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No. 20

**THE “HOW” OF PRIVATIZATION IN CENTRAL AND
EASTERN EUROPE**

Peter Huber

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The “How” of Privatization in Central and Eastern Europe

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Abstract

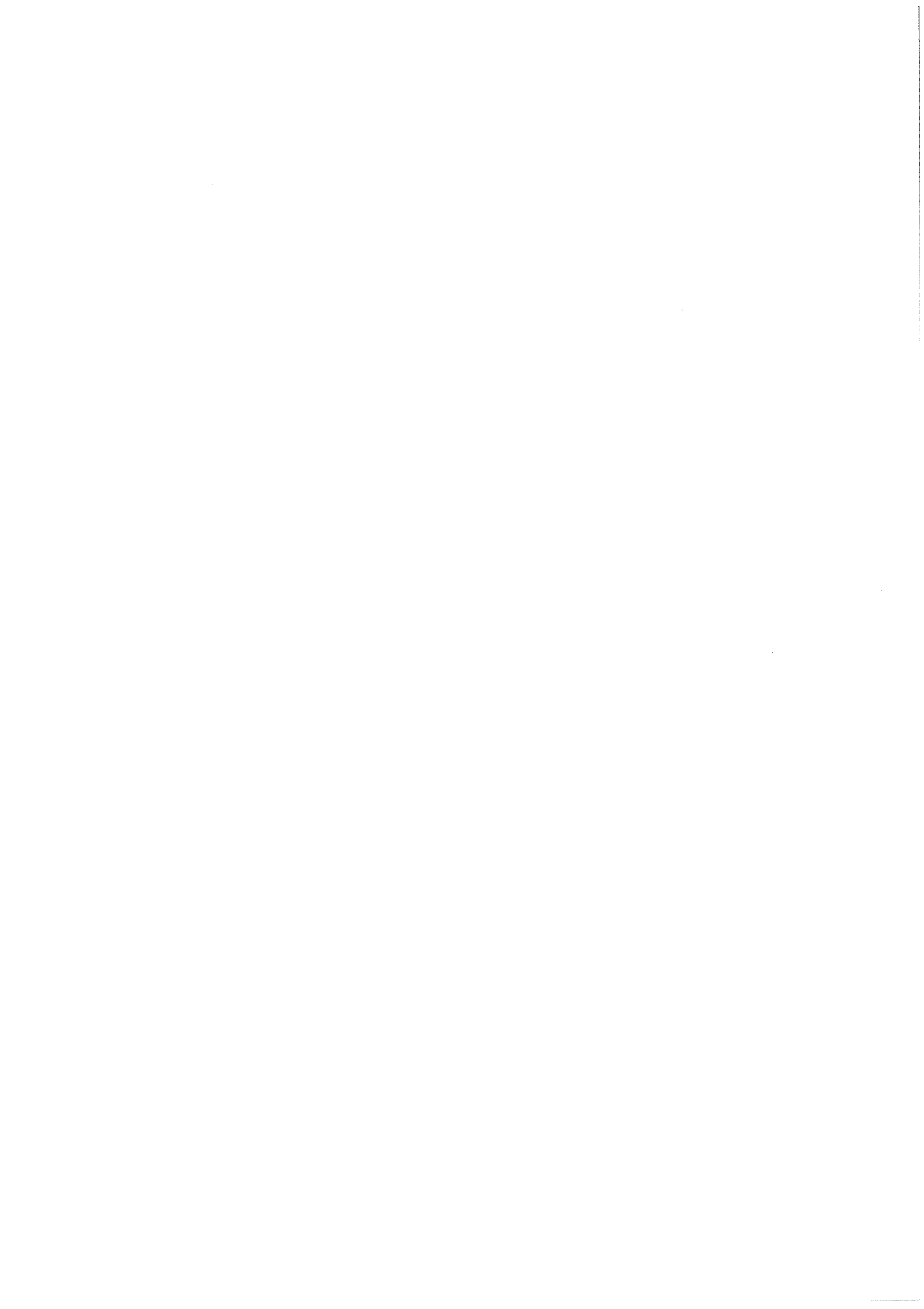
This paper analyzes how governments in transition economies, interested in their budgetary situation privatize large enterprises. While informal discussions favor voucher privatization my formal model of privatization suggests that voucher privatization may be hard to implement: In contrast to piecemeal privatization it generates no revenues that can be used to support workers which become unemployed. Therefore, from the political economy viewpoint piecemeal privatization will result in faster privatization unless governments have an ideological preference for private property or asymmetric information issues are important. The model therefore explains why governments other than the Czech have found it difficult to engage in voucher privatization.

JEL Classification

L33, P21, P26

Keywords

Privatization, Transition



0. Introduction

Despite the often voiced belief of economists that private ownership is superior to state ownership, economic theory has produced only pitifully few conclusions concerning what form of ownership is appropriate in certain settings. This lack of theory has left economists ill prepared for answering the questions posed by transition from a planned economy to a market economy, where the question of what to privatize when and how has become central.

Recently a number of authors have addressed the issues of what and when to privatize: Schmidt and Schnitzer (1993) address the optimal amount of privatization, Aghion et al. (1994) focus on the trade off between incentives of managers in state owned firms to restructure and privatization of firms during transition. In the Schmidt and Schnitzer (1993) model a liquidity constrained government agency is forced to implement a tight budget constraint by using revenues from privatization to finance loss making state owned firms, while in Aghion and Blanchard (1994) restructuring is understood as a process whereby management suffers now in order to reap the fruits later. In this model privatization which is associated with dismissal of management, by assumption, will actually hamper restructuring because the managers chances to reap the fruits of her efforts will be lower the faster privatization occurs.

Hussain and Sahay (1992) and Leamer (1994) have presented models that address the issue of what to privatize. In Hussain and Sahay (1992) state firms are assumed to be less flexible in response to private firms, the economy is divided into upstream (input producing) and a downstream (final good producing) sector. Depending on the relative size of the supply and demand shocks, either upstream or downstream firms should be privatized first. In general the sector with the smaller shocks should be privatized first since the state sector by assumption can react to shocks that affect it directly while the private sector can react to all shocks. Leamer (1994) uses a model in which capital is only partially transferable between advanced western technology and backward eastern technology. In this model the labor intensive sector should be privatized first because it can implement the new technology more rapidly.

