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Ownership versus Environment

Disentangling the Sources of Public Sector Inefficiency

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Is public sector inefficiency due primarily to agency-type problems ("ownership") or to the environment in which public enterprises operate (as measured by soft budget constraints or barriers to competition)? Both

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Summary findings

Bartel and Harrison compare the performance of public and private sector manufacturing firms in Indonesia for 1981–95. They analyze whether public sector inefficiency is due primarily to agency-type problems ("ownership") or to the business environment in which public enterprises operate, as measured by soft budget constraints or barriers to competition.

They nest the two alternatives in a production function framework.

The results, obtained from fixed-effects specifications, provide support for both models.

The business environment matters. *Only* public enterprises that received loans from state banks or those shielded from import competition performed worse than private enterprises.

Ownership matters. For a given level of import competition or soft loans, public enterprises perform worse than their counterparts in the private sector.

Eliminating soft loans to Indonesia's public enterprises would raise total factor productivity by 6 percentage points; the same result could be achieved by increasing import penetration by 15 percentage points.

Bartel and Harrison show that these findings are not due to selection effects for either privatization or the receipt of soft loans.

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OWNERSHIP VERSUS ENVIRONMENT:

DISENTANGLING THE SOURCES OF PUBLIC SECTOR INEFFICIENCY

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"The argument for privatizing the corporation, of course, is that private owners, driven by the profit incentive, will operate the company more efficiently."

-- Louis Uchitelle, The New York Times, May 31, 1998.

"Few privatized companies have become more efficient or profitable".

-- Venyamin Sokolov on Russia, The New York Times, June 1, 1998.

Why privatize? One primary objective of privatization is to enhance the efficiency of public enterprises. This is the perspective put forth by Louis Uchitelle in an interview with Joseph Stiglitz in the May 1998 New York Times. One day later, an editoral by the director of Russia's General Accounting Office appeared, pointing out that very few of Russia's privatized firms have actually increased efficiency. Clearly, the evidence to date on the superior performance of privatized plants is incomplete. Megginson et al.(1994) conclude their review of the evidence by stating that the wave of privatizations carried out over the last decade were based on blind faith. Laffont and Tirole, in their (1993) book, echo that point, remarking that "the empirical literature on the relative efficiency of the two ownership structures is itself currently inconclusive". Although many studies find that public sector plants perform poorly relative to their private sector counterparts (Boardman and Vining (1989), Kikeri, Nellis, and Shirley (1992), La Porta and Lopez-de-Silanes (1997)), other studies get mixed or ambigious results (Funkhouser and MacAvoy (1979), Groves, Hong, McMillan and Naughton (1994)).

One explanation for the conflicting evidence is that the efficiency gains from privatization depend on a variety of factors, including the degree of competition, the regulatory

environment, the magnitude of market failure, and the administrative capabilities of the government. These are the conclusions reached by Vickers and Yarrow (1991) in their lengthy review of the arguments for and against privatization. [1] One recent article which provides a formal argument for this view is Shleifer and Vishny (1994). They present a model of bargaining between politicians and managers and show that privatization enhances efficiency only if "control rights" over employment decisions are shifted to the plant manager and government subsidies are targeted at inefficient public plants. This perspective focuses on the *environment* in attempting to explain the performance of public and private enterprises.

Others, however, argue that private sector ownership is always inferior to public sector ownership, even after controlling for differences in the environment. These types of arguments, as illustrated by Ehrlich et al (1994), are often based on some variant of a principal agent problem: the principal (the government) either cannot or does not choose to properly monitor the managers. This approach focuses on *ownership* as the explanation for poor public sector performance.[2]

Despite these different perspectives, the empirical studies on privatization have typically focused on identifying the magnitude of the gains, rather than attempting to identify their

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[1]Recent evidence provides support for this view. The November 3, 1998 issue of The Financial Times reports that the Jamaican government retook control of the three largest sugar mills, which had been privatized four years earlier. The government claimed that the mills had "not met productivity and production targets and have depended too heavily on state support". The March 11, 1998 issue of The New York Times reports that the Argentinian government has eliminated the duopoly maintained by its two telephone companies, pointing out that since the "1990 privatization, the two companies have increased the number of lines in the country from three million to seven million, but their monopolies have kept Argentine telephone phone rates high by international standards".

[2]The importance of the principal-agent problem is also demonstrated by Gertner, Scharfstein and Stein (1994) who show how an internal capital market where corporate headquarters owns the business units to which it allocates capital leads to more monitoring compared to the situation of external financing where the bank does not own the firms to which it lends. Hubbard and Palia (1999) use the internal capital market hypothesis to explain why bidding firms earned positive abnormal returns in diversifying acquisitions in the 1960s.

sources. Recent papers (Megginson et al (1994), Boubakri and Cosset (1998)) compare performance in a set of enterprises before and after privatization, but do not control for the conditions under which privatization occurred. From a policy perspective, however, it is critical to be able to identify the determinants of improved performance with privatization. For example, if public sector enterprises perform poorly because they are located in sectors with very little internal or external competition, or because of access to soft loans, then public sector plants could be induced to behave like the private sector in a competitive, subsidy-free environment. These considerations become critical if privatization has been delayed or is not politically feasible in the short run.

One recent paper (LaPorta and Lopez-de-Silanes, 1997) does examine the sources of public sector inefficiency. Using data for all 218 non-financial privatizations that took place in Mexico between 1983 and 1991, LaPorta and Lopez-de-Silanes decompose the post-privatization improvement in the ratio of operating income to sales and show that 10 percent is due to higher product prices, 33 percent to transfers from laid-off workers and the remaining 57 percent to productivity gains. But their analysis does not focus primarily on *why* these improvements in performance occurred.

In this paper, we focus on the role of *ownership* versus the *environment* and attempt to assign a relative weight to these two explanations for poor public sector behavior.[3] Although many regulatory aspects cannot be adequately captured in our empirical work, we do measure

[3]In contrasting the roles of ownership and environment we do not distinguish between different types of owners post-privatization, i.e. our focus is on private vs. public owners. Barberis et.al. (1996) study the restructuring that occurred in privatized Russian shops when there were new owners and new managers compared to giving equity to the old managers.

two important environmental factors: (1) the role of soft budget constraints[4] and (2) the degree of internal and external competition.

Recent empirical work by Pinto and Van Wijnbergen (1995), Claessens and Djankov (1997) and others studies the effect of soft loans on performance, but, due to data limitations, does not fully address the issue of ownership versus environment. Pinto and Van Wijnbergen (1995) focus only on public sector enterprises, making public-private comparisons impossible. The study by Claessens and Djankov (1997) uses data on the Czech Republic for only the early 1990s when information on ownership changes was limited. In addition, data for the Czech Republic does not differentiate between soft loans and overall bank lending. Since virtually all firms in the Czech Republic received bank loans, this makes it difficult to test for the impact of soft loans there.

To identify the sources of public sector inefficiency, we use a 1981-1995 panel of all public and private enterprises in manufacturing in Indonesia. Our results suggest that the observed inferior performance of public sector enterprises (PSEs) is attributable to *both* ownership and the environment. The environment matters because *only* PSEs which received loans from state banks or those shielded from import competition performed worse than private enterprises. Ownership matters because, for a given level of import competition or soft loans, PSEs perform worse than their private sector counterparts. Eliminating soft loans to public enterprises in Indonesia would raise total factor productivity levels by 6 percentage points; the same result could be achieved by increasing import penetration by 15 percentage points.

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[4]Research on the impact of the soft budget constraint goes back to Kornai (1979), who first postulated that the possibility of bail-outs for public sector enterprises could be used to explain their poor performance.

Section II reviews a number of hypotheses regarding public sector efficiency and sets up the empirical framework for the paper. In Section III the Indonesian data are described and results are presented in Section IV. Section V concludes.

II. Theoretical Background and Empirical Implementation

A. Theoretical Background

Although there have been many articles written on the benefits and costs of privatization, two articles provide the theoretical motivation for our work. The first is a paper by Shleifer and Vishny (1994) which presents a model of bargaining between politicians and managers and shows the conditions under which privatization will lead to increased productivity. Shleifer and Vishny (1994) argue that government officials are willing to subsidize public enterprises only to the extent that they hire workers beyond the profit-maximizing level. Public enterprises are granted subsidies in return for promising to hire too many workers. There is a direct negative link between government transfers and plant productivity, since government officials "pay" enterprise managers to hire too many workers.

In this framework, privatization is defined as shifting control over "cash flow" to the enterprise. However, by placing the firm's equity in private hands, the government does not necessarily relinquish control over hiring decisions. This type of control is referred to as "control rights". The authors show that privatization alone need not lead to any increases in efficiency (ie a reduction in excess workers). In fact, privatization could be associated with falling efficiency if politicians retain control rights. This would be the case for a regulated firm, where cash flow is privatized but control rights remain with the government.

