# ASSET STRIPPERS*

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**Abstract:** During the transition from plan to market, managers and politicians succeeded in maintaining de facto ownership of assets. This paper puts forward a theoretical model and econometric evidence on asset stripping in transition. We argue that it is driven by the value of the stripped assets, the probability of punishment and political power (the latter proxied by firm size). Using 1997 survey data for about 950 firms in five countries, we find that (1) firm size is a chief determinant of asset stripping and (2) there is strong support for the predicted non-linear relationship between potential profitability and the use of stripped assets.

Keywords: Asset stripping, Transition.
JEL Codes: H82, K42, O17, P26, P31.

# 1. INTRODUCTION

One of the most disturbing surprises of the transition from centrally planned to market economy in Central and Eastern Europe and the former Soviet Union was that managers and politicians succeeded in maintaining de facto ownership of large parts of the stock of socialist physical capital. Although the significance of this process has been widely recognized,[1] there have not been systematic efforts to model, measure and explain it empirically. This paper attempts to fill this gap.

We offer two main motivations. One reason to study asset stripping is that it throws light on the relationship between economic reform, institutions and economic performance. Asset stripping emerged in the context of what is arguably the largest "tragedy of the commons" problem in recent history. Understanding its underlying factors provides important insights into what can happen with reform in a weak institutional setting (Rodrik, 1996; Acemoglu, Johnson and Robinson, 2001). A second motivation refers to the need to grasp what happened to the stock of capital inherited from the communist period. For instance, how much of it ends up in the emerging private and informal sectors? Can asset stripping be a cause for disorganization and, ultimately, for the output fall itself? (Blanchard and Kremer, 1997; Campos and Coricelli, 2002)

What determines asset stripping in transition? One obvious explanation is that asset stripping will be more likely to happen in situations in which the probability of being caught and subsequently punished is low and in situations in which the value of stripped assets is

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[1] According to Black, Kraakman and Tarassova (2000), "Comparing Russia with Ukraine suggests that if government is bad enough—badly enough corrupted, incapable of sustaining sensible economic performance—mass privatization won't affect economic performance very much, for better or worse. The assets of state-owned enterprises will be stolen whether they are privatized or not." (p. 1736). The authors of a leading textbook describe the Russian experience in the following manner: "Privatization therefore was designed to end the theft of (state) assets by giving those with control over them a stake in their preservation and efficient use" (Perkins et al., 2001, p. 186). Roland makes the case that an unintended consequence of various mass privatization programs in transition economies was the widespread "stripping of assets from corporations for private uses" (2002, p. 35). Finally, Hoff and Stiglitz (2002) emphasize that "The transfer of state property to private agents was accompanied by the stripping of Russia's assets" (2002, p. 9).

sufficiently large. In this paper, we add a third, less intuitive, factor that we believe is crucial in explaining asset stripping in transition economies, namely that firms can use their influence (political contributions, bribes, etc.) to stop the government from enforcing the law. If the government cares about these personal benefits (vis-à-vis the public interest), it will not be willing to enforce the law against influential firms which use looted assets. [2] We believe the size of the firm to be a useful proxy for the ability to influence the government. Thus, larger firms will be more likely to loot. In addition, our model shows that asset stripping can take place even when law enforcement is very effective.

Another important implication we generate is the non-linear relationship between potential profitability and use of stripped assets. More specifically, the model establishes three types of firms. Firms of the first type are those with low (relative) efficiency so that the expected return is so low, that there is too little to strip to make it worthwhile. On the other extreme, there are the high (relative) efficiency firms in which there is no need to use looted assets: potential profitability is too high vis-à-vis the risk of getting caught. It is the remaining firms (those with intermediate levels of efficiency) that will use looted assets. In a nutshell, the two main predictions we generate are that firm size matters and that there should be a non-linear relationship between (potential) profitability and use of stripped assets.

In order to test these hypotheses, we need a measure of the extent of the use of stripped assets. One measure we propose focuses on the percentage of a start-up firm's capital equipment that originated from state-owned enterprises. We use survey data for about 950 manufacturing firms in Poland, Slovakia, Romania, Ukraine and Russia in 1997. We restrict our sample to firms that are not spin-offs from state enterprises because spin-off firms will be

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[2] The terms "spontaneous privatization," "asset stripping," "tunneling," and "looting" have been used to describe this process. Stiglitz (2000) uses the term "looting" to describe the process of appropriation of physical and financial assets at the outset of the transition. Johnson, La Porta, Lopez-de-Silanes and Shleifer (2000) define "tunneling" as the transfer of assets and profits out of firms for the benefit of their controlling shareholders in transition economies. In this paper, we will use the terms asset stripping and looting interchangeably.

naturally expected to use capital previously in the state sector (thus, our sample solely contains newly created private firms). According to this measure, asset stripping is much more common in Russian and Ukrainian than in Polish, Slovak and Romanian firms. Our index also shows that asset stripping is more prevalent in capital-intensive than in labor-intensive sectors. The econometric results provide support to the notion that firm size is an important determinant and that there seems to exist a highly non-linear relationship between potential profitability and the use of stripped assets. These results are robust to various sensitivity checks.

There is a large literature on related topics, in particular that on privatization and, more generally, on institutions and political economy but this is the first paper, to the best of our knowledge, which offers a theory of asset stripping and tests it empirically.[3] Hoff and Stiglitz (2002) deserve a special mention because we feel our work complements theirs. In their model, the emphasis is on showing how managers (asset strippers) in their capacity as voters can generate a low demand for the rule-of-law even if it is in their collective interest to have high levels of protection for property rights. In our paper, however, we show how the government can decide to reduce the "supply" of the rule-of-law because it cares about the private benefits that only managers/asset strippers can provide to it. Further, we provide econometric evidence supporting the main prediction from our model.[4]

The paper is organized as follows. In the next section, we introduce the theoretical framework and, in section 3, we analyze its main implications. Section 4 presents the data set and our measure of asset stripping in transition economies. Section 5 discusses the empirical results. Section 6 concludes.

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[3] On privatization and restructuring see, among others, Debande and Friebel (1999), Carlin, Fries, Shaeffer and Seabright (2001), Frydman, Gray, Hessel and Rapaczynski (1999), and Cull, Matesova and Shirley (2001). An often cited reason for the disappointing results from privatization relates to law enforcement (see for example Hoff 2000, Johnson, Kaufmann and Shleifer 1998, and Roland and Verdier 2000). On political economy issues in transition, see Castanheira and Popov (2001) and Roland (2002).
[4] See De Meza and Gould (1992) for further discussion on the demand for rule-of-law in a more general context.

