Privatization in Eastern Germany: Management Selection and Economic Transition

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This paper suggests that management's role in enterprise restructuring and market failures in the managerial labor market help explain important features of the German privatization program. A model of adverse selection based on information advantages for private owners demonstrates how privatization can improve the quality and number of western managers in eastern enterprises. These benefits can increase with the size of the transition. Evidence of management replacement and significant differences between state-owned and privatized firms from a survey of eastern German firms supports model assumptions and predictions. These results suggest the importance of management replacement to successful privatization. (*JEL* L33, J41, P21)

"In order (for restructuring) to succeed, beside capital and technology, qualified management cannot be done without. Everyone knows that the largest bottleneck lies in this field."

(Helmut Kohl, January 16, 1992)[1]

On January 1, 1995, the German government disbanded the German privatization agency, the Treuhandanstalt (Treuhand), declaring it a success. Founded in 1990, the Treuhand was once the largest holding company in the world, employing four million people in more than 8,000 firms (later 14,000 as some large firms were separated). In just four and one-half years, the Treuhand privatized more than 13,800 firms and parts of firms.[2] This paper concentrates on three facts of the German economic transition. First, the Treuhand focused on rapid privatization rather than state-led restructuring despite the financial ability to purchase investment equipment and hire new management. Second, the Treuhand relied on sales rather than giveaways or vouchers despite the knowledge that sales would reduce the likelihood of significant ownership by eastern Germans. Third, eastern firms were purchased predominantly by established western firms, rather than by eastern Germans, or capital funds.

Analyzing the German program, critics have suggested that the restructuring strategy was inefficient and the outcome reveals corruption. These criticisms raise broader questions. Should the state have taken a more active role in restructuring before privatization? Did privatization have to take the form of sales? Do privatization results demonstrate corruption? What can eastern European countries learn from the German experience?

This paper rationalizes the Treuhand approach. The paper suggests that recognition of both the central role western management plays in firm restructuring and market failure in the

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[1] Speech given by Helmut Kohl, Chancellor of the Federal Republic of Germany. Found in Treuhandanstalt (Treuhand) (1992a p. 26). Translation by the author.

[2] Statistics for sales, October 1, 1994, Treuhand (1994).

managerial labor market helps to explain these three features of the privatization process. I present a model that links access to information about managerial ability with ownership. I use the model to investigate the relative efficiency of different restructuring programs. I show that when private owners are better able to overcome imperfections in the managerial labor market, they are able to transfer more managers of better ability than is possible under continued government ownership. The emphasis on managerial selection and asymmetric information helps to explain not only why the form of privatization matters, but why privatization might be of increasing importance as the number of firms to be restructured (the size of the transition) increases.

I supplement the theoretical model using evidence from official sources and a unique data set I gathered on management change in eastern Germany. I present evidence of significant western management transfer consistent with theoretical assumptions. I then show that details of the privatization process are consistent with actions of a government concerned about difficulties in hiring in the managerial labor market. Finally, I show predicted differences in the extent and nature of management transfer between privatized firms and publicly owned firms.

The paper proceeds in five parts. Section I briefly describes the central features of the German restructuring strategy and the privatization results that the model is designed to capture. In Section II, I introduce a simple model of the managerial labor market and the economic transition that shows the efficiency consequences of allocating firms to uninformed and informed owners. Section III evaluates extensions to the formal model. Section IV introduces evidence that supports the theoretical assumptions, and presents data on the level of managerial transfer in public and private firms. In Section V, I conclude and discuss the implications of adverse selection in the managerial labor market for economic reform in other eastern European countries. The remainder of this section offers a brief overview of the theoretical argument and links this paper to the literature on privatization and economic restructuring.

1. *An Overview.* The freeing of prices, reduction in regulation, and increase in competition associated with economic transition highlights the inefficient organization of eastern European firms. For firms to survive economic liberalization and operate efficiently, someone needs to restructure these firms. Restructuring is defined here as changes in internal firm organization, labor policies, product market policies, and financial control that maximize the long-run profitability of the firm given existing stocks of labor and capital. The need for decision-making at the business location combined with the probable lack of ownership concentration of large eastern European firms arising from most privatization programs suggests that the individual making restructuring decisions will not be an owner. Rather, managers assume the burden of reorganizing existing capital and labor stocks, establishing sales and marketing departments, implementing new accounting and control systems, deciding on new product strategies, and developing and implementing new investment programs. The key to successful restructuring of large firms, therefore, is the ability of owners to select able managers to restructure their enterprises.

In the short term, most existing eastern managers are not capable of envisaging and implementing the required restructuring. Through no fault of their own, eastern managers simply lack experience with a market economy and basic management principles. Consequently, what is often needed is a replacement of existing management with experienced western management. Viewed from this perspective, of first-order importance in determining the desirability of continued public ownership and various types of privatization is the comparative ability of public and private owners to select and introduce experienced western managers into eastern enterprises.

Existing management's significant de facto control over the firm in other eastern European countries, regardless of de jure ownership, limits the ability to change managers in the restructuring process.[3] The fact that manage-

[3] Maxim Boycko et al. (1993) emphasize management's control over the restructuring process in Russia.

ment change is restricted does not, however, imply that such management changes are not important. In fact, analyzing the German experience where incumbent management has much less control of the restructuring process can reveal the extent of managerial weaknesses.

The theoretical argument is straightforward. Owners of firms can collect and make use of information about managers they employ that is not available to individuals that have not employed these managers. If the government pursues a policy of continued public ownership and attempts to hire western managers to install in eastern firms, it acts as an uninformed owner attempting to hire from informed owners. Informed owners can take advantage of their superior information and match wage offers for all managers whose abilities justify the wage offered. With this asymmetry of information, uninformed owners, such as the government and citizens of eastern countries, hire managers of below-average ability.

If the number of firms exceeds a critical level, a government attempting state-led restructuring with a fixed budget constraint (not necessarily zero) will be forced to leave some eastern firms without new management. By offering higher wages the government can attract more managers with higher average ability, but adverse selection implies that the increase in quality is always below the increase in wage. The more firms to be restructured, the more likely that weaknesses in the managerial labor market will bind and constrain the ability of the government to restructure firms. The quality deterioration due to adverse selection further reduces efficiency if a manager's ability in the West affects his productivity in the East. These additional efficiency costs are greatest if more able managers have a comparative advantage in the East. An efficiency maximizing government realizing the possibility of efficiency losses will look for alternatives.

A policy of allocation of eastern firms to owners of western firms avoids the failure in the managerial labor market. Western owners can utilize their inside information on managerial ability and make an internal transfer of management from their western to their eastern operations. The optimal allocation of eastern firms to western owners can, moreover, be achieved through a competitive auction so long as it is open to western owners, and western owners are aware of the need for management transfer. Note that voucher privatization, where state-owned firms are privatized by transferring shares of state-owned companies to citizens, does not solve the management problems. Private eastern owners face the same information asymmetries as the government in trying to hire experienced western management.[4]

2. *Relationship to the Literature.* The paper contributes most directly to the fast-growing literature on privatization and restructuring in eastern Europe and Germany. Many papers emphasize the need for firm-level restructuring, and suggest the importance of changes in the owner-manager agency relationship. David Lipton and Jeffrey Sachs (1990), Stanley Fischer and Alan Gelb (1991), Jean Tirole (1991), Ken Mayhew and Paul Seabright (1992), and others encourage private ownership, and ownership concentration, assuming that ownership changes will lead to active oversight of management and/or higher-powered managerial incentives. Philippe Aghion et al. (1994) similarly focus on managerial incentives, analyzing the conditions that encourage and discourage management to restructure enterprises.

This paper's emphasis on management change contrasts with the incentive approach, emphasizing an important, but neglected, element of the restructuring process. Nicholas Barberis et al. (1996) similarly suggest the importance of management change to successful

Wendy Carlin et al. (1994) provide a comprehensive survey of case study evidence that reveals similar difficulties in Poland, Hungary, and the Czech and Slovak Republics.

[4] The superior efficiency of privatization in the model stems from the information structure, where inside owners are better informed about managerial ability. There was predominant private ownership in western Germany prior to reunification, so inside ownership coincided with private ownership. This need not be the case. Were inside owners prior to reunification government-owned enterprises, the model suggests transferring ownership of firms to the western government-owned enterprises.

restructuring in their empirical investigation of the privatization of Russian shops. An advantage of the selection argument relative to the incentive argument is that the benefits of a policy of privatization can increase more than proportionately with the number of firms needing restructuring. Gérard Roland and Thierry Verdier (1991) and Raul Laban and Holger C. Wolf (1993) derive similar results about the importance of mass effects but assume increasing returns to the size of the private sector rather than differences in information availability to public and private owners.

The argument for privatization in this paper is also not based on an assumption that privatization improves performance solely by insulating firms from noncommercial objectives of political overseers, as modeled by Boycko et al. (1996). This approach rationalizes rapid privatization but cannot explain the reliance on sales as opposed to giveaways or vouchers which presumably would have provided a better and faster insulation from government objectives. Moreover, as noted by David E. M. Sappington and Joseph Stiglitz (1987) and Carl Shapiro and Robert D. Willig (1990), a compelling theory of differences in efficiency between public and private ownership must explain why government intervention to advance its objectives is more difficult in privately owned firms. Suggestive of the government's influence over firm objectives, the German government not only employed noncommercial objectives in state-owned firms, but was able to convey its noncommercial objectives to private owners through the sales mechanism that considered employment and incentive commitments in addition to sale price.

In discussions focused on the German restructuring process, D. Demougin and Hans Werner Sinn (1992), as in this paper, suggest that the benefit of privatization through auction might be access to superior information of privately owned firms. They do not, however, specify access to managerial knowledge as an important information difference between public and private owners. Rather, they focus on different privatization schemes' impact on capital investment. Carlin and Colin Mayer (1994) center attention on the need to restructure corporate governance relationships in eastern Germany. But they do not recognize information-inspired imperfections in the managerial labor market. This leads them to infer that the state can restructure firms in a fairly efficient manner—a finding in direct contrast to that of this paper.

Finally, from a technical standpoint, the paper builds on Bruce C. Greenwald's (1986) model of adverse selection in the labor market. Greenwald employed the same information assumption of superior information on labor ability for previous owners than for outside owners. He investigated the equilibrium pattern of wages in primary markets and secondhand markets arising from this information asymmetry, arguing that this model accounts for many aspects of observed labor market behavior. Unlike Greenwald, but in the spirit of George A. Akerlof's (1970) model of the used car market, I investigate the welfare costs of adverse selection by introducing the possibility of efficiency losses as a result of the information asymmetry. To focus on these welfare costs, I ignore the dynamic pattern of wage offers.

I. German Reunification and the Managerial Labor Market

A. *Reunification*

This section gives a brief overview of the German restructuring process. I do not present a detailed account, but simply information about central features of the German privatization strategy and the results of this program for which the model is designed to account.[5]

Two legal steps formally brought an end to the East German planning system. First, on July 1, 1990, the two Germanys unified their currencies, mandating the exchange of the East German Mark for the West German Mark, the elimination of internal tariff barri-

[5] For general discussions of the German restructuring process see Akerlof et al. (1991), Horst Siebert (1991), and Rudiger Dornbusch and Holger C. Wolf (1994). For more focused discussions on German privatization, see Carlin and Mayer (1994). The articles presented in Wolfram Fischer et al. (1993) provide an excellent German language discussion of the origin and development of the Treuhand.

ers, and the application of numerous West German business laws. Second, on October 3, 1990, East Germany officially integrated into the Federal Republic of Germany. Most West German laws were immediately applicable in East Germany, including the commercial code, tax laws, provisions of the social security system, and the environmental laws of the Federal Republic of Germany.