The second article that provides a theoretical framework for our empirical work is Ehrlich et.al. (1994). In their model, the level of total factor productivity is a function of managerial time allocated to current production, while the rate of total factor productivity growth is positively related to the manager's commitment to investments in plant-specific capital. Public sector managers, according to their model, spend too much time pursuing independent private objectives. This has two effects: it reduces the time spent building plant-specific capital (which raises TFP growth in the long run) and it has an ambiguous effect on the time spent monitoring current production which impacts the current level of TFP. This framework implies that there is no reason why levels of productivity in public sector plants should be lower than in the private sector in the short run, but it does imply a lower rate of productivity growth for public sector enterprises. In the longer term, of course, lower public sector productivity growth should eventually lead to lower productivity levels than in the private sector. One insight provided by this model is that it can explain why PSEs could survive in the medium term even in a competitive environment. If the most efficient enterprises were taken over by the government initially–as appears to have been the case in Indonesia–than the myopia of these managers does not immediately translate into lower efficiency levels.

Ehrlich et al (1994) is typical of most work that addresses the issue of public versus private efficiency: public enterprises are assumed to be less efficient in the long run because the managers fail to act in a way that maximizes long run profits. Although Ehrlich et al do not say why, one reason could be imperfect monitoring by the government. The Ehrlich et. al. paper is one illustration of a wider literature which argues that public sector enterprises are more inefficient primarily due to principal agent problems. One implication is that there should be a

consistent negative coefficient on public ownership in any comparisons of productivity growth. Shleifer and Vishny (1994), on the other hand, argue that ownership changes by themselves are generally not associated with any change in performance. According to this alternative framework, it is the environment which determines the comparative performance of the two types of enterprises.

B. Measuring Total Factor Productivity (TFP)

As our yardstick of relative performance, we focus exclusively on total factor productivity (TFP), at least in part because prior research (La Porta and Lopez-de-Silanes, 1997) has shown that a very large part of the gains from privatization is due to productivity growth. We begin with a general discussion of the problems involved in production function estimation, and then discuss in turn how to introduce the role of soft budgets and ownership. A general production function for plant i in sector j at time t is given by equation (1):

$$Y_{ijt} = A_{ijt}F(Z_{ijt}) \qquad (1)$$

Output Y_{ijt} is a real measure of plant-level output and Z is a vector of M inputs. In our estimation, we will include as inputs both skilled and unskilled labor, capital inputs, and materials. A_{ijt} is a plant-specific index of Hicks-neutral technical progress which will depend on a number of factors, including ownership. Totally differentiating (1), and dividing through by Y, we have

$$dY/Y_{ijt} = \sum_m (\partial Y/\partial Z_m)(dZ_m/Y)_{ijt} + dA/A_{ijt} \qquad (2)$$

In this framework, imperfect competition enters (2) because plants with market power do not set the value marginal product $P(\partial Y/\partial Z)$ equal to the factor price. If we assume Cournot behavior by imperfectly competitive plants, then we can derive the first order conditions from each plant's profit maximization and write each of the partial derivatives $\partial Y/\partial Z$:

$$(\partial Y/\partial Z_m)_{ijt} = (w_m/p)_{jt} \left[\frac{1}{1 + (S_{ij}/e_j)}\right] = (w_m/p)_{jt}\, \mu_{ij} \qquad (3)$$

S is the ith plant's share in the jth industry, while e is the elasticity of demand. Factor prices for input m are given by w_m. If plant i is not perfectly competitive, then the value of the marginal product exceeds the factor cost by some mark-up μ. For simplicity, we will assume that the mark-up parameter does not vary across plants or over time.

Substituting (3) into (2) and rearranging terms, we have

$$dY/Y_{ijt} = \mu_j \sum_m \left[w_m Z_m/PY \frac{dZ_m}{Z_m}\right] + (dA/A)_{ijt} \qquad (4)$$

The value of $w_m Z_m/PY$ is the share of the mth factor in total output. We shall denote this share as B_m. Rewriting (4),

$$dlnY_{ijt} = dlnA_{ijt} + \mu \Sigma_{m=1 \text{ to } M} B_m dlnZ_{mijt} \qquad (5)$$

All variables have been rewritten in log form. Output growth can be decomposed into two sources: growth in productivity, or growth in input use. In a regression framework, the coefficients on the M inputs include two components: the mark-up parameter μ, and the factor share. By not constraining the coefficients, we allow both factor shares and mark-ups to vary. To simplify the presentation, we will now omit subscripts in most of the discussion which follows.

C. Introducing the Soft Budget Constraint

To introduce the importance of the soft budget constraint, we draw from the intuition provided by Shleifer and Vishny (1994). In their model, politicians and managers bargain over the level of employment in the firm. Politicians offer managers some amount of transfer, T, to induce them to hire extra labor. Shleifer and Vishny assume that this excess labor produces no extra output. This means that there is a direct link between T and lower productivity: firms which take more T and consequently hire more excess labor will have lower productivity. Our goal is to capture this effect empirically.

Consistent with their framework, we can assume that there are two types of labor: necessary labor (NL) and excess labor (EL). If EL is included with other labor inputs, estimation of the production function will show that firms with more EL have lower productivity growth. To the extent that firms with EL also tend to be public sector enterprises, we could conclude that public sector enterprises are more inefficient. If we can isolate labor inputs (EL) which are tied to transfers, however, then we can separate the impact of ownership from the soft budget constraint on productivity.

Unfortunately, however, we do not observe EL and NL separately. If we isolate labor

inputs from other inputs, we can rewrite equation (5) as follows:

$$dln(Y) = dlnA + \mu B_{NL+EL} dln(NL + EL) + \Sigma_{m=2\ to\ M} \mu B_m dln(Z_m) \qquad (6)$$

We only observe total labor inputs, given by the sum of NL and EL, as well as the total share of labor, given by B_{NL+EL}. Suppose we could isolate necessary from excess labor. Then we could define "true" TFPG, which is the residual *dlnA*, as:

$$dlnA_{true} = TFPG_{true} = dln(Y) - \mu B_{NL} dln(NL) - \Sigma_{m=2\ to\ M} \mu B_m dln(Z_m) \qquad (7)$$

However, since the plant has employees who do nothing, observed TFPG will in fact be lower:

$$dlnA_{observed} = TFPG_{observed} = dln(Y) - \mu B_{NL+EL} dln(NL + EL) - \Sigma_m \mu B_m dln(Z_m) \qquad (7)'$$

If we assume that necessary and unnecessary labor are paid the same wage, simple algebra shows that the difference between (7) and (7)' is given by the following:

$$TFPG_{observed} = TFPG_{true} - \mu B_{NL+EL}\{dEL/(NL + EL)\}$$

Observed TFPG for plants receiving transfers has two components--the component which measures actual technological change in the plant, and the component attributed to excess labor. So observed TFPG in plants which receive transfers will always be lower, due to the negative

contribution of excess labor. Ideally, we would like to be able estimate both true productivity growth, $dlnA_{true}$, as well as the contribution due to hiring excess labor. We can do this by estimating equation (8):

$$dln(Y) = dlnA_{true} + \mu B_{NL-EL} dln(NL+EL) + \Sigma_{m=2\ to\ M} \mu B_m dln(Z_m) - \mu B_{NL-EL}\{dEL/(NL+EL)\}$$

$$= dlnA_{true} + \Sigma_{m=1\ to\ M} \mu B_m dln(Z_m) - \mu B_{NL-EL}\{dEL/(NL+EL)\} \qquad (8)$$

We can now directly estimate the negative contribution of excess labor inputs to observed TFPG, which is captured by $\mu B_{NL+EL}\{dEL/(NL + EL)\}$. However, since EL is unobserved, we need a proxy for the change in the amount of "excess" labor. To derive an expression for excess labor, we modify the model outlined by Shleifer and Vishny in their 1994 QJE article (hereafter referred to as SV). Politicians use government funds, which in their model are labelled as transfers T, to get managers to hire more employees than is necessary. These excess employees are labeled EL and are paid a (real) wage w. Politicians maximize a utility function equal to the benefits from providing more jobs (B(EL)) less the costs of providing these transfers (C(T)), plus any bribes b they may receive for giving funds T to a particular firm. Managers, on the other hand maximize utility equal to $(\pi + T - wL)$-b, where π is profits. In their paper, SV assume that managers only care about the percentage of firm returns that are privately owned, so managers maximize α $(\pi + T - wL)$-b, where α is the % of the firm which is privately owned. We simplify the analysis in order to provide a clear separation between the roles of ownership and the environment. However, an extension to the model to make it consistent with the original SV

framework is provided in footnote 5.

