by stating that 'task-contingent rewards impair performance on interesting (complex or conceptual) tasks, but they improve performance on dull, repetitive tasks'.

(c) The more extensive an agent's *participation possibilities*, the higher his or her intrinsic motivation. A stronger use of monetary

rewards or punishments shifts the locus of control, thus damaging intrinsic motivation.

The relevance of this condition has been empirically supported for firms (Kochan et al., 1986; Montgomery, 1987). It has been shown, for example, that Japanese firms with a flatter hierarchy relying more on consensus and collaboration among the employees use fewer monetary rewards than corresponding American firms, because they are aware of the stronger demotivating effect on intrinsic motivation in their more participatory setting (Aoki, 1990; Lincoln and Kalleberg, 1990).

Better developed institutions for direct democratic participation in government have been demonstrated to raise tax morale, a specific type of intrinsic motivation. In Swiss cantons where the citizens have more extended possibilities to engage in initiatives and to vote in referenda, there is (keeping all other influences constant) less tax cheating. Compared to the mean of all cantons, in such cantons almost 8% less (or 1600 Swiss Francs) income per taxpayer and year is concealed (Pommerehne and Frey, 1992).

Additional conditions relate to the *characteristics of external intervention*.

(d) Monetary rewards and punishments which *distinguish between* persons of *high and low intrinsic motivation* are considered as being 'fair' and therefore tend to raise intrinsic motivation.

This condition plays a major role in industrial relations theory, where an effort is made to devise systems for reward and punishment which do not undermine, but rather raise, intrinsic motivation (see e.g. Freeman and Medoff, 1984; Lawler, 1990). The economic theory of an 'efficiency wage' (Akerlof and Yellen, 1990) is based on the same notion when it emphasizes the reciprocal exchange of effort from particular workers for the voluntary sharing of economic rents by employers.

(e) The more a reward is *contingent on task engagement and on the performance* desired by the principal, the more strongly the locus of control is shifted from intrinsic to extrinsic preferences, and the stronger the crowding-out effect.

Laboratory experiments undertaken by psychologists speak in favor of this condition (Ryan et al., 1983). 'Contingent rewards ... tend to

decrease intrinsic motivation', is Deci and Ryan's (1985, p. 81) summary of the accumulated literature. Monetary reward received through the functioning of the price system is a case where reward depends on performance. In a perfectly competitive market, the wage rate received depends exactly on the marginal product achieved. Pricing in this case therefore tends to undermine intrinsic motivation due to a perceived shift in the locus of control but, as has been stressed, the disciplining effect of pricing may well lead to satisfactory performance nonetheless.

(f) The more strongly pricing implies an acknowledgment of the agent's intrinsic motivation, the more strongly it fosters intrinsic motivation.

The pure price system or perfect market is free of any moral connotation. According to standard neo-classical economics, a person is completely free to act within the confines of the restrictions imposed by the prices. Provided that the price-external costs are internalized by appropriate prices or changes, an agent is free to behave as he or she desires (Kelman, 1983, p. 313). Accordingly, Friedman (1970) claims that the only business of business is to make profit. Actors who (partially) act according to their intrinsic motivation are often ridiculed. But once it is taken into account that intrinsic motivation may depend on the *form* of pricing, such global statements are no longer warranted. As soon as Friedman's position is adopted, the locus of control is shifted to external sources, and intrinsic motivation is crowded out. Most people are therefore reluctant to take his position – and rightly so. Indeed, even in market economics, admonitions and moral appeals play an important role in economic policy (see e.g. Frey, 1983) and are effective under identifiable circumstances (for environmental policy, see Baumol and Oates, 1979.)

4. Motivation spillovers

So far, only the sector of the economy in which pricing affects intrinsic motivation has been analyzed. In this section of the paper, a second sector of society is distinguished, in which pricing cannot be applied because it is forbidden by law, custom or social norms, or because transaction costs are too high (reasons are given in Frey,

1986). Thus, for example, pricing in the form of an effluent charge is applicable when the source and extent of pollution are well identified and measurable. In other areas of the environment, on the other hand, the costs of policing and administering an effluent charge might be so high (an example could be littering on the street) that it would be irrational to apply it.

The crucial point is that intrinsic motivation is not necessarily restricted to either of the two sectors; the same type of inner motivation may affect behavior in both sectors. In the example just given, environmental ethics may be important in both sectors -- whether effluent charges are applied or not. Motivation may thus spill over from one sector into the other. An increase in intrinsic motivation in one sector may increase or decrease motivation in the other sector. A positive spillover is more likely to obtain, the more costly an agent finds it to differentiate his or her motivation according to a particular sector. According to Frank (1988, p. 162), neurological research suggests that the modular construction of our brains limits the power to differentiate between varying circumstances, in our case to whether monetary rewards are applicable in a sector. Williamson (1975, pp. 37 and 256, 1992; see also Jensen, 1992), using a similar concept of 'attitudinal spillover', warns that technical separability (in our case whether prices are applied or not) does not imply attitudinal separability (what sector intrinsic motivation refers to), but he does not explore the issue further. Sugden (1989) argues that norms can be spread by analogy. If an analogy can be drawn between a sector in which a norm holds and another sector in which it does not yet hold, its validity can expand to the latter sector as well.