## 2. MODEL

We have a model where the actors are the government (central or local) and firm managers. Following a well-established literature in political economy, we assume that the government has both a "benevolent" and a "egoistic" side: on the one hand, the government seeks to maximize total efficiency in the economy, but on the other hand it also cares about possible private benefits it may receive such as bribes, campaign contributions, etc. [5]

We model these assumptions by representing the government's objective function as $U_G = \alpha B + (1 - \alpha)L$, where $B$ is equal to the returns on investment generated by firms and $L$ represents the overall private benefits the government receives. $\alpha \in [0,1]$ is a parameter that represents the trade-off between the government's concerns for public welfare and its own private welfare.

With regard to firms, we first assume that they are represented by their size parameter $l$, and the returns on investment $r$ that restructuring could potentially provide. We assume firm size is uniformly distributed on the interval $[0,1]$ while $r$ is distributed uniformly on $[0,2]$. We also assume that $l$ and $r$ are independent.[6] Managers control the firms and as such face three choices: do nothing, restructure or strip the assets of the firm.[7]

If the manager does nothing, the firm generates the same returns which it produced before the transition to a market economy. Because there is obviously no conflict with law

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[5] For example, Shleifer and Vishny (1994) also assume that government has a "benevolent" and an "egoistic" side: in their setup, government tries to maximize overall employment in the economy but also worries with the political costs associated with higher taxation.

[6] Note that $r$ represents returns on investment and is therefore a measure of potential return on capital, not of the absolute amount of profit, hence our assumption. Notice that this assumption finds strong support in our data. The correlation between firm size and the profit/capital ratio is -0.07 and the one between firm size and the profit/sales ratio is -0.09.

[7] Throughout, we assume that if managers are indifferent between stripping assets and either doing nothing or restructuring, they will not strip assets, while if they are indifferent between doing nothing and restructuring, they will do nothing. For the government, we assume that if it is indifferent between enforcing the law and not enforcing it, the government will enforce the law.

enforcement, there is no need for the firm to try to influence the government.[8] In reality, there will be other reasons for influence, but here we focus on the influence that arises from an asset stripper's need to protect herself from law enforcement. Thus, if there is no asset stripping, the government receives no private benefits. For simplicity, we assume that with no restructuring or asset stripping, all managers make identical returns equal to $2\delta$.[9]

If the manager restructures, the firm yields returns equal to $r$. Note that our assumptions guarantee that some managers (those for whom $r < 2\delta$) will find that it is not worthwhile to restructure a firm (the costs outweigh the benefits). We will refer to these as "inefficient firms" (and to the remaining firms as "efficient firms"). Thus, $\delta$ can be interpreted as a measure of the average level of efficiency in the economy against which the efficiency of any firm is measured. If $\delta$ is high, then most firms will have no need to restructure. As far as private benefits to government are concerned, again there is no need for them under restructuring because here too there is no conflict with law enforcement.

If the manager decides to strip assets from the firm, and does it successfully by avoiding law enforcement, then she gets $v(r)$ where $v(r) = 2\delta + r$. This formulation implies that $v(r)-r$ is always positive, with $v(0) = 2\delta$ and $v(2) = 2(1 + \delta)$. The implication is that if asset stripping is always successful because either there is no law enforcement or because law enforcement isn't effective, every manager would want to do it. This is because by stripping assets, managers can obtain the same profits from the assets without paying (or paying relatively little) for the assets themselves. In reality, however there is the risk that asset stripping is not successful (that is, the manager is caught), and in this case we assume that the returns to manager will be zero.

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[8] Becker (1983) introduces the concept of "influence" in the economics literature.
[9] Alternatively, we could have assumed heterogeneity in the returns for firms that do not restructure. However, assuming the same return for all such firms is a simplification that does not alter our qualitative results in any way.

As far as the government is concerned, successful asset stripping implies that the firm contributes zero to the government budget, as opposed to the $Max(2\delta, r)$ it would contribute otherwise. The intuition behind this assumption is that looting generates such negative externalities in terms of loss of confidence in property rights that it is worse than anything else that managers could choose. Thus, even if a venture which uses stripped assets could be of some benefit to the government because, say, it generates some tax revenue, we assume that these benefits are more than compensated by the externality costs mentioned above. On the other hand, in case of successful law enforcement, the government gets $Max(2\delta, r)$ and this simply suggests that if asset stripping is not successful then the government will reutilize the assets (either restructuring or doing nothing). Note that while these assumptions seem realistic, determining exactly what the benevolent side of government gets in case of asset stripping (whether it is successful or not) is not essential. For example, if we had assumed that asset stripping had some benefits for the "benevolent" side of the government, our main results would not be affected.

The crucial assumption here is that with successful asset stripping, the "egoistic" side of government receives private benefits proportional (and, for simplicity, equal) to the employment level *l*, but if asset stripping is not successful the government gets no such benefits at all. Hence, we use firm size (which we will proxy with firm employment when we test the model) as a measure of the ability of a firm's managers to provide private benefits.

The government's choice, once managers have made theirs, is whether or not to enforce the law. If it decides to enforce the law, it is effective only with probability *(1-q)*. We also assume that law enforcement has a fixed per-firm cost *c*.

The whole game is common knowledge to both players except for the specific value of *r* that characterizes a firm. [10] This implies that the government is aware of the size of a firm but

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[10] This is in accordance with the notion that control rights are in the hands of managers who are the only ones

it is not aware of its potential for restructuring or looting and so has to decide whether to enforce the law without knowing which firms have looted and which haven't.[11]

Figure 1 summarizes payoffs for managers and for the government. We define the strategies available to managers as N (no change), R (restructure), and S (asset stripping) while EN means that the government decides to enforce the law and -EN that is decides not to.

[INSERT FIGURE 1 ABOUT HERE]

The timing of the model is as follows. In the first stage, managers choose one of the three possibilities: N, R or S. In the second stage, the government decides whether to enforce the law to stop asset stripping or not. Nature determines the success of law enforcement and payoffs are realized.

## 3. ANALYSIS OF THE MODEL

To analyze the model, we proceed by backward induction and for simplicity will consider only equilibria in pure strategies.

In the second stage, the government has to decide whether or not to enforce the law. If it does not enforce the law, returns will be equal to zero because every firm will loot but there will be more private benefits from influence as measured by $l$. If the government decides to enforce the law, firms will not *necessarily* loot so that returns will increase and influence decrease. Since $r$ is not observable by the government, but $l$ is, this means that there will be a fixed per firm cut-off size $l^*$ such that the government will enforce the law for $l \le l^*$ and it will not otherwise.

Formally, the government will decide to enforce the law if

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who can judge whether a firm is profitable or not. See, for instance, Debande and Friebel (1999) for a similar assumption.