Legal integration brought a transfer of ownership of all state assets to the Federal Republic. This legal transfer of ownership was an effective transfer of control of most state-owned firms because the centralization of power in East Germany ensured that the government, rather than managers or workers, controlled state-owned firms prior to unification. Perhaps the largest asset transferred was a relatively new holding company for almost all eastern German state enterprises, the Trust Administration of the People's Property (Anstalt der Treuhändischen Verwaltung des Volkseigentums), known as the Treuhand.[6]

The law creating the Treuhand was passed in March 1990, prior to the first democratic election in East Germany. This law allowed for the conversion of state-owned enterprises into joint stock or limited liability companies and vested ownership of these firms in the Treuhand. The East German government thought that through this new organizational structure they could introduce elements of a market economy, such as limited private shareholding, without eliminating central control over the allocation of resources.

The tradition of predominant private ownership in the Federal Republic of Germany demanded a long-run transfer of ownership of most eastern German enterprises from the Treuhand to the private sector. In the short-run, perhaps for the first five to ten years, there remained the possibility of government-led restructuring and slow sales of enterprises. Unlike eastern European countries, continued government ownership implied neither a lack of funds for investment, nor decision-making by former officials of the state planning ministry and incumbent management. Rather, the government of the Federal Republic would be able to use its significant financial resources to invest in eastern firms, introduce western officials to supervise the transition, and hire new management.

The uncertainty of the speed of privatization was reflected in legislation passed on June 17, 1990, that increased the Treuhand's market orientation but was ambiguous about the state role in restructuring. The legislation stated that the agency's purpose was "to reduce the commercial activity of the state as rapidly and extensively as possible through privatization." However, the act also allowed room for an active role in restructuring East German firms, declaring that the Treuhand should promote "the structural adjustment of the economy to meet market requirements by developing potentially viable firms into competitive enterprises and transferring them into private ownership."[7]

The federal and state government's handling of state-owned enterprises in western Germany reinforced the uncertainty of the speed of privatization in the East. Despite the Kohl government's promise to rapidly privatize state assets in 1983, the western privatization policy had been only partially implemented with continued delays. By 1990, DM 10 billion in assets had been privatized, just one-half of the privatization revenues of France, and one-tenth of the privatization revenues of the United Kingdom. In contrast to other European nations, the Kohl government was not unified in a policy of rapid privatization.[8]

B. *German Privatization*

Under western direction, the Treuhand focused on rapid privatization. In October 1990,

[6] Eastern firms not transferred to the Treuhand included postal and telecommunications services, the railway, water supply, and local public transport. These were retained under central control or transferred to local governments.

[7] "Gesetz zur Privatisierung und Reorganisation des volkseigenen Vermögens (Treuhandgesetz)," June 17, 1990, reproduced in Die Wirtschaft (1993 pp. 389–95). Translation of excerpts used in the text provided in Treuhand (1992b).

[8] See Josef Esser (1989) and Hartmut Tofaute (1994) for discussions of government shareholding, statistics, and privatization policies in western Germany.

Treuhand chairman Detlev Rohwedder issued a set of policy guidelines that stated clearly that the Treuhand's central mission was the quick sales of firms and assets to private investors. Firms were not given away to eastern individuals through a policy of voucher privatization as is planned or has already occurred in the Czech Republic, the Slovak Republic, Romania, Poland, and many of the former Soviet Socialist Republics.[9] Firms were instead sold in a sales process open to domestic and foreign purchasers.

The sales process involved direct negotiations between Treuhand officials and potential buyers. In addition to selling price, the Treuhand considered a buyer's willingness to provide employment and investment guarantees, the buyer's business plan, and the negotiating team's perception of the prospective buyer's ability to implement its proposed business plan. In case of competing offers for a firm, the Treuhand negotiating team recommended a specific buyer to the Treuhand board. Over time, negotiating teams placed increased weight on a prospective buyer's employment and investment guarantees.[10]

While beginning slowly, the Treuhand rapidly increased its rate of privatization. Including parts of firms sold, the Treuhand privatized an average of 400 firms every month in 1991–1992, or almost 20 firms every working day. Table 1 shows the impressive results of the privatization program through 1994. West German firms bought most eastern facilities, accounting for three-quarters of privatization transactions with 5.9 percent of sales to foreign buyers (although often western German affiliates of multinational enterprises) and 20 percent of sales to eastern Germans. Of the sales to eastern Germans in July 1992, 78 percent of the firms sold had less than 100 employees, and only 5 percent of sales involved firms with more than 500 employees.[11] Most successful western German purchasers were established firms. Capital investment funds, which have been active in other eastern European countries, have been almost absent from the investment scene in eastern Germany. By October 1992, capital investment funds had invested only DM 120 million, a small fraction of the nearly DM 20 billion in revenue from privatization sales, and the more than DM 117 billion in promised future investments of privatized companies at that time.[12]

C. *Summary*

The Treuhand strategy of rapid privatization, the sales process, the openness to all purchasers, and the outcome of predominant ownership by established western firms have invited much criticism and analysis. German unions, political parties in eastern Germany, and the opposition Social Democratic Party have all suggested that slower, more coordinated privatization, and consequently longer state restructuring, could have improved efficiency. They emphasize the synergies associated with production in a region, arguing that the decentralized privatization and breaking apart of firms associated with privatization ignores these synergies. Rolf Schmachtenberg, a department director in an East German state government, echoed another common complaint: "The Treuhand stresses privatization for one simple reason—rapid privatization, unconstrained by concern for the East's economic viability, is what is best for West German industry, and West German industry is effectively in control of the Treuhand's priorities."[13]

The Treuhand has resolutely denied such explanations for the privatization strategy and outcomes. In the next section, I introduce a simple model of the restructuring process that accounts for the three above-mentioned facts of the German restructuring process assuming an efficiency-maximizing government that

[9] See Roman Frydman et al. (1993) for more details on voucher privatization in different East European countries.

[10] Carlin and Mayer (1994) report that the reduction in sales price per job saved varied from DM 12,000–50,000 in most cases, and in exceptional cases like the chemical industry could rise to DM 300,000.

[11] See Treuhand (1992c).

[12] See K. Klöttschen (1992).

[13] Cited in Kristen Lundberg and John Donahue (1992 pp. 20–21).

TABLE 1—RESULTS OF THE TREUHAND'S PRIVATIZATION ACTIVITIES THROUGH 1994

Panel A: Time Series of Privatization Activity

Year	Number of firms and parts of firms sold	Number of liquidations in process	Number of firms remaining	Number of jobs guaranteed (000s)	Investment guarantees (DM billions)	Net Treuhand cost[a] (DM billions)
1990–91	2,672	789	6,212	930	114	21.5
1992	8,024	1,460	2,575	470	55	27.1
1993	2,600	947	950	87	17	36.8
1994	1,092	—	147	13	21	31.6
Total 1990–94	14,388	3,196	—	1,500	207	117.0

Panel B: Distribution of Nationality of Buyers of Eastern German Firms

	Eastern German buyers (percent)[b]	Western German buyers (percent)	Foreign buyers (percent)
Number of privatization transactions (sales of firms and parts of firms)	20.0	74.1	5.9[c]
Total value of investment guarantees	2.9	87.1	10.0[d]
Total employment guarantees	9.2	80.6	10.2[e]

Note: – means not available.
Sources: Treuhand (1992c, 1992d, 1994).
[a] Net Treuhand cost is total funding provided by the Treuhand (the sum of investment subsidies, funds to cover losses and supply working capital, redundancy payments, interest and principal repayment, and other costs) less cash proceeds from privatization.
[b] Number of firms sold through a management buyout or management buy-in are used as a proxy for eastern German ownership. Data are from March 1994.
[c] Countries with the highest number of sales are Switzerland, the United Kingdom, Austria, and the Netherlands.
[d] Countries with the highest investments are France, the United States, the United Kingdom, and Canada.
[e] Countries with the highest employment commitments are France, Switzerland, Canada, and the United Kingdom.

recognizes the importance of management and the obstacles in the managerial labor market.

II. The Basic Model

A. *Managers, Owners, and Technology*

Consider an economy with experienced managers that are combined with firms to produce output. Each manager is characterized by an ability measure θ, a continuous variable on $(0, \infty)$.[14] To capture the idea that the stock of experienced managers is fixed during the transition period—for it takes time for managers to develop experience—I assume that there are a finite number of experienced managers, N, and consequently a smaller finite number of actual ability levels in the population.[15] To simplify exposition, each manager is also identified by an index i, with more able managers having a higher index (i.e., $\theta^N \cdots \geq \theta^i \geq \theta^{i-1} \geq \cdots \theta^1$). Managers seek to maximize their wages.

Risk-neutral owners set wage offers to managers to maximize expected profits and employ managers to produce output.[16] Owners

[14] Managerial ability is interpreted very broadly. It includes the willingness to exert effort, the knowledge of general managerial skills and industry-specific skills, and the knowledge of institutional constraints.

[15] This is not an appropriate assumption for a more general model when flows into the managerial pool should be taken into account; however, it captures the disequilibrium nature of the transition period.

[16] I assume that the government also chooses wage strategies to maximize expected profits. Different social objectives of government ownership could easily be

which have employed managers prior to unification are called *inside owners.* There are $M = N$ inside owners prior to unification. There are an equally large finite number of potential owners. They employ no managers prior to unification and are called *outside owners.* These outside owners could be private eastern citizens, private western citizens, or the government.

A manager can be employed in either the East or the West. In the West, the productivity, Y, of a manager is $Y = \theta$. To motivate a transfer of management from West to East, western management must be more productive in the East. The simplest possible assumption to generate this transfer is that the additional return to western managerial ability is the same regardless of ability level.

ASSUMPTION 1: *The productivity of a manager in the East is* $Y = \theta + \delta$, $\delta > 0$.

To capture the significant need for new management, I assume that unification introduces a finite number of additional firms in the East.

ASSUMPTION 2: *There are* S_E *eastern firms, with* S_E *significantly less than the number of western managers, that is,* $S_E \leq N/2$.

B. *Information and Sequence of Events*

In order for ownership to affect efficiency, there must be some market imperfection, and differences in the ability of different owners to overcome this imperfection. I introduce *ex ante* asymmetric information about managerial ability. Prior to unification, each inside owner has employed and observed the ability level of one manager.[17] For example, existing owners can examine disaggregated information on the performance of a division that a manager is responsible for, knowing of possible distortions induced by nonmarket transfer pricing. In addition, existing owners can make use of subjective performance measures. Outside owners, while not aware of any individual manager's ability, are aware of the distribution of managerial ability in the population.[18]

Market analysts only observe firm performance, a manager's promotion pattern, and managerial wages, and these signals are imperfect measures of managerial ability. As shown in this model, managerial wages need not reflect managerial productivity. The common practice of attaching wages to positions of responsibility rather than to managers' actual productivity also suggests the limited information content of wage levels. Promotion decisions reveal some information about ability, in particular which managers are relatively more able, but do not reveal information about actual ability levels.[19]

To focus on the information barrier, I make the following assumption.

ASSUMPTION 3: *Firms cannot offer wages based upon observed future productivity (i.e., no contingent wage offers), and managers cannot signal their ability.*

Section III discusses rationales for this strong assumption.

incorporated into the model without loss of generality by replacing the constraint of nonnegative profits by a finite loss equal to the social costs.

[17] This assumption does not rule out the possibility that "large firms" exist which employ many managers—a "large firm" simply being a conglomeration of many single-manager firms.

[18] I define $f(\theta)$ to be the probability that a randomly chosen manager is of ability level θ, and assume that this probability density function is common knowledge. I assume a sufficiently large number of managers at each of the realized ability levels so that inside owners will not update their prior estimates of managerial ability of a random manager given their knowledge of one manager's ability.