In this paper I look at the question how privatization should occur. I develop a model of voucher privatization and piecemeal privatization in a model where firms' managers endogenously chose their efforts in restructuring. Recent literature, building on the positive example of the Czech Republic has stressed the administrative ease of voucher privatization and has favored voucher schemes. However, aside from the Czech Republic most Central and Eastern European nations have found it difficult to implement voucher privatization schemes. In this paper I argue that this may be due to the fact that governments are primarily concerned about their budgetary situation (or equivalently the political costs of privatization) and ideological goals.

I show that if this is the case voucher privatization can only be undertaken by governments that have a strong ideological preference for private ownership while a piecemeal privatization, in absence of issues concerned with bargaining under asymmetric information, is feasible for governments without an ideological preference for private ownership.

Furthermore the model also suggests that some factors that have been deemed important in the discussion of privatization may not be as important as has been expected by recent literature. The speed of reforms outside the enterprise (i.e. the speed with which markets converge to ‘perfect markets’) has very little influence on what to privatize. Indeed to fast formation of a perfect market for managers may impinge on the incentives to restructure. Similarly it can be shown that the hypothesis held by much of the literature that under state ownership managers lack the incentive to restructure their enterprises is heavily dependent on a) the ideological preference of the government for private ownership and b) the social costs associated with bankruptcy.

Recent empirical Literature has confirmed this last prediction: Carlin et al. (1994) for instance, in a summary of case study materials, have shown that state owned firms took a number of organisational measures that could be associated with restructuring. In particular they find three types of management behavior in transition. There are a number of firms that are actually restructuring, others are plainly not taking any measures at all while finally some are taking steps that seem to be ill suited for successful restructuring, which may be associated with plain incompetence or with conscious resistance to the transition. Within the group of managers that do not take any measures to restructure there are furthermore those that do not restructure because they are discouraged because of the situation that their enterprise and those that do not restructure because they feel sure that the failure to restructure will not have any adverse effects for them.¹

Since the comparison of methods of privatization in transition economies entails assumptions that are particular to the situation of transition and makes necessary the comparison of two games that are identical in their structure but differ in the payoffs. I make the assumptions plausible in section one of this paper, while in section two I present the game at the example of voucher privatization schemes leaving the specification of payoffs under piecemeal privatization to later.

In section three I look at how much restructuring takes place in firms during transition in dependence of the ownership type under voucher privatization while in section five I examine what influences the speed of transition outside the enterprise sphere has on restructuring and sequencing of privatization. Section five then repeats this procedure for piecemeal privatization and section six concludes the paper.

1. The Specifics of Transition Economies

Three assumptions, especially plausible in the context of transition economies, make analysis of the model easy. At the same time these assumptions also limit the generality of the model seriously and represent the peculiarities of transition economies.

¹ Pinto Et al. (1993) use econometric methods on Labor market adjustment to show that the employment structure and financial indicators of state owned enterprises have actually reacted to the market reforms of the countries

The first of these particularities stems from the "heritage" from the old regime which expresses itself in a lack of a factor I call "market know-how". This refers to the lack of knowledge about potential customers that has arisen from the break-down of the old foreign trade partners, the lack of brand name products, the need for reducing the labor force and the necessity to develop new products commonly referred to in industrial analysis of transition economies, but it also encompasses such factors as lack of organizational and managerial know how and subsequent overstaffing of enterprises. Unlike in the case of most state owned enterprises in established market economies therefore there is no question whether firms need restructuring. It is quite clear in the transition context that restructuring, and therefore effort on the side of management, is needed.

The second peculiarity arises from the lack of a well established legal system that causes many uncertainties concerning the actual interpretation of contractual regulations and fails to regulate such issues as the form of reporting of managers to their respective owners. This peculiarity impinges on the possibilities of owners to create incentives for managers: Bonuses may be impossible simply because there is no way to enforce them legally, similarly principal agent problems will be extremely severe in a legal setting that has not taken account of the conflicts of interest in the capitalist economy.

The third aspect that makes transition economies different from established market economies is the lack of a well functioning labor and capital market and wrong relative prices. The lack of a well established system of labor offices or similar institutions, that guide the unemployed in their search for new employment, make it plausible that a layoff is associated with higher social costs than in the established market economies. Lack of capital markets on the other hand impinges further on the possibilities of owners to create incentives in the transition process. There is no possibility to let managers participate in the firms success via issue of shares as would be suggested by standard principal agent literature. Distorted relative prices at the beginning of transition finally may cause social losses in the form of inefficient investments. (Adam/Schwartz, 1992)

During transition there are therefore severe limitation on owners (private or state) possibilities to motivate managers. Indeed the only possible device capable of motivating managers may be the threat of dismissal. Such a threat to be effective, has to be credible. It is here that differences between state and private ownership arise.

Take for instance the case of a closing of operations: A private owner, unconcerned about social costs of closure can credibly threaten to close operations when the present value of a firm is lower than its liquidation value. A government on the other hand will have to take account of social costs and may therefore have a less credible threat.

2. The Model

In what follows I look at privatization in Central and Eastern Europe in a two period game which allows to analyze:

- a) The timing of privatization i.e. the question when should privatization take place

- b) The method of privatization i.e. how should one privatize
- c) the effects of reforms outside the enterprise sphere and the quality of the enterprise i.e. what should be privatized

Formally the game is very simple. There are three parties to the game: the management, the board of directors of privately owned firms and the government which is the owner of state owned firms

The government is concerned with its long run budgetary situation. If the government is concerned with its budgetary situation its payoffs depend on the costs of operation (w for wages) of the firm, the expected future value of the firm at the end of the game, if the firm is not privatized or the revenues from the sale of the firm if it is privatized, and the costs of closing a firm (such as unemployment benefits) which is reflected by a disutility² of Δ . Finally, the government also has disutility T if after transition it keeps the firm. This disutility reflects the ideological preferences of the government. A high T would signal high preferences for private ownership and a low T would imply low preferences for private ownership.³

Managers derive utility from the wages they receive and disutility from the effort they exert. On top of this, if their firm is closed managers have to come up for a social cost of $-\Delta^m$. The board finally is concerned about the future value of the firm and operating costs only.

The game has two periods ("now" and "later"). The difference between these two periods lies only in the social costs associated with closing of firms. In the period termed "now" these Social Costs are Δ_0 while in the second period (i.e. later) they are Δ . Later in the reforms labor markets will be more competitive than at the beginning of reforms it follows that $\Delta_0 > \Delta$.

