Investment, Credit Rationing, and the Soft Budget Constraint: Evidence from Czech Panel Data

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Investment, Credit Rationing and the Soft Budget Constraint:

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Abstract

Strategic restructuring of firms through investment is key to a transition from plan to market. Using data on industrial firms in the Czech Republic during 1992-98, we find that (a) foreign owned companies invest the most and cooperatives the least, (b) private firms do not invest more than state-owned ones and (c) cooperatives and small firms are credit rationed. Given the large volume of non-performing bank loans to firms and the high rate of investment of large state owned and private firms, our findings also suggest that these firms operate under a soft budget constraint. Estimates of a dynamic model, together with the support for the neoclassical model, suggest that firms started to behave consistently with profit-maximization.

Keywords: Investment, restructuring, credit rationing, soft budget constraint, ownership, legal status, transition to a market economy.

JEL Classification: E22, G32, P21, D21, D92

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1. Introduction

Studies of investment behavior have always occupied a pivotal place in western economics literature. On the demand side, much of the literature has focused on establishing the relative merits of the structural dynamic, Tobin Q, neoclassical, and accelerator models of investment demand, for the most part assuming that the supply of investment finance is perfectly elastic. More recently, an important part of the literature has concentrated on the supply side, examining the effects of potential capital market imperfections on investment behavior of firms.[1]

Investment studies also constituted a key area of comparative economics, in part because of Stalin's and other communist leaders' preoccupation with overtaking capitalist economies by massive capital formation.[2] The centrally planned economies indeed reported very high rates of investment during most of their existence, although in the Soviet bloc these rates declined somewhat in the 1980s as economic growth slowed down and popular demand for consumption goods became harder to ignore (EBRD, 1995). Moreover, the technological development of centrally planned economies increasingly lagged behind those of capitalist countries.[3]

As the transition to a market system started to unfold in the early 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 enterprises (SOEs) and privatized firms has been a focal point in the policy debate about optimal types of ownership and legal (corporate) structure of firms in the new market economies. Theoretical studies have focused on strategic or deep restructuring of firms in the presence of

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[1] See e.g., Jorgenson (1971), Nickell (1977), Abel (1980), Abel and Blanchard (1986), Shapiro (1986), Fazzari et al. (1988, 2000), Gertler (1988), Hayashi and Inoue (1991), Bond and Meghir (1994), Kaplan and Zingales (1997, 2000), Hubbard (1998), Oliner and Rudebusch (1992), and Chirinko et al. (1999).

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

[3] The embargo imposed in the 1980s by western countries on advanced technology exports to communist economies contributed to this technological gap.

imperfect capital markets as a key to the transition process and they recognized investment as a principal vehicle of this restructuring.[4] Yet, from the outset it was recognized that only productive investment would contribute to restructuring. If firms faced soft budget constraints (willingness of the government or some other institution to provide additional resources or otherwise bail them out),[5] investment might reflect a waste of resources as the firms used these funds for survival rather than restructuring. Indeed, there has been increasing concern that while direct government subsidies have been dramatically reduced in a number of countries, indirect subsidies through the banking system continued for the (former) SOEs on a large scale. Hence, while between 1989 and 1992 direct government subsidies to firms as a share of GDP fell from 25 to 5 percent in the Czech and Slovak republics, 12 to 5 percent in Poland and 11 to 3 percent in Hungary, [6] these economies experienced banking crises in the 1990s as the new commercial banks continued to extend loans to poorly performing SOEs and the large privatized firms[7]. The problem arose partly because under central planning, all capital allocation was carried out by a single bank that combined the roles of a central bank and commercial bank. At the start of the transition, this monobank system was terminated and independent commercial banks were created, but the new banks had virtually no project appraisal capability, some suffered from corruption and many were under government as well as "old boys network" pressure to continue extending credit to existing client firms. During the same period, there were also signs that newly created firms faced expensive bank finance or were denied access to bank loans altogether. (A comparative analysis of the Czech financial may be found a special issue of the *Journal of Comparative Economics*, 1997, and in EBRD, 1998).

In this paper, we analyze investment behavior using over 83,500 quarterly observations from

[4] See e.g., Grosfeld and Roland (1997), Aghion, Blanchard and Burgess (1994) and Blanchard (1997).
[5] See Kornai (1979, 1986, and 1998) for the introduction and discussion of the concept of a soft budget constraint.
[6] See Gao and Schaffer (1998) and Basu, Estrin and Svejnar (1999).
[7] In addition, Schaffer (1997) estimates that tax arrears of firms represented subsidies equal to 1-2% of GDP in the early 1990s.

the population of about 4,000 medium and large industrial firms located in the Czech Republic during the 1992-98 period. Our study is of special interest for five reasons.

First, our work constitutes one of the first firm-level analyses of investment behavior in the transition economies and it focuses on one of the lead countries that serve as models for countries that have launched their transitions later. Our findings are hence of broad interest in the context of the transition. While a small number of earlier studies have provided valuable partial surveys of investment in the transition economies,[8] detailed analytical studies of the investment behavior of firms in these economies are only now being carried out.[9] Our study stands out among these few studies because we combine several methodological approaches and use a longer (seven-year) panel of data. This allows us to capture better the process of new investment and allow for construction and gestation of capital.

Second, we provide evidence on the propensity to invest by ownership and legal status of firms, and how these propensities vary over time. As might be expected, we show that the foreign-owned companies invest the most and the (domestically owned) cooperatives the least. However, we find little support for the "accepted wisdom" that private firms invest more than state-owned ones. Moreover, the relative investment rate of the state-owned firms increased over time.

Third, we provide evidence on whether firms face credit rationing or a soft budget constraint and whether the degree of rationing or softness of the budget constraint varies with firm's ownership and legal status. In doing so, we test one of the leading explanations of the sharp decline in investment and output during the early transition period - Calvo and Coricelli's (1994) credit crunch hypothesis. We reject this hypothesis as an overall explanation. In particular, we find that cooperatives and to a lesser extent smaller and medium sized private firms were rationed in their access to credit, but the majority of firms, including the state-owned and larger privatized firms, were

not. Moreover, for many of the latter firms the availability of investment funds is negatively related to profitability. This availability of investment funds to the SOEs and larger privatized firms despite poor performance, together with their high rate of investment, complements the evidence that Czech banks accumulated a large amount of bad enterprise loans in the 1990s. Taken together, these findings provide strong evidence that many large firms have been operating with a soft budget constraint.[10]

Fourth, since a key turning point in the transition process occurs when firms start behaving like their western counterparts, we test whether the investment behavior of firms in our data set is consistent with profit maximization. In particular, we test if the demand side of investment reflects the neoclassical, accelerator and structural dynamic models. We find the behavior of most types of firms to be consistent with profit maximization in both the static (neoclassical) and structural dynamic framework. In the static context, we are also able to check if the support for the profit-maximizing model grows over time and we find that it does. Our analysis hence shows that while smaller firms suffer from credit rationing and larger ones have (too) easy access to bank loans, in terms of the use of financial resources they all behave consistently with profit maximization.

Finally, our study is of methodological interest since we use a large panel of quarterly firm-level data. We are hence able to eliminate bias introduced by data selectivity and aggregation (see e.g., Abel and Blanchard, 1986), reduce measurement error, take into account heterogeneity across firms and over time (see e.g., Bond and Meghir, 1994), and control for the seasonal variation in

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[8] See e.g., Belka et al. (1994), EBRD (1995) and Eickelpasch (1995).

[9] For the other studies see Lízal (1999a), Anderson and Kegels (1997) and Prasnikar and Svejnar (1998).

[10] At a meeting in Paris in December 2000, the governor of the Czech National Bank announced that in 1999 full 32 % of the total loan portfolio of the Czech banks was classified as substandard. He stated that "the problem has been most serious in large banks (with more than 40% of their loans being classified at the end of 1999) and small Czech-owned banks (more than 50% of their loans classified) …the public costs of the banking sector transformation have been estimated at over CZK 250 billion, or 14% of annual GDP (plus the as yet unknown public costs of the IPB [Investment and Postal Bank] case)." In late 2000, estimates of the cost of covering IPB losses were up to CZK 180 billion, or another 10% of Czech Republic's GDP.

investment. This makes our work important in the context of the growing literature on transition as well as recent investment literature in general.

Overall, while our choice of the Czech Republic is linked to the availability of a unique data set, an important factor for studying this case is clearly the fact that together with other countries in Central Europe, the Czech Republic has been a pioneering transition economy. In the early 1990s, the Czech Republic abolished central planning and carried out rapid price liberalization, macroeconomic stabilization and widespread privatization of state-owned firms. It was one of the most successful countries in the region in terms of macroeconomic stabilization, keeping relatively low inflation, budget deficit, and unemployment rate.[11] As may be seen from Table 1, like the other economies in Central Europe, the Czech Republic suffered a significant GDP decline in the first phase of the transition, followed by a recovery in the early-to-mid 1990s. Unlike the other Central European economies, however, the Czech Republic experienced a recession from 1997 to 1999. As in Slovakia and Poland, the Czech investment rate fell during the economic decline of the early 1990s and rebounded thereafter. The 1997-99 recession also brought about a significant decline in Czech Republic's high rate of investment. However, during most of the 1990s the Czech and Slovak investment rates were among the highest ones observed in the transition economies. Finally, like other transition economies, the Czech Republic experienced a severe banking crisis in the mid-to-late 1990s. The crisis stemmed form excessive lending to firms for non-viable investment projects and it was exacerbated by an underdeveloped legal framework, weak enforcement of existing laws and high reliance of firms on bank credit for capital. Hence, understanding investment behavior of the

[11] After price liberalization, the Czech Republic reduced inflation to about 10% throughout most of the 1990s, as compared to a more gradual reduction from about 20% to 10% in Hungary, 40% to 12% in Poland and 20% to 10% in Slovakia. During most years in the 1990s, the Czech government ran a 1-2% budget deficit, compared to a 5-8% deficit in Hungary, a 2-5% deficit in Poland and a 0-5% deficit in Slovakia. Finally, until the recession in the late 1990s, the Czech Republic maintained its unemployment rate below 5%, while the unemployment rate in the other three economies reached double digits. During the 1996-2000 recession, the Czech unemployment rate peaked at 9.8% in January 2000.

various types of firms in the Czech Republic is useful for gaining a broader understanding of the investment behavior and hence restructuring of firms in the transition economies in general.

2. Data and Basic Statistical Findings

The Czech Statistical Office (CSO) collected the data set we use. It covers all industrial firms employing more than 25 people in the 1992-94 and 1997-98 periods, and all industrial firms with more than 100 employees in 1995 and 1996. The 1998 data come from a preliminary file and do not include all firms with fewer than 100 employees.[12] 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 number of quarterly observations. In our analysis, we use data on total gross investment since this indicator is consistent with most existing studies of investment in the market economies and since we do not have much information on individual components of investment.[13]

While the CSO is very professional, the data set contained some inconsistencies.[14] We have therefore performed a number of consistency checks.[15] In imposing these consistency criteria, about 10 percent of the observations were dropped, leaving us with a data set of approximately 83,500

[12] In 1995 and 1996, the Czech Statistical office temporarily changed its methodology and collected data only for firms with 100 or more employees.

[13] For firms with investment over 1 million Czech Crowns (about $30,000), we have the investment figure broken down into tangible and intangible components. The share of intangible investment is relatively small, averaging 2.4% in 1993 and 1994, and rising to 3.9% in 1995.

[14] The CSO is regarded as one of the most professional statistical offices in the former Soviet bloc.

[15] These checks are similar to those used by Lízal et al. (2001) and Lízal (1999b). They are based on logical and economic limits and definitions: firm's capital at the start and end of each quarter should be positive; the average labor force in a given quarter should be more than 20 employees; investment should be non-negative (there were no negative values of investment reported in our data set); production should be positive; depreciation should be positive and less than the total capital value; investment should be smaller than the end-of-the-period capital stock; average wage should be higher than 2000 crowns/month (minimum wage in1992); sales should be non-negative; and one-year lagged production, sales and labor should be non-negative or missing. We note that due to historical factors, the Czech accounting system belongs to the Continental family of accounting systems. It is similar, though not identical to the system of International Accounting Standards. Our checks of variable definitions indicate that the relevant data are adequate for our analytical purposes.

quarterly observations.[16] In terms of the total number of firms (and quarterly observations) used in regressions, our data set covers 1867 firms (6947 quarterly observations) in the 1992-93 sub-panel, 2315 firms (7570 quarterly observations) in the 1993-44 sub-panel, 1922 firms (6991 quarterly observations) in the 1994-95 sub-panel, 1969 firms (7349 quarterly observations) in the 1995-96 sub-panel, 1861 firms (6975 quarterly observations) in the 1996-97 sub-panel, and 1799 firms (6651 quarterly observations) in the 1997-98 sub-panel.

As may be seen in Table 2, our data contain important information about the ownership and legal status (form) of the firms. Unfortunately, we cannot exploit this information in a panel format since changes in the legal status and frequently also ownership resulted in changed identification numbers of firms. We identify firms by their identification numbers, and changes in the legal status or ownership are from our standpoint indistinguishable from the births of new firms, breakups and spin-offs, or mergers.[17] While the inability to track the evolution of ownership and legal form over time imposes limits on our analysis, we are nevertheless able to exploit the ownership and legal form information in a number of ways.

The CSO classified firms into ownership categories by majority ownership. Hence a firm is for instance classified as being privately owned if it is more than fifty percent privately owned. When none of the types of owners (private owners, cooperative members, state, or foreign owners) have a majority stake, the firm is classified as having mixed ownership.

The legal status reflects the particular type of corporate governance and legal obligations associated with each form of registration. It also captures the relative financial and bureaucratic ease

[16] 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 coefficient and standard deviation in 1993:Q3 investment/production in Table 3) and some regression estimates. We have therefore eliminated this observation from the data set. Data on capital stock are unavailable for 1992, and we thus use the 1992 data only for estimations that do not require the capital stock variable. Finally, it should be noted that the consistency checks revealed that data quality was improving slightly over the 1992-98 period.

[17] Changes in firm size that do not induce changes in the identification number are controlled for by including the capital stock as a scaling variable.

of establishing a given type of firm. Understanding the legal (corporate) status is important because different countries placed different emphasis on privatization and corporatization of state-owned firms during the transition. For instance, while the Czech Republic and Russia focused on rapid privatization, Poland stressed early corporatization and slower privatization of state-owned firms. The relative merits of these different approaches continue to be debated.

In the Czech Republic, as in other Central European countries, individual, cooperative and limited liability categories tend to contain smaller firms that were started with relatively low initial capital base. In contrast, joint-stock companies tend to be larger in size. The state-owned and mixed ownership firms each have a similar average firm size in both the limited liability and joint-stock legal status. Finally, state-owned/state-enterprises tend to be relatively small, averaging less than one-half of the employees of other state-owned firms.[18] Corporate governance in smaller firms is relatively straightforward as ownership and management usually overlap. In state-controlled firms the government appoints and controls managers, while in private firms the decisions are made by the largest shareholder(s). Finally, in cooperatives the managers are elected by all coop members.

From Table 2 it is clear that in terms of the number of quarterly observations, the most important ownership-legal status category is that of privately-owned/limited liability companies (28,697 observations). It is followed by state-owned/joint-stock companies (12,170), privately-owned/joint stock companies (9,091), state-owned/state-enterprises (7,154), foreign-owned/limited liability companies (5,995), cooperatively-owned/cooperatives (5,461), privately-owned/individual businesses (5,355), mixed ownership/joint-stock companies (5,226), and foreign-owned/joint-stock companies (2,218). These nine categories, plus mixed ownership/limited liability firms (652), state-owned/limited liability companies (616), and "other firms" category constitute the twelve types of firms whose investment behavior we analyze.

Tables A1 and A2 in the Appendix give the evolution over time of the numbers of observations in the legal status and ownership categories, respectively. Taking into account the fact that firms with fewer than 100 employees were excluded from the data set in 1995, 1996 and to some extent also in1998, we see from Table A1 that there was an expected decrease in the number and share of state enterprises and an increase in the number and share of limited liability, individual and joint stock companies. The number of cooperatives appears to have stayed steady or declined slightly between the early 1990s and 1998. In terms of ownership, the data in Table A2 complement the picture by showing that the number and share of state-owned firms declined between the early and late 1990s, while the number and share of foreign, mixed and domestic privately-owned firms increased. The number of cooperatives again appears to have held steady or declined slightly between the early 1990s and 1998.

The distribution of observations across industries, not reported in a tabular form, is quite broad, with 15 percent of observations being in the food industry, 13 percent in the machinery industry, 12 percent in the metal product industry, 7 percent in the furniture industry, and 6 percent in the processing of non-metallic minerals and textile industries. Each of the remaining industry groups has less than 5 percent of all observations.

The summary statistics of the most relevant variables are presented in Tables 3 and 4. As may be seen from Table 3, investment/production and investment/labor ratios show an increase over time, although the pattern is not as steady as in the aggregate data in Table 1. The discrepancy is brought about by the fact that small firms are excluded from our micro data in 1995, 1996 and to some extent also in 1998, and by the fact that the aggregate investment figures in Table 1 contain significant infrastructure investment carried out by the government. The data in Table 3 also show

[18] Detailed descriptive tables may be obtained from the authors upon request.

a seasonal pattern with a fourth quarter peak, reflecting an end-of-the-year investment spree.[19] It is interesting that the communist era phenomenon of "spending funds before the year's end" is reflected in the investment behavior of firms well into the transition.[20]

Profit is defined as all revenues minus accrued costs. The data in Table 3 show that average profits were positive in all years during the 1992-98 period. There was also substantial quarterly and annual variation in average profits during this period, as was the variance of profits across firms in each quarter. In an opposite pattern to investment, there was a downward trend in profits across quarters in all years during the 1993-98 period, with profit reaching negative values in the last quarter of 1993 and 1995-98. Overall, the post 1992 transition has not been associated with declining profits, as may have been the case in the 1989-92 period (Blanchard, 1997, pp. 64-6). This finding, together with the consideration of the appropriateness and availability of data, has led us to use profit as a measure of the firm's availability of internal funds for investment.

In panels A-C of Table 4, we present for each of the 13 ownership-legal status categories of firms the annual evolution of the propensity to invest, as captured by the investment/capital, investment/labor and investment/production ratio, respectively. The foreign-owned/limited liability and joint-stock companies are a rapidly growing group of firms and they record some of the highest values of the three ratios in most years. These two findings based on micro evidence make us argue that foreign-owned firms are a major conduit of investment and innovations into the transition economies such as the Czech Republic. The domestic privately-owned/joint-stock companies are not far behind the foreign-owned companies, however, and they dominate the foreign/owned limited liability companies on some of the investment indicators in several years. Moreover, while the state-

[19] The seasonal pattern is much more pronounced in net investment than in depreciation, as shown by Lízal and Svejnar (2001).

[20] A more detailed examination indicates that the cyclical nature of investment is systematically reflected in the behavior of joint-stock companies of all ownership types and, to a lesser extent, of state-owned/state-enterprise and foreign-owned/limited liability firms.

owned/joint-stock companies (the second most numerous group of firms) do not record high investment/capital ratios, they rank fifth out of thirteen on investment/labor in most years and move from the sixth to third place in investment/production between 1992 and 1998. Similarly, the state-owned/limited liability companies register some of the highest investment/production ratios in the early-to-mid 1990s, while ranking relatively low in terms of investment/capital. The low investment/capital ratio found in state-owned firms may hence indicate that these firms continue to report in their accounting books the value of capital from the centrally planned period, rather than writing some of it off as obsolete and unproductive. In contrast, the privately-owned/limited liability firms (the single most numerous category of firms) and individually registered firms rank high in terms of investment/capital but low in the other two indicators, suggesting that these smaller private firms operate with a small (recorded) capital stock and do not invest heavily relative to their output and employment. Finally, cooperatives and state-owned/state-enterprises record the lowest investment ratios for all indicators in virtually every year.[21]

The statistics reported in Tables 4A-C hence indicate that foreign companies generally tend to invest the most and cooperatives the least. The behavioral difference between the private and state-owned firms is more complex. Private firms clearly invest more than the state-owned ones relative to their recorded capital stock and the private joint-stock companies (the large private firms) also tend to invest a bit more than the state-owned/joint-stock companies on all three criteria. However, in the early-to-mid 1990s state-owned/limited liability companies dominated all domestic private firms in terms of the investment/production ratio and throughout the 1990s the most numerous private/limited liability companies and the private individually registered firms tended to invest relatively little per output and per worker. The widely accepted Polish survey findings by

[21] It should be noticed that a large number of small firms (especially private/limited liability and in lesser extent private/individual businesses) did not report capital (see Tables 4A and 4B). This is because the forms that smaller firms were required to fill out for the CSO focused on variables related to the income statement rather than the balance sheets.

Belka et al. (1994), indicating that during transition investment is high in the new private firms and low in the state-owned enterprises, is hence not supported by our large Czech data set. Finally, it must be noted that some of the highest investment ratios are recorded in the mixed ownership and "other" categories of firms.

