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Organisational form and individual motivation: Public ownership, privatisation, and fat cats

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Abstract: The research on ownership has provided mixed results. Moreover, while agency theory suggests higher costs in a public firm without performance-related pay, costs become lower in the presence of adequate rewards and punishments. It therefore becomes difficult to explain why private firms are sometimes superior. Moreover, such models cannot explain efforts in the presence of a fixed or zero wage, or the fat-cat salaries that often follow privatisation. We therefore add potential intrinsic motivation to an agency model. The analysis can explain the conditions under which a given form of ownership is superior and suggests that dysfunctional performance targets can crowd out intrinsic motivation. An organisation with a fixed wage can therefore outperform an organisation with high-powered incentives.

Keywords: public and private provision, non-profits, intrinsic motivation, motivation crowding out

JEL-classification: L33, H42, D23, M52.

1. Introduction

State-owned and other non-commercial organisations still play a prominent role in most developed economies, in particular in industries such as health-care, public transport, postal services, research and education. However, state ownership used to be significant in many industrial countries in manufacturing and banking as well, often in competition with private providers. Ownership has in some new markets also become mixed through nationalisation (as a response to the crisis in 2008) and liberalisation (if the incumbent is not sold).

Real-world public firms may not always have conformed to the ideal of welfare maximisation, but they have frequently been associated with wider objectives than profit maximisation. They have often produced more than under profit maximisation, like in the theory of markets with mixed ownership or as recommended by normative theory. In Britain, this meant acting in the public interest, which was taken to mean either marginal cost pricing or breaking even (Rees, 1984: 219n; Vickers and Yarrow, 1988: 127, 130-34; De Fraja 1991). Privatisation led to a more profit-oriented behaviour (Parker, 1994). Other examples of public firms with higher production than under profit maximisation have been observed in the US market for ammonia in the 40s and 50s (Martin, 1959), and to some extent in the French car industry (Sheahan, 1966). Also, Argentine's state-owned companies tended to maximise output subject to a break-even constraint (Xu and Birch, 1999). Wider objectives, including a strong growth orientation, were typical in Finland as well, as late as in the 80s (Miettinen, 2000).

However, the policy of many countries has under several years been characterised by privatisation, liberalisation, and public-sector reforms that mimic the private sector. This development has been part of the so called Washington consensus, which refers to the prescriptions of Washington-based institutions such as the World-Bank and the IMF (Williamson, 2000). It has subsequently been used as a synonym for neoliberal market fundamentalism. In a similar spirit, the New Public Management (NPM) is increasingly used as a label for a policy that includes privatisation whenever possible, and otherwise a combination of budget cuts, competition, labour market flexibility, user charges, managerialism, and performance-related pay (Frey and Benz, 2005; Gruening, 2001).

While recent research suggests the Washington consensus is prejudiced on public ownership (see section 2), it is also true that state enterprises have often generated disappointments, in particular in less developed countries. Corruption or a lack of governance traditions may prevent both public- and private-sector economic activities to

work successfully. The existence of both successes and failures among public firms suggests that the conditions for good performance need closer attention, not least from the angle of economic development.

Success is partly about cost-efficient operation. We shall show that the earlier literature is difficult to interpret in favour of just one type of ownership. We focus on agency theory, i.e. on the relationship between cost efficiency and the actions of an organisation's employees, including managers whose efforts are difficult to observe. Such agents are in the standard theory usually assumed to value only income and to dislike effort, i.e. to be essentially greedy and lazy. While privatisation would indeed reduce marginal costs if high-powered incentives are provided only under private ownership, public ownership would on the other hand become yield both lower costs and higher welfare if both types of firms adopt performance-related pay.

We address this paradox by combining agency theory with recent advances in the theory of intrinsic motivation and motivation crowding out, as formulated by James (2005). The model implies that agents are under some circumstances better off by acting as if intrinsic motivation is present, and in other circumstances as when it is absent. It turns out that public ownership can still be superior, but the opposite may also be true, depending not only on the reward schedule and the public firm's weight for the consumer surplus, but also on whether the reward schedule is consistent with intrinsic motivation. For example, a strategy of setting ambitious performance targets may backfire, by causing motivation crowding out. While intrinsic motivation has been debated in the literature at least since the 1990s, this is the first contribution to include it in an analysis of public and private performance. Our main insights are not necessarily about where to privatise and where to nationalise, but about how the performance of a given type of organisation can be improved.

We proceed as follows. Next section highlights the motives for privatisation and their relationship to the academic literature before and after the onset of privatisation. Section 3 presents a conventional principal-agent analysis of ownership and competition, whereas section 4 adds intrinsic motivation, against a background of the earlier literature. Section 5 presents some policy implications and concluding remarks.

2. Privatisation motives versus the literature

The first example in Europe of a systematic policy to reduce the state-enterprise sector dramatically was initiated during the second Thatcher government in Britain 1983-1987. While privatisation has often been motivated by economic arguments, the comments by professional economists tended initially to be cautious or critical. Privatisation without competition (which was not always feasible) was not seen as beneficial (Vickers and Yarrow, 1988).[1] While there have also been other motives, the most prominent rationale for privatisation among decision-makers was the belief that state enterprises are inefficient. In the UK, this was expressed in the publications issued by free-market think-tanks like the Adam Smith Institute (Ikenberry, 1990; Pirie, 1988).

The empirical literature on costs and ownership before 1983 was surprisingly thin, given the strength of the trend to privatise (see also the summary in Stiglitz, 1986: 164-165). While private ownership more often appears as superior in the meta-study by Borcherding *et al.* (1982), these authors warn against premature conclusions and suggest that competition might explain more than ownership. Moreover, two other surveys, Millward (1982) and Boyd (1986), provide a far more positive picture of public ownership. This impression is strengthened in two subsequent overviews by Willner (2001 and 2003), which include additional references from both the pre- and post-privatisation periods.

