Financial Conditions and Investment

during the Transition:

Evidence from Czech Firms

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Abstract

In this paper, we examine net investment during the early stages of transition using micro data on the population of medium and large industrial firms in the Czech Republic during the 1992-95 period. We examine the relevance of alternative models of investment and test if investment behavior varies across categories of ownership and with the legal status of firms. Our analysis of depreciation leads us to the conclusion that replacement investment displays a similar pattern in many ownership-legal form categories of firms. Retained profit is found to be a major determinant of new investment and the estimate is statistically significant even when we use the most robust fixed effects estimates based on one-year differences. We find that enterprise profitability has a strong positive effect on investment in all types of firms except for privately owned-limited liability companies and foreign owned and mixed ownership firms. These results are consistent with the financing-hierarchy and credit-rationing hypotheses which indicate that domestic firms cannot easily borrow investment funds externally and that net investment varies with retained profits. Firms take into account various stock measures of internal finance. In particular, a stock of cash, receivables, receivables overdue, payables, and payables overdue systematically affect net investment.

Abstrakt

V tomto článku analyzujeme čisté investice na mikrodatech populace velkých a středních českých průmyslových podniků v počátečním období transformace v letech 1992-95. Porovnáváme jednotlivé investiční modely navzájem a též rozdíly v determinantech investic podle kateogirií firem v závislosti na vlastnictví a právní formě. Analýza odpisů nenachází rozdíly mezi jednotlivými kategoriemi vlastnictví a právní formy. Nerozdělený zisk je hlavním determinantem nových investic a odhady jsou statisticky signifikantní i při použití robustních odhadů (fixními efekty) na ročních diferencích. Ziskovost má silný pozitivní efekt na investice pro všechny typy firem s výjimkou soukromě vlastněných s.r.o. a též zahraničně vlastněných firem. Tyto výsledky jsou v souladu s hypotézami finanční hierarchie a úvěrového přidělování, což naznačuje, že domácí podniky si nemohou snadno půjčit na investice a tedy čisté investice se mění podle nerozdělených zisků. Podniky též berou v úvahu různé vnitřní finanční stavy, zejména peníze, pohledávky a pohledávky po lhůtě splatnosti, závazky a závazky po lhůtě splatnosti mají vliv na čisté investice.

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1. Introduction

Since investment determines the quantity and quality of one of the two most important factors of production and greatly affects macroeconomic activity, studies of investment behavior have always occupied a pivotal place in western economics. On the demand side, much of the literature has focused on establishing the relative merits of the Tobin Q, neoclassical and accelerator models of investment demand. For the most part, the literature has assumed that the supply of investment finance is perfectly elastic. In recent years, part of the literature has concentrated on the supply side, examining the effects of potential market imperfections on the supply of capital to different types of firms.[1)]

In view of Stalin's and other communist leaders' preoccupation with overtaking capitalist economies by carrying out massive capital formation, studies of investment also constituted a key area of comparative economics.[2)] The centrally planned economies (CPEs) indeed reported very high rates of investment during most of their existence, although these rates declined somewhat in the 1980s as the growth of these economies slowed down and popular demand for consumption goods became harder to ignore (EBRD, 1995). The high pre-1980s investment rates in CPEs also generated large stocks of capital whose vintage became gradually older in the 1980s. Finally, the CPEs increasingly lagged in terms of technical progress, and the COCOM embargo, imposed in the 1980s by western countries on advanced technology exports to the CPEs, further hampered the ability of these economies to reduce the rate of growth of their comparative technological obsolescence.

As the transition from central planning to a market system started to unfold in the 1990s, it became clear that the transition economies needed to invest heavily in order to modernize their obsolete capital stock and become competitive on world markets. The issue of how best to restructure and modernize the state-owned firms has been the focal point of a major policy debate about what constitutes an optimal type of ownership and legal form in these new market economies. Interestingly, while a small number of studies provided valuable partial surveys of investment in the transition economies,[3)] detailed

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1) See e.g., Jorgenson (1971), Nickell (1977), Abel (1980), Abel and Blanchard (1986), Shapiro (1986), Fazzari et al. (1988), Hayashi and Inoue (1991), Blanchard et al. (1990), and Bond and Meghir (1994).

2) See e.g., Thornton (1970), Desai (1976), Gomulka (1978, 1986), Greene and Levine (1976), Weitzman (1979), Brada and Hoffman (1985), and Terrell (1992, 1993).

3) See e.g., Belka et al. (1994), EBRD (1995) and Eickelpasch (1995).

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analytical studies of the investment behavior of firms in these economies are just now being performed.

In this paper, we carry out an in-depth analytical study of investment behavior using data from most industrial firms located in the Czech Republic during the 1992-95 period. The Czech Republic is one of the pioneering transition countries, having carried out the most widespread privatization and commercialization of firms, attracting significant foreign direct investment, and maintaining relatively high rates of investment in general. Our study is therefore of interest because it analyzes investment behavior in one of the leading transition economies that serves as a model for the countries that launched their transitions later.

While our study is naturally of interest to the analysts, policy makers and observers of the transition process, the fact that we are able to use a very large panel of quarterly firm-level data makes our work relevant in the context of the recent investment literature in general. In particular, by using micro panel data we are able to eliminate bias introduced by aggregation (see e.g., Abel and Blanchard,1986), reduce measurement error, and take into account heterogeneity across firms and over time (see e.g., Bond and Meghir, 1994).

Unlike in many western studies, we are fortunate to have data on both depreciation and net investment. Our empirical strategy has therefore been to examine the behavior of these two components of gross investment separately. Since our results about the behavior of depreciation parallel the earlier findings of Lizal (1999a), in this study we extend this work but focus primarily on the behavior of net investment. Moreover, since the issues of (a) the degree of imperfection of capital markets and (b) the relationship between enterprise ownership and investment (strategic restructuring) are key issues in the transition literature, we examine the relationship between net investment and the availability of internal finance using data from thirteen principal ownership-legal form categories of firms.

The switch from central planning to a transition period forced firms that traditionally received centrally-allocated investment funds to face the emerging commercial banks and other financial institutions. Operating in a highly protected and concentrated environment, the new commercial banks usually imposed high spreads between deposit and lending rates in order to increase their low initial capitalization. They also had to develop their project appraisal capability from scratch and establish international accounting standards. In this context, it is likely that many of the new and existing firms faced expensive external finance for investment or were denied such finance. The data from transition economies

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hence lend themselves to testing the financing hierarchy and credit rationing hypotheses advanced in western literature.[4)]

In this paper we present estimates of the financing hierarchy (credit rationing) models of net investment. Our focus on these supply side models is given by the fact that there are strong beliefs among observers of transition economies that capital markets are highly imperfect and that verifying the extent of this phenomenon is an important task for empirical research. Moreover, our pre-tests reveal that models that stem from neoclassical literature do not receive much support from the net investment data.[5)]

2. The Data and Basic Statistics

2a. Comparative Macroeconomic Indicators

Since 1991, the national statistical offices of the Czech Republic, Hungary, Poland and Slovakia have been collecting comparable data on major macroeconomic indicators. In Table 1, we present aggregate time series data from this source on GDP, gross investment, and the investment/GDP ratio for these four economies.[6)] The corresponding plots of the investment/GDP ratio are shown in Figure 1.

The data in Table 1 and Figure 1 reveal two striking features: a) the Czech and Slovak Republics have since 1991 uniformly invested a higher proportion of GDP than Hungary and Poland, and b) the investment behavior displays a very strong and regular seasonal character in all four economies.

With respect to rates of investment across the four economies, the investment/GDP ratio in the Czech Republic averaged 30% and fluctuated in the 14-54% range, between 1991 and the fourth quarter of 1996. In Slovakia, the ratio averaged 32%, with a range of 16-67%. In Hungary, investment/GDP attained an average of 19% and moved between 9% and 32%. Finally, in Poland the investment/GDP ratio averaged a mere 10%, with a range of 5-19%.

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4) See Fazzari et al. (1988) and Gertler (1988) for overviews of this literature.

5) As Lizal and Svejnar (1998) show, there is some support for neoclassical models in the behavior of gross investment. In future research it will also be useful to examine the possibility of estimating dynamic structural models of investment in more detail. However, as Lizal (1999b) shows, in the Czech case the parameters from these models imply unrealistic beliefs about the long-term sustainability of soft budget macroeconomic policies.

6) The source is CESTAT, various issues.

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The question that naturally arises is why do the four Central European countries display such different propensities to invest. In the case of Poland, the data cover only larger firms (those with more than 50 workers in industry and 20 workers elsewhere). It is hence possible that the low investment figures for Poland are brought about by this omission of smaller firms. As Gomulka and Jasinski (1994) have shown, the small private firms accounted for most of the growth in the Polish economy in the early 1990s and they are therefore likely to have invested significantly in order to produce this growth. In the Czech Republic, unlike the other three countries, the investment data exclude intangible assets. Consequently, the Czech investment/GDP ratio would be even higher if this type of investment were included. The greatest puzzle is perhaps Hungary, which is reported by the World Bank (1996) to have received $10.6 billion in foreign direct investment (equivalent to 31% of its 1994 GDP) between 1989 and 1995. In contrast, in the same period the Czech Republic, with a similar population, received only $4 billion (13% of its 1994 GDP), Poland $6.5 billion (7% of its 1994 GDP), and Slovakia $0.5 billion (4% of its 1994 GDP). Hungary's domestic investment is hence particularly low compared to the other three countries.

One striking aspect of the seasonal pattern is the finding that investment rises continuously from the first to the fourth quarter and in the fourth quarter, it is almost twice as high as in the second and third quarters. The pattern is most clearly visible in the Czech and Slovak data, but it exists in the investment series of all four countries. As we will presently show, the same seasonal pattern is visible in the Czech firm-level data.

2b. The Czech Enterprise-level Data

The principal data set that we use in the present analysis was collected by the Czech Statistical Office (CSO) and covers all industrial firms employing more than 25 people in the 1992-94 period and more than 100 employees in 1995. The data were collected in quarterly or monthly intervals, depending on the size of the enterprise and the reported variables. We have combined the monthly and quarterly data so as to maximize the sample size. In some parts of our analysis, we also treat the 1995 data separately because of the change in the composition of firms.

While the CSO was careful in collecting the data, the data set contains a number of errors and inconsistencies. Moreover, when coding data the CSO does not distinguish between missing values and zeroes. In an attempt to assemble a reliable data set (approximately 50,700 quarterly observations), we have used various consistency checks.[7)]

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7) These checks are similar to Lizal, Singer and Svejnar (1995). Namely, the firm's capital at the start and end of each quarter should be positive; the average labor force in a given

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In imposing these consistency criteria, about 10% of the observations had to be dropped, leaving us with a sample comprised of about 90 percent of all industrial firms in the Czech Republic.[8)] In terms of total number of firms (quarterly observations), our data set covers 2860 firms (2252-2738 quarterly observations) in 1992, 3231 firms (2657-3009 quarterly observations) in 1993, 4133 firms (3503-3867 quarterly observations) in 1994, and 2271 firms (2205-2261 quarterly observations) in 1995. The decline in the number of firms and quarterly observations between 1994 and 1995 was brought about by a CSO switch from covering firms with 25 or more employees to 100 or more employees. A detailed description of the data is provided in the Appendix.

As may be seen from Table 2, our data set contains detailed information about the ownership and legal form of the firms. The ownership categories reflect majority ownership of the firm (e.g., a firm is classified as privately owned if it is more than fifty percent privately owned). When the private owners, cooperative members, state, or foreign owners do not own a majority stake in the firm, the firm is classified as having mixed ownership. The ownership categorization was carried out by the CSO after two massive waves of privatization in 1992 and 1993. Since the mass privatization of 1992-93 constitutes the principal reallocation of majority ownership stakes, there is little variation in the ownership of any given firm during our 1992-95 sample period.

The legal form denotes the type of legal registration of the firm and reflects the legal obligations and liabilities associated with each form of registration. It also captures the relative financial and bureaucratic ease of establishing a given type of firm. Thus, individual (family), cooperative, and limited liability categories tend to capture smaller firms that were started with a relatively low initial capital base. In contrast, joint stock companies tend to be larger in size. The exceptions to this rule are the state owned and mixed ownership firms, each of which has a similar average firm size in both the limited liability and joint

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quarter should be more than 20 employees; investment should be non-negative; production should be positive; depreciation should be positive and less than the total capital value; investment should be smaller than end of the period capital stock; the average wage should be higher than 2000Kc/month (minimum wage); sales should be non-negative; one-year lagged production, sales and labor should be non-negative or missing.