The following conjectures about the determinants of the direction and extent of motivation spillovers, partly supported by empirical and circumstantial evidence, may be advanced. The spillover is more likely to be positive:

(a) the more similar the areas in question are perceived to be with respect to *material content*. An example is intrinsic motivation with respect to the preservation of the environment which pertains to all areas of nature, irrespective of whether pricing is used or not. The idea that similarity or perceived equality of content favors positive spillovers is supported by experiments undertaken by social psychologists (see Deci, 1972, 1975, p. 157);

(b) the more *people* there are acting in the sector with or without pricing. It has, for example, been argued that undermining tax morale spills over to the rest of the society: '...tax non-compliance may be creating a nation where citizens disrespect for tax laws will expand disrespect for other laws' (Graetz et al., 1986, p. 2);

(c) the more similar the *processes* that are used in the two sectors. The borders between the sectors are blurred, raising the cost of distinction (see Deci, 1972, for experimental evidence);

(d) the stronger the social, religious and ideological *norms and customs* urging individuals to apply the same intrinsic motivation or morale in all spheres of life. Christianity and many other religions, for example, do not differentiate between the commandments to be obeyed in the pricing and non-pricing sectors.

A principal maximizing the performance of the agents sets the appropriate financial rewards, but now takes into account the *indirect* effect of pricing on intrinsic motivation in the non-pricing sector.

(i) In the case of *motivation crowding-in* and *positive spillovers*, the optimal financial reward is higher than it would be without these effects (i.e. compared to the standard neo-classical case in which neither motivation-crowding nor spillovers are taken to exist). The principals use pricing more extensively to increase agents' performance if they are aware that the agents' intrinsic motivation is at the same time bolstered and spills over to sectors in which prices cannot be applied.

(ii) A more interesting case obtains when pricing *crowds out intrinsic motivation* and intrinsic motivation in the non-pricing sector follows suit. If this indirect motivational effect dominates the disciplining effect of pricing, the principals optimally refrain from using monetary incentives at all. They recognize that while an increase in financial rewards motivates agents to improve performance, the destructive effects of pricing on intrinsic motivation, and its spillover into sectors in which pricing is not applied, may be stronger. Under these circumstances pricing has counterproductive effects, and principals do better to rely on the intrinsic motivation of the agents.

A particularly important instance in which such a counterproductive outcome is relevant refers to *political decisions*. By constitutional

design, the behavior of individuals in democracies is not guided by the application of price incentives, but is importantly based on intrinsic motivation (especially where so-called low-cost decisions are involved; see Kirchgässner and Pommerhne, 1993). If agents' intrinsic motivation is impaired by the use of pricing, and this effect spills over into the political arena, then the agents' incentive to politically support the aims desired by the principal decreases (Hawkins and Thomas, 1984, p. 55; Kagan and Scholz, 1984, pp. 73–74). Rational principals in that case are more reluctant to use monetary rewards in the economic sector when they are aware that the induced damage to intrinsic motivation has negative repercussions in the political sphere. An example will be provided below.

5. Applications

The limits on the rational use of prices to influence behavior caused by the crowding and spillover effects of intrinsic motivation are now used to interpret empirical observations with respect to the environment and blood donation. It is argued that empirical observations tend to support the theoretical analysis undertaken, and that they are difficult or impossible to explain by relying only on standard neo-classical economics.

5.1. *Natural environment*

Economists strongly support the application of price-incentive based instruments for environmental management. A recent survey of environmental policy (Hahn, 1989, p. 95) states that 'the two tools to fight pollution which have received widespread support from the economics community [are] marketable permits and emission charges'. For a selection of typical cases, for example, it has been found that pricing is able to reduce abatement costs by between 42 and 90 percent compared to regulating (Tietenberg, 1985). On average, cost savings are estimated to be as high as 80 percent when the induced improvement in pollution-control technology is taken into account (Oates, 1984). However, incentive instruments based on pricing are *little* used in environmental policy all over the world (e.g. Hahn, 1989) and there is also little prospect for future use (see OECD, 1989). Various compet-

ing explanations for the discrepancy between theory and practice have been offered (e.g. Bohm and Russel, 1985):

(a) The transaction costs of applying pricing instruments are so high that it is not efficient to use them. While this argument may apply to some pollutants under some circumstances, economists have argued, and have presented convincing evidence (e.g. Baumol and Oates, 1979), that transaction costs are not systematically higher than for other environmental policy instruments such as regulations.

(b) Politicians and administrators do not understand the advantages of pricing for improving the environment (see the interviews in Kelman, 1981, or the arguments in Blinder, 1987, ch. 5). This explanation is not convincing. While it may be true that politicians and bureaucrats know little about economic incentive instruments (e.g. Kelman, 1983, for the U.S.) it is difficult to argue that these individuals are, on average, so much less intelligent than the economists who propose the use of pricing. Rather, politicians and administrators do not *want* to understand price-incentive instruments because they do not find it in their interest to apply them in the environmental area.

(c) Producer-interest groups lobby against the use of pricing. They prefer direct regulations (emission standards) which establish for them a government-imposed cartel by restricting the entry of new firms (Buchanan and Tullock, 1975). Producers also expect to have more influence over how stringent environmental policy is in the case of regulations compared to pricing. While this argument is persuasive, it does not explain why pricing to fight pollution is applied little or not at all in countries and sectors where producers are weakly organized (see e.g. Mueller, 1989) and where environmentalists are politically strong. One would expect that in countries and sectors with weak producer-interest groups and strong green interest groups and parties (who should favor an application of pricing instruments, see Opschoor, 1986; Henry, 1990, p. 258), the use of environmental charges and tradeable permits would be widespread.

(d) Public bureaucrats like to use non-price instruments (regulations) because such interventions raise their importance and give them more power. While this explanation *may* be correct, it is difficult to refute because it rests on putting an appropriate argument into the utility function of an actor. Without additional theoretical propositions, this procedure does not provide a testable explanation

for differences in the application of pricing instruments between countries and sectors and over time.

