Mass Privatization, Management Control and Efficiency

Dieter Bös[a,*], **Phillipp Harms**[b]

[a]*Department of Economics, University of Bonn, Adenauerallee 24-42, D-53113 Bonn, Germany*

[b]*Department of Economics, University of St. Gallen, FGN, Bodanstrasse 1 CH-9000 St. Gallen, Switzerland*

Abstract

We present a model where a government chooses the number of individuals to which ownership in a former state-owned firm shall be allocated. When making this decision the government maximizes the political support it gets from the firm's incumbent manager and from potential shareholders, anticipating that a greater dispersion of shares reduces the control of the manager by the firm's new owners. It turns out that shares will be allocated to the maximum number of individuals – and thus a policy of mass privatization will be implemented – if the manager's utility enters the political support function with a higher weight than the welfare of the potential shareholders. The result of the political process, however, need not conflict with the objective of achieving a Pareto-optimal allocation. Thus we contradict a widely shared presumption that mass privatization schemes sacrifice efficiency to satisfy political constraints and show that they can be very attractive from an efficiency point of view.

Keywords: Privatization, Vouchers, Economic Reform

JEL classification: L33, P21

* Corresponding author.

1. Introduction

When governments in the former socialist economies started to design their privatization programs, one of the key decisions was whether ownership in large industrial enterprises should be transferred to individual investors or to a dispersed multitude[1]. The debate on this issue has been intensified by the differences between the political choices of give-away policies in countries like Russia, the Czech republic, the Ukraine or Romania.

In this paper we use the term "mass privatization" for a give-away to the entire population, that is, a policy which leads to the maximum dispersion of ownership by firm outsiders[2]. The virtues of this approach are generally seen in its high speed, its potential to yield a "fair" distribution of ownership[3], to generate political support and thus to guarantee the irreversibility of the whole privatization process[4]. However, mass privatization also faces harsh criticism. Critics focus on issues of corporate control, arguing that widespread ownership reduces the owners' incentives to monitor the firm's performance and thus decreases management incentives to restructure enterprises[5]. According to this view the lack of concentrated ownership and tight corporate control is particularly harmful in an environment where capital markets with their control functions are yet to develop (Tirole (1991)).

In this paper we challenge the idea that mass privatization is chosen to win the political support of the broad population, and that there exists a basic trade-off between a government's objective to maximize political support and its aim of achieving allocative efficiency. We take critics of mass privatization at their words and develop a model, in which more dispersed share ownership, that is, a larger number of small shareholders, leads to less control of a firm's management. A government anticipates this effect when it chooses the dispersion of ownership for a firm which is to be privatized. In making this decision the government takes into account both the utility of the firm's incumbent manager and the potential shareholders. We show that the government is likely to choose a higher concentration of ownership if the political weight of a potential shareholder is higher than the weight of the incumbent manager. If, instead, the government is more concerned about the incumbent manager's utility, it will choose the maximum dispersion of shares. Thus we claim that the driving force behind the decision to distribute ownership among the entire population, is the political influence of the incumbent managerial class, whereas the average citizen hardly benefits from this program.

---

[1] For the intensive debate on the advantages and disadvantages of widespread ownership in transition economies, see e.g. Lipton and Sachs (1990), Schmidt and Schnitzer (1993), Boycko et al. (1994).
[2] Earle et al. (1993:46) use a similar definition.
[3] see e.g. Frydman et al. (1993a), Boycko and Shleifer (1993).
[4] see e.g. Bolton and Roland (1992), Roland and Verdier (1994).
[5] see e.g. Earle et al. (1993), Bolton (1995).

These distributional consequences notwithstanding we show that the result brought about by the political process has attractive normative properties: given the population's limited wealth and political constraints that prevent the government from giving away state ownership to the firm's manager free of charge, mass privatization may even turn out to be a way to reach allocative efficiency. In our framework this results from the fact that decreasing control by owners increases managerial incentives and that mass privatization thus can approximate a first-best contract which is not feasible under the constraints mentioned above. This conclusion does not imply that widespread ownership is a necessary condition for allocative efficiency. However, it refutes the common-sense argument that concentrated ownership is such a necessary condition.

In our analysis we consider a highly stylized version of mass privatization, abstracting from the particular institutional features that shaped the privatization programs in the countries mentioned above. We assume that there is an initial distribution of shares by the government which persists for the period considered in our model. This may not reflect the case of Russia where vouchers were freely traded immediately after being issued (Boycko et al. (1993)), but it may suit rather well with regard to Ukraine and Romania, where legal barriers prevent (or are planned to prevent) the emergence of voucher markets and of concentrated ownership. In addition, we abstract from the existence of financial intermediaries to whom Boycko et al. (1994: 256) attribute the role of blockholders that have strong incentives to monitor the firms' performance. In fact it is far from clear whether these mutual funds actually fulfill this function[6] and if so, what induces these funds to act in the interest of shareholders instead of their own.