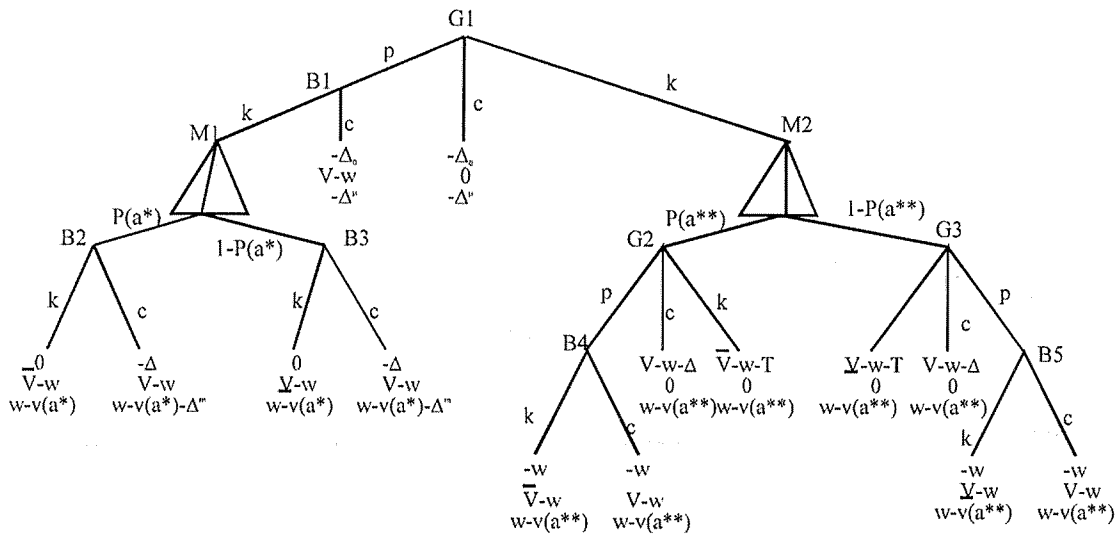
In the first step of the game the government, which is the owner of the firm initially, decides whether to privatize, close or keep a firm "now". If the government closes the firm it earns the firm's liquidation value V and has to come up for the social costs of the closure (Δ_0) the board receives nothing, while the managers receive $-\Delta^m$ and the game ends.

If the government decides to privatize or keep the firm the game continues to the second stage. This first step in the game is intended to model the decision to privatize the firm before restructuring can take place. This step creates two kinds of firms: those that were privatized now and those that were kept.

² Equivalently this disutility could be interpreted as a political cost in terms of loss of support with the voters, which would give the model an even closer "political economy" interpretation.

³ Another interpretation of T could be that government owned firms are less efficient in established market economies. In this instance T would reflect an actual "out of pocket" cost to the government of holding a firm. However, in the model there is nothing to suggest that in established market economies state owned firms are less efficient than government owned firms. Therefore for reasons of consistency we prefer the first interpretation.

Diagram 1: The Game under Voucher Privatization



If the firm has been privatized “how” the board of directors may liquidate the firm immediately if it was bought only on speculative grounds. If indeed the board chooses to close the firm it gets the liquidation value V and the game ends otherwise if the board continues the game period two is reached.

In the second period, irrespective of ownership type, the first move is by the managers; they decide on an activity level (a) such that $a \geq 0$ which is unobservable to the owners. This activity level adds to the existing stock of “market know how” which influences the chances of success of a firm. In the next move nature moves to one of two states of the world. The “good” state of the world is reached with a probability ($P(a)$) such that $P(0)=\rho$ $P'(\cdot)>0$ and $P''(\cdot)<0$ while with probability $1-P(a)$ the game moves to the “bad” state. This step in the game is intended to capture two ideas: First, restructuring is conditional on the activities set by the management and improves the chances of an enterprise to survive. Second, even firms with the hardest working management, that are restructuring very fast, may just be unlucky and restructuring may not lead to the firm being successful.

Restructuring of course is costly to managers in that the effort needed to show some activity causes disutility. This disutility is a function of a with the properties $v'(a)>0$ and $v''(a)>0$.⁴ The manager gets a wage (w) to compensate the manager, this wage, because of the above mentioned capital market inefficiencies and legal problems, can not be made state dependent. That is irrespective of the state of the world the manager can expect a benefit of $w-v(a)$ if her firm is kept in operation and $w-v(a)-\Delta^m$ if the firm is closed down at the end of the game.

⁴ This represents only a trivial “generalization” with respect to Schmidt/Schnitzer and could just as well be excluded without changing any of the qualitative results

Both the managers and the chance move occur irrespective whether the firm has been privatized ‘how’ or not. However, after these two moves it is once more the owners time to move and strategies depend on the ownership type of the firm.

If the firm has been privatized earlier the board decides whether to continue to run the firm or whether it should close it down. Since the outcome of the transition process is unsure and capital markets that could evaluate the firms do not exist, the owners of the firm have to evaluate the value of the firm by means of the state of the nature. It is assumed that in the good state of nature the expected future value of the firm will be \bar{V} while in the bad state it is \underline{V} .

The payoffs of the board if it continues operations in the good and bad states are $\bar{V} - w$ and $\underline{V} - w$ respectively. However, the board could also close down the operations such that they receive only the liquidation value V minus the wages of the firm. The payoffs of the government are $-\Delta$ if the firm is closed down by the board and zero else.

If the firm has not been privatized, once nature has moved, the government as the owner once more has to decide whether to close the firm down, keep it or privatize it. If it keeps the firm, the firm will not be privatized at all and the payoff is $\underline{V} - w - T$ or $\bar{V} - w - T$ depending on the state of nature, while if it closes the firm the payoff will be $V - w - \Delta$. If the government privatizes the firm in its second round it will have to pay the wage to the workers but, under voucher privatization, will not receive any revenues (because the firm will be given away for free) and it is once more the boards turn to choose whether to keep or close the firm.

3. Restructuring

The game has a number of specific features first of all the effort level (a) does not play a role for the decisions that have to be taken after the move of nature. Beliefs therefore have no role to play in equilibrium selection below these points. I therefore set the beliefs arbitrarily at a' if the good state is reached and a'' if the bad state is reached and solve for a perfect bayesian equilibrium by backward induction.

There are two proper subgames in the game both starting in the second period if the firm has been privatized previously or the state is still the owner (M1 and M2 in the diagram). These two subgames have an interpretation of their own: The first is a game that models restructuring under private ownership while the second models restructuring under state ownership.