The discrepancy between theory and practice observed for environmental policy noted can be explained by taking into account the damaging effect of pricing on intrinsic motivation. If decision-makers wanted to improve the environment and maximize performance, they would use pricing (e.g. tradeable licenses) less intensively, or not at all, because they are aware of the damaging effects of such pricing on environmental ethics. People affected perceive that their intrinsic motivation to preserve the environment is not recognized, and therefore the environmental motivation is crowded out. The sale of licenses allowing a specific amount of pollution suggests to people that pollution is not morally condemned and that *once a license has been granted*, a 'license to pollute' has been acquired. The environmental decision-makers, moreover, fear the destruction of environmentally relevant intrinsic motivation spilling over into those areas where pricing instruments are not applicable (for a similar argument see Kelman, 1981, pp. 34–35, 1983). People perceive the environment as a whole. Decision-makers fear that the use of pricing instruments would lead to a counterproductive effect: the quality of the environment is improved in those areas where tradeable licenses (or environmental charges or taxes) are applied, but environmental quality is lowered in all other areas because the guiding environmental ethic has weakened or has been completely destroyed. This reduced ethic moreover hampers individuals' willingness to accept any kind of action to fight pollution, i.e. political support for environmental policies would also be decreased. This explains why even those groups who claim to fight for green interests may oppose pricing as an instrument of environmental policy: it would erode the basis of their popular support. Provided the motivation-crowding and spillover effects are sizeable enough, 'overall' environmental quality will fall when pricing instruments are used. Under these conditions the application of pricing leads to the opposite of what was intended.

A proposition derived from the analysis is that the motivation crowding and spillover effects are stronger for consumers than for firms because the latter cannot pursue environmental ethics in a strongly competitive situation. As a consequence, it is to be expected that pricing instruments are used more on firms than on consumers. It

is, moreover, to be expected that firms supplying intermediate and homogeneous products, and operating in competitive markets are less, or not at all, subject to motivational effects of pricing. Therefore, environmental pricing instruments are expected to be used more on intermediate products, and less on final products. The theoretical analysis also suggests the instruments that are preferred will be those that entail a moral condemnation of pollution (i.e. regulations and, especially, subsidies which reward environmentally conscious behavior), compared to tradeable licenses and effluent charges which imply that no moral wrong is connected with pollution.

These propositions are consistent with the evidence (see OECD, 1989; Hahn, 1989): environmental charges or tradeable licenses are rarely, if ever, applied directly to consumers, but rather to firms, though standard economic theory argues that they work well for consumers, too (see Baumol and Oates, 1979). Indeed, the only successful application of tradeable permits in the United States is to oligopolistic petroleum refineries, to induce them to reduce the lead content of gasoline (Hahn and Hester, 1986). On the other hand, regulations, subsidies, and deposit-refunds (which are perceived as supporting environmental ethics) are predominantly used in all countries where environmental pricing instruments tend to be interpreted as a direct or indirect 'license to pollute'.

5.2. Blood donation

The way blood is donated is a second area where motivation-crowding effects induced by monetary rewards help to explain empirical observations which are difficult or even impossible to explain otherwise. Four issues will be discussed.

(a) Extent of commercial blood market

Standard economic theory 'suggests that donors *would* respond to prices by supplying more than they do at zero price' (Cooper and Culyer, 1973, p. 131; Roberts and Wolkoff, 1988). Two of the few economists who discuss Titmuss' (1970) well-known contention that to pay donors for giving blood may discourage cherished values¹ are

¹ Most economists have focused on the alleged difference in blood quality from unpaid and paid donors (see e.g. Kessel, 1974; Johnson, 1976). Even in the age of AIDS, this issue is, due to technical progress in identifying blood quality of much less importance today (e.g. Drake et al., 1982: ch. 4; Eckert, 1986) and will not be discussed here.

Solow (1971) and Arrow (1972), but they assume that the effects of price incentives can simply be added to that of altruistic donations, as the two motivations are independent of each other. As a result, it is predicted that if the price reigning in the commercial market for blood is increased, the total quantity supplied (both free of charge and at a price) would rise.

From our theory, no prediction follows directly about the share of blood supplied commercially. However, if pricing is thought to work as well in this area as in other areas of the economy, one would expect that the market for blood would be substantial. The transaction cost involved in paying for blood is small; it would therefore have to be predicted that blood demanders (hospital administrators) would find it advantageous to acquire it commercially, especially as the cost seems to be lower than for unpaid donors (Taswell, 1987, p. 145).

With the theory here proposed, the strong aversion of some, or even most, people against commercializing blood donation is taken seriously. 'Selling blood is regarded as an act unworthy of a respectable citizen', and there exists 'outrage at the mere idea of "selling blood" for money' (Ireland and Koch, 1973, pp. 148 and 151). A survey among American donors and non-donors reveals that 'a large majority of [the] respondents had a very negative attitude toward the purchase of blood from donors' (Drake et al., 1982, p. 108). Empirical studies have found moral considerations of great importance for voluntary donors (e.g. Oswalt, 1977; Lightman, 1981). According to Collard (1978, p. 5), blood donation is the most convincing example of true altruism and according to Stewart (1991), is a primordial example of commitment (see also Sen, 1982, 1987). Individuals who give blood for altruistic reasons suffer a utility loss when blood is priced. Intrinsic motivation is marginally crowded out and spills over to the blood donation sector in which no pricing is applied. There, the intrinsic motivation of people who have so far donated gratis is reduced. It is predicted that introducing or increasing the commercial blood market price raises the quantity supplied due to the monetary incentives, but decreases the quantity supplied free of charge. Whether the total blood supply falls depends on the size of the two countervailing influences. In a country where most of the blood is supplied gratis, paying for blood is likely to reduce total supply.