[11] Alternatively, one could assume that while not able to determine a firm's precise $r$ the government can tell whether asset stripping has occurred or not. In other words, law enforcement is not a problem of finding asset strippers but only a problem of convicting them. Either way, our main results are not affected.

$$\alpha E(B|EN) + (1-\alpha)E(L|EN) - c \geq \alpha E(B|-EN) + (1-\alpha)E(L|-EN) \qquad (1)$$

where $E(B|X)$ and $E(L|X)$ are the expected values of B and L conditional on the government choosing strategy $X = EN, -EN$.

Since we assume that the government can not ascertain ex-ante a firm's potential returns from restructuring nor whether a firm has looted or not, (1) can be rewritten as

$$\alpha[2\delta P_N + P_S(1-q)r^* + P_R \bar{r}] + (1-\alpha)P_S ql - c \geq (1-\alpha)l \qquad (1a)$$

where $P_N$ is the probability that a manager will do nothing conditional on law enforcement, $P_S$ is the probability that a manager will loot conditional on law enforcement, $P_R$ is the probability that a manager will restructure conditional on law enforcement, $r^* = E(Max(2\delta, r)|S, EN)$ is the expected return when looting is attempted but unsuccessful and $\bar{r} = E(r|R, EN)$ is the expected return for a firm that is restructured conditional on law enforcement being in place.

Now consider the behavior of a firm manager when she has to decide whether to strip assets, do nothing or restructure. As mentioned, our assumptions imply that if there is no law enforcement, asset stripping is a dominant strategy for all firms. If there is law enforcement, on the other hand, the manager will face the following choice. If she decides to loot, her expected utility is $q(v(r))$: the probability that the law will not be enforced times the gains from asset stripping. If she decides to do nothing, her utility is $2\delta$. Finally, if she decide to restructure, her utility is $r$. Thus, looting is the preferred option if $qv(s) > Max(2\delta, r)$. Hence, we have two cases. In the first, firms are inefficient and asset stripping requires $qv(s) > 2\delta$, while in the second case, firms are efficient and it requires that $qv(s) > r$.

It is easy to see that the first inequality determines a value $r_A = \dfrac{1-q}{q} 2\delta$ which indicates that asset stripping will occur for all inefficient firms such that $r > r_A$ while nothing

will be done for the remaining firms. The interpretation is that firms for which nothing will be done are so inefficient and their assets worth so little that stripping them does not give much utility above the guaranteed $2\delta$ and this is not enough to compensate the risk of getting utility zero if caught. The second inequality determines a value $r_B = \dfrac{q}{1-q} 2\delta$ which indicates that asset stripping occurs for all efficient firms such that $r < r_B$ while the remaining efficient firms will restructure. So, the most efficient firms will not have stripped assets and will be restructured because the assets for these firms are so productive that high returns can be made without the risks associated with asset stripping.

To summarize, all firms for which the managers expect law enforcement will be partitioned in three categories: firms in $(r_A, r_B)$ which will be stripped of assets, firms in $[0, r_A]$ to which nothing will be done and firms in $[r_B, 2]$ which will be restructured. Note that the partition is well defined[12] as long as

$$\frac{1}{2} \leq q \leq \frac{1}{1+\delta} \tag{2}$$

It should be emphasized that if $q < \dfrac{1}{2}$, i.e. law enforcement is very effective, then no firm will loot if the government decides to enforce the law. On the other hand, if $q > \dfrac{1}{1+\delta}$, that is, law enforcement is very ineffective, then all efficient firms will loot even if there is law enforcement. In the first case, $l^*$ will be equal to $\dfrac{\alpha}{1-\alpha}$ while in the latter case, $l^*$ is just as in (3) below with $P_R = 0$, so from now on we assume that (2) applies. Given that, solving (1a) completes the proof for:

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[12] Well-defined in this case means that $0 \leq r_A \leq 2\delta \leq r_B \leq 2$.

**Proposition 1:** Assume (2) applies. Then, we have that government will enforce the law for any firm of size $l \leq \min(1, l^*)$ while it will not enforce the law for any firm of size $l > Max(0, l^*)$ where

$$l^* = \frac{\alpha\left[2\delta P_N + (1-q)r^* P_S + \bar{r}P_R\right] - c}{(1-\alpha)(1-qP_S)}. \tag{3}$$

Firm managers will always loot if there is no law enforcement while if there is law enforcement, they will loot if the firm is in $(r_A, r_B)$, restructure if it is in $[r_B, 2]$ and do nothing if it is in $[0, r_A]$.

As a simple corollary to the proposition above, we have:

**Corollary 2:** Assuming $l^* \in (0,1)$, we have that $l^*$

1. Is increasing in how much government cares for returns as opposed to influence $(\alpha)$.

2. Is decreasing in the cost of law enforcement (*c*).

3. If *c* is sufficiently small, then it is increasing in $\delta$, a measure of average efficiency in the economy.

4. If *c* is sufficiently small, then it is increasing in *q*, the ineffectiveness of law enforcement.

<u>Proof.</u> All results follow from differentiating $l^*$ with respect to the relevant parameters noting that, for 3. and 4., (2) is needed to guarantee the result.

Figure 2 summarizes these results. A firm's potential returns are on the horizontal axis, while its size is on the vertical axis. The figure shows how governments partition firms in two categories: those for whom law enforcement is worthwhile (firms in IV,V and VI) and those for whom it isn't (firms in I,II and III). If there is no law enforcement, managers will always strip assets and so government only gets private benefits in sections I,II and III while in section IV managers will do nothing, in section V there is law enforcement but still these firms' managers strip assets and in section VI managers will restructure.

Consider two possible cut-off values $l_a^* < l_b^*$, and a change from the former to the latter: the government loses private benefits $(1-\alpha)l$ from all the firms that belonged in I and III and now belong in IV and VI. To compensate for that, public benefits $\alpha 2\delta - c$ and $\alpha E_{r\in[r_B,2]} r - c = \alpha \bar{r} - c$ are obtained. Firms that belonged to II continue to do asset stripping and there is a loss in private benefits, equal to $(1-\alpha)(1-q)l$ because for these firms asset stripping may now be stopped. At the same time, there are now new public benefits $\alpha E_{r\in(r_A,r_B)} Max(2\delta, r) - c = \alpha r^* - c$ precisely because there is now a positive probability that stripped assets will be recovered. Rearranging terms and multiplying each for the appropriate probabilities $P_N, P_S$ and $P_R$, we get that gains equal losses at $l^*$.

For the comparative statics in corollary 2, the first two results are straightforward: if $\alpha$ increases (i.e., a change in government preferences), the difference in returns between I,II,III versus IV,V and VI changes in favor of the latter. Given that, it is optimal for the government to enforce the law for larger firms. Conversely, if $c$ (the cost of law enforcement) increases, net returns for the government in between I, II, III versus IV,V and VI stay the same, but now law enforcement has become more expensive so that there is an incentive for the government to reduce the size of firms for which it will enforce the law.

