

# Where did the governments go wrong? The shutdown paradox of state-owned firms by multinationals.

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## Abstract

Privatization has exposed previously state-owned enterprises (SOEs) to prospects of shutdown by multinationals and domestic buyers. We determine whether foreign multinational enterprises (MNEs) have a higher propensity to shutdown SOEs as compared to domestic non-MNEs. Using data on Central and Eastern Europe, we find that SOEs owned by MNEs have significantly reduced probability of shutdown; these results hold even after controlling for firm characteristics that reduce the probability of shutdown. Our findings show that MNEs are not "footloose" in transition economies as they have been found to be in developed and developing countries. Our results suggest that MNEs behave differently towards SOEs and non-SOEs, and in different markets. We also note that SOEs taken over by MNEs experience higher levels of productivity than SOEs acquired by non-MNEs. We hope that governments going through privatization can learn from our findings and apply them in divesting state assets.

*Keywords:* shutdown, privatization, multinational firms, cross-border acquisition, state-owned enterprises

*JEL classification paper:* D21, D82, F22, F23, L22, P31

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# 1 Introduction

The end of the state-control and the transition to free market economies through the process of privatization has exposed previously state-owned enterprises (SOEs) to the prospects of shutdown and liquidation. With the change to market economies, governments have encouraged the entry of foreign multinational enterprises (MNEs) and the inflow of foreign direct investment (FDI). Multinational firms have too benefited from privatization processes as they have used privatization of SOEs as a form of market entry. How has the relationship between privatization and entry of foreign MNEs affected the shutdown of SOEs? Recent research on firm shutdown has shown that in developed and developing countries, firms owned by MNEs have a significantly higher probability to shutdown than firms owned by non-MNEs <sup>1</sup>. Can this be applied to transition economies? One must consider the differences in transition economies; here, potential buyers of SOEs compete for the right to acquire SOEs and the government makes the final decision on the allocation of SOEs. Is this difference enough to overturn the current findings on MNEs and firm shutdown? Focusing on Central and Eastern Europe, we investigate whether MNEs have a higher propensity to shutdown SOEs as compared to non-MNEs and also aim to determine factors that contribute to the shutdown of SOEs.

Privatization is still on the agenda of many governments, not only because privatization generates revenue for the governments, but also because SOEs are still a substantial part of the economy. Despite many mass privatization programs in transition countries over the last two decades, SOEs still play a vital role. For example, according to the 2004 World Bank report in Central and Eastern Europe and Central Asia, the government's ownership share of GDP in 2002 accounted for 20 to 50 percent in 22 countries and in 4 countries SOEs contribution to GDP was higher than 50%<sup>2</sup>.

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<sup>1</sup>See Bernard and Jensen (2004), Görg and Strobl (2003), Van Beveren (2006), Bernard and Sjöholm (2003)

<sup>2</sup>In 2002, SOEs share of GDP was: in Czech Republic 20%, in Poland 25%, in Latvia 30%, in Romania 35%, in Croatia 40%, in Ukraine 35%, in Uzbekistan 55%, and in Belarus 80%.

Shutdown of SOEs is a very real issue. The increasing FDI inflows and the pressure for governments to fully complete privatization can still lead to many firms being shutdown. This can have an enormous impact on employment, especially in local areas where SOEs are the primary source of employment. Research carried out on the effects of FDI on local economies has mainly focused on spillovers generated by MNEs and on the mode of market entry selected by MNEs. Research shows that spillovers generated by MNEs have increased productivity of domestic firms<sup>3</sup>. Studies of FDI as a form of market entry focus on differences between greenfield investment and mergers and acquisitions. The literature on MNEs activity has scarcely documented the involvement of MNEs in the shutdown of domestic firms<sup>4</sup>. Even more, the decision to shutdown SOEs, to our knowledge, has not been studied in both international trade and investment literature and in the privatization literature. The literature on privatization has mainly compared the performance and productivity of SOEs prior to and post privatization and has neglected the effects of SOEs shutdown.

Theoretical literature on involvement of MNEs in the role of firm shutdown has not been developed. There are many arguments for whether MNEs or non-MNEs have a higher or lower probability to shutdown firms. It is known that MNEs can shift production between countries with greater ease than non-MNEs during economic hardships and therefore are more likely to shutdown firms. MNEs may also have a lower probability to shutdown firms as compared to non-MNEs because MNEs have more capital and better access to capital, which can help sustain firms for a longer period of time. Other arguments suggest that MNEs are less committed to local economies and are by nature more "footloose" than domestic firms. We begin with a simple model that shows the importance of SOE's productivity and the importance of competition between MNEs and non-MNEs for the right to acquire the SOE. We find that these factors, as

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<sup>3</sup>For examples see Aitken and Harrison (1999), and Javorcik (2004).