Taken together, these meta-studies suggest a pattern. When it comes to industries such as refuse collection, public transport, health and social care, private ownership tends more often to be cheaper *if* cost efficiency differs. However, distributional issues matters when it comes to the cost performance of labour intensive activities, and it is not self-evident that the private sector always stands for the norm that should be followed.[2] There may in addition be a positive relationship between staffing and service quality, in

[1] Typically, one of the early academic contributions on the topic, Kay and Thompson (1986), was titled 'Privatisation: A Policy in Search of a Rationale'.

[2] Grönblom and Willner (2008) deals with public and private ownership in the presence of excess wages that are part of the total surplus.

which case public and private producers do necessarily not provide identical services.[3] But public ownership nevertheless turns out to be either no worse or even cheaper in more than half of the cases. Such concerns are on the other hand less prominent in capital intensive industries, such as cement, plastics, electricity and water. If there is a difference at all, public ownership appears in fact as *more* cost efficient (for bibliographical details, see Willner, 2001 or 2003).

From the 1990s onward, there has also emerged a body of empirical research that evaluates privatisation, as distinct from comparing existing firms with different ownership. However, the results are still mixed, despite attempts, such as by Megginson and Netter (2001), to interpret the literature in favour of privatisation. The study in question is widely cited, but it is characterised by striking omissions when it comes to industrial countries with a well-developed ability to organise public and private enterprises. The series of studies by Martin and Parker on the UK (as presented in the volume Martin and Parker, 1997) suggest by contrast that privatisation does not as a general rule improve performance. Similar conclusions follow also from Hodge (2000), Iordanoglou (2001), Willner (2001) and Florio (2004).

Rather than by looking for a majority in favour of either type of ownership, we interpret the mixed results of a large number of peer-reviewed comparisons as suggesting that no form of ownership is universally more cost efficient. It might then be more relevant to ask whether and how a given organisation can be improved, rather than to ask which form of ownership that should be adopted everywhere.

As for theoretical models, surprisingly few contributions from before 1983 explain why private ownership should be superior. For example, the comprehensive study by Vickers and Yarrow (1988) just states that privatisation can be beneficial only *if* ownership matters and *if* private ownership is more cost efficient. However, do not provide any specific mechanism. The property rights theory claims that profit maximising owners who face a threat of bankruptcy and/or takeover have stronger incentives to reduce costs than politicians or bureaucrats. This is believed to apply to firms led by appointed managers as well, because private owners are believed to have a stronger incentive to monitor and

[3] For example, when refuse collection was privatised in some British cities, the customers had to roll their dustbins from their back-gardens to the pavement before they were to be emptied, and then to roll the empty dustbins back again afterwards. The firms that handled the refuse collection may have saved money, but to a large extent by utilising the free labour of their customers.

motivate them. But despite such an emphasis on incentives, contributions that applied principal-agent analysis on public ownership and privatisation did not emerge until the 1990s, when privatisation in Britain and many other countries was well on its way.

Some contributions introduce public-sector inferiority almost by assumption. For example, public firms are just assumed to choose inferior pay schedules for its managers (Bös, 1991), or to make less successful R&D-investments (Bös and Peters, 1991). This comes close to just presenting public-sector inefficiency as a stylised fact, without theoretical analysis or empirical discussion, like in Boycko *et al.* (1996), Bradburd (1995), Beesley and Littlechild (1996), and Holmström and Honkapohja (1994).[4]

Some economists derive the inferiority of public firms from the notion of administrative and political failures. For example, state-owned firms have been accused of producing an excessive output (in which case there is a distortion even in the presence of technically efficient production), or of overmanning for opportunistic reasons.[5] The model of distorted decision-making by Boycko *et al.* (1996) yields in fact the same behaviour as the wider objectives that are recommended by normative theory. State ownership with distorted decision-making in this sense can therefore outperform private ownership under imperfect competition (Willner, 2001).[6] Moreover, such behaviour can also be caused by subsidies or regulation under private ownership.[7]

Other early critics of public ownership see distorted competition (also without higher costs or political failures) as the main problem. For example, state enterprises used to have

[4] Wider objectives are also sometimes believed to have adverse effects as such, for example if they lead to complicated chains of command (*Bureaucrats in Business*, 1995). Such complexity does not on the other hand necessarily depend on public ownership per se, but on how it is organised. Moreover, the regulation of a privatised industry might also lead to complexity.

[5] Public and private ownership may sometimes be biased in opposite ways, for example when private firms are overcapitalised and public firms overstaffed (Pint, 1991). It is therefore not meaningful to compare ideal private ownership to distorted public ownership (or vice versa).

[6] Also, the main culprit is democracy and not state ownership as such if the distorted decisions are explained by a desire to please voters. But this would yield the scarcely convincing conclusion that state ownership is more efficient under dictatorship (such as in the former Soviet bloc) than under democracy.

[7] Moreover, successful privatisation might require such a high quality of public sector governance that there is no need to privatise in the first place. Firms must be made attractive for investors, share prices should nit be distorted, and there should be no distortionary regulation, taxes, or subsidies afterwards.

better access to credit, because they were not likely to go bankrupt.[8] Moreover, state-owned companies that produce more than under profit maximisation or which earn sub-normal profit margins were described by Monsen and Walters (1983) as a sinister threat comparable to Soviet-style socialism.[9]

As for our focus on cost differences related to managerial behaviour, there now exist contributions that apply principal-agent analysis on public and private ownership. So far, their framework has still been provided by managerial utility functions that are increasing in income and decreasing in effort (or increasing in managerial slack). The seminal contribution by De Fraja (1993) finds that wider objectives can in fact lead to higher cost-efficiency. The results are the same when the analysis is extended by modelling the firm in a market context and assuming CARA-utility with normally distributed shocks rather than just a good and a bad state of nature (Willner and Parker, 2007), and. The same applies to privatisation with vertical separation (Willner and Grönblom, 2012).

As for the notion that competition might have a stronger impact than ownership on cost-efficiency, it turns out that an increase in the number of firms would even strengthen the agency problem under Cournot-competition with homogeneous goods (Martin, 1993; Willner and Parker, 2007). This result applies also when competition is introduced into a model of vertical relations (see Willner and Grönblom, 2012).