An experiment conducted with students suggests that an increase in the price offered for blood at a low price level decreases the quantity

supplied and increases it only when the price is further raised (Ireland and Koch, 1973, pp. 152–154). Another experiment yielded the same outcome: in a group regularly donating blood without monetary compensation, the offer of payment significantly reduced donation rates compared to a control group not offered payment (Upton, 1973). As is to be expected, the direct effect of pricing dominates its negative effect on intrinsic motivation when prices are increased to very high levels, after intrinsic motivation has been completely destroyed. Presumably, everything can be bought at some price. There do not seem to be any reliable real-life observations on whether, or to what extent, pricing blood discourages unpaid donations: 'The limited empirical evidence available in that context is ambiguous' (Hansmann, 1989, p. 68).

As a result of Titmuss' (1970) book on *The Gift Relationship*, it has generally been taken for granted that the commercial supply of blood in the United States is of great importance. This was true at the time the book was written. In 1965–1967, 80 percent of all blood was obtained from paid donors. Since 1973 a 'National Blood Policy' by the Department of Health, Education, and Welfare, officially undertaken to improve the quality of blood donated (see e.g. Hough, 1978; Wallace, 1985), has reduced the commercial share of blood donation drastically and today 'virtually all whole blood is obtained from unpaid donors' (Hansmann, 1989, p. 60; see also Johnson, 1973; or Drake et al., 1982, pp. 4–7, where a share of 3–4 percent paid donors is given). Between 1971 and 1980, whole blood collected from volunteers rose by 39 percent, while that from paid donors fell by 76 percent (see also Hough, 1978, Table 1, p. 102). Thus, to some extent at least, when the use of pricing is discontinued, an intrinsic motivation to donate blood for free re-emerges.

On the basis of the evidence mentioned, neither of the two theories discussed here can safely be rejected. Standard neo-classical economics, however, deals with the very small commercial share of the market only, and the question arises of what economics can say about the unpaid part of the supply of blood that is by far larger. In favor of the standard theory it may be argued that what matters is the *marginal* blood contribution which, in the United States and other countries, is paid for. The evidence shows, however, that precisely in emergencies (e.g., when natural catastrophes or wars occur) blood is typically donated gratis in large quantities (Baumol and Oates, 1979,

p. 297). Here, one draws on a type of intrinsic (altruistic) motivation aroused under such special circumstances.

(b) Non-monetary inducements to voluntary donors

Noting the small share of the commercial blood market, even in the United States, adherents of standard neo-classical economy tend to be suspicious of non-monetary incentives and may seek to extend the definition of a 'price' to include non-monetary but material inducements. Thus they argue that there are fewer voluntary contributions than there appear to be because donors receive a non-monetary form of compensation for giving blood.

The theory that takes intrinsic motivation into account offers a different interpretation of the non-monetary inducements offered. It is not a price in the usual sense but a *signal* indicating the appreciation or acknowledgment of voluntary contribution. This form of compensation increases the marginal benefit of giving for intrinsic reasons, supporting the altruistic motivation for donating it free of charge. It is hypothesized that the administrators of such inducement, which serves as a sign of recognition for the intrinsic motivation of the voluntary donors, make a considerable effort to distinguish it from a normal price; in particular, the inducement is given in non-tradeable forms.

Empirical evidence strongly supports our theory which includes the effect of pricing on intrinsic motivation. In both Europe and America, the non-monetary compensation which is indeed widely used (Ireland and Koch, 1973, p. 149) is given in the form of a free fruit juice and a sandwich, both non-tradeable goods of little value. Standard economics offers no explanation of why simpler monetary rewards are not used as an inducement, instead of juice and sandwiches. In contrast, our theory acknowledges the basic difference between an incentive payment and a (material) signal of recognition.

(c) Relative size of the blood market between countries

Standard neo-classical economics does not offer any ready explanation of why the extent of blood commercialization varies between countries; in essence it is proposed that the market works everywhere, as blood is a good like any other.

Our theory takes intrinsic motivation into account and focuses on the differences in the extent to which explicit markets are accepted as legitimate resource allocation mechanisms in different countries and

cultures. In line with standard neo-classical theory it is also acknowledged that a given payment offers a larger incentive to donate blood in poorer than in richer countries. Americans seem to be more ready to accept the use of prices than the British and Continental Europeans (see Frey et al., 1984). As a consequence, in the United States crowding out of intrinsic motivation by pricing is expected to be weaker than in Europe. It is therefore more efficient for blood collecting organizations to use pricing for blood in the United States than in Europe. The empirical facts are again consistent with our theory. The commercial blood market in the United States is larger than in the United Kingdom and elsewhere in Europe or in Japan (Institute of Economic Affairs, 1973; Eckert, 1985, p. 13). In countries of the Third World, cash payments for blood donation are common (Drake et al., 1982, p. 119).

(d) Market separation

Standard neo-classical economics which, following Arrow (1975, p. 19), wonders 'why it be that the creation of a market for blood would decrease the altruism embodied in giving blood', sees no need for a separation of the market for blood. The theory that includes intrinsic motivation, on the other hand, takes into account that (under identifiable conditions) the motivation to donate blood spills over from one sector to another. Paid and unpaid blood presents a good example for a motivation spillover because the same good is involved but is given in sectors with and without pricing. It is proposed that few people would donate blood gratis if at the same time and location they could get a fee for doing so. The potential voluntary donors would feel silly, and many of them would not give any blood, either for free or at the existing price. The organization collecting blood rationally responds by making a considerable effort to separate blood donation neatly into a voluntary (unpaid) and a commercial part.

Again, empirical evidence speaks in favor of our theory. The blood market is neatly separated (see Johnson, 1973, pp. 159–160): 'If there is one universal tendency, it is toward assigning one organization exclusive authority to collect blood within a defined territory' (Drake et al., 1982, p. 120). In the United States, for example, the Red Cross and the American Association of Blood Banks (AABB) collect donated blood and do not pay individuals, while commercial blood banks do. As a *consequence*, it also makes sense to separate the two groups

of donors (those intrinsically motivated and those doing it for money) as far as possible.