<sup>4</sup>Exceptions are listed in footnote # 1

well as the increasing trade costs provide the MNE higher commitment incentives to keep the SOE.

While much of the theoretical arguments for MNEs involvement in firm shutdown are inconclusive, our model provides evidence that MNEs have incentives for long commitments to sustain SOEs. Furthermore, our empirical findings decisively show that SOEs acquired by MNEs have a significantly lower probability of being shutdown than SOEs acquired by non-MNEs. We show that SOEs in Central and Eastern Europe have a higher productivity when acquired by MNEs and also that entry costs are higher for MNEs than non-MNEs. We control for various firm characteristics that have been previously identified as reducing the probability of shutdown. After controlling for age, size, productivity, and entry costs our results still hold and we indeed find that MNEs are not "footloose" when engaged in transition economies.

Our work adds to the emerging literature on MNEs and the shutdown of firms in developed and developing countries. Our findings strongly suggest that MNEs do not behave in the same fashion in every market. It has been previously found that firms with MNE ownership have a higher probability to exit in developed economies<sup>5</sup>. It has also been demonstrated that in developing economies MNEs are also first to exit<sup>6</sup>. Our results show that in transition economies MNEs have a lower probability to shutdown SOEs. We also contribute to the industrial organization literature, which has extensively studied the role of firm exit in the market. Our results highlight the importance of studying firm exit under different market structures as in the case of transition economies.

Our findings should also pique interest among privatization literature that has so far primarily focused on the performance of SOEs. Privatization is still an ongoing issue and our findings should have genuine policy implications for governments that are still in the mode of privatization. It may

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<sup>5</sup>See Bernard and Jensen (2004), Görg and Strobl (2003), Van Beveren (2006)

<sup>6</sup>Bernard and Sjöholm (2003) show this to be true in Indonesian manufacturing. Alvarez and Görg (2005) show that in Chile MNEs exit first when economy is in a downturn.

be controversial and politically unpopular to sell SOEs to foreign MNEs, however, it should not be forgotten that privatization is done in the best interest of the SOEs and the country. This paper provides the first evidence affirming that for economies going through transition from state to market, MNEs presence is not only beneficial, but unlike the case with developed and developing countries, SOEs owned by MNEs have significantly lower probability of shutting down.

## **2 Firm shutdown and privatization**

Previous theoretical literature on firm shutdown typically focuses on firm exit from declining industries. Ghemawat and Nalebuff (1985) show that in a Cournot competition with asymmetric market share and uniform costs, the larger firm exits first and the smaller firm remains a monopolist for longer. However, changing the assumption on costs can overturn these results. Whinston (1989) examines exit in declining industries from a multi-plant firm perspective. He finds that plants that are a part of a multi-plant firm will exit first. In contrast to these studies, we examine firm behavior and the decision to shutdown in transition economies where generally the economy is experiencing growth. We also incorporate the international trade setting where foreign and domestic firms compete for the right to acquire firms and then decide on shutdown. Transition economies and SOEs are perhaps the ideal candidates to compare whether or not MNEs shutdown first. Governments are the vendors of SOEs and in theory, are not only concerned with revenues generated by privatization but also the welfare of the SOEs. However, the assumption of governments unbiasedness when selling an SOEs is questionable.

Our work is more in-line with growing literature in international trade on the "footloose" nature of MNEs. A recent paper by Bernard and Jensen (2005) demonstrates that plants owned by U.S. multinationals and plants part of a multi-plant firm have a higher probability to shutdown. Other papers that examine this phenomenon in developed economies include Görg and Strobl

(2003) study of Ireland manufacturing sector and Van Beveren (2006) who examines all sectors of Belgian economy. All these studies find that MNEs have a higher exit rate than domestic firms. Similar studies have been done in developing nations. Bernard and Sjöholm (2003) study Indonesian firms and find the same results as in developed nations. Only Alvarez and Görg (2005) studying Chilean data find no impact of MNEs on firm exit. We examine countries that are going through transformation of economic system from state to market. Consequentially, the behavior of MNEs can be very different than in the developed and developing countries. The difference in our study is that we only look at government firms that were sold directly to MNEs or non-MNEs. All the firms in our study changed ownership only once, from state to initial private investor.