3. The Estimating Framework

We estimate several equations that allow us to explore the issues mentioned in the introduction and also permit us to compare our results to those obtained for western economies. On the demand side, we use two specifications. The first one corresponds to the basic neoclassical and accelerator models of investment demand (see e.g., Jorgenson, 1971). These models are internally consistent and have been widely used in the western context. They allow us to check if the behavior of firms in the transition is consistent with the profit maximization hypothesis inherent in these models. The models are based on somewhat restrictive assumptions about input substitutability (the accelerator model) or speed of adjustment (the neoclassical model), however, and we therefore also estimate an Euler equation that is derived explicitly from a dynamic structural model of investment demand. The Euler equation enables us to assess whether the firms display behavior that is consistent with dynamic profit maximization.[22]

On the supply side, we use a specification that allows us to test whether the firm's availability of internal and external funds affects its investment decisions. In particular, our discussion of imperfections in the newly established banking sector and the possible presence of a soft budget constraint make us hypothesize that the cooperatives and individually-owned or limited liability companies, which tend to be smaller and many of which are newly formed, could be expected to be

[22] This is a rather strict test since even in western empirical applications the model has often encountered problems of convergence or generated counter-intuitive parameter values (Bond and Meghir, 1994). However, the model represents

more rationed in their access to financial resources than the joint-stock companies that tend to be large and well established, or the foreign-owned firms that can obtain investment financing from other countries. Moreover, we expect that current and privatized state-owned enterprises may display behavior that is consistent with a soft budget constraint.

In terms of actual specification, on the demand side we start with the accelerator and neoclassical models, as developed and used by Koyck (1954), Jorgenson (1966), Kopcke (1985) and others. The capital accumulation constraint is given by

$$K_t = (1 - \delta)K_{t-1} + I_t,$$

where K_t is the current period capital stock, $I_t = I_t^{Gross} = I_t^{Net} + I_t^{Replacement}$ and hence $I_t^{Net} = I_t - \delta K_{t-1}$. Denoting output by Y_t and the optimal level of capital by K_t^*, the flexible accelerator (Koyck) model assumes that each period a proportion λ of the gap $K_t - K_t^*$ between the actual and optimal level of capital is closed. The model further assumes that $K_t^* = \mu Y_t$ and net investment is hence given by $I_t^{Net} = \lambda(K_t^* - K_{t-1}) = \lambda\mu Y_t - \lambda K_{t-1}$, implying that the actual level of capital may be expressed as

$$K_t = \lambda\mu Y_t + (1-\lambda)K_{t-1}.$$

Substituting this expression into the equations for K_{t-1}, K_{t-2},..., one obtains

$$K_t = \mu[\lambda Y_t + \lambda(1- \lambda)Y_{t-1} + \lambda(1- \lambda)^2Y_{t-2} + \lambda(1- \lambda)^3Y_{t-3} + ...], \qquad \textbf{(1)}$$

which yields the corresponding net investment equation in first differences:

$$I_t^{Net} = K_t - K_{t-1} = \Delta K_t = \mu[\lambda\Delta Y_t + \lambda(1- \lambda)\Delta Y_{t-1} + \lambda(1- \lambda)^2\Delta Y_{t-2} + \lambda(1- \lambda)^3\Delta Y_{t-3} + ...].$$

We can substitute back into the gross investment relationship to obtain

$$I_t = K_t - (1 - \delta)K_{t-1} = \lambda\mu Y_t + (\delta - \lambda)K_{t-1}. \qquad \textbf{(2)}$$

While it is possible to proceed further in rearranging equation (2), the resulting specification tends to suffer from autocorrelated error terms.[23] We hence use equations (1) and (2). Since this

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an appealing alternative to empirical specifications relying on Tobin's Q since financial markets are not yet efficient and adequate data for constructing the values of Q hence do not exist in the transition economies.

[23] Note that since equation (2) holds also for t-1, it follows that

specification requires the adjustment process to be a distributed lag (and hence the coefficients to decline according to a geometric pattern), we follow the literature and relax this restriction. In particular, we build on equations (1) and (2) by experimenting with specific numbers of lagged terms of output without imposing restrictions on their coefficients:

$$I_t = k + \Sigma b_i\, Y_{t-i} + cK_{t-1} + e_t \qquad i=0,1,2,...,m \qquad \textbf{(3)}$$

Where k is a constant, e is the error term and equation (3) may also be viewed as a special case of Jorgenson's rational lag function.

In a neoclassical model we arrive at equation such as (3) by assuming that the firm maximizes a profit function

$$\pi_t = p_t Y_t - w_t L_t - c_t K_t$$

subject to a neoclassical production function $Y_t = f(K_t, L_t)$, where capital K_t and labor L_t are substitutable, p is the output price, w is the wage, and c is the user cost of capital. The maximization results in the standard first order conditions equating the marginal product of labor to the wage and the marginal product of capital to its user cost. This approach requires one to specify the production function and define the user cost of capital. Depending on the production function, a general form of the estimating investment equation is of the form

$$I_t = k + \Sigma b_i\, (p/c)_{t-i}\, Y_{t-i} - \Sigma d_i\, (p/c)_{t-i}\, Y_{t-i-1} + \delta K_{t-1} + e_t \qquad i=0,1,2,...m.$$

If one considers a one-period investment ordering (investment requiring one period to be fully installed) in the context of a Cobb-Douglas production function $Y = K^{\theta}L^{1-\theta}$, one obtains $\theta(Y_t/K_t) = c_t/p_t$ and $K_t^* = \theta(p/c)_t Y_t$. The net investment is then given by

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$$I_{t-1} = K_{t-1} - (1 - \delta)K_{t-2} = \lambda\mu Y_{t-1} + (\delta - \lambda)K_{t-2}$$

and by multiplying each side by $(1 - \delta)$ and subtracting the resulting equation from (2) one obtains

$$I_t - (1 - \delta)I_{t-1} = \lambda\mu Y_t - (1 - \delta)\,\lambda\mu Y_{t-1} + (\delta - \lambda)K_{t-1} - (1 - \delta)(\delta - \lambda)K_{t-2}.$$

This equation may in turn be rewritten as

$$I_t - (1 - \delta)I_{t-1} = \lambda\mu Y_t - (1 - \delta)\,\lambda\mu Y_{t-1} + (\delta - \lambda)I_{t-1}$$

since $I_t = K_t - (1 - \delta)K_{t-1}$ implies $I_{t-1} = K_{t-1} - (1 - \delta)K_{t-2}$. Rearranging and collecting the I_{t-1} terms yields:

$$I_t = \lambda\mu Y_t - (1 - \delta)\,\lambda\mu Y_{t-1} + (1 - \lambda)I_{t-1}.$$

$$I_t^{net} = \Delta K_t^* = \theta(p/c)_t(Y_t - Y_{t-1}) = \theta(p/c)_t Y_t - \theta(p/c)_t Y_{t-1},$$

while gross investment is given by an equation that is of the same form as equation (3):

$$I_t = \Sigma g_i \theta(p/c)_{t-i} Y_{t-i} + \delta K_{t-1} + e_t, \qquad i=0,1,2,...m. \qquad \textbf{(3')}$$

where $\Sigma g_i = 1$ (i=0,1,2,...m), if no investment orders were canceled.

The neoclassical and accelerator models embedded in equations (3) and (3') are usually operationalized by relating a firm's investment/capital ratio to its output/capital ratio:[24]

$$\frac{I_t}{K_{t-1}} = \alpha + \sum_{k=1}^{m} \gamma_k \frac{Y_{t-k}}{K_{t-1}} + \varepsilon_t \quad , \qquad \textbf{(4)}$$

where the interpretation of γ's depends on whether the underlying theory refers to the neoclassical or accelerator models and m is the number of lags. In our empirical work, we also control for the output price to user cost of capital ratio by including firm-specific fixed effects and time dummy variables, and by estimating the equation separately for the different categories of firms.

Equation (4) reflects the firm's demand for investment and it implicitly assumes that the supply of investment funds is perfectly elastic. In accounting for the possibility that the firm faces transaction costs or restrictions in obtaining external financing, the usual approach in the investment literature is to augment this type of equation by one or more cash-flow variables such as profit. Since Czech firms were required to pay for internally financed investment from retained profits and our data set contains information on profit for most firms in most of the time periods, we examine the link of investment to this variable. In the studies of advanced market economies, a positive coefficient on profit (cash-flow) is usually interpreted as an indication that firms are credit rationed since in a perfect capital market the firm and lender would be indifferent between internal and external financing and the coefficient on profit would hence be zero.

The advantage of this resulting investment equation is that it does not require data on capital stock. However, since it contains lagged dependent variable, the error process tends to be correlated, leading to inconsistency problem in OLS.

[24] Note that the usual assumption on the form of heteroskedasticity of e_t leads to scaling with the reciprocal of capital. We therefore use ε_t to denote the transformed residuals.

We note that in the transition context the inclusion of the profit variable as a regressor allows one also to test the soft budget constraint hypothesis. In particular, since firms have used bank credit extensively as their principal and almost exclusive form of external financing, a zero coefficient on profit signals that firms have access to bank credit for investment irrespective of their profitability, which as we saw earlier ranges from highly positive to highly negative. In the presence of high investment rates and rapid accumulation of non-performing enterprise loans by the banks, this non-discriminatory supply of bank funds to firms signals the presence of a soft budget constraint for the poorly performing firms. We also formulate a stronger version of the soft budget constraint hypothesis, namely that the coefficient on profit is negative. This strong version reflects the case where poorly performing firms get a better access to bank loans and invest more, *ceteris paribus*, than profitable firms.[25]

During some quarters we are missing either profit, capital or investment data for some of the firms and since our final specification requires at least five quarters of consecutive presence in the data, the set of firms on which we run the investment equation is hence somewhat smaller than the original one. In order to control for possible selection bias stemming from this switch to a smaller data set, we first run a Heckman-type probit equation, predicting the probability of the firm being included in the sample on the basis of output, profit, industry dummy variables and firm type variables. The resulting inverse Mills ratio is included as an explanatory variable in the investment equation:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \sum_{m=1}^{4}\left(\beta_k \frac{\Pi_{i,t-k}}{K_{i,t-1}} + \gamma_k \frac{Y_{i,t-k}}{K_{i,t-1}} \right) + \mu M_{i,t} + \psi^T X_{i,t} + \varepsilon_{i,t} \quad , \qquad \textbf{(5)}$$

where Π denotes gross profit, M the inverse Mills ratio from the probit estimation and X a set of quarterly (and in the case of longer panels also annual) dummy variables. Naturally, βs and γs are

[25] For another possible manifestation of the soft budget constraint, namely in the form of higher wages, see Prasnikar and

the parameters of our main interest, with vector Ψ and μ being other parameters to be estimated. We have run pre-tests with varying numbers of lags. Since we have quarterly data, we have focused on models with the number of lags equal to or greater than four. The results for four or more lags are similar and we hence report findings based on m=4.[26] In order to control for firm-specific heterogeneity, we estimate equation (5) using a fixed effects (mean deviation or within group) specification. As is customary in the literature, we assume that the lagged values of the regressors are exogenous.

As mentioned earlier, we also estimate an investment equation that corresponds to a structural model of dynamic optimization by firms in the presence of adjustment costs:

$$\frac{I_{i,t}}{K_{i,t}} = \alpha + \varphi_1 \frac{I_{i,t-1}}{K_{i,t-1}} + \varphi_2 \left(\frac{I_{i,t-k}}{K_{i,t-1}} \right)^2 + \varphi_3 \left(\frac{Y_{i,t-1} - w_{i,t-1} L_{i,t-1}}{K_{i,t-1}} \right) + \psi^T X_{i,t} + \varepsilon_{i,t} \ , \qquad \textbf{(6)}$$

where w denotes the wage, L is employment and φs are parameters. Since models such as the one in equation (6) have a lagged dependent variable as a regressor and need a substantial time dimension for convergence (see e.g., Bond and Meghir, 1994), we estimate equation (6) on the deviations from the mean using the whole panel. We use the first and second powers of the deviations from the mean of the twice lagged labor/capital ratio, the wage interacted with the labor/capital ratio, the output per worker minus the wage interacted with the labor/capital ratio, and the output/capital ratio as instruments for the right-hand side variables.[27]

Svejnar (1998). The particular form of the soft budget constraint hence depends on institutional environments.

[26] We have also estimated equations with a four-quarter difference specification and found the results to be similar to those obtained with four quarterly lags. However, the four-quarter difference specification by construction shortens our panel by additional four periods and is more demanding on the completeness of the firm presence in the time dimension.

[27] The Euler equation models require a large time dimension to converge to consistent estimates even if the number of firms is large because in the presence of aggregate shocks the error term contains a prediction error that averages to zero over time but not over firms. This need for a long time span is a major problem in empirical studies of investment since there are usually fewer than twenty time observations. We have only seven-year data and the high seasonality of quarterly observations effectively wipes out the advantage of longer time dimension of the panel (Lízal, 1999b, examines the effects of such seasonality in a simpler setup for depreciation). As could be expected in this situation, when we carry out the estimation separately for the major ownership-legal status groups, the estimates generate high standard errors and unreasonable mean values of parameters. The need for a larger cross-sectional dimension in the presence of a limited

Equation (6) is appealing because it provides evidence on the consistency of enterprise behavior during the transition with a model of profit maximization in the presence of cost of adjustment. As mentioned earlier, this is valuable because a key turning point in the transition occurs when the behavior of firms starts approximating that of a firm in a market economy. We use the investment setting to provide micro-econometric evidence on this issue. In particular, omitting for simplicity the firm subscript i, equation (6) may be derived from the maximization of the present discounted value of firm's expected profits V_t as follows:[28]

$$V_t = E\left[\sum_{j=0}^{\infty} \xi_{t+j}\, \Pi_{t+j} \,\middle|\, \Omega_t\right] \quad , \tag{7}$$

Subject to:

$$\xi_{t+j} = \prod_{n=0}^{j-1} \frac{1}{1+r_{t+n}} \quad \forall \; j>0 \quad , \tag{8}$$

$$= 1 \qquad j=0 \quad ,$$

$$\Pi_t = \Pi(K_t, L_t, I_t) = p_t Y(K_t, L_t, I_t) - w_t L_t - p_t^I I_t \quad , \tag{9}$$

$$Y(K_t, L_t, I_t) = F(K_t, L_t) - G(K_t, I_t) \quad ,$$

and

$$G(K_t, I_t) = \frac{a}{2}\left(\frac{I_t}{K_t} - b\right)^2 K_t \quad , \quad a,b \geq 0 \tag{10}$$

The term $E[.\,|\,\Omega_t]$ denotes the expectation conditional on all information available at the time t, Π_t is the expected profit at time t, ξ_{t+j} is the discount factor between period t and t+j (assuming that payments are made at the beginning of each period), r is the discount rate, δ is the depreciation rate, p is output price, F(.,.) is a strictly concave (unobservable) frontier production function, G(.,.) is a strictly convex (unobservable) cost of capital adjustment function, Y(.,.,.) = F(.,.) - G(.,.) is the firm's observable production, and a and b are parameters of the cost of the capital adjustment function.[29] The term $p_t^I I_t$ is used instead of the usual "capital rental" on the assumption that investment is paid for at the time of purchase.

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number of time observations has led us to estimate the Euler equation jointly on all observations, allowing the ownership-legal status effects to be captured as different intercepts.

[28] See also Matyas and Severstre (1992) or Bond and Meghir (1994) for related derivations.

[29] In the classical setup, the production function F(.,.) and the adjustment cost function G(.,.) are assumed to be additively separable.

In this setting, the firm's optimal investment problem can be restated as a dynamic programming problem with a single state variable K_t and single control variable I_t:[30]

$$V_t(K_{t-1}) = \max_{K_t I_t L_t} \{\Pi(K_t, I_t, L_t) + E[\xi_{t+1} V_{t+1}(K_t) | \Omega_t]\} \ . \qquad \textbf{(11)}$$

Assuming that the production function F(.,.) is homogeneous of degree 1 in labor and capital and that the firm has rational expectations, one can differentiate equation (11) with respect to the choice variables K_t, L_t and I_t to obtain equation (6) after algebraic manipulations.[31]

4. Empirical Estimates

In Table 5, we present our overall estimates of equation (5), which allow us to capture the importance of the neoclassical-accelerator and the internal funds-soft budget constraint models. The estimates are based on 1992-98 quarterly data for the twelve principal categories of firms and the coefficients give the total effects of the four lagged output and profit variables.[32]

As may be seen from the Table 5, the sum of the coefficients on output is positive and statistically significant for all categories of firms except for the mixed/limited liability group (thirty-four firms), where the coefficient is –0.003 and statistically insignificant. As might be expected from these individual results, the overall regression using pooled data from all firms generates a positive and statistically significant coefficient on output as well. The sum of coefficients on profit is also positive in the overall regression based on pooled observations from all firms, but among the individual categories of firms it is positive and significant in only five of the twelve categories. All the remaining coefficient estimates are statistically insignificant, except for the coefficient on private/individual firms, which is negative and significant.

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[30] We assume that capital can be changed only through investment and the investment decision is made at the beginning of each period.

[31] In the present derivation, we assume that the labor input may be adjusted costlessly. This assumption may be relaxed with no influence on the core of our derivation. See e.g., Estrin and Svejnar (1993) for the derivation and estimation of a model with adjustment costs of labor.

The estimates in Table 5 hence indicate that the neoclassical-accelerator model, reflecting firm behavior that is consistent with profit maximization, receives a fairly uniform support from virtually all categories of firms. The credit-rationing hypothesis is supported by data from the three categories of mostly smaller firms (private/limited liability companies, cooperatives and foreign/limited liability firms) and also from the category of state-owned/joint stock firms. The finding that investment in smaller firms varies positively with firm's profit could be expected in an underdeveloped financial market where smaller firms do not have easy access to bank capital and are unlikely to benefit from a soft budget constraint since they are not former state-owned firms. The positive coefficient on profit in the category of state-owned/joint stock firms points to the absence of a soft budget constraint in these firms, but a more complex picture emerges as we address this issue with more disaggregated data below. All except one of the remaining categories contain primarily larger firms and generate insignificant coefficients on profit, a finding that is consistent with a lack of credit rationing and the presence of a soft budget constraint. Following on our earlier discussion, the soft budget constraint is consistent with these findings if some firms encounter difficulties selling their output at a profit, but receive bank loans even if they produce at a loss. If profitable firms in the same categories also have access to bank credit, one may find a positive coefficient on output (the firms produce and invest) and an insignificant coefficient on profit (banks provide investment funds irrespective of profitability). Finally, the negative profit coefficient in private/individual firms, while consistent with the strong soft budget constraint hypothesis, most likely stems from the fact that many of these firms are newly created entities whose investment occurs in the start-up stage in their life cycle when their profit is low or negative. We next examine these issues in more detail.

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[32] The 1992 data are used for lagged values of regressors. The underlying individual coefficients may be obtained from the authors upon request.

Our strategy is to generate first separate estimates for larger and smaller firms to see if investment behavior varies with size across the various categories of firms. We divide the firms into two groups: those with 100 or more workers and those with fewer than 100 workers. This division also allows us to take into account the fact that our data do not cover firms with fewer than 100 workers in 1995, 1996 and to some extent in 1998. In particular, by generating estimates for firms with 100 and more workers in all years, we can assess the impact of the aforementioned change in statistical coverage.

As may be seen from the top panel of Table 6, the estimates of equation (5) for firms with 100 and more workers are very similar to those obtained for all firms in Table 5.[33] The corresponding coefficients have identical signs in all cases except for the profit coefficient in privately-owned/individual firms, where firms with 100 and more workers display a statistically insignificant coefficient, as compared to the negative coefficient found in the combined group of large and small firms. As might be expected, the negative and statistically significant coefficient is found in the smaller privately-owned/individual firms in the lower panel of Table 6. Since these small firms tend to be more recent start-ups than their larger counterparts, the findings in Table 6 suggest that it is the small (rather than both small and large) privately-owned/individual firms that are observed during the start-up stage of their life cycle when they invest heavily and their profit is low or negative. Interestingly, while both small and large cooperatives appear to be credit rationed, private and foreign limited liability companies display credit rationing only among the larger firms. With these caveats in mind, we can conclude that the estimates based on all data are quite similar to those for larger firms.

[33] In this estimation, we have left out the three categories of firms that have too few observations when divided into the two size groups – state-owned/limited liability enterprises, mixed/limited liability companies and other firms.

Since investment behavior is likely to have undergone changes as the firms proceeded through the transition process, we have also estimated equation (5) separately for each year.[34] As may be seen from Table 7, the separate annual estimates for 1993-98 show considerable variation in investment behavior over time.[35] Moreover, in examining the raw data, we have detected significant movements of firms across categories during certain years. As we show presently, it is essential to use this information in evaluating changes in the estimated coefficients over time.

The overall regression (based on observations from all firms) in Table 7 generates a positive coefficient on total output in all six years, while the effect of profit is negative in 1993 and 1996, statistically insignificant in 1994 and positive in 1995, 1997 and 1998. In the aggregate, production hence drove investment in each year, while profitability was negatively related or unrelated to investment in the early 1990s, and primarily positively related in the second half of the 1990s. In examining the coefficients in the individual categories of firms, one finds in Table 7 (as in Table 5) that there are more positive (statistically significant) coefficients on output than on profit. The data are also increasingly supportive of the neoclassical-accelerator model as the transition proceeds, in that the number of categories of firms with positive coefficients on output increases (almost but not quite monotonically) from three in 1993 to eight in 1998. In contrast, the number of categories of firms with a positive coefficient on profit varies between one and four and while it increases over time, the pattern is not particularly strong. Hence, most coefficient estimates on profit are consistent with the soft budget constraint.