Consider now the third result. It is clear that any change in $\delta$ (average efficiency in the economy) will increase public benefits in IV (the benefit from doing nothing is higher) and reduce them in VI (fewer firms will restructure), but the effect in V is less obvious.[13] However note that an increase in average efficiency also increases average efficiency of the stripped firm ($r^*$) because $Max(2\delta, r)$ for firms that are stripped is now higher. Also note that the

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[13] To be more precise, the average efficiency of the restructuring firm increases but this is more than compensated by the reduction in the measure of firms that restructure.

probability that there will be asset stripping is also increased because the increase in the measure of firms that do nothing is smaller than the decrease in the measure of firms that restructure. In the end, if (2) applies and $c$ is small enough, we can be sure that the increases in public benefits in IV and V dominate the decrease in VI: in short, asset stripping is more likely to happen *conditional on law enforcement* whenever average efficiency is higher and this is simply because there is more to strip. However, to compensate for the relative increase in public benefits from law enforcement, government will increase $l^*$ in order to capture more of these benefits, which means that there will be a smaller measure of firms who strip assets under law enforcement.

Consider now an increase in $q$ (that is, law enforcement becomes less effective). This again has no effect on the government's utility in I,II,III but has three distinct effects for the case in which law enforcement applies: the first effect is that because law enforcement is less successful, there is a higher probability that private benefits will be obtained even with law enforcement (formally, the term $(1-\alpha)ql$ increases). The second effect is that the overall public benefits in V (where firms strip assets) also increase because average efficiency goes up. Finally, public benefits in IV and VI are negative. The negative effect on public benefits in IV and VI is greater than the positive effect in V but it can be shown that the first effect on the government private benefits is enough to compensate for this and make total government utility in IV+V+VI increasing in $q$. As in the previous case, the government will respond by increasing the extent of law enforcement.[14]

This section has provided a simple theoretical framework for the analysis of managers' decisions with regard to looting and government's decisions with regard to law enforcement. The main results are that (a) governments will be more willing to enforce the law for small

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[14] The comparative statics with respect to $q$ and $\delta$ change naturally for different specifications of the government's utility function when asset stripping occurs. However, the different effects described in the main text still apply, the only difference being their relative magnitude.

firms because these cannot provide the same level of influence of large firms, and (b) if there is no law enforcement managers will tend to loot while if there is law enforcement, only managers for firms with a "middle" level of efficiency will loot: managers for very efficient firms will prefer restructuring while those for very inefficient firms will neither use stripped assets nor restructure.

## 4. MEASUREMENT

We use the Johnson, McMillan and Woodruff (forthcoming) data set to examine the issue of asset stripping in transition economies. The survey was carried out in 1997 in five transition economies (Poland, Slovakia, Romania, Ukraine and Russia). It was carried out through face-to-face interviews with owners or general managers of about 300 firms in each of the five countries. These are recently founded (mostly, after 1990) medium-sized firms. Johnson et al. (forthcoming) argue that "the resulting sample is reasonably representative of small and medium-sized manufacturing firms in each country, though it is not a census" (p. 45).

The data set has some disadvantages. One is that it was collected with different purposes, to capture contractual relations between the firm and its suppliers and customers. Therefore the set of variables of potential interest for a study of asset stripping is limited. Another possible disadvantage is that the survey is limited to a single year, with no time series aspect to it. A third potential issue is that firms from only five transition economies were interviewed. Fourth, and finally, there is no information on the "master" state-owned enterprises from which the physical capital we are interested in this paper, originated.

We believe that the advantages greatly outweigh the disadvantages of the data set. One important advantage is that, although cross-sectional, the survey was carried out in 1997. This was a year close enough to the beginning of the transition so that managers and owners remembered how much of their capital came from state-owned enterprises. Yet 1997 was also

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far enough from the beginning of the transition that most asset stripping would be over and owners and managers would not be as reluctant to disclose its extent. Another important advantage is that although the survey does not cover all transition economies, the group of five countries displays a vast range of speeds and types of institutional and economic reform. For instance, in terms of progress in transition the EBRD (2000) indicators place Poland as a top all-around performer and Slovakia as a good performer with caveats in terms of accountability and transparency. Romania is classified as an intermediate case, while Russia and Ukraine, in this order, complete the ranking. Moreover, this set of countries also represents a useful array of initial conditions, industrial structures and privatization strategies. A third positive feature is that the survey encompasses firms from different manufacturing sectors (namely, metal products, wood, food, clothing, construction, chemical, pulp and paper, handicrafts, and electric equipment), allowing us to control for capital intensity. We expect the stripping of physical assets to be more prevalent in capital-intensive sectors. A fourth feature we deem advantageous regards the relatively large number of firms from each country. This allows us enough degrees of freedom to be able, for instance, to discard from the sample those firms that were previously parts of state-owned enterprises (spin-off firms). A fifth and final advantage of this data set is that it is restricted to small and medium sized manufacturing firms in medium-sized cities. We expect that small and medium-sized manufacturing firms (the average number of full-time employees in 1997 for the firms in our sample is 43.64) should give conservative estimates of the extent of asset stripping as it should be easier to observe in larger firms. In other words, not having large firms in the sample makes our hypothesis that "larger firms loot more" more likely to be rejected. Also, the fact that few of these medium-sized firms are located in the largest cities within each country, gives us an appropriate setting to test the

relationship between local politics and firm size and how these two impact the extent of asset stripping.[15]

As noted, the sample includes start-up firms as well as spin-offs from state enterprises, thus reflecting ownership structures in different countries.[16] Our focus in this paper is on asset stripping and the measure we propose is based on the amount of physical capital that originates from a state-owned enterprise. Capital from state enterprises is, almost by definition, more likely to be found in a spin-off than in a start-up firm. In order to provide estimates of asset stripping that are reasonably conservative, we decide to limit our attention to start-up firms and we do that by keeping in the sample only those firms that answer *no* to the question "was this firm previously a part of a state enterprise?" We start out with slightly less than 1,500 firms in the five countries and once we restrict it to those firms that were not previously part of a state-owned firm, the sample reduces to 966 firms: 237 in Poland, 238 in Slovakia, 281 in Romania, 128 in Ukraine and 82 in Russia.[17]

How do we measure asset stripping? The measure of asset stripping we propose is the percentage of the firm's capital equipment that originated from a state enterprise. We refer to physical capital currently owned by a start-up firm that originated from a state-owned enterprise and for which less than the full market price was paid. In the survey, the question is phrased as follows: "How much of your capital equipment came from state enterprises which helped found this firm?" The respondent is asked to indicate whether the answer to this

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[15] According to Johnson, McMillan and Woodruff, "In order to increase the cross-country comparability of the sample, the initial selection was limited to one medium-sized city in each country: Katowice (Poland), Brasov (Romania), Bratislava (Slovakia), Volgograd (Russia) and Dnepopetrovsk (Ukraine). Only in Slovakia did we have trouble identifying a large enough sample of firms meeting our size criteria who were willing to participate. In the final sample, about one-quarter of the Slovakian firms are located in Bratislava, one-quarter in Kosice, and the remaining half are spread across seven other cities. Participation were high among the firms contacted –in excess of 70% in Poland and Romania, and 68% in Slovakia."(forthcoming, p. 45).