We also extend the work on privatization. Much of the literature on privatization has focused on the performance of SOEs and can be classified into two categories. The first string of literature compares pre- and post-privatization performance of SOEs. The second compares the performance of SOEs to private owned firms. A summary of these studies can be found in Megginson and Netter (2001). There are relatively few studies that mention the impact on SOEs based on post-privatization ownership. Studies that do compare performance of SOEs based on foreign or domestic ownership limit the domestic post-privatization ownership to management or nonmanagerial employees, i.e. SOEs are taken over by former management and employees from the government (Frydman et al. 1999). Our contribution and expansion of this literature is in part when controlling for performance and other SOEs characteristics, we examine probability of SOEs shutdown. The decision to shutdown SOEs prior to privatization was strictly the governments decision and SOEs were not subject to market forces. After privatization, shutdown of SOEs has become a real issue as it is crucial for governments to know who will be a reliable buyer.

### 3 Simple Cournot model

To give insight into the theory of firm shutdown, we specify a Cournot world where firms first compete for a SOE via an auction and then decide on optimal output quantity. We consider a two country partial equilibrium model where we have a home ( $H$ ) country and a foreign ( $F$ ) country. In this model we have one MNE ( $M$ ) located in country  $F$  and one private domestic firm ( $D$ ) located in country  $H$ . There is also a SOE called asset  $k$  that will be privatized by the government of country  $H$  via second-price sealed-bid auction. We assume that firm  $M$  and  $D$  produce a single homogenous good  $x_i$  ( $i = M, D$ ) that will be sold only in country  $H$ . Firm  $M$  will have the option to either export good  $x_M$  from country  $F$  or acquire asset  $k$  and produce good  $x_M$  in country  $H$ . If firm  $M$  decides on export, then it will have to pay transportation cost of  $t > 0$ . Firm  $D$  will produce and sell good  $x_D$  either from its own plant or from the acquired plant of asset  $k$ . The incentive for each firm to acquire the state asset  $k$  is to gain the productive ability of the SOE in country  $H$ . We denote the productivity of asset  $k$  by  $\theta$  and assume that the winning firm  $i$  ( $i = M$  or  $D$ ) will be able to use  $\theta_i$  to reduce its cost of operating in market  $H$ .

In the model, the interaction in country  $H$  will take place in three stages. In the first stage, asset  $k$  will be privatized and sold via a second-price sealed-bid auction to the highest bidder. In the second stage the winner of asset  $k$  will have the option to shutdown asset  $k$  or to produce using  $k$ . In the third stage, firm  $M$  and  $D$  sell homogenous good in country  $H$ . This three stage game will be solved by backward induction.

In the third stage, competition will be of the Cournot type where firms decide on quantities. The demand will be given by a linear inverse demand function

$$p = \alpha - \beta(x_M + x_D) \tag{1}$$

and profit of each firm  $i$  will be given by  $\pi_i = (p - c_i)x_i$ . The productivity  $\theta$  will affect the cost

structure of each firm so that the cost functions of each firm under different market entry and auction outcome will be:

1.  $c_{MW} = c - \theta_M$ , which is the variable production cost for  $M$  when  $M$  wins asset  $k$ .
2.  $c_{ME} = c + t$ , which is the variable production cost for  $M$  when  $M$  exports from country  $F$ .
3.  $c_{DW} = c - \theta_D$ , which is the variable production cost for  $D$  when  $D$  wins asset  $k$ .
4.  $c_D = c$ , which is the variable production cost for  $D$  when  $D$  uses its own plant to produce and not asset  $k$ .

In the second stage, the winning firm will have the option to shutdown the asset  $k$  or to produce with it. The decision to shutdown will depend on how productivity parameter  $\theta_i$  will directly affect the profit of firm  $i$  if  $i$  wins the auction, and indirectly if firm  $i$  does not win the auction. We impose the following assumption on the productivity parameter.

**Assumption 1:** The productivity parameter  $\theta_i$  is commonly known to both bidding firms and reduces the winners cost of operating in market  $H$  by  $\theta_i \in [0, 1]$ .

*(We are working on relaxing this assumption in the next version of the paper where we will assume that  $\theta_i$  is know only to firm  $i$  before the auction, and firm  $j$  and the government know only the distribution of  $\theta_i$ ,  $F(\theta_i)$ .)*

In the first stage, the SOE will be sold to either firm  $M$  or to firm  $D$  via second-price sealed-bid auction where each firm will simultaneously post its bid. The highest bid wins the auction and pays the price equal to the losing bid. The auction will be solved for Nash equilibria in undominated pure strategies. Each firm  $i$  has a valuation of asset  $k$  equal to  $v_i$  where  $v_i = \pi_{ii} - \pi_{ij}$ , where winning profits of firm  $i$  are defined by  $\pi_{ii}$  and losing profits are  $\pi_{ij}$ .

**Lemma 1** *Let firm  $i$  be the firm with the highest valuation. The asset  $k$  is then acquired by firm  $i$ , at price equal to firm  $j$ 's valuation of obtaining the state asset instead of firm  $i$ ,  $v_j$ .*

Proof: See the Appendix.