Two further elements of our analysis are meant to reflect particular features of former socialist states: we exclude the possibility that owners replace the incumbent manager by a person with better skills. In fact Boycko et al. (1994:256) point out that "...no matter what the privatization strategy, managers simply must be retained in the short run" and Frydman et al. (1995:109) report an „amazing degree of managerial entrenchment in Russia". However, we do not agree with Earle et al. (1993:34) in their opinion that restructuring and more efficient production is impossible with incumbent managers staying in charge. Instead we argue that stronger incentives will induce these managers to improve enterprise performance in their own interest.

Furthermore we assume that the extremely noisy environment reduces the owners' capacity to learn about their firm's success, hence the manager can understate the firm's profit and withhold dividends from shareholders. According to Frydman et al. (1995: 109) only a small portion of Russian voucher funds has „regular access to financial data concerning their companies" and Boycko et al. (1993:162) state that "...few companies expect to pay dividends

[6] In a survey of the largest funds' strategies the Russian journal Kommersant (6.9.1993) reported that some of the larger funds explicitly sought to diversify their portfolios without acquiring large portions of shares. Frydman et al. (1995:108) provide recent evidence supporting this view.

in the near future, leaving more for the managers to take". Recent experience has shown that this forecast was not overly pessimistic[7].

Our paper is structured as follows: In section 2 we develop our basic partial equilibrium model, introduce the optimization problems of the firm's manager and its owners and derive the manager's effort and the intensity of control exercised by the firm's owners in equilibrium. Section 3 deals with the government's choice of ownership distribution with respect to its distributional and allocative objectives. Section 4 summarizes and provides some anecdotal evidence that confirms our theoretical results.

2. Ownership Concentration and Management Effort

2.1. The Model

We consider a firm whose profit is stochastic due to exogenous price fluctuations and technological shocks. We restrict ourselves to the analysis of two states of nature and assume that the firm's profit can take the values $\overline{\pi}$ or $\underline{\pi}$, with $\overline{\pi} > \underline{\pi}$. For ease of exposition we assume that $\underline{\pi} = 0$. The probability that the firm's profit is strictly positive, $q \in [0,1[$, is zero if the firm's technological and organizational status quo is maintained. However, during the production period the firm's manager can engage in restructuring and thus increase the probability of a strictly positive profit. Thus, the firm's expected profit is related to the effort, the manager invests in restructuring the firm, e_r[8]:

$$E(\pi) = q(e_r) \cdot \overline{\pi}, \qquad \text{with } \overline{\pi} > 0, \quad q' > 0, \quad q'' < 0, \quad q(0) = 0, \quad \lim_{e_r \to 0} q'(e_r) = \infty. \quad (1)$$

Our crucial assumption is that the manager's effort e_r and the firm's actual profit, π, are private information of the firm's manager. Knowing only $\underline{\pi}$ and $\overline{\pi}$, the firm's shareholders cannot observe and verify the actual realization of π unless they contribute to some costly audit procedure. This provides the manager with the possibility to pretend that the bad state of nature occurred and to appropriate more than his official salary, which is a share α of the firm's profit. Apart from literal theft this appropriation of profits can take the form of firm-intern consumption through investment in prestigious rather than productive assets, or it can appear in the form of excessive salaries (see Boycko et al. (1993:161)). However, we assume that the respective values are not consumed immediately and are still available at the end of the period.

---

[7] see, e.g., *The Economist*, July 8, 1995.

[8] The relationship between the manager's effort and the firm's expected profit is modeled similar to Schmidt and Schnitzer (1993).

If the manager understates the firm's profit he runs the risk of being detected. The probability p that the shareholders find out the firm's true profit increases with the aggregate amount of their audit contributions M, with $M = \sum_{i=1}^{N} m_i$. However, the manager can ex ante reduce the probability of being detected by looking for activities that do not increase the expected profit but make eventual profits harder to detect. The probability of a successful audit thus also depends on the effort the manager allocates to such „concealing activities“, e_c, and the audit function $p(M, e_c) \in [0,1[$ has the following properties:

$$p_1 > 0, \quad p_{11} < 0, \quad p_2 < 0, \quad p_{22} > 0, \quad p_{12} < 0,$$

$$p(0, e_c) = 0, \quad \lim_{M \to 0} p_1 = \infty \quad \forall\, e_c \in [0,1], \qquad \lim_{e_c \to 0} p_2 = -\infty \quad \forall\, M$$

where p_i refers to the derivative with respect to the i-th argument. If the manager is caught, he loses his job without getting his official salary and the firm's entire profit is divided equally among the firm's shareholders.

