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Finance and Investment in Transition: Czech Enterprises, 1993-1994

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FINANCE AND INVESTMENT IN TRANSITION: CZECH ENTERPRISES, 1993-1994[1]

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ABSTRACT

We use enterprise data to study the determinants of investment in Czech industry during the period from 1993 through 1994, a period when the transition toward a market economy was rapidly gaining momentum. We investigate accelerator type models modified to include financial variables intended to reflect the possibility of credit rationing. Overall, we find that finance is an important determinant of investment for firms in a transition economy. In particular we find that *de novo* private firms and firms privatized early invested heavily during 1993 and that they were financially constrained in 1993 and even more so in 1994. In contrast, state owned enterprises including those that were privatized in the course of 1994 invested relatively little in 1993 and were less financially constrained in 1994 than in 1993. This evidence is consistent with a pattern that state owned enterprises were placed under financial discipline relatively early in the Czech transition and that their financial access improved with the approach of their privatization.

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FINANCE AND INVESTMENT IN TRANSITION: CZECH ENTERPRISES, 1993-1994

1. *Introduction*

In this paper we use enterprise data to study the determinants of investment in Czech industry during the period from 1993 through 1994, a period when the transition toward a market economy was rapidly gaining momentum. To date very little work has been done on the investment behavior of enterprises in transition economies, essentially because of the difficulties of obtaining appropriate data. The advantage of our study is that we draw upon a sample of Czech enterprises including all sizes and categories of ownership. This allows us to gain some insights of the impact of the extensive Czech privatization program on investment behavior.

While the difficulties of collecting and analysing large data sets at the firm level have given our study a very precise focus, we are motivated by the following broad question: Is growth constrained by financial underdevelopment in ex-socialist economies? We take it as given that investment is a key to growth in transition economies and ask whether some or all enterprises' investments have been financial constrained. It is widely held view that the lack of access to finance was major obstacle to the growth of the private sector in transition economies.[*] In fact, an examination of aggregate indicators give mixed support for this hypothesis. In a macro study of the Hungarian credit channel, Baran and Kegels (1996) find that enterprise credit, especially to small enterprises, has significant and positive impact on a variety of indicators of future real activity. As a consequence the crowding out of enterprise credit by public sector credits during 1992-93 operated as a strong brake on growth in Hungary. In contrast, Anderson and Kegels (1997) present evidence for Poland that suggests that the diversion of credit from state enterprises toward private was very rapid during the period 1992-94. This may help in understanding why Poland emerged relatively early from the initial transition recession. However, such conclusions must be viewed as tentative in light of the rather coarse picture provided by aggregate data. To go further it is necessary to examine firm-level data as we do here.

Of course, the interest in the relation between finance and investment is not confined to transition economies. There have long been reasons to have some doubts about a view that firms operate in a perfect-markets, Modigliani-Miller world where all positive net present value (NPV) projects are undertaken and are unaffected by the financing method. The first reason for doubting this view is empirical: Studies of investment have long found that cashflow or other financial indicators were significant in explaining investment. More recently a variety of theoretical models, usually built on the assumption of asymmetric information, have provided possible

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[*] For a presentation of this argument see Anderson et al. (1996).

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explanations of the apparent importance of access to finance. In particular, since Stiglitz and Weiss it has been recognized that difficulties of banks in observing firm riskiness or other characteristics can sometimes result in credit rationing. Similarly, problems of moral hazard (for example, managerial prerogative or asset substitution by shareholders) could lead firms to pass up positive NPV contracts for reasons lack of finance.

There are several reasons for believing that agency problems and information asymmetries will be even more severe in transition economies than elsewhere. In these economies initial liberalization creates many private, start-up enterprises which lack track records and thus are difficult for potential lenders to evaluate. Furthermore, these firms are often in the service sector and possess relatively few tangible assets which can serve as collateral. Other firms, including virtually all large firms, have emerged from state-owned enterprises. These had been marked by the diverse attempts to reform the planning process prior to the ultimate collapse of communism. These reforms indirectly gave considerable power to employees, especially managers, to pursue private objectives. One of the major justifications for moving toward a market economy is to make these insiders use capital more efficiently by forcing them to be accountable to a specific group, the financial investors who seek to maximize returns on capital. However, at the outset of transition investors find themselves with few powers to discipline managers because of problems of contract enforcement or lack of information. If so, it may be rational for them to respond by withholding funds. This line of reasoning suggests agency problems will be at maximum early in transition. As financial development proceeds, banks should emerge as effective monitors, and securities laws should provide better investor protection. As this occurs we would expect financial constraints on investment to become less severe. We will call this the *reduced agency cost hypothesis*.