We now solve for the equilibrium ownership and derive the conditions under which the state asset  $k$  is acquired and subsequently shutdown. When firm  $M$  wins the auction and its cost reduction is known to firm  $D$  then firm  $M$  profits will be

$$\pi_{Mwin} = \beta \left[ x - \frac{2t1_s}{3\beta} + \frac{2\theta_M 1_p}{3\beta} \right]^2 \quad (2)$$

where  $x = \frac{\alpha - c}{3\beta}$  and  $1_s$  is an indicator function which it is equal to 1 if shutdown occurs and 0 if no shutdown occurs, and  $1_p$  is also an indicator function defined by 1 if no shutdown occurs and 0 if shutdown occurs. The profits for firm  $D$  when it loses the auction will then be

$$\pi_{Dlose} = \beta \left[ x + \frac{t1_s}{3\beta} - \frac{\theta_M 1_p}{3\beta} \right]^2 \quad (3)$$

If, on the other hand, firm  $D$  wins the auction then the profits for the two firms will be

$$\begin{aligned} \pi_{Dwin} &= \beta \left[ x + \frac{t}{3\beta} + \frac{2\theta_M 1_p}{3\beta} \right]^2 \\ \pi_{Mlose} &= \beta \left[ x - \frac{2t}{3\beta} - \frac{\theta_M 1_p}{3\beta} \right]^2 \end{aligned} \quad (4)$$

The valuation that each firm has for asset  $k$  is then equal to the difference in profits between winning and losing asset  $k$ . The valuation for firm  $M$  will be  $v_M = \pi_{Mwin} - \pi_{Mlose}$  and for firm  $D$  the valuation will be  $v_D = \pi_{Dwin} - \pi_{Dlose}$ . From the above profits we can easily show that  $v_M > v_D$  if  $\theta_M > \theta_D$  and  $v_D > v_M$  if  $\theta_D > \theta_M$ . The winner of the auction will have to then decide whether it is optimal to shutdown or not shutdown the state asset  $k$ . Based on the profit functions above, the following proposition can be developed.

**Proposition 2** *The necessary condition for the MNE to shutdown the SOE is:  $-t \geq \theta_M$ , which by assumptions cannot happen and therefore shutdown of asset  $k$  by the MNE will not occur. The*

*necessary condition for the domestic firm to shutdown the SOE is:  $0 \geq 2\theta_D$ , which can only happen if  $\theta_D = 0$ .*

The proposition demonstrates that under the assumptions of the model in the simple Cournot competition with linear inverse demand and commonly known  $\theta$  shutdown of asset  $k$  will not happen unless productivity  $\theta = 0$ . Therefore, under our assumptions this theory demonstrates that when firms compete for a SOE, the SOE will not be shutdown. However, in the next section, using evidence from Eastern and Central Europe, we show that privatized SOEs are being shutdown by MNEs and by domestic non-MNEs.

## 4 Data

In this study we use firm-level privatization data on Central and Eastern Europe to determine whether MNEs have a higher probability of shutting down SOEs. The data comes from Bureau van Dijk Electronic Publishing Zephyr merger and acquisition database. Using this database we were able to find every SOE sold to either a domestic or foreign investor. We then dropped any SOE that had less than 50% of its assets sold in the privatization process so that our data contains SOEs that have no direct government control and intervention. We also dropped from our sample any firm that did not report one or more input or output measures for all the years in the data. Also, few SOEs had more than one record as privatization was carried out in multiple stages, we dropped all duplicated records and only retained latest record for each SOE. In the end, we were left with 419 SOE that were privatized by direct majority sale to a private foreign or domestic investor. Using the years from 1998 to 2006 we constructed our panel firm-level data where each sample unit includes one formerly state-owned firm and contains detailed balance sheet data.

The difficulty that most studies run into when working in the area of privatization is the availability and consistency of the data. As is described by Megginson and Netter (2001) governments

that collect data have different standards, and the amount of information that is disclosed varies from country to country and over time. Our data set does not contain many of the consistency problems that exist in privatization data sets collected directly from the governments as all of our data was verified by the Bureau van Dijk Electronic Publishings. In our data we have missing values for some of the variables over the 9 year period. We addressed this issue by imputing the missing values and compared the results using both non-imputed data and imputed data; the results of the paper do not change. Another potential problem with privatization data is sample selection bias. Sample selection bias can arise from the fact that governments may want to privatize better performing firms or to privatize better firms first. Selection bias can also arise due to data availability and collection in transition countries where better data is collected on better performing firms. One of the main problems that selection bias can cause in our study is the underrepresentation of firms who were shutdown. To address this issue we wanted to be certain of the status of every firm in our data. We conducted a detailed search on each firm and were able to determine which firms are operational and which were shutdown.