The manager's preferences are quasilinear, that is

$$U^m(e_r, e_c, I^m) = I^m - V(e_r, e_c), \tag{2}$$

where I^m is the manager's income. The function $V(e_r, e_c)$, which denotes the manager's disutility of effort measured in monetary terms, has the following properties:

$$V_1 > 0, V_2 > 0, V_{11} > 0, V_{22} > 0, V_{12} \geq 0,$$

We assume that the manager’s aggregate effort is constant and can be normalized to one:

$$e_r + e_c = 1. \tag{3}$$

Hence, we can write $V(\cdot)$ as a function of e_r alone and (2) becomes

$$U^m(e, I^m) = I^m - V(e, 1-e), \tag{2’}$$

where we have eliminated the subscript r for notational ease.
Let us finally come to the shareholders. The government sets limits to the maximum number of shares an individual can have. For simplification, let us assume that every individual is entitled to, and actually gets, exactly one share. There are $\overline{N}$ identical potential shareholders, among

which the government randomly chooses a number N to which shares are allocated free of charge. Due to political constraints the firm's manager does not get shares. The utility of any single potential shareholder is a linear function of the income I^s.

$$U^s\left(I^s\right) = I^s. \tag{4}$$

I^s consists of the dividend a shareholder receives out of the firm's profit and an exogenous income that accrues to him at the end of the production period and that finances his audit contribution.

Throughout our model we assume that shareholders do not cooperate. If they could coordinate their behavior, they could design an optimal audit scheme which would specify the manager's official salary and an aggregate amount of audit contributions[9]. If the shareholders could agree on such a scheme and if their threat of auditing the manager were credible they could induce the manager to reveal the firm's true profit[10]. However, we argue that under present circumstances in Eastern Europe communication and cooperation among shareholders is extremely expensive, hence shareholders will not cooperate to offer the manager a contract. Thus the manager's "official" salary is specified in a contract that is inherited from the pre-privatization period.

The time structure of our model is as follows. First the government chooses N, the number of shareholders that maximizes its objective function. Then the manager allocates his effort between the two possible activities, followed by nature which determines whether the firm's profit is strictly positive or zero. Observing the true profit π the manager chooses $\hat{\pi}$, which he announces to the shareholders. After this announcement the shareholders decide simultaneously and noncooperatively how much they contribute to control the manager's honesty. The aggregate amount of audit contributions together with the manager's concealing effort determine the probability p that the shareholders learn the firm's true profit.

In the following subsection we analyze the signaling game between the manager and the shareholders, which takes place after nature has determined the firm's profit. We show that if an equilibrium in this game exists, it is a *pooling equilibrium*: the manager announces zero profits regardless of the firm's actual performance. We will then derive the values of restructuring effort and audit contributions that are chosen in equilibrium and demonstrate how these values are related to the number of shareholders.

---

[9] For contributions that derive optimal audit schemes see e.g. Baron and Besanko (1984), Border and Sobel (1987) and Mookherjee and Png (1989).

[10] Credibility could be obtained by making an irreversible "investment" into some audit institution before the manager's announcement. In our framework, however, such an investment is impossible due to the shareholders' wealth constraint.

2.2 Profit Announcements, Management Effort and Audit Contributions in Equilibrium

Observing nature's choice of π, with $\pi \in \{0,\overline{\pi}\}$, the firm's manager decides on the profit level $\hat{\pi}(\pi)$ he announces to the firm's shareholders. We define $\hat{\pi}_0 \equiv \hat{\pi}(0)$ and $\hat{\pi}_+ \equiv \hat{\pi}(\overline{\pi})$. When the manager has made his announcement $\hat{\pi} \in \{0,\overline{\pi}\}$[11], every individual shareholder *i* decides on his audit contribution $m_i(\hat{\pi})$, taking the other shareholders' contributions as given. Defining $m_{i0} \equiv m_i(0)$ and $m_{i+} \equiv m_i(\overline{\pi})$ we get $\sum_i m_{ij} = M_j$ with $j = 0,+$. The contributions are determined by the manager's signal and the shareholders' beliefs, which are the probabilities they attribute to the different profit levels given the manager's signal. We define $Prob\{\pi = \overline{\pi} \mid \hat{\pi} = 0\} \equiv \mu_0$, $Prob\{\pi = \overline{\pi} \mid \hat{\pi} = \overline{\pi}\} \equiv \mu_+$.

As a result of the audit the shareholders learn the firm's actual profit with probability $p(M_j, 1-e)$, whereas with probability $[1-p(M_j,1-e)]$ the audit does not yield any new information beyond the manager's signal.

If the manager announces that the firm's profit is strictly positive ($\hat{\pi} = \overline{\pi}$), he has to transfer $(1-\alpha)\overline{\pi}$ to the shareholders. If the true profit is $\overline{\pi}$ and the manager announces $\hat{\pi} = 0$ and is not caught, his income consists of the firm's entire profit $\overline{\pi}$. If, however, the shareholders find out that the manager understated the firm's profit, he loses his job without getting his official salary.

