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TRANSITION TO A MARKET
ECONOMY: EVIDENCE FROM
SLOVENIAN FIRMS**

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ABSTRACT

Investment, Wages and Ownership During the Transition to a Market Economy: Evidence from Slovenian Firms*

Given the concern about restructuring and the role of insiders during the transition, we analyse the determinants of (and trade-off between) investment and wages in Slovenian firms. We find that investment behaviour is more consistent with the imperfect capital market (internal funds) hypothesis than with the neoclassical or accelerator models. Firms also display a trade-off between investment and wages, and workers share in firms' surplus and appropriate funds that are supposed to be used for depreciation investment. Most findings are consistent with the principal theoretical models of restructuring. The models, however, underestimate the power of (elite) managers to restrain worker demands and overestimate this power on the part of external owners.

JEL Classification: C33, D92, J50 and P20

Keywords: investment, ownership, restructuring and wages

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1. Introduction

As the transition to a market economy unfolded, investment and wage determination became important issues in virtually all the post-communist economies. The Soviet bloc countries and Yugoslavia displayed high rates of investment until the 1980s, when economic slowdown and popular pressure for higher consumption forced the authorities to reduce the rate of investment and allow wages to rise (EBRD, 1995, 1996). As both the Soviet bloc and Yugoslavia disintegrated, analysts and policy makers started worrying about the fact that the rate of investment declined further, principally as a result of declining enterprise saving (EBRD, 1995).¹ At the same time, investment has been identified as a principal indicator of *strategic* or *deep* restructuring in the microeconomic models of transition (e.g., Grosfeld and Roland, 1997, and Blanchard, 1997) and a number of theoretical papers have examined conditions, such as managerial ownership stake, under which managers would restructure firms prior to privatization (e.g., Aghion, Blanchard and Burgess, 1994, Blanchard, 1997).

Concomitantly, there was considerable concern that the loosening of central controls in the absence of developed markets and competitive pressures would result in excessive wage increases (e.g., Blanchard, 1991, and Burda, 1993). One reason for this concern was the fact that real wages, after falling together with output in the early 1990s, started rising from about 1992-93 in most Central and East European countries (EBRD, 1996, pp. 113-119). Another cause of the concern was the fact that insiders (workers and managers) often seized control of firms and many transition

¹EBRD (1995, p. 67) for instance estimates that between 1985 and 1993 gross fixed investment declined from 29.5% to 19% in the former Soviet Union and from 24% to 18% in Eastern Europe. It should be noted that investment was an important subject of research already with respect to the communist economies. The principal focus at that time was on obsolescence of capital and the effects of foreign investment. See e.g., Thornton (1970), Desai (1976), Gomulka (1978), Greene and Levine (1978), Weitzman (1979), Brada and Hoffman (1985), and Terrell (1992, 1994).

countries took on features of labor-managed economies (e.g., Hinds, 1990, Prasnikar and Svejnar, 1991, Commander and Coricelli, 1995, and Earle, Estrin and Leschenko, 1995).

The literature on labor-managed firms has for a long time debated the existence and seriousness of the so called “under-investment problem,” allegedly brought about by the short time horizon of individual workers in these firms. The basic argument is that worker-insiders, unlike diversified capital owners (outsiders), would prefer to distribute enterprise surplus as labor income and fringe benefits rather than reinvesting it in the firm for future growth (see e.g., Furubotn and Pejovich, 1970, and Vanek, 1970). More recently, Blanchard and Aghion (1995) argue that insider-dominated firms may neither generate resources needed for restructuring activities such as investment, nor have an incentive to sell the firm to outsiders who have such resources.

In the context of a transition to a market economy, the investment-wage issue is especially important. The lifting of central controls gave workers significant powers in enterprises, a phenomenon that has been enhanced by insider privatization in countries such as Russia, Ukraine and some other newly independent states (NIS). Moreover, with the inability of many firms in the transition economies to pay wages, the tradeoff between using the firm’s value added for financing investment versus paying wages and fringe benefits has become particularly acute.

In this paper, we analyze the investment and wage (labor cost per worker) behavior of a panel of 458 Slovenian firms during the 1991-95 period. Among the transition economies, Slovenian enterprise-level data are of high quality and our data set is also unique in terms of the characteristics of firms. As a result, we carry out the analysis in a way that permits us to examine the wage-investment tradeoff in several categories of firms that are of interest from the policy standpoint in many transition countries. The environment and behavior of Slovenian firms have traditionally also displayed a number of similarities with those in the Soviet bloc. Like firms in the Soviet bloc

countries, the Slovenian firms traditionally exhibited high rates of investment as a result of government pressure and easy credit (soft budget constraint) policies of the banks.² The Slovenian firms were traditionally socially-owned, which meant that the society at large owned them but in practice government officials, managers and workers shared control. In this sense the Slovenian firms resembled those in Poland, Hungary and several other countries just before and also after the fall of communism (Hinds, 1990). Between 1989 and 1991, the Slovenian government greatly relaxed its traditional influence over firms and decision-making power devolved to a significant extent to managers and workers. In this respect, the Slovenian firms exemplified the greater autonomy observed in Russia, Ukraine and several other NIS after their insider privatization. As we show below, the Slovenian wage setting system, like the systems in the other transition economies, was flexible enough so that within a given year wages varied considerably across firms and with firm-specific performance.

Our analysis is of interest for four additional reasons. First, we examine the behavior of firms while they were going through the transition but before they were privatized in the late 1990s – a situation that corresponds to the focus of many theoretical models of enterprise restructuring.³ Yet, during the period of our analysis, the firms basically knew how they would be ultimately privatized – through the sale of majority of shares to insiders or outsiders. This information and sequence of events permit us to focus on the insider-outsider story that is at the heart of theoretical modeling and test whether the pre-privatization investment and wage behavior differed for firms that were approved for privatization to insiders versus outsiders. Second, among the 458 firms we identified 82 firms whose chief executive officers (CEOs) established their own private (so called “bypass”)

² See Prašnikar and Svejnar (1988).

³ See Aghion, Blanchard and Burgess (1994), Aghion, Blanchard and Carlin (1994), Blanchard and Aghion (1995), Grosfeld and Roland (1997), and Blanchard (1997).

companies in the early 1990s.⁴ These CEOs are perceived in Slovenia as being very capable managers. We hence check if firms headed by them displayed significantly different investment and wage behavior than other firms and if this behavior is consistent with the problem of capital dissipation by managers. Third, since 1991 or earlier, 108 of the 458 firms in our sample were partly owned by domestic or foreign companies and institutions, such as banks and government agencies, rather than being fully socially owned. We use this information to assess if this more tangible ownership, frequently connected with a potential source of financing, affected the investment and wage behavior of firms. Finally, while our study is of obvious interest to the analysts of the transition process, the fact that we use a relatively large panel of annual firm-level data makes our work relevant in the context of the investment literature in general. In particular, by using the micro panel data we are able to eliminate bias introduced by aggregation (e.g., Abel and Blanchard, 1986), reduce measurement error and take into account the heterogeneity across firms and over time (e.g., Bond and Meghir, 1994).

2. The Model

Our empirical model consists of an investment equation and a wage (labor cost per worker) equation. In the investment equation, we extend the usual approach that focuses on the relative importance of firm's output demand (demand side) and internal funds (supply side) by adding labor cost as a determinant of investment.⁵ Our basic hypothesis is that labor cost should have a negative

⁴ The procedure for identifying the CEOs with bypass companies consisted of comparing the names and addresses of the chief executive officers of the 458 firms with the corresponding information in the registry of all private firms. The firms resented having CEOs with their own bypass firms and by 1994 they effectively banned the CEOs from establishing bypass firms.

⁵ On the demand side, much of the literature has focused on establishing the relative merits of the dynamic structural, Tobin's q , neoclassical, and accelerator models of investment, while studies on the supply side examined links between the firm's availability of internal finance and its investment (reflecting the effects of transaction costs and other market imperfections on the supply of capital). See e.g., surveys in Fazzari et al. (1988), Kaplan and Zingales (1997) and Hubbard (1998). We follow this approach but stop short of casting our analysis in terms of Tobin's q framework because the Slovenian capital market was undeveloped during the first

effect on investment, *ceteris paribus*, in firms where workers appropriate part of value added that would otherwise be used for investment. We complement the investment equation with a wage equation that is based on a bargaining model in which workers may appropriate part of the surplus. We estimate the two equations independently as well as jointly in order to check efficiency gains obtained from joint estimation.

The Investment Equation

Since value added is the broadest measure of internally generated funds used by the firm to pay wages and finance investment, we include value added as a regressor in the investment equation to capture the tradeoff between investment and wages.⁶ While investment is expected not to depend on internal funds when capital markets are perfect, a number of theories predict a positive relationship between internal funds and investment in situations of imperfect capital markets (see e.g., Hubbard, 1998). The inclusion of the value added variable hence allows us to test whether the investment behavior of firms varies systematically with internal funds as has been observed in many studies using data from the advanced market economies.⁷ Since studies of market economies usually use narrower measures of internal funds (e.g., cash-flow), our specification is comparable but not identical to these studies. In order to capture the bargaining between workers and management over the allocation of value added between investment and worker compensation, we next include as a regressor the labor cost that was agreed upon in bargaining. Finally, we also include sales revenues as an explanatory variable in order to assess the investment effect of output demand that underlies the neoclassical and accelerator models of investment.⁸ While the inclusion of sales revenue

half of the 1990s.

⁶ Value added is defined as profit plus labor cost plus depreciation. It is net of servicing loans and other costs.

⁷ See Fazzari et al. (1988), Kaplan and Zingales (1997), and Hubbard (1998) for overviews of this literature.

⁸ As was shown by Jorgenson (1971), under a set of plausible assumptions the neoclassical and flexible accelerator models may both be captured by including sales in the investment equation. The two models differ only in terms of interpretation of the estimated coefficient on sales.

conforms to the practice in many studies of the market economies, it might be argued that our use of value added captures some or all of the output demand effect that is normally picked up by the sales variable. We test and reject this hypothesis.

Suppressing subscripts for simplicity of exposition, our basic firm-specific investment equation may, analogously to the existing studies, be written as

$$(1) \quad I/K = \alpha_0 + \alpha_1 (VA/K) + \alpha_2 (yL/K) + \alpha_3 (R/K) + (\text{FIRMTYPE})\alpha_4' + (\text{YEAR})\alpha_5' \\ + (\text{IND})\alpha_6' + \varepsilon_1,$$

where I = the firm's gross investment, K = the firm's capital stock, VA = value added of the firm, y = income per worker (measured as total labor cost per worker), L is the total number of workers, yL = total labor cost, and R = sales revenue of the firm. FIRMTYPE is a vector of dummy variables capturing the aforementioned principal categories of firms: i) the firm would eventually be privatized to outsiders (external privatization dummy = 1) versus insiders, ii) the CEO owns a bypass company (bypass firm dummy = 1) versus the absence of a bypass firm, and iii) the firm had since the early 1990s a tangible (partial) owner (previous owner dummy = 1) versus the firm was fully in social ownership. In order to control for data heterogeneity in level estimates, we also include YEAR = vector of annual dummy variables and IND = vector of industry dummy variables. Finally, ε_1 = the error term.

In terms of our conceptual framework, the capital market imperfection (internal funds) hypothesis implies $\alpha_1 > 0$, while the neoclassical and accelerator models are consistent with the hypothesis $\alpha_3 > 0$. The latter hypothesis may be formulated more strictly by testing the condition $\alpha_3 > 0$ in the presence of $\alpha_1 = 0$, i.e., the effect of sales revenue being positive when value added is excluded from the regression. Finally, if workers are able to appropriate part of the firm's investable surplus as wages and fringe benefits (labor cost), one should find support for the hypothesis $\alpha_2 < 0$.