The most important aspect of our study is to clearly identify which of the 419 privatized firms were shutdown after privatization took place. The data does not provide a clear indication of which of the firms were shutdown and therefore, in order to guarantee accuracy in identifying all the shutdown firms, we conducted detail search on all of the 419 firms. In our search we used various country databases, news sources, and firm websites. We identified 44 firms that were shutdown after they were acquired by private firms. Even with our detailed search, we were uncertain about the status of some firms. For those firms that we were unsure about we used employment to identify shutdown. Following Mata and Portugal (1994); Mata, Portugal and Guimarães (1995) and Van Beveren (2006) where they assume that if employment falls to zero in a particular year, then the firm is shutdown, we identified another 9 firms. We did slightly alter their definition of shutdown and only considered firms to be shutdown if employment fell by more

than a 1000% within the years of observation and last two years of known employment the firm had less than 10 employees.

Table 1 (*in Appendix*) provides the shutdown statistics. Out of 419 firms privatized, 292 (70%) firms were sold to domestic firms and 127 (30%) were sold to foreign MNEs. The total number of firms that were shutdown is 53; 13% of the total firms. Out of the total of 53 shutdown firms, 23% of them were shutdown by foreign MNEs and 77% were shutdown by domestic firms. In Table 4, we provide a comparison of SOEs characteristics by shutdown status. We see that firms which were shutdown had less revenue and capital. They had less employees and had lower productivity.

Table 2 breaks down the number of firms by ownership and industry. We classify the firms into two types of industries using USSIC codes. Manufacturing firms engage in manufacturing, construction and agricultural business, while Service firms engage in all types of services including financial, wholesale, retail, transportation, communication and various utilities. Due to the small sample size of our data, the two types of industry classification encompass a broad range of firms. However, this subgroup classification should still produce better estimates of productivity than by combining all the firms into one group.

In Table 3, we describe the firm characteristics by ownership. We present means for firm revenue, capital, employment, age, total factor productivity and entry costs. There is a significant difference between ownership type in revenue and capital, which are in thousand Euro. Employment provides mean number of employees by ownership where we see that domestic firms acquired SOE with significantly larger employment level than SOE acquired by multinationals. We obtained the Age variable by using the date of incorporation for each firm provided in our data. We have a significant difference in the mean age of SOEs, where SOEs sold to foreign multinationals are older than SOEs sold to domestic firms.

## 5 Empirical approach to shutdown

To estimate whether foreign MNEs have a higher probability to shutdown SOE we use a probit specification:

$$\Pr(\textit{ShutDown}_{it} = 1 | \mathbf{X}_{it}, \gamma) = \Phi(\mathbf{X}'_{it}\gamma) \quad (5)$$

where the dependant variable  $\textit{ShutDown}_{it} = 1$  if firm  $i$  was shutdown in the year  $t$ , and  $\textit{ShutDown}_{it} = 0$  if firm  $i$  is still operational in the last year of our panel data. In estimating the shutdown probability we control for various SOEs characteristics, including age, size and productivity. Previous literature on firm shutdown has shown that these characteristics lower the probability of shutdown. We also include entry costs and a full set of year and country dummies, as well as, industry controls using single digit USSIC codes.

To control for the age of SOEs, we use the initial date of incorporation given for each firm and the last year that a firm is present in the data to construct an  $\textit{Age}_{it}$  variable. To control for size of SOEs at a given time, we use the natural log of number of employees. Total factor productivity ( $\textit{TFP}$ ) of each SOE is obtained using Levinsohn and Petrin (2003) method where intermediate inputs are used as proxy for unobservable SOE productivity. We estimate the value added production function (gross output net materials)

$$v_{it} = \beta_o + \beta_l l_{it} + \beta_k k_{it} + \varpi_{it} + \eta_{it} \quad (6)$$

where  $v_{it}$  denotes value added, and  $l_{it}$  and  $k_{it}$  are labor and capital, respectively. The error term is split into the observable firm-level productivity  $\varpi_{it}$  and the unobserved error term  $\eta_{it}$  that captures the measurement error and other unexpected circumstances. After estimating the coefficients we

can back out total factor productivity in levels by

$$TFP_{it}^j = \exp(v_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it}) \quad (7)$$

where  $TFP_{it}^j$  is given for each firm  $i$  at time  $t$  in industry  $j$ . Table 5 provides the productivity coefficients obtained from estimating equation 6. In Table 3 we compare TFP for SOEs by ownership. Privatized SOEs acquired by MNEs have significantly higher TFP levels than SOEs acquired by non-MNEs. Also, Table 4 gives the TFP comparison for SOEs that were shutdown and SOEs that remained operations. As expected, shutdown SOEs have significantly lower productivity than operating SOEs.