6. Concluding remarks

Most economists consider the price system (the market) an effective incentive mechanism for influencing individual behavior and allocating resources. It is often concluded that monetary incentives provided by pricing should be extended to new areas. Monetary rewards are taken to have the same effect on behavior in any sector (except for the income effect), because the persons considered suffer the same opportunity cost when they do not act in the desired way.

In this paper, these positive and normative propositions have been analyzed by introducing two psychological elements into a principal-agent setting which have so far been neglected in standard (neo-classical) analysis. The first element is the 'motivation crowding effect' which states that pricing in the form of both, monetary rewards and punishment, may systematically influence intrinsic motivation. Conditions under which a price increase crowds in, leaves unaffected or crowds out intrinsic motivation have been identified. Monetary *rewards* have more diverse crowding effects on intrinsic motivation than monetary *punishments*; the equivalence in terms of opportunity costs stipulated by standard neo-classics no longer holds.

The second element is the 'motivation spillover effect' which states that the intrinsic motivation individuals have in the sector in which pricing is applied may be transferred to another sector where pricing is not applied, thus indirectly influencing behavior in the latter. Substantial empirical evidence exists for both motivation effects.

Under specific, identifiable and relevant real-life conditions (but not always of course), an application of pricing is *counterproductive*: when a principal offers monetary rewards, the agents act in a direction not desired by the principal because their intrinsic motivation has been weakened or destroyed. An economic theory which takes the effects of pricing on intrinsic motivation into account offers competing explanations of reality, deviating from standard neo-classical economics. Propositions derived on the basis of the motivation and crowding effects are consistent with empirical observations. Environmental policy and blood donation provide cases in which it is impor-

tant to take into account the effect of monetary intervention on intrinsic motivation.

The finding that there are motivational limits to pricing does not mean that an alternative decision-making mechanism is necessarily superior. It can indeed be shown that external intervention in the form of monitoring or regulating may under identifiable conditions also crowd out intrinsic motivation (see Frey, 1993, and, for a real-life econometric analysis, Barkema, 1992b). What is needed is a comparative view which contrasts the size of the possible damaging effects of various forms of external intervention and identifies the conditions of occurrence. It is argued that under more circumstances than suggested by standard neo-classical economic theory, the principal should not intervene by offering monetary rewards but rather rely on the intrinsic motivation of the agents.

References

- Aaron, D.J., 1990. Firm organization and the economic approach to personell management. *American Economic Review* 80, 23-27.
- Adams, J.S., 1963. Towards an understanding of inequity. *Journal of Abnormal and Social Psychology* 67, 422-436.
- Akerlof, G.A., 1984. *An Economic Theorist's Book of Tales*. Cambridge: Cambridge University Press.
- Akerlof, G.A., 1989. The economics of illusion. *Economics and Politics* 1, 1-15.
- Akerlof, G.A. and W.T. Dickens, 1982. The economic consequences of cognitive dissonance. *American Economic Review* 72, 307-319.
- Akerlof, G.A. and J.L. Yellen, 1990. Fair wage/effort hypothesis and unemployment. *Quarterly Journal of Economics* 105, 255-283.
- Alchian, A.A. and H. Demsetz, 1972. Production, information costs and economic organization. *American Economic Review* 62, 777-795.
- Andrews, I.R., 1967. Wage inequity and job performance: An experimental study. *Journal of Applied Psychology* 51, 39-45.
- Aoki, M., 1990. Towards an economic model of the Japanese firm. *Journal of Economic Literature* 28, 1-27.
- Arnold, H.J., 1976. Effects of performance feedback and extrinsic reward upon high intrinsic motivation. *Organizational Behavior and Human Performance* 17, 275-288.
- Aronfreed, J., 1968. *Conduct and Conscience*. New York: Academic Press.
- Arrow, K.J., 1970. 'Political and economic evaluation of social effects and externalities'. In: J. Margolis (Ed.), *The Analysis of Public Output* (pp. 1-23). New York: Columbia University Press.
- Arrow, K.J., 1972. Gifts and exchanges. *Philosophy and Public Affairs* 1, 343-362.
- Arrow, K.J., 1975. 'Gifts and exchanges'. In: E. Phelps (Ed.), *Altruism, Morality and Economic Theory* (pp. 13-28). New York: Sage.
- Barkema, H.G., 1992a. Are managers indeed motivated by their bonuses? Mimeo. Dept. of Business Administration, University of Tilburg.