8) One large firm that met the nine criteria reported a 90 percent drop in output during the third quarter of 1993. This deviation affected the summary statistics (see e.g., the large standard deviation in 1993:Q3 investment/production in Table 3) and some regression estimates. We have therefore eliminated this observation from the data set. Finally, data on capital stock are unavailable for 1992 and we hence use 1992 data for analyses that do not involve the capital stock variable.

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stock legal form. Finally, state owned-state registered firms tend to be relatively small, averaging less than one-half of the employees of other state owned firms.

From Table 2 it is clear that the most important ownership-legal form categories are privately owned-limited liability companies (13,927 quarterly observations) and state owned-joint stock companies (11,475 quarterly observations). These are followed by state owned-state registered enterprises (6,835 quarterly observations), cooperatively owned-rural cooperatives (3,063 observations), privately owned-joint stock companies (2,480 observations), foreign owned-limited liability companies (2,091 observations), privately owned-individual/family businesses (1,845 observations), mixed ownership-joint stock companies (766 observations), foreign owned-joint stock companies (707 observations), cooperatively owned-producer cooperatives (587 observations), state owned-limited liability companies (441 observations), and mixed ownership-limited liability firms (298 observations). These twelve categories plus the remaining "other" firms category constitute the thirteen categories that we analyze in this paper.

Appendix Tables A1 and A2 give the evolution over time of the number of observations in the legal form and ownership categories, respectively. As may be seen from Table A1, between 1992 and 1994, joint stock companies maintained their share in the total number of observations at around 30% but their share jumped to 46% when only firms with 100 or more employees were considered. The share of limited liability companies rose from 27% in 1992 to 47% in 1994 and then dropped to 36% in 1995 when only firms with 100 or more employees were included. The share of firms registered as having state owned enterprise legal form declined from 25% to 6% and those registered as individual/family (entrepreneur) legal form remained at about 4% in the 1992-94 period. However, they dropped under 2% when only larger firms were covered in 1995. In terms of ownership (Table A2), the share of privately owned firms rose from 31% in 1992 to 51% in 1994 and then receded to 41% in the larger firm sample in 1995. The share of state owned firms declined from 53% in 1992 to 31% in 1994, but then rose to 41% in 1995. Between 1992 and 1995, the cooperatively owned firms' share decreased from 10% to 7%, while that of foreign owned firms jumped from 4% to 8%, and that of mixed companies rose from 2% to 4%. Overall, while the trend has not been monotonic in all cases, since 1992 there has been a definite increase in the share of domestic private, foreign and mixed ownership, together with the limited liability legal form.

Table A3 in the Appendix gives the distribution of observations across industries. The distribution of firms across industries is quite broad with the largest share of firms (16%) in the food industry, 13% in the machinery industry, 11% in the metal product industry, 7% in both the processing of non-metallic minerals and the furniture industry, and 6% in the textile industry. Each of the remaining industry groups has under 5% of all firms.

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The summary statistics of variables that are relevant to our analysis are presented in Table 3. As may be seen from the table, while both net investment and depreciation show the seasonal pattern with a fourth quarter peak that was observed in the aggregate data, the pattern is much more pronounced in net investment than in depreciation. Profit is relatively steady across all quarters in 1992 but shows a strong downward trend across quarters in 1993, 1994 and 1995. In 1993 and 1995 profit reaches negative values in the last quarter and shows relatively low overall levels in comparison to 1992 and 1994. The elimination of the small firms from the data set between 1994 and 1995 means that the average size of the labor force and capital stock increase dramatically between the last quarter of 1994 and the first quarter of 1995.

In order to start understanding the micro foundations of the cyclicality of aggregate gross investment, characterized by the peak in the fourth quarter of each year (Tables 1 and 3), we examine the behavior of net investment as well as depreciation in each of the thirteen categories of firms. In Table 4, we present the quarterly evolution of the ratio of net investment to total production for each of the thirteen principal ownership-legal form categories of firms. As can be seen from the table, the aggregate cyclical nature of the gross investment behavior is reflected regularly in the net investment behavior of state owned-joint stock companies, foreign owned-joint stock companies, and mixed ownership-joint stock companies. In three out of the four years, this behavior is also detected in private-joint stock companies, state owned-state registered firms and foreign owned-limited liability companies. Finally, cooperatives, state owned-limited liability companies, mixed ownership-limited liability companies and other firms display this pattern in two of the four years. In sum, the strong aggregate seasonal pattern of gross investment is reflected primarily in the net investment behavior of joint stock companies of all ownership types, and to a lesser extent in the net investment pattern of state owned-state registered and foreign owned-limited liability firms. Privately owned-individual (family) businesses and limited liability companies show this pattern in only one of the four years.

In examining the behavior of the ratio of depreciation to production in the various types of firms, we find virtually no reflection of the aggregate cyclical pattern in gross investment (Table 5). The quarterly depreciation/production data of the various types of firms vary but do not display the strong upward trend with a peak in the fourth quarter. At the level of the specific categories of firms, the seasonal behavior of the aggregate gross investment/GDP is hence primarily accounted for by the pattern of net investment described earlier.

Finally, in Table 6 we present calculations of the ratio of net investment plus depreciation to depreciation for each type of firm. Examining this ratio is useful because values of less than unity identify firms that are not replacing existing capital stock, while

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values significantly in excess of unity indicate that firms are substantially increasing their capital stock. As may be seen from the table, the most substantial investors by this criterion have been foreign owned and privately owned limited liability companies, followed by privately owned individual businesses, privately owned and foreign owned joint stock companies and mixed ownership companies. State owned firms and cooperatives have been investing relatively little, with state owned-limited liability companies investing less than depreciation in 1992. Finally, it is worth noting that privately owned individual and limited liability firms have shown a declining tendency to invest between 1992 and 1995. This reflects the fact that these firms started growing from a low capital base but possibly also the fact that, after massive bank lending to new private firms in the early phase of the transition,[9] these firms gradually had less access to bank capital.

3. Econometric Models and Evidence

In our empirical analysis, we estimate separate equations for depreciation and net investment in order to establish the behavioral patterns of each of these two components of gross investment. All equations are estimated by ordinary least squares. In future research it would be useful to explore the availability of instrumental variables to correct for possible endogeneity of regressors.

3a. Depreciation

Czech laws and regulations permit firms to carry out straight-line depreciation of book value capital up to upper limits that are defined for various categories of capital goods. From the profit tax standpoint, depreciation is treated as a cost of production. In our analysis, we provide estimates of the share of book value capital that depreciation accounts for in the different types of firms. In particular, since depreciation does not display strong seasonal patterns (Table 3), we start by estimating the following linear depreciation equation:

$$D_{i,t} = \alpha + \delta K_{i,t} + \varepsilon_{i,t} \quad , \qquad \textbf{(1)}$$

where D denotes the quarterly value of depreciation, K the book value of capital and δ the depreciation rate. We have included a constant term which allows more flexibility since we might always view this specification as a first approximation of a depreciation process(see Lizal, 1999a).

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9) See Dyba and Svejnar (1995).

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The coefficient estimates of equation (1), covering the 1993-5 period for which capital data are available, are presented in Table 7 for the sample as a whole and Table 8 for each category of firms. Coefficient of interest δ is reported as a quarterly percentage rate. As the F-test statistics below the two tables indicate, the specification with a single intercept and single slope coefficient is preferable to specifications in which these vary by industry. Moreover, Hausman test statistics below the two tables indicate that the fixed effects specification is superior to the corresponding random effects model at a 1 percent significance test level. We hence use the results from the parsimonious specification and fixed effect (within) method of estimation. (The OLS, between and random effects estimates, are reported for comparison).

The overall estimated rate of depreciation is estimated to be about 1 percent of the capital stock per quarter or 4 percent at the annual rate (Table 7). Since the legally permissible depreciation rate varies from 2 to 20 percent per year, depending on the type of capital, our results indicate that the firms' capital stock tends to be dominated by low depreciation capital such as buildings.

In Table 8, we present estimates of the depreciation rate by firm type. The 1.74 percent coefficient of quarterly depreciation for the state owned and registered firms represents the base to which the coefficients for other types of firms are related. The coefficients for other types of firms hence indicate the deviation from the 1.74 coefficient of the state owned and registered firms. As may be seen from the table, one cannot reject the hypothesis that the 1.74 percent quarterly depreciation rate found for state owned and registered firms also reflects the depreciation rate of privately owned individual businesses, cooperatives, foreign owned-joint stock companies, and mixed ownership-limited liability companies. The estimate of quarterly depreciation rate for foreign owned-limited liability companies are almost twice as high, while estimates for private and state owned-joint stock companies are about one-third less than the base rate of 1.74. The state owned-limited liability companies generate a -1.43 fixed effects estimate which implies a very low rate of depreciation for these firms. This estimated coefficient is also out of line with the OLS, between and random effects estimates reported in Table 8. Given the implausibly low value and the difference in comparison with the other estimates, the state owned-limited liability estimate needs to be treated with caution.

The different estimated depreciation rates across categories of firms raises the question of whether they are brought about by the particular type of investment carried out recently by the different types of firms or whether they are due to a systematic change of ownership and legal form in firms with certain capital stock during the transition. In order to check which hypothesis receives more support, we have estimated equation (1) on data for 1993 and 1995, respectively. The 1993 capital data by and large reflect the capital

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stock inherited from the period of central planning, while the 1995 capital data are already much more influenced by the investment activity undertaken by firms since their commercialization and ownership changes in the early 1990s. The results (not reported here in a tabular form) indicate that the depreciation rate of companies with foreign ownership grows more than that of other types of firms over time. This suggests that depreciation is generally rising because of new investment but that (foreign) ownership plays a part as well.

3b. Net Investment

In the Czech Republic, net investment is legally not a cost of production. Net investment hence reflects the firm's desire to invest out of taxable retained earnings or funds obtained from government subsidies, bank loans, company bond issues, or equity issues. As we mentioned earlier, the transition has brought about a significant reduction of government subsidies to firms, while capital markets have been developing only very gradually. It is therefore likely that the availability of internal funds has had a significant impact on investment behavior of some types of firms. In particular, we hypothesize that the individually owned or limited liability companies, which tend to be small, will be more rationed in the capital market than the joint stock companies that tend to be large, or the foreign firms that can supply themselves with investment finance from other countries.[10)] We therefore estimate models that link net investment to factors such as the availability of internal finance within the firm which permit us to test this hypothesis (see e.g., Fazzari et al.,1988, Oliner and Rudebusch, 1992, and van Ees and Garretsen, 1994).[11)]

Investment and Profit

Since our data set contains information on profit for most firms for most of the time periods, we first examine the link of investment to this variable. This corresponds to the use of the cash flow variable (profit plus depreciation) in the Western studies, except that we are able to analyze depreciation separately and hence use net rather than gross investment as the dependent variable and profit rather than profit plus depreciation as the

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10) In the first phase of the transition, western banks opened branches and subsidiaries in the transition economies primarily to serve the foreign firms, many of which had been their established clients.

11) We have also tested the validity of the neoclassical/accelerator models of investment by including an output sales variable as a regressor. The estimated coefficient on this variable was usually insignificant and occasionally had a negative rather than positive sign.

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explanatory variable. We estimate two models that link each type of firm's quarterly net investment to the present and past values of its profit.

In the first model we explicitly take into account the strong seasonal component found in the quarterly data and estimate the equation in the four-quarter difference form, thus controlling for the seasonality as well as other firm-specific fixed effects. During some of the quarters we are missing either profit or net investment data for some of the firms, and the data set on which we run the net investment equation is hence smaller (by almost one-half) than the original data set. In order to control for possible selection bias in this process, we first run a Heckman-type probit equation, predicting the probability of the firm being included in the sample on the basis of data on investment, profit, industry and firm type. The resulting inverse Mills ratio is included as an explanatory variable in the four-quarter difference investment equation. The estimating equation is hence of the form

$$\Delta_4 I^{net}_{i,t} = \beta_1 \Delta_4 \Pi_{i,t} + \beta_2 \Delta_4 \Pi_{i,t-1} + \gamma M_{i,t} + \varepsilon_{i,t} \quad , \qquad \textbf{(2)}$$

where I^{net} denotes net investment, Π gross profit, and M the inverse Mills ratio from the probit estimation. In order to assess the seasonal and industry effects, we use the Anderson-Hsiao decomposition of the residuals generated by a level version of equation (2), using the estimated (within) coefficients from (2). These level residuals are regressed on quarterly and industry dummy variables.