There is also the argument that higher entry costs lower the probability of shutdown. We directly control for entry costs of each firm by using the deal value, which is the amount paid by each acquiring firm for the SOE during the privatization. Also, industry fixed effects control for the heterogeneity in entry cost by industry. Table 3 gives a comparison of domestic and foreign entry costs where it is clear that MNEs have incurred higher entry costs. Entry costs sustained for firms that were shutdown are also lower than for operating firms as shown in Table 4.

The goal of our study is to determine whether foreign MNEs have a higher probability to shutdown SOEs than non-MNEs. To capture this effect we construct the foreign ownership variable:

$$ForeignOwnership_{it} = \begin{cases} 1 & \text{if SOE is owned by foreign MNE} \\ 0 & \text{if SOE is owned by domestic firm} \end{cases} \quad (8)$$

## 6 Estimates and implications

In Table 6 we provide the marginal effects of the probit estimation. Column **I** presents the estimates with year and country dummies. The result is clear,  $ForeignOwnership_{it}$  has a negative impact on shutdown of SOEs, meaning that SOEs acquired by MNEs have 3.1% lower probability of being

shutdown as compared to SOEs owned by domestic non-MNEs. This finding is rather substantial in magnitude when we consider that only 13% of the firms in the data were shutdown. SOEs characteristics of age, size and TFP have the predicted negative impact on shutdown probability.

In column **II** we add entry costs as a control variable. Again,  $Ownership_{it}$  remains negative with MNEs ownership now reducing the probability of shutdown by 2.89%. Entry cost has the predicted negative impact on SOEs shutdown. Finally, adding industry controls in column **III** reinforces the main result and here we see that MNEs have 4.47% lower probability to shutdown SOEs than non-MNEs.

Our findings have significant implications for MNEs activity in transition economies and for governments engaged in privatization. Previous studies have found that MNEs are the first to exit and shutdown domestic firms in developed and developing economies. We find the opposite effect in transition economies. Evidence in Table 3 shows that SOEs acquired by MNEs had a higher level of revenue and capital, as well as, were older and more productive. After controlling for specific SOEs characteristics we still find that MNEs are less likely to shutdown SOEs. What are the potential causes for this behavior of MNEs in transition economies and not in developed and developing economies? There are many potential reasons why MNEs may behave differently when dealing with SOEs.

One argument could be framed by looking at the very nature of SOEs. Most SOEs were monopolies in their local markets and acquisition of such a SOE provides the MNE with a quick control of the local market. This quick market power advantage is worth investment and sustainability of the SOEs. This may not hold for other developed and developing economies as MNEs usually have competition when they enter those markets. For domestic non-MNEs, shutdown of SOEs may be less of an importance as presumably domestic non-MNEs are already established in the local market. Domestic non-MNEs may also have incentive to acquire SOEs in order to prevent market entry for MNEs. Quick access to the local market provides MNEs with local knowledge

and management. When conducting business in Central and Eastern Europe MNEs find that the rules of business are not the same as in developed countries and therefore, local knowledge is important.

Another potential reason why MNEs behave differently when dealing with SOEs is the close relationship with the government. Privatization is a politically charged issue especially in Central and Eastern Europe where governments try to limit the number of privatizing firms being sold to foreign MNEs<sup>7</sup>. Therefore, when acquiring state assets, foreign MNEs have to be aware of the political and social backlash if a SOE is shutdown. This is less of an issue in a developed and even developing economy where firm closure is a natural aspect of a market economy. Governments and politicians have to be very carefully when selling state assets to foreigners as a wrong decision could result in future loss of political office. In our study we have controlled for various SOEs characteristics and have found that MNEs have lower probability to shutdown SOEs. This provides some evidence that MNEs are aware of the potential political situation in transition economies and of potential complications for and with the government if a closure of an SOE occurs. This behavior of MNEs should put governments at ease to foreign acquisition of SOEs.

## **7 Conclusion**

We have studied the role of foreign MNEs and domestic non-MNEs in the shutdown of SOEs after the process of privatization. Governments carry out privatization with the goal to generate revenue and increase efficiency in the SOE and in the market. In the pursuit of these goals, the government may not always realize the potential of shutdown of SOEs after privatization is completed. We find that the probability of SOEs shutdown is reduced when SOEs are owned by MNEs as compared to non-MNEs. We hope that our findings will generate awareness for privatizing governments of

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<sup>7</sup>See Meggison and Netter (2001) for a review of privatization in different regions of the world.

the threat of shutdown and inform governments that MNEs are less likely to shutdown SOEs post privatization.