Restructuring in a privately owned firms

If the firm was privatized by the government and not closed by the board in the first period, the board will always close down operations in the good state of the world and keep the firm if in the good state of the world. Due to this very simple behavior of the board the manager maximizes the function

$$(8) \quad P(a)(w-v(a)) + (1-P(a))(w-v(a)-\Delta^m)$$

with respect to a . This gives rise to the following first order condition.

$$(9) \quad P'(a)\Delta^m = v'(a)$$

Note that by the assumptions on $P(\cdot)$ and $v(\cdot)$ the choice of activity level will be increasing in Δ^m . The manager will therefore work harder (restructure faster) the more she stands to lose by closing down the firm.⁵

Restructuring with a State Owned Firm

If the firm has not been privatized previously the second period starts just the same way as under private ownership: Managers decide on their activity level and then nature selects a state of the world given the original "market know how" and the additions that have been made to it by the managers activity.

1) Close down the firm in which case the government can obtain the liquidation value V and has to pay the wages. However, since the labor market in a transition economy is characterized by friction there will also be social costs to restructuring in the height of Δ that the government has to bear on top of wage costs

2) Keep the firm in this case the government obtains the value of the firm in the respective state of nature i.e. \bar{V} or \underline{V} depending on whether the state of nature is "good" or "bad" respectively. On top of this the government incurs a loss of T . This parameter T models the preference the government has for private ownership, that is the higher T the higher is the disutility the government incurs by holding a firm rather than giving it into the hands of a private owner.

3) Privatize the firm. If this last possibility is chosen the game does not end as in the other cases but continues on with a move from the board of the now private enterprise. The board can decide to close down the enterprise or it could keep it open. This last step is a step that takes into account that the board only acquires a "bargain" enterprise for asset stripping.

How do the equilibrium strategies look in this subgame? Clearly if the firm is privatized in the good state the board will choose to continue operations the payoff for the government will therefore be $-w$, while in the bad state the board will close operations and the payoff associated with privatization for the government will be $-w-\Delta$. In the bad state therefore privatizing will be dominated by closing the firm. However keeping the firm will be preferred to closing the firm if $T < \underline{V} - V + \Delta$. The equilibrium strategies are therefore keep if $T < \underline{V} - V + \Delta$ and close else.

⁵ A necessary condition for restructuring is that $\Delta^m > 0$. That is the motivation of the manager to restructure results here from the fact that the board will react differently in the good and in the bad state that is the real incentive to restructure in this model comes from the imperfection in the market for management skills. Of course a number of authors (including Aghion et al. (1994)) have suggested that the manager by restructuring successfully may be able to signal something about her quality. Such a difference in payoffs could of course easily be incorporated by assuming that the payoff in the good state is $w - v(a) + e$ where e is a market premium the worker gets for ending up in the good state. In such a slightly more general model the first order condition would be $P'(a)(e + \Delta^m) = v'(a)$. That is the premium clearly increases effort. Carlin et al. (1994) in their analysis of case studies note that such a market for managers does not seem to exist in most transition economies and therefore this source of motivation seems to be rather theoretical.

The equilibrium strategies in the bad state of the world are illustrated in diagram 3a. This diagram has the governments preferences for privatization (T) on the vertical axis and the social costs of closing the firm on its horizontal axes. The diagonal line in the diagram is the line $T = \underline{V} - (V - \Delta)$. If T is larger than the left hand side of this equation then the government will close the firm else it will keep the firm. Therefore combination of T, V and Δ in the lightly shaded area on the top right of this diagram will have closing as a consequence, while the bottom left (darkly shaded) area will signify closing.

In the bad state of the world closing will be more attractive the higher the governments preferences for private ownership (T), the higher the liquidation value, and the lower the social costs of closing a firm. All three relationships have intuitive appeal. First the more the government dislikes to have enterprises the better it will be for a government to close down the enterprise rather than continuing to run it. Second, the higher the net social benefits ($V - \Delta$) of closing the firm, the less the government stands to loose and the more willing it will be to close the firm.

Diagram 3:

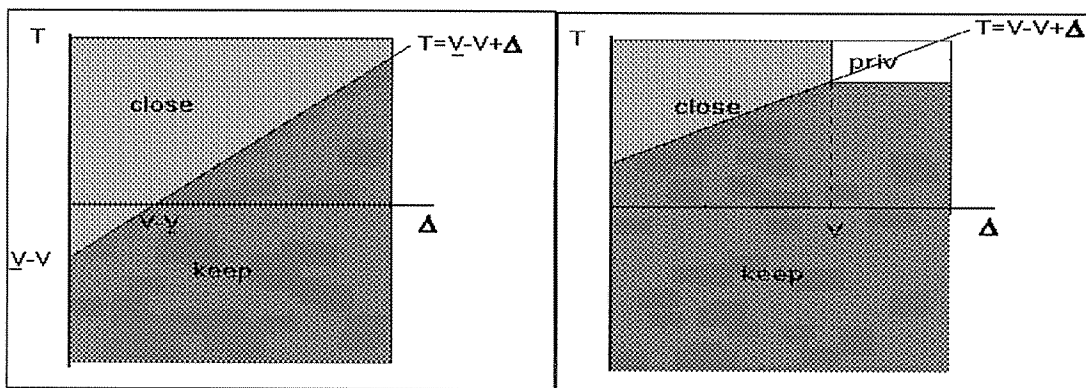


Diagram 3a

Diagram 3b

In the good state of the world the equilibrium strategies of the government can be summarized by the following theorem:

Theorem 1: If $0 \geq \max(\bar{V} - T, V - \Delta)$ then privatization will be the best choice in the good state, if this is not the case then the government will choose to close the firm if $T > \bar{V} - (V - \Delta)$ and keep it open else.

The proof of this theorem follows immediately from considering the government payoffs in diagram 1.

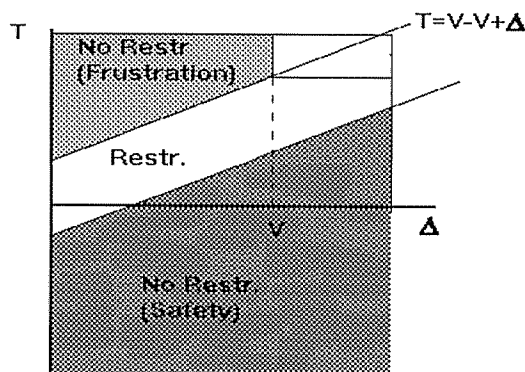
As in the case of the bad state the dominant strategies in the good state can be summarized by a diagram. In diagram 3b I illustrate the equilibrium strategies of the government in the good state.