3. A model of the ownership paradox

This section focuses on a simple model that illustrates the basic mechanism common for the otherwise different principal-agent models referred to in the previous section. The analysis can also be interpreted as describing the special case of motivation crowding out (see section 4), so it provides a useful point of comparison.

[8] However, state enterprises had to be funded by the state budget in many countries, whereas they had access to the banking system in for example Scandinavia.

[9] It is well known from the mixed-oligopoly literature that a (reasonably efficient) firm with wider objectives can indeed crowd out its profit maximising competitors. This *Cournot-paradox* (see Nett, 1993) just implies that the government must decide whether it prefers a genuinely mixed market by setting a moderate weight on welfare, or if it prefers full welfare maximisation, and hence a public monopoly.

Let inverse demand be denoted by $p=a-x$, where p and x stand for price and output respectively. Suppose that a private and monopolistic firm maximises its expected profits $E\pi$, whereas a public firm maximises a weighted sum of the consumer surplus *CS* and its profits. Competition exists only after privatisation, in which case we get an n-firm Cournot oligopoly. The agency problem is modelled as in Raith (2003) and Beiner *et al.* (2011). Marginal costs c depend on a constant parameter c_0, on the manager's effort e, and on an approximately normally distributed random variable u with zero mean and the variance σ^2, so that $c=c_0-e-u$.[10] The owner observes c and hence indirectly $e+u$, but not its components. The manager's utility U depends positively on income (w), and negatively on e (because of the absence of intrinsic motivation).

To prevent shirking, the manager therefore gets a performance-related wage $w=w_0+\beta(e+u)$, where w_0 is a positive or negative intercept and β a coefficient for the impact of cost performance. Its expected value and variance are then $Ew=w_0+\beta e$ and $\sigma_w^2=\beta^2\sigma^2$. Let $k/2$ denote the strength of the disutility of effort and r the risk-aversion parameter; we must assume $k \geq 1$ to ensure meaningful solutions. The utility function is then:

$$U=-\exp[-r(w-ke^2/2)]=-\exp[-r\{w_0+\beta(e+u)-ke^2/2\}]. \tag{3.1}$$

Use the properties of the normal distribution to write a function of the expected wage and its variance that yields the same choices as the expected value of (3.1):

$$V=w_0+\beta e-\frac{r\beta^2\sigma^2}{2}-\frac{ke^2}{2}. \tag{3.2}$$

The manager will maximise V given w_0 and β (the *incentive compatibility constraint*), which yields $e=\beta/k$. Let the reservation utility be denoted by v_0, so that the *participation constraint* becomes $V \geq v_0$.[11] It is obvious that this restriction is binding. Insert $e=\beta/k$ into (3.2) and rearrange the condition $V=v_0$:

[10] Strictly speaking, this assumption implies an infinite range of u, but it is a convenient simplification also if u belongs to a finite interval $[-\hat{u},\hat{u}]$ and if the distribution is bell-shaped and such that $\sigma^2 \approx (\hat{u}/3)^2$.

[11] The reservation utility can in this context be normalised to zero, like in Beiner et al (2011), but this would in some situations lead to negative wages when intrinsic motivation is introduced in section 4.

$$Ew = w_0 + \beta e = \frac{1}{2}\left(\frac{\beta}{k}\right)^2 (r\sigma^2 k^2 + k) + v_0. \tag{3.3}$$

It will be convenient to introduce the abbreviation

$$\phi = r\sigma^2 k^2 + k, \tag{3.4}$$

which expresses the significance of the agency problem, in the sense of being monotone and increasing in k, r, and σ^2. Note that $k \geq 1$ implies $\phi > 1$. Use (3.3) and (3.4) to express Ew in terms of ϕ:

$$Ew = \frac{\phi}{2}\left(\frac{\beta}{k}\right)^2 + v_0 = \frac{\phi}{2}e^2 + v_0. \tag{3.5}$$

Strictly speaking, the employer decides on w_0 and β, but we may as well use the right-hand version in (3.5) in the objective function, by maximising the objective function directly with respect to e and solving for β as ke.

First, consider the impact of ownership. It follows from (3.5) that a private monopolist would maximise the following objective functions with respect to x and e:

$$E(\pi) = ax - x^2 - c_0 x + ex - \frac{\phi}{2}e^2 - v_0. \tag{3.6}$$

As for the public firm, it is assumed to have wider objectives, which is taken to mean a mixed objective function where the consumer surplus ($CS=x^2/2$) gets the weight ρ.[12] This conforms to the presence of missed objectives as observed in many state enterprises, but it also simplifies the formal analysis in the presence of a non-zero reservation utility. The expected value of the objective function is then:

[12] A weight for output or the total surplus ($TS=\pi+x^2/2$) would yield similar results, because the presence for a weight for profits or a break-even constraint implies an optimal solution that lies in a region where *TS* and *CS* are monotone and increasing in *x*.

$$\Omega_G = \frac{\rho}{2}x^2 + ax - x^2 - c_0 x + ex - \frac{\phi}{2}e^2 - v_0. \tag{3.7}$$

Let the private and public solutions be indexed by *P* and *G*. We then get:

$$x_P = \frac{\phi(a - c_0)}{2\phi - 1}, \tag{3.8}$$

$$e_P = \frac{a - c_0}{2\phi - 1}. \tag{3.9}$$

$$x_G = \frac{\phi(a - c_0)}{(2 - \rho)\phi - 1}, \tag{3.10}$$

$$e_G = \frac{a - c_0}{(2 - \rho)\phi - 1}. \tag{3.11}$$

It is obvious that $x_G > x_P$ and $e_G > e_P$, so that public ownership yields lower marginal costs.