[19] Greenwald (1986) argues that the information asymmetry between inside and outside owners is a widespread phenomenon that is important in numerous labor markets in many countries, helping to explain patterns of internal promotion, and wage growth. Robert Gibbons and Lawrence F. Katz's (1991) study of wages and employment patterns of workers who lost their jobs due to plant closings and other causes provides some empirical support for such information assumptions. Greenwald and Robert R. Glasspiegel's (1983) study of the New Orleans slave market presents further empirical support, although J. Pritchett and R. M. Chamberlain's (1993) reexamination of the slave market data casts some doubt on these figures.

----1---->	----2---->	----------3---------->		----------4---------->	----5---->
Unification occurs, S_E eastern plants need western managers	**Ownership Regime declared and eastern firms allocated**	Outside owners make wage offers to managers they have not previously employed	Inside owners told of quit decisions by μ% of managers and make counter offer to their managers	Managers accept or reject wage offers	Managers work and then retire

FIGURE 1. SEQUENCE OF EVENTS IN THE MANAGERIAL LABOR MARKET

Figure 1 presents the sequence of events. An inside owner observes all other wage offers to its incumbent manager before making its wage offer.[20] In case of an identical wage offer from outside and inside owners, the manager stays with the inside owner. An exogenous fraction, μ, of managers quit their inside firms in the period of analysis, regardless of incumbent offers. This assumption ensures the existence of a secondhand market for managers during normal economic periods when there is no alternative more highly valued use for managers. Possible justifications for this assumption include separations because of dislike of the firm, its location, or that a worker's productivity differs across jobs, as in Boyan Jovanovic (1979). An alternative interpretation is that firms fire an exogenous fraction of their workforce for reasons unrelated to the workforce's ability, such as the valuable skills the worker possesses are in an oversupply in the firm, or a fraction of firms go out of business firing all of their employees.

C. *Market Equilibrium with Outside Ownership*

Equilibrium occurs when each owner, taking the wage strategies of others as given, has no incentive to deviate from its wage strategy. Invoking subgame perfection one first solves for actions of managers, then inside owners (given their knowledge of managerial actions), and finally outside owners (given their knowledge of managers' and inside owners' strategies).

PROPOSITION 1: *Under outside ownership there exists a subgame perfect symmetric Nash equilibrium in pure strategies.*

PROOF:
See Appendix.

Managers seek to maximize their wages. Consequently, they simply take the highest wage that is offered. An exogenous fraction of managers reject their incumbent owner's wage offer regardless of its level and accept the highest outside offer. Inside owners compare the productivity potential of their managers to the maximum wage offer made by outside owners. Inside owners match wage offers for those managers with productivity greater than or equal to outside wage offers. Formally, the equilibrium strategy of the inside owner, g, is:

$$w_g^i = \begin{cases} \max\limits_{f \neq g} w_f^i & \text{if } \theta^i \geq \max\limits_{f \neq g} w_f^i \\ \theta^i & \text{if } \theta^i < \max\limits_{f \neq g} w_f^i. \end{cases}$$

In effect, the inside owner gets an "information rent" from the manager in the restructuring period. The owner only has to offer the opportunity cost of the manager, yet retains managers with productivity levels greater or equal to this opportunity cost.[21]

[20] This can be interpreted as a manager soliciting job offers, then returning to his inside firm and asking the firm to match the offer.

[21] Greenwald (1986) shows in a two-period model that firms anticipating these rents after one period of

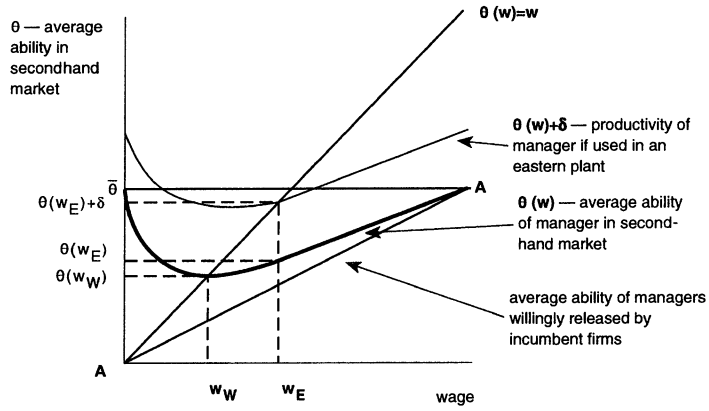

FIGURE 2. THE SECONDHAND MANAGERIAL LABOR MARKET

Outside owners form expectations of average ability of managers using the following function, $E(\theta(w)) = N[\int_0^w \theta f(\theta)\, d\theta + \int_w^\infty \mu\theta f(\theta)\, d\theta]/S(w)$, where $S(w)$ indicates the number of managers available given that wage offer and is defined as $S(w) = N[\int_0^w f(\theta)\, d\theta + \int_w^\infty \mu f(\theta)\, d\theta]$. There are two groups of managers in the pool of managers in the secondhand market. In the pool of managers who leave their firms for reasons unrelated to wage offers, there is no adverse selection and their expected ability is equal to the population average. In the pool of managers that inside firms encourage to leave by not matching offers of outside owners, the average level of ability is below this wage offer.

In Figure 2, line AA represents the average ability level of managers willingly released from western firms. $\theta(w)$ is the average ability in the secondhand market and is the weighted average of curves AA and $\theta(w) = \bar{\theta}$. The maximum wage that an outside owner without an eastern plant could offer is w_W. At that wage, the owner receives a manager of expected ability level equal to this wage offer. If an outside owner has an eastern firm, this increases a manager's productivity. In Figure 2, the expected profit from employing a western manager is represented by the distance between the $\theta(w) + \delta$ curve and the 45-degree line. Outside owners with eastern plants recognize that outside owners without eastern firms will offer wage w_W, putting a floor on feasible wage offers. The assumption of a nonnegative profit constraint caps feasible wage offers at w_E. Actual wage offers will not exceed these constraints and will ensure that in equilibrium outside owners can hire a manager. Formally, the equilibrium strategy of an outside owner, j, is $w_j = w_W + \alpha B$, where α is equal to one if the outside owner owns an eastern plant, and zero otherwise and B (defined below) depends on the relationship between wages offers and the probability of hiring a manager.

The probability of hiring a manager is a function of the relationship between the number of eastern firms and $S(w)$, the size of the secondhand market. Figure 3 plots this relationship. Because $S(w)$ is invertible, this function defines the wage needed to produce enough managers in the secondhand market to fill the S_E managerial positions in eastern plants. I define this wage as $w(S_E)$. If $w(S_E) > w_E$, then firms can only offer w_E, which yields zero expected profits, with fewer managers available than firms making such an offer. Accordingly, B is defined as

$$B = \begin{cases} \varepsilon & \text{if } S_E \leq S(w_W) \\ w(S_E) - w_W & \text{if } S(w_W) < S_E \leq S(w_E) \\ w_E - w_W & \text{if } S(w_E) < S_E. \end{cases}$$

employment will raise wage offers higher than average managerial productivity in the initial period; thus, over the two-period employment cycle, expected profits from employing a manager are zero.

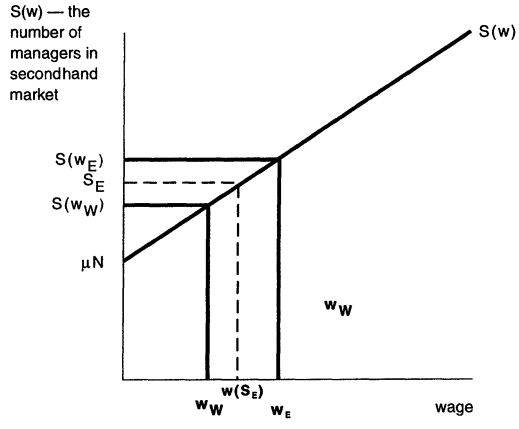

FIGURE 3. THE NUMBER OF MANAGERS IN THE SECOND-HAND MANAGERIAL LABOR MARKET

D. *Results*

This model helps to show why recognition of adverse selection in the managerial labor market matters. More precisely, the model shows that:

PROPOSITION 2: *Under outside ownership, managers hired for eastern firms are of below-average ability.*

PROOF:

From Proposition 1, the maximum wage that outside owners can offer is $w_E < \theta^N$. By the definition of expected average ability that follows from managers and inside owners' strategies, it is clear that $E(\theta(w)) < \overline{\theta}\ \forall w < \theta^N$.

PROPOSITION 3: *Under outside ownership, there exists a critical number of firms, $S(w_E)$. If $S_E > S(w_E)$, then some eastern firms do not receive western managers. If $S_E \leq S(w_E)$, then all eastern firms receive western managers.*

PROOF:

See Appendix.

The productivity of a western manager in the East could also be related to his ability level. To analyze this possibility, I characterize each manager (with ability index i) by a comparative advantage index j, $\delta(\theta^i)^j$. Managers with a greater comparative advantage have a higher index (i.e., $\delta(\theta)^N \cdots \geq \delta(\theta)^j \geq \delta(\theta)^{j-1} \geq \cdots \delta(\theta)^1$). Given the need for more intense use of many of the same functional skills demanded in the West, it is a strong possibility that more able western managers have a comparative advantage in the East, $\delta(0) > 0$, $\partial(\delta(\theta))/\partial\theta \geq 0$. In this circumstance, the ability index would coincide exactly with the comparative advantage index.

The efficiency costs of outside ownership are highest when able managers have a comparative advantage.

PROPOSITION 4: *Under outside ownership and a comparative advantage for more able managers, the equilibrium allocation of managers does not maximize net managerial productivity.*

PROOF:

This result follows directly from Proposition 2. Suppose the equilibrium wage is $\hat{w} \leq w_E$. Under Assumption 1, for the first eastern plant there is an expected loss related to the difference in additional return between the most able manager and the expected ability of a manager hired in the secondhand pool, $\delta(\theta^N) - \delta(\theta(\hat{w}))$. For every subsequent manager transferred, there is also a loss.

E. *Discussion*

This model clarifies the costs of outside ownership when there is imperfect information about managerial ability, and managerial ability is central to successful restructuring. If the transition is sufficiently large, outside owners attempting to work through the market to hire managers will not be able to hire enough managers to fill eastern positions. As a result, outside owners need to ration managers among eastern plants. This rationing is a clear efficiency loss relative to a perfect information world because there exist managers who would be more productive if employed in the East, and who would be hired if there were no information problems, but they cannot be hired due to informational barriers.[22] This cost

[22] In this way, the welfare cost is analogous to the welfare cost associated with the no-trade equilibrium in Akerlof (1970).

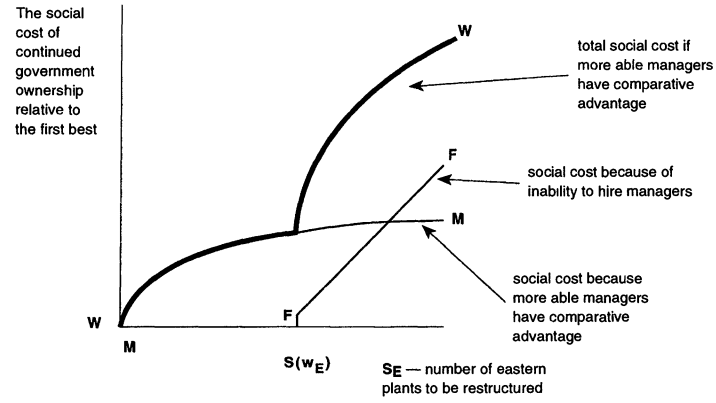

FIGURE 4. THE SOCIAL COST OF CONTINUED GOVERNMENT OWNERSHIP

is plotted as line FF in Figure 4. This prediction coincides with the general belief that privatization in eastern Europe is different than in the West, and that the comparative benefit of a policy of privatization is greater because of the number of firms that need to be restructured.