The estimates of equation (2), together with an analysis of implied residuals, are presented in Table 9. The reported specification is based on current and one quarter lagged profit since longer lags proved to be mostly insignificant and their inclusion did not materially alter the results. As may be seen from the first column, the overall regression that constrains the coefficients to be identical for all types of firms indicates that there is a statistically very strong positive relationship between profit and investment, with a one crown increase in profit resulting in a 0.1 crown instantaneous and 0.12 crown long term increase in investment.

The estimates by type of firm are presented in columns 2-13 of Table 9. As may be seen from these columns, enterprise profitability has a strong positive effect on investment in all types of firms except for privately owned-limited liability companies and foreign owned and mixed ownership firms. The result for foreign owned and mixed firms is consistent with the financing hierarchy and credit rationing hypotheses. In the case of privately owned-limited liability companies the finding is a bit counterintuitive. It must be noticed, however, that these three types of firms displayed a major decrease in profits in 1993 and to some extent also in 1995 (Table A4-A7). It is therefore possible that the lack of a positive relationship between their profit and investment reflects this fluctuation in profit -- a

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conjecture that we explore below. The inverse Mills ratio was always insignificant on one per cent level of significance, and only once significant on the ten per cent level for the state owned-joint stock type (which probably causes the same significance for the overall regression). Such a result indicates that the sample selection problem is minimal even in the most problematic case.

The second stage analysis of the residuals of equation (2), presented in the lower part of Table 9, indicates that there is a strong seasonal pattern in the overall regression. In particular, the coefficients on quarterly dummies imply a rising investment pattern over the four quarters with a strong increase in the fourth quarter. From the regressions run by firm type, we see that this overall pattern is driven by investment behavior of state owned companies that are state registered or joint stock, as well as by foreign owned-limited liability companies, coops, and to a lesser extent private joint stock companies. These findings are consistent with the summary statistics examined earlier.

The second model that we estimate uses current and lagged quarterly values of variables in levels rather than four-quarter differences:

$$I_{i,t}^{net} = \alpha + \beta_1 \Pi_{i,t} + \beta_2 \Pi_{i,t-1} + \varepsilon_{i,t} \quad . \qquad \textbf{(3)}$$

Not requiring a four-quarter lag, this model allows us to use all the data more effectively. Most importantly, it allows us to estimate a richer specification for the four quarters of 1994, a period for which we have data on more variables. The estimates of equation (3) are reported in Table 10. The results are based on a random effects specification which was found to be better supported by the data than a quarter-to-quarter fixed effects model.

As can be seen from Table 10, the overall specification that constrains the coefficients to be the same for all types of firms during the entire 1992-95 period yields a 0.094 coefficient on current quarter profit and a 0.034 coefficient on lagged profit. These coefficients are similar to those observed in Table 9, suggesting that the less data-intensive second model is able to capture the systematic features of investment behavior. As in Table 9, the estimates for the thirteen specific types of firms reported in Table 10 indicate that the firms that do not reflect the overall pattern are private-limited liability companies and mixed ownership companies. Unlike in Table 9, privately owned-limited liability companies as well as foreign owned companies display an insignificant effect of profit on net investment. Finally, "other firms" are also found to have a negative relationship between investment and profit. The two specifications hence produce identical overall estimates but somewhat different estimates across the thirteen groups of firms.

As mentioned earlier, profitability of firms varied over the 1992-95 period and the composition of the sample changed from 1994 to 1995. It is hence worth exploring if the

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estimates vary over time. In the lower parts of Table 10, we present separate estimates of equation (3) for each year. As the overall estimates in the first column indicate, there is indeed a sizable variation of the estimated effect of profit on net investment over the four years. While the overall long term effect is positive in all years, it is strong in 1992 and 1994, when reported enterprise profits were high, and much weaker in 1993 and 1995, when profits were on average lower. In particular, the short (long) term effect is estimated to be 0.25 (0.13) in 1992, -0.01 (0.07) in 1993, 0.36 (0.36) in 1994, and -0.01 (0.07) in 1995. The estimates for individual types of firms vary, but for a number of them the results are consistent with this overall pattern. Thus, state owned and registered firms have a strong positive effect in 1992 when their average profits were high, zero effect in 1993 when their average profits declined, and a small positive effect in 1994 and 1995 when their profit was low. Private joint stock companies register a strong positive effect in 1992 and 1994, when their profits were high, and smaller effects in the low profit years of 1993 and 1995. Foreign owned-limited liability companies produce a positive effect in 1992 when their average profit was moderately positive, a strongly negative effect in 1993 when the average profit became negative, a very strong positive effect in 1994 when average profit increased, and a positive (though less pronounced) effect in 1995 when their average profit (as well as its standard deviation) soared. The other types of firms display more diverse or less systematic patterns.[12)]

Stock and Flow Measures of Internal Finance

For 1994 (a relatively high profit year for most types of firms) we have data on a number of additional variables that capture potential sources of funds for firms in the transition setting. In particular, we have data on receivables, receivables overdue, payables, payables overdue, and cash balances. These variables correspond to the stock measures of internal finance used in some of the western studies (e.g., Fazzari et al.,

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12) The privately owned-individual businesses have a pattern that is unrelated to the behavior of average profit over time. They register a negative effect in 1992 (a profitable year) and a positive effect in 1993-95, despite the fact that their average profit in 1993-94 was similar to that in 1992, but became negative in 1995. The privately owned-limited liability firms show no effect in 1992 and 1994, when their average profit was relatively high, but they register a small positive effect in 1993 (a low profit year) and a small negative effect in 1995 (a high profit year). The foreign owned-joint stock firms show a positive effect in each year despite major fluctuations (including negative values) in average profit. Mixed ownership-joint stock companies have a positive effect in 1992, zero effect in 1993-94 and a negative effect in 1995. Mixed ownership-limited liability companies have a zero effect in 1992-93 and a positive effect in 1994-95.

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1988, Galeotti et al., 1994, Hubbard et al., 1995, or Whited, 1992). The overall results presented in the first column of Table 11 indicate that when these variables are included in the regression, profit continues to have a strong positive effect with an estimated coefficient of 0.34. Cash has an identical positive coefficient of 0.34, suggesting that it is an important determinant of investment behavior. The coefficients on the other variables are quantitatively smaller and reflect the ambiguous behavior of transition firms with respect to legal obligations. Receivables have a positive coefficient of 0.04, reflecting the fact that they represent a near term source of cash that may however be expected with less than certainty. Receivables overdue in turn have a negative coefficient of -0.08, which is consistent with the idea that these funds are unlikely to be repaid and are thus heavily discounted. Payables have an expected negative (but low) coefficient of -0.01, but payables overdue generate a positive coefficient of 0.03, likely reflecting the fact that some of these may never have to pay.

At the level of individual categories of firms, profit has a particularly strong effect on net investment among state owned-joint stock companies, foreign owned-limited liability companies, mixed ownership-limited liability companies, other firms, and to a lesser extent privately owned-joint stock companies. Cash has a strong positive effect in foreign owned-limited liability companies, mixed ownership-joint stock companies and cooperatives. It has a surprisingly negative effect in state and foreign owned joint stock companies. The latter two sets of companies appear to hold cash balances that are negatively related to their investment behavior. The investment behavior of foreign owned companies, mixed ownership-joint stock companies, and to a lesser extent state owned-joint stock companies is strongly influenced by the value of receivables and receivables overdue. Foreign owned-joint stock companies, state owned-joint stock companies, and to a lesser extent foreign owned-limited liability companies and mixed ownership-joint stock companies also generate significant coefficients on payables and payables overdue.

4. Concluding Remarks

In this study we have used firm-level data from the Czech Republic to estimate several specifications of depreciation and net investment functions, taking into account firm ownership and the seasonality of the data.

Our analysis of depreciation leads us to the conclusion that replacement investment displays a similar pattern in many ownership-legal form categories of firms. Important exceptions are foreign owned-limited liability companies, whose depreciation rate is almost twice as high, and private and state owned-joint stock companies, whose depreciation rate

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is about one-third less than the base rate of 1.74. These results reflect the findings of Lizal (1999a) who claims the major differences are associated with the type of industry.

Our analysis of net investment yields two major findings. First, retained profit is found to be a major determinant of new investment and the estimate is statistically significant even when we use the most robust fixed effects (within) estimates based on one-year differences. Our results indicate that a one crown increase in profit results in a 0.1 crown instantaneous and 0.12 crown long-term increase in investment. In estimating this effect by type of firm, we find that enterprise profitability has a strong positive effect on investment in all types of firms except for privately owned-limited liability companies and foreign owned and mixed ownership firms. All the results, except for the one related to privately owned-limited liability companies are consistent with the financing hierarchy and credit rationing hypotheses which indicate that domestic firms cannot easily borrow investment funds externally and that investment varies with (is financed from) retained profits. In the case of privately owned-limited liability companies the finding is a bit counterintuitive because one might expect these firms to be particularly rationed in the capital market. A possible explanation of the insignificant effect of profit on net investment in these firms is that many of these firms operate close to the zero profit level and a number of them may not be expanding beyond their existing scale.

Our second finding is that firms take into account various stock (as opposed to only flow) measures of internal finance in making investment decisions. In particular, a firm's stock of cash, receivables, receivables overdue, payables, and payables overdue systematically affect their net investments.

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Table 1 Macroeconomic Indicators

	Czech Republic		Hungary		Poland		Slovak Republic	
Date	I	I/GDP	I	I/GDP	I	I/GDP	I	I/GDP
1991	154.4	0.22	491.9	0.21	12.3	0.15	69.8	0.25
1992/1	28.1	0.14	80.9	0.11	2.3	0.08	16.3	0.22
1992/2	39.8	0.20	129.1	0.18	2.9	0.10	20.3	0.27
1992/3	40.8	0.20	159.4	0.22	2.7	0.09	20.3	0.27
1992/4	92.2	0.46	186.2	0.26	5.4	0.19	34.2	0.45
1993/1	33.3	0.15	78.1	0.09	2.0	0.05	15.2	0.16
1993/2	58.4	0.26	140.1	0.16	3.3	0.08	22.7	0.25
1993/3	64.2	0.28	202.8	0.23	3.4	0.09	27.0	0.29
1993/4	100.2	0.44	204.0	0.23	5.1	0.13	40.1	0.43
1994/1	40.0	0.15	109.3	0.10	2.9	0.06	20.4	0.18
1994/2	70.7	0.27	171.6	0.16	4.0	0.08	26.6	0.24
1994/3	81.4	0.31	234.2	0.21	4.5	0.09	29.4	0.27
1994/4	126.7	0.49	337.8	0.31	8.0	0.15	48.4	0.44
1995/1	55.3	0.18	139.4	0.10	4.0	0.06	24.1	0.19
1995/2	91.5	0.30	230.8	0.17	5.9	0.08	35.8	0.28
1995/3	101.0	0.33	241.3	0.18	7.1	0.10	39.1	0.30
1995/4	163.3	0.54	391.5	0.29	11.9	0.17	63.8	0.49
1996/1	80.2	0.21	177.1	0.10	5.1	0.06	39.1	0.27
1996/2	133.4	0.35	268.5	0.16	8.9	0.10	55.1	0.38
1996/3	142.5	0.37	313.1	0.18	9.0	0.11	57.9	0.40
1996/4	202.8	0.53	578.9	0.34	17.4	0.19	90.2	0.63
1996	558.9	0.36	1337.6	0.20	41.3	0.11	242.3	0.42

Notes: All figures in billions of current (nominal) national currencies (Czech Crown, Slovak Crown, Polish Zloty, Hungarian Forint) as of 1997. Source: CESTAT (former Statistical Bulletin of Czech, Hungarian, Polish, Slovak and then Slovenian Statistical Offices). All figures are comparable since the same methodology is used. Czech and Slovak Republics use the European System of Accounts (ESA) methodology, while Hungary and Poland use the System of National Accounts (SNA) methodology. Investment includes tangible and intangible fixed assets (with the exception of the Czech Republic which includes only tangible fixed assets). With the exception of Poland, all investment data are for the whole National Economy, including also estimates for entities not monitored by statistical offices. Poland investment reflects entities with more than 20 (50 for industry) employees.