[16] For instance, for Russia and Ukraine more than 50% of the firms interviewed are spin-offs (from state owned enterprises) while in the other three countries the share of start-ups is much higher.

[17] It must be noted that all econometric results presented in this paper are, not surprisingly, even stronger when we use the full sample (that is, start-up as well as spin-off firms). These are available from the authors upon request.

question is 0 %, 1-25 %, 26-50 %, 51-75 % or 76-100%. Notice that the question is restricted to capital equipment and deliberately excludes buildings, brands, patents and land, which are assets that might also have been subject to stripping.

One important problem with this measure is the possibility that not all public capital in a start-up firm was acquired through asset stripping.[18] Clearly, the ideal question for our purposes would ask instead "How much of your capital equipment came from state enterprises which helped found this firm *for which you paid less than market price*?" It may well be the case that the firm has purchased those assets from the public sector and paid for them the full market price.

However, we find large differences across countries in terms of our index. Table 1 shows that the percentage of start-up firms that explicitly say that a positive share of their initial capital stock came from the state sector is much greater in Russia and Ukraine than elsewhere. Because the share of start-ups is smaller in the Russian and Ukrainian samples, it is even more remarkable that there are a few firms in the other countries that (despite being start-ups) have almost all of their capital originating from the state sector. This is, however, an interesting commentary: the index strongly suggests this share is much larger in Russia and Ukraine than in Poland, Slovakia and Romania.[19]

[INSERT TABLE 1 ABOUT HERE]

What can explain this and still be compatible with the notion that little or no asset stripping is being captured by our index? One possibility is that there are differences in privatization methods which could account for the different distribution of former state assets in the start-ups of the different countries. This is unlikely to be the case. The cross-country

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[18] It is important to keep in mind that while we use our measure of asset stripping as a dependent variable rather than as a regressor, we considerably lessen the "error in variables" problem.
[19] Not surprisingly, the percentage of firms that answer "zero" is substantially smaller if we consider start-ups and spin-offs:  81% for Poland (down from 95%), 79% for Slovakia (down from 96%), 76% for Romania (down from 87%), 33% for Ukraine (down from 62%) and 19% for Russia (down from 64%).

aspect of the data is useful because these five countries have employed different privatization methods but still, according to recent IMF data, none of them had "direct sales" as the main privatization method (Garibaldi et al., 2002).[20] Moreover, among the countries in our sample, Russia and Slovakia extensively used voucher schemes in their privatization processes, while Romania and Ukraine emphasized privatization to insiders (management buyouts). This contrasts with the possibility that the similarity in the index between Russia and Ukraine, on the one hand, and Romania and Slovakia, on the other, is due purely to privatization methods. If so, how can countries with similar methods for transferring ownership (privatization methods) have achieved radically different outcomes in terms of the actual transfer of ownership? In other words, why did, for example, Poland and Ukraine achieve radically different levels of capital from former state-owned firms (our measure of asset stripping) if their privatization methods are not very different?

A second possible problem with our measure relates to the sectoral distribution of economic activity across countries. If it were the case that capital-intensive firms all belonged to specific countries (say, Russia and Ukraine) whereas all labor-intensive firms belonged to the other countries than we could not be confident that our index reflects actual stripping of assets. All the transfer of assets from state firms to the start-ups in our sample could have been done at full market price and the differences across countries explained simply by different sectoral compositions. This is not the case. The econometric evidence presented below shows that our index does not vary *significantly* across sectors, although it does across countries.

This all suggests that country-specific institutional features (neither privatization nor sector) drive the differences across countries revealed by our index. Russia and Ukraine seem to share more such features than, say, Poland, Romania and Slovakia. More specifically, in

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[20] Later on we report that our main econometric results are robust to the presence of a privatization variable that takes the value of 1 if "direct sales" was the primary or secondary method of privatization in a particular country in a given year. This variable is generated using data from Garibaldi et al. (2002).

terms of our theoretical model, these country-specific differences in institutional features are basically differences in   , the degree of government preference for public vis-à-vis private benefits or, in other words, how relatively "corrupt" are these governments.[21] On this basis, we claim that our index captures asset stripping.

It is important to mention, however, that although we do not find statically significant differences in explaining asset stripping across countries due to sector, this does not necessarily mean that sectoral differences in themselves are not important. Table 2 shows the distribution of asset stripping across industrial sectors, irrespective of country of operation. One way of reading the table is to try to identify those sectors with a lowest share of firms saying that zero percent of their capital came from state enterprises (those will be the sectors with relatively more asset stripping according to our measure). From Table 2, we identify handicrafts, wood and food products and clothing as the sectors in which asset stripping is relatively low. On the other hand, asset stripping seems relatively high in metal parts, construction, chemical products, electrical machinery and in pulp and paper.

[INSERT TABLE 2 ABOUT HERE]


## 5. EMPIRICAL RESULTS

The theoretical model presented above generates two main testable hypotheses. One is that firm size (as a proxy for political power) is an important determinant of asset stripping in transition economies. The other is that there is a non-linear relationship between the extent of the use of stripped assets and potential profitability. In this section, we investigate whether our data provide support for these two hypotheses.

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[21] Treisman (2002) provides an extensive analysis of the various measures of corruption in transition economies. These measures repeatedly classify Russia and Ukraine as relatively "more corrupt" than our other three countries.

In the context of an ordinal polichotomous dependent variable, estimation is carried out by maximum-likelihood ordered probit. Table 3 presents these estimates for our measure of asset stripping, namely, the share of physical capital at the outset that originated from a state enterprise. Recall the sample we use is restricted to start-up firms, that is, firms that were never part of a state enterprise (in other words, it excludes all spin-off firms). Column 1 shows our results when we control for country and industry-specific characteristics. It shows that size, as measured by total number of employees at the date the firm was founded, is a positive and statistically significant determinant of asset stripping, as our model predicts.[22] There are some other important results with respect to the fixed effects. Romania was chosen as the reference category for the countries and "miscellaneous" as the reference category for the industrial sectors. According to our measure of asset stripping, once again it seems to be a more severe problem in Russia and Ukraine than in Poland and Slovakia. In terms of the industrial sectors, the results are less informative. Yet, there is evidence suggesting that asset stripping is less severe in the food and handicrafts industries.[23]

[INSERT TABLE 3 ABOUT HERE]

One potential problem with these results is that the variable capturing firm size includes part-time workers. The data set offers an alternative, namely the number of full-time workers at the date the firm was founded. Column 2 shows our results if we use this different measure of firm size. We again find that the larger (of the small and medium-sized) firms seem to have more stripped assets from state-owned enterprises. Notice that using a measure of firm size at the date the firm started to operate naturally helps to address endogeneity concerns. Further, the pattern of results with respect to the country dummies does not change. As for differences across industries, one change is that using full-time workers as a measure of size, the clothing

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[22] Our results do not change if firm size enters in logs. These are available from the authors' upon request.
[23] In principle, it is possible that different sectors in different countries are systematically more (or less) prone to have stripped assets. In order to account for this, we added interactions terms between our country and sector dummies to these specifications. There are no qualitative changes in our results.

sector also appears to have been subjected to less asset stripping. Once again, country specific factors seem more important that purely sectoral effects in explaining asset stripping in transition.