As for post-privatisation competition, suppose that the market becomes a symmetric *n*-firm Cournot-oligopoly. The random shocks in different firms then have to be independent.[13] Assume simultaneous maximisation of; a slightly more complicated two-stage analysis would yield the same result:

$$\pi_i = ax - xx_i - c_0 x_i + e_i x_i - \frac{\phi}{2}e_i^2. \tag{3.12}$$

Let the solutions be indexed by *C*. Imposing ex post-symmetry after deriving the first-order conditions, so that $x_{Ci} = x_C/n$, and rearranging yield the following solution, indexed by *C*:

$$x_C = \frac{n\phi(a - c_0)}{\phi(n + 1) - 1}, \tag{3.13}$$

[13] This assumption is widely used but stringent. Our approach means that we focus on firm-specific risks only; common risks are assumed to be observable.

$$e_C = \frac{a - c_0}{\phi(n+1) - 1}. \tag{3.14}$$

It is obvious that x_C is increasing and e_C decreasing in n. We therefore reach the highest effort level in a profit-maximising monopoly (n=1) given that all firms are private; to introduce competition (i.e. to increase n from 1) leads to higher marginal costs under these conditions. Industry output is increasing in the number of firms.

These striking results are a logical consequence of the assumption of greedy and lazy managers, whose effort can be compared to a traded commodity. Wider objectives increase the willingness to pay for cost-reducing efforts. To introduce competition does not help, because an increasing number of firms reduces the gross profits (i.e. profits before the manager is paid). This means that firms become less and less able to pay for cost-reducing efforts.[14] Undoubtedly, twists can be added to the model so as to yield different results, but the most basic of principal-agent models predicts that public ownership is superior. Such paradoxical results suggest that a more careful modelling of individual motivation may be called for.

4. Agents with intrinsic motivation

4.1. A model of intrinsic motivation

The traditional assumptions on the economic man may be appropriate in the right circumstances. However, when applied on the comparative efficiency of public and private ownership, it yields the surprising conclusion that public firms are more efficient than private firms if both adopt performance-related pay. The mixed empirical evidence suggests however that models which identify one form of ownership as always superior are too simplistic. Moreover, they are not very helpful for those who are more interested in

[14] The model can also be reinterpreted so that e denotes an expected cost-reduction that is caused by R&D. The expression $\phi e^2/2$ can stand for a quadratic cost function that depends on the planned value of the expected cost reduction. We then get the same kind of results: public ownership with wider objectives means higher spending, whereas competition tends to reduce the efforts.

improving a given type of organisation instead of nationalising or privatising. Moreover, they do not provide any convincing explanation of the fat-cat salaries that often follow privatisation.

It has been argued that the absence of performance-related pay explains why public provision leads to higher costs (see, for example, Dixit, 1997). Public firms indeed be less efficient if they set $\beta = 0$ (but at least equally (in)efficient if the same applies to private firms as well). However, such models cannot explain the existence of non-zero efforts under a fixed wage, or the existence of unpaid voluntary work. Also, why do private-sector top managers in the US often get fixed salaries (Jensen and Murphy, 1990; Holmström and Milgrom, 1991).

As for public-sector and other non-profit organisations, their employees are often believed to be driven by a public-sector ethos (Besley and Ghatak, 2005; Francois, 2000). The literature has often focused on public sector employees who are prepared to provide efforts because they value for example a social service. Alternatively, employees may be characterised by intrinsic motivation, which means that efforts on the job yields benefits and not only costs, or that employees value the output or performance of their organisation (Frey, 1997; Frey and Benz, 2005). The former alternative is often referred to as *task involvement* and the latter as *goal orientation* (Murdock, 2002). In what follows, we focus on of task involvement.

Intrinsic motivation can however be reduced or crowded out by high-powered incentives in the form of economic rewards and punishment (Frey, 1997). There are several possible explanations for such motivation crowding out (or incompatibility between extrinsic and intrinsic motivation). The phenomenon can for example be related to self-confidence: employees feel encouraged by a reliance on intrinsic motivation which signals that the work is important, whereas sticks and carrots would convey the opposite message.[15] Employers are however not always keen on intrinsic motivation, because workers who are strongly committed to their tasks may also be highly opinionated (Frey, 1997). Motivation crowding out may therefore also be a deliberate strategy, as part of a power struggle within an organisation, together with methods such as concealing important information (Bénabou and Tirole, 2002 and 2003).

[15] For example, Bénabou and Tirole (2003) use the story about how Tom Sawyer, who has been ordered to paint a fence, gets his friends to take over the job by making them feel that the task is almost too prestigious for them.

In what follows, we apply a simple model which is included in James (2005), who applies insights from cognitive evaluation theory. The model is convenient to combine with the basic framework in section 3 and is therefore suitable for a first attempt to introduce richer assumptions on motivation.[16]

The model is based on the notion that intrinsic motivation can be compatible with external rewards and punishments only if the latter do not violate the agent's need to feel autonomous and competent. The agent gets under such circumstances satisfaction from behaving '...*as if* intrinsically and extrinsically motivated' (James, 2005: 553). The utility function is modelled as including an additive component that depends on intrinsic motivation. Certain parameter values of the reward function would then cause utility to become higher if the agent behaves as if this component was missing. This can for example be interpreted in terms of perceiving the external rewards and punishments as controlling.

The component depending on intrinsic motivation is denoted as in James (2005); otherwise we use the notation from the previous section. The symbol δ represents the strength or intensity of the intrinsic motivation, whereas I, which can only be either zero or one, denotes the absence or presence of intrinsic motivation. Moreover, $\bar{e}$ stands for the effort level associated with a social norm, contractual obligation, or an informal notion of 'an honest day's work'. In this context, we may think that the employer may set targets or communicate a given expectation of what the employee must perform, even if the possibilities to monitor the fulfilment of the norm are limited, given the assumption about asymmetric information.

The utility function U_J is:[17]

$$U_J = w_0 + \beta e - \frac{k}{2}e^2 + I\delta(e - \bar{e}). \tag{4.1}$$

The component to the far right component adds to U_J if $e > \bar{e}$, and vice versa.

[16] A different approach is presented in Willner and Grönblom (2009) and Grönblom and Willner (2013). The agent is assumed to be partly opportunistic, partly committed, and she decides according to a cooperative intra-personal Nash-game. Performance-related pay can then causes the former to dominate.

[17] In addition to the change of some symbols, the only difference as compared to James (2005) is that we have replaced the term $-e^2$ by $-ke^2/2$.