Traditionally, investment equations such as (1) have been estimated with all non-categorical variables divided by the capital stock. The practice reflects the fact that the Euler equations corresponding to intertemporal profit maximization with cost of capital adjustment have been formulated in a per unit of capital form (see e.g., Bond and Meghir, 1994, Lizal, 1995, and Lizal and Svejnar, 1997) and equations such as (1) are often taken to be approximations to these Euler equations. The power of workers in many transition economies of course calls into question the usefulness of profit as the goal of the firm. As we show in the Appendix, when one carries out the dynamic maximization of income per worker in the presence of cost of capital adjustment (the dynamic analog to the traditional maximand in the labor-management literature), one obtains an Euler equation that is analogous to the one obtained from profit maximization except that it is perhaps more naturally scaled by labor rather than capital. In a linearized approximation form, the per worker specification then provides an alternative specification to investment equation (1):

$$(2) \quad I/L = \beta_0 + \beta_1(VA/L) + \beta_2 y + \beta_3(R/L) + (FIRMTYPE)\beta_4' + (YEAR)\beta_5' + (IND)\beta_6' + \varepsilon_2,$$

where ε_2 = the error term corresponding to this specification and the predictions about the signs of α_1 , α_2 and α_3 carry over directly to β_1 , β_2 and β_3 , respectively.

In view of the lack of tight theoretical guidance in this area, we have estimated both equations (1) and (2). They provide broadly similar findings and the per worker form fits the data better more frequently than the per unit of capital form. As a result, in the main body of this paper we report estimates based on equation (2). For the sake of comparison, the basic estimates of equation (1) are reported in Appendix Table A1.⁹

⁹ The two equations are non-nested. Since they generate broadly similar results and the power of non-nested

In most investment studies, the issue of endogeneity of regressors is handled by including the lagged rather than current values of variables on the right hand side of equations such as (1). Unfortunately, to the extent that the error term contains a fixed component, this approach does not eliminate the correlation of the regressors with the error term. In order to assess the sensitivity of our results to this problem, we report estimates based on this approach as well as three other methods that may be deemed econometrically more appropriate: instrumental variables (IVs) using current values of regressors (IV levels), IVs using lagged values of regressors (IV lagged levels) and IV estimates based on a fixed effects specification of the equation (IV first difference). By design, the first difference model eliminates the problem of the fixed component of the error term and it also avoids the problem of data heterogeneity across firms. We combine this approach with the IV procedure since the first difference regressors may be endogenous. Similarly, if one selects appropriate instrumental variables in the levels specification, one also eliminates the problem of the fixed component in the error term. Depending on the particular specification, we use lagged values or lagged first differences of the principal variables in addition to dummy variables as instruments. Our guiding principle is that for specifications in levels we use as instruments current and lagged levels of strongly exogenous variables and lagged first differences of weakly exogenous variables. For first difference specifications, we use as instruments current and lagged first differences of strongly exogenous variables and twice lagged levels of weakly exogenous variables. The lists of instrumental variables used in the various specifications are given in notes to Tables 2-7.

Our approach is first to estimate equation (2) independently in order to obtain basic estimates that may be compared to the existing literature on firms in market economies. We next draw on the bargaining and labor-management literature and complement equation (2) with a wage

tests is low, we have not pursued the issue of model selection based on these tests.

(labor cost per worker) equation.

The Wage Equation

The wage equation illuminates the extent to which workers share in value added and even appropriate funds that the Slovenian firms were required to set aside by law for depreciation (replacement investment). The equation represents an extension of the models of Svejnar (1986) and Prasnikar et al. (1994) to the transition setting characterizing the Slovenian firms.

We start with the Nash nonsymmetric bargaining solution which predicts that the income per worker y consists of the reservation level (best alternative) income per worker y^a plus a share γ_2 of the surplus per worker $(R - H - y^a L)/L$, where the surplus is defined as revenue R net of the non-labor cost H and workers' reservation income $y^a L$:

$$(3) \quad y = y^a + \gamma_2[(R - H - y^a L)/L].$$

The share γ_2 reflects workers' bargaining power relative to managers and any other party that has a claim on the firm's surplus. At one extreme, $\gamma_2 = 0$, workers obtain just their reservation-level income y^a and appropriate no surplus. This case corresponds to a competitive labor market or a situation where the government sets the wage at a market clearing level. At the other extreme is a pure labor-managed firm, as $\gamma_2 = 1$ and workers appropriate all surplus [$y = (R - H)/L$]. In practice, one expects $0 < \gamma_2 < 1$, as workers share the surplus with managers and other parties. For estimation purposes it is convenient to rearrange the bargaining condition (3) by collecting the terms on y^a to obtain

$$(4) \quad y = (1 - \gamma_2)y^a + \gamma_2[(R - H)/L],$$

where $R - H$ is the value added of the firm.

An interesting empirical and policy question is whether the relatively low rate of investment

discussed in the introduction is in part brought about by workers appropriating funds that the firm should set aside for depreciation DEPR. Since the allocation of funds for depreciation is required by Slovenian law, it may be hypothesized that it is more difficult for workers to appropriate the depreciation funds DEPR than to share in the surplus that the firm generates over and above this amount (i.e., $R - H - DEPR$). We test this hypothesis by subtracting DEPR from $R - H$ and entering $(R - H - DEPR)/L$ and $DEPR/L$ as two separate terms on the right hand side of the estimating equation, in which we also include FIRMTYPE, regional, annual, and industry dummy variables:

$$(5) \quad y = \gamma_0 + \gamma_1 y^a + \gamma_2 [(R - H - DEPR)/L] + \gamma_3 (DEPR/L) + \gamma_4 \text{FIRMTYPE} + \gamma_5 \text{REGION} + \gamma_6 \text{YEAR} + \gamma_7 \text{IND} + \varepsilon_3.$$

Equation (5) permits us to test the hypothesis $\gamma_2 = \gamma_3$ (workers appropriate depreciation funds as easily as surplus over and above depreciation) against the alternative hypothesis $\gamma_2 > \gamma_3$ (surplus may be appropriated easier than depreciation funds). In addition, we test whether $\gamma_1 = 1 - \gamma_2$, as implied by condition (4) of the bargaining model. Finally, combining the investment model of equation (2) with the bargaining model of equation (5), note that if workers appropriate part of the surplus and/or depreciation funds, and do so at the expense of investment, we should observe simultaneously $\beta_2 < 0$ as well as $\gamma_2 > 0$ and/or $\gamma_3 > 0$.

3. Slovenian Transition and Enterprise Data

In this section we first provide a brief account of the main institutional developments that are relevant for our analysis. We then discuss the nature of the data that we use in our empirical work.

Slovenian Transition to a Market Economy¹⁰

The Slovenian transition of the 1990s was a process consisting of macro-stabilization with soft-budget constraints, relatively slow ownership transformation and a gradual change of the legal

system (Mencinger, 1991, Bole, OECD, 1997). In 1991, Slovenia declared independence from Yugoslavia, created its own currency (Tolar) and empowered the Bank of Slovenia to pursue independent monetary policy. The Bank in turn adopted a floating exchange rate policy together with sterilization of capital inflows as a strategy for macro-stabilization.

At the micro level, the government in 1993 rehabilitated the commercial bank sector, with losses being written off against capital and non-performing loans of the two largest banks being replaced with long-term bonds of the Agency for Bank Rehabilitation. As a result of the rehabilitation, the two banks came under state ownership, their operating costs started to decrease, profitability increased and the regulatory conditions set by the Bank of Slovenia were being met. By the mid-to-late 1990s, the two banks were ready for privatization.¹¹

As in many other transition economies, interest rates were kept high by central bank policy, limited competition in the banking sector and low domestic savings, while problems of asymmetric information between bankers and managers contributed to credit rationing at the level of firms.¹² In this situation, profitable firms could be expected to rely more on internal funds or funds from abroad in financing investment, even if the domestic supply of credit remained positively related to profitability and other performance criteria.¹³ In this context, it is worth noting that since its inception the Bank of Slovenia has been strict in enforcing regulations, thus forcing commercial banks to be more careful in screening credit applications by firms. The result of all these factors was limited

¹⁰ Due to space limitations, we provide only a brief account of the principal features of the Slovenian transition. For more detailed account, see e.g., OECD (1997).

¹¹ As of January 1997, there were thirty-three banks operating in Slovenia. Except for the two largest banks, all of them were in private hands. Twelve banks had foreign shareholders and in seven of them the share of foreign capital exceeded 20 percent. The market share of 5 largest banks was about 60 percent. Not all of the banks had equal operating licenses, with the limitations on bank operations varying with their capitalization and other factors.

¹² See e.g., Bole's (1997) analysis based on the theoretical framework of Stiglitz and Weiss (1981).

¹³ See e.g., Cornelli et al. (1997) for the argument that in the above circumstances demand for credit will be negatively related to profitability, as high profit firms are able and prefer to finance their investment internally rather than borrow.

financing of firms by domestic banks throughout the early-to-mid 1990s. In 1994, for instance, Slovenian commercial bank credit amounted to 23.2% of GDP, while by 1996 it dropped to a mere 14.5% of GDP.¹⁴

The part played by the newly established Ljubljana Stock Market in capital supply and allocation was also limited. With very few new issues and an annual turnover of transactions of only about \$6 billion, the primary capital market was almost non-existent in the early-to-mid 1990s. The information provided by the Stock Exchange was also highly incomplete as a result of limited regulatory framework, high volatility and insider trading.

The corporate ownership and governance issues that we explore in this paper were very much affected by the 1993 Privatization Law. The law applied to firms in virtually all sectors of the economy and required them to allocate 20 percent of their shares to insiders (employees), 20 percent to a Development Fund that auctioned the shares to investment funds, 10 percent to a National Pension Fund, and 10 percent to a Restitution Fund.¹⁵ In addition, in each enterprise the workers council or the board of directors (if it existed) was empowered to allocate the remaining 40 % of company shares for sale to insiders (employees) or outsiders (through a public tender). Based on the decision of how to allocate these remaining 40 percent of shares, we classify the firms in our sample as being eventually privatized to insiders (the internal method) or outsiders (the external method).

In terms of wage setting, Slovenia has since 1990 had a layered system of agreements that permitted wages to vary across firms and defy government attempts to reign in real wage growth. In

¹⁴ In comparison, in 1994 the ratio of bank credits to GDP attained 95% in the Czech Republic, 63% in Hungary, 33% in Poland, and 13% in Russia. By 1996, the corresponding percentages were 75, 27, 20, and 13. The range of values observed in developed market economies is 120-130% (see Meyendorff and Snyder, 1997).

¹⁵ The Law did not apply to enterprises providing special public services, banks and insurance companies, enterprises engaged in the organization of gambling, enterprises that were transformed under the Law on Cooperatives, enterprises that were transformed under the forestry legislation, and firms in the process of

August 1990 an “umbrella” general collective agreement was signed between the Slovenian Chamber of Commerce (representing all employers) and Trade Union Organization (representing all workers). This agreement set initial wages for each category of workers and it was supplemented by industry-specific agreements that effectively converted the initial wages in the umbrella agreement into minimum wages at the level of industries. Moreover, at the level of each firm the union and management bargained in the context of the firm’s annual plan further to adjust the industry-level wages. The multi-layer bargaining structure resulted in both wage dispersion, rapid wage growth and attempts by the government to limit these tendencies.¹⁶ Overall, the first half of the 1990s was a period of relatively rapid wage growth that allowed insiders to influence wages significantly at the firm level.

Slovenia’s economic performance during the early-to-mid 1990s was relatively successful. Mirroring the situation in the other transition economies, Slovenia experienced a period of economic decline in 1990-92. Thereafter growth resumed, with the GDP increasing 0.9% in 1993, 4.9% in 1994, 3.5% in both 1995 and 1996, and 3.8% in 1997. After experiencing hyperinflation while being part of Yugoslavia in the late 1980s and early 1990s, Slovenia imposed macro-stabilization measures and consistently reduced inflation to one of the lowest levels observed in the transition economies. Hence, while retail prices increased by 104.6% in 1991, the increases gradually declined to 92.9%, 22.9%, 18.3%, 8.6%, 8.8%, and 9.4% in 1992, 1993, 1994, 1995, 1996, and 1997 respectively. As in most other transition economies, the unemployment rate rose dramatically, starting at 2% in 1989 and reaching 14% in December 1997.