SV assume that managers and politicians bargain over EL and T in a Nash bargaining framework. SV also allow for (endogenously determined) bribes. The model is static. To make the model empirically tractable, we assume that T and b are predetermined, and that the managers and politicians only bargain over excess employment, EL. We will show that some key insights from the SV article continue to hold.

If bargaining breaks down, we assume that politicians receive their disagreement utility, U_0^P, and managers receive their disagreement utility U_0^M. Under Nash bargaining, the two players maximize over EL the product:

$$(B(EL) - C(T) + b - U_0^P)(\pi + T - wEL - b - U_0^M)$$

If we assume a functional form for B(EL) = BwEL and C(T) = CT, then the first order conditions from maximizing the above product can be rearranged to yield the following expression for wEL:

$$wEL = \tfrac{1}{2}\{\pi + T(C/B + 1) - b(1 + 1/B) - U_0^M + U_0^P/B\} \qquad (9)$$

The expenditure on redundant or "excess" employees is positively correlated with firm profits, government transfers and the politician's disagreement utility, but negatively correlated with bribes and the manager's disagreement utility. In Section IV, we provide estimates for equation (9), using as a proxy for excess labor (wEL) the individual plant's deviation from the subsector's average expenditure share on labor for that year.

It should be clear from equation (9) that public or private ownership is not the issue here; what determines excess employment (inefficiency) is the magnitude of transfers, bribes, and

other factors. In fact, if we introduce ownership into this framework, we get similar results to SV: privatization can lead to an increase in the use of excess labor (a decline in efficiency).[5]

SV also focus on the issue of control rights. In this context, control rights refer to who controls employment decisions if bargaining breaks down. Shifting control rights from the manager to the politician (and vice versa) changes the threat points and consequently the outcome of the bargaining game. We can show that in our simplified game, we get the same qualitative outcome as SV: shifting control rights from the politician to the manager reduces excess employment and raises efficiency.[6]

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[5] To illustrate this point, we can introduce ownership α, which varies between 0 and 1. SV assume that public sector managers only derive utility from the percentage of the firm's profits which are privately owned:

$U^M = \alpha(\pi + T - wL) - b$

If we rederive the first order conditions from the Nash bargaining game with $\alpha \neq 1$, we get the following:

$$w(EL) = \tfrac{1}{2}\{\pi + T(C/B + 1) - b(1/\alpha + 1/B) - U_0^M/\alpha + U_0^P/B\} \qquad (9)'$$

It is clear from (9)' that privatization (an increase in α) will lead to an increase in wEL. Shifting so-called cash flow rights to firms lowers efficiency. The intuition is that increasing private ownership raises the utility that managers derive from plant profits, which weakens their bargaining position and allows the politician to extract more surplus relative to managers. SV derive a similar result. They use this result to argue that privatization–by which they mean transferring cash flow rights (α becomes 1) to the firm–may have zero or even negative effects on efficiency.

[6] We assume that if politicians control excess employment, then if bargaining breaks down they will set EL so that the utility of the manager, U^M, is set equal to zero. The manager will be compensated exactly so that $\pi + T - wEL - b = 0$. If, on the other hand, the manager has control rights, we assume that when bargaining breaks down the manager will hire zero excess labor, get no transfers and give no bribes. In that case, we get that the utilities at the threat points are $U_0^M = \pi$ and $U_0^P = 0$. Under politician control, the outcome of the Nash bargaining game is:

$$w(EL) = \tfrac{1}{2}\{\pi + T(C/B + 1) - b(1 + 1/B) + U_0^P/B\}$$

Under manager control, the outcome of the Nash bargaining game is:

$$w(EL) = \tfrac{1}{2}\{T(C/B + 1) - b(1 + 1/B)\}$$

As long as profits are non-negative, it is clear that expenditure on excess labor will be higher under politician control. The different outcomes also provide a way to empirically identify who has control rights: under manager control, the firm's profits should not affect expenditure on excess labor.

To incorporate the insights from SV into our framework, we need to combine equation (8) and equation (9)'. Equation (9)' states that wEL should be a function of transfers, bribes, the manager's and politician's disagreement utilities, and ownership. A parsimonious representation of equation (9)' is given by equation (10):

$$wEL = \delta(\pi, T, b, U_0^M, U_0^P) \qquad (10)$$

To combine (10) with (8), we need to replace the expression $\mu B_{NL+EL}\{dEL/(NL + EL)\}$ in equation (8) with (10) above. It is possible to show that $\mu B_{NL+EL}\{dEL/(NL + EL)\}$ can be rewritten as $\rho[d(\omega EL)]$ as long as the change in the real wage ω is close to zero. Combining the first difference of equation(10) with (8) yields the following:

$$dln(Y) = dlnA_{true} + \Sigma_{m\text{-}1 \text{ to } M} \mu B_m dln(Z_m) - \rho d\delta(\pi, T, b, U_0^M, U_0^P) \qquad (11)$$

D. Ownership Effects

For clarity, we now redefine public ownership, equal to $1 - \alpha$, as PUB. We also re-introduce subscripts i for firm i and t for time t. Following Ehrlich et.al.(1994), we allow A to have the following components:

$$A_{it} = exp(\eta_1 PUB_{it} + \eta_2 PUB_{it} * time + \gamma X_{it} + f_i + d_t + e_{it}) \qquad (12)$$

The degree of public ownership, *PUB*, affects both the level and the growth rate of

productivity. The coefficient on *PUB* measures the relationship between ownership and the level of A; the coefficient on *PUB*time* measures the relationship between ownership and the change in A. The Ehrlich et.al. (1994) framework implies that the coefficient on *PUB* is ambiguous, while the coefficient on *PUB*time* should be negative. We also include a vector X of other factors which could also affect productivity, and which we will discuss in more detail below. The framework in equation (12) allows for a plant-specific fixed effect, f_i, which reflects fixed differences across plants which are persistent but unobserved over time, time effects which are common to plants but which vary over time, d_t, and a random unobserved component, e_{it}.

To take into account the plant-specific effect, we could either include plant dummies in the estimation or take first-differences. We have chosen to do the latter. If we log-linearize equation (12) and transform it into first-differences, combining with (11) yields the following specification:

$$dln(Y)_{it} = \eta_1 dPUB_{it} + \eta_2 d(PUB_{it}*time) + \gamma dX_{it} + \Sigma_{m\ 1\ to\ M}\ \mu B_m dln(Z_{mit})$$
$$- \rho\delta d(\pi, T, b, U_0^M, U_0^P)_{it} + d_t + e_{it} \qquad (13)$$

In the specification above, ownership enters because it can affect Hicks neutral productivity growth by directly affecting managerial incentives. However, to the extent that ownership can affect the outcome of the game played between politicians and managers over excess labor, it could also enter our excess labor function. In Section IV, we begin by testing for the possibility that the relationship between excess employment and its determinants, as captured

by equation (10), varies by ownership category.

A number of previous studies, especially the early studies, simply compare efficiency use across public and private plants of one factor, such as capital or labor. This is equivalent to estimating (13) in levels with M=1, ignoring the fixed effect, and setting all the γ's and ρ's as well as B_2 through B_M equal to zero. Some examples of these studies are Boardman and Vining (1989), Funkhouser and MacAvoy (1979) and Groves, Hong, McMillan and Naughton (1994).[7]

Ehrlich et al (1994) test for the impact of ownership by estimating a levels equation with plant fixed effects which includes ownership and the interaction of ownership with time. Consistent with the predictions of their model, they find a negative and significant coefficient for the interaction between ownership and time, suggesting that total factor productivity growth is slower for public enterprises. But the coefficient on ownership alone is not robust, suggesting no clear relationship between TFP levels and public ownership. However, they ignore the soft budget constraint. Consequently, they do not test whether poor public sector performance is attributable purely to ownership or to the fact that public sector enterprises have access to subsidized loans.

E. Other Environmental Factors

Total factor productivity growth (*dlnA*) is likely to be affected by a number of factors

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[7]Boardman and Vining (1989) use sales per employee and sales per asset as measures of efficiency and find that private enterprises are more efficient, controlling for assets, number of employees, market share, concentration, country and industry. Funkhouser and MacAvoy (1979) analyze labor productivity and do not control for any other factors. They find that physical output per employee is higher private plants but sales or value-added per employee is lower. Groves, Hong, McMillan and Naughton (1994) find that giving Chinese enterprises greater autonomy (either by selling output outside state quotas or retaining a larger share of profits) does not lead to an increase in productivity but increasing the use of bonuses as a fraction of the wage bill and increasing the use of contract workers does. These results are consistent with Shleifer and Vishny (1994); giving managers cash flow rights without giving them control rights does not raise productivity because politicians have an incentive to use government transfers to extract political benefits (excess employment) from the firm.

which could enter via the vector X. Public sector enterprises are often established in sectors where the government seeks to regulate what would have been a natural monopoly. A different competitive environment is likely to directly affect the efficiency parameter, A (see Nickell, 1996). To the extent that public sector enterprises operate in industries with big entry barriers, there is an omitted variable which could bias our results. The direction of the bias will depend on whether greater internal competition is likely to lead to higher or lower productivity. As a proxy for competition, we use the Herfindahl index. Despite its problems, it is the easiest measure to construct across industries and over time.