However there is an alternative view which suggests that the financial obstacles to investment and growth will *increase* during transition. This would follow if, in early stages of transition when most firms and banks are still not privatized, budget constraints are still soft. If so investments could be undertaken because firms have relatively ready access to outside finance. Later, as firms are privatized and budget constraints are hardened, finance may become more difficult and underinvestment problems could become more important. We call this the *hardening of budget constraints hypothesis*. It is certainly possible, perhaps even likely, that the reduced agency costs effect and the hardening of budget constraints effect will both be at work in transition and for the relative importance of these factors to differ across sectors and over time.

To date empirical studies of transition economies have shed little light on these questions. The creation of comprehensive data on finance and investment by Czech firms provides us with an excellent opportunity to do so by going behind the aggregates. Our approach in this paper is to estimate standard enterprise investment equations which are augmented to include a variety of financial variables. One difficulty with estimating investment relations in transition economies is to find good proxies for the expected profitability of investments. In accelerator models this is represented by past changes in sales. For many firms in transition, especially those firms which are being restructured, this may be a very poor indicator of investment

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prospects. An alternative approach might involve Tobin's Q since stock market valuations are thought to be forward looking. We have not pursued this here because we wish to cover a wider range of firms including large and small, private and state-owned. Many of these were unlisted. Furthermore, in the period of 1993-94 that we cover, the Czech stock market was just emerging and trading was illiquid and dispersed across two exchanges and a more active over-the-counter market. In our view, Q models which would necessarily based on stock exchange quotes would not reliably represent market valuations. Consequently, we estimate modified accelerator models. However, for the same reasons why theoretically Q models might be of interest, we must recognize that our financial variables might serve as proxies for investment prospects. In particular, the willingness of financial institutions to give credits may be an indicator that the firm has high-return investment opportunities.

Our basic finding is that generally financial variables are significant in explaining investment flows in the Czech Republic in 1993-94. We find important differences in the way financial conditions affect investment for different categories of firms. In particular, we find evidence that firms that were privatized early or *de novo* firms were often at their *debt capacity* and that therefore they faced severe finance constraints. Furthermore, these constraints appeared to increase in severity from 1993 to 1994. In contrast, we find that state enterprises or those that were privatized late were not so financially constrained. For these firms the level of credits outstanding appeared to serve as a proxy for these firms' investment prospects. We find that state-owned enterprises were able to finance some investments by using trade credit. However, given that the *levels* of trade credit were generally lower for state-owned enterprises, the results do not indicate that these firms were able to systematically exploit their power *vis à vis* suppliers as a form of soft budget constraints. When we break-down the sample by size and ownership, we find that small firm effects weaken but do not overturn the above conclusions.

The remainder of the paper is orgnaized as follows. In section 2, we describe the model which we will estimate. In section 3 we briefly summarize some of the main aspects of the Czech transition program, describe the construction of the data set, and present some interesting summary statistics. Section 4 presents our main results. Section 5 summarizes our conclusions.

2. *The model*

Many theoretical and empirical models designed to explain the investment behavior of firms have been proposed in the economic literature and estimated on various types of data for different countries and periods[1]. We can roughly classify these models as either *explicit* models or *implicit* models.

Explicit models propose specifications which take directly into account the main determinants of investment decisions. Most use neo-classical theory and are based on some sort of adjustment mechanism of the actual capital stock toward its

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[1] For an extensive survey of the main models and their empirical application see Chirinko (1993).

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steady-state level. They are thus based on a partial analysis of the firms' production-employment-capital decisions coming from a maximization of profit by a representative firm taking prices and costs as given and facing a production function with substitutable factors. In this category, extremely limited substitutibility of capital and labor gives rise to accelerator-type models of investment. In particular, when there is no substitutability either ex-ante or ex-post, the desired capital stock is thus simply proportional to revenue. Investment in this case would be a distributed lag function of changes in the level of revenue.