A third important issue for our understanding of asset stripping in transition is the age of each firm. It is important to make sure that these results are not driven by differences in how long these private firms have been in operation (e.g., latecomers or newer firms having less access to capital from state-owned enterprises). Column 3 presents these results when controlling for the year the firm was registered and our preferred measure of firm size (number of full-time employees). The results change very little and size is still an important determinant. Further, the pattern of results obtained with the country and sector dummies remains. Column 4 shows that using the preferred measure of age, namely the year when the firm started operating, generates similar results.[24]

There is an additional determinant of asset stripping stressed by our model, namely institutions. As previously discussed, law enforcement has a predicted conditional negative effect on asset stripping. Notice that asset stripping occurs in countries and industries in which the probability of punishment differs. The data set offers some different measures of institutional effectiveness. For instance, it asks firms to estimate the share of average unreported sales on total sales in their sector of activity.[25] Table 4 presents these results, using preferred measures of firm size and firm age (number of full-time employees at start of operation and year of start of operation, respectively). Column 1 shows that size is still a crucial determinant, although the coefficient on the institutional variable (share of unreported sales on total sales) is not statistically significant. Column 2 from Table 4 has similar results

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[24] A critic may charge that what matters is not what percentage of the initial capital equipment was made of stripped assets, but the decision whether to use stripped assets itself. Thus, we must note that our results are robust to a probit estimation (as opposed to the ordered probit estimates reported throughout).

[25] There is important information added by these institutional variables: while the country fixed effects reflect institutional differences at the aggregate level, these institutional variables reflect institutional effectiveness at the firm level.

for another proxy for institutional conditions, the share of unreported salaries on total salaries. Although the major predictions from our model are born out by the data, these results suggest an apparently counter-intuitive result for this institutional variable: the larger the relative share of unreported salaries, the smaller is asset stripping. One possibility is substitution: firms that can not use stripped assets, try to under-report their labor costs. Column 3 shows our results when the institutional variable is the share of input costs that are unreported. Note that the coefficient on institutions carries the expected sign: the higher the degree of underreporting (input costs in this case) the more likely the firm has looted assets. Column 4 shows the results for using the share of unreported exports on total exports and column 5 shows same set of results when the institutional variable is the share of unreported imports on total imports. For these last two cases, although the coefficient on these institutional variables have the expected positive signs, only the one on exports is statistically significant. Notice that firm size is still an important explanatory factor to understand asset stripping in transition throughout.[26]

[INSERT TABLE 4 ABOUT HERE]

Table 5 tests for one of the main implications of the model. Recall that, in terms of efficiency, we predict there will be three types of firms. The first is firms with very low (relative) efficiency. In this case, the expected payoff is so low that asset stripping does not occur. For the high (relative) efficiency firms, there is no need to use looted assets: potential returns are so high that the risk of getting caught is not worthwhile. The third type of firm is the middle efficiency ground. These are firms that have intermediate levels of efficiency in the sense that in order to raise returns they must use stripped assets, given the probability of being caught. Empirically this hypothesis translates into testing whether there is an inverted-U relationship between efficiency and asset stripping. One available measure of this relative

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[26] One can argue that the joint effect of firm size and the institutions that determine the effectiveness of law enforcement has to be taken into account. We re-run these specifications adding interaction terms between firm size and the relevant institutional variable. Although the interaction terms were never statistically significant, our main results were always stronger. These are available from the authors upon request.

efficiency, at the moment the firm was founded, is profitability. This translates into the linear coefficient on this measure being positive and the quadratic being negative. Column 1 shows that the share of after-tax profits over total investment in the first full year of operation of the firm has a positive and significant impact on asset stripping (notice that this result obtain irrespective of whether or not we control for the age of the firm). Column 2 shows that the inverted-U prediction generated by our model is confirmed: the coefficient on the linear term is positive and statistically significant while the coefficient on the quadratic term is negative and statistically significant. Our main results are in column 3: the size of the firm is still a fundamental determinant of asset stripping in transition even when accounting for non-linear differences in firm efficiency.[27]

[INSERT TABLE 5 ABOUT HERE]

One final issue that should be addressed is the direction of causality, in other words, do large firms loot more, as we suggest, or do firms that use stripped assets become bigger? Unfortunately, the data lacks the time series aspect needed for a comprehensive test of this possibility. Yet, there is a way of testing it indirectly, namely by looking at the effects of the extent of the use of stripped assets on the growth of firm's workforce. Table 6 has these results. Column 1 shows that, although firm growth does not seem different across sectors, it certainly differs across countries. Polish and Slovak firms seem to have grown much faster than their Romanian, Ukrainian and Russian counterparts. Second, the initial size of the firm matters for its subsequent growth: the smaller the firm, the faster it seems to have grown. Third, older

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[27] Our econometric results are also robust to the presence of a privatization variable that takes the value of 1 if "direct sales" was the primary or secondary method of privatization. These are available from the authors upon request. It should be noted that the underlying data originates from Garibaldi et al. (2002), who construct three indicator variables ranking the primary, secondary and tertiary privatization methods in all transition economies, yearly between 1990 and 1999. They consider three privatization methods: direct sales, vouchers and management-employee buyouts. Garibaldi et al. show that up to 1997, "direct sales" was never the primary method in any of our five countries. Further, up to 1997, direct sales was never the primary nor secondary method in Poland nor Ukraine. It was the secondary method for Russia after 1995, for Slovakia after 1992 and for Romania after 1993 (although with an exception for 1996).

firms seem to have grown faster than newer firms.[28] Column 2 adds our measure of asset stripping to this specification. Notice that the results just discussed remain. In addition, asset stripping has a positive effect on firm growth, although the coefficient is not statistically significant. This result suggests that causality indeed runs in the direction we propose.