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Figure 1

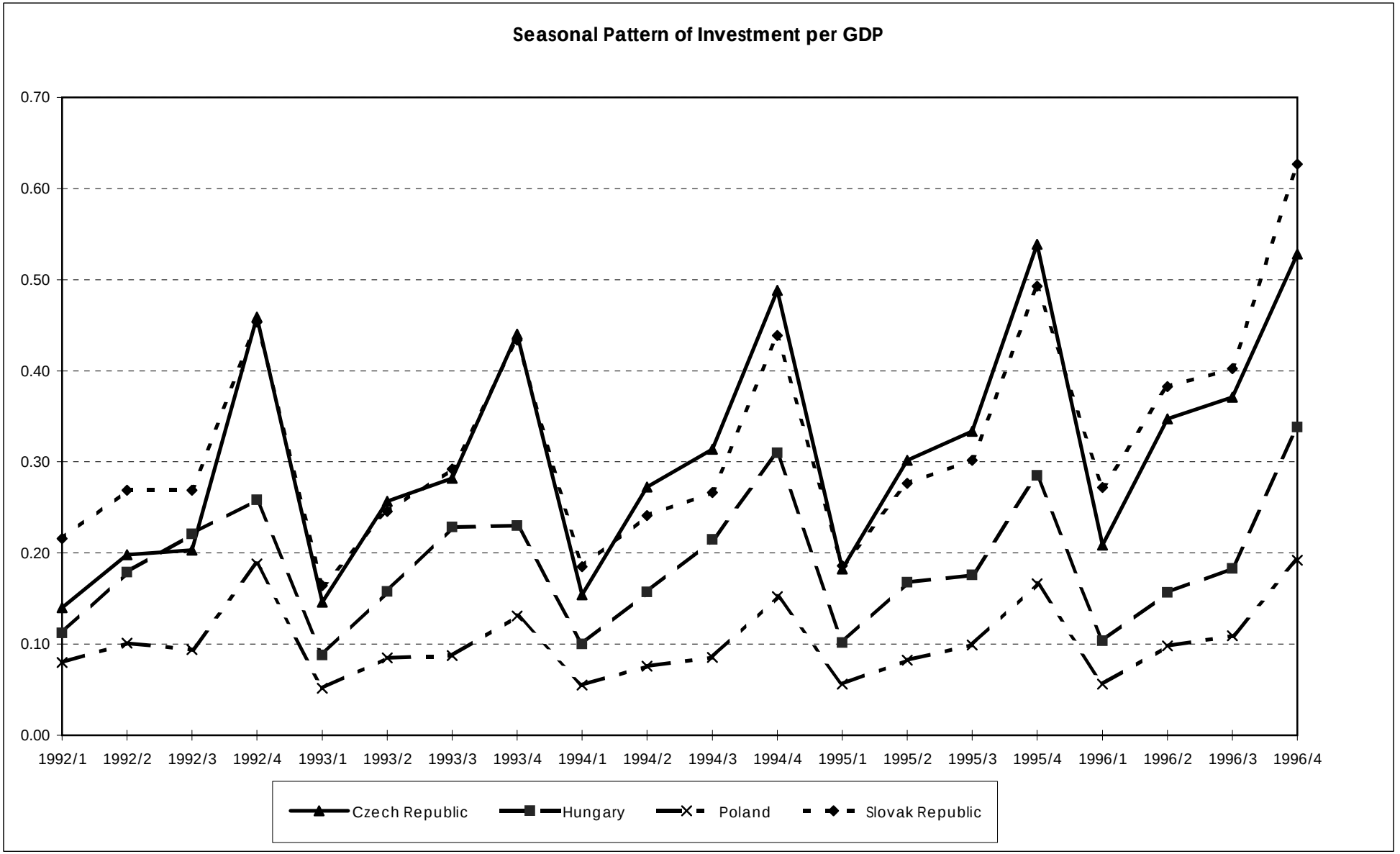

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Table 2 Crosstabulation of Known Ownership and Legal Form - Number of Observations

Ownership ====> Legal Form	Private	Cooperative	State	Foreign	Mixed	Other	Sum
Selfemployment	1845	0	0	4	0	0	1849
Limited Liability (Ltd.)	13927	9	441	2091	298	22	16716
Soc. Commandite	134	0	0	51	0	0	185
Joint Stock Co.	2480	0	11475	707	766	51	15479
Other Coop	4	3063	0	0	0	0	3067
Producer Coop	0	587	0	0	0	0	587
State Enterprise (SOE)	0	0	6835	0	0	0	6835
Subsidized Institutions	0	0	22	0	0	0	22
Other	12	3	0	26	0	11	52
Sum	18402	3662	18773	2807	1064	84	44792

Note:

The shaded cells denote the major ownership-legal form categories of firms that we analyze. All other types of firms are placed in the Other/Other category. Firms with unknown ownership and/or legal form are also included in the Other/Other group.

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Table 3 Means and Standard Deviations of the Principal Variables

Ownership/ Form	Investment/ Capital	Deprec./ Capital	Investment/ Labor	Investment/ Production	Profit	Labor	Investment	Production	Depre- ciation	Capital	Wage	Max. No. of Obs.[b]
1992/Q1	na	na	9.95 (72.30)	0.14 (1.66)	5913 (34295)	626 (1818)	4851 (21288)	76746 (267)	4629 (21660)	na	4.06 (0.98)	2252
1992/Q2	na	na	12.87 (95.63)	0.17 (2.26)	5195 (28505)	552 (1660)	6113 (28147)	71087 (259)	4791 (23316)	na	4.4 (1.13)	2484
1992/Q3	na	na	12.06 (52.00)	0.15 (0.97)	4267 (27974)	520 (1584)	5904 (31109)	62763 (235)	4075 (18824)	na	4.43 (1.06)	2626
1992/Q4	na	na	20.60 (82.07)	0.20 (1.14)	5265 (74644)	494 (1527)	10868 (57006)	67753 (258)	4914 (22750)	na	5.14 (1.38)	2738
1993/Q1	0.029 (0.094)	0.022 (0.044)	7.61 (29.31)	0.08 (0.27)	4577 (37346)	494 (1536)	4278 (30115)	70715 (273)	4440 (19677)	347 (1522)	5.00 (1.22)	2657
1993/Q2	0.041 (0.118)	0.025 (0.052)	13.57 (54.77)	0.15 (1.64)	3159 (27386)	457 (1415)	6452 (32831)	65880 (273)	4365 (19310)	328 (1469)	5.52 (1.51)	2841
1993/Q3	0.040 (0.110)	0.025 (0.053)	12.23 (43.43)	0.99 (43.27)	1577 (33231)	433 (1352)	6264 (36822)	56979 (224)	4281 (23792)	315 (1447)	5.51 (1.40)	2940
1993/Q4	0.054 (0.132)	0.035 (0.076)	19.46 (67.58)	0.18 (1.22)	-3800 (45994)	417 (1312)	9488 (56153)	61305 (265)	5154 (33444)	311 (1451)	6.16 (1.77)	3009
1994/Q1	0.031 (0.096)	0.022 (0.044)	11.38 (93.28)	0.14 (1.67)	5150 (29255)	347 (1086)	3520 (20835)	53363 (227)	3642 (19366)	279 (1350)	5.76 (1.50)	3503
1994/Q2	0.039 (0.101)	0.023 (0.039)	13.99 (48.84)	0.10 (0.51)	4432 (30952)	337 (1056)	5633 (40038)	57962 (270)	3546 (18740)	278 (1352)	6.28 (1.72)	3613
1994/Q3	0.036 (0.098)	0.024 (0.047)	13.84 (47.68)	0.11 (0.46)	3392 (34164)	332 (1032)	5685 (45034)	52619 (216)	3549 (17684)	274 (1331)	6.46 (1.73)	3653
1994/Q4	0.061 (0.132)	0.038 (0.075)	23.51 (98.29)	0.19 (1.37)	1271 (29555)	131 (991)	8319 (66621)	56160 (221)	3826 (19562)	261 (1329)	7.21 (2.17)	3867
1995/Q1	0.029 (0.097)	0.019 (0.028)	12.47 (51.68)	0.16 (2.89)	5581 (47196)	506 (1242)	5936 (27955)	105557 (448)	6021 (26858)	445 (1759)	6.81 (1.69)	2205

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Ownership/ Form	Investment/ Capital	Deprec./ Capital	Investment/ Labor	Investment/ Production	Profit	Labor	Investment	Production	Depre- ciation	Capital	Wage	Max. No. of Obs.[b]
1995/Q2	0.034 (0.09)	0.022 (0.041)	16.16 (48.20)	0.13 (0.87)	4931 (34482)	500 (1227)	8262 (37561)	108143 (437)	6455 (30794)	452 (1803)	7.51 (2.01)	2261
1995/Q3	0.032 (0.081)	0.021 (0.044)	15.31 (41.83)	0.13 (0.67)	3172 (41884)	496 (1212)	8965 (48508)	97267 (389)	6356 (27164)	453 (1784)	7.56 (1.91)	2234
1995/Q4	0.046 (0.100)	0.028 (0.057)	24.26 (62.51)	0.16 (0.51)	-1884 (35192)	493 (1201)	14463 (66746)	120059 (501)	7574 (23887)	459 (1815)	8.41 (2.50)	2243
Overall	0.040 (0.107)	0.026 (0.053)	15.06 (66.54)	0.19 (10.96)	3190 (38283)	442 (1326)	7033 (43544)	70895 (299)	4673 (13480)	335 (1509)	6.01 (2.01)	44984
Obs.[a]	34779	34779	44879	42936	44879	44879	44984	43610	44879	34779	44879	44984

Note: [a] The number of observations is the sum of all quarterly observations with non-missing values.

[b] The maximum number of observations is the maximum of all quarterly observations with non-missing values.

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Table 4 Net Investment / Production by Type of Firm, 1992-1995

Time	Private/ Enterpr.	Private/ Ltd.	Private/ J. Stock	Coop/ General	Coop/ Producer	State/ Ltd.	State/ J. Stock	State/ SOE	State/ Subsd.	Foreign/ Ltd.	Foreign/ J. Stock	Mixed/ J. Stock	Mixed/ Ltd.	Other/ Other	All
1992/Q1	0.00 (0.10)	0.27 (4.03)	0.25 (1.17)	0.01 (0.19)	-0.02 (0.10)	-1.81 (5.49)	-0.04 (0.69)	0.00 (0.34)	-0.33 (0.11)	0.07 (0.34)	0.13 (0.36)	0.20 (1.03)	-0.03 (0.03)	-0.03 (0.11)	0.03 (1.64)
1992/Q2	0.03 (0.25)	0.01 (0.30)	0.05 (0.24)	0.05 (0.36)	0.01 (0.11)	-0.52 (1.68)	0.00 (1.13)	0.02 (0.77)	-0.04 (0.03)	0.11 (0.60)	3.68 (18.94)	0.03 (0.32)	0.00 (0.10)	0.07 (0.66)	0.06 (2.30)
1992/Q3	0.02 (0.15)	0.05 (0.86)	-0.01 (0.27)	0.01 (0.25)	0.03 (0.38)	-0.17 (0.60)	-0.67 (17.01)	0.03 (0.51)	-0.03 (n.a.)	0.19 (0.70)	0.59 (1.76)	0.14 (0.60)	0.01 (0.73)	-0.03 (0.07)	-0.14 (8.76)
1992/Q4	0.09 (0.46)	-0.01 (1.57)	0.41 (3.31)	0.03 (0.63)	-0.01 (0.11)	-0.08 (0.17)	0.06 (1.19)	0.05 (0.92)	-0.04 (n.a.)	0.26 (1.10)	0.73 (3.39)	0.80 (4.52)	1.89 (5.86)	0.00 (0.09)	0.08 (1.50)
1993/Q1	0.04 (0.18)	0.00 (0.30)	0.00 (0.15)	-0.01 (0.12)	0.05 (0.70)	-0.16 (0.48)	-0.09 (1.45)	-0.06 (0.25)	-0.28 (0.02)	0.08 (0.41)	0.04 (0.28)	-0.04 (0.09)	0.18 (0.60)	0.07 (0.27)	-0.03 (0.78)
1993/Q2	0.04 (0.15)	0.04 (0.35)	0.05 (0.43)	0.01 (0.15)	-0.04 (0.20)	-0.01 (0.56)	-0.08 (1.32)	0.12 (2.79)	-0.11 (0.12)	0.08 (0.25)	0.32 (1.23)	0.03 (0.36)	0.21 (0.60)	-0.09 (0.47)	0.03 (1.55)
1993/Q3	0.03 (0.21)	0.04 (0.47)	0.07 (0.36)	0.03 (0.24)	-0.07 (0.31)	-0.08 (0.49)	-0.06 (1.13)	0.09 (2.96)	-0.03 (n.a.)	0.14 (0.42)	0.02 (0.22)	-0.02 (0.12)	0.36 (1.45)	0.00 (0.12)	0.03 (1.50)
1993/Q4	0.03 (0.16)	0.02 (1.39)	0.07 (0.63)	0.02 (0.26)	0.05 (0.30)	0.01 (0.66)	0.06 (0.42)	0.00 (0.65)	-0.22 (n.a.)	0.46 (1.92)	0.19 (0.54)	0.05 (0.23)	0.32 (0.60)	-0.06 (0.43)	0.05 (0.96)
1994/Q1	0.01 (0.23)	0.08 (1.97)	0.07 (1.08)	-0.02 (0.16)	-0.09 (0.01)	0.28 (5.13)	-0.14 (2.86)	-0.15 (0.47)	n.a.	0.15 (0.82)	0.03 (0.19)	0.06 (0.37)	-0.02 (0.14)	-0.03 (0.21)	0.00 (1.92)
1994/Q2	0.15 (1.13)	0.03 (0.35)	0.01 (0.35)	-0.01 (0.13)	-0.05 (0.05)	-0.03 (0.10)	-0.72 (19.62)	-0.21 (1.31)	n.a.	0.13 (0.54)	0.07 (0.41)	0.00 (0.17)	-0.02 (0.13)	0.03 (0.17)	-0.15 (9.36)
1994/Q3	0.11 (0.68)	0.03 (0.43)	0.10 (0.80)	-0.01 (0.17)	-0.09 (0.04)	0.01 (0.14)	-0.10 (3.01)	-0.79 (10.95)	n.a.	0.12 (0.44)	0.05 (0.39)	-0.03 (0.17)	-0.02 (0.11)	0.01 (0.22)	-0.05 (3.38)
1994/Q4	0.08 (0.49)	0.12 (1.73)	0.15 (0.98)	0.06 (0.60)	-0.05 (0.04)	-0.03 (0.26)	0.04 (0.39)	-0.06 (0.52)	n.a.	0.31 (1.51)	0.08 (0.35)	0.04 (0.17)	0.08 (0.33)	0.11 (0.30)	0.10 (1.25)
1995/Q1	0.04 (0.35)	0.03 (0.42)	-0.20 (3.44)	-0.02 (0.08)	-0.08 (0.09)	0.00 (0.09)	-0.11 (1.21)	-0.09 (0.26)	n.a.	0.10 (0.48)	0.10 (0.49)	-0.04 (0.18)	-0.02 (0.05)	0.09 (0.22)	-0.04 (1.27)
1995/Q2	0.00 (0.06)	0.02 (0.39)	0.06 (0.36)	0.00 (0.14)	-0.10 (0.18)	0.02 (0.09)	-0.07 (0.98)	-0.05 (0.18)	n.a.	0.10 (0.66)	0.05 (0.31)	-0.05 (0.86)	0.00 (0.10)	0.19 (0.67)	-0.01 (0.66)
1995/Q3	0.00 (0.06)	-0.01 (0.51)	0.08 (0.41)	0.02 (0.19)	-0.08 (0.16)	0.40 (2.03)	-0.08 (1.64)	-0.06							