The implicit models are based on a financial analysis of the firm and try to assess implicitly the profitability of its planned investment. In this kind of model, the firm is assumed to compare the cost of building new plant and equipment with the cost of buying an existing company on the stock market. The Q ratio is the ratio of the market value and the total cost of the planned investment. It is a measure of whether the investment decision is profitable. This theory is thus based on the notion that all relevant information is captured in the market valuation of the firm, and therefore other variables such as cash flow, profit, or capacity utilization should have no additional predictive power for investment.

These two categories of models have been extensively tested on data for industrialized countries and to lesser extent for developing countries, generating mixed results. Given the lack of data, there are not yet developed empirical analysis of firms' investment in Eastern European countries since the start of the transition. In this sense, the fact that a large database for Czech firms has become available provides a unique opportunity to understand investment in a small transition country[4]. The mass privatization program which was the central focus of Czech transition policy making has meant that a larg number of Czech firms are traded on the stock market. This would seem to raise the possibility of estimating Q models for Czech firms. In fact, there are important reasons for not choosing Q models to study Czech investments. First, the best source of financial structure and investment data is that collected by the Czech Statistical Office. However, this data sets mask firm identity thus making the link to stock market data impossible. Second, the Czech stock market does not cover *de novo* firms nor firms that were privatized by some method other than coupon privatization. Third, stock market quotes in the Czech Republic may be unreliable since most trading volume takes place in exchanges of large blocks of the exchange at prices that are not reported and which insiders claim differ substantially from exchange transactions.

For these reasons, we base our analysis on the sales accelerator model in which the desired level of investment is related to the current and future expected level of demand. As this level is unobserved, a common assumption is that the level of demand is proportional to sales, output or value added. Furthermore, investment may be related to the cash flow or to the profit. The use of cash flow or profit in the

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[4] Another empirical study using panel data on Czech firms and an estimated equation for investment based on the neo-classical model is that of Lizal (1996). He does not explore financial determinants of instment.

accelerator model may be justified either because realized profits measure expected profits or because the rate of investment may be constrained by the supply of funds[7]. The investment equation is thus of the following form:

$$\frac{I_t}{K_t} = a + \sum_{i=1}^{Q} b_{t-i} \frac{Y_{t-i}}{K_{t-i}} + \sum_{i=1}^{s} c_{t-i} \frac{CF_{t-i}}{K_{t-i}} + \varepsilon_t$$

where I_t represents investment in capital stock during time t; K_t denotes the capital stock at the beginning of the period; Y_t represents the income generated by the current activities of the enterprise and CF_t denotes the firm's internal cash flow. Under the hypothesis of perfect capital markets this term should not be significant if investment opportunities have been correctly controlled through income. However, under imperfect capital markets, firms liquidity and internally generated cash flow may determine the firms actual capital investment. Note that all variables have been divided by the capital stock. This brings all firms to a common scale and may help to avoid problems of heteroskedasticity.

In order to study the possibility that firms are financially constrained, we add to the basic equation financial variables designed to take into account the effect of the relative indebtedness on the investment behavior. This is motivated by the recognition that in the light of agency problems the firms may face a debt capacity which might become a binding constraint on the investment. In light of the nature of information available in financial reports of Czech firms, the estimation equation is:

$$\frac{I_t}{K_t} = a + \sum_{q=0}^{Q} b_{t-g} \frac{Y_{t-q}}{K_{t-g}} + \sum_{r=0}^{R} c_{t-r} \frac{CF_{t-r}}{K_{t-r}} + \sum_{i=0}^{I} d^1_{t-i} \frac{BL_{t-i}}{K_{t-i}}$$

$$+ \sum_{i=0}^{I} d^2_{t-i} \frac{TC_{t-i}}{K_{t-i}} + \sum_{i=0}^{I} d^3_{t-i} \frac{NBTC_{t-i}}{K_{t-i}} + \varepsilon_t$$

where BL is the stock of bank loans, TC is the stock of the trade credit, and NBTC is the stock of other debt such that the sum of BL, TC, and NBTC gives the total debt of the enterprise. All these debt variables are measured at the beginning of the period. By splitting the total debt into its main components, we use a more general specification of the equation as we do not impose the same value of the coefficient for all of these components. In this way we can assess the different effects of alternative financing choices.