The parameter β is not endogenous in James (2005), where there is in addition no asymmetric information, but we can derive an expected utility function that displays the same mechanism as in (4.1). Suppose that there are again normally distributed random shocks, so that the marginal costs are determined as in section 3.3, and let the original utility function be

$$U = -\exp\left[-r\left\{w_0 + \beta(e+u) - \frac{ke^2}{2} + I\delta(e-\bar{e})\right\}\right]. \tag{4.2}$$

This means that we can maximise the following expression:

$$V = w_0 + \beta e - \frac{r\beta^2\sigma^2}{2} - \frac{ke^2}{2} + I\delta(e-\bar{e}). \tag{4.3}$$

The employer now chooses the optimal values of w_0 and β subject to a participation constraint and an incentive compatibility constraint. The former requires $V \geq v_0$. Like in the previous section, the latter means that we get the effort levels $e_1=(\beta+\delta)/k$ and $e_2=\beta/k$, depending on whether the intrinsic motivation is present or absent. Without performance-related pay we get either $e_3=\delta/k$ or $e_4=0$, depending on I.

Insert $e=e_2$ and $I=0$ into (4.3), and compare the expression to what we get if we insert $e=e_1$ and $I=1$. There is then motivation crowding-out with a given performance-related reward schedule if the agent gets higher utility by behaving as if without intrinsic motivation. The condition for this to happen is:

$$\beta e_2 - \frac{ke_2^2}{2} > \beta e_1 - \frac{ke_1^2}{2} + I\delta(e_1-\bar{e}). \tag{4.4}$$

This implies

$$\bar{e} > \frac{\delta+2\beta}{2k} = e_1 - \frac{\delta}{2k}. \tag{4.5}$$

Suppose now that there is no performance-related pay, so that the terms that include β disappear from (4.5), and replace e_2 by e_4 and e_1 by e_3. It follows that the condition for motivation crowding-out becomes

$$\bar{e} > \frac{\delta}{2k} = \frac{e_3}{2}. \tag{4.6}$$

These inequalities imply three possibilities. First, there is motivation crowding out or no intrinsic motivation under both regimes if (4.5) holds true, because (4.5) implies (4.6). Second, the intrinsic motivation may be present both with and without performance-related pay. The latter requires

$$\bar{e} < \frac{\delta}{2k}. \tag{4.7}$$

Third, there may be intrinsic motivation under performance-related pay and no intrinsic motivation if the wage is fixed. This happens if

$$\frac{\delta + 2\beta}{2k} > \bar{e} > \frac{\delta}{2k}. \tag{4.8}$$

In other words, the employee's need to feel competent and autonomous is undermined if the norm is set too stringent, in which case there is motivation crowding out. Insofar as the employer can affect this norm by target-setting, too high ambitions may backfire.

4.2. The performance of public and private ownership

Consider a private firm that maximises profits in the presence of intrinsic motivation. Insert $e=(\beta+\delta)/k$ into V and assume that the participation constraint is satisfied with equality. This yields the following expression for the expected wage $Ew=w_0+\beta e$ as a function of β under both forms of ownership:

$$Ew = \frac{\beta^2\sigma^2 r}{2} + \frac{\beta^2 - \delta^2}{2k} + \delta\bar{e} + v_0. \tag{4.9}$$

The profit function then becomes:

$$E\pi = ax - x^2 - c_0 x + \frac{\beta + \delta}{k} x - \frac{\beta^2 \sigma^2 r}{2} - \frac{\beta^2 - \delta^2}{2k} - \delta\bar{e} - v_0, \tag{4.10}$$

Maximise simultaneously with respect to x and β and rearrange to get $\beta = kx/\phi$, where ϕ is the same as in section 3:

$$x_P = \frac{\phi(a - c_0 + \delta/k)}{2\phi - 1}, \tag{4.11}$$

$$e_P = \frac{a - c_0 + 2\phi\delta/k}{2\phi - 1}. \tag{4.12}$$

Suppose that the public firm maximises the same weighted objective function as in section 3, but now with respect to x and β, and in the presence of intrinsic motivation:

$$\Omega_G = \frac{\rho}{2} x^2 + ax - x^2 - c_0 x + \frac{\beta + \delta}{k} x - \frac{\beta^2 \sigma^2 r}{2} - \frac{\beta^2 - \delta^2}{2k} - \delta\bar{e} - v_0. \tag{4.13}$$

It follows that $\beta = kx/\phi$, so we get the solution

$$x_G = \frac{\phi(a - c_0 + \delta/k)}{(2 - \rho)\phi - 1}, \tag{4.14}$$

$$e_G = \frac{a - c_0 + (2 - \rho)\phi\delta/k}{(2 - \rho)\phi - 1}. \tag{4.15}$$

If on the other hand the intrinsic motivation is crowded out, we get the same results as in section 3.

The following Lemma summarises the outcome if intrinsic motivation is either present or absent in both types of firms:

Lemma 1. A public monopoly yields a higher output and total surplus and lower marginal costs than in a private monopoly if I=1 or I=0 in both types of firms, and if β is chosen optimally.

Proof: The proof is trivial and therefore omitted.

However, the cases where the firms choose different strategies and where intrinsic motivation is possible under only one type of ownership are more interesting. In a private monopoly, the condition for I=1, i.e. $\bar{e}_P < (\beta+\delta/2)/k$, means:

$$\bar{e}_P < \frac{a-c_0}{2\phi-1} + \frac{(2\phi+1)\delta/k}{2(2\phi-1)} = \bar{e}_P^*. \tag{4.16}$$

If this condition is violated, the intrinsic motivation is crowded out, and we get the same solutions as in section 3. As for the public monopoly, the corresponding condition, i.e. $\bar{e}_G < (2\beta_G+\delta)/2k$, becomes

$$\bar{e}_G < \frac{a-c_0}{(2-\rho)\phi-1} + \frac{[(2-\rho)\phi+1]\delta/k}{2[(2-\rho)\phi-1]} = \bar{e}_G^*. \tag{4.17}$$

To understand what can happen it may be useful to make the following partition of the parameter space in a diagram with $\bar{e}_P$ on the horizontal axis and $\bar{e}_G$ on the vertical axis. The fields A-I in Figure I contain combinations of $\bar{e}_G$ and $\bar{e}_P$ that produce different conditions for intrinsic motivation (IM) to exist. In some cases, it can exist with and without performance-related pay ($\beta > 0$ and $\beta = 0$ respectively). The latter case requires $\bar{e}_i < \delta/k$, i=P, G.