The support of the neoclassical-accelerator model also becomes evident when one notes that the categories of firms whose behavior is consistent with this model are the most numerous ones and increasingly so over time. Hence, while slightly over one-half of firms belonged to the categories that

[34] As in Tables 5 and 6, in Table 7 we report the total effects of output and profit. The individual coefficients for each of the lagged values of output and profit may be obtained from the authors upon request.
[35] In all sets of regressions, the 1992 data are used as lagged values of 1993 regressors.

conformed to this model in 1993 and 1994, by 1998 the proportion rose to almost 100%. The categories of firms whose coefficient estimates are consistent with the credit-rationing model account for about one-third of firms in each of the six years, while two-thirds of firms therefore have estimates that are consistent with the soft budget constraint hypothesis.

In examining the coefficients of individual categories of firms in Table 7, we take into account year-to-year movements of ten or more firms across the ownership/legal status categories. There was no such movement between 1992 and 1993, and the 1993 estimates reflect the categorization of firms just before the first wave of large-scale privatization.[36] A particularly interesting finding for 1993 is that the estimated coefficients on profit for state-owned/joint stock companies and state-owned/state enterprises are negative. This suggests that in 1992-93 these two largest groups of firms (accounting for over fifty percent of all industrial firms at the time) were operating under a strong version of the soft budget constraint in that investment was negatively related to profit.[37] The negative coefficient on profit changes to zero for these two categories of firms in 1994 and actually turns positive for state/joint ventures in 1995, before becoming again negative for both sets of firms in 1996.[38] This suggests that the nature of the credit constraint of the state-owned firms changed over time, showing little sign of being restrictive and some sign of being quite soft in at least two years.

[36] Czech mass privatization proceeded in several stages. Between 1990 and 1991, various properties valued between $2.5 billion and $4.2 billion were restituted to previous owners. Between 1991 and 1993, small firms were sold for about $1 billion in the so-called small-scale privatization program. The most important method by which most medium and large state-owned enterprises were privatized was the large-scale privatization program, which accounted for about $30 billion in asset value. In order to handle the large number of firms, the large-scale privatization program was divided into two waves, with the first wave occurring between 1992 and 1993, and the second wave between 1993 and 1995. The large-scale privatization program employed a variety of privatization methods, including direct sales and transfer of shares to the population at large.

[37] As mentioned earlier, there is also a negative coefficient on profit in the case of private/individual firms. This is most likely associated with the heavy investment in the early phase of the life cycle of these firms when profit is low or negative.

[38] The state-owned firms became numerically relatively insignificant in 1997 and especially 1998.

In interpreting changes in the estimated coefficients over time, one must take into account the fact that between 1993 and 1994, sixty-eight firms moved out of the state-owned/joint stock category of firms, with forty firms going to the private/joint stock and twenty-eight to the mixed/joint stock category. Moreover, one hundred and forty firms moved from the category of state-owned/state enterprises to other categories that we cannot identify.[39] Overall, the number of firms in the private/joint stock and mixed/joint stock categories virtually doubled in 1994, primarily due to the influx of former state-owned firms. The fact that the estimated coefficient on profit for the mixed/joint stock firms turns from being insignificant in 1993 to negative in 1994 hence suggest that the incoming firms were those that operated under the strong soft budget constraint and continued to do so a year later under mixed ownership. Hence, while some of the changes in coefficient estimates could signal moderation of state-owned banks in providing credit to unprofitable firms, some were brought about by the switch of firms across ownership/legal status categories.[40] In addition, it should be noted that the number of private/limited liability companies almost doubled between 1993 and 1994, and the firms also registered a negative coefficient on profit in 1994. Some of the new firms may be the former state-owned/state enterprises operating under the strong version of the soft budget constraint, while others are newly created firms that invest heavily during the start-up period when profits are low or negative. Finally, the number of foreign/joint stock companies increased by over one-third between 1993 and 1994, and these firms display a positive 1994 coefficient on profit.

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[39] State enterprises were assigned a new identification number as they switched their legal status.

[40] Between 1993 and 1994, thirty-three firms also moved into the category of state-owned/joint stock companies, with eighteen coming from the private/joint stock and fifteen from mixed/joint stock category. The movement into state ownership could reflect a number of phenomena, including an increase in the firm's basic capital, with the state becoming a majority owner by contributing more than the other owner(s) of the firm. As mentioned above, throughout the 1990s there was also a movement of firms from the state-owned/state enterprise category, much of which went to the state-owned/joint stock company group. The reader can surmise this flow from the changes in the number of firms in these two categories over the years. However, since this switch was accompanied by a change in the firm's identification number, we cannot detect it directly.

No firms moved across categories between 1994 and 1995 except for firms that moved from the state-owned/state enterprise category to other unidentifiable groups. During the 1994-95 period, the Czech economy also achieved the most rapid rate of growth of GDP (6%) in all of the 1990s. In our 1995 estimates we do not observe any significant negative profit coefficients, although the coefficients for private/joint stock firms and state-owned/state enterprises are zero and hence consistent with the soft budget constraint. Interestingly, we find a positive coefficient on profit for state and mixed/joint stock firms, as well as for private/limited liability firms and cooperatives. With the economy booming and the Czech Prime Minister declaring the transition to be over, the banks may have hardened the budget constraint for some categories of firms.

In 1996-99 the Czech economy experienced an unexpected recession and in 1996 the banks again relaxed the budget constraint for state-owned firms, in part under political pressure. With hundreds of firms moving from state to mixed and private ownership between 1995 and 1996, the estimates for 1996 in Table 7 indicate that investment was again negatively related to profits in state and mixed/joint stock companies, as well as in state-owned/state enterprises.[41] Between 1996 and 1997, over one hundred and fifty firms moved from state and mixed ownership to the private/joint stock category, where the 1997 and 1998 coefficients on profit turned negative. It is likely that this switch to a strong soft budget constraint in the private/joint stock firms in 1997-98 reflected the sizable inflow of firms that operated under a strong soft budget constraint in their original categories of firms in 1996. At the same time, as the banking crisis developed in 1997-98, cooperatives and to a lesser extent also private/limited liability companies appear to have operated under a credit crunch.

Overall, the disaggregated annual estimates in Table 7 suggest that during most of the 1993-98 period, the current and former state-owned firms operated under a soft budget constraint. In

[41] However, it was positive in private/joint stock and (the few) private/individual firms.

contrast, cooperatives and to a lesser extent the private/limited liability companies appear to have been credit rationed.

As the last step in our analysis of the soft budget constraints, we have checked various measures of the propensity to invest of profitable and unprofitable firms. We started by comparing annual data on the investment/capital, investment/output and investment/labor ratios of firms with positive and negative annual profit. We found that the difference was statistically insignificant for all three measures in all years. Second, to eliminate the effect of outliers we replicated these tests for trimmed samples, where we only compared profitable and loss making firms that were within two standard deviations of their respective means. Again, we found the difference to be statistically insignificant for all three measures in all years. Third, in order to check if the difference in investment rates between profitable and loss-making firms only reveals itself over a period of several years, we took firms that were present in our sample for at least six years and we compared a six-year cumulative propensity to invest of firms that had positive total profit and those that had negative total profit over the six-year period. Having found no statistically significant differences among these two groups of firms, we then sharpened the test by comparing only the highly profitable and highly loss making firms in this sample.[42] While the highly profitable firms had somewhat higher mean investment rates than the loss making firms, we again could not reject the hypothesis that the rates were the same.[43] Our findings hence indicate that the loss-making firms had long-term access to capital and on average were able to maintain investment rates that were comparable with those of profitable firms. This is strong complementary evidence that loss making firms operated under soft

[42] The highly profitable firms were defined as those with cumulative capital-weighted profits greater than 1 (cumulative profits exceeded the value of capital), while the highly loss making firms had cumulative capital weighted profits less than –1 (cumulative losses exceeded the value of capital).

[43] For example, the six-year investment to output ratios and corresponding standard errors were 0.08 (0.08) for the highly profitable firms and 0.06 (0.06) for the highly loss-making firms.

budget constraints and it is consistent with the observed lack of corporate bankruptcies in the Czech Republic in the 1990s.

Finally, in Table 8 we present estimated coefficients of the dynamic structural model based on our entire sample of firms. The model includes quarterly and ownership/legal form dummy variables and the inverse Mills ratio. In view of the difficulties that are frequently encountered in estimating this type of a model, our estimates are very encouraging since the three structural coefficients φ_1, φ_2 and φ_3 have the theoretically predicted signs and are statistically significant. In addition to providing support to the static neoclassical-accelerator model, the Czech data from the post 1992 phase of the transition hence suggest that in terms of investment the firms started behaving consistently with inter-temporal profit maximization.

5. Conclusions

Strategic restructuring of firms is viewed as key to a successful transition from plan to market, with investment under a hard budget constraint being a principal form of this restructuring. In this paper, we have used the population of medium-sized and large industrial firms operating in the Czech Republic between 1992 and 1998 to analyze the investment behavior of firms with various types of ownership and legal (corporate) status. Ours is one of the first studies in this area, and it differs from other studies in that we (1) examine the validity of the main competing models of investment in the transition context, (2) test for the presence of credit rationing and a soft budget constraint, (3) assess whether investment behavior of firms changes as the transition proceeds and whether it varies with a firm's ownership and legal status, (4) use quarterly rather than annual data in the presence of seasonal variation in investment, and (5) apply panel data and sample selection techniques to the firm-level data and thus eliminate aggregation and selectivity biases and control for heterogeneity across firms and over time.

A comparison of the investment/capital, investment/labor and investment/production ratios across thirteen principal ownership/legal-form categories of firms during 1992-98 shows that (the relatively few) foreign-owned companies generally tend to invest the most and (the domestically owned) cooperatives the least. Privately owned/joint-stock companies tend to rank after the foreign-owned firms in terms of their propensity to invest, followed by state-owned/joint-stock companies. However, the general picture is complex, as some domestic firms dominate foreign ones for some criteria in some years, and some state-owned firms dominate privately or foreign-owned ones in some cases. In particular, by 1994 and 1995 state-owned/limited liability companies dominated all domestic, private firms in terms of the investment/production ratio. Moreover, throughout 1992-98 the privately-owned/limited liability companies (the most numerous group of firms) and private individually-owned firms tended to invest little relative to their output and employment. The findings from our large data set hence contrast with the widely accepted findings of the relatively small Polish survey (Belka et al., 1994), which suggested that investment during the transition was high in the new private firms and low in the state-owned enterprises.

Our econometric tests based on data from all firms indicate that overall investment behavior may be approximated by the neoclassical-accelerator model. Estimates for individual types of firms in turn show that most firms behave consistently with this model and when we estimate on successive biennial sub-periods of data, we find that the support for the neoclassical-accelerator model grows over time. More generally, our results are similar to those from western economies in that we find output to be an important determinant of investment and the investment behavior of firms in the Czech Republic to be consistent with both the static (neoclassical-accelerator) and dynamic models of a profit maximizing firm.

The fact that we only find a positive relationship between profit and investment in cooperatives and to a lesser extent the smaller private firms supports the view that that these firms

encounter financing constraints. However, the lack of a strong positive link between profit and investment across the broad range of firms casts doubt on the validity of the Calvo-Coricelli hypothesis that stresses a positive relationship between credit rationing and aggregate investment and output. In fact, our results suggest that larger firms had virtually unlimited access to capital and in many years it was the less profitable (more loss making) state and former state-owned firms that received more bank credit and invested at a higher rate, *ceteris paribus*, than their more profitable counterparts. Taken together with the fact that the Czech banks accumulated a large portfolio of non-performing loans, large firms had a high propensity to invest and by the mid-to-late 1990s many of them reached the verge of bankruptcy, these findings suggest that throughout the 1990s many large firms operated under a soft budget constraint.

6. References

Abel, Andrew B. (1980), "Empirical Investment Equations: An Integrative Framework," *Carnegie-Rochester Conference Series on Public Policy, "On the State of Macroeconomics,"* vol. 12(6), Amsterdam: North Holland, pp. 39-91.

Abel, Andrew B. and Olivier Blanchard (1986), "The Present Value of Profits and Cyclical Movements in Investments," *Econometrica*, vol. 54(2), pp. 249-273.

Aghion, Philippe, Olivier Blanchard and Robin Burgess (1994), "The behavior of state firms in Eastern Europe pre-privatization," *European Economic Review*, 38(6), 132-49.

Anderson, Ronald and Chantal Kegels(1997), "Finance and Investment in Transition: Czech Enterprises, 1993 - 1994," IRES - Institut de Recherces, Department of Economics, Universite Catholique de Louvain, Discussion Paper no. 9715, Louvain-la-Neuve.

Basu, Swati, Saul Estrin and Jan Svejnar (1999), Employment and Wage Behavior of Enterprises in Transitional Economies," Working Paper 114 (1997, revised 1999), The William Davidson Institute, University of Michigan Business School.

Belka, Marek, Mark Schaffer, Saul Estrin, and Inderjit Singh (1994), "Evidence from a Survey of State-owned, Privatised and Emerging Private Firms," paper presented at *Workshop on Enterprise Adjustment in Eastern Europe*, World Bank, 22-23 September.

Blanchard, Olivier, *The Economics of Post-Communist Transition*, Oxford: Clarendon Press, 1997.

Bond, Stephen and Costas Meghir (1994), "Dynamic Investment Models and the Firm's Financial Policy," *Review of Economic Studies*, vol. 61(2), pp. 197-222.

Brada, Josef and Dennis Hoffman (1985), "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(1), pp. 6-18.

Calvo, Guilermo A. and Fabrizio Coricelli (1994), "Capital Market Imperfections and Output Response in Previously Centrally Planned Economies," in Caprio G., Folkerts-Landau D. and Lane T. (Eds.) *Building Sound Finance in Emerging Market Economies*, Washington, D.C.: IMF.

Chirinko, Robert, Steven Fazzari, and Andrew Meyer (1999), “How responsive is business capital formation to its user cost? An exploration with micro data,” *Journal of Public Economics*, vol. 74(1), pp. 53-80.

Dessai, Padma (1976), "The Production Function and Technical Change in Postwar Soviet Industry: A Reexamination," *American Economic Review*, vol. 66(3), pp. 372-381.

EBRD (1995, 1998), *Transition Report*, London: EBRD.

Eickelplasch, A. (1995), "Aspekte der Wettbewerbsfahigkeit der ostdeutschen Industrie," Vierteljahreshefte des DIW, no. 2195.

Estrin, Saul and Jan Svejnar (1993), "Wage Determination in Labor Managed Firms under Market Oriented Reforms: Estimates of Static and Dynamic Models," *Journal of Comparative Economics*, vol. 17(3), pp. 687-700.

Fazzari, Steven, Glenn Hubbard, and Bruce Petrsen (1988), "Financing Constraints and Corporate Investment," *Brooking Papers on Economic Activity*, vol. 0(1), pp. 141-206.

_____ (2000), “Investment-Cash Flow Sensitivities Are Useful: A Comment on Kaplan and Zingales,” *The Quarterly Journal of Economics*, vol. 115(2), pp. 695-705.

Gao, Shumei, and Mark Schaffer (1998), “Financial Discipline in the Enterprise Sector in Transition Countries: How Does China Compare?” Working Paper 98/1, Centre for Economic Reform and Transition, Edinburgh: Heriott-Watt University.

Gertler, Mark (1988), "Financial Structure and Aggregate Economic Activity: An Overview," *Journal of Money, Credit and Banking*, vol. 20(3), pp. 559-588.

Gomulka, Stanislaw (1978), "Import Technology and Growth: Poland 1971-1980," *Cambridge Journal of Economics*, vol. 2(1), pp. 1-16.

Gomulka, Stanislaw (1986), *Growth, Innovation and Reform in Eastern Europe*, Madison, Wisconsin: University of Wisconsin Press.

Greene, Donald and Herbert Levine (1978), "Soviet Machinery Imports," *Survey*, vol. 23, pp. 112-126.

Grosfeld, Irena and Gerard Roland (1997), "Defensive and Strategic Restructuring in Central European Enterprises", *Journal of Transforming Economies and Societies*, vol. 3(4), pp. 21-46.

Hayashi, Fujio and Tohru Inoue (1991), "The Relation Between Firm Growth and q with Multiple Capital Goods: Theory and Evidence from Japanese Panel Data," *Econometrica*, vol. 59(3), pp. 731-754.

Hubbard, Glenn (1998) "Capital-Market Imperfections and Investment," *Journal of Economic Literature*, vol. 36(1), pp. 193-225.

Jorgenson, Dale (1966), "Rational Distributed Lag Functions," *American Economic Review*, vol. 53(2), pp. 135-149.

Jorgenson, Dale (1971), "Econometric Studies of Investment Behavior: A Survey," *Journal of Economic Literature*, vol. 9(4), pp. 1111-1147.

Journal of Comparative Economics, (special issue) vol. 25(3-4), 1997.

Kaplan, Steven and Luigi Zingales (1997), "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" *The Quarterly Journal of Economics*, vol. 112(7), pp. 167-215.

Kaplan, Steven and Luigi Zingales (2000), "Investment-Cash Flow Sensitivities Are not Valid Measures of Financing Constraints," *The Quarterly Journal of Economics*, vol. 115(2), pp. 707-712.

Kopcke, Richard (1985), "The Determinants of Investment Spending," *New England Economic Review*, Boston, Mass.: Federal Reserve Bank of Boston, July-August, pp. 19-35.

Kornai, Janos (1979), "Resource Constrained versus Demand Constrained Systems," *Econometrica*, 47(4), pp. 801-19.

Kornai, Janos (1986), "The Soft Budget Constraint," *Kyklos*, vol. 39(1), pp. 3-29.

Kornai, Janos (1998), "The Place of the Soft Budget Constraint Syndrome in Economic Theory," J*ournal of Comparative Economics*, 26(1), 1998, pp. 11-17.

Koyck, Leendert (1954), *Distributed Lags and Investment Analysis*, Amsterdam: North-Holland.

Lizal, Lubomir (1999a), "Does a Soft Macroeconomic Environment Induce Restructuring on the Microeconomic Level during the Transition Period? Evidence from Investment Behavior of Czech Enterprises," Working Paper of CERGE-EI 147, Prague, June.

Lizal, Lubomir (1999b), "Depreciation Rates in a Transition Economy: Evidence from Czech Panel Data," *Prague Economic Papers*, vol. 8(3), pp. 261-77.

Lizal, Lubomir and Jan Svejnar (2001), "Enterprise Investment During the Transition: Evidence from Czech Panel Data" in Anna Meyendorff and Anjan Thakor (eds.) *Designing Financial Systems in Transition Economies: Strategies for Reform in Central and Eastern Europe*, MIT Press, 2001.

Lizal, Lubomir, Miroslav Singer, and Jan Svejnar (2001), "Enterprise Breakups and Performance During the Transition from Plan to Market," *Review of Economics and Statistics*, 83(1), pp.92-99.

Mátyás, László and Patrick Severstre (eds.) (1992), *The Econometrics of Panel Data*, Dordrecht: Kluwer Academic Publishers.

Nickell, Stephen (1977), *Uncertainty and Lags in the Investment Decisions of Firms*, Cambridge, U.K.: Cambridge University Press.

Oliner, Stephen and Glenn Rudebusch (1992), "Sources of the Financing Hierarchy for Business Investment," *The Review of Economics and Statistics*, vol. 74(4), pp. 643-654.

Prasnikar, Janez and Jan Svejnar (1998), "Investment and Wages During the Transition: Evidence from Slovene Firms," William Davidson Institute working paper No. 184, July.

Shapiro, Matthew (1986), "The Dynamic Demand for Capital and Labor," *Quarterly Journal of Economics*, vol. 101(3), pp. 513-542.

Schaffer, Mark E. (1997) “Do Firms in Transition Have Soft Budget Contraints? A Reconsideration of Concepts and Evidence,” Working Paper 97/120, Centre for Economic Reform and Transition, Edinburgh: Heriott-Watt University.

Terrell, Katherine (1992), "Productivity of Western and Domestic Capital in Polish Industry," *Journal of Comparative Economics*, vol. 16(3), pp. 494-514.

Terrell, Katherine (1993), "Technical Change and Factor Bias in Polish Industry," *Review of Economics and Statistics*, vol. 75(4), pp. 741-747.

Thornton, Judith (1970), "Value Added and Factor Productivity in Soviet Industry," *American Economic Review*, vol. 60(5), pp. 863-871.

Weitzman, Martin (1979), "Technology Transfer to the USSR: An Economic Analysis," *Journal of Comparative Economics*, vol. 3(2), pp. 167-177.

TABLE 1.—INVESTMENT AND GDP GROWTH IN CENTRAL EUROPE

	Czech Republic		Hungary		Poland		Slovak Republic	
Year	%ΔGDP	I/GDP	%ΔGDP	I/GDP	%ΔGDP	I/GDP	%ΔGDP	I/GDP
1991	-11.6	0.22	-11.9	0.21	-7.0	0.15	-14.6	0.25
1992	-0.5	0.25	-3.1	0.19	2.6	0.12	-6.5	0.30
1993	0.1	0.28	-0.6	0.18	3.8	0.09	-3.7	0.28
1994	2.2	0.31	2.9	0.20	5.2	0.09	4.9	0.28
1995	5.9	0.34	1.5	0.18	7.0	0.10	6.7	0.31
1996	4.8	0.38	1.3	0.19	6.1	0.11	6.2	0.42
1997	-1.0	0.37	4.6	0.20	6.9	0.12	6.2	0.44
1998	-2.2	0.31	4.9	0.21	4.8	0.14	4.1	0.44
1999	-0.2	0.30	4.5	0.20	4.1	0.14	1.9	0.36

Note: % ΔGDP stands for the annual percentage change in real GDP. Comparable methodology is used across countries. Investment includes tangible and intangible fixed assets (except for the Czech Republic, where it includes only tangible fixed assets). With the exception of Poland, all investment data are for the entire economy, including estimates for entities not directly monitored by the statistical offices. In Poland, investment reflects entities with more than 20 (50 in industry) employees. 1998 and 1999 data for Hungarian investment share is preliminary estimate.