Public sector enterprises are typically located in sectors which receive special protection from import competition. Consequently, failing to control for differences in import competition could lead to the incorrect conclusion that public sector enterprises are more inefficient, if lack of import competition is correlated with poor performance. To address this possibility, we constructed measures of import competition at the disaggregated industry level. Import penetration could have a direct impact on the Hicks neutral term dlnA, if plants subjected to import competition are more likely to innovate, use better quality inputs, or learn about better production techniques.

Finally, we also include in the vector X a dummy variable which identifies stock market participation at the enterprise level. Laffont and Tirole (1993) argue that the kinds of problems that arise when there is separation of ownership and control can be mitigated by stock market participation. This is because the stock market provides at least a partial disciplining device to managers through stock prices. However, limited stock market participation, noisy prices, and different ownership structures can limit the amount of information such participation is likely to

convey.

III. Data

We apply our framework to the manufacturing sector in Indonesia for the time period 1981-1995. Indonesia has a number of features which make it an interesting country to study. First, over this time period we are able to observe a trend towards privatization which allows us to examine the impacts of changes in ownership on enterprise performance. When Indonesia became independent in 1945, its constitution provided for government ownership of mineral resources and other "important" sectors of the economy. State enterprises were operated by indigenous Indonesians and the government's infusion of capital into these enterprises was viewed as a way of providing a counterweight to the Chinese firms that tended to dominate the private sector.[8] During the early 1980s, the government infused much capital into the state enterprise sector, facilitating its growth. But, beginning in the late 1980s and continuing into the early 1990s, a wave of privatizations occurred,[9] so that by 1992, the private sector in Indonesia became, for the first time, the driving force behind economic growth.[10] A second feature of the Indonesian economy during this time period is a significant liberalization of trade in the late 1980s, which provides variation in the variable we use to measure external competition.

The Indonesian dataset that we use is a manufacturing census, which is conducted annually. Data are available for 1975 through 1995, but information on financing sources is only

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[8]See Bresnan (1993), p. 253.

[9]The Fourth Five-Year Plan, announced in early 1984, called for an increased role for the private sector. Bresnan (1993), p. 254.

[10]Bresnan (1993), p. 264.

available beginning in 1981. The number of observations ranges from 6,258 in 1982 to over 12,904 in 1995. The dataset includes information on output, the number of skilled and unskilled workers, investment, material inputs, compensation, ownership, location, age and financing sources. Pitt and Lee (1981) used this dataset for the 1972-75 time period to study the impact of foreign ownership on the productivity of weaving firms. Goeltom (1995) used the 1981-88 census data to study the impact of financial liberalization on efficiency in the manufacturing sector. We know of no attempt to use the Indonesian census to examine the relationship between public ownership and the soft budget constraint.

Data from the Indonesian census were merged with import and export data collected by the United Nations. Since the United Nations trade data (as made available to the World Bank), is available on an ISIC basis, it was possible to merge the two databases by three-digit ISIC. The United Nations data included information on both net exports and imports by ISIC. Import penetration (MPEN) was defined as imports divided by domestic production plus imports less exports. Domestic production was calculated by adding up enterprise-level production from the Census to the three-digit level. To avoid possibility endogeneity problems, we lagged MPEN one period. This variable is only available through 1993.

According to the framework developed in Section II, public sector firms which receive more financing from the government will exhibit lower productivity due to the hiring of unnecessary workers. We will proxy for transfers T using the share of the plant's investments that are financed by government loans (GLOAN). One limitation of this variable is that it only measures loans from the government and does not measure the transfer of government funds to

public sector plants through direct grants or subsidies.[11] However, anecdotal evidence suggests that government loans have a large subsidy component, and that many of these loans are never repaid at all. Another problem is that government loans may be endogeneous. If, for example, government loans are simply extended to the weakest enterprises, then equation (13) could lead to a negative and significant coefficient on GLOAN. Since our goal is to identify the independent effects of a soft budget constraint on performance, we also provide instrumental variable estimates of the impacts of GLOAN on performance.

Table 1 provides some summary statistics from the Indonesian manufacturing census that compare the characteristics of private and public establishments. A private establishment is defined as one with 100 percent private (non-government) equity, while a public enterprise refers to establishments with any level of central or regional government equity participation. Table 1 shows that between 1981 and 1993 approximately 30 percent of public enterprise investment was financed by government loans, compared to only 1 to 2 percent for private firms. Note that by 1995, the share of public enterprise investment financed by government loans had fallen to 23 percent, because of the rise of alternative sources of financing.[12] Over the entire time period 1981-1995, the percentage of government loans measured in rupiah that was allocated to the public sector was at least 70 percent, and rose to 96 percent by 1995, again as a likely result of the growth of private banks and the stock exchange. In the early 1980s, approximately 30

[11]This is not a problem as long as the share of government loans in the total value of loans and subsidies is not correlated with the firm's productivity.

[12]A series of reforms between 1988 and 1990 reduced the barriers to entry into the banking system and reduced the privileges of state banks. Forty new domestic banks were established between 1988 and 1990, and there was a dramatic growth in the Jakarta stock exchange, thereby providing new sources of investment financing. See Bresnan (1993), p.265.

percent of public firms received government loans, but by 1995, only 13 percent were receiving loans from the government. Public sector enterprises, which accounted for 13-18 percent of total manufacturing output over the 1981-95 time period, are twice as old as private firms, at least four times as large, and have a higher ratio of skilled to unskilled workers.

Table 2 provides information, by industrial sector, on the share of output accounted for by public enterprises and the percentage of investment financed by government loans in public and private enterprises. There are significant variations across sectors in the degree of private competition facing public enterprises. In some sectors, such as food products, industrial chemicals, and iron and steel, public enterprises account for a major share of production. In many other sectors, such as tobacco, apparel, footwear and professional equipment, public enterprises account for a small share of overall productive activity. Note that, even within the public sector, there are variations across industries in the share of investment financed by government loans. For example, in the food products industry, 47 percent of investment by public enterprises is financed by government loans, while in the industrial chemicals industry, only 22 percent of investment by public enterprises is financed by government loans.

Other Variable Definitions Equations (1) through (13), described in Section II, provide the framework for our empirical analysis. The dependent variable, Y, is measured by the real value of annual output. Inputs include the number of skilled production workers (SKILLED), the number of unskilled workers (UNSKILLED), the sum of the real value of domestically produced raw materials, imported raw materials, and energy used (MATERIALS), and the real value of

investment or capital(CAPITAL).[13] Public ownership is measured by the percentage of equity owned by the central government or regional governments (PUB). Since public enterprises are less likely to raise funds on the stock exchange and firms that raise funds on the stock exchange may be partially disciplined by the information revealed through share prices, we also add a dummy variable (STOCK) which equals one if the stock exchange is a source of investment financing for the firm.

Although we have no data on bribes b, we do have data on gifts at the plant level (GIFTS), which we shall use as a proxy for bribes. Although we considered using plant-level reported profits as our measure of π, to minimize endogeneity problems we instead use as a proxy for profits two sector-level measures, lagged one period: the herfindahl index (HERF) and import penetration (MPEN). Since higher concentration is typically associated with higher profits, we expect the coefficient on HERF positively affect excess labor and negatively affect productivity growth. Since higher import competition is typically associated with lower profits, we expect the coefficient on MPEN to negatively affect excess employment and positively affect productivity growth. Both MPEN and HERF are lagged one period to avoid potential endogeneity problems. As we discussed in Section III, these variables could also affect productivity directly via the X vector, rather than operating through their impact on excess labor.

In the SV model, the parties' disagreement points are the utilities each would obtain in the absence of a negotiated agreement. A party with a high disagreement utility has more

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[13]The census data only reports the value of the capital stock beginning in 1987. In the specifications that use first differences, we have chosen to proxy capital stock by investment. By doing this, we are in effect assuming either zero depreciation or that the omitted term, lagged capital stock multiplied by the rate of depreciation, does not induce any omitted variable bias. In our within specifications, this approach is not appropriate and we therefore used the perpetual inventory method to estimate the value of the capital stock in the years prior to 1987. A flat depreciation rate of 10 percent was utilized.

bargaining power and is therefore able to obtain a more favorable negotiated agreement. Although we do not observe disagreement points in our data, we do have variables which are likely to be correlated with the disagreement points. For example, firms with foreign equity participation are likely to have higher disagreement utilities and can therefore bargain from a stronger position. The variable FOREIGN, the percentage of foreign investment, is therefore included in the empirical analysis and its interaction with PUB is predicted to have a positive effect on total factor productivity. Foreign ownership may also have an independent effect on productivity since foreign-owned firms are likely to be more efficient than domestically owned firms.[14] Another variable that we use is JAVA, a dummy variable which indicates whether or not the plant is located on the main island of Indonesia, since it may be more difficult for politicians to wield bargaining power against plants that are located in remote regions far from the country's capital. In addition, on the main island of Java, there may be smaller costs to raising taxes to finance subsidized loans. These arguments would predict a negative effect of JAVA on total factor productivity.