<Fig. 1 about here>

The different areas in Figure 1 can be described as follows:

A. IM possible only under private ownership and if $\beta \geq 0$.

B. IM possible only under private ownership and if $\beta > 0$.

C. IM neither possible under public nor private ownership.

D. IM requires $\beta > 0$ and $\beta \geq 0$ under public respective private ownership.

E. IM requires $\beta > 0$ under both public and private ownership.

F. IM possible only under public ownership and if $\beta > 0$.

G. IM possible under both public and private ownership if $\beta \geq 0$.

H. IM requires $\beta \geq 0$ and $\beta > 0$ under public respective private ownership.

I. IM possible only under public ownership and if $\beta \geq 0$.

The fact that $\bar{e}^*_G > \bar{e}^*_P$ means that a 45°-line through Fig. 1 would pass through the area F. This means that there exist values of $\bar{e}$ such that intrinsic motivation is possible only under public ownership but not under private ownership.

The following proposition formulates the impact of ownership on marginal costs for those regions in Figure 1 where intrinsic motivation is possible. Region C is therefore ignored, because the situation is then the same as in section 3. The situation β_i means a fixed wage. PRP is an abbreviation of performance-related pay.

Proposition 1. Suppose that the private monopoly adopts performance-related pay. The differences in cost efficiency can then be characterised as follows in the regions in Figure 1:

A-B: $c_G > c_P$ *if* $\beta_G = 0$*; the same applies under PRP in the public monopoly if* ρ *is small, but* $c_G < c_P$ *if* ρ *is close to unity and if* δ *is small.*

D-E, F-H: $c_G > c_P$ *if* $\beta_G = 0$*;* $c_G < c_P$ *if the public monopoly adopts PRP.*

I: If $\beta_G = 0$*,* $c_G > c_P$ *holds true if* $(a-c_0)/(2\phi-1) > \delta/k$ *and vice versa;* $c_G < c_P$ *under PRP in the public monopoly.*

Proof: See Appendix.

Note that higher marginal costs under public ownership does not necessarily mean a lower output or a lower total surplus. The fact that wider objectives can compensate for a cost disadvantage should by now be fairly well known, and it is fairly easy to work out the conditions for a given direction of the difference in output or total surplus, so we focus on efforts/marginal costs.

Corollary 1 below applies to region A, where intrinsic motivation is possible only under private ownership. It suggests the possibility that the public firm is doomed to inferior performance despite performance-related pay, because of too high a value of $\bar{e}_G$, i. e. by setting $\bar{e}_G$ above $\bar{e}^*_G$. It describes the potentially counter-productive effect of setting targets too high:

Corollary 1. Consider region A and suppose that the private firm pays a fixed wage and that the public firm adopts PRP. Marginal costs are then higher in the public firm if $\delta/k > (a-c_0)/[(2-\rho)\phi-1]$ *and vice versa.*

Proof: See appendix.

If Corollary 1 describes a private firm without high-powered incentives but a strong intrinsic motivation that makes the public monopoly less efficient despite its sticks and carrots. Corollary 2 describes on the other hand the opposite situation, which also explains why privatisation can lead to a fat-cat salary.

Corollary 2. Consider region I and suppose that the public firm pays a fixed wage and that the private firm adopts PRP. Marginal costs are then higher in the private firm if $\delta/k > (a-c_0)/(2\phi-1)$*, in which case it also pays a higher wage to the manager.*

Proof: See Appendix.

4.3. An extension to competition

To privatise in order to create a private monopoly is not usual. However, this subsection shows that the comparison of a public and private monopoly captures the essential mechanisms of privatisation within an attractively simple setting. Consider therefore post-privatisation competition in the form of an *n*-firm Cournot oligopoly. Each firm then maximises

$$E\pi_i = ax_i - xx_i - c_0x_i + \frac{\beta_i + \delta}{k}x_i - \frac{\beta_i^2\sigma^2 r}{2} - \frac{\beta_i^2 - \delta^2}{2k} - \delta\bar{e} - v_0, \tag{4.18}$$

with respect to x_i and β. This yields after rearranging $\beta = kx_i/\phi$. Impose ex-post symmetry so that $x_i = x/n$. The solution is then:

$$x_C = \frac{n\phi(a - c_0 + \delta/k)}{\phi(n+1) - 1}, \tag{4.19}$$

$$e_C = \frac{a - c_0 + \phi(n+1)\delta/k}{\phi(n+1) - 1}. \tag{4.20}$$

The impact of a change in the number of firms is described by the following proposition:

Proposition 2. a) Output and marginal costs are increasing in the number of firms if I=1 *or* I=0 *in both types of firms, and if* β *is chosen optimally; b) Output is higher in the public monopoly if* $\rho > (n-1)(\phi-1)/n\phi$ *and vice versa.*

Proof: The proof is straightforward and therefore omitted.

Output increases with the number of firms for the same reason as in a conventional oligopoly. The effort decreases given the presence or absence of intrinsic motivation, because increased competition makes it more difficult to afford to pay for cost reducing efforts, like in section 3. As for part b), very low values of ρ means that the difference between a public and private monopoly is small, in which case an oligopoly with profit maximising firms can be superior. Values close to unity means the public monopoly cannot be outperformed even by a fragmented market.[18]

However, the optimal $\beta = kx/n\phi$ is consistent with intrinsic motivation only if $\bar{e} < (2\beta + \delta)/2k$, i.e. if

$$\bar{e}_C < \frac{a - c_0}{(n+1)\phi - 1} + \frac{[(n+1)\phi + 1]\delta/k}{2[(n+1)\phi - 1]} = \bar{e}_C^*. \tag{4.21}$$

It can easily be seen that $\bar{e}_C^*$ is decreasing in n, and that $n = 1$ means that $\bar{e}_C^* = \bar{e}_P^*$. We get similar regions as in Fig. 1, with the difference that the vertical line $\bar{e}_P^*$ has to be replaced by a line that stands to the left of it, but to the right of the line $\delta/2k$. This also means that there is now a wider range of common values of the norm parameter $\bar{e}$ for which there can exist intrinsic motivation only under public ownership.