Source: EBRD (Transition Report) and CESTAT (Statistical Bulletin of Czech, Hungarian, Polish, Slovak and Slovenian Statistical Offices), various issues.

TABLE 2.—NUMBER OF FIRM-LEVEL OBSERVATIONS BY FIRM OWNERSHIP AND LEGAL FORM

	Ownership						
Legal Form	Private	State	Cooper.	Foreign	Mixed	Other	Total
Joint Stock Company	9091	12170	0	2218	5226	93	28798
State Enterprise (SOE)	0	7154	0	0	0	20	7174
Limited Liability (Ltd.)	28697	616	9	5995	652	88	36057
Cooperative	4	0	5461	0	0	0	5465
Individual	5355	0	0	4	0	7	5366
Societé Commandite	261	0	0	256	4	0	521
Subsidized Institutions	0	14	0	0	0	0	14
Other	19	17	3	95	0	10	144
Total	43427	19971	5473	8568	5882	218	83539

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 (other ownership/other legal from) category. Firms with unknown ownership and/or legal form are also included in the Other/Other group.

TABLE 3.— MEANS, STANDARD DEVIATIONS AND NUMBERS OF QUARTERLY OBSERVATIONS OF THE PRINCIPAL VARIABLES

	Inv./ Capital	Inv./ Prod.	Inv./ Lab.	Profit	Labor	Investm.	Prod.	Capital
1992/Q1	0.014	0.140	9.3	6337	653	4975	77524	559905
	(0.034)	(1.656)	(73.1)	(35855)	(1899)	(21544)	(269293)	(2490146)
	[727]	[2018]	[2018]	[2018]	[2018]	[2018]	[2018]	[728]
1992/Q2	0.019	0.167	11.3	5779	569	6160	71796	539167
	(0.049)	(2.264)	(63.7)	(29100)	(1714)	(28426)	(260696)	(2442947)
	[719]	[2305]	[2305]	[2305]	[2305]	[2305]	[2305]	[719]
1992/Q3	0.020	0.149	11.6	4524	540	6062	63127	528921
	(0.091)	(0.966)	(51.5)	(28758)	(1645)	(32202)	(235927)	(2413873)
	[745]	[2413]	[2413]	[2413]	[2413]	[2413]	[2413]	[745]
1992/Q4	0.035	0.197	18.3	5684	484	10251	67834	509865
	(0.111)	(1.143)	(62.3)	(75347)	(1516)	(54632)	(259059)	(2346213)
	[736]	[2548]	[2548]	[2548]	[2548]	[2548]	[2548]	[736]
1993/Q1	0.057	0.079	7.7	5025	531	4717	71284	371088
	(0.775)	(0.273)	(29.2)	(39474)	(1625)	(32206)	(276324)	(1628198)
	[2319]	[2321]	[2318]	[2318]	[2318]	[2321]	[2321]	[2319]
1993/Q2	0.118	0.146	12.2	3719	474	6559	66645	328661
	(1.841)	(1.637)	(45.3)	(27107)	(1463)	(33746)	(274414)	(1505538)
	[2624]	[2624]	[2624]	[2624]	[2624]	[2624]	[2624]	[2624]
1993/Q3	0.103	0.165	11.8	1953	453	6511	57370	321219
	(1.409)	(1.780)	(43.1)	(33458)	(1403)	(38268)	(225152)	(1482040)
	[2714]	[2714]	[2713]	[2713]	[2713]	[2714]	[2714]	[2714]
1993/Q4	0.155	0.181	18.4	-3024	414	9217	61449	289762
	(1.914)	(1.218)	(59.8)	(39238)	(1303)	(56872)	(266118)	(1408122)
	[2825]	[2827]	[2824]	[2824]	[2824]	[2827]	[2827]	[2825]
1994/Q1	0.070	0.137	11.6	5150	347	3488	53893	281997
	(0.813)	(1.675)	(94.1)	(29256)	(1087)	(20776)	(228914)	(1432938)
	[3499]	[3503]	[3495]	[3495]	[3495]	[3503]	[3503]	[3499]
1994/Q2	0.067	0.105	14.1	4432	337	5624	58161	274200
	(0.488)	(0.513)	(48.9)	(30953)	(1056)	(40069)	(270944)	(1341419)
	[3596]	[3599]	[3595]	[3595]	[3595]	[3599]	[3599]	[3596]
1994/Q3	0.072	0.108	13.9	3392	332	5672	52641	274121
	(0.981)	(0.456)	(47.7)	(34164)	(1032)	(45049)	(216243)	(1341158)
	[3634]	[3636]	[3633]	[3633]	[3633]	[3636]	[3636]	[3634]
1994/Q4	0.134	0.190	23.6	1271	313	8315	56365	258243
	(1.263)	(1.366)	(98.3)	(29556)	(991)	(66671)	(221359)	(1297227)
	[3846]	[3849]	[3844]	[3844]	[3844]	[3849]	[3849]	[3846]
1995/Q1	0.037	0.161	12.5	5752	516	6070	89731	451553
	(0.230)	(2.893)	(52.4)	(47867)	(1260)	(28393)	(317440)	(1770985)
	[2117]	[2117]	[2117]	[2117]	[2117]	[2117]	[2117]	[2117]
1995/Q2	0.051	0.128	16.0	4986	505	8335	95449	447173
	(0.304)	(0.866)	(48.3)	(34653)	(1237)	(37889)	(341655)	(1769675)
	[2150]	[2150]	[2150]	[2150]	[2150]	[2150]	[2150]	[2150]
1995/Q3	0.041	0.127	15.2	3136	501	8857	85535	448239
	(0.181)	(0.666)	(41.8)	(41489)	(1224)	(48161)	(296572)	(1812700)
	[2148]	[2148]	[2148]	[2148]	[2148]	[2148]	[2148]	[2148]
1995/Q4	0.085	0.157	24.0	-1637	499	14472	103634	455185

	(0.549)	(0.514)	(61.2)	(35154)	(1212)	(66702)	(386065)	(1796648)
	[2152]	[2152]	[2152]	[2152]	[2152]	[2152]	[2152]	[2152]
1996/Q1	0.042	0.074	12.3	5978	491	7172	110981	472241
	(0.456)	(0.312)	(37.3)	(41854)	(1187)	(33138)	(413775)	(1894208)
	[2169]	[2169]	[2169]	[2169]	[2169]	[2169]	[2169]	[2169]
1996/Q2	0.064	0.103	19.0	3435	483	12401	114792	472699
	(0.520)	(0.525)	(69.7)	(32327)	(1180)	(79131)	(417202)	(1892272)
	[2177]	[2177]	[2177]	[2177]	[2177]	[2177]	[2177]	[2177]
1996/Q3	0.104	0.118	19.2	946	474	12279	104168	466544
	(2.067)	(0.805)	(59.4)	(37750)	(1160)	(107420)	(360790)	(1834646)
	[2180]	[2180]	[2180]	[2180]	[2180]	[2180]	[2180]	[2180]
1996/Q4	0.072	0.152	27.0	-4850	469	16997	118928	477815
	(0.423)	(0.951)	(74.6)	(50014)	(1151)	(87768)	(415584)	(1906272)
	[2172]	[2172]	[2172]	[2172]	[2172]	[2172]	[2172]	[2172]
1997/Q1	0.030	0.098	11.8	4165	208	3199	47918	531098
	(0.184)	(1.077)	(56.5)	(34911)	(720)	(22855)	(291868)	(2064342)
	[1896]	[5708]	[5623]	[2054]	[5623]	[5708]	[5708]	[1896]
1997/Q2	0.058	0.101	15.0	5770	200	4295	54033	279171
	(0.201)	(0.848)	(50.3)	(44793)	(697)	(38622)	(341041)	(1083281)
	[2021]	[5849]	[5773]	[2035]	[5773]	[5849]	[5849]	[2021]
1997/Q3	0.068	0.113	16.7	2887	200	4748	53530	281805
	(0.220)	(0.828)	(65.3)	(43077)	(693)	(37662)	(333722)	(1113805)
	[2052]	[5856]	[5778]	[2062]	[5778]	[5856]	[5856]	[2052]
1997/Q4	0.094	0.123	24.2	-2406	200	7870	60647	283355
	(0.260)	(0.698)	(77.9)	(55193)	(691)	(72069)	(389258)	(1077797)
	[2040]	[5823]	[5735]	[2044]	[5735]	[5823]	[5823]	[2040]
1998/Q1	0.058	0.065	16.7	13111	453	10365	166251	306743
	(0.421)	(0.214)	(49.8)	(110878)	(1092)	(71311)	(786826)	(1158120)
	[1872]	[2205]	[2205]	[2205]	[2205]	[2205]	[2205]	[1872]
1998/Q2	0.058	0.073	21.9	6623	455	14796	166796	395351
	(0.245)	(0.189)	(67.0)	(52878)	(1092)	(104167)	(785015)	(3076007)
	[2167]	[2171]	[2171]	[2171]	[2171]	[2171]	[2171]	[2167]
1998/Q3	0.060	0.083	22.2	3936	451	14866	153501	399330
	(0.279)	(0.248)	(80.9)	(68175)	(1082)	(104122)	(693473)	(3100550)
	[2171]	[2173]	[2173]	[2173]	[2173]	[2173]	[2173]	[2171]
1998/Q4	0.088	0.120	37.7	-2019	452	27536	173375	412321
	(0.382)	(0.604)	(154.8)	(75062)	(1079)	(241179)	(766146)	(3174196)
	[2132]	[2132]	[2132]	[2132]	[2132]	[2132]	[2132]	[2132]
Total	0.075	0.126	16.8	3326	384	8046	78877	370325
	(0.919)	(1.124)	(67.2)	(46659)	(1160)	(66978)	(383870)	(1832438)
	[61600]	[83539]	[83185]	[68471]	[83185]	[83539]	[83539]	[61601]

Note: Standard deviations in parentheses, number of quarterly observations in brackets.
Investment/labor, profit, investment, production, and capital are in thousands of crowns.

TABLE 4A.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATIONS OF INVESTMENT PER CAPITAL BY TYPE OF FIRM IN 1992-1998

	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop	Private/ Individ.	State/ Ltd.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock	Mixed/ Ltd.	Other	Total
1992	0.021	0.144	0.015	.	0.031	.	.	0.079	0.192	0.104	.	.	0.022
	(0.034)	(0.337)	(0.039)	(.)	(0.120)	(.)	(.)	(0.135)	(0.245)	(0.322)	(.)	(.)	(0.078)
	[619]	[28]	[1704]	[0]	[524]	[0]	[0]	[20]	[14]	[18]	[0]	[0]	[2927]
1993	0.034	0.083	0.012	0.252	0.024	0.166	0.032	0.185	0.291	0.022	0.665	0.029	0.110
	(0.262)	(0.483)	(0.028)	(2.842)	(0.063)	(1.527)	(0.086)	(0.739)	(1.263)	(0.071)	(2.583)	(0.060)	(1.576)
	[2516]	[331]	[2395]	[2906]	[984]	[508]	[90]	[141]	[358]	[123]	[53]	[77]	[10482]
1994	0.019	0.055	0.009	0.150	0.024	0.089	0.033	0.049	0.167	0.025	0.108	0.076	0.087
	(0.054)	(0.201)	(0.030)	(1.450)	(0.147)	(0.431)	(0.106)	(0.077)	(0.685)	(0.066)	(0.546)	(0.265)	(0.938)
	[3225]	[870]	[1186]	[5758]	[1026]	[695]	[126]	[243]	[881]	[272]	[99]	[194]	[14575]
1995	0.021	0.062	0.009	0.085	0.018	0.050	0.043	0.040	0.168	0.023	0.112	0.112	0.053
	(0.067)	(0.378)	(0.024)	(0.474)	(0.033)	(0.096)	(0.144)	(0.089)	(0.832)	(0.088)	(0.295)	(0.229)	(0.347)
	[2859]	[836]	[479]	[2539]	[590]	[138]	[100]	[190]	[432]	[231]	[91]	[82]	[8567]
1996	0.015	0.053	0.010	0.124	0.021	0.055	0.035	0.044	0.165	0.021	0.046	0.112	0.071
	(0.029)	(0.325)	(0.030)	(1.947)	(0.082)	(0.155)	(0.063)	(0.170)	(1.012)	(0.076)	(0.119)	(0.582)	(1.111)
	[416]	[1575]	[295]	[2593]	[534]	[123]	[80]	[420]	[649]	[1841]	[84]	[88]	[8698]
1997	0.033	0.042	0.024	0.080	0.031	0.155	0.038	0.049	0.138	0.039	0.093	0.111	0.063
	(0.081)	(0.108)	(0.068)	(0.271)	(0.066)	(0.606)	(0.061)	(0.086)	(0.324)	(0.172)	(0.213)	(0.398)	(0.220)
	[303]	[1993]	[165]	[2314]	[446]	[139]	[73]	[481]	[699]	[1226]	[84]	[86]	[8009]
1998	0.038	0.042	0.031	0.083	0.031	0.123	0.056	0.065	0.141	0.039	0.092	0.054	0.066
	(0.091)	(0.107)	(0.103)	(0.442)	(0.061)	(0.604)	(0.081)	(0.149)	(0.633)	(0.141)	(0.173)	(0.128)	(0.336)
	[267]	[2262]	[118]	[2243]	[424]	[190]	[59]	[489]	[886]	[1200]	[84]	[120]	[8342]
Total	0.024	0.050	0.013	0.136	0.025	0.114	0.038	0.061	0.167	0.031	0.152	0.080	0.075
	(0.140)	(0.239)	(0.036)	(1.594)	(0.096)	(0.896)	(0.098)	(0.234)	(0.779)	(0.125)	(0.908)	(0.313)	(0.919)
	[10205]	[7895]	[6342]	[18353]	[4528]	[1793]	[528]	[1984]	[3919]	[4911]	[495]	[647]	[61600]

TABLE 4B.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATIONS OF INVESTMENT PER LABOR BY TYPE OF FIRM IN 1992-1998

	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop	Private/ Individ.	State/ Ltd.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock	Mixed/ Ltd.	Other	Total
1992	17.1	25.6	10.9	10.2	3.7	8.2	2.9	50.6	22.9	14.3	21.1	9.9	12.9
	(68.0)	(120.3)	(34.8)	(74.6)	(12.0)	(30.9)	(7.8)	(156.3)	(88.2)	(38.5)	(69.3)	(20.7)	(62.7)
	[2490]	[292]	[2393]	[2079]	[959]	[393]	[78]	[124]	[261]	[117]	[34]	[64]	[9284]
1993	17.4	27.2	9.9	8.8	4.2	7.4	18.8	50.5	29.9	13.3	35.7	10.7	12.8
	(47.6)	(100.5)	(27.4)	(32.4)	(11.1)	(16.9)	(69.6)	(142.8)	(105.7)	(41.0)	(84.5)	(22.4)	(46.5)
	[2516]	[331]	[2395]	[2906]	[984]	[508]	[90]	[141]	[358]	[123]	[53]	[74]	[10479]
1994	17.4	31.1	7.0	12.7	4.7	13.3	13.5	38.8	38.2	15.7	10.5	19.4	16.0
	(48.6)	(190.1)	(25.8)	(69.5)	(11.3)	(47.6)	(66.5)	(59.7)	(119.7)	(34.2)	(25.4)	(49.5)	(76.5)
	[3225]	[870]	[1186]	[5758]	[1026]	[695]	[126]	[243]	[881]	[272]	[99]	[186]	[14567]
1995	18.6	27.4	8.1	9.8	5.8	7.3	21	44.2	39.4	17.3	7.5	46.2	17.0
	(41.2)	(93.4)	(21.0)	(33.4)	(12.0)	(21.2)	(80.4)	(77.6)	(86.7)	(66.6)	(18.7)	(86.4)	(51.6)
	[2859]	[836]	[479]	[2539]	[590]	[138]	[100]	[190]	[432]	[231]	[91]	[82]	[8567]
1996	16.3	21.0	14.2	11.5	5.4	8.6	31.5	50.8	37.0	21.6	4.2	32.8	19.4
	(44.0)	(64.7)	(89.9)	(52.4)	(12.2)	(21.5)	(105.8)	(88.2)	(94.1)	(53.2)	(7.0)	(75.9)	(62.1)
	[416]	[1575]	[295]	[2593]	[534]	[123]	[80]	[420]	[649]	[1841]	[84]	[88]	[8698]
1997	20.0	22.0	14.7	12.5	5.3	12.6	15.6	43.2	32.7	17.5	8.3	23.0	16.9
	(71.9)	(75.0)	(63.1)	(52.7)	(14.3)	(51.4)	(32.1)	(81.8)	(106.8)	(34.6)	(22.0)	(56.9)	(63.5)
	[392]	[2817]	[280]	[10355]	[927]	[3147]	[81]	[605]	[2459]	[1395]	[200]	[251]	[22909]
1998	26.3	25.4	10.7	10.9	5.9	9.4	13.9	54.8	40.6	36.3	9.9	19.8	24.5
	(63.3)	(123.9)	(19.4)	(39.3)	(13.2)	(17.0)	(23.7)	(117.0)	(87.8)	(139)	(24.4)	(31.8)	(96.6)
	[272]	[2370]	[124]	[2321]	[431]	[208]	[61]	[495]	[934]	[1247]	[87]	[131]	[8681]
Total	17.9	24.4	10.0	11.5	4.8	11.5	16.8	47.7	35.1	23.2	11.1	22.9	16.8
	(52.6)	(107.5)	(35.9)	(54.5)	(12.3)	(45.1)	(65.8)	(99.6)	(102.7)	(79.4)	(35.6)	(54.9)	(67.2)
	[12170]	[9091]	[7152]	[28551]	[5451]	[5212]	[616]	[2218]	[5974]	[5226]	[648]	[876]	[83185]

TABLE 4C.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATIONS OF INVESTMENT PER PRODUCTION BY TYPE OF FIRM IN 1992-1998

	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop	Private/ Individ.	State/ Ltd.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock	Mixed/ Ltd.	Other	Total
1992	0.176	0.272	0.144	0.124	0.080	0.077	0.029	1.354	0.236	0.403	0.651	0.091	0.165
	(1.004)	(1.935)	(0.744)	(1.582)	(0.308)	(0.309)	(0.072)	(9.548)	(0.791)	(2.532)	(3.200)	(0.315)	(1.572)
	[2490]	[292]	[2393]	[2079]	[959]	[393]	[78]	[124]	[261]	[117]	[34]	[64]	[9284]
1993	0.139	0.158	0.221	0.097	0.079	0.074	0.144	0.260	0.289	0.075	0.350	0.184	0.145
	(0.404)	(0.420)	(2.747)	(0.437)	(0.255)	(0.205)	(0.419)	(0.694)	(1.346)	(0.219)	(0.908)	(0.472)	(1.381)
	[2516]	[331]	[2395]	[2906]	[984]	[508]	[90]	[141]	[358]	[123]	[53]	[81]	[10486]
1994	0.132	0.223	0.055	0.127	0.075	0.153	0.25	0.171	0.275	0.103	0.085	0.15	0.136
	(0.985)	(1.466)	(0.170)	(1.397)	(0.318)	(0.788)	(2.163)	(0.322)	(1.179)	(0.245)	(0.201)	(0.395)	(1.133)
	[3225]	[870]	[1186]	[5758]	[1026]	[695]	[126]	[243]	[881]	[272]	[99]	[206]	[14587]
1995	0.196	0.177	0.072	0.086	0.082	0.057	0.211	0.168	0.242	0.094	0.048	0.278	0.143
	(2.606)	(0.524)	(0.298)	(0.473)	(0.185)	(0.178)	(1.142)	(0.333)	(0.890)	(0.291)	(0.081)	(0.640)	(1.560)
	[2859]	[836]	[479]	[2539]	[590]	[138]	[100]	[190]	[432]	[231]	[91]	[82]	[8567]
1996	0.107	0.143	0.233	0.061	0.066	0.064	0.164	0.151	0.165	0.128	0.033	0.103	0.112
	(0.300)	(1.075)	(2.386)	(0.212)	(0.147)	(0.144)	(0.672)	(0.279)	(0.422)	(0.420)	(0.063)	(0.167)	(0.694)
	[416]	[1575]	[295]	[2593]	[534]	[123]	[80]	[420]	[649]	[1841]	[84]	[88]	[8698]
1997	0.096	0.100	0.506	0.085	0.063	0.129	0.06	0.139	0.162	0.100	0.068	0.192	0.109
	(0.254)	(0.433)	(3.132)	(0.847)	(0.367)	(1.226)	(0.123)	(0.593)	(0.662)	(0.374)	(0.204)	(0.915)	(0.872)
	[392]	[2817]	[282]	[10501]	[937]	[3290]	[81]	[605]	[2480]	[1395]	[204]	[252]	[23236]
1998	0.133	0.082	0.053	0.047	0.053	0.083	0.048	0.134	0.139	0.108	0.040	0.093	0.085
	(0.391)	(0.240)	(0.101)	(0.131)	(0.108)	(0.419)	(0.079)	(0.304)	(0.273)	(0.747)	(0.091)	(0.291)	(0.355)
	[272]	[2370]	[124]	[2321]	[431]	[208]	[61]	[495]	[934]	[1247]	[87]	[131]	[8681]
Total	0.156	0.129	0.166	0.092	0.073	0.118	0.144	0.222	0.192	0.118	0.113	0.159	0.126
	(1.449)	(0.795)	(1.830)	(0.938)	(0.278)	(1.012)	(1.12)	(2.306)	(0.782)	(0.62)	(0.793)	(0.591)	(1.124)
	[12170]	[9091]	[7154]	[28697]	[5461]	[5355]	[616]	[2218]	[5995]	[5226]	[652]	[904]	[83539]

Note: Standard errors in parentheses, number of observations in brackets.