- Barkema, H.G., 1992b. Do job executives work harder when they are monitored? Evidence from the Netherlands. Mimeo. Dept. of Business Administration, University of Tilburg.
- Baumol, W.A. and W.E. Oates, 1979. Economics, Environmental Policy, and the Quality of Life. Englewood Cliffs, NJ: Prentice-Hall.
- Becker, G.S., 1976. The Economic Approach to Human Behavior. Chicago, IL: Chicago University Press.
- Beer, M., B. Spector, P.R. Lawrence, D.Q. Mills and R.E. Walton, 1984. Managing Human Assets. New York: Macmillan.
- Bell, D., 1976. The Cultural Contradictions of Capitalism. New York: Basic Books.
- Blinder, A.S., 1987. Hard Heads, Soft Hearts. Reading, MA: Addison-Wesley.
- Bohm, P. and C.S. Russel, 1985. 'Alternative policy instruments'. In: A.V. Kneese et al. (Eds.), Handbook of Natural Resource and Energy Economics, Vol. 1. Amsterdam: North-Holland.
- Brody, D., 1980. Workers in Industrial America. Oxford: Oxford University Press.
- Buchanan, J.M. and G. Tullock, 1975. Polluter's profits and political response: Direct control versus taxes. American Economic Review 65, 139-147.
- Calder, B.J. and B.M. Staw, 1975. The self-perception of intrinsic and extrinsic motivation. Journal of Personality and Social Psychology 31, 599-605.
- Coleman, J.S., 1990. Foundation of Social Theory. Cambridge, MA: Harvard University Press.
- Collard, D., 1978. Altruism and the Economy: A Study of Non-Selfish Economics. London: Martin Robertson.
- Cooper, M.H., 1973. 'The economics of giving and selling blood'. In: The Economics of Charity (pp. 109-143). London: Institute of Economic Affairs.
- Cooper, M.H. and A.J. Culyer, 1968. The Price of Blood. Hobart Paper 41. London: Institute of Economic Affairs.
- Cooper, M.H. and A.J. Culyer, 1973. 'The economics of giving and selling blood'. In: The Economics of Charity (pp. 109-143). London: Institute of Economic Affairs.
- Condorcet, Marquis de, 1795. Esquisse d'un tableau historique du progrès de l'esprit humain. Paris: Diannière.
- DeCharms, R., 1968. Personal Causation: The Internal Affective Determinants of Behavior. New York: Academic Press.
- Deci, E.L., 1971. Effects of externally mediated rewards on intrinsic motivation. Journal of Personality and Social Psychology 18, 105-115.
- Deci, E.L., 1972. Intrinsic motivation, extrinsic reinforcement and inequity. Journal of Personality and Social Psychology 22, 113-120.
- Deci, E.L., 1975. Intrinsic Motivation. New York: Plenum Press.
- Deci, E.L., 1987. The support of autonomy and the control of behavior. Journal of Personality and Social Psychology 53, 1024-1037.
- Deci, E.L. and R.M. Ryan, 1980. 'The empirical exploration of intrinsic motivational processes'. In: L. Berkowitz (Ed.), Advances in Experimental Social Psychology 10, 39-80.
- Deci, E.L. and R.M. Ryan, 1985. Intrinsic Motivation and Self-Determination in Human Behavior. New York: Plenum Press.
- Doeringer, P.B., 1991. 'The socio-economics of labor productivity'. In: R.M. Coughlin (Ed.), Morality, Rationality, and Efficiency: New Perspectives on Socio-Economics (pp. 103-117). Armonk, NY: Sharpe.
- Drake, A.W., S.N. Finkelstein and H.M. Sapolsky, 1982. The American Blood Supply. Cambridge, MA: MIT Press.
- Durkheim, E., 1893/1964. The Division of Labor in Society. New York: Free Press.
- Eckert, R.D., 1985. 'Blood, money and monopoly'. In: R.D. Eckert (Ed.), Securing a Safer Blood Supply: Two Views (pp. 1-84). Washington and London: American Enterprise Institute for Public Policy Research.

- Eckert, R.D., 1986. AIDS and the blood bankers. Regulation (September/October), 15-24.
- Festinger, L., 1957. A Theory of Cognitive Dissonance. Evanston, IL: Roar, Peterson.
- Fischhoff, B., 1982. 'Debiasing'. In: D. Kahnemann, P. Slovic and A. Tversky (Eds.), Judgement Under Uncertainty: Heuristics and Biases (pp. 422-444). Cambridge: Cambridge University Press.
- Folger, R., D. Rosenfield and R. Hays, 1978. Equity and intrinsic motivation: The role of choice. Journal of Personality and Social Psychology 36, 557-564.
- Frank, R.H., 1985. Choosing the Right Pond. Oxford: Oxford University Press.
- Frank, R.H., 1988. Passions within Reason. The Strategic Role of the Emotions. New York: Norton.
- Freeman, R.B. and J.L. Medoff, 1984. What Do Unions Do? New York: Basic Books.
- Frey, B.S., 1983. Democratic-Economic Policy. Oxford: Blackwell.
- Frey, B.S., 1986. Economists favour the price system - Who else does? Kyklos 39, 537-563.
- Frey, B.S., 1992. Economics as a Science of Human Behaviour. Towards a New Social Science Paradigm. Boston, MA: Kluwer.
- Frey, B.S., 1993. Shirking or work morale? The impact of regulating. European Economic Review, forthcoming.
- Frey, B.S. and W.W. Pommerehne, 1993. On the fairness of pricing - An empirical survey among the general population. Journal of Economic Behavior and Organization 20, 295-307.
- Frey, B.S., W.W. Pommerehne, F. Schneider and G. Gilbert, 1984. Consensus and dissension among economists: An empirical inquiry. American Economic Review 74, 986-994.
- Friedman, M., 1970. 'The social responsibility of business is to increase its Profits'. Reprinted in: T. Beauchamp and N. Bowie (Eds.), 1988. Ethical Theory and Business. Englewood Cliffs, NJ: Prentice Hall.
- Graetz, M.J., J.F. Reinganum and L.L. Wilde, 1986. The tax compliance game: Toward an interactive theory of law enforcement. Journal of Law, Economics and Organization 2, 1-32.
- Hahn, R.W., 1989. Economic prescriptions for environmental problems: How the patients followed the doctor's orders. Journal of Economic Perspectives 3, 95-114.
- Hahn, R.W. and G. Hester, 1986. Where did all the markets go? An analysis of EPA's emission trading program. Working Paper 87-3. School of Urban and Public Affairs, Carnegie Mellon University, Pittsburgh, PA.
- Hansmann, H.B., 1989. The economics and ethics of markets for human organs. Journal of Health Politics, Policy and Law 14, 57-85.
- Hawkins, K. and J.M. Thomas (Eds.), 1984. Enforcing Regulation. Boston, MA: Kluwer.
- Henry, C., 1990. Microeconomics and public decision making when geography matters. European Economic Review 34, 249-271.
- Hirsch, F., 1976. The Social Limits to Growth. Cambridge, MA: Harvard University Press.
- Hirschman, A.O., 1977. The Passions and the Interests: Political Arguments for Capitalism before its Triumph. Princeton, NJ: Princeton University Press.
- Hirschman, A.O., 1982. Rival interpretations of market society: Civilizing, destructive, or feeble? Journal of Economic Literature 20, 1463-1484.
- Hirst, M.K., 1988. Intrinsic motivation as influenced by task interdependence and goal setting. Journal of Applied Psychology 73, 96-101.
- Horkheimer, M., 1952. Zum Begriff der Vernunft. Frankfurt: Klostermann.
- Hough, D.E., 1978. The Market for Human Blood. Lexington, MA: Heath.
- Institute of Economic Affairs, 1973. The Economics of Charity: Essays on the Comparative Economics and Ethics of Giving, Selling, with Applications to Blood. London: Institute of Economic Affairs.
- Ireland, T.R. and J.V. Koch, 1973. 'Blood and American social attitudes'. In: The Economics of Charity (pp. 145-155). London: Institute of Economic Affairs.