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Table 6 Investment / Depreciation by Type of Firm, 1992-1995

Time	Private/ Enterpr.	Private/ Ltd.	Private/ J. Stock	Coop/ General	Coop/ Producer	State/ Ltd.	State/ J. Stock	State/ SOE	State/ Subsd.	Foreign/ Ltd.	Foreign/ J. Stock	Mixed/ J. Stock	Mixed/ Ltd.	Other/ Other	All
1992/Q1	3.04 (10.59)	21.66 (288.18)	12.42 (43.71)	1.33 (2.87)	0.98 (2.05)	0.30 (0.88)	1.87 (6.47)	1.30 (4.30)	0.21 (0.32)	4.73 (11.12)	2.59 (3.78)	2.03 (5.43)	0.08 (0.17)	0.62 (1.16)	4.99 (112.14)
1992/Q2	6.60 (30.54)	115.81 (2565.19)	4.07 (14.16)	2.97 (12.21)	1.93 (6.77)	0.49 (1.03)	4.05 (49.23)	1.58 (3.78)	0.40 (0.57)	7.13 (25.20)	10.71 (36.32)	1.70 (2.97)	1.68 (3.45)	3.37 (7.70)	27.20 (1183.5)
1992/Q3	3.92 (12.75)	6.96 (40.14)	3.27 (13.72)	1.98 (11.03)	3.86 (17.75)	0.38 (1.02)	2.03 (5.37)	1.40 (3.96)	0.00 (n.a.)	30.69 (127.65)	11.59 (36.92)	43.13 (226.18)	4.71 (14.46)	3.66 (8.75)	4.85 (40.77)
1992/Q4	7.58 (30.44)	6.44 (28.71)	4.87 (14.92)	4.68 (21.06)	1.04 (2.10)	0.47 (1.16)	3.74 (13.91)	1.98 (4.26)	0.00 (n.a.)	15.00 (50.12)	10.11 (27.51)	11.69 (54.70)	35.36 (81.87)	8.81 (29.64)	5.05 (23.25)
1993/Q1	6.60 (26.30)	3.87 (17.58)	2.51 (8.78)	2.45 (15.10)	2.12 (8.43)	1.09 (4.88)	1.78 (7.48)	0.95 (3.61)	0.29 (0.27)	5.24 (16.44)	4.62 (12.69)	0.53 (0.88)	1.69 (3.50)	2.13 (2.89)	2.46 (12.40)
1993/Q2	5.53 (21.76)	6.64 (34.34)	3.63 (7.79)	1.70 (3.58)	1.28 (2.96)	2.46 (9.89)	2.76 (12.74)	1.08 (2.51)	0.20 (0.29)	5.94 (14.08)	5.09 (11.05)	2.00 (5.13)	4.05 (5.94)	1.93 (3.51)	3.60 (20.08)
1993/Q3	5.71 (26.36)	5.37 (23.65)	13.31 (105.60)	2.75 (7.61)	0.94 (1.90)	1.29 (2.87)	1.98 (7.29)	6.37 (128.11)	0.00 (n.a.)	25.06 (107.16)	2.37 (5.32)	1.33 (3.36)	3.78 (7.21)	0.88 (1.61)	5.38 (66.63)
1993/Q4	12.07 (96.52)	4.32 (19.50)	3.66 (7.65)	2.09 (3.93)	1.98 (3.60)	1.59 (3.08)	4.51 (33.05)	1.55 (5.63)	0.00 (n.a.)	9.05 (32.42)	5.39 (14.89)	10.48 (50.49)	7.08 (11.40)	1.53 (2.52)	4.28 (30.69)
1994/Q1	3.27 (10.88)	6.74 (46.72)	2.31 (10.71)	1.46 (6.36)	0.00 (0.00)	7.50 (27.19)	1.55 (17.71)	2.31 (31.47)	n.a.	10.18 (64.30)	2.44 (5.77)	5.47 (22.24)	1.30 (1.44)	1.62 (3.57)	4.32 (35.52)
1994/Q2	4.66 (15.88)	8.39 (115.53)	2.55 (7.94)	1.63 (4.87)	0.40 (0.57)	1.63 (3.44)	2.60 (19.17)	0.66 (1.90)	n.a.	16.91 (171.82)	3.23 (6.79)	1.64 (3.10)	1.27 (1.73)	5.01 (15.12)	5.57 (83.95)
1994/Q3	6.22 (24.19)	7.11 (46.00)	5.38 (45.97)	1.42 (4.64)	0.02 (0.02)	1.81 (3.49)	1.94 (10.10)	1.54 (16.60)	n.a.	15.55 (106.42)	2.47 (3.68)	1.07 (1.56)	1.46 (3.29)	1.89 (2.76)	5.14 (41.69)
1994/Q4	3.14 (10.19)	5.91 (50.01)	2.86 (6.01)	2.75 (15.81)	0.38 (0.53)	1.21 (1.96)	2.34 (6.28)	1.48 (3.62)	n.a.	25.44 (255.50)	3.46 (4.98)	1.89 (3.84)	4.27 (8.68)	6.49 (23.91)	5.43 (72.92)
1995/Q1	3.01 (10.67)	5.79 (77.99)	2.24 (7.01)	0.95 (1.90)	0.86 (1.86)	0.97 (1.29)	1.22 (6.70)	0.66 (2.15)	n.a.	7.51 (28.02)	2.45 (7.68)	0.73 (1.33)	4.49 (12.77)	3.04 (3.64)	3.00 (42.74)
1995/Q2	2.34 (4.38)	4.81 (42.75)	2.61 (6.58)	1.26 (2.06)	2.45 (6.37)	1.39 (1.65)	1.34 (2.89)	0.65 (1.07)	n.a.	5.91 (16.65)	1.92 (3.45)	1.98 (7.56)	3.35 (7.49)	5.28 (9.30)	2.79 (23.78)
1995/Q3	1.62 (3.05)	3.95 (27.81)	3.42 (20.30)	1.51 (3.11)	0.28 (0.69)	2.30 (6.78)	1.50 (5.55)	1.15 (3.60)	n.a.	7.28 (25.47)	1.56 (1.82)	1.08 (1.62)	2.31 (6.03)	2.38 (3.02)	2.72 (17.91)
1995/Q4	1.95 (2.75)	2.84 (9.05)	4.09 (21.36)	2.08 (4.00)	2.26 (3.45)	4.38 (10.52)	2.04 (3.59)	0.81 (1.15)	n.a.	7.77 (24.25)	2.58 (5.41)	1.55 (2.36)	1.43 (2.04)	6.08 (9.23)	2.79 (10.63)

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Table 7 Estimated Depreciation Rate in % of Capital Stock

$$D_{i,t} = \alpha + \delta K_{i,t} + \varepsilon_{i,t}$$

Coeff.	OLS	Between	Within	Random Effect
α	34400*** (7500)	29300** (13700)	na	52600*** (16900)
δ	1.306*** (.004)	1.261*** (.011)	0.944*** (.022)	1.184*** (.011)
Rsq.	.675	.737	.890	.878
Nob/Ni	34779/4935	34779/4935	34779/4935	34779/4935

Tests p-values:
1) AB=AiBi: 0.00
2) AiB=AiBi 1.00
3) AB=AiB 0.00
4) FE vs. RE 0.00

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Table 8 Estimated Depreciation Rate in % of Capital

$$D_{i,t} = \alpha + \delta K_{i,t} + \sum_{G} \delta_{G,i} G_{i,t} K_{i,t} + \varepsilon_{i,t}$$

Coeff.	OLS	Between	Within	Random Effect
α	25300*** (5500)	16300** (6600)	na	33200*** (8800)
δ (State/SOE)	1.633*** (.025)	2.294*** (.094)	1.738*** (.076)	1.581*** (.037)
δ_G Private/ Entrepreneur	-.118 (.327)	-.272 (.496)	-1.019 (.808)	-.391 (.502)
δ_G Private/ Ltd.	.181** (.079)	-.257** (.107)	-.510** (.259)	.052 (.121)
δ_G Private/ J. Stock Co.	.117*** (.020)	-.469*** (.044)	-.552*** (.112)	.107*** (.029)
δ_G Cooperative/ Other Coop	.099 (.204)	-.223 (.328)	-.082 (.466)	.019 (.296)
δ_G Cooperative/ Producer Coop	-.354 (.788)	-.877 (1.774)	-.120 (1.051)	-.180 (.882)
δ_G State/ Ltd.	.098 (.057)	-.173* (.092)	-1.434*** (.182)	-.214** (.092)
δ_G State/ J. Stock Co.	-.086*** (.016)	-.483*** (.031)	-.524*** (.070)	-.091*** (.021)
δ_G State/ Subsidized	-.192*** (.061)	.059 (.053)	-.954 (20.4)	-.173*** (.067)
δ_G Foreign/ Ltd.	1.390*** (.066)	.904*** (.106)	1.234*** (.159)	1.430*** (.098)
δ_G Foreign/ J. Stock Co.	2.226*** (.025)	1.912*** (.046)	.120 (.092)	1.709*** (.040)
δ_G Mixed/ J. Stock Co.	.159*** (.030)	-.003 (.055)	-.291*** (.078)	.154*** (.037)
δ_G Mixed/ Ltd.	.445*** (.130)	.079 (.317)	.567 (.364)	.570*** (.205)
δ_G Other	-.191 (.201)	.179 (.324)	-.930*** (.295)	-.252 (.223)
Industry Dummies	Yes	Yes	Yes	Yes
Quarter Dummies	Yes	Yes	Yes	Yes
Rsq.	.864	.953	.899	.877
NOB/NI	34779/4935	34779/4935	34779/4935	34779/4935

Tests p-values:
1) AB=AiBi: na
2) AiB=AiBi na
3) AB=AiB 0.00
4) FE vs. RE 0.00
Note: Gis are dummy variables taking on value of one if the firm is a member of a given group and zero otherwise.