TABLE 5.—FIXED EFFECT ESTIMATES OF INVESTMENT EQUATION (5) FOR 1992-1998

		Ownership / Legal Form Category											
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	State/ Ltd.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock	Mixed/ Ltd.	Other
$\Sigma \gamma_k$	0.010*** (0.001)	0.065*** (0.003)	0.008*** (0.001)	0.013*** (0.002)	0.014*** (0.001)	0.027*** (0.003)	0.572*** (0.018)	0.016** (0.007)	0.128*** (0.024)	0.026*** (0.004)	0.050*** (0.002)	-0.003 (0.002)	0.040*** (0.008)
$\Sigma \beta_k$	0.019*** (0.003)	0.063*** (0.010)	-0.007 (0.011)	-0.002 (0.012)	0.051*** (0.008)	0.052*** (0.015)	-0.808*** (0.127)	-0.060 (0.114)	0.104 (0.088)	0.062** (0.028)	-0.001 (0.014)	-0.015 (0.013)	0.127*** (0.021)
P-value	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.076	0.000	0.004	0.948	0.003	0.000
Adj.R^2	0.118	0.291	0.166	0.097	0.180	0.373	0.661	0.273	0.252	0.079	0.170	0.290	0.178
N/NF	42483/3805	7884/865	5751/699	3797/501	10899/1254	3635/255	971/159	373/35	1728/149	2372/265	4410/504	305/34	358/46

Note to tables 5, 6, 7, 8, A5, A6, A7, and A8:
Standard errors in parentheses.
Values for 1992 are used for lagged values of regressors only.
*** = significant at 1% level,
** = significant at 5% level,
* = significant at 10% level,
N = number of quarterly observations,
NF = number of firms,
P-value = p-value of the Hausman test of equality of fixed effect and random effect estimates.

TABLE 6.—1992-93 FIXED EFFECT ESTIMATES OF INVESTMENT EQUATION (5) BY SIZE AND TYPE OF THE FIRM

	Large Firms (Labor ≥ 100 Employees)									
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
$\Sigma \gamma_k$	0.007*** (0.000)	0.072*** (0.003)	0.009*** (0.001)	0.017*** (0.002)	0.015*** (0.002)	0.027*** (0.004)	0.060*** (0.011)	0.132*** (0.025)	0.027*** (0.005)	0.051*** (0.002)
$\Sigma \beta_k$	0.039*** (0.003)	0.057*** (0.011)	-0.013 (0.012)	-0.016 (0.016)	0.081*** (0.011)	0.057*** (0.020)	-0.041 (0.034)	0.094 (0.092)	0.075** (0.037)	0.032 (0.025)
P-value	0.000	0.000	0.000	0.001	0.000	0.026	0.008	0.000	0.015	0.991
Adj.R^2	0.133	0.301	0.177	0.109	0.183	0.211	0.251	0.254	0.079	0.177
N/NF	36837/2974	7557/826	5479/671	3036/395	8497/842	2905/174	501/63	1651/140	2018/214	4237/486
	Small Firms (Labor < 100 Employees)									
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
$\Sigma \gamma_k$	0.046*** (0.003)	0.003 (0.010)	0.022* (0.012)	0.011 (0.008)	0.006** (0.003)	0.024** (0.010)	0.620*** (0.024)	0.048 (0.055)	0.017 (0.011)	0.033 (0.039)
$\Sigma \beta_k$	-0.075*** (0.019)	0.011 (0.029)	0.072 (0.108)	0.002 (0.032)	0.005 (0.014)	0.096** (0.044)	-1.014*** (0.218)	-0.187 (0.242)	0.015 (0.041)	-0.038 (0.085)
P-value	0.000	0.000	1.000	0.218	0.027	0.158	0.000	0.000	0.667	0.902
Adj.R^2	-0.024	0.371	0.006	0.088	0.156	0.654	0.756	0.787	0.177	0.035
N/NF	5646/1412	327/89	272/89	761/182	2402/622	730/147	470/116	77/18	354/85	173/59

TABLE 7.—ANNUAL FIXED EFFECT ESTIMATES OF INVESTMENT EQUATION (5)

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
1993										
$\Sigma \gamma_k$	0.095***	0.113***	0.028	0.040**	-0.001	0.043	0.712***	0.706	-0.046*	0.199
	(0.005)	(0.010)	(0.022)	(0.015)	(0.006)	(0.029)	(0.029)	(0.875)	(0.025)	(0.132)
$\Sigma \beta_k$	-0.229***	-0.114*	-0.163	-0.150***	0.136***	0.153**	-1.138**	-0.239	-0.043	-0.432
	(0.030)	(0.062)	(0.404)	(0.042)	(0.041)	(0.060)	(0.475)	(2.870)	(0.083)	(0.291)
P-value	0.000	0.006	0.396	0.000	0.000	0.112	0.000	0.017	0.080	0.598
Adj.R^2	0.205	0.546	0.212	0.283	0.429	0.313	0.854	0.053	0.379	0.047
N/NF	6947/1867	2140/544	197/57	1787/457	1250/386	832/215	262/77	108/27	184/55	96/25
1994										
$\Sigma \gamma_k$	0.016***	0.000	0.025	0.000	0.016**	0.036***	0.310***	-0.018	0.228***	0.083
	(0.002)	(0.008)	(0.023)	(0.005)	(0.007)	(0.011)	(0.040)	(0.121)	(0.030)	(0.056)
$\Sigma \beta_k$	0.003	0.001	0.048	0.013	-0.057**	0.021	-0.351***	0.993**	0.114	-0.379**
	(0.013)	(0.020)	(0.242)	(0.025)	(0.028)	(0.054)	(0.092)	(0.394)	(0.080)	(0.165)
P-value	0.000	0.000	0.000	0.996	0.000	0.015	0.000	0.012	0.000	0.164
Adj.R^2	0.242	0.314	0.515	0.007	0.197	0.758	0.291	0.500	0.345	0.251
N/NF	7570/2315	2118/581	344/108	1006/317	2125/720	866/232	327/107	137/40	309/102	163/47
1995										
$\Sigma \gamma_k$	0.074***	0.064***	0.038*	0.011**	0.090***	-0.003	0.070	0.240***	-0.078	-0.023
	(0.006)	(0.009)	(0.019)	(0.005)	(0.009)	(0.021)	(0.044)	(0.070)	(0.211)	(0.018)
$\Sigma \beta_k$	0.065***	0.084**	0.028	0.019	0.055**	0.159*	0.020	-0.268	0.436	1.164**
	(0.015)	(0.042)	(0.078)	(0.036)	(0.023)	(0.086)	(0.113)	(0.216)	(0.610)	(0.463)
P-value	0.000	0.000	0.000	0.000	0.000	0.084	0.607	0.044	0.987	0.004
Adj.R^2	0.101	0.336	0.247	0.650	0.151	0.282	0.241	0.638	-0.004	0.072
N/NF	6991/1922	2695/700	554/159	463/128	1760/523	571/149	105/30	175/45	293/83	188/53
1996										

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
$\Sigma \gamma_k$	0.023*** (0.004)	0.059** (0.029)	0.061*** (0.004)	0.104*** (0.016)	0.052*** (0.012)	0.024 (0.027)	0.225** (0.091)	0.048 (0.029)	0.039** (0.018)	0.058*** (0.003)
$\Sigma \beta_k$	-0.070* (0.036)	-0.190** (0.093)	0.971*** (0.056)	-0.459*** (0.131)	0.011 (0.084)	0.032 (0.248)	0.688** (0.320)	0.033 (0.230)	-0.045 (0.056)	-0.267*** (0.060)
P-value	0.000	0.059	0.000	0.000	0.000	0.704	0.099	0.206	0.208	0.000
Adj.R^2	0.094	0.284	0.566	0.490	0.098	0.107	0.485	0.115	0.415	0.725
N/NF	7349/1969	392/103	1219/341	282/83	2076/576	526/133	94/26	391/101	414/111	1757/459

1997

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
$\Sigma \gamma_k$	0.014*** (0.002)	0.051** (0.020)	0.105*** (0.008)	0.024 (0.021)	0.017*** (0.003)	0.020 (0.012)	-0.029 (0.057)	0.037 (0.034)	0.026*** (0.007)	0.011 (0.008)
$\Sigma \beta_k$	0.050*** (0.011)	0.063 (0.060)	-0.100** (0.043)	0.113 (0.082)	0.050** (0.022)	0.249*** (0.086)	-0.261 (0.283)	0.351** (0.141)	0.330*** (0.063)	-0.025 (0.072)
P-value	0.000	0.216	0.000	1.000	0.039	0.000	0.009	0.331	0.000	0.130
Adj.R^2	0.217	0.178	0.291	0.075	0.168	0.455	0.685	0.264	0.413	0.073
N/NF	6975/1861	297/76	1691/460	162/44	1913/522	440/112	70/19	462/118	543/147	1191/306

1998

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
$\Sigma \gamma_k$	0.013*** (0.001)	0.051 (0.042)	0.014*** (0.003)	0.630*** (0.131)	0.013*** (0.004)	0.042*** (0.012)	0.029* (0.016)	0.620*** (0.061)	0.013*** (0.004)	0.067*** (0.005)
$\Sigma \beta_k$	0.027*** (0.007)	-0.050 (0.243)	-0.118*** (0.037)	0.694* (0.363)	0.005 (0.034)	0.136* (0.077)	0.017 (0.066)	-0.361 (0.220)	-0.020 (0.055)	0.056*** (0.020)
P-value	0.000	0.636	0.000	0.006	0.019	0.579	0.448	0.000	0.000	0.000
Adj.R^2	0.169	0.141	0.194	0.190	0.066	0.380	0.407	0.399	0.541	0.331
N/NF	6651/1799	242/64	1746/475	97/28	1775/484	400/103	113/35	455/119	629/172	1015/271

TABLE 8.—ESTIMATES OF THE DYNAMIC MODEL WITH ADJUSTMENT COSTS, EQUATION (6)

Parameter	Estimate
$\_1$	1.0208*** (.0067)
$\_2$	-.00021** (.00010)
$\_3$	-.00014*** (.00005)
μ	-.060** (.030)
Adj. R^2	.969
N	48226

Note: *** = significant at 1% level,
** = significant at 5% level,
* = significant at 10% level.
Estimates of the dynamic investment function are based on the entire sample. The specification includes the inverse Mills ratio (estimated parameter associated with it is denoted μ) to control for the possible selection bias. Model contained quarterly and ownership/legal form dummy variables to control for a possible shift across ownership/legal categories (parameter vector Ψ, none of the

TABLE A1.—NUMBER AND FREQUENCY DISTRIBUTION OF FIRMS BY LEGAL STATUS

Legal Form	1992	1993	1994	1995	1996	1997	1998	Total
Joint Stock Co.	3036	3124	4633	4124	4256	5225	4400	28798
	[3.63]	[3.74]	[5.55]	[4.94]	[5.09]	[6.25]	[5.27]	[34.47]
State Enterprise (SOE)	2393	2395	1203	482	295	282	124	7174
	[2.86]	[2.87]	[1.44]	[0.58]	[0.35]	[0.34]	[0.15]	[8.59]
Limited Liability (Ltd.)	2459	3414	6920	3165	3410	13277	3412	36057
	[2.94]	[4.09]	[8.28]	[3.79]	[4.08]	[15.89]	[4.08]	[43.16]
Cooperative	959	984	1030	590	534	937	431	5465
	[1.15]	[1.18]	[1.23]	[0.71]	[0.64]	[1.12]	[0.52]	[6.54]
Individual	393	508	705	139	123	3290	208	5366
	[0.47]	[0.61]	[0.84]	[0.17]	[0.15]	[3.94]	[0.25]	[6.42]
Other	44	61	96	67	80	225	106	679
	[0.06]	[0.08]	[0.12]	[0.08]	[0.09]	[0.27]	[0.12]	[0.81]
Total	9284	10486	14587	8567	8698	23236	8681	83539
	[11.11]	[12.55]	[17.46]	[10.26]	[10.41]	[27.81]	[10.39]	[100.00]

Note: Relative frequency in % is denoted in squared brackets [] .

TABLE A2.—NUMBER AND FREQUENCY DISTRIBUTION OF FIRMS BY OWNERSHIP

Ownership	1992	1993	1994	1995	1996	1997	1998	Total
Private	2795	3787	7376	3541	4326	16683	4919	43427
	[3.35]	[4.53]	[8.83]	[4.24]	[5.18]	[19.97]	[5.89]	[51.98]
State	4968	5012	4550	3438	791	755	457	19971
	[5.95]	[6.00]	[5.45]	[4.12]	[0.95]	[0.90]	[0.55]	[23.91]
Cooperative	964	990	1027	590	534	937	431	5473
	[1.15]	[1.19]	[1.23]	[0.71]	[0.64]	[1.12]	[0.52]	[6.55]
Foreign	390	505	1156	657	1114	3231	1515	8568
	[0.47]	[0.60]	[1.38]	[0.79]	[1.33]	[3.87]	[1.81]	[10.26]
Mixed	151	176	371	322	1925	1603	1334	5882
	[0.18]	[0.21]	[0.44]	[0.39]	[2.30]	[1.92]	[1.60]	[7.04]
Other	16	16	107	19	8	27	25	218
	[0.02]	[0.02]	[0.13]	[0.02]	[0.01]	[0.03]	[0.03]	[0.26]
Total	9284	10486	14587	8567	8698	23236	8681	83539
	[11.11]	[12.55]	[17.46]	[10.26]	[10.41]	[27.81]	[10.39]	[100.00]

Note: Relative frequency in % is denoted in squared brackets [] .

TABLE A3.—COMPARISON OF INVESTMENT RATIOS BY SIZE OF FIRM

	Investment/Capital						Investment/Production						Investment/Labor					
	Large			Small			Large			Small			Large			Small		
Time	μ	σ	N	μ	σ	N	μ	σ	N	μ	σ	N	μ	σ	N	μ	σ	N
1992/Q1	0.014	0.031	636	0.015	0.052	91	0.110	0.728	1539	0.238	3.140	479	7.3	20.1	1539	15.9	145.5	479
1992/Q2	0.017	0.035	620	0.028	0.100	99	0.137	0.686	1623	0.239	4.027	682	11.9	62.8	1623	10.1	66.1	682
1992/Q3	0.018	0.076	635	0.031	0.151	110	0.139	0.503	1655	0.172	1.556	758	11.7	42.4	1655	11.4	67.3	758
1992/Q4	0.030	0.059	620	0.064	0.243	116	0.198	1.060	1687	0.197	1.291	861	19.9	63.8	1687	15.2	59.0	861
1993/Q1	0.026	0.210	1611	0.129	1.364	708	0.082	0.252	1613	0.071	0.315	708	8.4	30.2	1610	6.2	26.7	708
1993/Q2	0.048	0.326	1706	0.248	3.077	918	0.186	2.016	1706	0.074	0.306	918	14.9	52.6	1706	7.0	26.3	918
1993/Q3	0.098	1.704	1737	0.111	0.595	977	0.197	2.155	1737	0.108	0.738	977	13.0	33.6	1736	9.7	56.0	977
1993/Q4	0.084	0.567	1755	0.271	3.022	1070	0.195	1.397	1757	0.159	0.846	1070	20.7	56.2	1754	14.6	65.1	1070
1994/Q1	0.037	0.323	1956	0.111	1.168	1543	0.120	1.336	1960	0.159	2.025	1543	9.4	31.8	1952	14.5	137.0	1543
1994/Q2	0.048	0.347	1979	0.091	0.618	1617	0.098	0.411	1982	0.113	0.614	1617	14.3	43.9	1978	13.8	54.3	1617
1994/Q3	0.069	1.280	2015	0.075	0.349	1619	0.110	0.466	2017	0.106	0.444	1619	14.9	52.9	2014	12.5	40.2	1619
1994/Q4	0.091	1.491	2065	0.184	0.928	1781	0.143	0.345	2068	0.244	1.972	1781	22.2	57.5	2063	25.2	130.5	1781
1995/Q1	0.036	0.222	2061	0.090	0.434	56	0.160	2.930	2061	0.200	0.678	56	12.2	51.4	2061	23.5	82.2	56
1995/Q2	0.049	0.292	2073	0.097	0.535	77	0.129	0.880	2073	0.106	0.288	77	16.0	47.6	2073	18.0	64.6	77
1995/Q3	0.041	0.185	2045	0.026	0.088	103	0.129	0.681	2045	0.080	0.199	103	15.5	42.5	2045	8.9	24.8	103
1995/Q4	0.086	0.561	2039	0.067	0.239	113	0.154	0.492	2039	0.207	0.816	113	24.5	62.2	2039	15.1	37.9	113
1996/Q1	0.039	0.430	2086	0.120	0.891	83	0.074	0.310	2086	0.075	0.352	83	12.5	37.7	2086	6.2	26.1	83
1996/Q2	0.066	0.533	2067	0.033	0.120	110	0.102	0.496	2067	0.126	0.911	110	19.7	71.3	2067	6.3	18.6	110
1996/Q3	0.108	2.134	2042	0.050	0.299	138	0.118	0.821	2042	0.110	0.508	138	20.1	61.2	2042	5.9	13.0	138
1996/Q4	0.075	0.437	2020	0.039	0.122	152	0.130	0.355	2020	0.438	3.349	152	26.6	64.9	2020	32.1	154.0	152
1997/Q1	0.031	0.185	1871	0.015	0.059	25	0.074	0.335	2354	0.115	1.376	3354	14.4	55.7	2269	10.0	57.0	3354
1997/Q2	0.058	0.203	1959	0.039	0.110	62	0.082	0.343	2308	0.113	1.055	3541	18.3	47.6	2232	12.9	51.9	3541
1997/Q3	0.069	0.224	1957	0.042	0.124	95	0.108	0.562	2310	0.116	0.963	3546	22.1	77.3	2232	13.3	56.2	3546
1997/Q4	0.097	0.266	1931	0.038	0.096	109	0.128	0.354	2302	0.120	0.851	3521	30.9	90.0	2214	20.0	68.9	3521
1998/Q1	0.059	0.428	1804	0.047	0.139	68	0.066	0.217	2099	0.049	0.136	106	17.1	50.7	2099	8.4	24.1	106
1998/Q2	0.058	0.245	2037	0.047	0.240	130	0.073	0.181	2041	0.067	0.295	130	22.1	63.4	2041	18.2	109.6	130
1998/Q3	0.061	0.287	2024	0.040	0.119	147	0.084	0.253	2026	0.060	0.162	147	22.6	76.9	2026	16.9	123.7	147
1998/Q4	0.092	0.395	1975	0.043	0.115	157	0.113	0.248	1975	0.216	2.046	157	37.8	137.9	1975	36.2	294.3	157
Total	0.062	0.742	49326	0.129	1.421	12274	0.121	0.971	55192	0.135	1.373	28347	18.2	61.7	54838	14.2	76.5	28347

Note: μ denotes sample mean, σ standard deviation, and N number of observations. Large firm has 100 employees or more, small one less than 100 employees.