4.2. Some examples

A couple of regions in Figure 1 may be of special interest. Suppose that the inverse demand function is $p = 130 - x$ and that c_0 is 50. As for the parameters related to the utility functions, suppose that $\delta = 10$, $k = 2$, $r = 1$, and $\sigma^2 = 2.5$, so that $\phi = 10.5$. Let the reservation utility be 40.

[18] Large values of v_0 and $\bar{e}_i$ set an upper limit for both ρ and n.

Our first example represents a best-case from the standpoint of the public monopoly. Suppose that $\rho = 0.9$ and $\bar{e}_G = 2.0$.[19] The public monopoly pays a fixed wage, so there is intrinsic motivation if $\bar{e}_G < \delta/2k = 2.50$, in which case we get the effort level $\delta/k = 5$. Privatisation would mean either a private, unregulated and profit-maximising monopoly or an oligopoly with three profit-maximising Cournot oligopolists. We assume the same norm $\bar{e}_P = \bar{e}_C = 7.5$ after privatisation. As follows from (4.17) and (4.21), we get $\bar{e}_P^* = 6.75$ and $\bar{e}_C^* = 7.2490$, so there can be no intrinsic after privatisation. This means a constellation in region I in Figure 1.

<Table 1 about here>

The public monopoly outperforms both the private monopoly and the oligopoly on all fronts except for when it comes to profitability, because the objective function (4.13) works as when profits are given the weight of only $1/(\rho+1) = 0.526$. The manager in the public monopoly also gets the lowest wage, because there is no need for compensating the loss of intrinsic motivation.

Our second example represents a worst case from the standpoint of public ownership. Suppose that ρ is now 0.2, that $\bar{e}_G$ is 7.5, and that $\bar{e}_P = \bar{e}_C = 4.50$. It follows that $\bar{e}_G^*$ is 7.2940, so there is no intrinsic motivation in the public monopoly. However, we get $\bar{e}_P^*$ and $\bar{e}_C^* = 4.57$, so there can be intrinsic motivation both in the private monopoly and in the oligopoly.

<Table 2 about here>

In other words, the private monopoly outperforms its public counterpart on all fronts except for when it comes to output. However, the private oligopoly yields the best performance in terms of total surplus and output, but not when it comes to effort and marginal and average costs.

It is also possible to construct an example where a fixed wage under private ownership is consistent with superior performance as compared to a public monopoly with performance-related pay.

[19] The calculations have been made with at least four decimals.

5. Concluding remarks

Our assumptions of potential intrinsic motivation and motivation crowding-out under both forms of ownership mean that it is highly unlikely that one form of ownership turns out as always superior. This makes the analysis stand out from many earlier principal-agent applications. Instead, further research may outline in more detail the conditions under which a given arrangement tends to be superior and on how it can be improved.

The conclusion that no form of ownership is always more efficient and that its performance depends on how it is implemented may sound modest. However, it undermines the belief that all public firms should be privatised. Moreover, the analysis might suggest a less defensive approach for example when private firms do not emerge like mushrooms after rain. It is a well-known stylised fact that enterprise formation is sticky even in the presence of profit opportunities (Geroski, 1995). A strategy to establish public enterprises should not be routinely dismissed, not least given the destruction of private companies that the present economic crisis has brought about.

The state stepped in and established enterprises in Finland before and after the Second World War, because of a lack of private venture capital (Miettinen, 2000; Pohjola, 1996). As a consequence, state-owned companies contributed to a significant proportion of industrial value added. The figure was 18-22% in the years before the government started to privatise in the 1990s. This should be compared to figures such as 14% in Austria, 11% in Britain and 6% in Sweden. Less is known about comparative cost performance, but the financial performance of the state-owned firms in Finland did not compare unfavourably to their private competitors, despite their somewhat wider objectives (see Willner, 2006). It remains to be proven that the extent of state ownership contributed significantly to Finland's spectacular growth performance, but its extent suggests that it is at least hard to believe that it was harmful. Finland's GDP per capita was 8.7 times higher in 1998 than in 1913, whereas the corresponding figures for Germany, UK, Sweden, US, and China are 4.6, 3.8, 6.0, 5,2, and 5.6 (Maddison, 2001).[20] There is evidence of a positive relationship between economic growth and the size of the state enterprise sector (not to be confused with the public sector) in the OECD-countries (Fowler and Richards, 1995).

[20] Japan's percentage growth of 14.7 was even higher (Maddison, 2001), but its regulated and protected economy means that the country is even less suitable than Finland as an argument in favour of the Washington consensus.

We have also suggested that the analysis can interpreted in terms of how a given organisation can be improved. In particular, it seems that the targets that an employee (or in the present analysis, the manager) is expected to conform to are of crucial importance. For example, the tendency to introduce more stringent public-sector targets, as called for by the New Public Management, may backfire by crowding out the intrinsic motivation. More generally, the analysis may shed some light on the circumstances under which a strategy of establishing public enterprises can work.

APPENDIX

Proof of Proposition 1:

A-B: If the public monopoly pays a fixed wage (β_G=0), we get c_G=c_0 and $c_P = c_0 - e_P$, where e_P is expressed by (4.12). In the case of PRP in the public monopoly and if ρ=0, e_G is the same as in a private monopoly without intrinsic motivation, as expressed by (3.9), and hence smaller than (4.12). Comparing (4.12) and (3.15) shows on the other hand that $e_G > e_P$ can hold true if ρ is close to unity and/or if δ is small.