The main result of this study is contrary to literature on international trade and shutdown of firms. While others find that MNEs are more "footloose" in nature, we do not find this effect in transition economies. Our findings suggest that MNEs do not behave in the same fashion in every market and towards every firm after takeover. Reasons for difference in our findings could stem from the fact that transition economies are different than both developed and developing economies. Also, SOEs are different than other private firms; even after controlling for all known firm characteristics that reduce the probability of shutdown, our findings are substantially large. This may imply that SOEs have unobservable characteristics that differ from private firms.

The next step in our research on the shutdown of firms in transition economies is to study the shutdown pattern of non-SOEs. If we find that MNEs have a lower probability to shutdown non-SOEs then we can conclude that MNEs' behavior in transition economies is different as compared to developed and developing economies. However, if we find that MNEs have a higher probability to shutdown non-SOEs, then we can conclude that MNEs behave differently towards SOEs and non-SOEs. We can then attempt to study the difference in SOEs and non-SOEs in the context of international trade.

We also plan to further develop the theory of firm shutdown. We are currently working on relaxing Assumption 1 of this paper. We hope to find an equilibrium for shutdown of firms under competition with asymmetric information. We suspect that governments unable to have full information misallocate SOEs to buyers with higher probability to shutdown.

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## Appendix

### Proof of Lemma 1

Let  $v_i > v_j$  without loss of generality. First, consider the equilibrium candidate where firm  $i$  acquires asset  $k$ . Consider the equilibrium bid  $b^*$ , where  $b_i^* > b_j^*$ ,  $j \neq i$ . Let firm  $i$  be the owner obtaining asset  $k$ . Note that  $b_i^* > v_i^*$  is a weakly dominated strategy, since no firm will post a bid over its maximum valuation of obtaining the assets. If  $b_i^* < v_i^*$ , firm  $j$  benefits from deviating to  $b_j^{**} = b_i^* + \varepsilon$ , since it then obtains the assets and pays a price for the assets lower than its valuation of obtaining them. Last, consider bid  $b_i^* = v_i^*$ ,  $b_j^* = v_j - \varepsilon$ . Then, no firm has an incentive to deviate. Thus, this is a Nash Equilibrium (NE) and the only NE where firm  $i$  obtains asset  $k$ .

Let us now show that this is the only NE. First, consider the situation where firm  $j$  obtains asset  $k$ . Consider the equilibrium bid  $b^*$ , where  $b_j^* > b_i^*$ ,  $j \neq i$ . But we know that in equilibrium,  $b_j^* < v_j$ , since firm  $j$  otherwise plays a weakly dominated strategy. But if  $b_j^* < v_j$ , firm  $i$  benefits from deviating to  $b_i^{**} = b_j^* + \varepsilon$ , since it then obtains asset  $k$  and pays a price which is lower than its valuation of obtaining asset  $k$ . Thus, firm  $j$  obtaining asset  $k$  is not an equilibrium.

Second, note that the situation where firms  $i$  and  $j$  do not obtain the assets cannot occur if there is no reservation price at the auction. ■

### Proof of Proposition 1:

We start by rewriting the profits of both firms. Profits for firm  $M$  when they win the auction and either shutdown ( $\pi_{MwinSD}$ ) or not shutdown ( $\pi_{MwinNSD}$ ) the state asset  $k$  are

$$\begin{aligned}\pi_{MwinSD} &= \beta \left[ x - \frac{2t}{3\beta} \right]^2 \\ \pi_{MwinNSD} &= \beta \left[ x + \frac{2\theta_M}{3\beta} \right]^2\end{aligned}$$

The profits of firm  $D$  when they lose the auction and firm  $M$  either shutdown ( $\pi_{DloseSD}$ ) or

not shutdown ( $\pi_{DloseNSD}$ ) asset  $k$  are

$$\begin{aligned}\pi_{DloseSD} &= \beta\left[x + \frac{t}{3\beta}\right]^2 \\ \pi_{DloseNSD} &= \beta\left[x - \frac{\theta_M}{3\beta}\right]^2\end{aligned}$$

Profits for firm  $D$  when they win the auction and either shutdown ( $\pi_{DwinSD}$ ) or not shutdown ( $\pi_{DwinNSD}$ ) the state asset  $k$  are

$$\begin{aligned}\pi_{DwinSD} &= \beta\left[x + \frac{t}{3\beta}\right]^2 \\ \pi_{DwinNSD} &= \beta\left[x + \frac{t}{3\beta} + \frac{2\theta_D}{3\beta}\right]^2\end{aligned}$$

Finally, the profits of firm  $M$  when they lose the auction and firm  $D$  either shutdown ( $\pi_{DloseSD}$ ) or not shutdown ( $\pi_{DloseNSD}$ ) asset  $k$  are

$$\begin{aligned}\pi_{MloseSD} &= \beta\left[x - \frac{2t}{3\beta}\right]^2 \\ \pi_{MloseNSD} &= \beta\left[x - \frac{2t}{3\beta} - \frac{\theta_D}{3\beta}\right]^2\end{aligned}$$