- Jensen, M.C. and W.H. Meckling, 1976. Theory of the firm: Managerial behavior. Agency costs and ownership structure. *Journal of Financial Economics* 3, 305-360.
- Jensen, R., 1992. Reputational spillovers, innovation, licensing and entry. *International Journal of Industrial Organization* 10, 193-212.
- Johnson, D.B., 1973. 'The U.S. market in blood'. In: *The Economics of Charity* (pp. 157-167). London: Institute of Economic Affairs.
- Johnson, D.B. (Ed.), 1976. *Blood Policy: Issues and Alternatives*. Washington, DC: American Enterprise Institute for Policy Research.
- Jordan, P.C., 1986. Effects of an extrinsic reward on intrinsic motivation: A field experiment. *Academy of Management Journal* 29, 405-412.
- Kagan, R.A. and J.T. Scholz, 1984. 'The criminology of cooperation and regulatory enforcement strategies'. In: Keith Hawkins and J.M. Thomas (Eds.), *Enforcing Regulation*. Boston, MA: Kluwer.
- Kahneman, D., J. Knetsch and R. Thaler, 1986. Fairness as constraint on profit seeking: Entitlements in the market. *American Economic Review* 76, 728-741.
- Kant, I., 1795. *Zum Ewigen Frieden*. Kants gesammelte Schriften. Königliche Preussische Akademie der Wissenschaft (ed.), Vol. 8, Berlin and Leipzig 1923. Photomech. reproduction 1969.
- Kazdin, A.E., 1982. The token economy: A decade later. *Journal of Applied Behavior Analysis* 15, 431-445.
- Kazdin, A.E. and R.R. Bootzin, 1972. The token economy: An evaluative review. *Journal of Applied Behavior Analysis* 5, 343-392.
- Kelman, S., 1981. *What Price Incentives? Economists and the Environment*. Boston, MA: Auburn House.
- Kelman, S., 1983. 'Economic incentives and environmental policy: Politics, ideology and Philosophy'. In: Thomas C. Schelling (Ed.), *Incentives for Environmental Protection* (pp. 291-331). Cambridge, MA: MIT Press.
- Kessel, R.A., 1974. Transfused blood, serum hepatitis, and the Coase theorem. *Journal of Law and Economics* 2, 183-207.
- Kirchgässner, G. and W.W. Pommerehne, 1993. Low cost decisions as a challenge to public choice. *Public Choice*, forthcoming.
- Kochan, T., H. Katz and R.B. McKersie, 1986. *The Transformation of American Industrial Relations*. New York: Basic Books.
- Lawler, E.E., 1990. *Aligning Organizational Strategies and Pay Systems*. San Francisco, CA: Jossey-Bass.
- Lawler, E.E. and P.W. O'Gara, 1967. The effects of inequity produced by underpayment on work output, work quality and attitudes toward the work. *Journal of Applied Psychology* 51, 403-410.
- Lazear, E.P., 1991. Economic approaches to the psychology of organizations. *Journal of Economic Perspectives* 5, 89-110.
- Lee, C., 1987. The new employment contract. *Training* (December), 45-56.
- Lepper, M.R. and D. Greene (Eds.), 1978. *The Hidden Costs of Reward: New Perspectives on the Psychology of Human Motivation*. New York: Erlbaum.
- Lepper, M.R., D. Greene and R. Nisbett, 1973. Undermining children's interest with extrinsic rewards: A test of the 'overjustification' hypothesis. *Journal of Personality and Social Psychology* 28, 129-137.
- Lightman, E.S., 1981. Continuity in social policy behaviors: The case of voluntary blood donorship. *Journal of Social Policy* 10, 53-97.
- Lincoln, J.R. and A.L. Kalleberg, 1990. *Culture, Control and Commitment. A Study of Work Organization and Work Attitude in the United States and Japan*. Cambridge: Cambridge University Press.