IV. Results

A. Testing SV: The Relationship between Transfers and Excess Employment

We begin by examining whether there is support for the SV framework, which suggests that firms which receive subsidized loans "pay" for them by hiring too many employees–which then shows up as poor productivity growth. We do this by examining the relationship between

[14]Surprisingly, Pitt and Lee (1981) found that in the 1970s, Indonesian weaving firms that were foreign owned were less efficient than domestically owned firms in the industry.

excess employment and subsidized loans in the data, then examine the impact of loans on productivity directly.

Equation (10) suggests that there should be a positive relationship between expenditure on excess labor EL and transfers T, which we proxy with GLOAN. Although we do not directly observe EL, we do observe total expenditure on labor. Labor expenditure was first normalized simply by dividing by sales, to give a labor share in sales variable. However, labor share is not an appropriate measure for "excess" labor. To capture the idea of excess labor, we divided each firm's labor share by the annual mean labor share for each 3-digit manufacturing subsector. This alternative definition of labor share measures excess labor as the deviation from the sector mean.

Table 3 reports the means for raw labor share, as well as raw labor share normalized by the sector mean, across public and private ownership. In column (1), which is restricted to the enterprises that did not receive government loans, we observe that the public sector enterprises have a higher share of labor costs in sales relative to private enterprises. This difference is more striking after controlling for sector means; private sector enterprises had a mean labor share which averaged 95 percent of sector means, compared to 109 percent for public sector enterprises.

According to the theoretical framework, excess labor should be higher in enterprises which received government support. The evidence in column (2) is consistent with that hypothesis for the public sector, but not for the private sector. Private sector enterprises which receive government loans hire fewer workers than other private sector enterprises. This trend is even stronger for the normalized labor shares, which drop from 95 percent of the industry average to 80 percent. For the public sector, however, there is an increase in excess labor, at

least if labor shares are measured using the normalized shares. Public sector enterprises which receive government loans have labor shares in sales which are 14 % above the industry average, compared to 9 percent above the industry average for public enterprises which do not receive such loans.

Table 4 presents raw pairwise correlations between changes in government loans and changes in labor share using both measures of labor shares. The findings show important differences between public and private enterprises. For private sector enterprises, there is no significant correlation between government loans and labor shares, however measured, but for public sector enterprises, the correlations are significant. The raw correlation is between 8 and 10 percent and is statistically significant at the 1 percent level.

The main conclusion from Tables 3 and 4 is that the relationship between government support and excess labor is quite different across public and private enterprises.[15] Therefore, we will modify (10) to allow for different coefficients by ownership class. The empirical version of $wEL = \delta(\pi, T, b, U_0^M, U_0^P)$, modified to allow the coefficients to vary across public and private owners, is given by:

$$\begin{aligned} wEL = {} & \delta_1 GLOAN - \delta_2 GIFTS + \delta_3 HERF - \delta_4 MPEN - \delta_5 FOR + \delta_6 JAVA - \delta_7 PUB \\ & + \delta_8 PUB*GLOAN - \delta_9 PUB*GIFTS + \delta_{10} PUB*HERF - \delta_{11} PUB*MPEN - \delta_{12} PUB*FOR \\ & + \delta_{13} PUB*JAVA \end{aligned} \qquad (10)'$$

[15]It is possible that government loans are used by the private sector to hire more capital so we do not observe an increase in labor shares for the private firms. This explanation of the observed difference between private and public sector firms would require the assumption that the private firms are more capital-constrained than the public firms.

Transfers are proxied by GLOAN and bribes are captured by GIFTS. Determinants of profits include MPEN and HERF. We attempt to control for firm and politician threat points with the variables FOR and JAVA. The model suggests that the coefficients on GLOAN and HERF should be positive. The coefficients on MPEN, FOR, and GIFTS should be negative while the coefficient on JAVA should be positive..

The results are reported in Table 5. The evidence suggests that there is no independent impact of public ownership per se on the magnitude of excess employment. The effect of public sector ownership on excess labor operates via government loans. The interactions between PUB and GLOAN are positive and significant in every equation in Table 5 while the effect of government loans for private firms is zero or negative. Public sector firms which receive government loans spend more on employees, but this is not the case in the private sector. In other words, the SV framework is consistent with public enterprise behavior, but not with evidence for the private sector. Privatization matters because public enterprises hire too many employees in return for government support. To take into account the fact that the SV model is only empirically relevant for public sector enterprises, we modify equation (13) by including the interaction of PUB with all the determinants of excess labor:

$$dln(Y)_{it} = (\eta_1 + \rho\delta_7)\, dPUB_{it} + \eta_2\, d(PUB_{it}*time) + \Sigma_{m=1\ to\ M}\, \mu B_m dln(Z_{mit})$$

$$- \rho\delta_1 dGLOAN_{it} + \rho\delta_2 dGIFTS_{it} - (\gamma_1+\rho\delta_3) dHERF_{jt} + (\gamma_2+\rho\delta_4) dMPEN_{jt} + \rho\delta_5 dFOR_{it} -$$

$$\rho\delta_6 dJAVA_{it} + \gamma_3 dSTOCK_{it} - \rho\, \delta_8\, d(PUB*GLOAN)_{it} - \rho\delta_{10} d(PUB*HERF)_{it} +$$

$$\rho\delta_{11} d(PUB*MPEN)_{it} + \rho\delta_{12} d(PUB*FOR)_{it} - \rho\delta_{13} d(PUB*JAVA)_{it} + d_t + e_{it} \qquad (13')$$

The results of estimating equation 13' are discussed in the next section.

B. Effects of Public Ownership and Government Loans - First Difference Fixed Effects Results

It is problematic to compare productivity levels across plants since there could be a number of unobserved level effects leading to the observed differences between public and private enterprises: different prices, hidden subsidies, a different product mix, or a different regulatory environment. To the extent that these differences are fixed over time, the first difference specification, equation (13'), eliminates them. The results of estimating 13' are shown in columns (1) through (4) of Table 6.

The first difference estimates suggest that the negative effects of public ownership are concentrated in firms which receive government loans: PUB by itself is not significant but the interaction of GLOAN and PUB is negative and significant. According to the estimates in column (4), a ten percentage point increase in the share of investment funded by government loans lowers efficiency by . 27 percentage points for an enterprise with 50 percent public ownership and by .58 percentage points for a fully public firm. The negative impact of government support for public enterprises is large in magnitude: moving from zero to full government financing for a publicly owned enterprise would be associated with a reduction in total factor productivity levels of 5.8 percentage points. The results in Table 6 provide support for the argument that a major source of public sector inefficiency is the environment in which these firms operate.

It is important to point out that GLOAN has no negative, significant impact on the

operation of private enterprises. In other words, there may be an agency problem associated with public sector ownership, but it only "appears" when firms are given access to soft loans or protected from import competition. The kind of agency problem modeled by Ehrlich et al (1994) does not appear to matter: public ownership *by itself* has no independent, negative impact on either productivity levels or productivity growth.

D. Within Estimation

One serious potential problem with using first-differences to eliminate individual effects is that first-differences magnify any potential measurement errors in the independent variables (for a discussion, see Griliches and Hausman (1986)). To the extent that the ownership variables are measured with error, the insignificant coefficient on ownership in the first-differences specification could be explained by errors in variables, instead of biases arising from failing to take into account the plant fixed effect. Griliches and Hausman (1986) show that under certain plausible assumptions about serial correlation in the independent variables, the bias due to measurement error is likely to be less severe under a within than under a first-difference transformation. Consequently, we redid our estimation by transforming the dependent and independent variables into deviations from firm-specific means. This transformation is not as attractive as first-differences for a number of reasons. First, the theoretical model allows us to use a general production function without specifying functional form precisely because it is based on a first-difference specification. Second, we use a constructed capital stock series as described in footnote 13.