This diagram differs from diagram 3b in two ways. First of all the border condition for closing the firm has moved to the right. In the good state the government will be less willing to close the enterprise. Second of all there is an area where privatization could occur on the left hand top corner of this diagram. Privatization under voucher privatization will therefore only be possible when the preference of the government for privatization is high (higher than the present value of the firm in the good state) and when there are net social costs to closing the firm.

When will restructuring occur in a state owned enterprise? Clearly managers will only have an incentive to restructure if outcomes for them differ according to the states of nature (this after all is what guarantees restructuring). It follows that by superimposing diagrams 3a and 3b one gets an area where the parameter constellation is such that the firms will restructure, while there are two areas where the outcome for managers does not depend on the state of the world:

On the right top of diagram 4 the firm will be closed irrespective of the state of the world. I label this area frustration zone because managers in this situation know that irrespective of their activity level their firm will always close down. On the bottom the firm will never be closed no matter what the state of the world. This area is labeled safety zone because managers will not put in any effort at all since no punishment for their laziness will occur. The relative restructuring of state and private owned firms is therefore heavily dependent on the parameter constellation. In the restructuring zone private and state owned firms will exhibit the same amount of restructuring, while everywhere else state owned firms will not restructure at all.

Diagram 4:



4. Privatizing Now or Later

Having analyzed the two subgames in the game the expected equilibrium payoffs of the first period moves can be read off from diagram 5. In this diagram the expected equilibrium payoffs of the strategies "closing now" and "privatizing now" for the government are written, while the payoff of the strategy "keeping" for the government is denoted by an X since it depends on the parameter constellation.

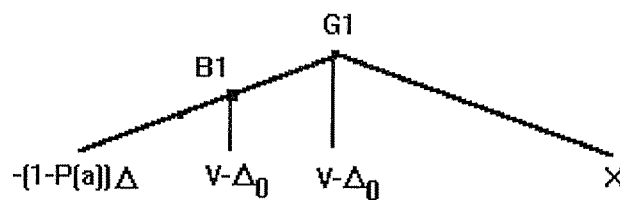
As can be easily checked from diagram 5 the board will choose to close down a firm as long as $w > P(a^*)(\bar{V} - V)$. This leads to the following results:

Theorem 2: If $w > P(a^*)(\bar{V} - V)$ the government will never privatize the firm and prefer to close it in the first period. If however $w < P(a^*)(\bar{V} - V)$. As long as

$$(10) \quad \Delta > (\Delta_0 - V) / (1 - P(a^*))$$

The government will always prefer to close the firm now rather than privatizing it immediately. That is as long as reforms lead to a rapid fall in the social costs of a closure to a government it would always prefer to speculate on a possible success of restructuring rather than closing down the firm.

Diagram 5:



Concerning the expected payoff of keeping the firm four situations are imaginable:

1. Restructuring - with keeping the firm if it ends up in the good state and with closing in case the firm ends in the bad state.
2. Restructuring - with privatizing the firm in the good state and closing it in the bad one.
3. No restructuring - with keeping the firm in both states
4. No restructuring and closing the firm no matter what state is reached

Each of these scenarios has its own implications for the timing of privatization. However, the derivation of the equilibria involves a substantial amount of tedious algebra and therefore derivations are relegated to the appendix at the end of the paper, while I turn directly to the analysis of the overall picture here.

Diagram 6 “maps” the optimal strategies in dependence of the parameter constellations on the T, Δ diagram. In developing this diagram the following additional assumption were made⁶

A1: $\Delta_0 - V > \bar{V} + V$

A2: $w > (1 - P(a^*))V$

⁶ Appendix 1 also discusses the results of a relaxation of these assumptions in some detail

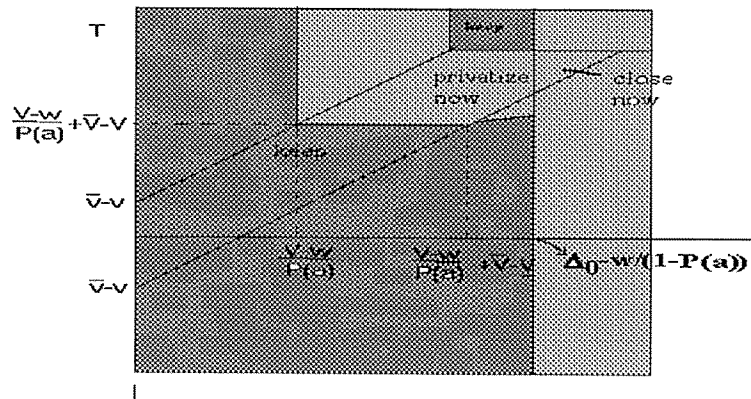
Given these assumptions on the parameters I can unambiguously decide on the optimal strategies under all scenarios.

In diagram 6 closing will occur whenever $\Delta(1-P(a^*))+w$ is larger than Δ_0 . The term $\Delta(1-P(a^*))+w$ represents the expected costs due to keeping the firm in operation for just one more period while Δ_0 are the savings when keeping the firm in operation. The intuition for this result is clear: When the expected savings, due to keeping the firm in operation, are smaller than the anticipated costs it is better to close the firm immediately and not to gamble on a possible success of the restructuring program.

What is more interesting in this diagram is that privatization is only possible at all if the government has a distinct preference for the private form of ownership. This is a point that seems to be empirically relevant in the context of voucher privatization. It is one of the most commonly cited experiences that although largely successful in the Czech Republic, voucher privatization has not come of ground either in Poland or in the Slovak Republic after its split from the Czech Republic, the date of such privatization having been continuously shifted backwards.

The model presented here would suggest that the reason for these different experiences with voucher privatization lies primarily with government preferences rather than with other factors

Diagram 6



At the same time the model allows the analysis of two factors that have repeatedly been stated as decisive in discussions on the actual speed of privatization. First one can look at how changes in the social costs of a closure later (Δ) will change the privatization decision. Keeping Δ_0 constant this will amount to the question of how the speed of reform in the environment of enterprises would affect the speed of

privatization.⁷ The conclusion of this model is that the importance this factor may well have been overestimated. In general as Δ becomes smaller, while keeping all other factors constant the only result is that less should be closed. Only if the government has strong preferences for privatization will there be a possibility for the government to capitalize on these lower expected social costs.