We estimate this equation on the full sample and on subsamples according to ownership of firms size.

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[7] For a more extensive development of this argument see Fazzari, Hubbard and Petersen (1988) p. 163-165.

3.1. *A brief sketch of the Czech privatization and bad debt resolution*

The starting point for the economic transition of the Czech Republic was the so-called "Velvet Revolution" of 1989 which paved the way for democratic elections in 1990. In contrast with most of the transition countries where a variety of significant market-oriented economic reforms preceded the political shift, in 1989 Czechoslovak economy still conformed closely to the mold of Soviet style central planning. From this starting point, a program of fundamental changes was conceived with the clear aim of creating a market economy dominated by private enterprise. Despite many unforeseen developments including the political division into the Czech Republic and Slovakia in 1993, this path has been followed in a remarkably single-minded manner.[*] The overall impact of this program, measured in aggregate growth rates, is given by Table 1.

Table 1: Growth of real GDP in the Czech Republic* (per cent)

	1989	1990	1991	1992	1993	1994	1995	1996
Czech Republic*	1.4	-1.2	-14.2	-6.4	-0.9	2.6	4.8	5.1**

*For Czechoslovakia prior to 1993. Source: Anderson and Kegels (1997). **EBRD estimate.

The hallmark of the Czech approach to transition is the great emphasis placed on the privatization of state enterprises. Other elements of the program, such as development of banking and capital markets, have been developed in light of this priority. The privatization began early with "small scale privatization" which started in January 1991 and was completed by the end of 1993 and which resulted in the cash sale of some 20,000 retail stores, restaurants, and service facilities. Some 4400 larger firms including virtually all manufacturing firms were treated by "large scale privatization" which partially involved the sale of enterprises for coupons purchased by Czech citizens at approximately 1/30'th of the book value of the assets being sold. The first-wave of this progam was initiated in 1991 and was completed at the end of 1992. The second wave started in October 1992 by the submission of privatization projects and the final round bidding of these projects took place in December 1994. The result was that the Czech economy, which was virtually completely state-owned five years earlier, had created a stock market with a capitalization representing 30 percent of GDP a level exceeding that in many mature capitalist economies. It is worth noting first that the state retained large minority stakes in many enterprises considered to be of stategic interest. In particular, this was the case of the largest banks. Second, rather than puchasing shares directly, most investors opted to place their coupons in mutual funds created by a small number of investment companies generally run by big banks or insurance companies. As a result when trading of shares on the secondary market began, the largest blocks were controlled by the state and the large investment companies.

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[*]For a detailed description see Anderson and Kegels (1997).

Generally speaking the enterprises that were privatized in the first wave were considered those relatively simpler to privatize. Others that were kept back for the second wave presented a variety of problems which might have made quick privatization difficult. Among the most important of these problems was a heavy debt burden which made these enterprises unattractive acquisition targets and which undermined the incentives to restructure and invest. The Czech approach to solving debt overhang concentrated on the recapitalization of the banks rather than the direct debt relief for enterprises. The main efforts to address the bad loans problem involved two specialized state institutions: the National Property Fund (NPF) charged with the privatization and the Consolidation Bank (KOB) charged with working out bad debts. Between 1991 and 1994 these two institutions undertook a series of measures involving replacing non-performing loans from assets of large state-owned commercial banks and replacing them with bonds issued by the NPF. The bad loans were transferred to the books of the KOB against corresponding deposits of the Czech National Bank. The KOB then had the responsibility of dealing with its borrowers on a case-by-case basis.

Thus, there has been no general debt moratorium in the Czech Republic. However, there has been an active public policy to cushion the shock of transition for indebted enterprises. This included some budgetary subsidies for some selected state enterprises prior to their privatization. Furthermore, enterprise loans in certain large state banks scheduled for privatization were transferred to KOB which worked out many of the troubled debts. This was funded by asset sales in the small scale privatization program and the cash proceeds from the initial phase of the large-scale program. In addition, the program has been partially funded through interest rate subsidies since the KOB pays below market rates for some of its credits.