It is obvious that in equilibrium the manager will never choose $\hat{\pi}_0 = \overline{\pi}$, since in this case he would receive a negative income. Hence we always have $\mu_+ = 1$. Moreover, the shareholders have no incentive to contribute to an audit once the manager has announced $\hat{\pi} = \overline{\pi}$, since in this case a successful audit would not yield more than $(1-\alpha)\overline{\pi}$. Therefore we can restrict our attention to the choice of $\hat{\pi}_+, e$ and the shareholders' contributions m_{i0} in equilibrium. We thus look for a vector $(e^*, \hat{\pi}_+^*, m_{10}^*, ..., m_{N0}^*)$ and beliefs μ_0 that satisfy the following conditions:

(a) For every $M(\hat{\pi}_+)$

$e^*, \hat{\pi}_+^*$ maximize

$$E(U^m) = q(e) \cdot \left\{ [1-p(M(\hat{\pi}_+),1-e)] \cdot (\overline{\pi} - (1-\alpha)\hat{\pi}_+) + p[M(\hat{\pi}_+),1-e] \cdot \alpha\, \hat{\pi}_+ \right\} - V(e,1-e).$$

[11] Of course, the manager could announce *any* level of profit. However, since there are only two states of nature, an announcement $\hat{\pi}_+ \notin \{0,\overline{\pi}\}$ would clearly reveal a cheating manager and will not be chosen in equilibrium.

(b) Given the announcement $\hat{\pi} = 0$ and the beliefs μ_0, for every e and m_{j0}, with $j \neq i$ m_{i0}^* maximizes

$$E\left(U_i^s\right) = \mu_0 \cdot p\left(m_{i0} + \sum_{j \neq i} m_{j0}, 1-e\right) \cdot \frac{\overline{\pi}}{N} - m_{i0}.$$

(c) Beliefs are formed according to Bayes' Rule.

(d) $e = e^*$, $M_j = M_j^*$.

In a *separating equilibrium* the manager announces the firm's true profit, that is $\hat{\pi}_0^* = 0, \hat{\pi}_+^* = \overline{\pi}$. Accordingly, the shareholders' beliefs are $\mu_0^* = 0$ and it follows from (b) that no rational shareholder will make any audit contribution. Hence the probability of a successful audit is zero in equilibrium. This in turn implies that the manager will have an incentive to deviate from his equilibrium strategy unless $\alpha = 1$: given the zero-probability of detection it is more profitable to cheat the shareholders unless the official contract grants the manager the firm's entire profit anyway[12]. However, such a contract does not seem realistic for the transition economies we consider. Hence, in the following analysis we do not further investigate the separating equilibrium.

In a *pooling equilibrium* the manager announces that the profit is zero regardless of the firm's true performance, that is: $\hat{\pi}_0^* = \hat{\pi}_+^* = 0$. In equilibrium the shareholders' beliefs are $\mu_0^* = q\left(e^*\right)$. If the manager deviates from his equilibrium strategy, the shareholders' beliefs are $\mu_+ = 1$. We get from (a) and (b):

$$e^*: \quad \begin{array}{l} q'\left(e^*\right) \cdot \left[1 - p\left(M_0, 1-e^*\right)\right] \cdot \overline{\pi} + q\left(e^*\right) \cdot p_2\left(M_0, 1-e^*\right) \cdot \overline{\pi} \\ - V_1(e^*, 1-e^*) + V_2\left(e^*, 1-e^*\right) = 0 \end{array}, \qquad \text{(P1)}$$

$$\hat{\pi}_+^*: \quad \left[1 - p\left(M_0, 1-e^*\right)\right] \cdot \overline{\pi} \geq \alpha \overline{\pi}, \qquad \text{(P2)}$$

$$m_{i0}^*: \quad q(e) \cdot p_1\left(M_0^*, 1-e\right) \cdot \frac{\overline{\pi}}{N} - 1 = 0, \qquad \text{(P3)}$$

(P1) implicitly defines the level of effort the manager allocates to restructuring the firm. Obviously this level is defined by equating the net marginal utilities from restructuring and from concealing. If (P2) were not satisfied the manager would have an incentive to deviate

[12] This result would not change if a cheating manager, beyond losing his job, suffered from a stronger punishment.

from his equilibrium strategy and the pooling equilibrium would not exist. Hence, α has to be sufficiently small to sustain this equilibrium[13]. (P3) defines the shareholders' aggregate audit contributions in equilibrium: every shareholder has an incentive to increase his contribution until the marginal expected income is equal to the marginal costs of contributing.

2.3. The Manager's Reaction Function

In what follows we analyze the comparative static properties of the pooling equilibrium characterized above. Since the equilibrium values *e** and *M**[14] can be represented by the intersection of the manager's and the shareholders' reaction functions we start by determining the slope of these reaction functions.