There are additional social costs if the return to western management depends on the ability of managers. I highlight these costs by focusing on the analytically tractable case where the additional cost to transferring adversely selected managers is highest—when the most able managers in the West have a comparative advantage in the East. The efficiency costs resulting from the transfer of less able managers is plotted as MM in Figure 4. As the figure shows, the incremental social welfare loss is greatest for the first managers hired and the aggregate social welfare loss increases, but at a declining rate, with every manager hired by outside owners. Alternative assumptions about the relationship between ability and additional productivity would lead to new curves below the MM curve.

These alternative MM curves are greater than zero for almost all circumstances. For example, if managers of average ability have the highest additional return in the East, there are still additional efficiency costs to outside ownership. Outside owners cannot just hire managers of average ability but must hire from a pool that includes managers with the lowest ability levels. Only when ability in the West is unrelated to ability in the East, or the least able managers in the West have the highest additional return in the East, do these inefficiencies not arise. The total social cost is found by combining the MM and FF curves to form the WW curve.

F. *Market Equilibrium with Inside Ownership*

An efficiency-maximizing government would consider alternative institutional arrangements to reduce efficiency losses. A possible mechanism is privatization that allows for eastern plants to be allocated to inside owners. Inside owners can take advantage of internal labor markets and transfer managers from their western to their eastern operations. These firms need not face adverse selection in the managerial labor market. For privatization to maximize efficiency, it needs to ensure that eastern plants are allocated to the inside owners which can achieve the maximum benefits from these enterprises.

Regardless of the relationship between ability in the West and productivity in the East, efficiency-maximizing privatization requires allocation of eastern plants to those western firms with the S_E managers with the highest additional productivity, i.e., $\delta(\theta)^j \geq \delta(\theta)^{N-S_E}$. If more able managers had a comparative advantage in the East, efficiency-maximizing privatization requires allocation of eastern plants to those western firms which

employ the S_E most able managers, i.e., $\theta^i \geq \theta^{N-S_E}$. If productivity in the East is unrelated to ability in the West, the government should be indifferent as to how eastern plants are allocated, so long as the plants are allocated to western firms with management.

A privatization procedure that ensures that the western firms with the highest additional return in the East receive western managers, regardless of the exact relationship between ability in the West and productivity in the East, is an auction with openness to western purchasers. In an auction, firms would evaluate the potential gains associated with purchasing an eastern plant. Western firms expecting to retain their managers would be willing to bid an amount equal to the managers' additional productivity in the East. If the additional productivity in the East was unrelated to ability, all western firms would be willing to offer the same amount and that would end up being the sale price. When productivity in the East is related to ability in the West, there is a limited supply of firms with managers with this additional return in the East. Consequently, it would be sufficient to offer a bid equal to the additional return to the firm with a manager of ability $\delta(\theta)^j = \delta(\theta)^{N-S_E}$. Firms not expecting to employ managers if allocated an eastern plant (i.e., western firms whose managers' ability levels in the East plus additional potential productivity in the West is less than the outside wage) will not make bids.

For the auction to function as intended, firms in the West must be aware of the need for management transfer and be aware of the relationship between ability in the West and productivity in the East.[23] If the government puts a higher social value on able managers being employed in the East than private firms, it might want to adopt an alternative privatization mechanism that ensured that eastern plants were allocated to western firms that could employ more able managers in the East.

G. *Optimal Ownership*

A government that is concerned with managerial transfer and aware of its information disadvantage would likely arrive at the same conclusions captured in the propositions and in subsection F. With continued government ownership, the average ability of managers transferred will be low, and given the large number of firms requiring managers, there must be rationing of the scarce management to eastern firms. Alternatively, allocation of eastern firms to inside owners leads to more managers of better ability transferred to the East. Efficiency can be maximized if allocation is done through a competitive privatization process and inside owners are aware of the comparative advantage of western managers.

Faced with these trade-offs, an efficiency-maximizing government would pursue a policy of privatization rather than restructuring, would use sales through auction rather than giveaways or voucher auctions, and successful bidders in the auction process will only be established western firms which can transfer managers from West to East. These results are consistent with the facts summarized in the description of the German privatization process in Section I and presented in Table 1. In effect, the model of management transfer rationalizes the Treuhand activities suggesting efficient institutional adaptation as a result of anticipation of failures in the labor market. It captures in a theoretical model the assertion of Detlev Rohwedder, the first western German president of the Treuhand, that: "(privatization is) the best way to obtain *new knowledge,* new capital and *new strategic business aims* for a firm and its employees and to give the firm a new future. Privatization is the most effective restructuring."[24]

[23] An additional implicit assumption is that an inside owner can fill the gap in its western operations created by this transfer also by drawing from a pool of experienced managers that it already employs. One interpretation of this assumption is that managers are moved up through a hierarchy and that the owner finds a new manager to fill the position in the hierarchy by hiring at the entry level where there are no adverse selection concerns. This interpretation corresponds with the activity of western firms described in Section IV.

[24] Excerpts from statement issued March 1991, reproduced in Treuhand (1992a p. 3, emphasis added).

III. Extensions and Modifications

To focus on information-based difficulties with government restructuring, the model employed several restrictive assumptions. This section considers the relevance of the assumptions for the transition period in eastern Germany, and the implications of relaxing the assumptions.

A. *Signaling and Screening*

The paper does not allow for a signaling technology that could separate out managers of different ability levels. During normal times, firms seeking experienced managers can, in principle, overcome much of this information gap by using screening or signaling mechanisms to separate out managers by ability or by delegating the screening activities to a third party. Three modeling techniques that allow for such a possibility are: allowing managers to purchase a signal, such as educational attainment, as in A. Michael Spence (1973) and Joseph Stiglitz (1975); changing the sequence of decision-making to allow outside owners to observe inside owners' wage offers before making counter offers, as in Michael Waldman (1984) and Gibbons and Katz (1991); and, making the model dynamic by allowing outside owners to observe previous wage offers, and update their beliefs about managerial ability, as in Greenwald (1986). Were these technologies available, managers with ability levels above the market wage would have an incentive to signal their ability levels, for it would increase their wage offers, and owners would have an incentive to screen for ability.

The decision to ignore signaling and screening mechanisms is based upon German empirical evidence. The large number of managers that would need to be evaluated under continued government ownership would have completely overwhelmed existing professional screening services. Estimating the number of managerial positions requiring experienced western managers in eastern Germany suggests the extraordinary additional strain that could have been placed on screening services. Assuming a need for 2.0 managers per enterprise, as implied by the survey results presented below, and multiplying this by the number of enterprises under Treuhand control (8,000–14,000), places the management need at between 16,000 and 28,000 managers.

This does not deny Treuhand efforts to reduce information problems. The Treuhand introduced westerners to the supervisory boards of eastern German firms which supervised the hiring process, made use of third-party screening services, and hired managers from the Treuhand head office. By June 1991, the Treuhand had successfully revamped the supervisory boards of the 552 large eastern German enterprises that legally required a board.[25] While mitigating information problems under government ownership, these actions probably did not eliminate information barriers. Treuhand firms' difficulty in screening for ability likely declined over time as screening services expanded and the number of Treuhand-owned firms declined.

The decision to ignore screening and signaling as a solution to the asymmetric information problem also has strong theoretical foundations. Signaling and screening can perfectly separate out productivity in models with only two productivity types. However, in more general and realistic models that model ability on a continuum, the effect of signaling and screening is usually not to fully reveal productivity but to segment the pool of previously observationally identical managers into smaller pools.[26] Each pool has a different average ability level but there is variance within the pool. Consequently, outside owners still face adverse selection in hiring within these pools.

B. *Contingent Contracts*

Another critical modeling decision was to rule out performance-contingent contracts as a

[25] The background of westerners sitting on eastern boards is almost identical to the background of board members in western Germany. Carlin and Mayer (1994) report that there are three groups of representatives on the supervisory boards of Treuhand firms, banks (20–25 percent), local authorities (10–15 percent), and employees of other normally western companies (60–70 percent). In the West, the actors are the same, with a slight adjustment of relative shares.

[26] See Greenwald (1986).

potential low-cost method to screen for managerial ability. If this assumption were relaxed and firms could contract to pay managers what they *ex post* produced, the government could encourage self-selection of able managers by offering high levels of performance-related pay. Ownership would not affect the costs of restructuring.

The decision not to allow performance-related pay was based on German evidence. Instability in the economic environment aggravated concerns with use of performance-related pay in more general settings. Moreover, case evidence suggests large transaction costs in implementing pay-for-performance contracts in Treuhand-owned firms.

Risk-averse managers prefer less use of performance-related pay if they are imperfectly informed about their own productivity levels, or if performance measures are very noisy measures of managerial productivity.[27] There was undeniably a large amount of noise associated with managerial performance measures in eastern German firms. Firms lacked cost and financial accounting systems and consequently had very imprecise measures of current performance. Moreover, economic shocks beyond management's control and not observed perfectly by the market further distorted performance measures. These shocks included the loss of eastern European markets, dramatic changes in East German domestic demand, and unanticipated increases in wage costs as a result of wage agreements.

Performance-related pay could also introduce additional costs. There were undoubtedly large transaction costs in specifying and measuring performance in eastern Germany. The lack of an initial estimate of firm value made it very difficult to benchmark changes in long-run firm value without expensive auditing. The Treuhand also considered and changed its weighting across employment and investment commitments in addition to sale price at the time of privatization. This increased the difficulty in measuring changes in value associated with managerial effort. These two factors reduced the feasibility of rewarding management based upon their contribution to long-term performance. As shown in the multitask principal-agent models of Bengt Holmstrom and Paul Milgrom (1991, 1994), when there is no contractible measure for management effort that improves the long-run value of the firm, it may be optimal to offer no incentive-related pay even for tasks that are measurable.

The experience of the Management KGs (commercial limited partnerships), organizations created by the Treuhand that used performance-related pay, provides detailed evidence on the significant transaction costs in using this instrument during the transition period.[28] In the Management KG, a management team was given broad rights to restructure and privatize a number of firms, while the Treuhand retained ownership of the firms' physical assets. Five such organizations were created. Management was compensated with fixed pay and an incentive contract. To reflect the government's multiple goals of increasing sale price, employment, and investment, managers were rewarded based on "social value" created in the restructuring and privatization. Social value was defined as a fixed combination of the sale price (less an initial estimate of firm value), and employment and investment committed by new private owners. For feasible levels of social value, compensation averaged between 5–10 percent of "social value" created. One of the advertised benefits of this organizational form was its ability to attract and retain highly qualified management. As the vice chairman of the Treuhand argued, "(the management contractor provides) small highly qualified teams the Treuhand could otherwise not make available."[29]

Implementing this program was costly and difficult. Explicitly mentioning political

[27] Many papers, such as Stiglitz (1975), show that with risk-averse managers and unobserved exogenous shocks it is optimal to have less than fully contingent pay. Tirole (1991) suggests that noisy performance measures during the transition period in eastern Europe will lower optimal incentive intensity.

[28] Dyck and Karen Wruck (1995) and Bundesrechnungshof (1995) provide detailed descriptions of the Management KG.

[29] See Brahms (1992 p. 5).

concerns with potentially large bonuses coinciding with massive employment reductions, government officials capped the performance bonus at DM 6 million per management team.[30] Professional auditors were employed to establish an initial value of the firm at a cost of DM 1 million per organization, more than 16 percent of the maximum achievable bonus and 40 percent of the expected bonus.[31] The Treuhand had great difficulty specifying and securing approval for a specific trade-off between sale price, employment, and investment. The specific performance bonus used for all KG organizations required the approval not only of the Treuhand management board but also the finance minister.