Data and Summary Statistics

bankruptcy.

The main data source for our research is the Slovenian Agency for Privatization, to which all Slovenian firms had to provide their privatization plans. We use data on 458 firms that were given permission by the Agency in the early 1990s to start implementing privatization by January 1997 and whose data were internally consistent for the period 1989-1995.¹⁷ The enterprises are from twelve industries, comprising all areas of the Slovenian economy. Each firm's privatization plan indicates whether the government permits workers and managers to use enterprise profits to buy the residual 40 percent of shares at a discount price over a five year period (internal privatization) or prescribes that the residual 40 percent of shares be sold to outsiders (external privatization). The privatization plan also provides information on whether the firm was already partially owned by a domestic or foreign institution (usually a bank or a government agency) in or before 1991. The data set for the 458 firms also includes balance sheets and income statements that the Slovenian firms were required by law to provide to the government.

The second data set comes from the Slovenian National Office of Statistics and contains annual enterprise-level investment data during the 1990-1995 period. These data were supplied by firms in their annual reports on investment spending in fixed capital. The third data source is the 1992-93 Directory of Slovenian Legal Entities, which provides data on private enterprises and their founders and owners. By comparing the names and addresses of general managers of the fully or partly socially-owned firms with the names and addresses of founders and owners of private firms, we are able to identify managers who own or are partners in private bypass firms.

In Table 1 we present the means and standard deviations of the principal variables that we use in our analysis. The values are averages for the 1991-1995 period and they are presented for the entire sample of 458 firms as well as for the four principal categories of firms: i) 303 firms that were eventually privatized to insiders (internal privatization firms), ii) 155 firms that were

subsequently privatized to outsiders (external privatization firms), iii) 82 firms whose CEOs established private bypass firms (bypass firms), and iv) 108 firms that were since the early 1990s less than 100% in social ownership (previous owner firms). The internal and external ownership categories are mutually exclusive and they span the 458 firms. The bypass and previous owner firm categories are not mutually exclusive and firms with these characteristics have eventually been privatized by either the internal or external method.

As may be seen from column 1 of Table 1, during the 1991-95 period the average firm employed 301 workers, generated 51 million Tolars (\$4.7 million) in value added, paid 38.5 million Tolars (\$3.7 million) in wages and fringe benefits, and reported 0.57 million Tolars (\$54,000) in profit. The average level of gross investment was 11.8 million Tolars (\$1.1 million), with the average level of capital stock¹⁸ being reported at 140 million Tolars (\$13.3 million).¹⁹ All variables show sizable standard deviations, reflecting significant cross-sectional as well as temporal variations in the values of the relevant variables. Interestingly, during the 1991-95 period the mean value of gross investment fell slightly short of the (legally prescribed) mean level of depreciation investment. This shortfall was in part brought about by the fact that loss-making firms paid wages and fringe benefits out of funds that were earmarked for depreciation.

In examining the variable values across types of firms in Table 1, one observes that firms that have been privatized to insiders were on average smaller and less capital-intensive than firms that have sold residual shares to outsiders. Since the Slovene capital market was underdeveloped throughout the 1990s, the finding that insiders bought smaller and less capital-intensive firms is in accordance with expectations.²⁰ The insider privatized firms were on average also more profitable,

¹⁸ We use real assets as our measure of the capital stock.

¹⁹ One U.S. \$ was approximately 10.5 Tolars (Dinars) in 1990. All Tolar values are in constant 1991 prices.

²⁰ See Dreze (1989) for the theoretical underpinning of these arguments.

a finding that is consistent with (a) the hypothesis that insiders had been able to cherry-pick the firms that they subsequently privatized and (b) the fact that insiders could use the profits generated by their firms during the 1990s to pay for their private purchase of shares of their companies. Correspondingly, the fact that the group of outsider privatized firms contains a number of firms with sizable losses accounts for the finding that investment on average fell short of depreciation in all firms taken together. Moreover, the insiders were obviously less able to bid on and privatize internally the large firms. Finally, the negative value of average profit among the outsider privatized firms probably reflects the fact that insiders would be less interested in (a) obtaining majority ownership of loss making firms and (b) generating profit in firms that would be majority-owned by outsiders.

Firms run by CEOs with bypass companies were on average relatively capital-intensive and displayed high value added and profit, as well as high profit/value added ratio. They reported high rates of investment per worker but low investment per unit of capital in comparison to the other types of firms. Finally, firms with previous owners were on average larger than the other types of firms. They were relatively capital intensive, reported positive profit, and displayed relatively high rate of investment in relation to the size of their capital as well as labor.

4. Empirical Results

The estimated parameters are reported in Tables 2-7. In Tables 2 and 3 we present the estimates of equation (2), while in Tables 4 and 5 we report the parameters of equation (5). Finally, in Tables 6 and 7 we present jointly estimated parameters of equations (2) and (5).

The Investment Equation

The estimates of the investment equation reported in Table 2 reflect the assumption that all types of firms have identical coefficients on value added per worker, labor cost per worker and sales revenues per worker, but that the principal types of firms differ in their intercepts. To assess

the sensitivity of our parameter estimates to different categorization of firms, we have coded the firm dummy variables in two ways. First, we have divided the firms into eight categories, reflecting the eight possible combinations of internal versus external privatization with the presence or absence of previous ownership and the presence or absence of a bypass firm. This specification amounts to allowing full interaction among these characteristics of firms in terms of their fixed effects. In this setting, the constant captures firms with internal privatization, no previous ownership and no bypass firm (the most numerous group of firms). The seven dummy variables capture the remaining seven categories of firms: Group 1 = firms with internal privatization, previous ownership and no bypass firms; Group 2 = firms with internal privatization, previous ownership and bypass firms; Group 3 = firms with internal privatization, no previous ownership and with bypass firms; Group 4 = firms with external privatization, previous ownership and no bypass firms; Group 5 = firms with external privatization, previous ownership and bypass firms; Group 6 = firms with external privatization, no previous ownership and with bypass firms; and Group 7 = firms with external privatization, no previous ownership and no bypass firms. The results based on this specification are reported in the left-hand side panel of Table 2.

The second specification is more parsimonious and consists of three dummy variables (external privatization, previous owner and bypass firm), with the constant reflecting internal privatization, no previous owner and no bypass firm. This specification assumes that there is no interaction among these characteristics of firms in terms of their fixed effects. The estimated parameters based on this specification are reported in the right-hand side panel of Table 2.

As may be seen from Table 2, the different estimation methods and alternative specifications of firm categories yield similar estimates of the coefficients on value added per worker, labor cost per worker and sales revenue per worker. The estimated coefficients of equation (2) indicate that

investment is related positively to value added ($\hat{\alpha}_1 > 0$), negatively linked to labor cost ($\hat{\alpha}_2 < 0$) and unrelated to sales revenue ($\hat{\alpha}_3 = 0$). The coefficients on value added and labor cost thus have the predicted signs and are statistically significant in all specifications. Moreover, except for the IV estimates based on lagged levels of explanatory variables, the coefficients have similar values across the estimation methods, with the coefficient on value added ranging from 0.25 to 0.40 and that on labor cost per worker being in the -0.22 to -0.42 interval.

The positive value added coefficients indicate that the value of funds generated internally by the firm after paying suppliers and other external claimants has a positive effect on investment, *ceteris paribus*. This is consistent with the internal funds (credit rationing) hypotheses suggesting that the availability of internal funds is an important determinant of the firm's investment. As we discussed earlier, the Slovenian capital markets were undeveloped during the period of our study, thus providing an institutional setting that is consistent with this empirical finding. The negative estimated coefficient on labor cost per worker suggests that there is a trade-off between worker compensation and the amount of investment, *ceteris paribus*, with a one hundred Tolar increase in the labor cost per worker resulting in a twenty to forty Tolar decrease in investment per worker.

The statistically insignificant coefficient on sales revenue would traditionally be interpreted as a lack of support for the neoclassical and accelerator models, in which sales revenue is the principal determinant of investment. Yet, in most other studies the sales revenue variable competes against a regressor that reflects a much narrower measure of internal funds (e.g., cash flow) than value added.²¹ A possible interpretation of our insignificant coefficients on the sales variable could hence be that the output effect of the neoclassical and accelerator models is already being captured in our specification by the value added variable. To check this hypothesis, we have re-estimated the

²¹ See e.g., Hubbard (1998) for a survey.

equations reported in Table 2 without the value added variable. The resulting estimated coefficients of the sales revenue variable are again very small and by and large not significantly different from zero. These results hence suggest that the investment behavior of Slovenian firms was principally determined by the availability of internal funds (i.e., supply side factors) rather than by demand side considerations (as implied by the neoclassical and accelerator models).²²

²² This finding is in contrast to that obtained by the contemporaneous studies of the Czech industrial firms (Anderson and Kegels, 1997, and Lizal and Svejnar, 1997), where investment is found to be positively related to firm's sales. There may be a number of reasons for this discrepancy, including the fact that in the 1980s and early 1990s Slovenia was a more western-oriented market economy than the Czech Republic and that in the early 1990s many Czech firms appear to have operated under softer budget constraints than their Slovenian counterparts.

In view of the insignificance of the sales revenue variable in virtually all specifications, we have also re-estimated the investment equations without this variable. The results show that the exclusion of the revenue variable does not materially affect the remaining coefficients. In what follows we hence report results from specifications that exclude the sales revenue variable.

Finally, our estimates in the left-hand side panel of Table 2 indicate that firms in Groups 1, 4 and 7 had significantly higher investment rates in most specifications, *ceteris paribus*, than other types of firms. This suggests that previous ownership by an external institution and to a lesser extent internal privatization together with a lack of a bypass firm were structural characteristics that were conducive to higher rates of investment. The more restricted estimates reported in the right-hand side panel of Table 2 confirm that previous ownership had a significantly positive effect on investment. The results from both panels of Table 2 suggest that the CEOs with bypass firm's had an insignificant or negative effect on investment, *ceteris paribus*.

In Table 3 we report estimates from a model that allows the coefficients on value added and labor cost per worker to vary across the four principal types of firms.²³ As in Table 2, firms that were eventually privatized to insiders and had neither previous owners nor managers with bypass companies serve as the base. The value added and labor cost coefficients for the three other types of firms are hence relative to the coefficients of this base group rather than relative to zero.

As may be seen from Table 3, the base category of firms continues to register a strong positive relationship between value added and investment ($\hat{\alpha}_1 > 0$), as well as a negative relationship between labor cost and investment ($\hat{\alpha}_2 < 0$) in all the econometric specifications. In contrast, firms that were eventually privatized to outsiders and, like the base firms, did not have previous ownership

²³ Since the number of observations becomes small in some categories of firms when we use the eight-category scheme and the basic results reported in Table 2 are unaffected by the more parsimonious choice of four categories, we have carried out our estimation within the four-category scheme.

nor CEOs with bypass firms show a much weaker relationship between value added and investment, as well as between labor cost and investment in all but one econometric specification. In fact, in several specifications one cannot reject the hypothesis that at least one of the coefficients (on value added or labor cost) is zero. In this second category of firms one hence observes investment behavior that is only weakly related to firm's internal funds, as proxied by value added, and to the ability of workers to obtain higher wages. From a corporate governance perspective, note that in the pre-privatization period that we study, these large and on average loss making firms had close ties with suppliers and banks and hence could more easily obtain capital by delaying payments to suppliers (arrears) or by receiving supplier or bank credit.