[INSERT TABLE 6 ABOUT HERE]

In summary, this section presented econometric evidence supporting the theoretical model. Specifically, the results seem to provide support for the two hypotheses. One is that firm size is an important determinant of asset stripping in transition economies: larger firms use more stripped assets. Another is that there is a highly non-linear relationship between profitability and asset stripping. These conclusions are robust to different proxies for institutional conditions, different estimators, differences in privatization methods, different ways of measuring firm size and different ways of measuring the age of the firm.


## 6. CONCLUSIONS

In this paper, we presented a theory of asset stripping in transition economies which highlights the importance of firm size. We argued that very large firms which use stripped assets will be safe from law enforcement because governments understand that the costs of intervening against them, in terms of influence, are larger than the benefits of reclaiming the looted assets.

Using firm-level survey data for about 950 firms in Poland, Slovak Republic, Romania, Ukraine and Russia in 1997, we find support for our hypothesis: firm size is an important determinant of asset stripping in transition economies. This result is robust to different proxies for institutional conditions, different ways to measuring firm size and different ways of measuring the age of the firm. Another important result is the finding of a non-linear

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[28] Notice that more than 60% of the firms in our sample start to operate between 1991 and 1994.

relationship between potential profitability and use of stripped assets, so that firms whose profitability is not too low nor too high, will use stripped assets.

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| | Returns to managers | Returns to government |
|---|---|---|
| N | $2\delta$ | $2\alpha\delta$ |
| R | $r$ | $\alpha r$ |
| S - unsuccessful | $0$ | $\alpha Max(2\delta, r)$ |
| S - successful | $v(r)$ | $(1-\alpha)l$ |

**Figure 1.**
**Returns to managers and returns to government**

**Figure 2:**
**Equilibrium behavior**
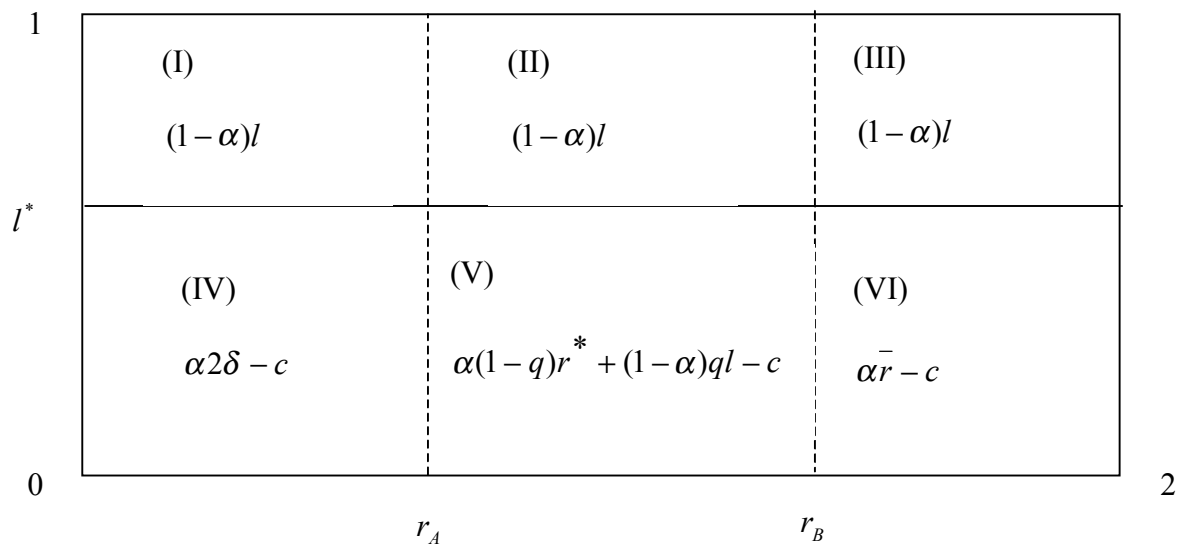
**Table 1: Asset Stripping as Physical Capital from State Enterprise, per Country**

| Country | Capital from State Enterprises | | | | | |
|---|---|---|---|---|---|---|
| | 0% | 1-25% | 26-50% | 51-75% | 76-100% | Total |
| Poland | 226 | 7 | 0 | 0 | 3 | 236 |
| | 95.76 | 2.97 | 0.00 | 0.00 | 1.27 | 100.00 |
| Slovakia | 229 | 2 | 3 | 2 | 2 | 238 |
| | 96.22 | 0.84 | 1.26 | 0.84 | 0.84 | 100.00 |
| Romania | 245 | 26 | 6 | 0 | 4 | 281 |
| | 87.19 | 9.25 | 2.14 | 0.00 | 1.42 | 100.00 |
| Ukraine | 80 | 20 | 24 | 3 | 0 | 127 |
| | 62.99 | 15.75 | 18.90 | 2.36 | 0.00 | 100.00 |
| Russia | 52 | 21 | 7 | 1 | 0 | 81 |
| | 64.20 | 25.93 | 8.64 | 1.23 | 0.00 | 100.00 |
| Total | 832 | 76 | 40 | 6 | 9 | 963 |
| | 86.40 | 7.89 | 4.15 | 0.62 | 0.93 | 100.00 |

Source: authors` calculation

**Table 2: Asset Stripping as Physical Capital from State Enterprise, per Industry**

| Main Busines Activity | Capital from State Enterprises | | | | | |
|---|---|---|---|---|---|---|
| | 0% | 1-25% | 26-50% | 51-75% | 76-100% | Total |
| Metal Parts | 201 | 17 | 9 | 1 | 3 | 231 |
| | 87.01 | 7.36 | 3.90 | 0.43 | 1.30 | 100.00 |
| Wood | 69 | 4 | 1 | 1 | 0 | 75 |
| | 92.00 | 5.33 | 1.33 | 1.33 | 0.00 | 100.00 |
| Food | 117 | 5 | 4 | 1 | 1 | 128 |
| | 91.41 | 3.91 | 3.13 | 0.78 | 0.78 | 100.00 |
| Clothing | 143 | 5 | 1 | 0 | 3 | 152 |
| | 94.08 | 3.29 | 0.66 | 0.00 | 1.97 | 100.00 |
| Construction | 67 | 14 | 5 | 0 | 1 | 87 |
| | 77.01 | 16.09 | 5.75 | 0.00 | 1.15 | 100.00 |
| Chemical | 69 | 6 | 1 | 1 | 1 | 78 |
| | 88.46 | 7.69 | 1.28 | 1.28 | 1.28 | 100.00 |
| Paper | 23 | 3 | 3 | 1 | 0 | 30 |
| | 76.67 | 10.00 | 10.00 | 3.33 | 0.00 | 100.00 |
| Handicrafts | 14 | 1 | 0 | 0 | 0 | 15 |
| | 93.33 | 6.67 | 0.00 | 0.00 | 0.00 | 100.00 |
| Electric | 51 | 3 | 5 | 0 | 0 | 59 |
| | 86.44 | 5.08 | 8.47 | 0.00 | 0.00 | 100.00 |
| Miscellaneous | 78 | 18 | 11 | 1 | 0 | 108 |
| | 72.22 | 16.67 | 10.19 | 0.93 | 0.00 | 100.00 |
| Total | 832 | 76 | 40 | 6 | 9 | 963 |
| | 86.40 | 7.89 | 4.15 | 0.62 | 0.93 | 100.00 |