To derive the slope of the manager's reaction function with respect to *M* we implicitly differentiate the first-order-condition (P1):

$$\frac{de^*}{dM} = \frac{\left[q'\left(e^*\right)\cdot p_1\left(M,1-e^*\right) - q\left(e^*\right)\cdot p_{21}\left(M,1-e^*\right)\right]\cdot\bar{\pi}}{D}, \qquad (5)$$

with $D = \left[q''\cdot(1-p) + 2\cdot q'\cdot p_2 - q\cdot p_{22}\right]\cdot\bar{\pi} - V_{11} + V_{12} - V_{22} + V_{21}$

The denominator D has to be negative for *e** to define a local maximum[15]. The numerator is positive, hence the management's reaction curve is downward sloping, reflecting the fact that a higher amount of audit contributions increases the probability of detection for the manager and thus decreases his marginal expected income derived from additional effort devoted to restructuring the firm. Hence the manager will shift effort from restructuring to concealing activities if the shareholders' audit contributions increase.

2.4. The Shareholders' Reaction Function

To derive the shareholders' aggregate reaction function we start from (P3) which implicitly defines the sum of audit contributions, M^*, as a function of *e*. Due to our assumptions about *p(M,1-e)* the shareholders' problem has an interior solution, that is, the sum of all shareholders' audit contributions M^* is strictly positive even if the expected profit is very low[16].

---

[13] Aghion et al. (1994:1332) support the notion that α can be assumed to be small enough to support a pooling equilibrium.

[14] In what follows we drop the subscript 0 in M_0^*

[15] With exception of V_{12} and V_{21} all the terms in D are negative. Hence, a sufficient condition for D to be negative is that the cross derivatives of V are not too large.

[16] There exist infinitely many Nash equilibria, and in spite of complete symmetry it need not be that all individuals contribute a strictly positive amount in every single equilibrium. However, there will always be an

We use the implicit function rule to derive the slope of the shareholders' aggregate reaction function:

$$\frac{dM^*}{de} = \frac{-q'(e)\cdot p_1\left(M^*,1-e\right)+q(e)\cdot p_{12}\left(M^*,1-e\right)}{q(e)\cdot p_{11}\left(M^*,1-e\right)} > 0. \qquad (6)$$

This is positive: The more effort the manager allocates to restructuring the higher the firm's expected profit. The higher stake in turn induces the shareholders to spend more on controlling the manager.

2.5. The Equilibrium Values of Effort and Audit Contributions

The point of intersection of the manager's and the shareholders' reaction curves determines effort and and aggregate audit contributions in equilibrium. Since the slope of the manager's reaction function, given by (5), is unambiguously negative and the slope of the shareholders' aggregate reaction function (6) is unambiguously positive, this equilibrium determines unique levels of *e** and *M**. It remains to be shown that in this equilibrium the manager's effort and the shareholders' contributions are positive: there would not exist an equilibrium with both values being positive if the shareholders' reaction curve intersected the *e*-axis at a value e_0 larger than *e**(0). Given our assumptions about $p_1(M,1-e)$ this cannot be the case since shareholders will cease to contribute only if *e* (and consequently the firm's profit) is zero. *e**(0) however is greater than zero and smaller than one due to our assumptions about $q'(e)$ and $p_2(M,1-e)$. We can also exclude the case that the *M*(e)*-curve intersects the *M*-axis at a strictly positive value: this would mean that the shareholders are willing to contribute a positive amount even if the manager used zero effort and consequently the firm's profit is zero. Thus, we can draw the reaction functions as in figure 1, where the point of intersection indicates the equilibrium values *e** and *M**.

2.6. Comparative Static Properties of the Equilibrium

We are interested in the comparative-static properties of the equilibrium derived above, particularly in the relationship between *N*, the number of shareholders, and *M**, the total amount of audit contributions. We use (P3) and the implicit function rule to derive:

---

incentive for an individual shareholder to increase his contribution as long as his additional expected income - the *N*-th part of expected profit times marginal probability of detection - is higher than his marginal costs, which are equal to one. Thus, although there exist multiple Nash equilibria among the shareholders, all of these equilibria yield the same aggregate amount *M**.

$$\frac{dM^*}{dN} = \frac{p_1\left(M^*, 1-e\right)}{N \cdot p_{11}\left(M^*, 1-e\right)} < 0\,, \qquad (7)$$

which is negative, given our assumption of a concave audit function. Since the benefit of a single shareholder diminishes when he has to share profits with a greater number of other owners, and since the audit technology exhibits decreasing returns, the aggregate amount of audit contributions in our model decreases in the number of shareholders.

This is the effect more or less explicitly suggested by critics of mass privatization schemes: voucher privatization that allocates shares to a very large number of individuals is likely to create a "large group" in the sense of Olson, where the individual stockholder "...has no incentive to challenge the management of the company, however inept or corrupt it might be" (Olson 1965:55).

Increasing N from N_0 to N_1 thus shifts the shareholders' reaction curve to the left. As Figure 1 shows, this leads to a higher level of managerial effort in the pooling equilibrium.