As may be seen from rows 5 and 6 in Table 3, previous ownership by an external institution has a positive effect on the coefficient of value added in all four specifications. The effect on the coefficient of labor cost varies across specifications, being positive in two specifications and negative and insignificant in the other two, respectively. Contrary to what might be expected, previous ownership by an external institution hence strengthens rather than reduces the dependence of investment on the availability of internal funds, while its effect on the labor cost-investment relationship depends on the particular econometric specification. Finally, except for the statistically insignificant coefficients in the first difference specification, the ownership of a bypass company by the CEO has a negative effect on the value added-investment link and a positive one on the relationship between labor cost and investment. These coefficients mitigate the positive effect of value added on investment observed in the base set of firms and neutralize the negative effect of labor cost on investment. The elite CEOs who own a bypass company are hence able to secure sufficient investment funds and eliminate any link between investment and internal funds. They also appear successfully to resist wage increases at the expense of investment. These findings are

consistent with a number of hypotheses, including a view that the elite CEOs siphon off investment funds that they prevent workers from appropriating.

The Wage Equation

Estimates of the labor cost per worker equation are reported in Tables 4 and 5. In Table 4 we report results from the basic specification in which, analogously to Table 2, the effects of the various types of firms are captured as different intercepts. In Table 5 we report estimates from a model that allows both intercepts and slope coefficients to vary across types of firms.

As may be seen from the left and right hand side panels of Table 4, the coefficients on the principal explanatory variables are all statistically significant and their values are not materially affected by using eight versus four dummy variables for categories of firms. The various IV and OLS specifications also yield the same signs on the corresponding coefficients, thus indicating that the results are robust to the choice of an estimating technique.

The estimates in Table 4 imply that workers share significantly in their firm's surplus, with the estimated coefficient γ_2 on surplus per worker $(R - H - DEPR)/L$ ranging from 0.2 to 0.6. In all models we also find that workers appropriate part of the funds DEPR that are legally supposed to be allocated for depreciation investment ($\gamma_3 > 0$). Moreover, as we report in a footnote to Table 4, in all specifications except the IV first difference model we find that workers' ability to share in their firm's surplus is significantly greater than their ability to appropriate their firm's depreciation funds ($\gamma_2 > \gamma_3$). Taking the results in Tables 2 and 4 together, we hence find strong econometric evidence that workers appropriate part of the surplus and depreciation funds, and that they do so at the expense of investment ($\beta_2 < 0$ together with $\gamma_2 > 0$ and $\gamma_3 > 0$).

The estimated coefficients γ_1 on the alternative (reservation) wage y^a are all positive and significantly different from zero, providing basic empirical support for the bargaining model.

However, as we show in note (6) to Table 4, except for the OLS lagged levels model, we always reject the condition that $\gamma_1 = 1 - \gamma_2$.²⁴ Unlike in the investment equation, the type of firm appears to have no independent effect in the wage equation. Hence, once the bargaining structure and regional as well as industry characteristics of the firms are taken into account, factors such as the presence or absence of external ownership, the form of subsequent privatization and the private bypass activities of managers do not affect systematically the wage. This finding holds irrespective of whether we use the eight or four category classification of firms.

Estimates from specifications that allow different types of firms to take on different intercepts as well as slope coefficients are reported in Table 5. Firms in the base category (those with internal privatization and no previous ownership or bypass firm) show a uniformly positive set of coefficients γ_2 on surplus per worker. With the γ_2 coefficients ranging from 0.7 to 0.9, the results suggest that workers in these firms appropriate a very significant part of their firm's surplus. With the exception of the IV first difference specification, the corresponding γ_1 coefficients on the alternative wage are between zero and unity, as expected.²⁵ In these specifications, we cannot reject the null hypothesis of the bargaining model that $\gamma_1 = 1 - \gamma_2$ in three of the four specifications (see note (7) to Table 5). Interestingly, in the base category of firms one finds no support for the hypothesis that workers appropriate part of the funds allocated by law for depreciation investment ($\gamma_3 > 0$). As a result, as may be seen from note (6) to Table 5, in all specifications we reject the hypothesis ($\gamma_2 = \gamma_3$) that workers appropriate depreciation funds as easily as surplus in favor of the hypothesis ($\gamma_2 > \gamma_3$) that workers appropriate surplus much more readily than depreciation funds. These findings are quite logical, given that workers in these firms know that in a few years they will be majority owners. They

²⁴ This is not an infrequent outcome in other studies using this type of a model. In the present case, the finding may also be brought about by the fact that $\tilde{a}_2 > \tilde{a}_3$, rather than $\gamma_2 = \gamma_3$.

²⁵ The IV first difference coefficient is negative but insignificant.

hence replace their firm's capital but also pay themselves wages at the expense of current surplus that they may otherwise have to remit in part to the government. Taking these results together with the corresponding investment results in Table 3, we find strong econometric evidence that workers in these firms appropriate part of the surplus (but not depreciation funds), and that they do so at the expense of investment ($\beta_2 < 0$ together with $\gamma_2 > 0$ and $\gamma_3 = 0$).

Firms that were eventually privatized to outsiders yield similar or somewhat higher coefficients γ_1 on the alternative wage, uniformly lower coefficients γ_2 on surplus and higher coefficients γ_3 on depreciation per worker than the insider privatized firms. In these firms, many of which have negative profit, one hence finds that wages are more related to the alternative wage and that workers boost their wages by appropriating depreciation funds and by not sharing in losses. The wage setting in these types of firms is hence driven by the available alternatives and the deficiency in corporate governance is manifested by the resistance of workers to share in losses and by their ability to appropriate depreciation funds. Combining these results with those in Table 3, we find that workers in these firms appropriate part of the depreciation funds but that this behavior is unrelated to firms' investment decisions ($\beta_2 = 0$ together with $\gamma_2 = 0$ and $\gamma_3 > 0$).

Previous ownership by an external institution has a relatively insignificant effect on the alternative wage and surplus coefficients. The exception is the IV first difference specification, in which the effect on the coefficient of the alternative wage is positive and on the coefficient of surplus negative. Combining these coefficients with those for the base set of firms, we find that firms with previous owners have coefficients on both the alternative wage and surplus per worker that are significant and in the [0,1] interval in all specifications. Furthermore, relative to the base results, previous ownership diminishes the ability of workers to appropriate depreciation funds as wages.

The estimated coefficient γ_3 is negative in all specifications and it is statistically significant in all specifications except for IV first difference. The effect of previous ownership is hence relatively neutral with respect to β_2 and γ_2 , but negative with respect to γ_3 .

Finally, the effect of the CEO having a bypass company is to increase the tie of the own wage to the alternative wage (increasing γ_1) and reduce its link to the surplus generated by the firm (reducing γ_2). In only one of the four specifications (IV levels) is there also a positive link between the presence of a bypass firm and the ability of workers to increase their wages at the expense of the depreciation funds ($\gamma_3 > 0$). The effect of a CEO with a bypass firm is hence to reduce the negative effect of β_2 (i.e., to reduce the ability of workers to increase wages at the expense of investment), reduce γ_2 and exert virtually no significant effect on γ_3 .

In Tables 6 and 7, we present the coefficients from the joint estimation of equations (2) and (5). In Table 6, the effects of the different types of firms are captured as intercepts, while in Table 7 they are reflected in both the intercepts and slope coefficients. As may be seen from Table 6, with the exception of the 2SLS specification with lagged variable levels in the investment equation (which generates higher values of estimates), the parameter estimates are very similar to those obtained in the separate estimations of these equations in Tables 2 and 4. The joint estimates in Table 7 are also similar to the corresponding single equation estimates in Tables 3 and 5. Most coefficients have the same signs and in the few cases when they do not, the difference is not significant. The two sets of coefficients also have broadly similar values, with some differences being found in the 3SLS first difference and 2SLS lagged levels specifications.

5. Conclusions

The decline in investment, rise in wages, importance of strategic restructuring, and interest in the role of insiders in the transition economies have led us to analyze the determinants of (and

tradeoff between) investment and wages in an unusual panel data set covering several important types of firms. In our analysis, which covers the 1991-95 period in Slovenia, we are able to exploit the fact that during this pre-privatization period the relevant decision-makers already knew how the firms would eventually be privatized in the mid-to-late 1990s. Taking the sample of 458 firms as a whole, our central finding is that enterprise investment is positively linked to value added, unrelated to sales and negatively linked to labor cost. This result implies that (a) the investment behavior of firms is more consistent with the imperfect capital market (internal funds) hypothesis than with the neoclassical or flexible accelerator models and (b) the firms display a strong tradeoff between investment and wages. These findings support the assumption about capital market imperfections and the predictions about the role of insiders in the models of enterprise restructuring (Aghion, Blanchard and Burgess, 1994, Aghion, Blanchard and Carlin, 1994 and Blanchard and Aghion, 1995). Our second finding based on the entire sample of 458 firms is that workers share in their firm's surplus and are also able to appropriate some of the funds that firms are legally supposed to use for depreciation investment. Insiders hence have power and they exercise it at the expense of strategic restructuring as proxied by depreciation investment and new capital formation.

We have also divided the firms into those that ultimately would be privatized to insiders versus outsiders and we have taken into account whether during the pre-privatization period the firms were in part owned by an external institution and/or managed by CEOs who owned bypass companies. With this stratification, we find that firms that were ultimately privatized to insiders (and had no previous ownership by an external institution or a CEO with a bypass firm) have a significant positive relationship between investment and value added, while firms that were ultimately privatized to outsiders do not. The effect of previous ownership strengthens, while the presence of a CEO with a bypass company weakens, this relationship. Firms that were ultimately privatized to outsiders as

well as those with the CEO bypass firms hence appear to be less constrained in their investment behavior by the availability of internal funds than are firms ultimately privatized to insiders and those with previous ownership by an external institution. Anecdotal evidence indicates that firms privatized to outsiders, being predominantly large firms, have (a) stronger ties to suppliers that are willing to provide credit or tolerate arrears and (b) more assets (especially land) that can be used as collateral to obtain bank loans. Firms that were ultimately privatized to insiders are smaller and have a less powerful relationship with suppliers and banks. The elite CEOs with bypass firms appear to be able to overcome capital market imperfections on their firms, while previous external owners are (surprisingly) unable to do so.

Firms that were ultimately privatized to insiders register a very strong tradeoff between investment and wages, while those ultimately privatized to outsiders do not. The tradeoff is weakened by the presence of a CEO with a bypass company and unaffected by previous ownership of the firm by an external institution. Moreover, firms that were ultimately privatized to insiders and those with previous ownership by an external institution have wages that are relatively unrelated to the alternative wage, but strongly linked to the firm's surplus. In contrast, the firms that were eventually privatized to outsiders and firms with CEO bypass companies link wages to the alternative wage and display little surplus sharing. Workers hence have and exploit bargaining power in firms where they have obtained the government's permission to privatize the firm to themselves and their managers. Similarly, the lack of a link between wages and surplus in the firms that are to be privatized to outsiders is not a sign of lack of worker power since surplus in these firms is often negative. An interesting finding is that the CEOs with bypass firms are able to resist workers' demands for surplus sharing, while previous ownership by an external institution has the opposite effect. These findings suggest that theoretical modeling and policy formulation have underestimated

the power of elite (and highly self-interested) managers to restrain wage demands of worker-insiders and overestimated such powers on the part of external owners.

Finally, while workers in firms with internal privatization, prior ownership and CEO bypass companies do not appropriate depreciation funds as wages, workers in the (frequently loss making) firms with eventual external privatization do so. In the latter group of firms, workers hence do not share in losses but appropriate depreciation funds as wages. In contrast, workers who know that they will ultimately own the firm tend to replace their firm's capital but also pay themselves wages at the expense of current surplus that they may otherwise have to remit in part to the government.