Furthermore, one can analyze how the development of the cost of closing the firm to a manager and a change in the quality of enterprises changes the picture. A better development of the labor market for managers is equivalent to a fall in Δ^m which in turn reduces $P(a^*)$ while a reduction of the quality of enterprises reduces $P(a^*)$. Therefore according to diagram 6 both make privatization in an early stage of transition even more unlikely with given government preferences.⁸

5. Piecemeal Privatization

As pointed at the beginning of the paper the difference between piecemeal privatization and voucher privatization from the point of view of the model presented is that in piecemeal privatization the government receives revenues from the purchaser of the company. This implies that in a game that would attempt to model piecemeal privatization care would have to be taken to model the bargaining process that would have to take place prior to privatization.

Due to the missing capital markets it has to be assumed that this bargaining takes place under asymmetric information meaning that the solution to the bargaining game going on between the government and the prospective buyer is all but clear. This means that a detailed model of such a privatization would undoubtedly run into an extremely complicated structure.

As a starter, I cut through these problems by simply assuming that in piecemeal privatization both the government and the prospective seller have complete information and that each period with certainty one buyer starts negotiation with the government. The government confronts the prospective buyer with a take it or leave it offer. If the prospective buyer in the first period rejects the offer the government will have to wait until the second before it can enter negotiations with another (or the same buyer) again. If the prospective buyer rejects the offer in the second period the firm will remain unprivatized.

In this setup the government will always offer the firm for the maximum price the buyer is willing to pay. This maximum price in turn will be the expected Value of the firm in all instances. That is the government can expect revenues from privatization equal to \bar{V} or \underline{V} depending on the state of nature in the second period and equal to $P(a^*)(\bar{V} - w) + (1 - P(a^*))(\underline{V} - w)$ in the first period. If the government does not want to

⁷ Assuming that in "perfect" markets the costs are close to zero this is equivalent to asking what effects the speed of convergence to such a perfect market has.

⁸ However, the development of reputational effects in the market for managers referred to earlier actually make early privatization likelier in the transition.

privatize, it will simply offer a price in excess of the prospective payers willingness to pay. Otherwise the game proceeds as previously.

Diagram 7: The Game under Piecemeal Privatization

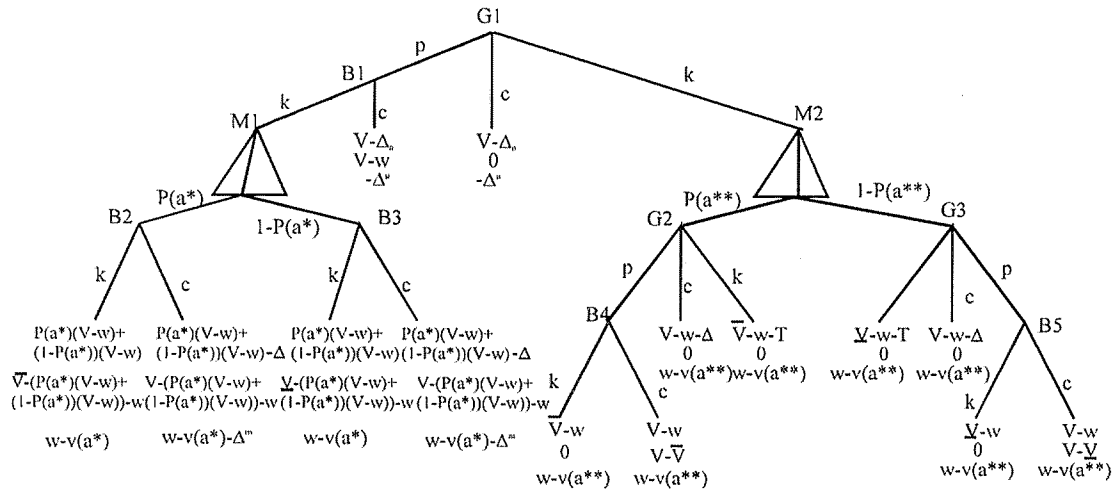


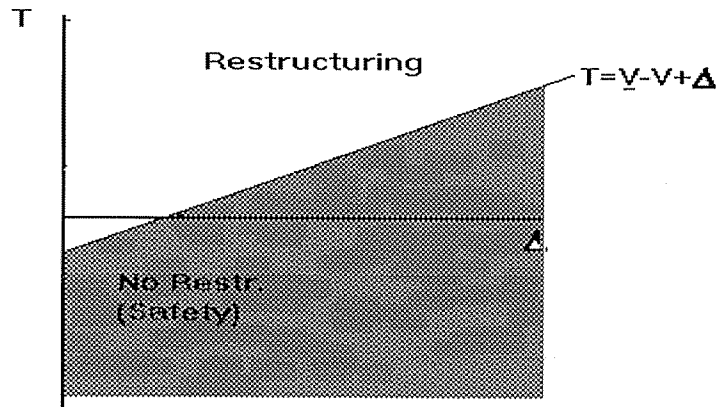
Diagram 7 illustrates that the only difference to voucher privatization in this simplified model of piecemeal privatization will be that privatization is now accompanied with revenues. However the equilibrium of the subgame starting in the second period if the firm was privatized remains unchanged. Therefore all that has to be done is to analyze the equilibrium of the subgame under state ownership.

In this game in the good state privatization dominates closing the firm the decision is therefore only between keeping and privatizing. As long as $T > 0$ the government will always want to privatize and the board will subsequently continue operations. In the bad state privatization and closing are equivalent, it follows that the firm will be closed if $T > \underline{V} - (V - \Delta)$ and kept else.

The equilibrium strategies of the managers are summarized in Diagram 8. Comparing this diagram to diagram 4 one can see that the area of frustration on the top left of diagram four which results in voucher privatization disappears under piecemeal privatization. This means that under piecemeal privatization there will be a higher chance to find government owned enterprises that are restructuring. The reason for this is that the revenues resulting from privatization make a government, concerned about budgetary issues, more willing to privatize. Therefore it becomes more profitable to privatize relative to closing down a firm.

The same revenue generating function of privatization under piecemeal privatization also generates the second major difference between voucher and piecemeal privatization. Under piecemeal privatization the government can achieve privatization in the second period as long as $T \geq 0$. While under voucher privatization this is only possible when $T > V$. That is the government will be more willing to privatize under this setting.

Diagram 8



Privatizing Now or Later

In contrast to the case of voucher privatization there are only three scenarios with different implications for the speed of privatization left in the instance of piecemeal privatization:

1. Restructuring with privatization in the good state and closing in the bad state
- 2 Restructuring with keeping in the good state and closing in the bad state
- 3 No restructuring and keeping in both states

Again the optimal strategies for each case are presented in appendix one while below I only analyze the results.