TABLE A4A.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF INVESTMENT/CAPITAL BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	0.021	0.034	0.019	0.021	0.015	0.033	0.038	0.024
	(0.034)	(0.262)	(0.054)	(0.067)	(0.029)	(0.081)	(0.091)	(0.140)
	[619]	[2516]	[3225]	[2859]	[416]	[303]	[267]	[10205]
Private/J.Stock	0.144	0.083	0.055	0.062	0.053	0.042	0.042	0.050
	(0.337)	(0.483)	(0.201)	(0.378)	(0.325)	(0.108)	(0.107)	(0.239)
	[28]	[331]	[870]	[836]	[1575]	[1993]	[2262]	[7895]
State/SOE	0.015	0.012	0.009	0.009	0.010	0.024	0.031	0.013
	(0.039)	(0.028)	(0.030)	(0.024)	(0.030)	(0.068)	(0.103)	(0.036)
	[1704]	[2395]	[1186]	[479]	[295]	[165]	[118]	[6342]
Private/Ltd.	.	0.252	0.150	0.085	0.124	0.080	0.083	0.136
	(.)	(2.842)	(1.450)	(0.474)	(1.947)	(0.271)	(0.442)	(1.594)
	[0]	[2906]	[5758]	[2539]	[2593]	[2314]	[2243]	[18353]
Cooperative	0.031	0.024	0.024	0.018	0.021	0.031	0.031	0.025
	(0.120)	(0.063)	(0.147)	(0.033)	(0.082)	(0.066)	(0.061)	(0.096)
	[524]	[984]	[1026]	[590]	[534]	[446]	[424]	[4528]
Private/Individual	.	0.166	0.089	0.050	0.055	0.155	0.123	0.114
	(.)	(1.527)	(0.431)	(0.096)	(0.155)	(0.606)	(0.604)	(0.896)
	[0]	[508]	[695]	[138]	[123]	[139]	[190]	[1793]
State/Ltd.	.	0.032	0.033	0.043	0.035	0.038	0.056	0.038
	(.)	(0.086)	(0.106)	(0.144)	(0.063)	(0.061)	(0.081)	(0.098)
	[0]	[90]	[126]	[100]	[80]	[73]	[59]	[528]
Foreign/Ltd.	0.192	0.291	0.167	0.168	0.165	0.138	0.141	0.167
	(0.245)	(1.263)	(0.685)	(0.832)	(1.012)	(0.324)	(0.633)	(0.779)
	[14]	[358]	[881]	[432]	[649]	[699]	[886]	[3919]
Foreign/J.Stock	0.079	0.185	0.049	0.040	0.044	0.049	0.065	0.061
	(0.135)	(0.739)	(0.077)	(0.089)	(0.170)	(0.086)	(0.149)	(0.234)
	[20]	[141]	[243]	[190]	[420]	[481]	[489]	[1984]
Mixed/J.Stock	0.104	0.022	0.025	0.023	0.021	0.039	0.039	0.031
	(0.322)	(0.071)	(0.066)	(0.088)	(0.076)	(0.172)	(0.141)	(0.125)
	[18]	[123]	[272]	[231]	[1841]	[1226]	[1200]	[4911]
Mixed/Ltd.	.	0.665	0.108	0.112	0.046	0.093	0.092	0.152
	(.)	(2.583)	(0.546)	(0.295)	(0.119)	(0.213)	(0.173)	(0.908)
	[0]	[53]	[99]	[91]	[84]	[84]	[84]	[495]
Other	.	0.029	0.076	0.112	0.112	0.111	0.054	0.080
	(.)	(0.060)	(0.265)	(0.229)	(0.582)	(0.398)	(0.128)	(0.313)
	[0]	[77]	[194]	[82]	[88]	[86]	[120]	[647]
Total	0.022	0.110	0.087	0.053	0.071	0.063	0.066	0.075
	(0.078)	(1.576)	(0.938)	(0.347)	(1.111)	(0.220)	(0.336)	(0.919)
	[2927]	[10482]	[14575]	[8567]	[8698]	[8009]	[8342]	[61600]

TABLE A4B.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF INVESTMENT/LABOR BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	17.1	17.4	17.4	18.6	16.3	20.0	26.3	17.9
	(68.0)	(47.6)	(48.6)	(41.2)	(44.0)	(71.9)	(63.3)	(52.6)
	[2490]	[2516]	[3225]	[2859]	[416]	[392]	[272]	[12170]
Private/J.Stock	25.6	27.2	31.1	27.4	21.0	22.0	25.4	24.4
	(120.3)	(100.5)	(190.1)	(93.4)	(64.7)	(75.0)	(123.9)	(107.5)
	[292]	[331]	[870]	[836]	[1575]	[2817]	[2370]	[9091]
State/SOE	10.9	9.9	7.0	8.1	14.2	14.7	10.7	10.0
	(34.8)	(27.4)	(25.8)	(21.0)	(89.9)	(63.1)	(19.4)	(35.9)
	[2393]	[2395]	[1186]	[479]	[295]	[280]	[124]	[7152]
Private/Ltd.	10.2	8.8	12.7	9.8	11.5	12.5	10.9	11.5
	(74.6)	(32.4)	(69.5)	(33.4)	(52.4)	(52.7)	(39.3)	(54.5)
	[2079]	[2906]	[5758]	[2539]	[2593]	[10355]	[2321]	[28551]
Cooperative	3.7	4.2	4.7	5.8	5.4	5.3	5.9	4.8
	(12.0)	(11.1)	(11.3)	(12.0)	(12.2)	(14.3)	(13.2)	(12.3)
	[959]	[984]	[1026]	[590]	[534]	[927]	[431]	[5451]
Private/Individual	8.2	7.4	13.3	7.3	8.6	12.6	9.4	11.5
	(30.9)	(16.9)	(47.6)	(21.2)	(21.5)	(51.4)	(17.0)	(45.1)
	[393]	[508]	[695]	[138]	[123]	[3147]	[208]	[5212]
State/Ltd.	2.9	18.8	13.5	21.0	31.5	15.6	13.9	16.8
	(7.8)	(69.6)	(66.5)	(80.4)	(105.8)	(32.1)	(23.7)	(65.8)
	[78]	[90]	[126]	[100]	[80]	[81]	[61]	[616]
Foreign/Ltd.	22.9	29.9	38.2	39.4	37.0	32.7	40.6	35.1
	(88.2)	(105.7)	(119.7)	(86.7)	(94.1)	(106.8)	(87.8)	(102.7)
	[261]	[358]	[881]	[432]	[649]	[2459]	[934]	[5974]
Foreign/J.Stock	50.6	50.5	38.8	44.2	50.8	43.2	54.8	47.7
	(156.3)	(142.8)	(59.7)	(77.6)	(88.2)	(81.8)	(117.0)	(99.6)
	[124]	[141]	[243]	[190]	[420]	[605]	[495]	[2218]
Mixed/J.Stock	14.3	13.3	15.7	17.3	21.6	17.5	36.3	23.2
	(38.5)	(41.0)	(34.2)	(66.6)	(53.2)	(34.6)	(139.0)	(79.4)
	[117]	[123]	[272]	[231]	[1841]	[1395]	[1247]	[5226]
Mixed/Ltd.	21.1	35.7	10.5	7.5	4.2	8.3	9.9	11.1
	(69.3)	(84.5)	(25.4)	(18.7)	(7.0)	(22.0)	(24.4)	(35.6)
	[34]	[53]	[99]	[91]	[84]	[200]	[87]	[648]
Other	9.9	10.7	19.4	46.2	32.8	23.0	19.8	22.9
	(20.7)	(22.4)	(49.5)	(86.4)	(75.9)	(56.9)	(31.8)	(54.9)
	[64]	[74]	[186]	[82]	[88]	[251]	[131]	[876]
Total	12.9	12.8	16.0	17.0	19.4	16.9	24.5	16.8
	(62.7)	(46.5)	(76.5)	(51.6)	(62.1)	(63.5)	(96.6)	(67.2)
	[9284]	[10479]	[14567]	[8567]	[8698]	[22909]	[8681]	[83185]

TABLE A4C.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF INVESTMENT/PRODUCTION BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	0.176	0.139	0.132	0.196	0.107	0.096	0.133	0.156
	(1.004)	(0.404)	(0.985)	(2.606)	(0.300)	(0.254)	(0.391)	(1.449)
	[2490]	[2516]	[3225]	[2859]	[416]	[392]	[272]	[12170]
Private/J.Stock	0.272	0.158	0.223	0.177	0.143	0.100	0.082	0.129
	(1.935)	(0.420)	(1.466)	(0.524)	(1.075)	(0.433)	(0.240)	(0.795)
	[292]	[331]	[870]	[836]	[1575]	[2817]	[2370]	[9091]
State/SOE	0.144	0.221	0.055	0.072	0.233	0.506	0.053	0.166
	(0.744)	(2.747)	(0.170)	(0.298)	(2.386)	(3.132)	(0.101)	(1.830)
	[2393]	[2395]	[1186]	[479]	[295]	[282]	[124]	[7154]
Private/Ltd.	0.124	0.097	0.127	0.086	0.061	0.085	0.047	0.092
	(1.582)	(0.437)	(1.397)	(0.473)	(0.212)	(0.847)	(0.131)	(0.938)
	[2079]	[2906]	[5758]	[2539]	[2593]	[10501]	[2321]	[28697]
Cooperative	0.080	0.079	0.075	0.082	0.066	0.063	0.053	0.073
	(0.308)	(0.255)	(0.318)	(0.185)	(0.147)	(0.367)	(0.108)	(0.278)
	[959]	[984]	[1026]	[590]	[534]	[937]	[431]	[5461]
Private/Individual	0.077	0.074	0.153	0.057	0.064	0.129	0.083	0.118
	(0.309)	(0.205)	(0.788)	(0.178)	(0.144)	(1.226)	(0.419)	(1.012)
	[393]	[508]	[695]	[138]	[123]	[3290]	[208]	[5355]
State/Ltd.	0.029	0.144	0.250	0.211	0.164	0.060	0.048	0.144
	(0.072)	(0.419)	(2.163)	(1.142)	(0.672)	(0.123)	(0.079)	(1.120)
	[78]	[90]	[126]	[100]	[80]	[81]	[61]	[616]
Foreign/Ltd.	0.236	0.289	0.275	0.242	0.165	0.162	0.139	0.192
	(0.791)	(1.346)	(1.179)	(0.890)	(0.422)	(0.662)	(0.273)	(0.782)
	[261]	[358]	[881]	[432]	[649]	[2480]	[934]	[5995]
Foreign/J.Stock	1.354	0.260	0.171	0.168	0.151	0.139	0.134	0.222
	(9.548)	(0.694)	(0.322)	(0.333)	(0.279)	(0.593)	(0.304)	(2.306)
	[124]	[141]	[243]	[190]	[420]	[605]	[495]	[2218]
Mixed/J.Stock	0.403	0.075	0.103	0.094	0.128	0.100	0.108	0.118
	(2.532)	(0.219)	(0.245)	(0.291)	(0.420)	(0.374)	(0.747)	(0.620)
	[117]	[123]	[272]	[231]	[1841]	[1395]	[1247]	[5226]
Mixed/Ltd.	0.651	0.350	0.085	0.048	0.033	0.068	0.040	0.113
	(3.200)	(0.908)	(0.201)	(0.081)	(0.063)	(0.204)	(0.091)	(0.793)
	[34]	[53]	[99]	[91]	[84]	[204]	[87]	[652]
Other	0.091	0.184	0.150	0.278	0.103	0.192	0.093	0.159
	(0.315)	(0.472)	(0.395)	(0.640)	(0.167)	(0.915)	(0.291)	(0.591)
	[64]	[81]	[206]	[82]	[88]	[252]	[131]	[904]
Total	0.165	0.145	0.136	0.143	0.112	0.109	0.085	0.126
	(1.572)	(1.381)	(1.133)	(1.560)	(0.694)	(0.872)	(0.355)	(1.124)
	[9284]	[10486]	[14587]	[8567]	[8698]	[23236]	[8681]	[83539]

TABLE A4D.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF PROFIT BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	10906	3686	8966	4951	-3292	1912	-2625	6455
	(44336)	(56507)	(49711)	(43289)	(63315)	(49454)	(51527)	(49444)
	[2490]	[2516]	[3225]	[2859]	[416]	[305]	[272]	[12083]
Private/J.Stock	4065	172	5936	2229	913	-1682	-971	480
	(12488)	(12642)	(42895)	(47055)	(25440)	(44554)	(40971)	(38982)
	[292]	[331]	[870]	[836]	[1575]	[2033]	[2370]	[8307]
State/SOE	5623	2714	436	631	63	2053	1278	3025
	(35536)	(38700)	(14433)	(18792)	(21408)	(28385)	(30842)	(32509)
	[2393]	[2395]	[1186]	[479]	[295]	[165]	[124]	[7037]
Private/Ltd.	1448	984	1603	1700	1320	2320	2239	1631
	(5193)	(8445)	(7314)	(15363)	(15627)	(21337)	(16163)	(13042)
	[2079]	[2906]	[5758]	[2539]	[2593]	[2394]	[2321]	[20590]
Cooperative	682	810	925	854	776	647	316	753
	(3068)	(3859)	(6072)	(3735)	(4361)	(4484)	(5143)	(4492)
	[959]	[984]	[1026]	[590]	[534]	[448]	[431]	[4972]
Private/Individual	1046	1038	1108	-145	1800	1771	3165	1282
	(3747)	(4537)	(3619)	(10295)	(8849)	(8966)	(10128)	(6156)
	[393]	[508]	[695]	[138]	[123]	[160]	[208]	[2225]
State/Ltd.	-3163	-7357	292	5531	3181	58	6686	572
	(27767)	(33794)	(28059)	(26048)	(34323)	(23828)	(23650)	(28877)
	[78]	[90]	[126]	[100]	[80]	[73]	[61]	[608]
Foreign/Ltd.	1035	-743	2909	9370	4725	4660	7918	4824
	(6256)	(14476)	(20103)	(91271)	(42954)	(46645)	(42171)	(44774)
	[261]	[358]	[881]	[432]	[649]	[731]	[934]	[4246]
Foreign/J.Stock	38615	-10485	3253	-8	13270	20316	31951	16842
	(319800)	(78742)	(112464)	(98996)	(64456)	(100242)	(144761)	(130510)
	[124]	[141]	[243]	[190]	[420]	[483]	[495]	[2096]
Mixed/J.Stock	3898	2792	5763	-1486	-453	3797	16373	5192
	(13127)	(9782)	(24781)	(32455)	(66337)	(56386)	(173041)	(99388)
	[117]	[123]	[272]	[231]	[1841]	[1230]	[1247]	[5061]
Mixed/Ltd.	6801	1171	3098	5560	110	-921	1346	2171
	(22005)	(15550)	(20397)	(20082)	(9812)	(16063)	(6937)	(16370)
	[34]	[53]	[99]	[91]	[84]	[84]	[87]	[532]
Other	2104	2027	1807	2771	-2774	-1308	1888	1029
	(6462)	(6848)	(11437)	(16598)	(25857)	(31492)	(20023)	(18818)
	[64]	[74]	[186]	[82]	[88]	[89]	[131]	[714]
Total	5548	1733	3511	3048	1377	2603	5476	3326
	(47565)	(35250)	(31071)	(40215)	(41179)	(45156)	(79978)	(46659)
	[9284]	[10479]	[14567]	[8567]	[8698]	[8195]	[8681]	[68471]

TABLE A4E.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF INVESTMENT BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	15888	15640	13021	14516	8531	9942	15667	14307
	(60845)	(62852)	(57018)	(48010)	(21803)	(38451)	(42567)	(55529)
	[2490]	[2516]	[3225]	[2859]	[416]	[392]	[272]	[12170]
Private/J.Stock	6361	7130	9031	11373	8945	9301	11754	9870
	(23744)	(19503)	(36900)	(43512)	(34537)	(44828)	(58180)	(45270)
	[292]	[331]	[870]	[836]	[1575]	[2817]	[2370]	[9091]
State/SOE	5822	5556	2241	3221	5159	3956	5256	4855
	(21019)	(19383)	(8125)	(8505)	(22321)	(21345)	(13635)	(18239)
	[2393]	[2395]	[1186]	[479]	[295]	[282]	[124]	[7154]
Private/Ltd.	1213	986	1227	2244	3968	1325	2751	1698
	(6040)	(3354)	(5694)	(6882)	(36727)	(9034)	(9531)	(13201)
	[2079]	[2906]	[5758]	[2539]	[2593]	[10501]	[2321]	[28697]
Cooperative	835	817	804	1290	1288	856	1094	943
	(2480)	(2152)	(2207)	(2998)	(4381)	(3732)	(2133)	(2907)
	[959]	[984]	[1026]	[590]	[534]	[937]	[431]	[5461]
Private/Individual	539	632	836	1213	1266	659	1504	732
	(2027)	(1872)	(4014)	(3844)	(3023)	(2789)	(2920)	(2908)
	[393]	[508]	[695]	[138]	[123]	[3290]	[208]	[5355]
State/Ltd.	3114	11510	7164	12037	19976	10617	11697	10644
	(9257)	(37056)	(19368)	(26944)	(46959)	(26305)	(23226)	(29154)
	[78]	[90]	[126]	[100]	[80]	[81]	[61]	[616]
Foreign/Ltd.	2991	7859	7561	15087	13910	6534	16608	9594
	(14275)	(28897)	(30788)	(35100)	(40576)	(30401)	(45657)	(34489)
	[261]	[358]	[881]	[432]	[649]	[2480]	[934]	[5995]
Foreign/J.Stock	34525	53418	49258	51534	51206	29984	43501	42721
	(124624)	(213238)	(269263)	(223983)	(275671)	(161470)	(233515)	(222757)
	[124]	[141]	[243]	[190]	[420]	[605]	[495]	[2218]
Mixed/J.Stock	3377	4300	7739	11934	23334	23282	54096	28450
	(7395)	(11326)	(21954)	(35173)	(98795)	(130615)	(337721)	(188432)
	[117]	[123]	[272]	[231]	[1841]	[1395]	[1247]	[5226]
Mixed/Ltd.	8219	10860	6969	6889	1284	1176	1583	4076
	(23976)	(30274)	(28591)	(19990)	(2606)	(3070)	(3357)	(17246)
	[34]	[53]	[99]	[91]	[84]	[204]	[87]	[652]
Other	1897	4867	8632	10518	8490	3949	5308	6188
	(3629)	(16360)	(44687)	(26874)	(18828)	(12862)	(11400)	(25459)
	[64]	[81]	[206]	[82]	[88]	[252]	[131]	[904]
Total	7000	6855	5833	9448	12214	5036	16817	8046
	(37336)	(42044)	(46702)	(47618)	(81649)	(46536)	(145045)	(66978)
	[9284]	[10486]	[14587]	[8567]	[8698]	[23236]	[8681]	[83539]

TABLE A4F.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF PRODUCTION BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	142578	141957	135249	150705	86187	83706	135599	138437
	(375564)	(378323)	(384889)	(403516)	(153078)	(186799)	(267196)	(373715)
	[2490]	[2516]	[3225]	[2859]	[416]	[392]	[272]	[12170]
Private/J.Stock	59391	54104	69140	80336	87291	97386	128621	96713
	(116413)	(98033)	(187588)	(176629)	(126945)	(260840)	(310869)	(237814)
	[292]	[331]	[870]	[836]	[1575]	[2817]	[2370]	[9091]
State/SOE	65888	64561	37294	50778	60846	42631	74259	58712
	(141962)	(141483)	(65591)	(72823)	(83474)	(76875)	(104843)	(123843)
	[2393]	[2395]	[1186]	[479]	[295]	[282]	[124]	[7154]
Private/Ltd.	19469	17077	17756	36820	49114	20794	58807	26763
	(28438)	(25314)	(27419)	(51071)	(79193)	(40448)	(151963)	(60966)
	[2079]	[2906]	[5758]	[2539]	[2593]	[10501]	[2321]	[28697]
Cooperative	12519	12074	12806	17565	20721	14314	24256	15074
	(14172)	(15165)	(23978)	(23683)	(25485)	(24079)	(34950)	(22767)
	[959]	[984]	[1026]	[590]	[534]	[937]	[431]	[5461]
Private/Individual	10815	10813	9923	23349	23696	8968	39826	11310
	(18746)	(17044)	(13967)	(18695)	(24173)	(14945)	(40947)	(18583)
	[393]	[508]	[695]	[138]	[123]	[3290]	[208]	[5355]
State/Ltd.	127080	100830	99866	175273	197915	195070	277653	158552
	(149747)	(117098)	(116022)	(193357)	(171974)	(186052)	(380656)	(197821)
	[78]	[90]	[126]	[100]	[80]	[81]	[61]	[616]
Foreign/Ltd.	16335	26799	34041	93559	108212	49600	137059	67642
	(40967)	(83701)	(99953)	(169963)	(273064)	(147938)	(255135)	(181028)
	[261]	[358]	[881]	[432]	[649]	[2480]	[934]	[5995]
Foreign/J.Stock	285600	305212	239548	392872	323431	308884	462700	344030
	(1173448)	(1361490)	(946759)	(1453467)	(1242255)	(1650641)	(2319878)	(1646144)
	[124]	[141]	[243]	[190]	[420]	[605]	[495]	[2218]
Mixed/J.Stock	63994	56282	104716	126977	221921	237980	429202	257937
	(100773)	(81129)	(235028)	(260082)	(569664)	(686926)	(1197414)	(774373)
	[117]	[123]	[272]	[231]	[1841]	[1395]	[1247]	[5226]
Mixed/Ltd.	42369	35043	64032	67426	65966	30130	53829	49300
	(103762)	(84967)	(107974)	(100699)	(80526)	(40154)	(41510)	(78027)
	[34]	[53]	[99]	[91]	[84]	[204]	[87]	[652]
Other	28448	31705	38917	54203	84085	47313	90487	53127
	(26250)	(40254)	(103841)	(62447)	(77919)	(68048)	(129659)	(87850)
	[64]	[81]	[206]	[82]	[88]	[252]	[131]	[904]
Total	69701	63871	55286	93606	112212	54062	164945	78877
	(255983)	(260700)	(235106)	(337186)	(402473)	(340953)	(758786)	(383870)
	[9284]	[10486]	[14587]	[8567]	[8698]	[23236]	[8681]	[83539]