Overall, our findings indicate that policy makers in the transition economies should assign priority to establishing a proper legal and institutional framework as they relax or lose government control over firms. Insiders behave rationally and exploit legal and institutional opportunities. Our results are also consistent with the concerns that workers in the transition economies appropriate rents that may have spillover effects and weaken the competitive position of these economies. If these rents cannot be eliminated by open economy and domestic competition policies, policy makers may consider taxing excess wages so as to alleviate the pressure by insiders to raise wages, decapitalize firms and prevent outsiders from entering the firm (see e.g., Crombrughe and Walque, 1997, and Estrin et al., 1988).

References

- Aghion, Philippe, Olivier Blanchard and R. Burgess, "The behavior of state firms in Eastern Europe pre-privatization," *European Economic Review*, 38(6), 1994, 132-49.
- Aghion, Philippe, Olivier Blanchard and Wendy Carlin, "The Economics of Enterprise Restructuring in Central and Eastern Europe," Discussion paper No. 1058, Center for Economic Policy Research, London, 1994.
- Abel, Andrew B. and Blanchard, Olivier J. "The Present Value of Profits and Cyclical Movements in Investments," *Econometrica*, Vol. 54, 1986.
- Anderson, Ronald and Kegels, Chantal. "Finance and Investment in Transition: Czech Enterprises," 1993-1994. IRES Discussion paper n. 9715, May 1997
- Blanchard, Olivier J., "Notes on the Speed of Transition, Unemployment and Growth in Poland," mimeo, MIT, 1991.
- _____, *The Economics of Post-Communist Transition*, Oxford: Clarendon Press, 1997.
- Blanchard, Olivier and Philippe Aghion, "On Insider Privatization," mimeo, MIT, 1995.
- Bole, Veljko. "Stabilization in Slovenia: From High Inflation to Excessive Inflow of Foreign Capital," in Blejer, M. and M. Škreb (eds.), *Macroeconomic Stabilization in Transition Economies*, Cambridge: Cambridge University Press, 1997.
- Bond, Stephen and Meghir, Costas. "Dynamic Investment Models and the Firm's Financial Policy," *Review of Economic Studies*, Vol. 61, 1994.
- Brada, Josef and Hoffman, Dennis L. "The Productivity Differential Between Soviet and Western Capital and the Benefits of Technology Imports to the Soviet Economy," *Quarterly Review of Economics and Business*, Vol. 25, 1985, pp.7-18.
- Burda, M. "Unemployment, Labour Markets and Structural Change in Eastern Europe," *Economic Policy*, Vol. 16, 1993.
- Commander, S. and F. Coricelli (eds.)(1995), "Unemployment, Restructuring, and the Labour Market in Eastern Europe and Russia," Washington, D.C., The World Bank.
- Cornelli, Francesca, Portes, Richard and Schaffer, Mark E. "The Capital Structure of Firms in the Central and Eastern Europe, CEPR Discussion paper no. 1392, May 1996
- Crombrugge, Alain and Walque, Gregory "Fiscal Norming of Wages to Promote Employment with Monopoly Power," CEPR discussion paper n. 1766, December 1997

- Desai, Padma . "The Production Function and Technical Change in Postwar Soviet Industry: A Reexamination," *American Economic Review*, Vol. 66, 1976, pp. 372-381.
- Dreze, Jacques, H. "Labor Management, Contracts and Capital Markets," Oxford: Basil Blackwell, 1989.
- EBRD (European Bank for Reconstruction and Development), Transition Report 1995, London: EBRD, 1995.
- EBRD (European Bank for Reconstruction and Development), Transition Report 1996, London: EBRD, 1996.
- Earle, John S., Saul Estrin, and Larisa L. Leshchenko. "Ownership Structures, Patterns of Control and Enterprise Behavior in Russia," Mimeo, August 1995.
- Estrin, Saul, Robert Moore and Jan Svejnar, "Market Imperfection, Labor-Management and Earnings Differentials in a Developing Economy: Theory and Econometric Evidence from Yugoslavia," *Quarterly Journal of Economics*, Vol. CIII, No. 3, August 1988, pp. 465-478.
- Fazzari, Steven M., Hubbard, Glenn R. and Petersen, Bruce C. "Financing Constraints and Corporate Investment," *Brooking Papers on Economic Activity*, 1988, pp. 141-206.
- Furobotn, Eric, and Svetozar Pejovich, "Property Rights and the Behavior of the Firm in a Socialist State: The Example of Yugoslavia," *Zeitschrift fur Nationaleconomie*, 1970, pp. 431-454.
- Gomulka, Stanislaw. "Import Technology and Growth: Poland 1971-1980," *Cambridge Journal of Economics*, Vol. 2, 1978, pp.1-16.
- Green, Donald W. and Levine, Herbert S. "Implications of Technology Transfers for the USSR," East-West Technological Co-operation, 1976.
- Grosfeld, Irena and Gerard Roland. "Defensive and Strategic Restructuring in Central European Enterprises", *Journal of Transforming Economies and Societies*, vol. 3 n° 4, 1997, pp. 21-46.
- Hinds, Manuel. "Issues in the Introduction of Market Forces in Eastern European Socialist Economics." In S. Commander (ed.), *Managing Inflation in Socialist Economies in Transition*, The Economic Development Institute of the World Bank, 1990.
- Hubbard, Glenn R. "Capital-Market Imperfections and Investment," *Journal of Economic Literature*, Vol. 36, No. 1, 1998, pp. 193-225.
- Jorgenson, Dale W. "Econometric Studies of Investment Behavior: A Survey," *Journal of Economic Literature*, Vol. 9, 1971, pp. 111-1147.
- Kaplan, Steven and Zingales, Luigi. "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints," *The Quarterly Journal of Economics*, February 1997, pp. 167-215.
- Lizal, Lubomir. "Depreciation Rates in Transition Economy Evidence from Czech Panel Data," CERGE-EI Working Paper, October 1977.

- Lizal, Lubomir and Svejnar, Jan. "Enterprise Investment during the Transition: Evidence from Czech Panel Data," William Davidson Institute Working Paper No. 60a, Ann Arbor, MI, 1997.
- Mencinger, Jože. "Makroekonomske dileme republike Slovenije". *Gospodarska gibanja*, EPIF,5, 1991.
- Meyendorff, Anna and Snyder, Edward. "Transactional Structures of Bank Privatizations in Central Europe and Russia," *Journal of Comparative Economics*, Vol. 25 No. 1, August 1997.
- OECD, Economic Survey of Slovenia, Paris, May 1997
- Prašnikar, Janez and Svejnar, Jan. "Enterprise Behavior in Yugoslavia," *Advances in the Economic Analysis of Participatory and Labor-Managed Firms*," 3, 1988, 237-311.
- Prašnikar, Janez and Svejnar, Jan. "Workers Participation in Management vs. Social Ownership and Government Policies: Lessons for Transforming Socialist Economies,": *Comparative Economic Studies*, 4, 1991, 27-45.
- Prašnikar, Janez., Jan Svejnar, Dubravko Mihajlek, and Vesna Prašnikar, "Behavior of Participatory Firms in Yugoslavia: Lessons for Transforming Economies, *The Review of Economics and Statistics*, LXXVI (4), 1994, 728-41.
- Stiglitz, J. and Weiss, A. "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, Vol. 71, 1981, pp. 393-410
- Svejnar, Jan. "Bargaining Power, Fear of Disagreement and Wage Settlements: Theory and Evidence from U.S. Industry." *Econometrica*, Vol. 54, 1986, pp. 1055-1078.
- Terrell, Katherine. "Productivity of Western and Domestic Capital in Polish Industry," *Journal of Comparative Economics*, Vol. 16, 1992, pp. 494-514.
- Terrell, Katherine. "Technical Change and Factor Bias in Polish Industry," *The Review of Economics and Statistics*, Vol. 75, 1993, pp. 741-747.
- Thornton, Judith. "Value Added and Factor Productivity in Soviet Industry," *American Economic Review*, Vol. 60, 1970, pp. 863-871.
- Vanek, Jaroslav. "The General Theory of Labor-Managed Market Economies, Ithaca, Cornell University Press, 1970.
- Weitzman, Martin L. "Technology Transfer to the USSR: An Economic Analysis," *Journal of Comparative Economics*, Vol. 3, 1979, pp.167-177.

Table 1: Means and Standard Deviations of Selected Variables During the 1991-95 Period

	Entire Sample	Internal Privatization	External Privatization	Bypass Firm	Previous Owner
No. of Workers	301 (546)	252 (475)	397 (652)	206 (298)	411 (663)
Value Added	50957 (129013)	36876 (73539)	78482 (193646)	36408 (76959)	80373 (209137)
Labor Cost	38491 (79751)	30058 (56666)	54977 (110078)	26242 (42114)	56013 (118159)
Profit	566 (38985)	1016 (19362)	-313 (61321)	2406 (30510)	2431 (29781)
Revenue	205362 (463857)	142609 (262476)	328033 (691940)	149627 (262588)	332074 (777043)
Investment	11822 (55397)	6333 (17846)	22553 (90986)	9439 (29187)	25292 (105437)
Capital	140066 (478726)	69441 (116646)	278126 (788861)	120619 (425447)	268407 (788959)
Alternative Wage	94.377 (16.807)	94.384 (17.185)	94.365 (16.054)	94.627 (17.217)	93.466 (16.603)
Profit+Labor Cost	39057 (95551)	31074 (63714)	54664 (136717)	28649 (61017)	58444 (138912)
Profit / Value Added	0.111 (0.765)	0.027 (0.525)	-0.004 (0.781)	0.066 (0.837)	0.030 (0.370)
Labor Cost / Worker	127.47 (264.11)	119.00 (224.35)	138.47 (277.25)	126.86 (203.58)	136.26 (287.43)
Value Added / Worker	168.75 (427.25)	146.00 (291.15)	197.67 (487.73)	176.00 (372.02)	195.51 (508.74)
Profit / Worker	1.875 (129.11)	4.023 (76.66)	-0.788 (154.45)	11.634 (147.49)	5.913 (72.45)
Revenue / Worker	680.10 (1536.16)	564.62 (1039.19)	826.20 (1742.76)	723.30 (1269.35)	807.79 (1890.21)
Investment / Worker	39.15 (183.460)	25.07 (70.66)	56.80 (229.16)	45.63 (141.09)	61.53 (256.48)
Capital / Worker	463.86 (1585.40)	274.93 (461.82)	700.51 (1986.87)	583.07 (2056.61)	652.92 (1919.20)
No. of Workers / Capital	0.002 (0.003)	0.003 (0.006)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Value Added / Capital	0.363 (0.921)	0.531 (1.059)	0.282 (0.696)	0.301 (0.638)	0.299 (0.779)
Labor Cost / Capital	0.274 (0.569)	0.432 (0.816)	0.197 (0.395)	0.217 (0.349)	0.208 (0.440)
Profit / Capital	0.004 (0.278)	0.014 (0.278)	-0.001 (0.220)	0.019 (0.252)	0.009 (0.110)
Revenue / Capital	1.466 (3.311)	2.053 (3.779)	1.179 (2.487)	1.240 (2.177)	1.237 (2.895)
Investment / Capital	0.084 (0.395)	0.091 (0.257)	0.081 (0.327)	0.078 (0.241)	0.094 (0.392)
No. of Firms	458	303	155	82	108
No. of Observations	2290	1515	775	410	540

Notes:

- Values are in thousand of Tolars in constant 1991 prices.
- Values in parentheses are standard deviations.
- Means and standard deviations for ratios are calculated by dividing the numerator of each observation by the mean value of the denominator (taking into account the different sample means) and calculating the mean and standard deviation for each of these newly created variables.