The results of the within estimation are reported in columns (5) and (6) of Table 6 and the

results are virtually identical to the first difference results. We still find that public ownership by itself has no independent impact on either productivity levels or productivity growth. But, public sector enterprises with soft loans perform significantly worse than other enterprises and the point estimates are consistent with the first differences: according to column (6), eliminating government loans would raise productivity by 5.9 percentage points for a fully public enterprise. Further evidence of the role of the environment is our finding that raising import penetration by 15 percentage points would increase TFP by 6 percentage points for a fully public enterprise. The results in Table 6 therefore indicate that the negative impact of ownership in Indonesia operates through the environmental factors of soft loans and import protection. While soft loans do not have a negative effect on private firms, they significantly reduce the productivity of public enterprises. In addition, import protection has a more detrimental effect on public firms compared to those in the private sector.[16] Public sector enterprises in Indonesia appear to be more prone to poor performance if soft loans and/or import protection are available.
It is also true that, given the same amount of competition, public sector firms are less productive than their private sector counterparts.

E. Effects of Other Variables

As predicted, if a firm uses the stock exchange as a source of investment funding, it is more efficient. This holds for the first difference and the within models, although the effect is not significant. Increases in foreign ownership are associated with higher productivity growth, but the coefficient on FOREIGN becomes insignificant when we add other controls. However,

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[16]This result is quite possibly picking up the fact that public sector enterprises receive special protection from import competition, leading to differential effects of opening up to outside competition on public versus private enterprises.

partnerships between public and foreign enterprises do have a positive impact on efficiency.[17] This effect is significant across all specifications. One policy implication is that governments reluctant to privatize could improve efficiency in the public sector by finding them foreign partners.

The Herfindahl index is negative and significant in the within specification, indicating that in Indonesia firms in more concentrated industries are less productive. The coefficient on lagged import penetration is also positive and sometimes significant, indicating that enterprises in sectors with import competition are more efficient. GIFTS are positive and significant. consistent with the predictions of the Shleifer/Vishny model. Although one alternative interpretation of the positive and significant coefficient on GIFTS is that bribery pays, the results are consistent with our earlier results pointing to a significant negative relationship between gift-giving and excess employment. Finally, JAVA, a proxy for the politician's relative bargaining power, is negative and generally significant, as predicted by the SV model. One alternative interpretation, which we cannot rule out, is that the JAVA dummy is picking up congestion effects on productivity.

F. Endogeneity of Ownership and Government Loans

It could be argued that our findings that public ownership and soft loans reduce efficiency may reflect reverse causality, i.e. that more efficient public sector firms are selected for privatization and that government loans are essentially bail-outs given to failing enterprises. We

[17]We argue that foreign ownership is a good proxy for the manager's disagreement point and that enterprises with foreign ownership should have less excess employment.

consider whether this argument is correct by using two approaches which are described below.

1. Comparing Pre and Post-Privatization Performance

We examine the pre and post-privatization performance of privatized firms compared to firms with no change in ownership and the pre-and-post receipt of government loans performance for public sector firms that received these loans compared to public sector firms that did not. The results are shown in Table 7 where selection for government loans is examined in Panel A and selection into privatization is examined in Panel B. Panel A shows that in the three years prior to receipt of government loans, those public sector firms that receive the loans are not performing worse relative to other public sector firms, where performance is measured either as total factor productivity growth, the log of sales per employee, the change in the log of sales per employee, cost per unit, or the change in cost per unit. Panel B shows that public sector firms that are subsequently privatized perform no worse, as measured by total factor productivity growth, the change in the log of sales per employee, or the change in cost per unit, compared to firms with no change in ownership. It is true that, consistent with the predictions of the Ehrlich et.al.(1994) framework, the privatized firms have higher levels of productivity as measured by the log of sales per employee or cost per unit. However, their growth rates are not significantly different from plants with no change in ownership. The results in Table 7 suggest that selection is not responsible for the findings in Table 6 that both ownership and environment are responsible for the observed inferior performance of publicly owned manufacturing enterprises in Indonesia. There is no evidence that poor performers were subsequently bailed out with government loans. Nor is there any evidence that privatizing firms were selected on the basis of unusually good or bad previous performance, which could lead to under or over-estimating the

gains from privatization.

2. Instrumental Variable Estimates

We also re-estimated the productivity equations using an instrumental variables (IV) approach for both the first differences and the within specifications. Our focus is on the endogeneity of GLOAN; we assume that changes in ownership are exogenously determined. This assumption seems plausible both in light of the results in Table 6 as well as the fact that many firms were privatized as part of an overall mandate to deregulate the Indonesian economy. For the first differences IV specification, instruments for GLOAN are: the second lag of GLOAN, the lag of SKILLED, the lag of PUB*GLOAN, the lag of SKILLED * the lag of PUB, the lag of UNSKILLED* the lag of PUB, the lag of MATERIALS *the lag of PUB, the lag of CAPITAL*the lag of PUB, the second lag of CAPITAL * the lag of PUB, the lag of PUB, the lag of GIFT, and the lag of FOR. The results are shown in columns (2) and (4) of Table 8. For the within IV specification, we use a Helmert transformation whereby we subtract from each t-1 observation the mean of the remaining future observations available in the sample. This approach, which is described in Arellano and Bover (1995), allows us to legitimately use lags of levels as instruments in the within specification, since in a standard within transformation, lags of levels could be correlated with the errors. The instruments for GLOAN used in the within specification are: lagged GLOAN*PUB, lagged SKILLED *PUB, lagged CAPITAL*PUB, lagged GIFTS*PUB, and the lags of GIFTS, FOREIGN and GLOAN.. The IV results using forward mean deviations are shown in columns (6) and (8).

A comparison of the OLS and IV estimates in the first four columns of Table 8 suggests that the coefficient on GLOAN*PUB is stable across specifications. Allowing for endogeneity of

GLOAN does not change either the point estimates or statistical significance. The results for the forward mean deviations are presented in the last four columns. Using forward mean deviations, the coefficient on PUB*GLOAN becomes statistically insignificant in the IV specifications. The point estimates, however, are similar to the ordinary least squares estimates (compare column (5) to column (6) and column (7) to column (8)). For all specifications, our Chi-Square tests of the validity of the excess instruments suggest our instruments are valid. We cannot reject the hypothesis that OLS and IV point estimates are the same, and conclude from Table 8 that there is no clear pattern of loan allocation which reflects bail-outs.[18]

G. Extensions

In addition to the alternative specifications discussed above, we also experimented with a number of other extensions, each of which did not alter the results in Table 6. First, we redefined government loans as the real value of government loans, instead of normalizing by investment. This captures the possibility that a firm with a high degree of government subsidy via loans might not appear to be heavily subsidized if investment is also high. Our results were unaffected, although the interpretation of the coefficient on GLOAN changes. Second, we used a two-step approach for estimating TFP in which we first estimated sector-specific production functions and then calculated TFP growth as the residual by subtracting coefficient-weighted changes in inputs from output growth. We then regressed total factor productivity growth on all variables except the inputs and obtained results that are very similar to those reported in Table 6. Third, we estimated the equations in Table 6 by three-digit subsector. To the extent that factor shares or

[18] But the lack of significance of the IV results indicates the difficulty in achieving efficiency with this approach.

mark-ups vary across sectors, the framework presented in equations (1)-(10) would justify presenting separate estimates by sector. Although many coefficients are insignificant due to small sample sizes, the sector-level results (not shown) are consistent with the aggregate results--particularly in sectors where there are enough observations with positive public ownership. Fourth, we considered the possibility that the coefficient on the PUB*GLOAN interaction term is capturing a nonlinear quadratic effect of ownership. This would be the case if GLOAN is highly collinear with PUB and simply acting as a proxy for public ownership. We tested for this by adding the square of PUB to the regressions and the results were unaffected. Finally, we considered the possibility that government loans are being used for purposes other than hiring labor –such as increasing capital intensity. We tested for this possibility by interacting GLOAN with capital inputs, which would allow the coefficient on capital to vary with the amount of government loans and our original results were unchanged.

V. Conclusions

In this paper we disentangle the sources of public sector inefficiency using a 1981-1995 panel data set of all public and private manufacturing firms in Indonesia. We consider two leading hypotheses: (1) public sector enterprises are inefficient due to monitoring problems and (2) public sector enterprises are inefficient because of the environment in which they operate, as measured by the soft budget constraint or barriers to competition. We nest the two models in a production function framework and show that if the first model is correct, then public sector ownership will be associated with lower productivity growth. The second model implies that

different types of ownership have no association with productivity; what matters is whether enterprises receive government subsidies in return for hiring excess labor.

The empirical results, which are obtained from fixed effects specifications, provide support for both models. Although we find that public ownership by itself has no independent negative impact on either productivity level or productivity growth, *ownership* matters in Indonesia, because, for a given level of soft loans or import competition, public sector enterprises perform worse than their private sector counterparts. The *environment* matters because only those public sector enterprises which received loans from state banks or those shielded from import competition performed worse than private enterprises. Eliminating soft loans to public enterprises in Indonesia would raise total factor productivity by 6 percentage points; the same result could be achieved by increasing import penetration by 15 percentage points. We show that these findings are not due to selection effects for either privatization or the receipt of soft loans. Interestingly, private Indonesian firms that receive government loans did not perform more poorly than other private sector enterprises.