Perhaps most importantly, there was a significant administrative delay between the agreement to use performance-related pay and implementation of this system. The idea of the Management KG was first floated in November 1991, more than 16 months following economic and monetary union. The proposal took six months to be approved by political representatives, Treuhand officials, and management, was announced in May 1992 and first introduced in September 1992—26 months following economic and monetary union. Three new management KGs were only introduced after a one-year trial in September 1993. While representing a small fraction of the firms under Treuhand ownership, these difficulties suggest wider problems in using performance-related pay to address screening problems.[32]

C. *Ability in East and West*

Model results rely upon the assumption that managers in the West are more productive than eastern managers. The strongest model results rely upon a link between ability in the West and productivity in the East. This subsection evaluates these assumptions.[33]

The economic integration of eastern and western Germany subjects eastern German firms to the same set of laws, regulations, and competitors as those in the West, suggesting that the functional skills required of a manager are similar in East and West.[34] In both regions, a manager needs to know how to control costs and increase revenues. Cost control required managers to implement new managerial and financial accounting systems. East German managers had no experience with such accounting systems. Financial reports made under the old system were designed to aid plan fulfillment, not provide the kind of information sought by investors, creditors, or cost-reducing managers. Revenue generation demanded the creation of a sales department, a marketing department, as well as a new, efficient distribution network. Under planning, most firms had distributed, as opposed to sold, their products or had sold through a foreign trade office.[35]

[30] At the average exchange rate for 1992 = $3.85 million.

[31] See Bundesrechnungshof (1995).

[32] Evidence I collected confirms the limited use of performance-related pay. In the 50 firms I surveyed in 1992 (a description of sample firms is found in Section IV), performance-related pay of any sort was only utilized in 16 percent of Treuhand-owned firms, while utilized in 48 percent of privately owned firms. The Treuhand had similar difficulties in introducing performance-related pay for its own staff. Beginning in 1992, the Treuhand attempted to introduce performance-related pay for top-level management. This attempt was widely criticized, and following a public condemnation of this procedure by the German equivalent of the General Accounting Office (Bundesrechnungshof [1993, 1995]), performance-related pay was capped and severely constrained for 1993 and 1994. In an interview with the author, the personnel director of the Treuhand reported very limited use of contingent pay in Treuhand enterprises, but was unable to provide documentary evidence, as managerial contracts were kept at the individual firm locations.

[33] The model also assumes that inside owners will transfer managers with the highest additional productivity to their eastern plants. A reviewer noted that if western firms were intent on reducing the power of rivals to their western operations, they could purchase eastern operations with the intent of sending incapable western managers. The likelihood of sending able, rather than incapable, managers is enhanced to the degree that the sale process requirement that owners make investment and employment commitments fostered a longer term perspective for eastern operations.

[34] Knowledge of the western institutional and legal system was particularly helpful for personnel managers, for German law required the creation of works councils at the plant level, and industry union wage agreements required the introduction of specific wage and salary structures.

[35] For example, prior to reunification, East German breweries maintained no marketing or sales personnel, a

Numerous studies reinforce the claim of a need for functional skills in eastern enterprises and a lack of knowledge of marketing, sales, personnel, and accounting in eastern German firms. W. Lenske (1992) reports that a majority of firms surveyed by the institute of the German economy mentioned a large to very-large deficit in knowledge of relevant business laws, marketing, sales, and distribution, while more than 70 percent of firms found some weaknesses in general management skills, cost accounting, and knowledge of labor law. The German Institute for Economic Research (DIW) (1991) reports that 70 percent of surveyed firms were introducing or expanding their marketing branches, 54 percent were changing their accounting system, and 37 percent were changing their supply networks. Indicative of eastern managers' weaknesses was the Treuhand's release of 1,800 eastern managers because of a reported lack of skills or illegal activities and dismissal of 570 managers because of their political ties to the Communist Party or secret service (STASI).[36] Consistent with this desire for functional skills possessed by western German firms, Jenapharm, a producer of prescription drugs in eastern Germany, found that: "it would go bankrupt before it had trained a sales force for the distribution of its products and a group of representatives for visiting doctors."[37] Its solution was to join with a western German firm with an established distribution network.

In addition to functional skills, eastern managers required restructuring skills that likely combined functional knowledge with other talents, such as the ability to implement many changes at once. The model still applies so long as western managers had higher levels of restructuring skills and one of the following two conditions was met: inside owners had a greater knowledge of managers' potential productivity in restructuring than outside owners (not necessarily complete knowledge); or, restructuring knowledge was complementary to functional knowledge about which inside owners were better informed. In both instances, inside owners would transfer managers with the highest additional return in the East, while outside owners would still transfer managers of lower average ability and perhaps fewer managers than inside owners.

The model is less well suited to environments where a manager requires a knowledge of idiosyncratic features of a country including societal norms and language. Under those circumstances, eastern managers arguably have a higher level of such skills than western managers, and inside owners would have no information advantage relative to outside owners in hiring such managers. This model, therefore, has greater applicability to countries where idiosyncratic knowledge is less important relative to functional and restructuring skills. Possible indicators of the importance of functional and restructuring skills are a greater degree of international openness, use of developed country standards and regulations, and a minimal governmental role in allocating goods, capital, and services. Eastern Germany's integration into western Germany, the use of a common language, and the high level of management transfer from western to eastern Germany (documented in the next section) suggest that eastern German idiosyncratic knowledge was relatively unimportant in this case. The importance of knowledge of the German language and institutional system perhaps account for the overwhelming dominance of western German purchasers of eastern enterprises.

IV. The Evidence

This section presents evidence to support the assumptions and implications of the theoretical model. First, consistent with model assumptions, I show a significant transfer of western managers to eastern Germany. Second, I show that details of the privatization process are consistent with a policy motivated

department responsible for more than 7 percent of the work force in a western German brewery. Findings are from interviews and questionnaires of German breweries conducted by the author in summer 1992 and 1993.

[36] Two mechanisms were used to evaluate the political past of managers. First, in October 1990 a commission of retired judges from West Germany heard complaints about the political past of managers. As of May 1992, they had heard 6,000 such complaints. Second, in March 1991, the Treuhand asked for an evaluation of the political past of managers by the head of each firm's newly appointed supervisory board (Hermann Wagner, 1991).

[37] Horst Albach (1992 p. 14).

by concerns over adverse selection in the managerial labor market. Third, I show the predicted differences in management transfer between government-owned firms and Treuhand-owned enterprises and discuss alternative explanations for this result.

A. *Model Assumption—A Need for Western Management Transfer*

To evaluate the extent of management transfer and to see how privatized firms were responding to the challenge of restructuring, I conducted a survey of eastern German enterprises in the summer of 1992 in conjunction with the DIW. This survey is supplemented by additional evidence on management transfer provided by internal Treuhand documents and a more limited survey of the financial service sector.

We selected all of the industrial firms in the brewing, telecommunications and electronics, chemicals, and machine tool sectors with more than 500 employees at the time of German economic and monetary union from DIW-provided lists of enterprises in eastern Germany. The resulting sample had 340 firms. Each firm was initially sent a survey and many firms were subsequently called or visited to complete the survey. The usual respondent was the managing director, who was asked to report on the characteristics of the firm's governance structure.

The German system of corporate governance has a two-tiered board. At the top sits a supervisory board (Aufsichtsrat), composed of representatives of shareholders and workers. The fraction of worker representatives differs by industry and by the size of firm, but is never greater than half of all representatives. At the next level is the managing board (Vorstand), composed of professional managers. Unlike Anglo-American boards, managing board members are forbidden from sitting on supervisory boards.[38] Below the managing board are top line managers called leading employees (leitende Angestellte). The number of individuals at the different governance levels is partially defined by statute and partially a choice of the firm's owners. Many firms do not have supervisory boards and some firms, particularly subsidiaries of larger organizations, do not have managing boards.

For each category of management, firms were asked to indicate whether the individuals in these positions were easterners or westerners. Eighty-nine firms (26-percent response rate) provided completed responses. In accordance with German data protection rules, these firms had to be asked again whether their data could be used in this formal analysis. Of the original 89 firms, 50 responded affirmatively.[39]

Table 2 provides a summary of the surveyed firms' basic characteristics. As Table 2 shows, the firms in the survey are initially larger than industrial averages, but experienced the same general pattern of massive downsizing, slow increases in sales, and some positive improvement in profitability. All but one of these firms were initially under government ownership.

The survey has a number of limitations. The survey focused on only a few manufacturing industries and, most importantly, only a relatively small number of firms provided complete responses. While this sample is not representative of the eastern German economy, it provides a glimpse into the internal restructuring of owner-manager relationships in private and state-owned enterprises, and is the only available evidence on this issue. Moreover, the pattern of behavior found in this sample is consistent with results found in larger sample studies of Treuhand-owned firms and in surveys of firms in the financial services sector discussed below.

Table 3 shows the transfer of western personnel to leading positions in eastern plants in the surveyed firms. The table presents results for firms that maintained the management position and had complete data between 1990–1992. The number of managerial levels in a particular firm changed over time as a result of owner decisions and changing legal requirements (e.g., employment reductions removed the legal requirement to form supervisory

[38] See Theodore Baums (1992) for a description of this system.

[39] The results for the larger sample are qualitatively similar to those presented in the paper.

TABLE 2—DESCRIPTIVE STATISTICS OF SURVEYED FIRMS BY INDUSTRIAL SECTOR[a]

	1990 July–Dec.	1991 Jan.–June	1991 July–Dec.	1992 Jan.–June	1992 July–Dec.	1993 Jan.–June
Employees per firm						
Chemicals	3,216	2,098	1,230	679	484	671
	613	*468*	*356*	*305*	*292*	*239*
Machine tools	1,334	1,014	722	501	431	427
	339	*259*	*197*	*162*	*140*	*121*
Electronics	1,997	1,255	1,062	915	744	612
	434	*313*	*202*	*167*	*144*	*132*
Telecom manufacturing	2,746	2,131	1,690	1,390	734	452
All firms (includes others)	2,226	1,550	1,134	740	558	503
Sales per employee (in thousands of DM)						
Chemicals	15.9	16.3	27.3	41.4	46.4	58.1
	28.9	*43.5*	*56.3*	*56.6*	*58.6*	*70.3*
Machine tools	31.2	20.5	31.6	23.5	32.4	25.2
	16.4	*27.9*	*27.1*	*41.6*	*37.2*	*54.8*
Electronics	29.0	39.7	38.7	45.4	49.1	82.5
	14.8	*22.8*	*33.1*	*47.7*	*50.0*	*63.7*
Telecom manufacturing	37.1	17.3	29.0	34.7	54.0	112.2
All firms (includes others)	25.9	21.3	31.0	39.9	45.3	62.4
Profits per employee (in thousands of DM)						
Chemicals	−4.1	−7.0	−11.8	−18.9	−31.5	−13.8
Machine tools	−6.8	−6.1	−9.9	−7.4	−13.5	−14.9
Electronics	−1.4	−6.9	−20.9	−5.2	−1.3	−0.4
Telecom manufacturing	−2.0	−6.8	−10.6	−6.2	−34.5	−12.8
All firms (includes others)	−3.6	−6.2	−10.6	−8.6	−15.0	−9.5

Note: The 50 sample firms include 15 firms from the chemical sector, 15 firms from the machine tool sector, 5 firms from the electronics sector, and 8 firms that manufacture products for the telecommunication industry.