Table 2: Determinants of Investment / Worker in a Basic Model

Variable \ Model	IV	IV	OLS	IV	IV	IV	OLS	IV
	Levels	First	Lagged	Lagged	Levels	First	Lagged	Lagged
		Difference	Levels	Levels		Difference	Levels	Levels
VAL	0.402a	0.305a	0.335a	0.766a	0.394a	0.304a	0.338a	0.686a
	(0.042)	(0.052)	(0.023)	(0.182)	(0.042)	(0.053)	(0.023)	(0.176)
LC/L	-0.421a	-0.408a	-0.267a	-0.922a	-0.405a	-0.404a	-0.270a	-0.802a
	(-0.084)	(0.112)	(0.033)	(0.270)	(0.084)	(0.112)	(0.033)	(0.262)
R/L	0.011	0.004	-0.002	0.011	0.008	0.004	-0.002	0.005
	(0.014)	(0.011)	(0.001)	(0.017)	(0.014)	(0.010)	(0.001)	(0.017)
Group 1 Dummy	20.905a	\	20.969a	21.381a	\	\	\	\
	(6.640)		(5.766)	(8.153)				
Group 2 Dummy	10.907	\	8.804	12.300	\	\	\	\
	(11.728)		(10.561)	(13.704)				
Group 3 Dummy	8.993	\	7.302	2.288	\	\	\	\
	(5.517)		(4.924)	(6.827)				
Group 4 Dummy	20.647a	\	25.836a	11.041	\	\	\	\
	(5.989)		(4.850)	(9.743)				
Group 5 Dummy	8.619	\	19.636b	22.325c	\	\	\	\
	(12.097)		(9.791)	(13.303)				
Group 6 Dummy	-4.474	\	-0.799	-8.473	\	\	\	\
	(10.506)		(8.884)	(12.444)				
Group 7 Dummy	8.996b		7.267c	8.849	\	\	\	\
	(4.727)		(4.246)	(5.545)				
External Privatization Dummy	\	\	\	\	4.095	\	5.272	2.977
					(3.753)		(3.322)	(4.463)
Previous Owner Dummy	\	\	\	\	14.904a	\	17.966a	14.522a
					(4.468)		(3.647)	(5.999)
Bypass Firm Dummy	\	\	\	\	0.640	\	0.881	-0.395

					(4.376)		(3.782)	(4.906)
Constant	9.341	3.623	-7.841	29.913a	10.776	3.584	-7.528	29.245a
	(8.157)	(4.022)	(5.712)	(10.154)	(8.073)	(4.025)	(5.684)	(9.814)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Adjusted R-squared	0.243	0.016	0.153	...	0.248	0.017	0.153	0.041
No. of Observations	1832	1832	2290	1832	1832	1832	2290	1832

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) Group 1 firms (a) did not have CEOs with bypass firms, (b) were in part owned by external institutions and (c) were subsequently privatized by the internal method.
- 4) Group 2 firms (a) had CEOs with bypass firms, (b) were in part owned by external institutions and (c) were subsequently privatized by the internal method.
- 5) Group 3 firms (a) had CEOs with bypass firms, (b) were not owned by external owners and (c) were eventually privatized by the internal method.
- 6) Group 4 firms (a) did not have CEOs with bypass firms, (b) were in part owned by external institutions and (c) were subsequently privatized by the external method.
- 7) Group 5 firms (a) had CEOs with bypass firms, (b) were in part owned by external institutions and (c) were subsequently privatized by the external method.
- 8) Group 6 firms (a) had CEOs with bypass firms, (b) were not owned by external institutions and (c) were subsequently privatized by the external method.
- 9) Group 7 firms (a) did not have CEOs with bypass firms, (b) were not owned by external institutions and (c) were subsequently privatized by the external method.
- 10) Firms serving as the base (constant) (a) did not have CEOs with bypass firms, (b) were not in part owned by external institutions and (c) were eventually privatized by the internal method.
- 11) In the level estimates, the constant term reflects the year 1991, firms in manufacturing industry and firms that (a) had CEOs with bypass firms, (b) were not in part owned by external institutions and (c) were eventually privatized by the internal method.
- 12) In the IV Levels model we used the following instruments: dummy variables for industry, region, time and firm types, lagged difference of revenue/worker, lagged capital/worker, lagged first difference of capital/worker, lagged first difference of the alternative wage, first difference of the alternative wage, lagged first difference of depreciation/worker, and lagged first difference of (profit+labor cost)/worker.
- 13) In the IV First Difference model we used the following instruments: dummy variables for industry, region, time and firm types, lagged first difference of revenue/worker, lagged first difference of capital/worker, lagged first difference of the alternative wage, lagged first difference of depreciation/worker, twice lagged (profit+labor cost)/worker, lagged first difference of the revenue/worker, lagged first difference of value added/worker, lagged first difference of depreciation/worker, and lagged first difference of (profit+labor cost)/worker.
- 14) In the IV Lagged Levels model we used the following instruments: dummy variables for industry, region, time and firm types, lagged first difference of revenue/worker, lagged first difference of capital/worker, lagged capital/worker, lagged first difference of

Table 3: Determinants of Investment / Worker in an Expanded Model

Variable \ Model	IV	IV	OLS	IV
	Levels	First	Lagged	Lagged
		Difference	Levels	Levels
VAL	0.602 ^a	0.285 ^a	0.399 ^a	0.934 ^a
	(0.094)	(0.120)	(0.041)	(0.145)
y	-0.600 ^a	-0.324 ^b	-0.383 ^a	-0.995 ^a
	(0.113)	(0.171)	(0.049)	(0.168)
VA/L * External Privatization	-0.508 ^a	-0.281 ^a	-0.319 ^a	-0.734 ^a
	(0.093)	(0.118)	(0.051)	(0.126)
y * External Privatization	0.574 ^a	0.353 ^c	0.516 ^a	0.615 ^a
	(0.183)	(0.215)	(0.092)	(0.201)
VA/L * Previous Owner	0.560 ^a	0.411 ^a	0.350 ^a	0.214 ^b
	(0.085)	(0.112)	(0.052)	(0.109)
y * Previous Owner	-0.346 ^c	-0.329	0.172 ^c	0.507 ^a
	(0.185)	(0.223)	(0.099)	(0.209)
VA/L * Bypass Firm	-0.388 ^a	-0.037	-0.182 ^a	-0.827 ^a
	(0.077)	(0.097)	(0.057)	(0.148)
LC/L * Bypass Firm	0.761 ^a	-0.027	0.346 ^a	1.271 ^a
	(0.161)	(0.191)	(0.100)	(0.219)
External Privatization Dummy	7.666	\	-10.287	40.144 ^a
	(16.026)		(8.292)	(15.763)
Previous Owner Dummy	-37.868 ^b	\	-19.587 ^b	-80.165 ^a
	(17.657)		(9.002)	(16.772)
Bypass Firm Dummy	-39.144 ^b	\	-12.382	-27.327
	(17.755)		(9.055)	(17.109)
Constant	3.765	1.859	-2.486	9.160
	(7.462)	(3.831)	(5.624)	(7.649)
Year Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes

Adjusted R-squared	0.255	0.007	0.198	0.114
No. of Observations	1832	1832	2290	1832

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) Firms serving as the base (constant) are the same ones as in Table 2.
- 4) The instrumental variables used are the same as those listed under Table 2 plus the non-dummy instruments interacted with firm group dummies.
- 5) In the level estimates, the constant term reflects the same characteristics as in Table 2.

Table 4: Determinants of Labor Cost / Worker in a Basic Model

Variable \ Model	IV	IV	OLS	IV	IV	IV	OLS	IV
	Levels	First	Lagged	Lagged	Levels	First	Lagged	Lag
		Difference	Levels	Levels		Difference	Levels	Lev
y^a	1.500 ^a	1.857 ^a	0.663 ^a	0.852 ^a	1.501 ^a	1.856 ^a	0.657 ^a	0.8
	(0.361)	(0.462)	(0.103)	(0.136)	(0.359)	(0.461)	(0.102)	(0.1
(R - H - DEPR) / L	0.562 ^a	0.222 ^a	0.525 ^a	0.597 ^a	0.562 ^a	0.223 ^a	0.525 ^a	0.5
	(0.017)	(0.036)	(0.014)	(0.023)	(0.017)	(0.036)	(0.014)	(0.0
DEPR / L	0.175 ^a	0.395 ^a	0.365 ^a	0.369 ^a	0.184 ^a	0.390 ^a	0.362 ^a	0.3
	(0.070)	(0.139)	(0.037)	(0.084)	(0.070)	(0.140)	(0.037)	(0.0
Group 1 Dummy	-1.417	\	-2.527	-2.691	\	\	\	
	(5.690)		(6.292)	(7.765)				
Group 2 Dummy	-3.858	\	-5.853	-6.195	\	\	\	
	(10.499)		(11.630)	(14.354)				
Group 3 Dummy	-1.880	\	-9.949 ^c	-10.329	\	\	\	
	(4.916)		(5.414)	(6.688)				
Group 4 Dummy	1.827	\	-8.590	-7.850	\	\	\	
	(5.614)		(5.381)	(7.146)				
Group 5 Dummy	-10.925	\	-1.499	-0.047	\	\	\	
	(9.743)		(10.552)	(13.096)				
Group 6 Dummy	-3.477	\	-8.578	-7.365	\	\	\	
	(8.759)		(9.695)	(11.968)				
Group 7 Dummy	-0.176	\	-6.383	-5.361	\	\	\	
	(4.362)		(4.590)	(5.810)				
External Privatization	\	\	\	\	-0.019	\	-4.760	-3.8
Dummy					(3.516)		(3.613)	(4.6
Previous Owner	\	\	\	\	-0.631	\	-0.877	-1.0
Dummy					(3.709)		(3.955)	(4.9
Bypass Firm	\	\	\	\	-3.596	\	-5.680	-5.7
Dummy					(3.793)		(4.180)	(5.1

Constant	-65.429 ^b	0.418	-56.684 ^a	-0.839	-65.852 ^b	0.431	-56.867 ^a	-1.2
	(32.899)	(3.381)	(13.684)	(14.927)	(32.774)	(3.378)	(12.885)	(14
Regional Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Adjusted R-squared	0.728	0.397	0.495	0.479	0.729	0.399	0.496	0.4
No. of Observations	1832	1832	2290	1832	1832	1832	2290	183

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) Firms in Groups 1 - 7 are the same ones as those identified in the notes below Table 2.
- 4) The instrumental variables used are the same ones as those listed under Table 2.
- 5) In testing the null hypothesis that $\gamma_2 = \gamma_3$, the values of the relevant F statistics for models in columns 1 to 8 are 28.4, 1.7, 16.1, 6.6, 27.1, 1.5, 17.0, and 6.3, respectively. With these F values, we reject the null hypothesis at 5% level in all specifications except for both IV First Difference models.
- 6) In testing the null hypothesis that $\gamma_1 = 1 - \gamma_2$, the values of the relevant F statistics for models in columns 1 to 8 are 8.6, 5.6, 3.4, 11.3, 8.7, 5.6, 3.4, and 11.1, respectively. The null hypothesis can be rejected at the 5% level in all specifications except for the OLS Lagged Level models, in which it can be rejected at 10%.