Diagram 9

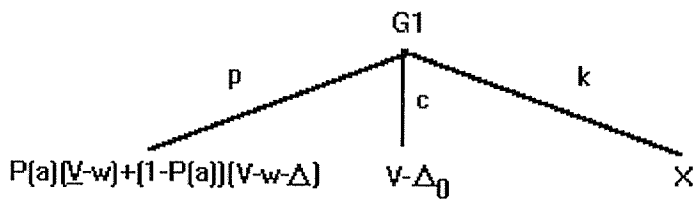


Diagram 11 shows the expected equilibrium payoffs of the government from its first period actions as is obvious from this diagram privatization will be preferred to closing if:

$$(21) \quad \Delta = <(P(a^*)(\bar{V} - V) - w + \Delta_0) / (1 - P(a^*))>$$

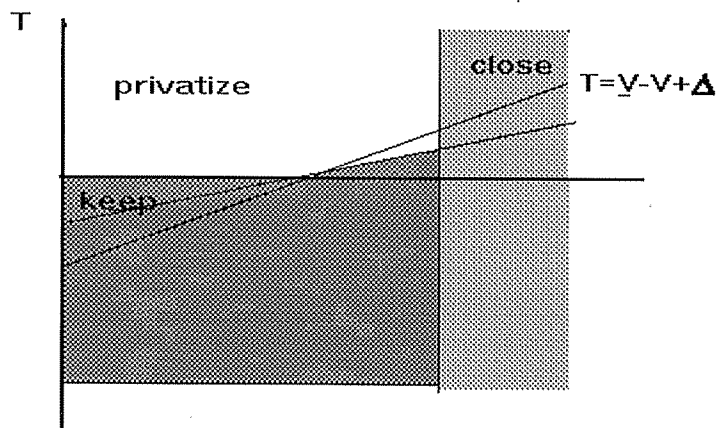
Diagram 10 repeats Diagram 8 (and shows which firms will be closed in dependence of the parameters of the problem). As can be easily seen much more will be privatized in an early stage under piecemeal privatization. The privatization process will be much faster in the piecemeal privatization programs. This seems to contradict the stylized facts of privatization. Indeed one of the reasons why voucher privatization has been superior to piecemeal privatization is that voucher privatization is faster.

This contradiction to the facts stems most probably from the missing elements in the model. Two advantages are usually named when comparing voucher to piecemeal privatization. First, it is argued that the voucher privatization doesn't entail lengthy bargaining over the price of the firm. Second it is held that under voucher privatization there is less of a chance for workers to form coalitions that oppose privatization to a concrete owner. Both arguments are abstracted from in this model.

Despite this shortcoming of the model there are interesting predictions it makes about the speed of privatization and reforms: An increase in the speed of reforms outside the firm (an decrease in Δ) will reduce the number of firms closed and increase the number of firms privatized early. The number of firms that are kept for possible later privatization remains unchanged, however. Similarly a decrease in the second period imperfection of the market for managers will not change the number of firms kept but work in the opposite way of the speed of reforms.

There is therefore a parallelity in both forms of privatization in that the speed of outside reforms does not seem to have a significant influence on the amount of privatization in the early stages of reforms. Much rather it is government preferences that are decisive.

Diagram 10



6 Conclusions

This paper had a twofold purpose: The first purpose was to see how well a simple model of privatization could be used to explain the phenomena appearing in Central and Eastern Europe and the second purpose was to compare two methods of privatization popular in Central and Eastern Europe. Three popular hypotheses of

scientists in the field were analyzed in this model. The first hypothesis is that state owned firms restructure less than do the government owned firms. The second hypothesis was that the speed of reforms outside the firms sphere of influence has heavy bearing on both the restructuring within firms and on the speed of privatization. The third hypothesis, finally was that the institutional setting in which privatization will take place has heavy bearing on the speed of privatization.

Within the simple model (based upon a model of Schmidt and Schnitzer) I used, I found that a government that is interested in revenues, political costs and has a certain "ideological" preference for a certain property type will not privatize much earlier in transition if reforms outside the firm are faster. Furthermore the only relevant bearing the form of ownership has on the restructuring effort of managers is that under government ownership the management has no incentive to restructure under certain parameter constellations. If the parameter constellations are "right", however, government owned firms will restructure just as much as privately owned firms.

The institutional setting under which privatization takes place does have a heavy influence on both restructuring, however. Under piecemeal privatization restructuring will take place in all firms while under voucher privatization there are some firms that will either be frustrated and won't restructure or feel safe enough so that no restructuring will be needed.

Although the model I presented is very simple it seems that the general structure of this model could well be helpful in analyzing privatization issues. In particular it may be valuable to look at how privatization would change a) with a benevolent government that maximizes social welfare and b) what this model would predict if the owners could actually create incentives in the form of bonuses as are usual in the developed capitalist economies.

Appendix 1: The separate Scenarios under Voucher Privatization

Case 1 (keeping in good State closing in bad)

Theorem 2: In the first scenario (keeping in the good state and closing in the bad) the government will prefer privatizing the firm for now to keeping it as long as:

$$(11) \quad T \geq (V-w)/P(a^*) + \bar{V} - V$$

while closing will be preferred to keeping if

$$(12) \quad T > \bar{V} - V + (\Delta_0 - (1-P(a^*))\Delta - w)/P(a^*)$$

The equilibrium strategy of the government in the first period is therefore to keep all firms for which (11) does not hold, and to privatize the others as long as (10) holds. Firms for which (10) does not hold will be closed.

Proof: Note that in this scenario the expected payoff of keeping the firm just one period longer is given by:

$$X = P(a^*)(\bar{V} - T - w) + (1 - P(a^*))(V - w - \Delta)$$

Comparing this to the expected payoff of privatizing the firm now given in diagram 6 yields equation (11) and comparing the payoff of closing to this yields (12).

Case 2 Privatizing the firm in the good state and closing it in the bad

In this case the expected payoff of keeping the firm in this situation is

$$(14) \quad X = -P(a^*)w + (1 - P(a^*))(V - w - \Delta)$$

Therefore the government will prefer keeping to privatizing if:

$$(15) \quad w > (1 - P(a^*))V$$

while keeping will be preferred to closing as long as

$$(16) \quad (\Delta_0 - w - P(a^*)V)/(1 - P(a^*)) > \Delta$$

Case 3 Safety

In this case under privatization the managers will not exert any effort at all and the probability of ending up in the good state of nature will be ρ therefore the expected equilibrium payoff of keeping the firm is :

$$(17) \quad X = \underline{V} - w - T + \rho(\bar{V} - \underline{V})$$

if

$$(18) \quad T > \underline{V} - V - w + \rho(\bar{V} - \underline{V}) + \Delta_0$$

then the expected payoff of closing will exceed that of keeping the firm and if

$$(19) \quad T < (1 - P(a^*))\Delta + \underline{V} - w + \rho(\bar{V} - \underline{V})$$

privatization will be better than keeping.