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Table 9 Net Investment and Profit - Heckman's 2-step Estimation Based on 4-quarter Difference and Analysis of Residuals

$$\Delta_4 I_{i,t}^{net} = \beta_1 \Delta_4 \Pi_{i,t} + \beta_2 \Delta_4 \Pi_{i,t-1} + \gamma M_{i,t} + \varepsilon_{i,t}$$

	All	State/ SOE	Private/Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop	State/ Ltd.	State/ J.Stock	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ J.Stock	Mixed/ Ltd.	Other
Pred.Succ%	60.0	55.8	61.0	63.3	56.9	60.6	60.3	59.4	63.6	60.0	65.3	70.8	63.9
N. of Obs.	20491	2962	722	5073	1101	2120	246	6481	743	353	432	96	159
Ad.Rsq.	0.012	0.022	0.017	0.004	0.021	0.013	-0.004	0.022	0.101	0.075	0.069	0.236	0.102
β_1	0.095*** (0.006)	0.114*** (0.014)	0.057*** (0.018)	-0.023** (0.009)	0.128*** (0.027)	0.189*** (0.036)	0.102* (0.062)	0.117*** (0.012)	0.131*** (0.021)	-0.229*** (0.088)	-0.050* (0.026)	-0.189*** (0.061)	0.123*** (0.040)
β_2	0.019*** (0.007)	-0.032** (0.014)	0.035* (0.020)	-0.034*** (0.011)	0.037 (0.030)	-0.124*** (0.039)	-0.016 (0.066)	0.063*** (0.013)	-0.200*** (0.023)	-0.347*** (0.090)	-0.091*** (0.031)	-0.595*** (0.118)	0.196** (0.083)
γ	-768** (321)	-717 (447)	-20 (122)	-46 (101)	-894 (978)	176 (300)	980 (2938)	-2374** (1134)	-1092 (1215)	-6318 (5381)	-2253* (1367)	-1506 (2660)	716 (1101)
Ad.Rsq.	0.017	0.039	0.000	0.004	0.052	0.027	0.121	0.034	0.045	0.023	0.048	0.738	0.233
Dummy Q1	-6353*** (612)	-3436*** (857)	46 (311)	-385 (251)	-4286** (2170)	-891*** (180)	-3764 (5642)	-14283*** (1636)	-12155*** (3813)	-17251 (11762)	-4568 (2879)	-8198 (6891)	-2666 (2433)
Dummy Q2	-3617*** (520)	-2336*** (682)	-333 (253)	-230 (216)	-1774 (1881)	-479*** (156)	-3889 (4979)	-8936*** (1399)	-9260*** (3350)	9906 (10393)	739 (2627)	-1892 (5506)	-2659 (2122)
Dummy Q3	-3125*** (508)	-1556** (692)	-312 (239)	-422** (201)	-1224 (1836)	-423*** (156)	-4780 (4844)	-8024*** (1384)	-5697* (3178)	-1175 (10277)	2319 (2586)	-1227 (4941)	-3594* (2045)
Constant	4977*** (463)	1709*** (613)	498*** (223)	897*** (183)	3796** (1613)	197 (257)	6619 (4445)	10376*** (1204)	24649*** (3323)	35424*** (8952)	5318** (2196)	3807 (4398)	453 (1769)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The top part of the table contains estimates of the four-quarter difference equation. The bottom part contains estimates from the analysis of residuals.

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Table 10 Net Investment and Profit - Random Effects Estimates Based on Current and One Quarter Lagged Profit, in Levels

$$I_{i,t}^{net} = \alpha + \beta_1 \Pi_{i,t} + \beta_2 \Pi_{i,t-1} + \varepsilon_{i,t}$$

Coeff.	All	State/ SOE	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop	State/ Ltd.	State/ J.Stock	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ J.Stock	Mixed/ Ltd.	Other
All Years													
Obs.	36814	5123	1502	11169	2052	3189	390	9975	1610	568	672	233	325
Rsq.	0.036	0.040	0.044	0.000	0.010	0.007	0.022	0.043	0.041	0.051	0.010	0.029	0.015
β_1	0.094*** (0.005)	0.108*** (0.010)	0.012** (2.243)	-0.016*** (0.006)	0.093*** (0.017)	-0.107*** (0.036)	0.048 (0.047)	0.118*** (0.009)	0.026*** (0.013)	-0.212*** (0.069)	-0.057*** (0.022)	-0.063 (0.067)	-0.034 (0.044)
β_2	0.034*** (0.005)	-0.024*** (0.008)	0.013*** (6.048)	-0.005 (0.007)	0.064*** (0.016)	0.175*** (0.035)	0.010 (0.048)	0.049*** (0.010)	0.001 (0.014)	0.252*** (0.067)	-0.023 (0.030)	-0.062 (0.051)	-0.039*** (0.011)
α	1775*** (199)	435 (347)	65*** (4)	578*** (81)	3950*** (1149)	-4 (177)	833 (2469)	3633*** (653)	4717*** (935)	11184*** (3620)	1993 (1233)	3797 (2825)	4429*** (1652)
FE vs. RE	0.250	0.406	0.000	0.510	0.919	0.210	0.664	0.452	0.403	0.259	1.000	0.694	0.563

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Coeff.	All	State/ SOE	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop	State/ Ltd.	State/ J.Stock	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ J.Stock	Mixed/ Ltd.	Other
1992													
Obs.	6618	1593	290	1471	225	703	68	1860	178	80	86	23	38
Rsq.	0.027	0.105	0.012	0.004	0.053	0.037	0.033	0.016	0.141	0.370	0.150	0.037	0.047
β_1	0.249*** (0.016)	0.302*** (0.024)	-0.097** (0.042)	0.030 (0.034)	0.383** (0.155)	-0.989*** (0.220)	0.028 (0.047)	0.242*** (0.031)	-0.074 (0.103)	0.397*** (0.122)	0.169*** (0.057)	0.251 (0.440)	-0.051 (0.098)
β_2	-0.128*** (0.016)	-0.105*** (0.020)	0.002 (0.043)	0.068 (0.042)	0.142 (0.182)	0.997*** (0.238)	-0.016 (0.061)	-0.177*** (0.035)	0.418*** (0.102)	0.510*** (0.129)	0.104 (0.090)	-0.230 (0.878)	-0.134 (0.106)
α	2539*** (469)	1153* (612)	706*** (207)	426** (207)	2040 (1826)	-276 (686)	-7476*** (2965)	7331*** (1587)	1725** (837)	6016 (4004)	-526 (1026)	9143 (8343)	395 (635)
FE vs. RE	0.741	0.611	0.346	0.236	0.466	0.274	0.574	0.952	0.212	0.912	0.258	0.000	0.337
1993													
Obs.	9744	2068	490	2646	328	954	104	2476	332	115	120	49	59
Rsq.	0.040	0.004	0.095	0.010	0.012	0.084	0.016	0.082	0.062	0.070	0.012	0.014	0.008
β_1	-0.014* (0.008)	0.027** (0.012)	0.013 (0.014)	-0.001 (0.008)	-0.069 (0.081)	-0.150*** (0.020)	0.036 (0.104)	-0.016 (0.015)	-0.274*** (0.082)	-0.543* (0.309)	0.106 (0.078)	-0.146 (0.216)	0.006 (0.071)
β_2	0.082*** (0.010)	-0.025*** (0.010)	0.107*** (0.020)	0.055*** (0.013)	0.129* (0.075)	0.167*** (0.023)	0.002 (0.149)	0.152*** (0.021)	-0.570*** (0.090)	1.379*** (0.422)	-0.102 (0.067)	0.306 (0.257)	0.096 (0.059)
α	1889*** (392)	225 (506)	184* (103)	263*** (80)	3577*** (1253)	111 (129)	1376 (5645)	4349*** (1317)	5992*** (2054)	18135 (11062)	2079 (1581)	6522 (6519)	759 (864)
FE vs. RE	0.012	0.175	0.002	0.025	0.973	0.224	0.775	0.013	0.748	0.377	0.945	0.960	0.962

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Coeff.	All	State/ SOE	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop	State/ Ltd.	State/ J.Stock	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ J.Stock	Mixed/ Ltd.	Other
1994													
Obs.	12299	1019	595	4653	716	956	119	2882	702	199	241	78	149
Rsq.	0.139	0.026	0.082	0.000	0.061	0.000	0.109	0.175	0.326	0.200	0.112	0.074	0.051
β_1	0.356*** (0.008)	0.032** (0.016)	0.032 (0.021)	0.012 (0.012)	0.201*** (0.027)	-0.006 (0.013)	0.111 (0.083)	0.413*** (0.017)	0.237*** (0.036)	0.039 (0.086)	-0.213*** (0.046)	0.248* (0.129)	0.049 (0.062)
β_2	0.000 (0.007)	0.018 (0.013)	0.044*** (0.015)	-0.013 (0.012)	0.195*** (0.019)	-0.001 (0.014)	0.135** (0.067)	-0.034** (0.015)	0.455*** (0.042)	0.209*** (0.078)	0.203*** (0.035)	0.041 (0.069)	-0.034*** (0.012)
α	625** (260)	-760** (321)	300*** (108)	573*** (123)	2195 (1467)	136* (73)	811 (2436)	421 (933)	3309*** (1004)	10124** (4222)	1476 (1717)	3620 (4124)	1609 (1067)
FE vs. RE	0.975	0.285	0.018	0.680	0.224	0.021	0.711	0.976	0.721	0.350	0.230	0.648	0.454
1995													
Obs.	8153	443	137	2399	783	576	99	2757	398	174	225	83	79
Rsq.	0.025	0.066	0.063	0.003	0.010	0.020	0.009	0.052	0.060	0.175	0.013	0.287	0.053
β_1	-0.011 (0.007)	0.008 (0.020)	0.069 (0.036)	-0.029*** (0.010)	0.078*** (0.024)	0.034 (0.025)	-0.019 (0.092)	-0.109*** (0.014)	0.039** (0.017)	0.031 (0.064)	0.043 (0.037)	0.204*** (0.063)	-0.175* (0.092)
β_2	0.082*** (0.007)	0.045* (0.024)	0.063* (0.048)	0.005 (0.010)	-0.031 (0.025)	0.031* (0.018)	-0.082 (0.091)	0.179*** (0.014)	0.036** (0.018)	0.193*** (0.059)	-0.164** (0.070)	0.212*** (0.079)	-0.220* (0.122)
α	2321*** (360)	-997** (493)	261 (353)	726*** (170)	4690*** (1692)	217* (129)	3471 (3901)	2942*** (834)	7593*** (1781)	5838** (3032)	3483* (1975)	819 (1702)	13473*** (5014)
FE vs. RE	0.194	0.007	0.000	0.944	0.905	0.000	0.872	0.287	0.710	0.166	0.954	0.398	0.000

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Table 11 Net Investment and Firm's Financial Conditions - Random Effects Estimates, in Levels 1994

$$I_{i,t}^{net} = \alpha + \beta_1 \Pi_{i,t} + \beta_2 R_{i,t} + \beta_3 RO_{i,t} + \beta_4 P_{i,t} + \beta_5 PO_{i,t} + \beta_6 C_{i,t} + \varepsilon_{i,t}$$