These results suggest that two different types of policies could be used to increase the efficiency of public sector enterprises in Indonesia or in other countries to which these results might generalize. Since private firms in Indonesia outperform public sector firms for a given degree of competition, simply privatizing the firms should lead to gains in efficiency. But the results also demonstrate that an alternative way to achieve efficiency gains is to manipulate the environment, specifically to eliminate soft loans to public enterprises and/or to increase import competition for these firms. These are alternative policy options which can be evaluated for their appropriateness in other countries.

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Table 1

Summary Statistics

Year	% of Investment Financed by Gov't Loans			Percentage of Rupiah Amount of Gov't Loans Allocated to Public Sector	% of Firms Receiving Gov't Loans		% of Total Output Accounted For By Public Sector Enterprises	Ratio of Public To Private			# of observations with Non-Missing Gov't Loans	
	All Plants	Public	Private		Public	Private		Age	Size	# of Skilled To Unskilled	Public	Private
1981	2.9%	31.8%	1.4%	79.1%	32.7%	1.5%	14.4%	2.1	4.0	3.0	178	3,494
1983	3.6	30.3	2.5	82.6	28.3	2.9	17.3	2.1	5.3	2.8	165	3,766
1985	3.0	30.7	1.8	80.2	28.4	2.2	17.3	2.4	6.0	2.8	261	6,211
1987	2.7	27.9	1.7	89.4	26.4	2.0	17.8	2.3	6.3	3.1	256	6,704
1989	3.3	31.6	2.3	70.9	26.5	2.3	18.2	2.3	7.0	2.9	246	6,997
1993	2.0	31.0	1.2	91.8	16.5	1.1	13.7	2.0	5.8	3.8	82	3,260
1995	1.7	22.7	1.2	95.7	13.6	1.0	13.3	1.8	5.4	2.8	80	2,985

Table 2

ISIC Code	Percentage of Output Produced by each Sector (1)	Percentage of Output Produced by Public Sector Enterprises (All Years) (2)	Percentage of Investment Financed by Government Loans (All Years) (3) Public Sector	(4) Private Sector
311 Food Products	9.8%	23.7%	46.9%	1.7%
312 Food Products, NEL	2.7%	4.6%	22.9%	1.7%
313 Beverages	0.8%	8.0%	0	0.9%
314 Tobacco	10.9%	0.2%	16.3%	6.6%
321 Textiles	12.3%	5.7%	23.5%	1.7%
322 Apparel	1.8%	0.2%	20.6%	2.8%
323 Leather Products	0.3%	1.9%	40.0%	0.6%
324 Footwear	0.8%	0.6%	18.4%	1.1%
331 Wood Products	11.0%	2.1%	18.4%	1.7%
332 Furniture	0.4%	1.0%	0%	1.3%
341 Paper Products	2.8%	17.8%	28.0%	1.1%
342 Printing, Publishing	0.9%	7.1%	33.4%	1.6%
351 Industrial Chemicals	5.3%	50.5%	22.1%	1.8%
352 Other Chemicals	5.1%	2.0%	39.8%	0.7%
354 Petroleum Products	0.0%	-	-	-
355 Rubber Products	4.8%	7.1%	38.7%	2.2%
356 Plastic Products	2.4%	0.1%	3.7%	0.8%
361 Pottery and China	0.4%	1.5%	3.8%	1.2%
362 Glass Products	0.5%	11.1%	0	2.0%
369 Non-Metal Products	0.2%	5.3%	17.8%	1.3%
371 Iron & Steel	7.6%	62.1%	39.1%	3.7%
372 Non-Ferrous Metals	1.3%	46.1%	21.5%	0
381 Metal Products	4.1%	11.6%	19.4%	1.2%
382 Machinery, NEL	1.1%	14.0%	31.2%	0.8%
383 Electrical Machinery	4.0%	10.0%	23.0%	0.7%
384 Transport Equipment	5.7%	9.4%	37.7%	1.9%
385 Professional Equipment	0.1%	0.3%	0	1.4%
390 Other Industries	2.9%	0.2%	0	1.3%

Table 3
Means For Labor Share Across Categories

	No Government Loans	Some Government Loans (Loans >0)
	(1)	(2)
No Public Ownership		
Labor Share	.18	.15
Labor Share Normalized by Sector Mean	.95	.80
Some Public Ownership		
Labor Share	.20	.20
Labor Share Normalized by Sector Mean	1.09	1.14

Notes: Labor Share is equal to total expenses on both skilled and unskilled labor, divided by sales. The Normalized labor share is divided by the 3-digit sector mean for each year.

Table 4
Correlations Between Labor Share And Government Loans

No Public Sector Ownership

	Change in Government Loans As % of Investment	Change in Labor Share	Change in Labor Share Normalized by Sector Mean
Change in Government Loans as % of Investment	1.0		
Change in Labor Share	-.01	1.0	
Change in Labor Share Normalized by Sector Mean	.00	.94*	1.0

Some Public Sector Ownership

	Change in Government Loans as % of Investment	Change in Labor Share	Change in Labor Share Normalized by Sector Mean
Change in Government Loans as % of Investment	1.0		
Change in Labor Share	.08*	1.0	
Change in Labor Share Normalized by Sector Mean	.09*	.96*	1.0

Notes: See definitions for Table 4. A "*" indicates statistically significant at the 1% level.

Table 5
Dependent Variable: Labor Share Normalized by Sectoral Mean

	1981-1993		1981-1995	
	Levels	First Differences	Levels	First Differences
	(1)	(2)	(3)	(4)
% Public Ownership (PUB)	-.774 (-2.5)	.138 (0.9)	-.051 (0.0)	-.209 (-1.3)
Gov't Loans as % of Investment (GLOAN)	-.248 (-10.6)	-.008 (-0.3)	-.213 (-10.9)	-.015 (-0.7)
Gifts	-.036 (-29.5)	-.008 (-5.3)	-.035 (-34.7)	-.007 (-5.2)
Foreign Ownership (FOR)	-.004 (-20.7)	.001 (1.1)	-.004 (-21.6)	.000 (0.0)
Herfindahl Index $_{t-1}$ (HERF)	.332 (7.3)	.037 (0.5)	.253 (7.3)	.102 (1.6)
Import Penetration $_{t-1}$ (MPEN)	.002 (0.0)	.016 (0.2)	-	-
Java Dummy	-.024 (-2.4)	.018 (0.2)	-.040 (-5.1)	.015 (0.4)
PUB * GLOAN	.274 (4.4)	.193 (3.2)	.272 (4.9)	.156 (2.9)
PUB * GIFTS	.020 (2.6)	.011 (1.3)	.019 (3.1)	.017 (2.2)
PUB * FOR	-.009 (-3.7)	-.006 (-.8)	-.009 (-3.6)	-.004 (-0.7)
PUB * HERF	-1.126 (-3.4)	.156 (0.5)	-.833 (-3.3)	.243 (1.0)
PUB * MPEN	-.532 (-1.2)	-1.285 (-3.2)	-	-
PUB * JAVA	.075 (1.2)	-.414 (-1.8)	.127 (2.5)	-.113 (-0.6)
Number of Observations	45,101	27,487	66,840	39,920
R-Square	.04	.04	.04	.01

Notes: T-Values in parentheses. Standard errors are corrected for heteroskedasticity. All Specifications include year and sector (ISIC) dummies, as well as PUB interacted with year end SIC dummies to allow for differences across ownership status.