Case 4 Close in both cases

In this case the payoff when keeping is given by $V - w - \Delta$. As long as $\Delta - \Delta_0 < V - w$ (which is true by assumption A1) keeping dominates closing now. The decision is therefore between keeping and privatizing. The decision is therefore only between privatizing and keeping now: If

$$(20) \quad \Delta > (V - w)/P(a^*)$$

privatizing will be chosen else keeping

Appendix 2: The separate scenarios under piecemeal privatization

Case 1: Privatize in Good State and Close in Bad

In this case the payoff from privatizing now is equivalent to that of keeping the firm one more period. That is the government will privatize as long as (21) holds

Case 2: Keep in Good State and Close in Bad

Here $X = P(a^*)(\bar{V} - T - V) + V - w - (1 - P(a^*))\Delta$ and privatizing is only better than keeping the firm in the first period when $0 \geq -P(a^*)T$. However, since $T < 0$ in this case this cannot be fulfilled. When inequality (21) is fulfilled therefore the government will prefer keeping to privatizing and privatizing to closing. Therefore keeping is the best choice.

If inequality (21) is not fulfilled then the choice is between closing and keeping: Closing will be preferred if $(w - \Delta_0 - P(a^*)(\bar{V} - T - V)) / (1 - P(a^*)) > \Delta$. However, since $T < 0$ and $\Delta_0 > w$ the left hand side of this inequality is negative. Therefore keeping will also be the best option in this case. The government will therefore always choose to keep the firm.

Case 3: Keep in Both States

In case 3 finally the expected equilibrium payoff for keeping the firm is given by $X = \rho(\bar{V} - \underline{V}) - T - w + V$ this will be lower than the payoff of early privatization if

$$(22) \quad T \geq (1 - P(a^*))(\underline{V} - V + \Delta) + \rho(\bar{V} - \underline{V})$$

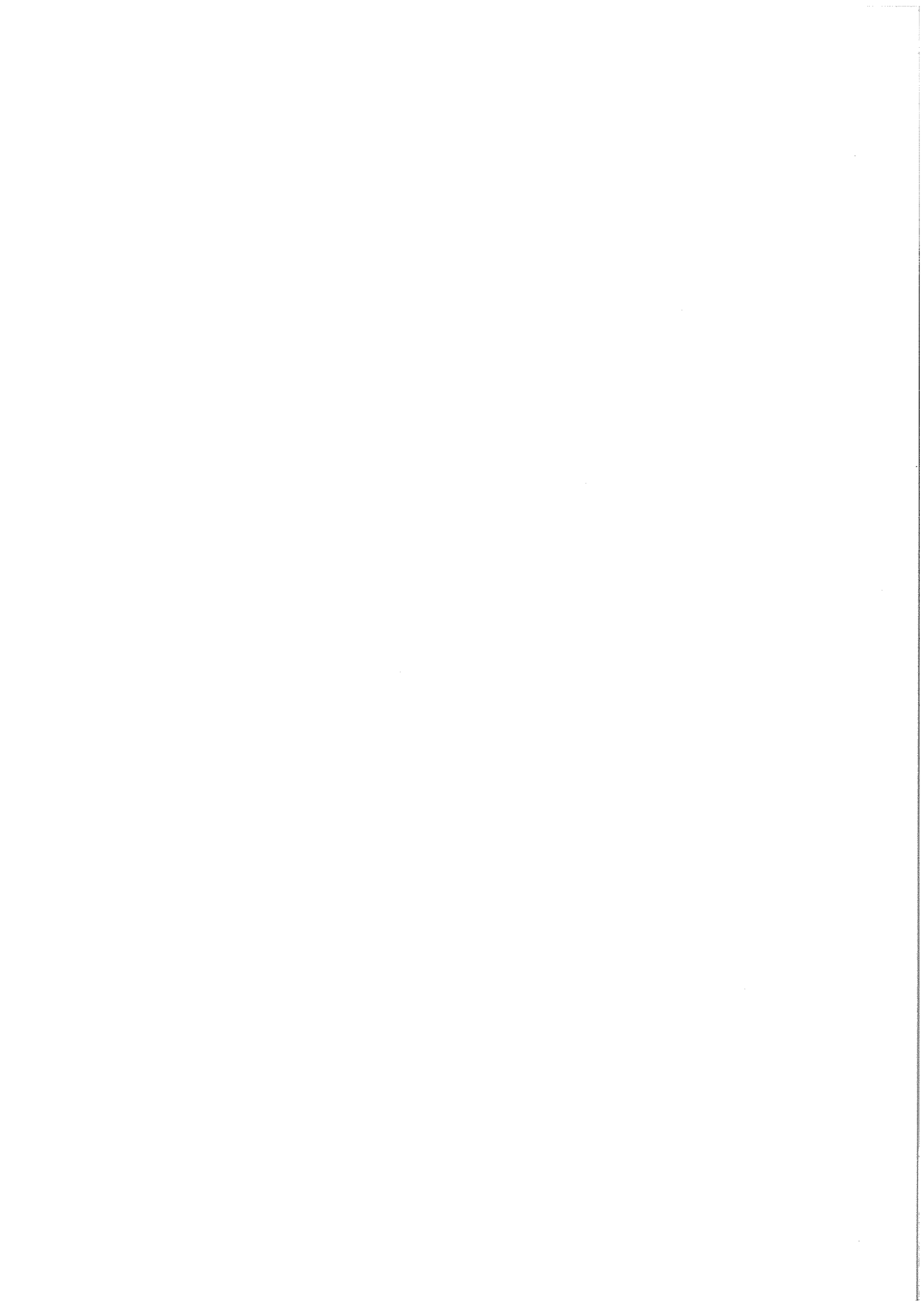
For $\Delta = 0$ this implies that T must be larger than $(1 - P(a^*))(\underline{V} - V) + \rho(\bar{V} - \underline{V})$. For $T = V - V + \Delta$ the critical Δ must be equal to $\rho(\bar{V} - \underline{V}) / P(a^*)$.

At the same time closing will be preferred to keeping if

$$(23) \quad T > \Delta_0 - V - w + P(a^*)(\bar{V} - \underline{V}) + \underline{V}$$

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