R=receivables, RO=receivables Overdue, P=Payables, PO=Payables Overdue, C=Cash

Coeff.	All	State/ SOE	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop	State/ Ltd.	State/ J.Stock	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ J.Stock	Mixed/ Ltd.	Other
Obs.	14170	1047	695	5729	851	988	126	3106	869	218	264	95	182
Rsq.	0.143	0.082	0.035	0.006	0.283	0.059	0.192	0.198	0.276	0.478	0.551	0.601	0.125
β_1	0.344*** (0.008)	0.021 (0.016)	-0.044 (0.047)	0.003 (0.011)	0.063*** (0.019)	0.010 (0.011)	0.113 (0.074)	0.457*** (0.017)	0.380*** (0.045)	-0.101 (0.069)	-0.058 (0.043)	0.224** (0.092)	0.406*** (0.098)
β_2	0.038*** (0.003)	-0.007 (0.005)	0.024 (0.028)	-0.001 (0.005)	-0.056*** (0.016)	-0.002 (0.004)	0.029 (0.024)	0.032*** (0.006)	0.145*** (0.022)	0.402*** (0.038)	0.155*** (0.016)	0.017 (0.052)	-0.081* (0.044)***
β_3	-0.076*** (0.005)	0.014* (0.008)	0.011 (0.057)	0.012 (0.010)	0.301*** (0.031)	0.028*** (0.010)	-0.078 (0.048)	-0.082*** (0.010)	-0.173*** (0.050)	-0.495*** (0.069)	-0.107*** (0.026)	0.374*** (0.107)	0.198 (0.070)
β_4	-0.012*** (0.002)	0.014** (0.006)	0.005 (0.009)	0.008*** (0.003)	-0.007 (0.008)	-0.010*** (0.003)	-0.006 (0.008)	-0.013** (0.005)	-0.017 (0.016)	-0.109*** (0.012)	-0.073*** (0.007)	0.004 (0.020)	0.022*** (0.016)
β_5	0.028*** (0.004)	-0.066*** (0.011)	-0.093*** (0.033)	-0.020*** (0.005)	-0.056*** (0.021)	-0.010 (0.008)	-0.004 (0.031)	0.044*** (0.009)	-0.112* (0.062)	0.173*** (0.049)	-0.020 (0.022)	-0.078 (0.048)	-0.098 (0.018)
β_6	0.339*** (0.050)	0.164 (0.148)	0.256 (0.198)	-0.006 (0.067)	-0.198 (0.345)	0.272** (0.133)	0.180 (0.687)	-0.383** (0.151)	0.508*** (0.091)	-0.758* (0.444)	0.873*** (0.338)	4.020 (3.277)	-0.420 (0.447)
α	548** (256)	-218 (341)	580** (236)	464*** (109)	-817 (1284)	128 (82)	2927 (2630)	1304 (1035)	2649** (1052)	1182 (3707)	-1001 (1154)	-4689* (2406)	938 (1014)
FE vs. RE	0.122	0.477	0.956	0.008	0.979	0.000	0.000	0.056	0.958	0.006	0.074	0.240	0.026

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Table A1 Frequency Distribution of Firms by Legal Form

Legal Form	1992	1993	1994	1995	Total
Entrepreneurship	4.23	4.92	4.80	1.59	4.06
Ltd.	26.83	33.06	47.06	35.58	36.67
Joint Stock Co.	31.99	28.95	31.50	46.17	33.88
General Coop	7.13	6.47	6.95	6.15	6.70
Industry Coop	2.64	2.36	0.05	0.36	1.28
SOE	25.16	22.04	8.18	5.55	15.00
State Subsidized	0.12	0.09	0.00	0.00	0.05
Other	1.90	2.11	1.46	4.60	2.36
Observations	10257	11644	14706	9110	45717

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Table A2 Frequency Distribution of Firms by Ownership

Ownership	1992	1993	1994	1995	Total
Private	31.11	37.40	50.63	40.85	40.93
Cooperative	9.86	8.94	6.99	6.52	8.04
State	52.62	46.53	31.10	41.11	41.85
International/Foreign	4.19	4.88	7.91	7.48	6.12
Mixed	1.65	1.74	2.53	3.70	2.36
Other/Unknown	0.57	0.51	0.84	0.34	0.70
Observations	10257	11644	14706	9110	45717

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Table A3 Frequency Distribution of Firms by Industry

Industry/NACE	Observations	Percent
Unknown	669	1.46
Mining of Coal	220	0.48
Mining of Oil and Gas	64	0.14
Mining of Metal Ores	32	0.07
Other Mining and Quarrying	701	1.53
Food Production	7171	15.96
Textile	2652	5.80
Apparel Manufacturing	1773	3.88
Leather and Footwear	1128	2.47
Wood Production	1996	4.37
Pulp and Paper	815	1.78
Publishing and Printing	1371	3.00
Chemicals	1124	2.46
Rubber and Plastics	1308	2.86
Non-metallic Minerals	3017	6.60
Manufacture of Basic Metals	1186	2.59
Fabricated Metal products except Machinery	4903	10.72
Machinery	6103	13.35
Office Machinery and Computers	92	0.20
Electrical Apparatus	1783	3.90
Radio and Television	698	1.53
Medical and Precision Instruments	1043	2.28
Motor Vehicles	805	1.76
Other Transport Equipment	756	1.65
Furniture	3213	7.03
Recycling	336	0.73
Water Utilities	755	1.65
Other	3	0.00
Total	45717	100

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Table A4 Means and Standard Deviations of the Principal Variables by Type of Firm in 1992

Owner/ Form	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop./ General	Coop./ Producer	State/ Ltd.	State/ J.Stock	State/ SOE	State/ Subsd.	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ Ltd.	Mixed/ J.Stock	Other
Investment/ Capital	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Depreciation/ Capital	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Investment/ Labor	8.98 (33.27)	9.96 (71.69)	30.31 (123.5)	3.91 (13)	2.59 (7.1)	2.43 (7.01)	18.64 (76.07)	11.66 (50.18)	5.79 (8.69)	29.18 (110.56)	48.74 (153.51)	13.7 (37.23)	111.5 (581.1)	9.84 (20.92)
Investment/ Production	0.764 (0.308)	0.124 (1.582)	0.272 (1.934)	0.087 (0.34)	0.061 (0.199)	0.029 (0.072)	0.176 (1)	0.144 (0.743)	0.076 (0.095)	0.239 (0.791)	1.353 (9.584)	0.403 (2.53)	0.651 (3.2)	0.093 (0.332)
Profit	1071 (4653)	1354 (5315)	3699 (11734)	700 (2859)	523 (3448)	-2003 (25276)	10436 (45873)	5013 (35442)	4525 (9598)	866 (7875)	37127 (313608)	3778 (13320)	3287 (25534)	1113 (5305)
Labor	94.74 (164.81)	153.6 (222.5)	435 (637)	209 (163)	224 (170)	1152 (1065)	1127 (2866)	539 (920)	386 (357)	115 (246)	895 (2960)	400 (740)	306 (732)	204 (216)
Investment	687 (2808)	1184 (5952)	7438 (27429)	850 (2524)	679 (2163)	2641 (8305)	16197 (62462)	5918 (21959)	3707 (6221)	3573 (15794)	33300 (122324)	3215 (7158)	10703 (30685)	1387 (2500)
Production	10843 (18731)	19468 (28438)	59391 (116413)	12390 (15009)	12857 (11700)	127080 (149797)	142523 (375498)	66014 (141968)	41684 (33798)	16335 (40967)	285600 (1173000)	63994 (100773)	42369 (103761)	25627 (32995)
Depreciation	318 (867)	743 (1933)	2608 (4564)	1193 (16017)	598 (919)	9733 (14311)	10210 (35600)	4497 (14250)	10579 (12141)	823 (1920)	13900 (58682)	3290 (6618)	6775 (24813)	1342 (1834)
Capital	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Wage	4.4 (1.35)	4.59 (1.31)	4.97 (2.01)	3.78 (0.97)	3.89 (0.92)	4.88 (0.78)	4.66 (1.06)	4.46 (0.96)	4.51 (1.05)	5.08 (1.78)	5.47 (1.71)	4.66 (1.15)	4.69 (0.93)	4.79 (1.51)
N(max)	434	2319	346	731	271	99	2663	2581	12	287	129	127	39	155

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Table A5 Means and Standard Deviations of the Principal Variables by Type of Firm in 1993

Owner/ Form	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop./ General	Coop./ Producer	State/ Ltd.	State/ J.Stock	State/ SOE	State/ Subsid.	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ Ltd.	Mixed/ J.Stock	Other
Investment/ Capital	0.07 (0.148)	0.066 (0.158)	0.05 (0.108)	0.024 (0.061)	0.017 (0.048)	0.026 (0.078)	0.026 (0.064)	0.013 (0.033)	0.002 (0.003)	0.115 (0.208)	0.086 (0.181)	0.02 (0.066)	0.122 (0.232)	0.026 (0.049)
Depreciation/ Capital	0.037 (0.067)	0.043 (0.087)	0.028 (0.056)	0.016 (0.018)	0.014 (0.022)	0.024 (0.023)	0.016 (0.02)	0.015 (0.02)	0.019 (0.03)	0.05 (0.087)	0.039 (0.068)	0.015 (0.013)	0.079 (0.166)	0.021 (0.019)
Investment/ Labor	7.54 (17.28)	8.74 (33.48)	31.03 (125.19)	4.32 (10.01)	3.56 (14.06)	15.39 (62.43)	19.34 (57.29)	10.08 (31.05)	5.53 (5.66)	30.53 (101.74)	51.04 (142.1)	13.28 (39.97)	32.68 (78.36)	11.55 (23.16)
Investment/ Production	0.074 (0.205)	0.097 (0.439)	0.158 (0.42)	0.079 (0.184)	0.081 (0.385)	0.144 (0.419)	1.033 (44.9)	0.22 (2.745)	0.042 (0.049)	0.289 (1.346)	0.26 (0.694)	0.075 (0.219)	0.35 (0.908)	0.198 (0.492)
Profit	1034 (6316)	913 (8307)	207 (13030)	810 (3979)	683 (3239)	-5790 (31442)	2305 (62298)	2247 (37776)	4527 (8464)	-726 (14069)	-10588 (77925)	2214 (10071)	-436 (18576)	1303 (6275)
Labor	90 (132)	132 (177)	379 (566)	179 (147)	182 (135)	884 (889)	1008 (2562)	488 (850)	407 (355)	169 (458)	802 (2785)	368 (644)	240 (567)	194 (210)
Investment	646 (1894)	961 (2382)	7206 (23419)	885 (2340)	557 (1350)	9569 (33310)	15644 (61812)	5400 (18988)	3686 (4974)	7425 (27399)	54169 (211834)	4310 (11247)	9498 (27430)	7051 (18216)
Production	10827 (17029)	17077 (25314)	54103 (98033)	12187 (16387)	11770 (11264)	100830 (117097)	141845 (378194)	64615 (141421)	41851 (34478)	26799 (83701)	305212 (1361490)	56282 (81129)	35043 (84967)	23290 (36495)
Depreciation	359 (1006)	668 (1418)	3112 (5421)	669 (2095)	625 (1109)	9040 (11380)	10379 (32326)	5187 (14930)	11666 (11239)	2100 (7684)	28431 (154475)	3182 (5418)	3275 (7924)	1387 (1740)
Capital	23578 (77120)	39767 (75792)	208708 (384474)	44935 (68889)	47097 (41867)	459586 (556065)	777125 (2683192)	421418 (1113766)	3254432 (3694429)	82302 (245969)	752431 (2413205)	253069 (423279)	137377 (332314)	93082 (127073)
Wage	5.09 (1.41)	5.6 (1.6)	6.16 (2.68)	4.59 (1.16)	4.79 (1.11)	6.4 (1.04)	5.81 (1.42)	5.42 (1.18)	5.56 (0.7)	6.27 (2.09)	6.85 (1.99)	5.74 (1.2)	5.63 (1.27)	5.82 (1.92)
N(max)	572	3257	391	754	275	113	2687	2566	10	406	144	133	66	205

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Table A6 Means and Standard Deviations of the Principal Variables by Type of Firm in 1994