TABLE A4G.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF CAPITAL BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	1147293	765972	769048	861261	674812	496171	555251	799529
	(4861470)	(2740927)	(2502764)	(2652614)	(1429215)	(1114462)	(1045057)	(2719397)
	[619]	[2516]	[3225]	[2859]	[416]	[303]	[267]	[10205]
Private/J.Stock	62736	203725	416240	470169	341596	344611	307605	347689
	(105557)	(372792)	(1533437)	(1674807)	(718970)	(886058)	(707130)	(1004758)
	[28]	[331]	[870]	[836]	[1575]	[1993]	[2262]	[7895]
State/SOE	459370	421117	260720	368715	438226	354351	357787	395322
	(1034318)	(1080279)	(597589)	(779283)	(965855)	(912901)	(987455)	(963420)
	[1704]	[2395]	[1186]	[479]	[295]	[165]	[118]	[6342]
Private/Ltd.	.	39496	38646	79382	93506	62415	61918	58008
	(.)	(75350)	(86412)	(137152)	(230062)	(112077)	(132320)	(132127)
	[0]	[2906]	[5758]	[2539]	[2593]	[2314]	[2243]	[18353]
Cooperative	48491	44734	52638	69461	70105	49634	39012	53119
	(96339)	(55851)	(85148)	(63638)	(67763)	(50432)	(34673)	(70203)
	[525]	[984]	[1026]	[590]	[534]	[446]	[424]	[4529]
Private/Individual	.	20092	22098	64276	58564	43692	47397	31632
	(.)	(56301)	(46751)	(90729)	(71270)	(62173)	(95273)	(64930)
	[0]	[508]	[695]	[138]	[123]	[139]	[190]	[1793]
State/Ltd.	.	493687	444242	606978	544241	327335	277849	463886
	(.)	(626102)	(714432)	(789343)	(560188)	(423771)	(339263)	(632554)
	[0]	[90]	[126]	[100]	[80]	[73]	[59]	[528]
Foreign/Ltd.	8475	72698	93440	245203	232490	234691	224611	185847
	(7369)	(214736)	(249823)	(459766)	(476173)	(452881)	(420370)	(400182)
	[14]	[358]	[881]	[432]	[649]	[699]	[886]	[3919]
Foreign/J.Stock	2072876	720781	829128	1233792	1148891	866447	804315	943342
	(4076611)	(2269763)	(2732066)	(3695920)	(3236288)	(2676871)	(2335857)	(2840291)
	[20]	[141]	[243]	[190]	[420]	[481]	[489]	[1984]
Mixed/J.Stock	158174	246800	515908	645744	1176970	841232	1243745	1020840
	(162959)	(433743)	(1537579)	(1759961)	(3493970)	(2717722)	(7050661)	(4348004)
	[18]	[123]	[272]	[231]	[1841]	[1226]	[1200]	[4911]
Mixed/Ltd.	.	118985	173084	172850	122009	71495	42995	119266
	(.)	(339109)	(384854)	(465551)	(246429)	(151550)	(75617)	(313823)
	[0]	[53]	[99]	[91]	[84]	[84]	[84]	[495]
Other	.	420550	110536	126426	217200	199500	178717	188423
	(.)	(1503744)	(263267)	(129832)	(275663)	(243543)	(204941)	(568774)
	[0]	[77]	[194]	[82]	[88]	[86]	[120]	[647]
Total	534351	325637	271841	450535	472320	340551	380839	370325
	(2422355)	(1502388)	(1352447)	(1787343)	(1881692)	(1388965)	(2799057)	(1832438)
	[2928]	[10482]	[14575]	[8567]	[8698]	[8009]	[8342]	[61601]

TABLE A4H.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF LABOR BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	1142	1030	809	830	483	367	451	895
	(2925)	(2612)	(1918)	(1872)	(608)	(572)	(570)	(2242)
	[2490]	[2516]	[3225]	[2859]	[416]	[392]	[272]	[12170]
Private/J.Stock	458	399	428	497	405	359	429	409
	(647)	(572)	(970)	(930)	(447)	(654)	(673)	(694)
	[292]	[331]	[870]	[836]	[1575]	[2817]	[2370]	[9091]
State/SOE	553	503	279	335	343	232	417	453
	(936)	(870)	(378)	(301)	(312)	(283)	(698)	(778)
	[2393]	[2395]	[1186]	[479]	[295]	[280]	[124]	[7152]
Private/Ltd.	152	133	122	244	258	100	241	150
	(209)	(170)	(166)	(251)	(344)	(175)	(331)	(227)
	[2079]	[2906]	[5758]	[2539]	[2593]	[10355]	[2321]	[28551]
Cooperative	216	183	161	209	203	129	195	181
	(167)	(145)	(143)	(106)	(104)	(101)	(99)	(135)
	[959]	[984]	[1026]	[590]	[534]	[927]	[431]	[5451]
Private/Individual	88	86	83	201	161	50	157	72
	(136)	(113)	(112)	(169)	(91)	(36)	(58)	(86)
	[393]	[508]	[695]	[138]	[123]	[3147]	[208]	[5212]
State/Ltd.	1175	908	730	851	749	669	780	831
	(1140)	(946)	(764)	(696)	(493)	(508)	(927)	(812)
	[78]	[90]	[126]	[100]	[80]	[81]	[61]	[616]
Foreign/Ltd.	105	170	150	364	305	144	337	209
	(135)	(445)	(358)	(658)	(426)	(283)	(462)	(396)
	[261]	[358]	[881]	[432]	[649]	[2459]	[934]	[5974]
Foreign/J.Stock	907	809	742	916	721	557	689	704
	(3017)	(2813)	(2242)	(2390)	(1702)	(1550)	(1837)	(2002)
	[124]	[141]	[243]	[190]	[420]	[605]	[495]	[2218]
Mixed/J.Stock	417	382	483	572	988	924	1049	914
	(768)	(667)	(693)	(691)	(2211)	(2202)	(2228)	(2074)
	[117]	[123]	[272]	[231]	[1841]	[1395]	[1247]	[5226]
Mixed/Ltd.	340	263	367	439	334	164	253	285
	(780)	(617)	(555)	(586)	(316)	(217)	(238)	(448)
	[34]	[53]	[99]	[91]	[84]	[200]	[87]	[648]
Other	233	221	132	203	274	142	257	189
	(250)	(237)	(129)	(85)	(236)	(163)	(180)	(185)
	[64]	[74]	[186]	[82]	[88]	[251]	[131]	[876]
Total	557	465	332	505	479	202	453	384
	(1688)	(1445)	(1041)	(1233)	(1169)	(700)	(1086)	(1160)
	[9284]	[10479]	[14567]	[8567]	[8698]	[22909]	[8681]	[83185]

TABLE A4I.—MEANS, STANDARD DEVIATIONS AND NUMBER OF OBSERVATION OF MONTHLY WAGE BY TYPE OF FIRM

Type	1992	1993	1994	1995	1996	1997	1998	Total
State/J.Stock	4.64	5.75	6.56	7.68	9.03	10.48	11.65	6.59
	(1.01)	(1.29)	(1.58)	(1.79)	(2.46)	(4.06)	(3.25)	(2.32)
	[2490]	[2516]	[3225]	[2859]	[416]	[392]	[272]	[12170]
Private/J.Stock	4.80	5.93	6.95	7.84	8.99	10.50	11.31	9.52
	(1.30)	(1.64)	(2.19)	(2.37)	(2.50)	(3.14)	(3.06)	(3.31)
	[292]	[331]	[870]	[836]	[1575]	[2817]	[2370]	[9091]
State/SOE	4.47	5.43	6.07	7.29	8.69	10.03	11.19	5.75
	(0.95)	(1.17)	(1.39)	(1.61)	(2.07)	(2.42)	(2.97)	(2.04)
	[2393]	[2395]	[1186]	[479]	[295]	[280]	[124]	[7152]
Private/Ltd.	4.59	5.61	6.39	7.24	8.50	9.98	10.62	8.09
	(1.29)	(1.58)	(1.85)	(1.85)	(2.14)	(3.36)	(2.84)	(3.25)
	[2079]	[2906]	[5758]	[2539]	[2593]	[10355]	[2321]	[28551]
Cooperative	3.80	4.63	5.25	6.15	7.08	7.91	8.57	5.87
	(0.95)	(1.12)	(1.30)	(1.53)	(1.88)	(2.36)	(2.58)	(2.30)
	[959]	[984]	[1026]	[590]	[534]	[927]	[431]	[5451]
Private/Individual	4.46	5.14	5.84	6.98	7.65	8.43	9.89	7.47
	(1.38)	(1.43)	(1.70)	(2.25)	(1.90)	(2.97)	(3.92)	(3.04)
	[393]	[508]	[695]	[138]	[123]	[3147]	[208]	[5212]
State/Ltd.	4.89	6.43	7.37	9.13	11.59	12.56	13.80	9.07
	(0.68)	(0.97)	(1.30)	(1.54)	(2.81)	(2.17)	(2.44)	(3.41)
	[78]	[90]	[126]	[100]	[80]	[81]	[61]	[616]
Foreign/Ltd.	4.92	6.14	7.21	8.93	10.08	11.53	12.85	10.14
	(1.42)	(1.68)	(2.26)	(3.32)	(3.72)	(4.78)	(4.59)	(4.63)
	[261]	[358]	[881]	[432]	[649]	[2459]	[934]	[5974]
Foreign/J.Stock	5.47	6.87	8.31	9.62	11.05	13.02	14.19	11.29
	(1.72)	(2.00)	(2.46)	(3.46)	(3.36)	(4.19)	(4.18)	(4.47)
	[124]	[141]	[243]	[190]	[420]	[605]	[495]	[2218]
Mixed/J.Stock	4.68	5.78	7.24	8.09	8.89	10.21	11.53	9.58
	(1.13)	(1.18)	(2.56)	(1.84)	(2.08)	(2.46)	(2.94)	(2.86)
	[117]	[123]	[272]	[231]	[1841]	[1395]	[1247]	[5226]
Mixed/Ltd.	4.66	5.69	7.08	8.39	9.09	9.87	11.76	8.77
	(0.95)	(1.27)	(2.48)	(2.28)	(2.45)	(3.16)	(3.17)	(3.27)
	[34]	[53]	[99]	[91]	[84]	[200]	[87]	[648]
Other	4.81	5.81	7.05	8.39	10.38	10.77	11.91	9.03
	(1.49)	(1.83)	(2.43)	(2.88)	(3.73)	(4.43)	(4.32)	(4.19)
	[64]	[74]	[186]	[82]	[88]	[251]	[131]	[876]
Total	4.52	5.54	6.45	7.58	8.90	10.03	11.36	7.99
	(1.15)	(1.43)	(1.88)	(2.12)	(2.58)	(3.58)	(3.48)	(3.45)
	[9284]	[10479]	[14567]	[8567]	[8698]	[22909]	[8681]	[83185]

Appendix

TABLE A5.—COMPLETE FIXED EFFECT PARAMETER ESTIMATES OF THE BASIC INVESTMENT EQUATION FOR 1993-1998

		Ownership / Legal Form Category											
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	State/ Ltd.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock	Mixed/ Ltd.	Other
β_1	0.013*** (0.002)	0.059*** (0.008)	0.004 (0.004)	0.015** (0.007)	0.014*** (0.004)	0.018* (0.009)	-0.333*** (0.037)	0.059 (0.044)	-0.073 (0.046)	0.017 (0.013)	-0.043*** (0.011)	-0.010 (0.006)	0.080*** (0.015)
β_2	0.001 (0.002)	0.009 (0.007)	0.001 (0.004)	-0.010 (0.006)	0.014*** (0.004)	0.020** (0.009)	-0.309*** (0.038)	-0.097* (0.054)	0.025 (0.043)	0.003 (0.013)	0.031*** (0.004)	-0.022*** (0.006)	0.048*** (0.014)
β_3	0.012*** (0.001)	0.005 (0.006)	-0.012** (0.005)	0.000 (0.006)	0.043*** (0.003)	0.012 (0.009)	-0.077** (0.036)	0.028 (0.055)	0.132*** (0.042)	0.032*** (0.012)	0.019** (0.009)	0.005 (0.006)	0.030*** (0.011)
β_4	-0.007*** (0.002)	-0.009 (0.006)	-0.001 (0.004)	-0.007 (0.006)	-0.018*** (0.004)	0.001 (0.009)	-0.089** (0.039)	-0.050 (0.056)	0.019 (0.040)	0.009 (0.011)	-0.008 (0.010)	0.012** (0.006)	-0.032*** (0.007)
γ_1	-0.003*** (0.000)	0.003 (0.004)	-0.003*** (0.001)	0.014*** (0.003)	0.000 (0.001)	0.014*** (0.004)	0.404*** (0.028)	0.002 (0.010)	0.098*** (0.022)	0.014*** (0.004)	0.044*** (0.002)	0.013*** (0.004)	-0.031** (0.012)
γ_2	-0.004*** (0.001)	0.047*** (0.004)	-0.002*** (0.001)	0.001 (0.003)	-0.002 (0.002)	-0.006 (0.005)	-0.067*** (0.023)	0.021** (0.010)	0.001 (0.023)	0.005 (0.007)	0.006*** (0.002)	-0.002 (0.003)	0.033*** (0.011)
γ_3	0.006*** (0.001)	0.016*** (0.005)	0.005*** (0.002)	0.003 (0.003)	0.003 (0.003)	0.008 (0.006)	-0.099*** (0.024)	-0.014 (0.011)	0.033 (0.024)	0.015** (0.007)	0.001 (0.001)	-0.009*** (0.003)	-0.049*** (0.009)
γ_4	0.011*** (0.001)	-0.001 (0.003)	0.008*** (0.002)	-0.004** (0.002)	0.012*** (0.002)	0.010** (0.004)	0.334*** (0.030)	0.007 (0.011)	-0.005 (0.021)	-0.009** (0.004)	-0.002 (0.001)	-0.005* (0.003)	0.087*** (0.015)
μ	-0.024 (0.016)	-0.016* (0.008)	-0.138** (0.054)	-0.011 (0.008)	-0.065 (0.053)	-0.014** (0.006)	0.225 (0.282)	0.008 (0.036)	-0.029 (0.072)	0.025 (0.106)	0.001 (0.027)	-0.210 (0.136)	0.007 (0.063)
$\Sigma \gamma_k$	0.010*** (0.001)	0.065*** (0.003)	0.008*** (0.001)	0.013*** (0.002)	0.014*** (0.001)	0.027*** (0.003)	0.572*** (0.018)	0.016** (0.007)	0.128*** (0.024)	0.026*** (0.004)	0.050*** (0.002)	-0.003 (0.002)	0.040*** (0.008)
$\Sigma \beta_k$	0.019*** (0.003)	0.063*** (0.010)	-0.007 (0.011)	-0.002 (0.012)	0.051*** (0.008)	0.052*** (0.015)	-0.808*** (0.127)	-0.060 (0.114)	0.104 (0.088)	0.062** (0.028)	-0.001 (0.014)	-0.015 (0.013)	0.127*** (0.021)
P-value	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.076	0.000	0.004	0.948	0.003	0.000
Adj.R^2	0.118	0.291	0.166	0.097	0.180	0.373	0.661	0.273	0.252	0.079	0.170	0.290	0.178
N/NF	42483/3805	7884/865	5751/699	3797/501	10899/1254	3635/255	971/159	373/35	1728/149	2372/265	4410/504	305/34	358/46

TABLE A6.—COMPLETE FIXED EFFECT PARAMETER ESTIMATES OF THE BASIC INVESTMENT EQUATION BY SIZE AND TYPE OF THE FIRM

	Large Firms (Labor ≥ 100 Employees)									
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
β_1	0.023*** (0.002)	0.079*** (0.009)	0.003 (0.005)	0.006 (0.009)	0.032*** (0.006)	0.022* (0.012)	-0.028** (0.014)	-0.083* (0.048)	0.019 (0.016)	-0.049*** (0.014)
β_2	0.006*** (0.001)	0.036*** (0.008)	-0.001 (0.004)	-0.018* (0.009)	-0.001 (0.005)	0.025** (0.011)	-0.007 (0.013)	0.036 (0.045)	0.002 (0.015)	0.034*** (0.005)
β_3	0.014*** (0.001)	-0.017* (0.009)	-0.014*** (0.005)	0.006 (0.009)	0.063*** (0.004)	0.012 (0.011)	-0.001 (0.015)	0.127*** (0.043)	0.041*** (0.014)	0.043*** (0.013)
β_4	-0.003** (0.001)	-0.041*** (0.008)	-0.001 (0.004)	-0.009 (0.008)	-0.013** (0.005)	-0.002 (0.010)	-0.005 (0.013)	0.014 (0.042)	0.013 (0.015)	0.004 (0.014)
γ_1	-0.006*** (0.000)	0.006 (0.005)	-0.003** (0.001)	0.018*** (0.003)	-0.002 (0.004)	0.017*** (0.005)	0.038*** (0.008)	0.109*** (0.024)	0.016*** (0.004)	0.043*** (0.003)
γ_2	-0.004*** (0.000)	0.044*** (0.005)	-0.001** (0.001)	0.001 (0.004)	-0.010*** (0.003)	0.001 (0.007)	0.019 (0.012)	-0.006 (0.026)	0.004 (0.008)	0.006*** (0.002)
γ_3	0.008*** (0.001)	0.019*** (0.005)	0.005*** (0.002)	0.004 (0.004)	0.017*** (0.003)	0.004 (0.007)	-0.008 (0.013)	0.029 (0.027)	0.019** (0.008)	0.003** (0.002)
γ_4	0.009*** (0.001)	0.002 (0.004)	0.008*** (0.002)	-0.007** (0.003)	0.011*** (0.003)	0.006 (0.006)	0.011 (0.012)	0.001 (0.023)	-0.011** (0.005)	-0.001 (0.001)
μ	-0.007 (0.015)	-0.008 (0.007)	-0.099* (0.060)	-0.012 (0.008)	-0.058 (0.088)	-0.010 (0.007)	-0.002 (0.078)	-0.065 (0.073)	0.044 (0.233)	-0.038 (0.030)
$\Sigma \gamma_k$	0.007*** (0.000)	0.072*** (0.003)	0.009*** (0.001)	0.017*** (0.002)	0.015*** (0.002)	0.027*** (0.004)	0.060*** (0.011)	0.132*** (0.025)	0.027*** (0.005)	0.051*** (0.002)
$\Sigma \beta_k$	0.039*** (0.003)	0.057*** (0.011)	-0.013 (0.012)	-0.016 (0.016)	0.081*** (0.011)	0.057*** (0.020)	-0.041 (0.034)	0.094 (0.092)	0.075** (0.037)	0.032 (0.025)
P-value	0.000	0.000	0.000	0.001	0.000	0.026	0.008	0.000	0.015	0.991
Adj.R^2	0.133	0.301	0.177	0.109	0.183	0.211	0.251	0.254	0.079	0.177
N/NF	36837/2974	7557/826	5479/671	3036/395	8497/842	2905/174	501/63	1651/140	2018/214	4237/486

	Small Firms (Labor < 100 Employees)									
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
β_1	-0.046*** (0.008)	0.015 (0.021)	0.043 (0.046)	0.021 (0.019)	0.006 (0.006)	0.013 (0.020)	-0.393*** (0.058)	-0.028 (0.089)	0.016 (0.021)	-0.008 (0.042)

β_2	-0.029***	-0.010	0.026	0.000	0.012	0.023	-0.463***	-0.079	0.001	-0.035
	(0.010)	(0.019)	(0.039)	(0.012)	(0.008)	(0.021)	(0.063)	(0.095)	(0.023)	(0.043)
β_3	0.009	0.005	0.016	-0.010	0.000	0.038*	-0.106*	0.019	-0.014	-0.001
	(0.010)	(0.010)	(0.044)	(0.012)	(0.008)	(0.022)	(0.059)	(0.087)	(0.027)	(0.031)
β_4	-0.008	0.002	-0.013	-0.010	-0.013*	0.021	-0.053	-0.099	0.012	0.006
	(0.009)	(0.010)	(0.044)	(0.013)	(0.007)	(0.019)	(0.064)	(0.092)	(0.015)	(0.036)
γ_1	0.023***	-0.006	-0.027	0.003	0.002	0.012	0.667***	-0.002	-0.008	0.029
	(0.003)	(0.013)	(0.029)	(0.007)	(0.002)	(0.009)	(0.045)	(0.032)	(0.015)	(0.034)
γ_2	0.014***	-0.011	0.017	0.002	-0.002	-0.007	-0.148***	0.014	0.013	0.028
	(0.004)	(0.013)	(0.031)	(0.005)	(0.004)	(0.011)	(0.035)	(0.028)	(0.018)	(0.036)
γ_3	-0.037***	0.004	-0.041	0.002	0.002	0.013	-0.114***	0.035	0.031*	-0.008
	(0.006)	(0.013)	(0.031)	(0.006)	(0.004)	(0.012)	(0.032)	(0.030)	(0.017)	(0.033)
γ_4	0.046***	0.016	0.073*	0.004	0.005	0.007	0.215***	0.001	-0.019	-0.016
	(0.005)	(0.011)	(0.041)	(0.006)	(0.004)	(0.010)	(0.045)	(0.026)	(0.016)	(0.033)
μ	0.003	0.019	-0.018	-0.069	-0.023	0.056**	0.634*	-0.099	-0.009	0.035
	(0.079)	(0.028)	(0.048)	(0.077)	(0.071)	(0.024)	(0.326)	(0.133)	(0.129)	(0.123)
$\Sigma \gamma_k$	0.046***	0.003	0.022*	0.011	0.006**	0.024**	0.620***	0.048	0.017	0.033
	(0.003)	(0.010)	(0.012)	(0.008)	(0.003)	(0.010)	(0.024)	(0.055)	(0.011)	(0.039)
$\Sigma \beta_k$	-0.075***	0.011	0.072	0.002	0.005	0.096**	-1.014***	-0.187	0.015	-0.038
	(0.019)	(0.029)	(0.108)	(0.032)	(0.014)	(0.044)	(0.218)	(0.242)	(0.041)	(0.085)
P-value	0.000	0.000	1.000	0.218	0.027	0.158	0.000	0.000	0.667	0.902
Adj.R^2	-0.024	0.371	0.006	0.088	0.156	0.654	0.756	0.787	0.177	0.035
N/NF	5646/1412	327/89	272/89	761/182	2402/622	730/147	470/116	77/18	354/85	173/59