[a] Italicized figures represent average values for all eastern German firms operating in the relevant industry. Industry data from DIW.

boards in some firms). The most basic measure of operational management transfer is the absolute number of western managers per enterprise. By this measure there has been a sustained increase in the number of western managers from 0.33 managers per enterprise in June 1990 to 1.86 managers per enterprise in 1992. Another measure that controls for the changing number of positions at the various governance levels is the fraction of the governance level occupied by westerners. Western representation at the managing board increases from 11.5 percent in 1990 to 33.4 percent in 1992. The same trend is repeated at the leading employee level where western representation increases from 1.9 percent in 1990 to 6.4

TABLE 3—WESTERN MANAGEMENT EMPLOYMENT IN MANUFACTURING FIRMS

	June 1990	June 1991	June 1992
Number of individuals per management level			
Managing board	2.8	2.7	2.2
Leading employees[a]	18.5	12.6	10.1
Supervisory board[b]	3.7	4.6	4.8
Western managers as a percentage of total			
Managing board (percent)	11.5	21.6	33.4
Leading employees[a] (percent)	1.9	5.7	6.4
Supervisory board[b] (percent)	69.4	69.4	78.5
Number of western managers employed full time per firm[c]	0.33	1.30	1.86

Notes: Each row in the table presents data for the sample firms that reported management positions at that level over the whole sample period. The number of managerial levels per firm changed over time due to owner decisions and legal requirements as the size of the firm changed. There were 12 firms providing supervisory board data, 26 firms providing managing board data, 30 firms reporting leading employee data, and 37 firms reporting data at either the managing board or leading employee levels.

[a] "Leading employees" is the management level directly below the managing board (e.g., line managers).

[b] Shareholder representatives.

[c] Includes managers at the managing board and leading employee levels.

percent in 1992. At the supervisory board level, western representation rose from 69.4 percent to 78.5 percent.

To supplement this evidence from the manufacturing sector, I collected data on the revealed need for western skills in the financial service sector. As Table 4 shows, for a sample of firms representing 44 percent of all employment in private eastern German banks in 1992, western personnel accounted for 30 percent of all *employees* both in 1990 and 1992. The same firms reported that at upper-management levels, here defined to be directors of branch offices, 75 percent of personnel came from the West in 1990, rising to 94 percent by 1992.

I also collected information on western management transfer directly from the Treuhand. Consistent with the theoretical assumption and survey data, Table 5 shows that there has been a massive transfer of management from western to eastern Germany. Management transfer within Treuhand-owned firms peaked in July of 1992, with 6,000 western managers under Treuhand employ. Although results should not be overinterpreted due to sample attrition, this table also shows an increasing level of western involvement. Expressed as a fraction of total management under contract, there was a steady, sustained increase in western dominance at the management level. By January 1993, 40 percent of all managing board members and 20 percent of all leading employees came from the West. This contributed to a western presence of 1.92 managers per enterprise.[40] These numbers underestimate the level of managerial transfer, as they do not include a measure of consultant services.

These results can be compared with other studies on management change in western

[40] The Treuhand undoubtedly had a social objective and operated on a different budget constraint than private firms. This could affect hiring decisions, and Treuhand transfer is, therefore, not a definitive index of the comparative advantage of western managers.

TABLE 4—WESTERN PERSONNEL EMPLOYMENT IN THE FINANCIAL SERVICE SECTOR

	December 1990	July 1992
Number of positions		
All employees	5,834	8,274
Branch directors	168	311
Westerners as a percentage of total		
All employees (percent)	30	30
Branch directors (percent)	75	94

Note: Surveyed firms account for 44 percent of all employment by the eight largest private banks in eastern Germany in 1992.
Sources: Bundesverband deutscher Banken (1992, 1993) and survey conducted by author, and DIW.

Germany and management change with privatization. Steven N. Kaplan (1994) studied management and board turnover for a sample of 42 large western German corporations between 1981–1989. He reports an annual average turnover rate of 10.9 percent for the chairman of the management board and 9.9 percent for a member of the management board, with corresponding numbers for the supervisory board of 13.8 percent and 11.6 percent. William L. Megginson et al. (1994), in their sample of 61 large firms from 18 countries privatized through initial public share offerings, report that only 14 percent of firms replaced their top executive following privatization. These results contrast with the above survey results, where almost 40 percent of the managing board comes from the West just two years after reunification. Interviews with managing directors of plants taken over in the East by large German firms, such as Becks, Siemens, and Alcatel, all report significantly greater levels of management transfer than in takeovers of enterprises in the Federal Republic of Germany or other European countries.

B. *Model Prediction—The Restructuring Process*

The model predicts that a government interested in restructuring eastern enterprises and cognizant of both the need for western management and the likely adverse selection in the labor market would choose a policy of rapid privatization with openness to western purchasers. As mentioned in Section I and shown in Table 1, the German government adopted a policy of rapid privatization. The model further suggests that a sales mechanism that allocates eastern plants to owners that can transfer managers with the greatest increase in value in the East maximizes efficiency. Consistent with theoretical predictions, the Treuhand sold firms in a process open to all purchasers and rarely set aside shares for incumbent workers, managers, or eastern German citizens.

Section II suggested that an auction is an efficiency-maximizing, privatization mechanism. German evidence shows that the sales process involved direct negotiation with potential buyers with only exceptional use of an auction mechanism. While seeming to contradict the model, a detailed examination shows that a significant motivation for the discretion in the sales process was the Treuhand's concerns about the ability of potential owners to manage the new eastern assets. The Treuhand negotiating team screened potential buyers for their ability to implement their business plans. While they did not directly evaluate the quality of the proposed buyer's management team, the Treuhand looked more favorably upon bids from established enterprises that presumably had the ability to provide the required management skills. As the Treuhand explained:

TABLE 5—WESTERN MANAGEMENT EMPLOYMENT IN ALL TREUHAND-OWNED FIRMS

	July 1, 1990	July 1, 1991	July 1, 1992	Jan. 1, 1993
Number of individuals per management level				
Management board	~25,000	18,000	10,000	7,000
Leading employees[a]	~45,000	40,000	20,000	10,000
Supervisory board[b]	~2,000	2,600	2,300	—
Western managers as a percentage of total				
Management board (percent)	~4	8	30	40
Leading employees[a] (percent)	~2	4	15	20
Supervisory board[b] (percent)	~25	69	83	—
Number of western managers employed full time per firm[c]	0.15	0.42	1.46	1.92
Number of Treuhand-owned firms	13,000	7,200	4,100	2,500

Note: – means not available.
Source: Letter from Kristian Dorenberg and Hans-Dieter Thom (personnel director and manager, Treuhand), December 1, 1992.
[a] "Leading employees" is the management level directly below the managing board (e.g., line managers).
[b] Shareholder representatives.
[c] Includes managers at the managing board and leading employee levels.

"An investor who is ready to *inject new management* and substantial new investment into a company, and, crucially, is prepared to keep or create a substantial number of jobs, is likely to take precedence over an investor who is offering only a higher price."[41] The importance of a bidder's restructuring ability was reflected in the decision protocols written for each sale. The perceived restructuring ability of bidders was also reflected in incentive systems for Treuhand negotiating teams. Superiors judged the negotiating team based on the quality of the buyers as well as the sales, investment, and employment commitments, and used this evaluation in determining bonuses.[42]

The 80 percent of sales to noneasterners reported in Table 1 is consistent with theoretical predictions. The relatively few number of firms purchased by venture capitalists suggests that the majority of western German buyers were established western firms. Not predicted by the model was the relatively small number of firms purchased by foreigners. The model could be adapted to arrive at this result if one defines managerial skill to include knowledge of German and features of the German institutional system.

C. *Model Prediction—Management Transfer Differences*

While privatization was the foremost policy of the Treuhand, this task took longer than initially expected. Many firms remained under Treuhand ownership for considerable lengths of time. For example, in July 1992, 4,100 firms remained under Treuhand control. The simultaneous presence of private and public ownership allows an evaluation of the predictions of the theoretical model, in particular, an evaluation of differences in

[41] Treuhand (1992b p. 27, emphasis added).
[42] I am indebted to a reviewer for noting the inclusion of restructuring ability in decision protocols, and to Treuhand negotiators for information on the form of performance evaluations.

management transfer between state-owned and private firms.

The theoretical predictions of Section II can be applied if one assumes that a specific fraction of the firms is retained by the government and set aside for government-led restructuring and the remainder are immediately allocated to inside owners. Because of selection problems for the government as an outside owner, it will transfer managers of lower-than-average ability. Inside owners will take advantage of internal labor markets to make a transfer of managers from their western to their eastern operations. Consequently, inside owners will be able to transfer managers of above-average ability and will transfer those managers they perceive to have the highest additional return in the East. In addition, if the number of firms retained by the government is still larger than the "critical number," there will be a lower level of managerial transfer in government-owned enterprises than in privatized enterprises. Selection problems are predicted at both the management and leading employees levels.

1. *Mechanism of Hiring Western Managers.* The model assumes that inside owners will transfer managers from their existing operation to the eastern plants, while outside owners will hire through the managerial labor market. All of the privatized firms surveyed reported that they met their new managerial needs by transferring managers from their western operations instead of hiring new managers for these positions. Many interviewed managers were directed to assume control of eastern operations and transferred from director positions of western plants or foreign subsidiaries. Alternatively, the Dresdner Bank paired each eastern German branch with two western facilities that were required to transfer 5 percent of their staff to the East. The choice of individuals transferred was decentralized to the western branch and most of those transferred had some historical connection to the East. Treuhand firms, on the other hand, met their needs by hiring in the market. Searches were conducted either by the Treuhand personnel office based on preliminary screening by western German head-hunting offices or at the firm by the supervisory board.

2. *Productivity Levels.* It is not possible to get an index of managerial ability. If it were observable to the researcher it would also presumably be observable to the eastern firms hiring. *Ex-post* performance might be a signal of managerial ability, but it is difficult to disentangle performance from the many other difficult-to-measure exogenous economic shocks that affect a firm's performance. Firm-level interviews, interviews of Treuhand personnel responsible for hiring managers for Treuhand firms, and press reports provide some anecdotal evidence about the variance in ability of managers hired by the Treuhand, and the presence of a significant fraction of low-ability managers hired by Treuhand firms.[43] For example, the director of personnel responsible for hiring management for Treuhand-owned enterprises recognized the importance of managerial deficits and of adverse selection in hiring:

> Because of volume (of management to be hired) problems, between fall 1990 and summer 1991, we knew that the management candidates were second best. But the firms were in such a bad situation that we said to ourselves, this was a deliberate decision, we must hire these second best because they can help us to ensure that these firms will not drown or be liquidated.[44]

3. *Levels of Transfer.* The null hypothesis that ownership does not affect western management transfer is clearly rejected when the firms in the data set are divided into privatized and publicly owned firms. In privately owned firms, 2.72 western managers had been transferred per enterprise by June of 1991, a number that rose to 3.18 managers per enterprise by June of 1992. In firms not yet privatized, the transfer levels are lower, with less than one western manager per enterprise by June of

[43] For example, in two of the publicly owned firms surveyed, some of the western managers hired were later replaced following attempts to defraud the firm. Similar stories are seen in the official newsletter of the Treuhand, with titles such as "A Wild East is Not Tolerated" and "The Goldgrabber Time of Criminals After Unification Is Past" (Treuhand, 1992c).

[44] Interview conducted by author with Hermann Wagner, director for personnel for associated firms of the Treuhand, in October 1993.