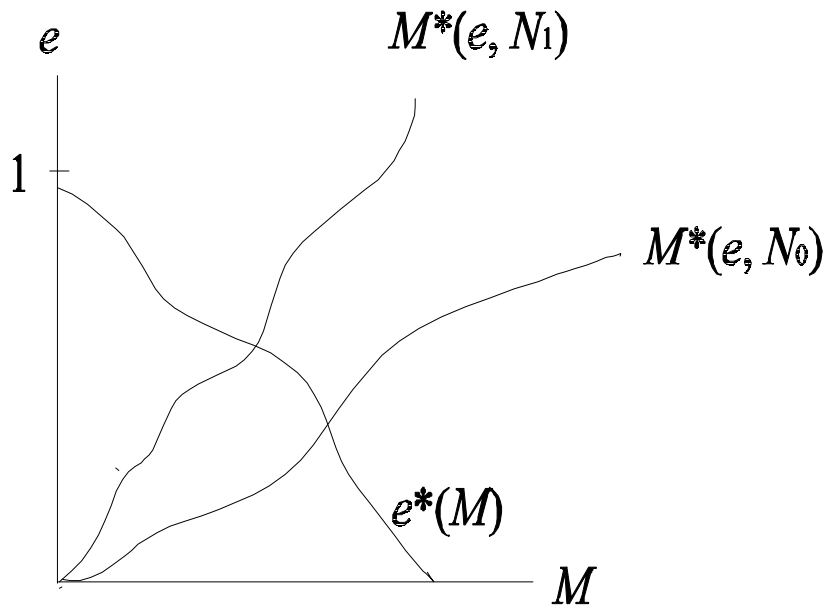

Figure 1: The manager's and the shareholder's reaction functions for different numbers of shareholders ($N_1 > N_0$).

3. Choosing the Optimal Number of Shareholders

When deciding on the dispersion of shares, that is, on the number of shareholders to which state property is allocated, the government anticipates the equilibrium of the game between the

manager and the shareholders and the comparative static properties derived in the preceding section. In the present section we first consider the decision of a government that seeks to maximize the political support it gets from the firm's manager and the potential shareholders. Thus we offer an explanation of what may have driven governments in Eastern Europe to implement mass privatization schemes. In order to evaluate how the result of the political process fares from an efficiency point of view we then derive the number of shareholders chosen by a government that seeks to implement a Pareto-optimal allocation.

3.1 Government concerned about political support

We view the incumbent manager and potential shareholders as two different interest groups. The government chooses N to maximize a „political support function", which is a weighted sum of the utility levels obtained by these interest groups' members. The weights are a_m for the manager and a_s for every potential shareholder. According to Coughlin et al. (1990) these weights are larger the greater the homogeneity of the respective interest group, i.e. the lower the government's uncertainty about the political support it gets from the members of this group[17].

Since the number of potential shareholders is $\overline{N}$, a potential shareholder's expected utility is his expected dividend (less audit contributions) multiplied by the probability of obtaining a share, $N / \overline{N}$, plus his exogenous income[18]. The government's problem is

$$\underset{N}{Maximize}\ S(N) = a_m \cdot q\left[e^*(N)\right] \cdot \left[1 - p\left(M^*(N), 1 - e^*(N)\right)\right] \cdot \overline{\pi} - a_m \cdot V\left[e^*(N), 1 - e^*(N)\right] + a_s \cdot q\left[e^*(N)\right] \cdot p\left(M^*(N), 1 - e^*(N)\right) \cdot \overline{\pi} - a_s \cdot M^*(N)$$

$$s.t. \quad 1 \le N \le \overline{N}. \qquad (8)$$

The corresponding Lagrangean is

$$\mathcal{L}(N) = S(N) + \lambda_0(N - 1) + \lambda_1\left(\overline{N} - N\right). \qquad (9)$$

Using the envelope theorem and substituting equation (P3) the first order condition can be written as follows:

[17] Actually Coughlin et al. (1990) refer to a probabilistic voting model where government and opposition design their platforms in order to maximize their expected number of votes. Since in equilibrium both parties offer the same platform, the result may also be applied to an incumbent government that seeks to maximize its political support.

[18] A detailed motivation and formal derivation of the government's objective function is sent to the reader on request. Constant terms have been suppressed in presenting *S(N)*.

$$\frac{\partial \mathrm{L}(N,\cdot)}{\partial N} = \left(a_s - a_m\right)\cdot M_N^* \cdot N + a_s\left\{\left[p\cdot q' - q\cdot p_2\right]\cdot \bar{\pi}\cdot e_N^* - M_N^*\right\} + \lambda_0 - \lambda_1 = 0. \quad (10)$$

If $a_s > a_m$, the first term is negative: via the negative relationship between *M** and *N* the probability of detection and thus the shareholders' expected dividend decreases when *N* increases. Thus, if a potential shareholder's utility enters the government's objective function with a larger weight than the manager's utility, increasing *N* shifts expected profits to the manager and lowers the political support for the incumbent government. The term in squared brackets is unambiguously positive, representing the efficiency gains from widespread ownership: a large number of shareholders yields a low probability of detection and therefore higher incentives for the manager to engage in restructuring instead of concealing. This in turn leads to higher expected profits. In addition aggregate audit contributions decrease, which increases the share-holders' net incomes. As a result of these different effects the optimal number of shareholders may lie between 1 and $\bar{N}$, but in any case it is greater than 1[19].