TABLE A7.—COMPLETE ANNUAL FIXED EFFECT PARAMETER ESTIMATES OF THE BASIC INVESTMENT EQUATION

	1993									
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
β_1	-0.068*** (0.008)	0.095*** (0.029)	0.008 (0.133)	-0.035** (0.016)	0.017* (0.010)	0.075*** (0.019)	-0.445*** (0.118)	-0.291 (0.891)	-0.006 (0.037)	-0.181 (0.114)
β_2	-0.096*** (0.011)	-0.007 (0.030)	-0.110 (0.177)	-0.015 (0.013)	0.057*** (0.017)	0.034 (0.023)	-0.471*** (0.126)	-0.449 (0.869)	-0.021 (0.039)	-0.107 (0.079)
β_3	-0.008 (0.012)	0.055* (0.033)	-0.090 (0.101)	-0.028** (0.014)	0.033** (0.016)	0.051** (0.024)	-0.134 (0.125)	0.757 (1.078)	-0.084** (0.041)	-0.057 (0.066)
β_4	-0.057*** (0.011)	-0.257*** (0.026)	0.029 (0.114)	-0.073*** (0.022)	0.029* (0.016)	-0.007 (0.025)	-0.088 (0.122)	-0.256 (1.221)	0.068*** (0.024)	-0.087 (0.073)
γ_1	0.028*** (0.002)	0.034** (0.015)	-0.055* (0.032)	-0.008 (0.007)	0.003 (0.003)	0.014 (0.012)	0.365*** (0.050)	0.497 (0.323)	-0.008 (0.026)	0.050 (0.056)
γ_2	0.024*** (0.002)	0.055*** (0.015)	-0.001 (0.014)	0.010 (0.007)	0.001 (0.006)	-0.007 (0.015)	-0.068* (0.039)	0.054 (0.308)	-0.014 (0.020)	-0.046 (0.051)
γ_3	-0.043*** (0.006)	-0.017 (0.016)	-0.064 (0.040)	0.011 (0.008)	0.003 (0.007)	0.024 (0.016)	-0.222*** (0.040)	0.360 (0.566)	0.024 (0.021)	0.083 (0.066)
γ_4	0.086*** (0.005)	0.041** (0.017)	0.149*** (0.049)	0.027*** (0.010)	-0.008 (0.008)	0.012 (0.016)	0.637*** (0.055)	-0.205 (0.373)	-0.049** (0.019)	0.112 (0.076)
μ	0.117 (0.527)	-0.035 (0.122)	0.034 (0.105)	-0.011 (0.038)	-0.436 (0.688)	-0.088 (0.091)	0.953 (4.039)	-0.528 (1.172)	1.273 (1.626)	0.244 (0.237)
$\Sigma \gamma_k$	0.095*** (0.005)	0.113*** (0.010)	0.028 (0.022)	0.040** (0.015)	-0.001 (0.006)	0.043 (0.029)	0.712*** (0.029)	0.706 (0.875)	-0.046* (0.025)	0.199 (0.132)
$\Sigma \beta_k$	-0.229*** (0.030)	-0.114* (0.062)	-0.163 (0.404)	-0.150*** (0.042)	0.136*** (0.041)	0.153** (0.060)	-1.138** (0.475)	-0.239 (2.870)	-0.043 (0.083)	-0.432 (0.291)
P-value	0.000	0.006	0.396	0.000	0.000	0.112	0.000	0.017	0.080	0.598
Adj.R^2	0.205	0.546	0.212	0.283	0.429	0.313	0.854	0.053	0.379	0.047
N/NF	6947/1867	2140/544	197/57	1787/457	1250/386	832/215	262/77	108/27	184/55	96/25
	1994									
	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
β_1	0.018*** (0.006)	0.000 (0.014)	-0.154** (0.068)	0.010 (0.010)	-0.004 (0.012)	-0.008 (0.020)	0.000 (0.032)	0.278** (0.117)	0.059 (0.050)	-0.147 (0.099)
β_2	0.002	-0.003	0.115	0.004	0.002	-0.006	-0.107***	0.117	-0.042	-0.123

	(0.006)	(0.012)	(0.073)	(0.014)	(0.011)	(0.021)	(0.031)	(0.126)	(0.051)	(0.086)
	0.000	0.006	-0.004	-0.002	-0.015	0.034	-0.124***	0.383***	0.160***	-0.041
β_3	(0.005)	(0.009)	(0.076)	(0.013)	(0.009)	(0.022)	(0.025)	(0.111)	(0.050)	(0.054)
	-0.017***	-0.003	0.090	0.000	-0.040***	0.001	-0.120***	0.216*	-0.063*	-0.068
β_4	(0.005)	(0.009)	(0.073)	(0.009)	(0.010)	(0.020)	(0.030)	(0.117)	(0.034)	(0.053)
	0.018***	-0.004	0.002	0.002	0.026***	-0.005	0.049***	-0.064	0.051*	0.007
γ_1	(0.004)	(0.008)	(0.021)	(0.004)	(0.008)	(0.009)	(0.018)	(0.046)	(0.030)	(0.034)
	-0.004	0.002	-0.001	0.002	-0.014*	0.021**	0.095***	-0.008	0.155***	0.013
γ_2	(0.003)	(0.009)	(0.020)	(0.004)	(0.007)	(0.010)	(0.018)	(0.054)	(0.037)	(0.029)
	0.010***	0.013	0.003	-0.001	0.009	0.002	0.121***	0.012	-0.011	0.019
γ_3	(0.003)	(0.009)	(0.019)	(0.004)	(0.005)	(0.011)	(0.018)	(0.032)	(0.036)	(0.032)
	-0.007***	-0.010	0.021	-0.004	-0.003	0.019*	0.045**	0.042	0.033	0.044
γ_4	(0.002)	(0.008)	(0.023)	(0.004)	(0.005)	(0.010)	(0.017)	(0.034)	(0.027)	(0.030)
	-0.205***	-0.293***	-1.309**	0.119*	0.013	0.174**	-0.132	-0.009	-0.522*	0.089
μ	(0.071)	(0.056)	(0.608)	(0.071)	(0.166)	(0.088)	(0.159)	(0.089)	(0.285)	(0.058)
	0.016***	0.000	0.025	0.000	0.016**	0.036***	0.310***	-0.018	0.228***	0.083
$\Sigma \gamma_k$	(0.002)	(0.008)	(0.023)	(0.005)	(0.007)	(0.011)	(0.040)	(0.121)	(0.030)	(0.056)
	0.003	0.001	0.048	0.013	-0.057**	0.021	-0.351***	0.993**	0.114	-0.379**
$\Sigma \beta_k$	(0.013)	(0.020)	(0.242)	(0.025)	(0.028)	(0.054)	(0.092)	(0.394)	(0.080)	(0.165)
P-value	0.000	0.000	0.000	0.996	0.000	0.015	0.000	0.012	0.000	0.164
Adj.R^2	0.242	0.314	0.515	0.007	0.197	0.758	0.291	0.500	0.345	0.251
N/NF	7570/2315	2118/581	344/108	1006/317	2125/720	866/232	327/107	137/40	309/102	163/47

1995

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
	0.006	0.071***	-0.006	0.011	-0.001	0.086**	0.038	-0.186**	-0.002	0.142
β_1	(0.008)	(0.015)	(0.021)	(0.015)	(0.013)	(0.035)	(0.057)	(0.087)	(0.226)	(0.126)
	-0.002	-0.001	0.005	0.001	-0.001	0.018	0.021	0.021	-0.092	0.486***
β_2	(0.009)	(0.015)	(0.024)	(0.014)	(0.011)	(0.030)	(0.042)	(0.070)	(0.221)	(0.161)
	0.050***	0.042***	0.004	0.017	0.042**	0.030*	0.004	-0.064	0.336	0.191
β_3	(0.009)	(0.014)	(0.031)	(0.015)	(0.018)	(0.016)	(0.039)	(0.075)	(0.217)	(0.116)
	0.011*	-0.028**	0.026	-0.010	0.015*	0.025	-0.043	-0.038	0.195	0.345**
β_4	(0.006)	(0.014)	(0.036)	(0.015)	(0.009)	(0.029)	(0.029)	(0.074)	(0.309)	(0.146)
	0.026***	0.005	0.008	0.017**	0.035***	-0.047***	0.033	0.091**	-0.084	0.068
γ_1	(0.006)	(0.006)	(0.008)	(0.007)	(0.010)	(0.016)	(0.037)	(0.044)	(0.138)	(0.056)
γ_2	0.011**	0.027***	0.010	-0.009	0.022**	0.018	-0.026	0.052	-0.211	-0.118**

	(0.004)	(0.006)	(0.009)	(0.007)	(0.010)	(0.012)	(0.052)	(0.039)	(0.186)	(0.053)
γ_3	0.010	-0.001	0.018	0.005	0.014	0.022**	0.045	0.061	0.285*	0.026
	(0.007)	(0.007)	(0.011)	(0.006)	(0.015)	(0.010)	(0.045)	(0.037)	(0.147)	(0.045)
γ_4	0.026***	0.033***	0.002	-0.002	0.019	0.004	0.018	0.036	-0.068	0.000
	(0.008)	(0.007)	(0.009)	(0.005)	(0.016)	(0.012)	(0.045)	(0.036)	(0.156)	(0.036)
μ	-0.164	-0.249	0.079	0.012	1.073**	0.040	-0.264*	0.430	0.017	-0.150
	(0.172)	(0.309)	(0.106)	(0.024)	(0.498)	(0.074)	(0.137)	(0.288)	(1.060)	(0.176)
$\Sigma \gamma_k$	0.074***	0.064***	0.038*	0.011**	0.090***	-0.003	0.070	0.240***	-0.078	-0.023
	(0.006)	(0.009)	(0.019)	(0.005)	(0.009)	(0.021)	(0.044)	(0.070)	(0.211)	(0.018)
$\Sigma \beta_k$	0.065***	0.084**	0.028	0.019	0.055**	0.159*	0.020	-0.268	0.436	1.164**
	(0.015)	(0.042)	(0.078)	(0.036)	(0.023)	(0.086)	(0.113)	(0.216)	(0.610)	(0.463)
P-value	0.000	0.000	0.000	0.000	0.000	0.084	0.607	0.044	0.987	0.004
Adj.R^2	0.101	0.336	0.247	0.650	0.151	0.282	0.241	0.638	-0.004	0.072
N/NF	6991/1922	2695/700	554/159	463/128	1760/523	571/149	105/30	175/45	293/83	188/53

1996

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
β_1	-0.010	-0.020	0.206***	-0.016	0.075**	0.039	-0.164*	0.071	-0.020	-0.105***
	(0.013)	(0.036)	(0.028)	(0.042)	(0.033)	(0.080)	(0.097)	(0.065)	(0.024)	(0.016)
β_2	-0.050***	-0.008	0.251***	-0.116***	-0.089***	-0.011	0.220**	-0.038	-0.006	-0.007
	(0.014)	(0.044)	(0.030)	(0.043)	(0.033)	(0.093)	(0.104)	(0.073)	(0.020)	(0.023)
β_3	0.040***	-0.075**	0.282***	-0.115**	0.121***	0.030	0.351**	-0.013	-0.018	-0.109***
	(0.013)	(0.035)	(0.028)	(0.045)	(0.034)	(0.095)	(0.139)	(0.076)	(0.019)	(0.020)
β_4	-0.049***	-0.086***	0.232***	-0.212***	-0.096***	-0.026	0.281**	0.013	-0.001	-0.045**
	(0.011)	(0.032)	(0.016)	(0.044)	(0.026)	(0.092)	(0.120)	(0.067)	(0.017)	(0.021)
γ_1	0.004	-0.014	0.022	0.078***	0.009	0.082**	0.284***	-0.034*	-0.007	0.127***
	(0.007)	(0.016)	(0.013)	(0.022)	(0.018)	(0.032)	(0.080)	(0.019)	(0.008)	(0.006)
γ_2	0.004	0.019	0.041***	0.031	-0.008	-0.056	-0.063	0.081***	0.004	-0.038***
	(0.006)	(0.017)	(0.015)	(0.021)	(0.018)	(0.034)	(0.092)	(0.029)	(0.009)	(0.009)
γ_3	-0.013**	0.007	-0.017	-0.057***	-0.037**	0.009	-0.066	-0.038	0.020	0.035***
	(0.006)	(0.021)	(0.014)	(0.019)	(0.017)	(0.045)	(0.113)	(0.029)	(0.018)	(0.009)
γ_4	0.027***	0.048**	0.015	0.051**	0.088***	-0.011	0.071	0.039	0.022	-0.065***
	(0.007)	(0.023)	(0.016)	(0.024)	(0.019)	(0.047)	(0.098)	(0.030)	(0.016)	(0.010)
μ	0.212	0.055	-0.130	0.070*	-3.628***	-0.209	0.261*	0.015	-0.210	0.123**
	(0.280)	(0.185)	(0.271)	(0.039)	(1.004)	(0.260)	(0.141)	(0.085)	(0.224)	(0.058)
$\Sigma \gamma_k$	0.023***	0.059**	0.061***	0.104***	0.052***	0.024	0.225**	0.048	0.039**	0.058***

	(0.004)	(0.029)	(0.004)	(0.016)	(0.012)	(0.027)	(0.091)	(0.029)	(0.018)	(0.003)
$\Sigma \beta_k$	-0.070* (0.036)	-0.190** (0.093)	0.971*** (0.056)	-0.459*** (0.131)	0.011 (0.084)	0.032 (0.248)	0.688** (0.320)	0.033 (0.230)	-0.045 (0.056)	-0.267*** (0.060)
P-value	0.000	0.059	0.000	0.000	0.000	0.704	0.099	0.206	0.208	0.000
Adj.R^2	0.094	0.284	0.566	0.490	0.098	0.107	0.485	0.115	0.415	0.725
N/NF	7349/1969	392/103	1219/341	282/83	2076/576	526/133	94/26	391/101	414/111	1757/459

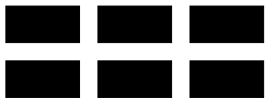
1997

	All	State/ J.Stock	Private/ J.Stock	State/ SOE	Private/ Ltd.	Coop.	Private/ Individ.	Foreign/ J.Stock	Foreign/ Ltd.	Mixed/ J.Stock
β_1	0.026*** (0.006)	-0.007 (0.043)	-0.024 (0.016)	-0.056 (0.042)	0.034*** (0.011)	0.065* (0.033)	0.013 (0.112)	0.070 (0.053)	0.085*** (0.020)	-0.165*** (0.047)
β_2	0.019*** (0.004)	0.024 (0.027)	0.017 (0.014)	-0.029 (0.044)	0.014* (0.008)	0.143*** (0.037)	-0.047 (0.106)	0.106** (0.051)	0.126*** (0.024)	0.012 (0.010)
β_3	0.006 (0.004)	0.015 (0.022)	-0.054*** (0.017)	0.152** (0.060)	0.007 (0.007)	0.043 (0.035)	-0.024 (0.101)	0.119** (0.052)	0.095*** (0.022)	0.071** (0.035)
β_4	0.000 (0.005)	0.031 (0.025)	-0.039** (0.017)	0.045 (0.068)	-0.006 (0.010)	-0.002 (0.032)	-0.203** (0.088)	0.056 (0.046)	0.024 (0.023)	0.057* (0.035)
γ_1	0.008*** (0.002)	0.018 (0.025)	0.021* (0.011)	0.032 (0.032)	0.000 (0.005)	0.030* (0.016)	-0.088 (0.066)	0.021 (0.024)	0.015 (0.010)	0.003 (0.007)
γ_2	0.001 (0.002)	0.039* (0.020)	0.037*** (0.010)	0.049 (0.032)	0.001 (0.004)	-0.017 (0.015)	0.081 (0.104)	0.010 (0.024)	0.001 (0.008)	-0.003 (0.004)
γ_3	0.004*** (0.002)	0.011 (0.021)	0.036*** (0.009)	-0.001 (0.036)	0.009** (0.004)	0.007 (0.015)	-0.085 (0.084)	0.009 (0.024)	0.011 (0.012)	0.008** (0.003)
γ_4	0.000 (0.001)	-0.016 (0.016)	0.011 (0.009)	-0.057* (0.034)	0.008* (0.004)	-0.001 (0.013)	0.063 (0.066)	-0.003 (0.020)	-0.001 (0.004)	0.003 (0.003)
μ	-0.108*** (0.040)	-0.076 (0.090)	-0.168*** (0.065)	0.036 (0.032)	-0.156* (0.080)	-0.027 (0.025)	0.051 (0.112)	0.024 (0.075)	-0.126 (0.148)	0.007 (0.086)
$\Sigma \gamma_k$	0.014*** (0.002)	0.051** (0.020)	0.105*** (0.008)	0.024 (0.021)	0.017*** (0.003)	0.020 (0.012)	-0.029 (0.057)	0.037 (0.034)	0.026*** (0.007)	0.011 (0.008)
$\Sigma \beta_k$	0.050*** (0.011)	0.063 (0.060)	-0.100** (0.043)	0.113 (0.082)	0.050** (0.022)	0.249*** (0.086)	-0.261 (0.283)	0.351** (0.141)	0.330*** (0.063)	-0.025 (0.072)
P-value	0.000	0.216	0.000	1.000	0.039	0.000	0.009	0.331	0.000	0.130
Adj.R^2	0.217	0.178	0.291	0.075	0.168	0.455	0.685	0.264	0.413	0.073
N/NF	6975/1861	297/76	1691/460	162/44	1913/522	440/112	70/19	462/118	543/147	1191/306

1998

	All	State/	Private/	State/	Private/	Coop.	Private/	Foreign/	Foreign/	Mixed/

		J.Stock	J.Stock	SOE	Ltd.		Individ.	J.Stock	Ltd.	J.Stock
	0.007**	0.038	-0.015	0.109	0.004	0.022	-0.032	-0.192***	0.002	0.015
β_1	(0.004)	(0.052)	(0.010)	(0.165)	(0.012)	(0.025)	(0.029)	(0.073)	(0.014)	(0.013)
	0.012***	0.127	-0.031**	0.281*	0.000	0.041	-0.016	-0.077	-0.022	0.069***
β_2	(0.003)	(0.081)	(0.013)	(0.143)	(0.014)	(0.026)	(0.023)	(0.068)	(0.014)	(0.017)
	0.010***	-0.119	-0.036***	0.211*	0.005	0.042*	0.031	-0.026	0.017	-0.026*
β_3	(0.002)	(0.093)	(0.014)	(0.109)	(0.009)	(0.023)	(0.027)	(0.061)	(0.018)	(0.014)
	-0.002	-0.096	-0.036***	0.093	-0.004	0.031	0.034	-0.066	-0.017	-0.001
β_4	(0.001)	(0.089)	(0.012)	(0.148)	(0.010)	(0.024)	(0.024)	(0.063)	(0.018)	(0.013)
	0.009***	-0.038	0.002	0.186***	0.009*	0.020**	-0.007	0.204***	0.015***	0.012
γ_1	(0.001)	(0.033)	(0.003)	(0.067)	(0.005)	(0.010)	(0.024)	(0.029)	(0.002)	(0.008)
	0.006***	-0.018	-0.001	0.073	-0.002	0.007	0.068***	0.154***	0.041***	0.006*
γ_2	(0.002)	(0.024)	(0.004)	(0.050)	(0.006)	(0.012)	(0.022)	(0.029)	(0.006)	(0.003)
	-0.003*	0.066**	0.014**	0.141**	0.002	0.003	-0.030	0.127***	-0.042***	0.026***
γ_3	(0.002)	(0.029)	(0.005)	(0.059)	(0.005)	(0.011)	(0.028)	(0.029)	(0.011)	(0.005)
	0.000	0.040	-0.002	0.231***	0.003	0.012	-0.001	0.135***	-0.002	0.024***
γ_4	(0.001)	(0.034)	(0.005)	(0.068)	(0.002)	(0.012)	(0.027)	(0.031)	(0.012)	(0.005)
	-0.002	0.042	-0.059	-0.001	-0.314	0.125	-0.135	0.029	-0.165	0.049*
μ	(0.058)	(0.190)	(0.081)	(0.160)	(0.506)	(0.096)	(0.151)	(0.248)	(0.630)	(0.029)
	0.013***	0.051	0.014***	0.630***	0.013***	0.042***	0.029*	0.620***	0.013***	0.067***
$\Sigma \gamma_k$	(0.001)	(0.042)	(0.003)	(0.131)	(0.004)	(0.012)	(0.016)	(0.061)	(0.004)	(0.005)
	0.027***	-0.050	-0.118***	0.694*	0.005	0.136*	0.017	-0.361	-0.020	0.056***
$\Sigma \beta_k$	(0.007)	(0.243)	(0.037)	(0.363)	(0.034)	(0.077)	(0.066)	(0.220)	(0.055)	(0.020)
P-value	0.000	0.636	0.000	0.006	0.019	0.579	0.448	0.000	0.000	0.000
Adj.R^2	0.169	0.141	0.194	0.190	0.066	0.380	0.407	0.399	0.541	0.331
N/NF	6651/1799	242/64	1746/475	97/28	1775/484	400/103	113/35	455/119	629/172	1015/271



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