3.2. Description of the enterprise panel data

The data come from the Czech National Office of Statistics and are based on balance sheet and income statements which by law all Czech firms are obliged to report. Incomplete or false declarations are subject to penalties. We restrict our data set to non-financial enterprises only. It includes the main items of balance sheet and income statement for the years 1993 and 1994. The investment data are less complete given that they are collected on a voluntary basis and tend to be reported only by relatively larger firms. Starting from these two sources of information, we have constructed a sample of 976 enterprises for which we have both accounting and investment data. After various checks for the consistency of data, 961 enterprises remain. A balanced sample has been constructed according to ownership category and includes: 216 private enterprises, 599 state-owned enterprises, 38 international firms (defined as being totally or partially owned by foreign investors) and 108 cooperatives. Several particularities of this data set should be mentioned. First, the identity of the firm was masked to us. As a consequence, we were able to constitute the sample only by matching year values for reported for certain variables in 1993 with previous year values reported in 1994. This meant that we were forced to exclude a number of cases where firms were closed, created, or restructured in 1994 or where data series were revised. Second, we were able to identify ownership status for 1993 only. During the course of 1994 a large number of firms underwent

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privatization. We are unable to distinguish these from those which remained state-owned at the end of 1994. Thus "private" in our sample includes *de novo* private firms or those firms which were privatized before the end of 1993 (including those in which the state retained a share) and "state-owned" includes many which were privatized by the end of 1994. Third, "international" firms were those in which there was foreign direct investment (as opposed to portfolio investments through the stock market).

Table 2 presents the means of the variables for the overall sample as well as by ownership category both in current Czech crowns and in ratio form. A number of interesting facts about the state of the Czech enterprises in 1993 and 1994 emerge from inspecting this table. First note that private enterprises were much smaller firms than state-owned enterprises. This reflects the fact that large numbers of new firms were small firms, especially those in the rapidly emerging service sector. The first state-owned enterprises to be privatized were relatively smaller, simpler firms which were auctioned off. The larger state-owned firms underwent voucher privatization at a later time. Furthermore, the international firms were on average very large firms, as one might expect. The cooperative sector is characterized by many very small firms.

Table 2: Czech Enterprises in 1993 and 1994-Data Summary

(in thousands of crowns)	Full Sample		Private Enterprises		State-owned Enterprises		Coopera-tives	Interna-tional Firms
	1993	1994	1993	1994	1993	1994	1994	1994
Income (Y)	45162	51247	18369	20482	53765	60416	8474	203149
Capital Stock (K)	650070	650396	138490	147142	906442	892980	80607	1306486
Debt (D)	257637	260932	76297	90935	360164	354781	30595	402514
Bank Loans (BL)	123853	120778	39048	42653	177544	167240	10644	145475
Trade Credit (TC)	103506	95979	25137	30302	145123	130279	8595	176971.
Non bank non trade debt (NBTD)	30278	44175	12112	17981	37498	57261	11357	80068
Total Assets (TA)	668160	665929	144388	153944	926624	906987	81604	1437046
Cash Flow (CF)	20814	14642	5953	3935	31915	18832	4423	38494
Investment (I)	49017	46148	11435	13230	60666	53831	4444	230692
$\Delta Y/K$	.	0	.	0.02	.	-0.01	0.01	0.05
D/K	0.43	0.45	0.65	0.70	0.37	0.38	0.33	0.47
BL/K	0.20	0.20	0.28	0.31	0.18	0.18	0.13	0.21
TC/K	0.16	0.16	0.25	0.26	0.14	0.14	0.10	0.18
NBTD/K	0.07	0.08	0.12	0.13	0.05	0.06	0.11	0.09
CF/K	0.05	0.03	0.08	0.05	0.04	0.02	0.05	0.04
I/K	0.09	0.07	0.15	0.09	0.07	0.06	0.06	0.12
Number of enterprises	961		216		599		108	38

See appendix for detailed data definitions.

The second thing to note is the relatively high level of investment (as a per cent of capital stock) by private firms in 1993 which decreased sharply in 1994. Investment by state-owned firms was a lower level (as a percentage of capital) than private in 1993 and declined to a lesser extent in 1994. Note the high level of investment by international firms in 1994. Third, note that private firms were highly in debt in 1993 and that they were even more so in at the beginning of 1994, probably reflecting debt

added in the investment boom of 1993. Interestingly, the higher level of debt of private firms applied to all three types of debt, namely bank debt, trade credit and other debt. One factor to recall in this regard is that in the run-up to mass privatization, a number of state-owned enterprises benefitted from debt write-downs as well as direct subsidies. This may have contributed to their relative low leverage as reflected in our sample. Finally, note that the levels of cash flow were relatively high for private firms in 1993 and that they declined in 1994. In both years, cash flows for state-owned firms were lower than for private firms.