Owner/ Form	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop./ General	Coop./ Producer	State/ Ltd.	State/ J.Stock	State/ SOE	State/ Subsid.	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ Ltd.	Mixed/ J.Stock	Other
Investment/ Capital	0.054 (0.129)	0.059 (0.137)	0.04 (0.092)	0.019 (0.059)	0.002 (0.003)	0.023 (0.052)	0.017 (0.037)	0.01 (0.034)	na	0.089 (0.159)	0.043 (0.059)	0.024 (0.065)	0.049 (0.128)	0.056 (0.13)
Depreciation/ Capital	0.036 (0.064)	0.037 (0.068)	0.024 (0.049)	0.014 (0.028)	0.009 (0.002)	0.022 (0.019)	0.014 (0.01)	0.014 (0.025)	na	0.042 (0.08)	0.022 (0.016)	0.019 (0.031)	0.041 (0.07)	0.03 (0.052)
Investment/ Labor	13.08 (47.46)	12.69 (69.5)	31.08 (190)	4.74 (11.33)	0.71 (1.29)	7.64 (14.8)	17.29 (48.53)	7.01 (25.78)	na	37.92 (119.8)	38.76 (59.66)	15.55 (34.16)	10.54 (25.4)	18.97 (49.31)
Investment/ Production	0.153 (0.787)	0.127 (1.397)	0.223 (1.466)	0.076 (0.319)	0.013 (0.024)	0.25 (2.16)	0.132 (0.985)	0.055 (0.17)	na	0.275 (1.179)	0.171 (0.322)	0.103 (0.245)	0.085 (0.201)	0.15 (0.395)
Profit	1108 (3619)	1602 (7313)	5936 (42895)	931 (6095)	189 (244)	292 (28059)	8966 (49711)	436 (14432)	na	2909 (20102)	3253 (112464)	5763 (24781)	3098 (20397)	1807 (11437)
Labor	83 (111)	122 (166)	428 (970)	162 (143)	38 (17)	730 (764)	809 (1918)	279 (378)	na	150 (358)	742 (2242)	482 (693)	367 (555)	132 (129)
Investment	836 (4014)	1227 (5694)	9031 (36900)	810 (2214)	38 (68)	7164 (19368)	13021 (57018)	2241 (8125)	na	7561 (30788)	49257 (269262)	7739 (21954)	6969 (28591)	9348 (43367)
Production	9923 (13967)	17756 (27419)	69140 (187588)	12889 (24053)	2187 (654)	99866 (116022)	135249 (384889)	37294 (65591)	na	34040 (99953)	239548 (946759)	104716 (235027)	64032 (109975)	32749 (95218)
Depreciation	400 (976)	703 (1705)	5421 (21348)	678 (1332)	171 (21)	7353 (11612)	9194 (27232)	3053 (6199)	na	2170 (7170)	20116 (88377)	6699 (21833)	3012 (5914)	1264 (2213)
Capital	22630 (47006)	39080 (87244)	423510 (1561458)	52673 (80917)	20984 (3125)	451189 (718105)	771171 (2455390)	247935 (559310)	na	98893 (264924)	862069 (2893561)	520282 (1544992)	160024 (380825)	98488 (227349)
Wage	5.84 (1.7)	6.39 (1.85)	6.95 (2.19)	5.24 (1.3)	6.65 (0.49)	7.37 (1.3)	6.56 (1.58)	6.07 (1.39)	na	7.21 (2.26)	8.31 (2.46)	7.24 (2.56)	7.07 (2.48)	7.05 (2.43)
N(max)	695	5758	870	1018	8	126	3225	1186	0	881	243	272	99	306

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Table A7 Means and Standard Deviations of the Principal Variables by Type of Firm in 1995

Owner/ Form	Private/ Enterpr.	Private/ Ltd.	Private/ J.Stock	Coop./ General	Coop./ Producer	State/ Ltd.	State/ J.Stock	State/ SOE	State/ Subsid.	Foreign/ Ltd.	Foreign/ J.Stock	Mixed/ Ltd.	Mixed/ J.Stock	Other
Investment/ Capital	0.044 (0.083)	0.049 (0.122)	0.039 (0.095)	0.018 (0.033)	0.01 (0.037)	0.029 (0.064)	0.019 (0.042)	0.01 (0.047)	na	0.092 (0.15)	0.035 (0.066)	0.021 (0.066)	0.09 (0.204)	0.078 (0.114)
Depreciation/ Capital	0.025 (0.026)	0.032 (0.072)	0.021 (0.021)	0.015 (0.018)	0.011 (0.008)	0.019 (0.014)	0.015 (0.015)	0.013 (0.016)	na	0.035 (0.047)	0.024 (0.029)	0.021 (0.026)	0.047 (0.048)	0.027 (0.028)
Investment/ Labor	7.72 (21.15)	9.78 (33.11)	27.47 (92)	5.92 (11.87)	4.05 (13.6)	20.37 (79.27)	18.9 (43.17)	8.4 (20.88)	na	39.05 (85.64)	44 (77.46)	17.16 (66.15)	7.32 (18.47)	42.4 (81.88)
Investment/ Production	0.059 (0.178)	0.086 (0.473)	0.177 (0.524)	0.082 (0.182)	0.085 (0.221)	0.211 (1.142)	0.196 (2.606)	0.072 (0.298)	na	0.242 (0.889)	0.168 (0.333)	0.094 (0.291)	0.048 (0.081)	0.277 (0.64)
Profit	-256 (10130)	1634 (15237)	1863 (46211)	866 (4082)	-575 (2703)	4113 (28060)	4960 (43822)	417 (18895)	na	9204 (89970)	0 (98735)	-1350 (32291)	5460 (19792)	2637 (15642)
Labor	198 (166)	242 (249)	486 (912)	210 (106)	183 (104)	845 (689)	823 (1861)	327 (297)	na	358 (650)	912 (2384)	568 (688)	433 (579)	195 (87)
Investment	1233 (3780)	2217 (6816)	11126 (42637)	1300 (2840)	1101 (4959)	11698 (26618)	14696 (48980)	3170 (8325)	na	14789 (34643)	51272 (223421)	11816 (34962)	6671 (19701)	9492 (25383)
Production	23349 (18695)	36820 (51071)	80336 (176629)	18157 (24172)	7237 (6521)	175272 (193357)	150705 (403516)	50778 (72823)	na	93468 (169777)	392873 (1453467)	126977 (260081)	67426 (100698)	381909 (133915)
Depreciation	982 (1342)	1535 (2665)	6554 (23430)	1034 (2025)	837 (979)	8896 (9002)	11171 (33449)	4184 (6910)	na	6847 (17428)	32934 (131052)	9030 (27184)	3585 (9777)	2339 (2657)
Capital	64694 (88694)	79192 (137220)	468711 (1661331)	70002 (66750)	69941 (33302)	623811 (790346)	868185 (2655066)	361926 (765303)	na	252529 (478841)	1270628 (3849551)	652680 (1778220)	175129 (474067)	121550 (131445)
Wage	6.96 (2.21)	7.23 (1.85)	7.84 (2.36)	6.16 (1.55)	5.97 (1.23)	9.11 (1.53)	7.68 (1.8)	7.31 (1.7)	na	8.91 (3.31)	9.6 (3.46)	8.09 (1.85)	8.37 (2.26)	8.36 (2.78)
N(max)	144	2593	873	560	33	103	2900	502	0	445	191	234	94	427

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Table A8 Gross Investment / Production by Type of Firm 1992-1995

Time	Private/ Enterpr.	Private/ Ltd.	Private/ J. Stock	Coop/ General	Coop/ Producer	State/ Ltd.	State/ J. Stock	State/ SOE	State/ Subsd.	Foreign/ Ltd.	Foreign/ J. Stock	Mixed/ J. Stock	Mixed/ Ltd.	Other/ Other	All
1992/Q1	0.03 (0.09)	0.31 (4.04)	0.31 (1.16)	0.06 (0.19)	0.04 (0.07)	0.03 (0.09)	0.11 (0.40)	0.12 (1.01)	0.09 (0.01)	0.13 (0.34)	0.19 (0.38)	0.31 (1.29)	0.00 (0.00)	0.04 (0.09)	0.14 (1.66)
1992/Q2	0.07 (0.25)	0.06 (0.26)	0.12 (0.30)	0.10 (0.35)	0.06 (0.12)	0.03 (0.06)	0.16 (0.98)	0.14 (0.60)	0.13 (0.19)	0.18 (0.59)	3.76 (19.03)	0.13 (0.47)	0.04 (0.09)	0.22 (0.59)	0.17 (2.26)
1992/Q3	0.05 (0.18)	0.11 (0.82)	0.09 (0.20)	0.06 (0.24)	0.10 (0.35)	0.03 (0.08)	0.21 (1.52)	0.14 (0.58)	0.00 (n.a.)	0.24 (0.71)	0.74 (1.82)	0.22 (0.66)	0.18 (0.52)	0.03 (0.06)	0.15 (0.97)
1992/Q4	0.13 (0.47)	0.10 (0.43)	0.52 (3.35)	0.13 (0.49)	0.05 (0.11)	0.03 (0.07)	0.22 (0.75)	0.18 (0.66)	0.00 (n.a.)	0.33 (1.09)	0.80 (3.46)	0.86 (4.52)	1.99 (5.87)	0.05 (0.07)	0.20 (1.14)
1993/Q1	0.08 (0.18)	0.05 (0.19)	0.07 (0.16)	0.04 (0.11)	0.12 (0.70)	0.09 (0.26)	0.10 (0.29)	0.07 (0.22)	0.06 (0.02)	0.13 (0.44)	0.14 (0.23)	0.03 (0.06)	0.23 (0.66)	0.45 (0.87)	0.08 (0.27)
1993/Q2	0.07 (0.22)	0.08 (0.35)	0.14 (0.40)	0.07 (0.14)	0.05 (0.09)	0.15 (0.43)	0.14 (0.53)	0.26 (3.23)	0.07 (0.09)	0.13 (0.27)	0.43 (1.24)	0.10 (0.36)	0.30 (0.60)	0.09 (0.15)	0.15 (1.64)
1993/Q3	0.07 (0.25)	0.10 (0.48)	0.17 (0.34)	0.10 (0.22)	0.05 (0.12)	0.10 (0.20)	0.13 (0.30)	0.36 (3.80)	0.00 (n.a.)	0.20 (0.42)	0.15 (0.21)	0.06 (0.10)	0.43 (1.49)	0.05 (0.12)	0.16 (1.78)
1993/Q4	0.07 (0.16)	0.13 (0.54)	0.22 (0.58)	0.11 (0.23)	0.11 (0.33)	0.21 (0.60)	0.18 (0.43)	0.22 (2.44)	0.00 (n.a.)	0.60 (2.36)	0.32 (0.59)	0.11 (0.23)	0.38 (0.60)	0.22 (0.45)	0.18 (1.22)
1994/Q1	0.07 (0.24)	0.14 (1.96)	0.29 (2.63)	0.05 (0.13)	0.00 (0.00)	0.81 (4.36)	0.13 (1.77)	0.05 (0.19)	n.a.	0.25 (1.26)	0.14 (0.19)	0.13 (0.37)	0.11 (0.14)	0.10 (0.27)	0.14 (1.67)
1994/Q2	0.21 (1.17)	0.08 (0.29)	0.12 (0.33)	0.05 (0.11)	0.03 (0.04)	0.04 (0.05)	0.12 (0.60)	0.04 (0.08)	n.a.	0.23 (1.09)	0.18 (0.39)	0.08 (0.16)	0.05 (0.08)	0.12 (0.20)	0.10 (0.51)
1994/Q3	0.16 (0.68)	0.09 (0.35)	0.21 (0.86)	0.06 (0.15)	0.00 (0.00)	0.08 (0.14)	0.13 (0.58)	0.04 (0.12)	n.a.	0.18 (0.43)	0.16 (0.38)	0.08 (0.17)	0.04 (0.10)	0.10 (0.25)	0.11 (0.46)
1994/Q4	0.17 (0.75)	0.19 (1.92)	0.28 (1.16)	0.14 (0.59)	0.02 (0.03)	0.08 (0.14)	0.15 (0.32)	0.09 (0.24)	n.a.	0.42 (1.57)	0.20 (0.29)	0.13 (0.24)	0.14 (0.33)	0.28 (0.67)	0.19 (1.37)
1995/Q1	0.09 (0.34)	0.09 (0.54)	0.15 (0.66)	0.04 (0.07)	0.02 (0.02)	0.07 (0.10)	0.10 (0.53)	0.05 (0.18)	n.a.	0.16 (0.48)	0.22 (0.51)	0.07 (0.14)	0.03 (0.05)	0.16 (0.23)	0.10 (0.49)
1995/Q2	0.04 (0.05)	0.07 (0.34)	0.16 (0.42)	0.07 (0.14)	0.03 (0.04)	0.06 (0.10)	0.18 (1.40)	0.07 (0.31)	n.a.	0.19 (0.61)	0.15 (0.30)	0.13 (0.49)	0.06 (0.10)	0.27 (0.68)	0.13 (0.87)
1995/Q3	0.04 (0.05)	0.07 (0.32)	0.18 (0.48)	0.09 (0.19)	0.06 (0.15)	0.46 (2.08)	0.14 (0.83)	0.06 (0.12)	n.a.	0.33 (1.42)	0.14 (0.23)	0.07 (0.11)	0.06 (0.11)	0.19 (0.44)	0.13 (0.67)
1995/Q4	0.06 (0.06)	0.11 (0.63)	0.21 (0.52)	0.13 (0.27)	0.24 (0.39)	0.24 (0.94)	0.17 (0.40)	0.10 (0.47)	n.a.	0.29 (0.70)	0.16 (0.21)	0.11 (0.27)	0.04 (0.04)	0.54 (1.00)	0.16 (0.51)

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