If, however , $a_s < a_m$ the first term in (10) is positive, too, and we arrive at a corner solution: the government will decide to distribute the shares among the $\bar{N}$ potential shareholders. It is thus a high political weight of the manager, not a high weight of the potential shareholders that induces the government to choose the maximum dispersion of shares.

3.2. Government concerned about efficiency

What would be the number of shareholders chosen by a government whose only concern was to implement the Pareto-optimal allocation[20]? With the preferences of all agents being quasilinear this would amount to maximizing the sum of the agents' expected utilities. Thus we can use the function from (8), simply setting $a_m = a_s = 1$. In this case the first-order condition (10) boils down to

$$\frac{\partial \mathrm{L}}{\partial N} = \left[p\cdot q' - p_2\cdot q\right]\cdot \bar{\pi}\cdot e_N^* - M_N^* + \lambda_0 - \lambda_1 = 0\,. \quad (11)$$

---

19 This can be seen if we rewrite (10):

$$\frac{\partial \mathrm{L}(N,\cdot)}{\partial N} = a_s(N-1)\cdot M_N^* - a_m\cdot N\cdot M_N^* + a_s\cdot\left[p\cdot q' - q\cdot p_2\right]\cdot\bar{\pi}\cdot e_N^* + \lambda_0 - \lambda_1 = 0.$$

If *N*=1, the first term cancels out and only positive terms remain. This results from the fact that at N=1 aggregate marginal benefits and aggregate marginal costs from auditing are equalized. As soon as $N > 1$, aggregate marginal benefits are greater than aggregate marginal costs (see (P3)) and the losses implied by the suboptimal level of management control have to be traded off against the benefits from increasing management incentives.

20 When we identify the Pareto-optimal allocation we use the compensation principle introduced by Kaldor and Hicks. For a concise presentation of this principle see Boadway and Bruce (1984).

In this case all terms associated with pure income redistribution disappear and only the efficiency-enhancing effects remain. Therefore the government will choose the maximum number of shareholders, $\overline{N}$. The interpretation of this result is as follows: given its pure allocative objectives and our assumptions about the manager's preferences, the best approach for the government would be to make the manager the residual claimant of the firm's profits. This would lead to the highest level of restructuring effort and thus maximize the firm's expected profit. If, however, the government can neither sell the firm to the manager (because of the latter's wealth constraint) nor give it to him free of charge (because of political constraints), it can approximate the optimal allocation by making him a "quasi"-residual claimant by distributing ownership among the maximum number of individuals.

4. Conclusions

In our model we have shown that it is not necessarily the political weight of the broad population that induces a government to privatize an industry by allocating shares to a large number of individuals. Instead, the choice of a mass privatization scheme can rather be explained by the government's concern about the political support of the incumbent managerial class. In addition, we have shown that the government's decision to allocate shares to the maximum number of individuals makes the manager the quasi-residual claimant to the firm's profit and thus approximates a Pareto-optimal allocation - at the cost of shareholders, however, who are left with little more than they had before the event of privatization[21].

Anecdotal evidence supports our claim that it is the managerial class that strongly favors the implementation of mass privatization, and that managers try to maintain the initial wide dispersion of shares. Describing the Czech privatization where managers were invited to suggest how their firm should be privatized in a "basic project", Frydman et al. (1993b:81) report: "among the basic projects, conversion to joint stock form (leading to share sales, meaning mostly voucher privatization) predominated;...". Boycko et al. (1993) also stress the managers' resistance against large shareholders and provide evidence that insiders of the firm tried to prevent investors from acquiring greater portions of shares. The situation of the population at large on the other hand is highlighted by an opinion poll of Moskovskie Novosti of February 1994 where only 7% of the respondents uttered that the voucher program had turned them into owners.

[21] In our purely static framework we did not consider potential inefficiencies arising from a conflict between short-term income maximization and the maximization of the firm's value. Such an analysis would require the solution of an intertemporal optimization problem both by the manager and the shareholders, which was beyond the scope of this paper.

Our result that mass privatization can be a means to enhance efficiency crucially hinges on the assumption that incumbent managers will forward efficient restructuring if they are given the right incentives. Thus we do not share the wide-spread belief that "...in a great majority of cases, the incentives of the new insider 'owners' to engage in significant restructuring are rather minimal" (Earle et al. (1993:34)) and that managers „are generally survivors from an earlier period, maintaining their good connections and bad habits“ (Earle and Estrin (1995:114)). In our opinion the idea that firms are still governed by communist officials who received leading positions as a reward for their political achievements is distorted. The incumbent managers we have in mind are technically educated "technocrats" who are well able to proceed efficiently if they are given the right incentives.