TABLE 6—WESTERN MANAGEMENT EMPLOYMENT IN MANUFACTURING FIRMS BY MANAGEMENT LEVEL

	Management board		Leading employees[a]		Supervisory board[b]	
	June 1991	June 1992	June 1991	June 1992	June 1991	June 1992
Number of managers						
Per Treuhand-owned enterprise	2.9	2.2	12.8	8.3	5.4	5.0
Per privatized enterprise	2.5	2.5	10.8	12.0	3.7	3.9
Western managers as a percentage of total						
Per Treuhand-owned enterprise (percent)	12.2	28.0	1.5	2.1	59.5	63.2
Per privatized enterprise (percent)	42.2	50.4	24.6	24.1	91.7	93.2
t-statistic for the difference in western managers as a percentage of total	2.58[d]	1.83[e]	3.80[c]	3.38[c]	2.34[d]	2.46[d]

Notes: There were 44 firms included in this sample. Of the 32 firms maintaining the management board level, 18 were Treuhand-owned in 1991 and 15 in 1992. Of the 42 firms maintaining the leading employee level, 25 were Treuhand-owned in 1991 and 21 in 1992. Of the 23 firms maintaining the supervisory board position, 14 were Treuhand-owned in 1991 and 12 in 1992.

[a] "Leading employees" is the management level directly below the managing board (e.g., line managers).

[b] Shareholder representatives.

[c] Statistically significant at the 1-percent level.

[d] Statistically significant at the 5-percent level.

[e] Statistically significant at the 10-percent level.

1992. The difference in the level of western management transfer (2.22 managers per firm in 1991, 2.4 managers per firm in 1992) is significant at the 1-percent significance level.

Table 6 shows the rapid introduction of westerners at the different management levels. Western representation was 30 percentage points higher on management boards of privatized firms than in Treuhand-owned firms in June 1991 (42.2 percent relative to 12.2 percent) and 22.4 percentage points higher in June 1992 (50.4 percent relative to 28.0 percent). These transfer levels compare with an absolute difference at the leading employee level of 23.1 percentage points in June 1991 (24.6 percent relative to 1.5 percent) and 22 percentage points in June 1992 (24.1 percent relative to 2.1 percent). In the slightly more than half of our sample that was legally required to form supervisory boards, western representation levels were 32.2 percentage points higher in private firms in 1991 and 30 percentage points higher in 1992. All of the differences in the mean levels of western representation are statistically significant at the 10-percent significance level or less.

A possible objection to comparisons of mean levels of western representation is that characteristics of the firms other than ownership could drive the differences in management transfer. Another potential explanation for the differences in management transfer is that firms that were privatized less rapidly may have been firms for which there were fewer qualified western managers, or firms that western purchasers viewed as having poor prospects. Similarly, western managers may not want to threaten their career prospects by working for a firm that has low chances of survival. To control for some of these possibilities I adopted a regression framework and have used various proxies for a firm's a priori chance of survival.

First, I introduce time dummies, as management transfer is more likely to increase over time as conditions in eastern Germany im-

prove. Second, I introduce a firm's industry classification. Given the change in relative prices with economic liberalization and the removal of state controls, some industries had little chance for success. The eastern German chemical industry, for example, relied heavily on environmentally damaging brown coal and needed to fundamentally change its production technology. I controlled for industry by identifying the industry group at the two-digit SIC level and dividing the data set into four two-digit industries (chemicals, machine tools, electronics, and telecommunications manufacturing) and one residual category. Third, I control for possible differences in firm prospects within an industry by introducing sales per employee in 1990. I ranked all firms according to this measure and then separated them into three categories, labeling the top one-third of firms "high sales per employee firms," and the bottom third "low sales per employee firms." I introduce dummy variables for the high and low sales per employee firms.

Our prior finding, that we can reject the null hypothesis that private ownership has no impact on management transfer, is robust to including time, industry, and sales per employee dummies. The first and second column for each dependent variable in Table 7 present the coefficient estimates and *t*-statistics for the regressions where the independent variable for ownership is whether the firm is privatized in that year or earlier. When time and industry dummies are included, private ownership contributes to an additional 1.24 western managers per enterprise, with a 22-percentage-point difference in the level of western representation at the managing board level and a 12-percentage-point difference at the leading employee level. These differences are statistically significant at the 5-percent significance level or less. The coefficients for privatization's impact on western representation at the supervisory board level remain positive, but these results, about which we had no strong theoretical priors, are not statistically significant. Introducing sales per employee dummies lowers the predicted contribution of private ownership to western management transfer, while the results remain statistically significant.

The regression framework also allows us to evaluate when private ownership has its greatest impact on management transfer. In Table 8 I replaced the private ownership dummy with two dummies indicating if the firm was privatized in that year or the previous year. The results show that private ownership has a significant impact on western management transfer in the year of privatization for all levels of operational management and a statistically significant impact in the second year of privatization at the leading employee level.

4. *Alternative Explanations for Managerial Transfer Differences.* A competing hypothesis for the difference in management transfer levels is that eastern managers were able to block the hiring of western managers in government-owned firms. As emphasized by Aghion et al. (1994) and Boycko et al. (1995), as well as eastern European case study evidence summarized by Carlin et al. (1994), if the government had de jure or de facto allocated decision rights to workers and/or management, it is perfectly consistent for incumbent employees to block new management. In Germany, however, the state never abdicated its control rights over enterprises, did change thousands of managers, and delegated decision-making to westerners to realize more hiring.

Another explanation for the difference in managerial transfer levels could be differences in managerial contracts offered by the Treuhand and privatized enterprises. However, the Treuhand followed a high salary policy to attract and retain qualified western managers. For example, within the Treuhand, the board set salary levels for 1991 at between DM 250,000 and DM 300,000 per year, which placed Treuhand managers in the 15th percentile of average salaries of top executives in the 100 largest publicly listed German firms in that same year. By 1992, the 46 Treuhand directors received higher average compensation of DM 379,000 per year.[45] Managers for Treuhand-owned enterprises were officially hired by their enterprise, not

[45] Treuhand compensation strategy and salary information are provided in Bundesrechnungshof (1993) and salaries from publicly listed firms come from Kay Baden and Michael Gatermann (1991).

TABLE 7—OLS ESTIMATES OF DETERMINANTS OF WESTERN MANAGEMENT EMPLOYMENT

Independent variables	Dependent variables							
	Number of western managers employed full time per firm[a]		Western managers as a percentage of total—The managing board		Western managers as a percentage of total—Leading employee level[b]		Western managers as a percentage of total—Supervisory board	
Privatized	1.24[c]	1.12[d]	0.22[d]	0.25[d]	0.12[d]	0.09[d]	0.15	0.11
	(2.79)	(2.27)	(2.37)	(2.59)	(2.62)	(2.50)	(1.62)	(1.21)
Machine tool sector	0.27	−0.50	−0.03	0.02	0.03	−0.02	−0.55[c]	−0.60[c]
	(0.53)	(0.85)	(0.30)	(0.12)	(0.63)	(0.50)	(4.83)	(5.13)
Electronics sector	2.05[c]	2.43[c]	0.02	−0.00	0.14[d]	0.16	−0.08	0.13
	(3.07)	(3.44)	(0.13)	(0.01)	(2.07)	(3.10)	(0.55)	(0.81)
Telecom manufacturing sector	4.02[c]	4.37[c]	0.26[d]	0.33[d]	0.28[c]	0.27[c]	0.10	−0.01
	(6.23)	(5.85)	(2.16)	(2.46)	(4.59)	(5.33)	(0.94)	(0.06)
Other sectors	0.70	0.79	−0.24[e]	−0.26[e]	0.17	0.06	−0.45[c]	−0.30[d]
	(1.16)	(1.14)	(1.92)	(1.93)	(2.90)	(1.26)	(3.44)	(2.11)
Dummy if year = 1991	−0.17	0.82	0.15	0.09	−0.04	0.04	0.90	1.02[c]
	(0.41)	(1.40)	(1.79)	(0.71)	(0.99)	(1.07)	(9.67)	(9.28)
Dummy if year = 1992	0.28	1.22[e]	0.27[c]	0.21	−0.03	0.05	0.95[c]	1.07[c]
	(0.65)	(2.06)	(3.22)	(1.72)	(0.68)	(1.23)	(9.78)	(9.64)
Low sales per employee in 1990	—	−0.93	—	0.09	—	−0.05	—	−0.32[c]
	—	(1.54)	—	(0.71)	—	(1.29)	—	(2.96)
High sales per employee in 1990	—	−1.54[c]	—	0.04	—	−0.12[c]	—	−.011
	—	(2.78)	—	(0.40)	—	(3.18)	—	(1.04)
Number of observations	88	74	64	58	84	70	46	42
Adjusted R^2	0.49	0.51	0.30	0.32	0.40	0.51	0.50	0.56

Notes: Identical sample as detailed in Tables 5 and 6. *t*-statistics provided in parentheses. Omitted industrial category is the chemical industry. Omitted sales category is average sales per employee in 1990.

[a] Includes managers at the managing board and leading employee levels.

[b] "Leading employees" is the management level directly below the managing board (e.g., line managers).

[c] Statistically significant at the 1-percent level.

[d] Statistically significant at the 5-percent level.

[e] Statistically significant at the 10-percent level.

the state, and according to the personnel director of the Treuhand, often received salaries in excess of those offered Treuhand directors. In addition, the Treuhand offered contracts of two–five years for the managers they hired, differing little from the standard three-year contract available to western managers in privately owned enterprises. However, it must be admitted that Treuhand-owned firms could not offer the implicit guarantee of future employment available to established private enterprises. On the other hand, Treuhand managers could usually assume more responsibility than possible if they remained with their western enterprise, increasing the incentive for managerial transfer.

Perhaps the most compelling competing argument for the difference in transfer levels is

TABLE 8—OLS ESTIMATES OF DETERMINANTS OF WESTERN MANAGEMENT EMPLOYMENT BY PRIVATIZATION YEAR

Independent variables	Dependent variables			
	Number of western managers employed full time per firm[a]	Western managers as a percentage of total—The managing board	Western managers as a percentage of total—Leading employee level[b]	Western managers as a percentage of total—Supervisory board
Privatized this year	1.35[c]	0.28[c]	0.11[d]	0.16
	(2.67)	(2.84)	(2.21)	(1.49)
Privatized one year earlier	0.99	0.12	0.15[d]	0.13
	(1.66)	(1.05)	(2.39)	(1.04)
Machine tool sector	0.28	−0.02	0.03	−0.55[c]
	(0.54)	(0.20)	(0.63)	(4.75)
Electronics sector	2.08[c]	0.03	0.14[d]	−0.08
	(3.10)	(0.26)	(2.01)	(0.52)
Telecom manufacturing sector	4.18[c]	0.30[d]	0.28	−0.10
	(6.50)	(2.57)	(4.65)	(0.88)
Other sectors	0.76	−0.22[e]	0.16[c]	−0.45[c]
	(1.23)	(1.77)	(2.78)	(3.34)
Dummy if year = 1991	−0.25	0.11	−0.04	0.90[c]
	(0.57)	(1.22)	(0.87)	(8.98)
Dummy if year = 1992	0.36	0.29[c]	−0.03	0.95[c]
	(0.80)	(3.48)	(0.78)	(9.53)
Number of observations	88	64	84	46
Adjusted R^2	0.48	0.32	0.40	0.48

Notes: Identical sample as detailed in Tables 5 and 6. *t*-statistics provided in parentheses. Omitted industrial category is the chemical industry. Omitted sales category is average sales per employee in 1990.

[a] Includes managers at the managing board and leading employee levels.

[b] "Leading employees" is the management level directly below the managing board (e.g., line managers).

[c] Statistically significant at the 1-percent level.

[d] Statistically significant at the 5-percent level.

[e] Statistically significant at the 10-percent level.

that the Treuhand and its appointed supervisory boards may have had no desire, or less of a desire, to remove eastern management. The dispersion and effective nontransferability of ownership in state-owned enterprises leaves owners and board members with lower incentives to reduce managerial slack, perhaps reflected in fewer actions to replace eastern management.