- Maital, S., 1988. 'Novelty, comfort, and pleasure: Inside the utility-function black box'. In: P.J. Albanese (Ed.), *Psychological Foundations of Economic Behavior* (pp. 1-34). New York: Praeger.
- Marcuse, H., 1965. *Industrialization and capitalism*. *New Left Review* (March/April), 3-17.
- McGraw, K.O., 1978. 'The detrimental effects of reward on performance: A literature review and a prediction model'. In: M.R. Lepper and D. Greene (Eds.), *The Hidden Costs of Reward: New Perspectives of Human Behaviour* (pp. 33-60). New York: Erlbaum.
- Michelman, F.I., 1967. Property, utility and fairness: Comments on the ethical foundations of 'just compensation' laws. *Harvard Law Review* 80, 1165-1258.
- Montesquieu, C.L., 1749. *De l'esprit des lois*. Paris: Garnier.
- Montgomery, D., 1987. *The Fall of the House of Labour*. Cambridge: Cambridge University Press.
- Mueller, D.C., 1989. *Public Choice II*. Cambridge: Cambridge University Press.
- Murray, C.A., 1988. In *Pursuit of Happiness and Good Government*. New York: Simon and Schuster.
- Notz, W., 1975. Work motivation and the negative effects of extrinsic rewards. *American Psychologist* 30, 887-891.
- Oates, W.E., 1984. Markets for pollution control. *Challenge* 27, 11-17.
- OECD, 1989. *Economic Instruments for Environmental Protection*. Paris: Organization for Economic Cooperation and Development.
- Opschoor, J., 1986. *Economic Instruments for Environmental Protection in the Netherlands*. Paris: Organization for Economic Cooperation and Development.
- Oswalt, R.M., 1977. A review of blood donor motivation and procurement. *Transfusion* 17, 124-144.
- Pittman, T.S. and J.F. Heller, 1987. Social motivation. *Annual Review of Psychology* 38, 461-489.
- Pommerehne, W.W. and B.S. Frey, 1992. The effects of tax administration. Paper presented at the Conference on Tax Administration and Tax Evasion of the International Seminar in Public Economics (ISPE) at El Escorial, June.
- Porac, J.F. and J. Meindl, 1982. Undermining overjustification: Inducing intrinsic and extrinsic task representatives. *Organizational Behavior and Human Performance* 29, 208-226.
- Ribeaux, P. and S.E. Poppleton, 1978. *Psychology of Word: An Introduction*. London: Macmillan.
- Roberts, R.D. and M.J. Wolkoff, 1988. Improving the quality and quantity of whole blood supply: Limits to voluntary arrangements. *Journal of Health Politics, Policy and Law* 13, 167-178.
- Robertson, D.H., 1956. 'What does the economist economize?' In: *Economic Commentaries* (pp. 147-154). London: Staples.
- Ryan, R.M., V. Mims and R. Koestner, 1983. Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology* 45, 736-750.
- Schlicht, E., 1990. Social psychology: A review article. *Journal of Institutional and Theoretical Economics* 146, 355-362.
- Schumpeter, J.A., 1934. *The Theory of Economic Developments: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (1st ed.). Cambridge, MA: Harvard University Press.
- Schumpeter, J.A., 1942. *Capitalism, Socialism and Democracy* (1st ed.) New York: Harper.
- Scott, W.E., J.-L. Farh and P.M. Podsakoff, 1988. The effects of 'intrinsic' and 'extrinsic' reinforcement contingencies on task behavior. *Organizational Behavior and Human Decision Processes* 41, 405-425.

- Sen, A.K., 1982. *Choice, Welfare and Measurement*. Oxford: Blackwell.
- Sen, A.K., 1987. *On Ethics and Economics*. Oxford: Blackwell.
- Singer, P., 1973. Altruism and commerce: A defence of Titmuss against Arrow. *Philosophy and Public Affairs* 2, 312-320.
- Solow, R.S., 1971. Blood and thunder. *Yale Law Journal* 80, 170-183.
- Staw, B.M., 1976. *Intrinsic and Extrinsic Motivation*. Morristown, NJ: General Learning Press.
- Stewart, H., 1992. Rationality and the market for human blood. *Journal of Economic Behavior and Organization* 19, 125-143.
- Stigler, G. and G.S. Becker, 1977. De gustibus non est disputandum. *American Economic Review* 67, 76-90.
- Sugden, R., 1989. Spontaneous order. *Journal of Economic Perspectives* 3, 85-98.
- Taswell, H.T., 1987. 'Directed, paid and self donors, Part III'. In: Gilbert M. Clarke (Ed.), *Competition in Blood Services* (pp. 137-148). Arlington, VA: American Association of Blood Banks.
- Tietenberg, T.H., 1985. *Emissions Trading: An Exercise in the Reforming Pollution Policy*. Washington, DC: Resources for the Future.
- Titmuss, R.M., 1970. *The Gift Relationship*. London: Allen and Unwin.
- Umstot, D.D., T.R. Mitchell and C.H. Bell, 1978. Goal setting and job enrichment: An integrated approach to job design. *Academy of Management Review* 3, 867-879.
- Upton, W., 1973. 'Altruism, attribution and intrinsic motivation in the recruitment of blood donors'. In: *Selected Readings in Donor Motivation and Recruitment*, Vol. III, Ed. American Red Cross.
- Wallace, E.L., 1985. 'The case for national blood policy'. In: R.D. Eckert (Ed.), *Securing a Safer Blood Supply: Two Views* (pp. 85-153). Washington and London: American Enterprise Institute for Public Policy Research.
- Walster, E., W.G. Walster and E. Berscheid, 1977. *Equity: Theory and Research*. Boston, MA: Allyn and Bacon.
- Weber, M., 1920-21. 'Die protestantische Ethik und der Geist des Kapitalismus'. In: M. Weber, *Gesammelte Aufsätze zur Religionssoziologie*. Tübingen: Mohr (Siebeck).
- Williamson, O.E., 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press.
- Williamson, O.E., 1992. Calculativeness, trust and economic organization. *Organizational behavior and industrial relations*. Working Paper OBIR-59, University of California at Berkeley.
- Wright, W.F. and M.E. Aboul-Ezz, 1988. Effects of extrinsic incentives on the quality of frequency assessments. *Organizational Behavior and Human Decision Processes* 41, 143-152.