Table 5: Determinants of Labor Cost/Worker in an Expanded Model

Variable \ Model	IV	IV	OLS	IV
	Levels	First	Lagged	Lagged
		Difference	Levels	Levels
y^a	0.332	-0.063	0.475a	0.691a
	(0.257)	(0.316)	(0.123)	(0.171)
(R - H - DEPR) / L	0.854a	0.766a	0.676a	0.696a
	(0.016)	(0.032)	(0.018)	(0.024)
DEPR / L	0.011	-0.141	0.083	0.107
	(0.095)	(0.129)	(0.090)	(0.149)
y^a · External Privatization	0.523a	1.511a	0.216	0.193
	(0.163)	(0.356)	(0.198)	(0.312)
[(R - H - DEPR) / L] · External Privatization	-0.435a	-0.429a	-0.334a	-0.312a
	(0.034)	(0.045)	(0.034)	(0.067)
(DEPR / L) · External Privatization	0.575a	0.592a	0.476a	0.471a
	(0.094)	(0.145)	(0.101)	(0.162)
y^a · Previous Owner	0.189	0.855b	0.029	0.158
	(0.189)	(0.399)	(0.223)	(0.363)
[(R - H - DEPR) / L] · Previous Owner	-0.024	-0.246a	0.028	0.009
	(0.042)	(0.058)	(0.043)	(0.089)
(DEPR / L) · Previous Owner	-0.234a	-0.063	-0.321a	-0.311a
	(0.062)	(0.124)	(0.078)	(0.106)
y^a · Bypass Firm	0.502a	1.085a	0.163	0.251
	(0.165)	(0.395)	(0.210)	(0.323)
[(R - H - DEPR) / L] · Bypass Firm	-0.363a	-0.101	-0.320a	-0.499a
	(0.039)	(0.064)	(0.046)	(0.092)
(DEPR / L) · Bypass Firm	0.263c	0.248	0.160	0.203
	(0.158)	(0.184)	(0.126)	(0.228)

External Privatization Dummy	-4.614	\	6.802	5.968
	(14.913)		(19.482)	(28.833)
Previous Owner Dummy	-3.542	\	5.206	-3.549
	(16.489)		(21.201)	(31.302)
Bypass Firm Dummy	-1.044	\	16.483	28.324
	(15.167)		(20.606)	(29.236)
Constant	-0.137	2.231	-53.213a	8.335
	(23.656)	(2.00)	(14.344)	(17.496)
Regional Dummies	Yes	No	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes
Adjusted R-squared	0.863	0.571	0.534	0.520
No. of Observations	1832	1832	2290	1832

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) Firms serving as the base (constant) (a) did not have managers with bypass firms, (b) were not in part owned by external institutions and (c) were eventually privatized by the internal method.
- 4) The instrumental variables used are the same ones as those listed under Table 3.
- 5) In the level estimates, the constant term reflects the year 1991, firms in manufacturing industry, firms in Ljubljana region and firms that (a) had managers with bypass firms, (b) were not in part owned by an external institution and (c) were eventually privatized by the internal method.
- 6) In testing the hypothesis that $\gamma_2 = \gamma_3$ the values of relevant Fstatistics for IV Levels, IV First Difference, OLS Lagged Levels and IV Lagged Levels models are 71.8, 41.3, 39.9, and 14.7 respectively. The null institutions and (c) were eventually privatized in all specifications.
- 7) In testing the hypothesis that $\gamma_1 = 1 - \gamma_2$ the values of relevant F statistics for IV Levels, IV First Difference, OLS Lagged Levels and IV Lagged Levels models are 0.54, 0.9, 1.6, and 5.5 respectively. At the 5% level we A71 can reject all except IV Lagged Levels model.

Table 6: Joint Estimates of the Investment and Labor Cost Equations - Basic Model

Variable \ Model	3SLS	3SLS	2SLS	3SLS	3SLS	3SLS	2SLS	3SLS
	Levels	First	Lagged	Lagged	Levels	First	Lagged	Lagged
		Difference	Levels	Levels		Difference	Levels	Levels
INVESTMENT EQUATION								
VA/L	0.449 ^a	0.342 ^a	0.705 ^a	0.718 ^a	0.441 ^a	0.340 ^a	0.655 ^a	0.671 ^a
	(0.041)	(0.051)	(0.156)	(0.153)	(0.041)	(0.051)	(0.152)	(0.151)
LC/L	-0.479 ^a	-0.338 ^a	-0.814 ^a	-0.833 ^a	-0.468 ^a	-0.334 ^a	-0.746 ^a	-0.769 ^a
	(0.066)	(0.086)	(0.216)	(0.212)	(0.067)	(0.086)	(0.211)	(0.208)
Group Firm 1 Dummy	22.069 ^a	\	23.511 ^a	23.348 ^a	\	\	\	\
	(6.292)		(7.187)	(7.137)				
Group Firm 2 Dummy	11.284	\	12.093	12.141	\	\	\	\
	(11.539)		(13.216)	(13.123)				
Group Firm 3 Dummy	9.236 ^c	\	3.615	3.354	\	\	\	\
	(5.381)		(6.308)	(6.260)				
Group Firm 4 Dummy	21.273 ^a	\	15.138 ^b	14.655 ^b	\	\	\	\
	(5.368)		(7.319)	(7.250)				
Group Firm 5 Dummy	11.163	\	24.925 ^b	24.675 ^b	\	\	\	\
	(10.744)		(12.220)	(12.127)				
Group Firm 6 Dummy	-1.744	\	-5.382	-5.197	\	\	\	\
	(9.696)		(11.094)	(11.017)				
Group Firm 7 Dummy	8.338 ^c	\	8.632 ^c	8.024	\	\	\	\
	(4.649)		(5.336)	(5.294)				
External Privatization Dummy	\	\	\	\	3.880	\	3.339	2.952
					(3.656)		(4.284)	(4.255)
Previous Owner Dummy	\	\	\	\	15.585 ^a	\	15.742 ^a	15.709 ^a
					(4.006)		(4.625)	(4.596)
Bypass Firm Dummy	\	\	\		1.307	\	0.036	0.064
					(4.141)		(4.654)	(4.628)
Constant	16.325 ^b	4.261 ^c	29.376 ^a	29.192 ^a	17.069 ^b	4.191 ^c	28.770 ^a	28.583 ^a
	(7.763)	(2.391)	(9.824)	(9.694)	(7.744)	(2.391)	(9.684)	(9.574)
Year Dummies	Yes							
Industry Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes
LABOR EQUATION								
y ^a	1.462 ^a	1.213 ^a	0.848 ^a	0.833 ^a	1.462 ^a	1.211 ^a	0.839 ^a	0.826 ^a
	(0.356)	(0.263)	(0.136)	(0.135)	(0.355)	(0.263)	(0.135)	(0.134)
(R - H - DEPR)/L	0.565 ^a	0.351 ^a	0.600 ^a	0.606 ^a	0.564 ^a	0.352 ^a	0.602 ^a	0.607 ^a
	(0.017)	(0.030)	(0.023)	(0.022)	(0.017)	(0.030)	(0.023)	(0.023)
DEPR/L	0.154 ^b	0.597 ^a	0.364 ^a	0.323 ^a	0.164 ^a	0.591 ^a	0.369 ^a	0.328 ^a
	(0.069)	(0.126)	(0.084)	(0.083)	(0.069)	(0.128)	(0.085)	(0.084)

Group 1 Dummy	-1.298	\	-2.661	-2.755	\	\	\	\
	(5.642)		(7.768)	(7.724)				
Group 2 Dummy	-3.600	\	-6.170	-5.985	\	\	\	\
	(10.409)		(14.360)	(14.275)				
Group 3 Dummy	-1.665	\	-10.277	-9.994	\	\	\	\
	(4.874)		(6.691)	(6.652)				
Group 4 Dummy	2.681	\	-7.659	-6.256	\	\	\	\
	(5.563)		(7.150)	(7.101)				
Group 5 Dummy	-10.558	\	0.055	1.122	\	\	\	\
	(9.659)		(13.101)	(13.027)				
Group 6 Dummy	-3.275	\	-7.299	-6.858	\	\	\	\
	(8.685)		(11.973)	(11.905)				
Group 7 Dummy	0.189		-5.238	-4.596	\	\	\	\
	(4.324)		(5.813)	(5.777)				
External Privatization Dummy	\	\	\	\	0.367	\	-3.713	-2.896
					(3.489)		(4.688)	(4.664)
Previous Owner Dummy	\	\	\	\	-0.377	\	-1.060	-0.739
					(3.681)		(4.932)	(4.909)
Bypass Firm Dummy	\	\	\	\	-3.557	\	-5.753	-5.641
					(3.764)		(5.166)	(5.141)
Constant	-61.883 ^b	10.648 ^a	-0.949	0.409	-62.154 ^b	10.653 ^a	-1.427	-0.266
	(32.457)	(1.698)	(14.933)	(14.800)	(32.387)	(1.696)	(14.695)	(14.588)
Regional Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) Firms in Groups 1-7 are the same ones as those identified in the notes below Table 2.
- 4) The instrumental variables used are the same ones as those listed under Table 2.

Table 7: Simultaneous Investment and Labor Cost Equation with Interactions Among Groups of Firms

Variable \ Model	3SLS Levels	3SLS First Difference	2SLS Lagged Levels	3SLS Lagged Levels
INVESTMENT EQUATION				
VAL	0.662 ^a (0.093)	0.643 ^a (0.154)	0.934 ^a (0.145)	0.942 ^a (0.143)
y	-0.676 ^a (0.112)	-0.871 ^a (0.231)	-0.995 ^a (0.168)	-1.005 ^a (0.167)
VAL · External Privatization	-0.515 ^a (0.092)	-0.853 ^a (0.172)	-0.734 ^a (0.126)	-0.733 ^a (0.125)
y · External Privatization	0.546 ^a (0.181)	1.106 ^a (0.328)	0.615 ^a (0.202)	0.602 ^a (0.199)
VAL · Previous Owner	0.535 ^a (0.084)	0.731 ^a (0.161)	0.214 ^b (0.109)	0.218 ^b (0.108)
y · Previous Owner	-0.319 ^c (0.184)	-0.639 ^c (0.339)	0.507 ^b (0.210)	0.492 ^b (0.207)
VAL · Bypass Firm	-0.415 ^a (0.077)	-0.168 (0.128)	-0.827 ^a (0.148)	-0.823 ^a (0.147)
y · Bypass Firm	0.771 ^a (0.159)	0.074 (0.261)	1.271 ^a (0.219)	1.252 ^a (0.217)
External Privatization Dummy	12.952 (15.891)	\	40.144 ^a (15.768)	41.609 ^a (15.625)
Previous Owner Dummy	-37.131 ^b (17.515)	\	-80.165 ^a (16.776)	-78.822 ^a (16.619)
Bypass Firm Dummy	-35.812 ^b (17.613)	\	-27.327 (17.115)	-25.583 (16.965)
Constant	5.417 (7.407)	2.221 (4.160)	-4.861 (7.010)	-5.815 (6.942)
Year Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes

LABOR EQUATION

y^a	0.304	-0.698 ^c	0.691 ^a	0.680 ^a
	(0.252)	(0.412)	(0.171)	(0.169)
(R - H - DEPR) / L	0.854 ^a	0.898 ^a	0.696 ^a	0.696 ^a
	(0.016)	(0.053)	(0.024)	(0.024)
DEPR / L	-0.003	0.312	0.107	0.088
	(0.094)	(0.335)	(0.149)	(0.148)
y^a · External Privatization	0.526 ^a	2.332 ^a	0.193	0.151
	(0.161)	(0.476)	(0.312)	(0.308)
[(R - H - DEPR) / L] · External Privatization	-0.434 ^a	-0.561 ^a	-0.312 ^a	-0.309 ^a
	(0.034)	(0.078)	(0.067)	(0.066)
(DEPR / L) · External Privatization	0.583 ^a	-0.094	0.471 ^a	0.498 ^a
	(0.093)	(0.351)	(0.162)	(0.161)
y^a · Previous Owner	0.187	1.859 ^a	0.158	0.206
	(0.186)	(0.637)	(0.363)	(0.359)
[(R - H - DEPR) / L] · Previous Owner	-0.017	-0.585 ^a	0.009	0.024
	(0.042)	(0.176)	(0.089)	(0.088)
(DEPR / L) · Previous Owner	0.243 ^a	0.188	-0.311 ^a	-0.334 ^a
	(0.061)	(0.254)	(0.106)	(0.105)
y^a · Bypass Firm	0.500 ^a	0.591	0.251	0.263
	(0.163)	(0.607)	(0.323)	(0.320)
[(R - H - DEPR) / L] · Bypass Firm	-0.372 ^a	0.229	-0.499 ^a	-0.505 ^a
	(0.039)	(0.194)	(0.092)	(0.091)
(DEPR / L) · Bypass Firm	0.290 ^c	-0.772	0.203	0.229
	(0.155)	(0.549)	(0.228)	(0.225)
External Privatization Dummy	-5.263	\	5.968	8.483
	(14.730)		(28.833)	(28.546)
Previous Owner Dummy	-4.022	\	-3.549	-9.103
	(16.301)		(31.302)	(30.997)
Bypass Firm Dummy	-0.481	\	28.324	27.144
	(14.988)		(29.236)	(28.963)
Constant	3.252	1.992	8.335	10.203
	(23.233)	(2.298)	(17.496)	(17.346)
Regional Dummies	Yes	No	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes

Notes: Next page

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) In the IV Levels model we used the following instruments: dummy variables for industry, region, time and firm types, lagged first difference of value added/worker, lagged first difference of revenue/worker, lagged capital/worker, lagged first difference of capital/worker, lagged first difference of the alternative wage, first difference of the alternative wage, lagged first difference of depreciation/worker and lagged first difference of (profit+labor cost)/worker and all above non-dummy instruments multiplied by firm group dummies.
- 4) In the IV First Difference model we used the following instruments: dummy variables for time and firm types, twice lagged value added/worker, twice lagged revenue/worker, lagged first difference of capital/worker, first difference of capital/worker, lagged first difference of the alternative wage, first difference of the alternative wage, twice lagged depreciation/worker, lagged first difference of revenue/worker, lagged first difference of value added/worker, lagged first difference of depreciation/worker, lagged first difference of (profit+labor cost)/worker, lagged first difference of value added/worker multiplied by firm dummy, lagged first difference of depreciation/worker multiplied by firm dummy, first difference of capital/worker multiplied by firm dummy, lagged first difference of depreciation/worker multiplied by firm dummy and lagged first difference of (profit+labor cost)/worker multiplied by firm dummy.
- 5) In the IV Lagged Levels model we used the following instruments: dummy variables for industry, region and firm types, lagged first difference of value added/worker, lagged first difference of revenue/worker, lagged first difference of capital/worker, lagged capital/worker, lagged first difference of the alternative wage, lagged alternative wage, lagged first difference of depreciation/worker, lagged first difference of (profit+labor cost)/worker and all above non-dummy variables multiplied by firm group dummies.
- 6) In the level estimates of the investment equation, the constant term reflects the year 1991, firms in manufacturing industry and firms that (a) had managers with bypass firms, (b) were not in part owned by an external institution and (c) were eventually privatized by the internal method.
- 7) In the level estimates of the investment equation, the constant term reflects the year 1991, firms in manufacturing industry and firms that (a) had managers with bypass firms, (b) were not in part owned by an external institution and (c) were eventually privatized by the internal method and also firms in the Ljubljana region.

APPENDIX

In this appendix we show that when one carries out the dynamic maximization of income per worker in the presence of cost of capital adjustment (the dynamic analog to the traditional maximand in the labor-management literature), one obtains an Euler equation that is analogous to the one obtained from profit maximization except that variables are usually scaled by labor rather than capital. We also show the similarity between the two sets of equations when one expresses them both in per capital form.

Assume that the firm maximizes the value function V_t

$$(A1) \quad V_t = E \left[\sum_{j=0}^{\infty} \xi_{t+j} y_{t+j} \middle| \Omega_t \right],$$

where E is the expectations operator, ξ_{t+j} is the discount factor given by

$$\xi_{t+j} = \prod_{n=0}^{j-1} \frac{1}{1+r_{t+n}} \text{ for } j > 0, \text{ and } \xi_{t+j} = 1 \text{ for } j = 0,$$

r_{t+n} is the discount rate, y_t is income per worker, and Ω_t is the information set at time t . Define income per worker as y_t

$$(A2) \quad y_t = w_t + \frac{\pi_t}{L_t},$$

where w_t is the market (reservation) wage, π_t is net profit and L_t is the number of workers. Now let p_t denote the product price, F the production function, G the cost of capital adjustment function, and p_t^I the price of investment goods. Next define net profit π_t as revenue $p_t F$ net of the cost of capital adjustment G , labor cost wL and direct investment cost $p_t^I I$:

$$(A3) \quad \pi_t = \pi(K_t, L_t, I_t) = p_t [F(K_t, L_t) - G(K_t, I_t)] - w_t L_t - p_t^I I_t.$$

Substituting equation (A3) into (A2) yields the following expression for the income per worker:

$$(A4) \quad y_t = y(K_t, L_t, I_t) = \frac{p_t [F(K_t, L_t) - G(K_t, I_t)] - p_t^I I_t}{L_t}.$$

Assuming that direct investment cost is incurred at the start of each period, the dynamic programming problem of optimal investment in the presence of capital adjustment cost may be formulated as

$$(A5) \quad V_t(K_{t-1}) = \max_{K_t, L_t, I_t} \{y_t(K_t, L_t, I_t) + E[\xi_{t+1} V_{t+1}(K_t) | \Omega_t]\},$$

where $K_t = (1 - \delta)K_{t-1} + I_t$ and δ is the rate of depreciation of the capital stock. Maximizing equation (A5) with respect to K_t , L_t and I_t , and assuming that the firms have rational expectations, quadratic cost of capital adjustment and a Cobb-Douglas production function, yields a dynamic nonlinear investment equation of the form

$$(A6) \quad \frac{I_t}{L_t} = \gamma_0 + \gamma_1 \frac{Q_{t-1}}{K_{t-1}} \frac{K_t}{L_{t-1}} + \gamma_2 \left(\frac{I_{t-1}}{K_{t-1}} \right)^2 \frac{K_t}{L_{t-1}} + \gamma_3 \frac{I_{t-1}}{K_{t-1}} \frac{K_t}{L_{t-1}} + \gamma_4 \frac{K_t}{L_{t-1}} + \gamma_5 K_t$$

Note that the corresponding equation under dynamic profit maximization is analogous except that the relevant variables are expressed in a “per unit of capital” rather than “per worker” form (Lizal and Svejnar, 1997):

$$(A7) \quad \frac{I_t}{K_t} = \psi_0 + \psi_1 \frac{Q_{t-1}}{K_{t-1}} + \psi_2 \left(\frac{I_{t-1}}{K_{t-1}} \right)^2 + \psi_3 \left(\frac{I_{t-1}}{K_{t-1}} \right)$$

Now, multiplying equation (A6) throughout by L_t and dividing by K_t yields an equation that is similar to equation (A7) in that most terms are scaled by lagged capital, but most terms are also multiplied by L_t/L_{t-1} :

$$(A6') \quad \frac{I_t}{K_t} = \gamma_0 + \gamma_1 \frac{Q_{t-1}}{K_{t-1}} \frac{L_t}{L_{t-1}} + \gamma_2 \left(\frac{I_{t-1}}{K_{t-1}} \right)^2 \frac{L_t}{L_{t-1}} + \gamma_3 \frac{I_{t-1}}{K_{t-1}} \frac{L_t}{L_{t-1}} + \gamma_4 \frac{L_t}{L_{t-1}} + \gamma_5 K_t$$

The choice of estimating the investment equations in a per unit of capital or per worker form is hence somewhat arbitrary. The results from the basic estimation in a per unit of capital form are shown in

Table A1 below.

Table A1: Determinants of Investment / Capital

Variable \ Model	IV	IV	OLS	IV	IV	IV	OLS	IV
	Levels	First	Lagged	Lagged	Levels	First	Lagged	Lagged
		Difference	Levels	Levels		Difference	Levels	Levels
VAK	0.180 ^a	-0.084	0.082 ^a	0.059	0.180 ^a	-0.086	0.082 ^a	0.068
	(0.065)	(0.053)	(0.009)	(0.053)	(0.064)	(0.054)	(0.009)	(0.051)
yL/K	-0.138 ^b	0.091 ^c	-0.062 ^a	-0.020	-0.138 ^b	0.093 ^c	-0.063 ^a	-0.033
	(0.068)	(0.053)	(0.010)	(0.059)	(0.067)	(0.053)	(0.010)	(0.056)
R/K	-0.002	-0.001	0.001 ^a	-0.001	-0.002	-0.001	0.001 ^a	0.0001
	(0.003)	(0.002)	(0.0003)	(0.004)	(0.003)	(0.002)	(0.0004)	(0.004)
Group 1 Dummy	0.009	\	0.002	0.004	\	\	\	\
	(0.010)		(0.008)	(0.010)				
Group 2 Dummy	-0.015	\	-0.016	-0.023	\	\	\	\
	(0.017)		(0.014)	(0.017)				
Group 3 Dummy	-0.0003	\	0.002	0.0002	\	\	\	\
	(0.008)		(0.007)	(0.008)				
Group 4 Dummy	0.0007	\	0.003	0.0008	\	\	\	\
	(0.008)		(0.006)	(0.008)				
Group 5 Dummy	0.012	\	0.006	0.007	\	\	\	\
	(0.016)		(0.013)	(0.016)				
Group 6 Dummy	0.006	\	0.002	0.002	\	\	\	\
	(0.015)		(0.012)	(0.015)				
Group 7 Dummy	-0.001	\	-0.005	-0.006	\	\	\	\
	(0.007)		(0.006)	(0.008)				
External Privatization	\	\	\	\	-0.0007	\	-0.002	-0.002
Dummy					(0.005)		(0.004)	(0.005)
Previous Owner Dummy	\	\	\	\	0.003	\	0.003	0.001
					(0.006)		(0.005)	(0.006)
Bypass Firm Dummy	\	\	\	\	0.0001	\	0.001	-0.0001
					(0.006)		(0.005)	(0.006)
Constant	0.039 ^a	0.009 ^c	0.007	0.058 ^a	0.039 ^a	0.009 ^c	0.007	0.043 ^a
	(0.009)	(0.005)	(0.007)	(0.009)	(0.010)	(0.005)	(0.007)	(0.009)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	No	Yes	Yes	Yes	No	Yes	Yes

Adjusted R-squared	0.158	...	0.169	0.174	0.159	...	0.169	0.185
No. of Observations	1832	1832	2290	1832	1832	1832	2290	1832

Notes:

- 1) Values in parentheses are standard errors.
- 2) a, b, c = statistically significant at 1%, 5% and 10% on a two tail test, respectively.
- 3) Firms in Groups 1-7 are the same ones as those identified in the notes below Table 2
- 4) Firms serving as the base (constant) are firms that (a) did not have managers with bypass firms, (b) were not in part owned by an external institution and (c) were eventually privatized by the internal method.
- 5) In the level estimates, the constant term reflects the year 1991, firms in manufacturing industry and firms that (a) had managers with bypass firms, (b) were not in part owned by an external institution prior to privatization and (c) were eventually privatized by the internal method.
- 6) In the IV Levels model we used the following instruments: dummy variables for industry, region, time and firm types, lagged first difference of value added/capital, lagged first difference of revenue/capital, lagged worker/capital, lagged first difference of worker/capital, lagged first difference of the alternative wage, first difference of the alternative wage, lagged first difference of depreciation/worker, and lagged first difference of (profit+labor cost)/worker.
- 7) In the IV First Difference model we used the following instruments: dummy variables for industry, region, time and firm types, lagged value added/capital, twice lagged revenue/capital, lagged first difference of worker/capital, first difference of worker/capital, lagged first difference of the alternative wage, first difference of the alternative wage, twice lagged depreciation/worker, twice lagged (profit+labor cost)/worker, lagged first difference of revenue/capital, lagged first difference of value added/capital, lagged first difference of depreciation/worker, and lagged first difference of (profit+labor cost)/worker.
- 8) In the IV Lagged Levels model we used the following instruments: dummy variables for industry, region, time and firm types, lagged first difference of depreciation/worker, lagged first difference of (profit+labor cost)/worker, lagged worker/capital, lagged first difference of the alternative wage, lagged alternative wage, lagged first difference of depreciation/worker, and first difference of (profit+labor cost)/worker.