D-E, F-H: If the public monopoly pays a fixed wage (β_G=0), we get $c_G = c_0$ in the regions D-E, F and H and $c_0 - \delta/k$ in region G. We get $c_P = c_0 - e_P$, where e_P is expressed by (4.12) in regions D-E and G-H and by (3.9) in region F. It is obvious that $c_G > c_P$ i all regions where $e_G = 0$; as for region G, note that $e_G > e_P$ would imply a negative output, so $c_G > c_P$ must hold true also there. If the public monopoly adopts PRP, $c_P > c_G$, because e_G is expressed by (4.15), and e_P by (4.14) in regions D-E and H, and by (3.9) in case F.

I: If the public monopoly pays a fixed wage (β_G=0), we get $c_G = c_0 - \delta/k$. There cannot be intrinsic motivation in the public monopoly, so the result follows from comparing δ/k and (3.9). If the public monopoly adopts PRP, a comparison of (3.9) and (4.15) shows that $c_P > c_G$. QED.

Proof of Corollary 1:

The result follows directly from the fact that a private monopoly that pays a fixed wage gets the effort level δ/k, whereas a public monopoly with PRP and no intrinsic motivation gets an effort level expressed by (3.11). QED.

Proof of Corollary 2:

The superiority of the public firm follows directly from Proposition 1. As for the wages, note that it follows from (4.9). (3.5), and (3.9) that they are:

$$w_G = v_0 - \delta\left(\frac{\delta}{2k} - \bar{e}_G\right), \tag{A.1}$$

$$Ew_G = v_0 + \frac{\phi(a - c_0)^2}{2(2\phi - 1)^2}. \tag{A.2}$$

Note that region *I* means that $\bar{e}_G < \delta/2k$. This implies that $w_G < v_0$. It is on the other hand obvious that $w_P > v_0$.

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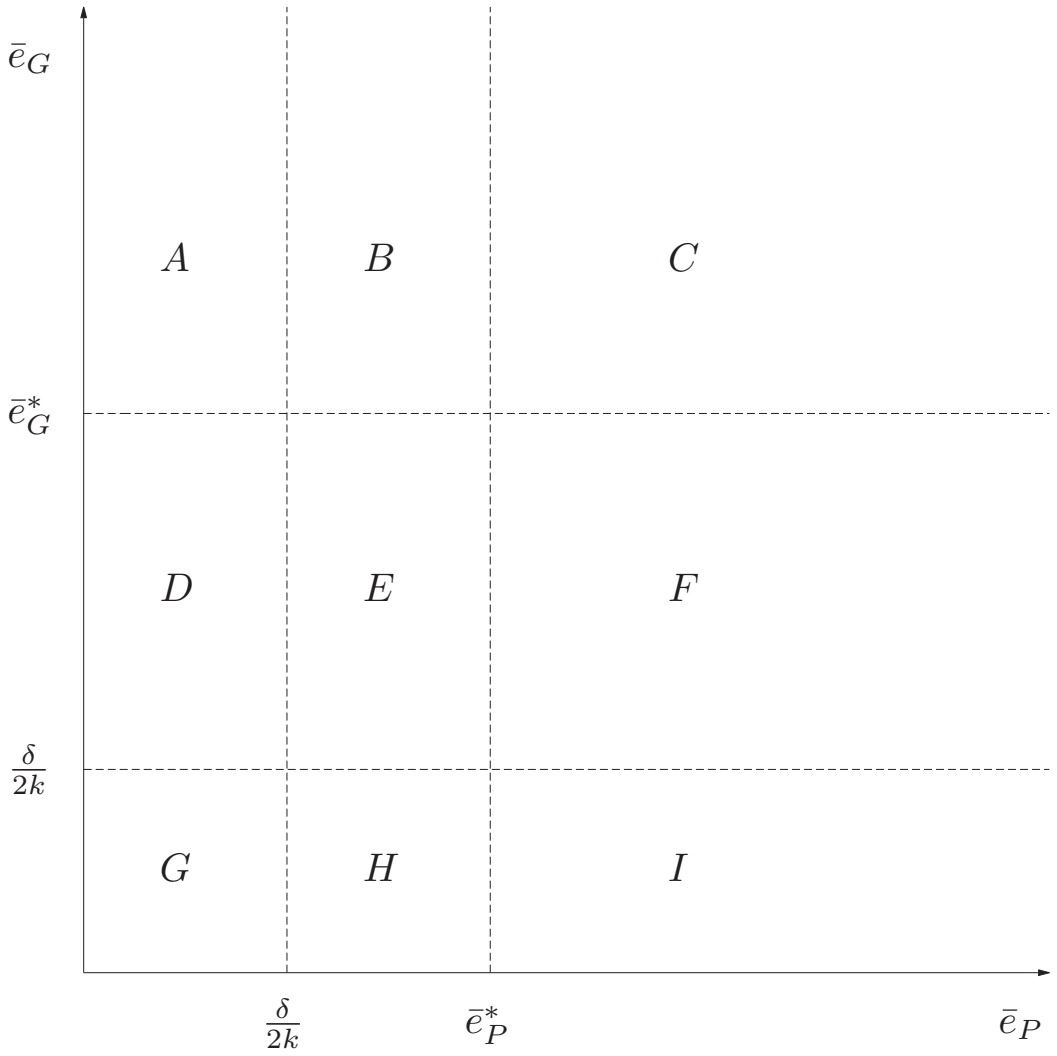
Figure 1. The conditions for intrinsic motivation



	Public monopoly	Private monopoly	Oligopoly (n=3)
Effort	5.00	4.00	1.95
Marginal costs	45.00	46.00	48.05
Managerial wage	35.00	124.00	59.99
Unit costs	45.45	48.95	50.98
Industry profits	562.11	1540.00	1079.29
Output	77.27	42.00	61.46
Total surplus	3347.64	2422.00	2968.16

Table 1. The performance of a public and private monopoly in Example 1

	Public monopoly	Private monopoly	Oligopoly (n=3)
Effort	4.47	8.81	7.07
Marginal costs	45.53	41.19	42.93
Managerial wage	144.87	154.83	82.56
Unit costs	48.80	44.66	46.72
Industry profits	1616.88	1836.65	1173.91
Industry output	46.93	44.63	65.30
Total surplus	2717.97	2832.26	3306.26

Table 2. The performance of a public and private monopoly in Example 2