Table 6
Impact of Ownership and the Soft Budget Constraint on Productivity: First Differences and Within Estimation

Dependent Variable: Log Change in Real Output or Log Deviation from Log Mean of Output

	First Differences				Within Estimation	
		1982-1995		1982-1993	1981-95	1981-1993
	(1)	(2)	(3)	(4)	(5)	(6)
PUB	.004	0.559	.799	.411	.016	-.184
	(0.1)	(1.0)	(1.2)	(0.5)	(0.1)	(-0.5)
PUB*T	-	-.006	-.009	-.005	-.001	.002
		(-1.0)	(-1.2)	(-0.6)	(-0.6)	(0.4)
GLOAN	-	-	.020	.004	.013	.006
			(1.0)	(0.2)	(0.8)	(0.3)
GLOAN*PUB	-	-	-.066	-.062	-.060	-.065
			(-2.2)	(1.8)	(-2.2)	(-2.0)
SKILLED	.069	.069	.081	.078	.071	.072
	(14.2)	(14.1)	(12.5)	(9.9)	(21.5)	(16.8)
UNSKILLED	.192	.192	.175	.176	.200	.198
	(23.5)	(23.4)	(16.9)	(14.1)	(40.4)	(30.1)
MATERIALS	.624	.624	.612	.592	.671	.664
	(81.2)	(81.2)	(59.4)	(51.5)	(234.3)	(180.8)
CAPITAL	.003	.003	.003	.003	.023	.016
	(4.4)	(4.4)	(3.3)	(2.9)	(11.1)	(6.3)
FOREIGN	.001	.001	.001	.000	.001	0.0
	(2.0)	(2.0)	(0.8)	(0.4)	(1.9)	(-0.4)
$HERF_{t-1}$	-	-	-	-.028	-.059	-.087
				(-0.4)	(-2.0)	(-2.0)
STOCK	-	-	-	.029	.012	.046
				(1.0)	(1.0)	(2.3)
$MPEN_{t-1}$	-	-	-	.038	-	.077
				(0.6)		(1.8)
GIFTS	-	-	-	.005	.006	.006
				(3.9)	(7.7)	(6.7)
JAVA	-	-	-	-.161	-.143	-.245
				(-.8)	(-3.7)	(-2.8)
PUB*HERF	-	-	-	-.031	.128	.153
				(-0.1)	(1.1)	(1.1)
PUB*PEN	-	-	-	.553	-	.332
				(2.8)		(2.3)
PUB*FOR	-	-	-	.025	.014	.021
				(2.2)	(3.2)	(3.5)
PUB*JAVA	-	-	-	-.019	.058	-.143
				(-0.1)	(0.7)	(-1.1)
R-Square	.65	.65	.62	.59	.80	.78
Number of Observations	30,698	30,698	19,098	14,208	36,922	25,622

Notes: T-Values in parentheses. Standard errors are corrected for heteroskedesticity. All specifications include year and ISIC dummies. The change in the capital stock is proxied by investment for first differences Specification.

Table 7
Relative Performance Pre-and-Post Receipt of Government Loans and Privatization

	3 Years Prior	2 Years Prior	1 Year Prior	1 Year After
A. Loans (control group is public sector enterprises without loans)				
TFP Growth	-.091	-.079	-.031	.052
	(2.5)	(1.2)	(0.7)	(1.6)
Log (Sales/Employee)	.014	-.008	-.002	.002
	(1.2)	(0.5)	(0.2)	(0.2)
Change in Log (Sales//employee)	-.006	-.008	.002	.001
	(1.2)	(0.9)	(0.4)	(0.2)
Cost Per Unit	-.050	-.008	-.020	-.023
	(2.1)	(0.2)	(0.9)	(1.1)
Change in Cost Per Unit	.022	.028	.023	.000
	(1.0)	(0.9)	(1.1)	(0.0)
B. Privatization (control group is plants with no change in ownership)				
TFP Growth	.065	.018	.028	-.024
	(1.5)	(0.5)	(0.8)	(0.6)
Log (Sales/Employee)	.092	.087	.070	.045
	(6.5)	(6.9)	(6.6)	(3.5)
Change in Log (Sales/Employee)	.001	.002	.011	-.003
	(0.2)	(0.2)	(1.8)	(0.4)
Cost Per Unit	-.105	-.101	-.087	-.086
	(4.5)	(4.8)	(5.0)	(4.1)
Change in Cost Per Unit	-.003	.004	-.014	-.010
	(0.2)	(0.2)	(0.8)	(0.5)

Notes: T-Value for test of differences in means in ( ). Values indicate differences between plants and control group. For all values other than TFP growth, values are normalized by sector means. Therefore a value of .014 for Log (Sales/Employee) indicates that firms receiving loans had higher sales per employee (relative to sector mean) of 1.4%. See definition for Cost Per Unit in Table 1.

Table 8
Impact of Ownership and the Soft Budget Constraint on Productivity:
First difference OLS, IV, and Forward Deviation from Means Estimates.
Dependent Variable: Log Change in Real Output or Deviation from Mean Log Output

	First Differences				Forward Deviations from Means			
	1982-1993		1982-1995		1981-1993		1981-1995	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PUB	-.677	-.670	-.388	-.036	-.235	-.407	.008	-.186
	(-0.6)	(-0.6)	(-0.4)	(0.0)	(-0.4)	(-0.7)	(0.0)	(-0.4)
PUB*T	.009	.008	.007	.003	.002	.004	-.001	.001
	(0.7)	(0.7)	(0.7)	(0.3)	(0.4)	(0.7)	(-0.3)	(0.2)
GLOAN	.044	-.041	.048	.038	.027	.183	.042	.166
	(1.5)	(-0.6)	(1.8)	(0.6)	(0.9)	(1.7)	(1.7)	(1.6)
GLOAN*PUB	-.132	-.131	-.113	-.226	-.086	-.083	-.101	-.088
	(-3.0)	(-1.2)	(-2.8)	(-2.4)	(-2.1)	(-0.5)	(-2.7)	(-0.5)
SKILLED	.078	.078	.076	.075	.080	.080	.081	.081
	(7.0)	(6.9)	(8.4)	(8.3)	(9.7)	(9.6)	(11.2)	(11.2)
UNSKILLED	.179	.181	.178	.180	.214	.213	.207	.207
	(9.7)	(9.7)	(11.8)	(11.9)	(17.2)	(17.1)	(18.5)	(18.5)
MATERIALS	.560	.560	.574	.573	.637	.637	.641	.641
	(30.4)	(30.4)	(34.6)	(34.6)	(57.7)	(57.7)	(63.5)	(63.4)
CAPITAL	.004	.004	.004	.004	.019	.019	.019	.018
	(3.0)	(3.0)	(3.5)	(3.5)	(6.4)	(6.2)	(6.7)	(6.6)
FOREIGN	.001	.0004	.001	.001	.001	.001	.001	.001
	(0.9)	(0.9)	(1.3)	(1.3)	(2.0)	(2.0)	(2.1)	(2.1)
$HERF_{t-1}$	-.183	-.180	-.083	-.082	-.078	-.082	-.050	-.053
	(-2.1)	(-2.0)	(-1.4)	(-1.4)	(-1.4)	(-1.5)	(-1.0)	(-1.1)
STOCK	.041	.040	.044	.044	.004	005	.005	.006
	(1.1)	(1.1)	(1.9)	(1.9)	(0.2)	(0.3)	(0.3)	(0.3)
$MPEN_{t-1}$	.070	.068	-	-	-.060	-.061	-	-
	(0.9)	(0.9)			(-2.2)	(-2.2)		
GIFTS	.003	.002	.002	.002	.004	.004	.004	.004
	(1.5)	(1.5)	(1.4)	(1.4)	(3.4)	(3.3)	(3.3)	(3.3)
JAVA	-.454	-.456	-.089	-.087	-.167	-.159	-.186	-.182
	(-3.6)	(-3.6)	(-0.6)	(-0.6)	(-2.3)	(-2.2)	(-2.7)	(-2.6)
PUB*HERF	-.286	-.226	-.554	-.497	.381	.376	.293	.289
	(-0.7)	(-0.6)	(-2.1)	(-1.9)	(1.9)	(1.8)	(1.4)	(1.4)
PUB*PEN	.404	.476	-	-	.018	.011	-	-
	(1.9)	(2.1)			(0.4)	(0.2)		
PUB*FOR	.031	.030	.035	.034	.020	.020	.018	.018
	(2.5)	(2.4)	(3.1)	(3.0)	(2.7)	(2.7)	(2.5)	(2.5)
PUB*JAVA	-.165	-.124	-.186	-.182	-.142	-.176	-.024	-.050
	(-0.5)	(-0.4)	(-1.1)	(-1.0)	(-0.9)	(-1.1)	(-0.2)	(-0.4)
R-Square	.54	.54	.57	.56	.74	.74	.74	.74
Number of Observations	7,487	7,487	9,889	9,889	11,074	11,074	13,730	13,730
Chi-Square Value for Over-identification Test	-	3.0	-	3.0	-	10.0	-	12.4

Notes: T-Values in parentheses. Standard errors are corrected for heteroskedesticity. All Specifications include year and ISIC dummies. All variables in columns (1) through (4) are in first differences, while all variables in columns (5) through (8) are deviation from plant means. In the first differences specification, instruments for GLOAN include the lag of SKILLED, the lag of PUB*GLOAN, the lag of SKILLED* the lag of PUB, the lag of first differences UNSKILLED* the lag of PUB, the lag of MATERIALS* the lag of PUB, the lag CAPITAL* the lag of PUB, the second lag of CAPITAL* the lag of PUB, the second lag of GLOAN, the lag of PUB, the lag of GIFT, and the lag of FOR. For the forward mean deviations, the following were used to instrument GLOAN and PUB*GLOAN: lagged PUBGL, lagged skill*PUB, lagged capital*PUB, lagged GIFTS*PUB, and the lag of GIFTS, FOREIGN, and GLOAN.

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