It should be clear by definition that transition economies will not be in transition for ever. Mass privatization clearly is a transition phenomenon and will soon lose its political and economic significance. The number of small shareholders will drop quickly[22] , and large shareholders will eventually gain control over the firms. With the development of capital markets and a tight bankruptcy regulation the "control by non-control" will be replaced with more appropriate means of managerial supervision. Hence, if we emphasize that mass privatization can increase allocative efficiency so desperately needed in the transition period, we are well aware that this is a temporarily efficient instrument but not a panacea for ever.

Acknowledgements

We are indebted to Giacomo Corneo, Nico Hansen, Anke Kessler, Christoph Lülfesmann and an anonymous referee for helpful comments. Of course, all remaining errors are ours. Financial support from the SFB 303 at the University of Bonn is gratefully acknowledged.

References

Aghion, Philippe, Olivier Blanchard and Robin Burgess (1994): „The behaviour of state firms in eastern Europe, pre-privatisation“, *European Economic Review 38*, 1327-1356.

Baron, David P. and David Besanko (1984): "Regulation, Asymmetric Information, and Auditing", *Rand Journal of Economics 15*, 447-470.

Boadway, Robin W. and Neil Bruce (1984): *Welfare Economics* , Oxford (Basil Blackwell).

[22] Compare the experiences in Western popular capitalism. See Bös (1991:4-5).

Bolton, Patrick (1995): „Privatization and the separation of ownership and control: lessons from Chinese enterprise reform“, *Economics of Transition 3,* 1-12.

Bolton, Patrick and Gerard Roland (1992): „Privatization Policies in Central and Eastern Europe“, *Economic Policy,* 276-309.

Border, Kim C. and Joel Sobel (1987): "Samurai Accountant: A Theory of Auditing and Plunder", *Review of Economic Studies LIV,* 525-540.

Bös, Dieter (1991): *Privatization: A Theoretical Treatment,* Oxford (Clarendon Press).

Boycko, Maxim and Andrei Shleifer (1993): „The Voucher Program for Russia“, in A. Aslund and R. Layard (eds.): *Changing the Economic System in Russia,* London (Pinter).

Boycko, Maxim, Andrei Shleifer and Robert W. Vishny (1993): "Privatizing Russia", *Brookings Papers on Economic Activity 2,* 139-192.

Boycko, Maxim, Andrei Shleifer and Robert W. Vishny (1994): "Voucher privatization", *Journal of Financial Economics 35,* 249-266.

Coughlin, Peter J., Dennis C. Mueller and Peter Murrell (1990): "A model of electoral competition with interest groups", *Economics Letters 32,* 307-311.

Earle, John S. and Saul Estrin (1995): „Alternative ownership forms: the impact on restructuring“, *Economics of Transition 3,* 111-115.

Earle, John S., Roman Frydman and Andrzej Rapaczynski (1993): "Transition Policies and the Establishment of a Private Property Regime in Eastern Europe", Paper presented at the 18th Panel meeting of *Economic Policy* in Brussels on 22-23 October 1993.

Frydman, Roman, Katherina Pistor and Andrzej Rapaczynski (1995): „Corporate governance in an insider-dominated economy: a report on Russia“, *Economics of Transition 3,* 107-111.

Frydman, Roman, Andrzej Rapaczynski and John S. Earle (1993a): *The Privatization Process in Russia, Ukraine and the Baltic States,* Budapest, London, New York (Central European University Press).

Frydman, Roman, Andrzej Rapaczynski and John S. Earle (1993b): *The Privatization Process in Central Europe*, Budapest, London, New York (Central European University Press).

Lipton, David and Jeffrey Sachs (1990): "Privatization in Eastern Europe: The Case of Poland", *Brookings Papers on Economic Activity,* 293-342.

Mookherjee, Dilip and Ivan Png (1989): "Optimal Auditing, Insurance, and Redistribution", *Quarterly Journal of Economics 104,* 399-415.

Olson, Mancur (1965): *The Logic of Collective Action,* Cambridge (MA), (Harvard University Press).

Roland, Gerard and Thierry Verdier (1994): "Privatization in Eastern Europe: Irreversibility and Critical Mass Effects", *Journal of Public Economics 54,* 161-184.

Schmidt, Klaus B. and Monika Schnitzer (1993): "Privatization and Management Incentives in the Transition Period in Eastern Europe", *Journal of Comparative Economics 17,* 264-287.

Tirole, Jean (1991): "Privatization in Eastern Europe: Incentives and the Economics of Transition", in J. Blanchard and S. Fischer (eds.): *NBER Macroeconomics Annual,* Cambridge (MIT Press).