4.   *Results*

In order to estimate accelerator type investment models at the firm level, we necessarily must have a time series of firm output or sales. In our case we had available firm sales information for 1993 and 1994. As a consequence we were able to estimate the accelerator relation for 1994 only. The results of the estimates obtained by ordinary least squares are summarized in Table 3. The first panel presents the results for the full sample of firms; whereas, the other panels give results by ownership category.

In the full sample results we note that the change of sales is insignificant suggesting that in the Czech Republic in 1994 sales growth was not generally a good indicator of investment opportunity. While this undermines the basic motivation for conventional investment models, it is not necessarily surprising in a period when many firms were undergoing restructuring so that sales might be flat or declining even though there is strong potential for future growth. In contrast, the financial variables are significant so that overall the regression accounts for some 34 percent of total sample variation which is relatively high explanatory power in cross-sectional, firm investment studies. As might be expected cash-flow enters with a positive sign and is highly significant. This is consistent with the view that investment by Czech firms is financially constrained and with the hypothesis that cash flow may be an indicator of returns on investments. Furthermore, the amount of bank loans and trade credit outstanding at the start of the period both enter with positive sign and are significant. This at first may seem surprising since if firms are highly indebted we might expect them to be close to their debt capacity and therefore less able to pursue attractive investment opportunities. In this case, we would expect these variables to enter negatively in the regression. An alternative view is that indebtedness may be an indicator of the firm's investment opportunities. In a world were few investment analysts follow firms and firms are obliged to reveal little about themselves, it may be that the firm's bankers possess superior information about the firm's prospects.[*] Thus, relatively high bank debt may certify a good firm and thus enable the firm to obtain further credit needed to pursue investment opportunities. Similar reasoning might be applied in interpreting the positive sign for trade credit, that is, high trade credit indicates relatively high confidence in the firm's growth prospects. However, we note that an alternative interpretation could be that the level of trade credit may be involuntary. Thus the firm's ability to impose greater payment delays on its suppliers may be key to undertaking needed investments. In effect, the positive coefficient of

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[*] A theoretical model illustrating this point and evidence from American bank loan announcements is presented in Hadlock and James (1997).

trade credit in our regressions may indicate the persistence of soft budget constraints in the Czech Republic. At this stage we do not view any single interpretation as necessarily best and will explore these issues further in our more detailed analyses.

Turning to the results for private enterprises only we note that the change of sales variable is insignificant but that cash flow, bank loans, and trade credit are all significant at the 10 per cent level. However, unlike the full sample results bank and trade credit both enter with a negative sign. These firms had much higher levels of indebtedness at the start of 1994 than did other categories of firms. Thus it seems likely that many of these firms were at debt capacity and that difficulties in obtaining finance have constrained their investments. It may be that for these firms bank loans and trade credit also serve to signal good investment prospects; however, apparently beyond certain levels of indebtedness, debt capacity constraints start to bind. We should note, however, that the adjusted R^2 is only 5 per cent. This indicates that there is considerable variation in the investment and finance experience for private firms in transition economies which is unexplained by our variables.

Table 3: Accelerator model including financial variables, year 1994

	Full Sample		Private		State-owned		Cooperatives		International	
R^2	0.3438		0.0531		0.5078		0.1663		0.0333	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
C	0.0165	1.126	0.1296	4.553**	0.0129	1.092	0.0311	1.543	0.0557	0.764
ΔY	0.0255	0.539	0.0086	0.208	0.0452	0.702	-0.030	-0.305	0.0015	0.009
CF	0.2733	5.781**	0.1405	1.886*	0.0209	3.882**	0.5094	1.871*	0.7259	2.468*
BL	0.0890	2.352*	-0.077	-1.720*	0.1149	2.151*	-0.070	-1.280	0.1112	0.938
TC	0.1343	2.691**	-0.080	-1.733*	0.1376	2.567**	0.1084	0.686	0.1004	0.545
NBTC	-0.000	-0.007	-0.046	-1.010	-0.022	-0.274	0.0333	0.542	-0.061	-0.551

** : significant at 1%
* : significant at 5%
* : significant at 10%

As explained above, in our sample "state-owned" refers to the firm's status in 1993. Many of the firms in this category were privatized in the course of 1994. The results in Table 3 show that this group of firms conform to the pattern we observed in the full sample. Cash flow, bank loans, and trade credit are all positive and highly significant. Overall, the regression explains more than 50 percent of the sample variation. Thus the investments of the state-owned sector were dependent on a firm's access to bank credit and/or trade credit. Given that firms in this category were considerably less levered than were private firms (Table 2), it suggests that most firms judged to have good investment opportunities were below their debt capacity.