Source: authors` calculation

**Table 3: Determinants of Asset stripping in Transition Economies:  Size, Age, Country and Industry Effects**

*Maximum Likelihood Ordered Probit Estimates*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Firm size (all employees) | .003*** (.0009) | | | |
| Firm size (full time employees) | | .003*** (.0009) | .003*** (.001) | .003*** (.001) |
| Age: Year firm was registered | | | -.007*** (.008) | |
| Age: Year firm start operate | | | | -.002*** (.009) |
| Dummy: Poland | -.642*** (.182) | -.619*** (.182) | -.648*** (.193) | -.626*** (.195) |
| Dummy: Slovakia | -.525*** (.198) | -.514*** (.198) | -.508*** (.198) | -.512*** (.199) |
| Dummy: Ukraine | .756 *** (.149) | .771*** (.149) | .783*** (.149) | .787*** (.149) |
| Dummy: Russia | .589*** (.172) | .599*** (.175) | .609*** (.172) | .605*** (.172) |
| Dummy: Metal | -.053 (.169) | -.071 (.171) | -.055 (.173) | -.065 (.171) |
| Dummy: Wood | -.358 (.262) | -.355 (.263) | -.336 (.264) | -.347 (.267) |
| Dummy: Food | -.412** (.221) | -.388* (.222) | -.359 (.224) | -.371* (.223) |
| Dummy: Cloth | -.599*** (.234) | -.591** (.235) | -.554** (.236) | -.564** (.236) |
| Dummy: Construction | .089 (.191) | .106 (.191) | .111 (.193) | .108 (.192) |
| Dummy: Chemical | -.095 (.244) | -.087 (.245) | -.065 (.247) | -.081 (.245) |
| Dummy: Pulp and paper | .022 (.286) | .012 (.289) | .026 (.285) | .0146 (.285) |
| Dummy: Handcrafts | -.832* (.478) | -.826* (.478) | -.811* (.477) | -.755 (.478) |
| Dummy: Electric | -.209 (.237) | -.211 (.237) | -.209 (.238) | -.211 (.237) |
| Number of obs | 951 | 941 | 937 | 937 |
| Log likelihood | -445.95 | -440.47 | -437.79 | -439.48 |

*** denotes statistically significant at the 1 percent level.
** denotes statistically significant at the 5 percent level.
* denotes statistically significant at the 10 percent level.

**Table 4: Determinants of Asset Stripping in Transition Economies: The Role of Institutional Conditions**

*Maximum Likelihood Ordered Probit Estimates*

|  | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Firm size (full time employees) | .003*** (.0009) | .003*** (.0009) | .005*** (.0008) | .002* (.001) | .002** (.001) |
| Age: Year firm start operate | .027*** (.009) | .026*** (.009) | .026* (.014) | .016* (.009) | .018* (.008) |
| Share unreported on total sales | .0003 (.003) |  |  |  |  |
| Share unreported on total salaries |  | -.006** (.003) |  |  |  |
| Share unreported on total inputs |  |  | .005** (.002) |  |  |
| Share unreported on total exports |  |  |  | .003* (.002) |  |
| Share unreported on total imports |  |  |  |  | .002 (.002) |
| Country dummies? | No | No | No | No | No |
| Industry dummies? | Yes | Yes | Yes | Yes | Yes |
| Number of obs | 635 | 622 | 400 | 599 | 592 |
| Log likelihood | -382.41 | -369.97 | -165.36 | -350.42 | -344.01 |

*** denotes statistically significant at the 1 percent level.
** denotes statistically significant at the 5 percent level.
* denotes statistically significant at the 10 percent level.

**Table 5: Determinants of Asset stripping in Transition Economies: The Role of Profitability**

*Maximum Likelihood Ordered Probit Estimates*

|  | (1) | (2) | (3) |
|---|---|---|---|
| After-tax profit 1$^{st}$ year (% inv.) | .079* (.044) | .678*** (.238) | .715*** (.243) |
| Squared: After-tax profit 1$^{st}$ year (% inv.) |  | -.075** (.029) | -.076** (.031) |
| Firm size (full time employees) |  |  | .004*** (.001) |
| Age: Year firm start operate | -.004 (.008) | -.002 (.008) | -.008 (.011) |
| Country dummies? | Yes | Yes | Yes |
| Industry dummies? | Yes | Yes | Yes |
| Number of obs | 941 | 941 | 923 |
| Log likelihood | -451.29 | -448.45 | -432.65 |

*** denotes statistically significant at the 1 percent level.
** denotes statistically significant at the 5 percent level.
* denotes statistically significant at the 10 percent level.

**Table 6: Do Firms With Stripped Assets Grow Faster?**

*Firm Growth Measured as Employment Growth (Ordinary Least Square Estimates)*

| | (1) | (2) |
|---|---|---|
| Asset stripping as share of physical capital from state enterprise | | .382 (.236) |
| Firm size (full time employees) | -.025*** (.007) | -.0261*** (.007) |
| Age: Year firm start operate | -.168*** (.055) | -.165*** (.056) |
| Dummy: Poland | 2.249*** (.599) | 2.289*** (.605) |
| Dummy: Slovakia | .837** (.391) | .874** (.394) |
| Dummy: Ukraine | -2.507*** (.272) | -2.68*** (.278) |
| Dummy: Russia | -2.016*** (.313) | -2.11*** (.319) |
| Dummy: Metal | -.2904 (.546) | -.279 (.547) |
| Dummy: Wood | -.113 (.638) | -.071 (.638) |
| Dummy: Food | -.349 (.497) | -.309 (.501) |
| Dummy: Cloth | .219 (.543) | .275 (.548) |
| Dummy: Construction | -.8632 (.592) | -.866 (.596) |
| Dummy: Chemical | -.137 (.595) | -.161 (.602) |
| Dummy: Pulp and paper | .771 (1.179) | .767 (1.18) |
| Dummy: Handicrafts | 1.457 (2.719) | 1.54 (2.723) |
| Dummy: Electric | -.934 (.591) | -.921 (.595) |
| Constant | 18.65*** (5.19) | 18.023*** (5.18) |
| Number of obs | 937 | 935 |
| R-squared | 0.166 | 0.166 |

*** denotes statistically significant at the 1 percent level.
** denotes statistically significant at the 5 percent level.
* denotes statistically significant at the 10 percent level.