This argument probably helps to explain some of the difference in transfer levels, but nonetheless has some difficulties. First, this argument does not specify the costs involved in hiring new managers, whereas the model presented here suggests that costs arise as a result of the need to screen for ability. Second, board members did have significant nonmonetary incentives and considerable support services to lower their personal cost associated with hiring new managers. Board members were selected after a personal appeal by the chancellor, and a sense of civic duty motivated diligent supervision and served as a partial substitute for lower monetary incentives. Supervisory boards were aided by third-party screening services and by the Treuhand central

office. Evidence of these groups' combined efforts is reflected in the significant number of western managers that were hired by Treuhand-owned firms.

V. Conclusion

This paper rationalizes the German government approach to restructuring state-owned enterprises. It shows that, ceteris paribus, concerns over adverse selection in the western managerial labor market suggest a policy of rapid privatization rather than state-led restructuring, and privatization through sales with openness to all purchasers rather than giveaways to easterners. The model also shows how the benefits of a policy of targeted privatization increase more than proportionately once the number of firms to be restructured increases beyond a "critical level." The observed results of rapid privatization, predominant ownership by established western firms, significant western management transfer, and differences in the method and extent of management transfer between Treuhand-owned and privatized enterprises are consistent with model assumptions and predictions.

The paper's principal message—that reformers need to consider how privatization programs affect the replacement of managerial human capital—has broad implications even though other eastern European countries cannot replicate the German privatization strategy. The extent of management replacement in Germany, where incumbent managers lacked the ability to block such changes, is a strong signal of the importance of management replacement in enterprise restructuring. Recognition of the link between the design of privatization programs and the ability to facilitate needed management change suggests lowered expectations from many privatization policies in eastern Europe. It also suggests how countries aside from Germany can take steps in their privatization programs to encourage appropriate management change.

Privatization policies that discouraged management change or introduced owners without the ability to identify qualified western managers are likely to have significant opportunity costs. For example, Russia's privatization policy gave incumbent management significant stakes. This shareholding increased managerial incentives, but by entrenching management made it very difficult to introduce the replacement of human capital that this paper suggests is critical to successful restructuring. Barberis et al. (1996) document the advantage of management replacement for firm restructuring. Also costly were privatization plans that avoided managerial entrenchment by distributing a significant fraction of shares to the domestic populace through various voucher schemes. This paper suggests that unless voucher privatization was coupled with possible purchase of shares by foreign firms, the newly privatized state enterprises will have difficulty making the required changes with existing management, and will face additional costs in purchasing those skills on the labor market because of adverse selection. Relative to the government, the domestic populace has no better information about productivity levels of western managers with the required functional skills.

The positive message of the paper is that privatization programs that allow for management change and are open to foreign purchasers can improve firm performance. Outside of the German context, the paper's message becomes an argument for direct foreign investment or joint ventures with established western firms. The advantage of foreign investment from this perspective is the ability of foreign owners to introduce western managerial know-how at a lower cost than the government could achieve, at a higher average productivity level, and the possibility of introducing more managers. The paper therefore suggests that foreign firms that bring management capability in addition to capital are likely to have greater returns than those that focus solely on financial contributions. This focus on the management advantage of foreign direct investment differs from the standard argument about a foreign firm's ability to bring in capital and technology.

The model suggests that privatization policies open to foreigners are likely to have a higher return in countries where functional skills such as marketing, distribution, fi-

nance, sales, controlling, and knowledge of market economy institutions are more important relative to idiosyncratic knowledge of domestic language and institutions. Model implications therefore have greatest force in eastern European countries like Poland, Hungary, and the Czech Republic that have attempted to rapidly introduce macroeconomic stabilization measures and tailored reform policies to European union standards. Applied more broadly, the model suggests greater return to foreign direct investment as a result of more effective management transfer in developing economies that have recently reduced state allocation of goods and opened their economy to international trade and competition. The paper has fewer direct implications for transition economies that have been slow to remove the state from the economy, have idiosyncratic legal systems, and have not opened their economy to international trade and competition. Of course, these advantages of foreign investment must be weighed against other costs and benefits.

In countries where functional skills are important, but foreign direct investment on a large scale is not politically feasible or introduces additional costs, the paper suggests that owners should recruit western managers in the early stages of privatization and tailor their recruitment policies to overcome potential informational asymmetries. As highlighted in Section III, potential mechanisms include screening, signaling, and rewarding managers through performance-contingent contracts. Attempts to recruit western management for mutual funds in the Polish privatization scheme have exploited such policies.

Finally, in showing the benefits of targeted privatization, this paper also provides another example where firm-mediated transactions are lower in cost than market-mediated transactions. Here, quality information on managerial ability is costly to acquire through the market, is valuable, and needs to be quickly acted upon. Existing firms are simply more efficient at making use of this information. As Ronald Coase (1937) pointed out, sometimes allowing firms to control transactions increases economic efficiency.

APPENDIX

PROOF OF PROPOSITION 1:

It is necessary to show that the profits of the owners cannot be improved upon by different wage strategies.[46]

(i) Outside owners without eastern firms.— The expected payoff of owner j from hiring a manager is

$$E(\theta(w_j)) - w_j = \frac{1}{\int_0^{w_j} Nf(\theta)\,d\theta + \int_{w_j}^{\infty} \mu Nf(\theta)\,d\theta} \times \left[\int_0^{w_j} \theta Nf(\theta)\,d\theta + \int_{w_j}^{\infty} \mu\theta Nf(\theta)\,d\theta\right] - w_j^i.$$

Note that this is a single-valued function, and while $d[E(\theta^i(w))]/dw$ can be greater or less than zero, it is always <1. Therefore, the expected payoff function is monotonically declining.

Defining $\bar{\theta}$ as the average level of ability in the whole managerial pool, $\lim_{w\to 0} E(\theta(w)) = \lim_{w\to 0} (\int_w^{\infty} \mu\theta N(\theta)\,d\theta / \int_w^{\infty} \mu N(\theta)\,d\theta) = \bar{\theta}$. Therefore, as w approaches zero, $E(\theta(w)) - w > 0$.

Given the form of the expected ability function, the average level of ability of managers in the secondhand pool cannot be greater than $\bar{\theta}$. Therefore, for $w > \bar{\theta}$, $E(\theta(w)) \leq \bar{\theta} < w$, and $E(\theta(w)) - w < 0$.

Because the expected payoff function is single valued and monotonically declining, and wages exist at which the payoff is positive and negative, there exists a unique wage w^* such that $E(\theta(w^*)) - w^* = 0$. I define this wage as w_W.

The expected payoff for owner j from employing a manager is defined as $E(\pi(w_j)) = E(\theta(w_j)) - w_j$. Suppose a western owner j

[46] For expositional convenience, $f(\theta)$ is assumed to be continuous.

offers wage $w_j < w_W$. Because other firms offer w_W, no managers accept the offer and the owner makes zero profits. Suppose $w_j > w_W$. Since for high levels of w, $w > E(\theta(w))$, it must be true that $w_j > E(\theta(w_j))$, and $E(\pi(w_j)) = [E(\theta(w_j)) - w_j] < 0$. Thus, the only feasible wage offer at which managers are hired and outside owners make zero expected profits is $w_j = w_W$.

(ii) Outside owners with eastern firms.—The expected productivity of a manager hired given wage offer w is indicated by $D(w)$, where $D(w) \equiv E(\theta(w) + \delta(\theta(w)))$. To simplify discussion, I limit $E[\delta(\theta(w))] < \max_i(\theta^i)$ so that wages exist at which owners make negative profits.

As w approaches zero, $\lim_{w\to 0} E(\theta(w)) = \lim_{w\to 0} \int_w^\infty \mu\theta N f(\theta)\, d\theta / \int_w^\infty \mu N f(\theta)\, d\theta = \bar{\theta}$. Since $D(w)$ is an increasing function of expected ability, as w approaches zero, $D(w) - w > 0$.

Since the expected ability level of managers in the secondhand pool cannot be greater than $\bar{\theta}$, and since I have constrained the possible size of δ, at high wage offers, owners of eastern firms make losses. That is, for $w > (\bar{\theta} + \delta(\bar{\theta}))$, $D(w) < (\bar{\theta} + \delta(\bar{\theta})) < w$ and $D(w) - w < 0$.

Since the expected payoff function is single valued and monotonically declining, and wages exist at which there are positive and negative profits, there exists a unique wage w^{**} such that $D(w^{**}) - w^{**} = 0$. I define this wage as w_E. w_E will shift depending on whether more able managers have a comparative advantage in the East.

Suppose an outside owner with an eastern firm offers $w_h > w_E$. For high levels of w, $w > D(w)$, therefore, it must be true that $w_h > D(w_h)$, and $E(\pi(w_h)) = E[(\theta(w_h)) + \delta(\theta(w_h))] - w_h < 0$. Thus, w_E is an upper bound on feasible wage offers. Suppose an outside owner with an eastern firm offers $w_h < w_E$. Since western firms hiring managers in the secondhand market are offering w_W, no managers accept this offer and expected profits are zero. Thus, w_W is a lower bound on feasible wage offers.

Note that if outside owners with eastern firms offer $w(S_E)$ and $w_W < w(S_E) < w_E$. Then, there are S_E owners making offers and S_E managers available. Thus, each owner is assured of being able to hire a manager. At this wage, the expected payoff to the owner is positive, as the expected payoff function equals zero at w_E and is monotonically decreasing in wages,

$$E(\pi(w(S_E))) = E[(\theta(w(S_E))) - w(S_E) + \delta(\theta(w(S_E)))] > 0.$$

Suppose an outside owner with an eastern firm offers $w_h < w(S_E)$ and $w_W < w(S_E) < w_E$. Then, since other eastern firms are offering $w(S_E)$, they are not able to hire any managers and expected profits are zero. Alternatively, suppose an outside owner with an eastern firm offers $w_h > w(S_E)$; this does not increase the owner's probability of hiring a manager, while it reduces the expected profit from hiring a manager since the profit function is monotonically declining in wages.

Thus, the wage strategy of outside owners with eastern firms is optimal.

(iii) Inside owners.—Note that if the highest wage offered in the secondhand market is w', then the optimal response of inside owners is $w^i = \begin{cases} w' & \text{if } \theta^i \geq w' \\ \theta^i & \text{if } \theta^i < w' \end{cases}$. An inside owner's expected payoff from continuing to employ a manager is $E\pi_g^i = \theta^i - w'$.

If an inside owner, g, offers $w_g^i < w'$ to its managers with ability levels $\theta^i > w'$, it will not rehire these managers and make zero profits, a return not greater than its previous payoff. If an inside owner offers $w_g^i > w'$, it would rehire managers with ability levels $\theta^i > w'$. Because the expected payoff function is monotonically declining in wages, its expected payoff would be reduced.

Thus, the wage strategy of inside owners is optimal.

PROOF OF PROPOSITION 3:

Assume $S_E > S(w_E)$. By Proposition 1, the maximum wage outside owners with eastern plants can profitably offer to hire managers is w_E, while outside firms without eastern plants offer w_W. Because $w_E > w_W$, inside owners offer

wage strategy $w^i = \begin{cases} w_E & \text{if } \theta^i \geq w_E \\ \theta^i & \text{if } \theta^i < w_E \end{cases}$. In equilibrium, the number of managers in the secondhand pool is $S(w_E)$, all hired by outside owners which were allocated eastern firms. The remaining managers are employed by inside owners. While all managers are employed, some managers are not used in the East and this additional productivity is foregone.

If $S_E \leq S(w_E)$, then by Proposition 1, outside owners with eastern plants make equilibrium offer w_j. This offer is, by definition, sufficiently high to outbid outside owners without eastern plants, and high enough to ensure enough managers in the secondhand market to staff all eastern plants.

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