Assume that firm  $M$  shuts down asset  $k$  after acquisition. This would imply that shutdown profits of firm  $M$  would be greater than profits of firm  $M$  under no shutdown, i.e.  $\pi_{MwinSD} \geq \pi_{MwinNSD}$ . Simplifying this expression we obtain the following condition

$$-t \geq \theta_M$$

which contradicts the assumption that trade costs  $t > 0$ . Therefore, profits under no shutdown will always be greater than profits under shutdown.

Assume that firm  $D$  shuts down asset  $k$  after acquisition. This would imply that shutdown

profits of firm  $D$  would be greater than profits of firm  $D$  under no shutdown, i.e.  $\pi_{MwinSD} \geq \pi_{MwinNSD}$ . Simplifying this expression we obtain the following condition

$$0 \geq 2\theta_D$$

which holds only if  $\theta_D = 0$ , for  $\theta_D > 0$  this condition does not hold. ■

<b>SOEs acquired by:</b>	<b>Domestic</b>	<b>Foreign</b>	<b>Total</b>
<b>Shutdown Firms</b>	41 (77%)	12 (23%)	53 (13%)
<b>Operating Firms</b>	251	115	366 (87%)
<b>Total</b>	292 (70%)	127 (30%)	419 (100%)

Note: Domestic firms are SOEs acquired by domestic private firms and Foreign firms are SOEs acquired by foreign MNEs.

Table 1: Shutdown Statistics of SOEs by Ownership

<b>SOEs acquired by:</b>	<b>Domestic</b>	<b>Foreign</b>	<b>Total</b>
<b>Manufacturing</b>	195	73	268
<b>Service</b>	97	54	151
<b>Total</b>	292	127	419

Table 2: Ownership of SOEs by Industry

<b>SOEs acquired by:</b>	<b>Domestic</b>	<b>Foreign</b>	<b>t-test</b>
<b>Revenue</b>	101194.3	151719.1	-2.25**
<b>Capital</b>	97453.97	142713.8	-2.8***
<b>Employment</b>	1913	1310	-3.75***
<b>Age</b>	25	28.3	-2.4**
<b>TFP</b>	15.2	18	-2.28**
<b>Entry Cost</b>	18480.25	122430.7	-2.50**

Note: Means of all values are given, where Revenue, Capital and Entry Cost are in Thousand Euro. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 3: SOEs characteristics by Ownership

	<b>Shutdown Firms</b>	<b>Operating Firms</b>	t-test
<b>Revenue</b>	30258.45	128221.8	8.9***
<b>Capital</b>	45131.48	120917.7	7.37***
<b>Employment</b>	1120	1904	3.88***
<b>Age</b>	27.05	26.03	-0.45
<b>TFP</b>	11.32	16.80	5.18***
<b>Entry Cost</b>	14996.79	55608.04	2.49**

Note: Means of all values are given, where Revenue, Capital and Entry Costs are in Thousand Euro. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 4: SOEs characteristics by Shutdown

	<b>labor</b>	<b>capital</b>
<b>Manufacturing</b>	0.0988* (.0581)	0.5865*** (0.1878)
<b>Service</b>	0.4740*** (0.0748)	0.4060*** (0.1546)

Note: Standard Errors are given in the parenthesis. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 5: Productivity estimates

	<b>I</b>	<b>II</b>	<b>III</b>
<b>ForeignOwnership</b>	-0.0312 <sup>**</sup> (0.0137)	-0.0289 <sup>**</sup> (0.0132)	-0.0447 <sup>***</sup> (0.013)
<b>Size</b>	-0.0171 <sup>***</sup> (0.0039)	-0.0138 <sup>***</sup> (0.0036)	-0.0119 <sup>***</sup> (0.0040)
<b>Age</b>	-0.0004 (0.0003)	-0.0015 <sup>***</sup> (0.0004)	-0.0010 <sup>***</sup> (0.0003)
<b>TFP</b>	-0.0009 <sup>**</sup> (0.0004)	-0.0011 <sup>***</sup> (0.0004)	-0.0016 <sup>***</sup> (0.0004)
<b>Entry Cost</b>		-0.0001 <sup>***</sup> (0)	-0.0001 <sup>***</sup> (0)

Note: The coefficients provide marginal effects. Column **I** gives the coefficients with time and country dummies. Column **II** adds the Entry Cost and Column **III** also includes industry fixed effects. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Standard Errors are given in parenthesis and are robust.

Table 6: Probit Results