Cooperatives constitute a rather heterogenous category composed of relatively small firms. In contrast, the international category is composed of a small number of very large firms with foreign ownership. This group accounted for the large amounts of foreign direct investment attracted by the Czech Republic during this period. For both of these categories only the cash flow variable is significant.

These results reveal important differences in investment behavior among various categories of Czech firms in 1994. In particular, for *de novo* private firms or those firms that had been privatized by 1993 the high levels of bank loans or trade

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credit were associated with low levels of investment whereas the opposite partial correlation held for firms that were state-owned in 1993. This suggests that financial access may have been better for state-owned enterprises than for private in 1994. However, the findings might be accounted for by other differences among these firms than that of ownership. In particular, from Table 2 we see that the private firms tend to be much smaller than the state-owned firms, so that we are perhaps mostly picking up a firm size effect. In order to verify our results we have split our sample by firm size, using personnel costs as an indicator of size.[10] For private firms, we have split the sample at the median to create groups of small and large firms. For state-owned firms we have split the sample at the 1/3 and 2/3 quantiles to yield groups of small, medium, and large firms. We note that the size of large private firms corresponds roughly to that of medium state-owned firms. The results of the accelerator estimates are presented in Tables 4 and 5.

The results partially confirm the presence of a firm-size effect. In Table 4 we see that for small private firms the cash flow enters with a positive sign whereas bank loans and trade credit enter with negative signs, the former being highly significant. For large private enterprises the sign pattern is similar; however, these three variables are no longer significant. Thus the pattern of financially constrained firms hitting up against their debt capacity seems to best characterize the small private firms.

Table 4: Accelerator by size, private enterprises, year 1994

R²	Private: full sample		Private: small enterprises		Private: large enterprises	
	0.0531		0.1098		0.0297	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
C	0.1296	4.553**	0.8459	3.408**	0.1596	3.629**
ΔY	0.0086	0.208	0.0385	0.788	-0.030	-0.277
CF	0.1405	1.886*	0.1457	2.228*	0.2093	1.315
BL	-0.077	-1.720*	-0.0765	-3.014**	-0.0729	-0.903
TC	-0.080	-1.733*	-0.0392	-0.757	-0.1026	-1.275
NBTC	-0.046	-1.010	0.0427	0.839	-0.1187	-1.848*

Table 5: Accelerator by size, state-owned enterprises, year 1994

R²	full sample		small		medium		large	
	0.5078		0.0767		0.3039		0.7127	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
C	0.0129	1.092	0.0546	4.965**	-0.0014	-0.029	0.0179	0.981
ΔY	0.0452	0.702	-0.0026	-0.125	-0.0024	-0.023	-0.0855	-0.455
CF	0.0209	3.882**	0.1206	3.969**	0.1308	1.423	0.5602	2.952**
BL	0.1149	2.151*	-0.0423	-1.536	0.2393	1.359	0.0095	0.105
TC	0.1376	2.567**	-0.0478	-2.274*	0.0801	0.733	0.1993	2.463*
NBTC	-0.022	-0.274	0.0476	1.628	0.0596	0.608	0.0347	0.320

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[10] We use personnel costs because they are not subject to difficulties of asset valuation which add measurement difficulties for capital stock and are a better indicator of value added than are sales revenues.

For state-owned enterprises we see that the large enterprises conform best to the pattern we have identified with both bank loans and trade credit entering with positive signs. The latter in particular is highly significant. To find this for the largest state-owned enterprises may seem to support the hypothesis that some firms are able to finance their investment program largely by their ability to extract credit from their suppliers. However, this idea of market power for large state-owned enterprises over their suppliers seems to be undermined by the fact that large state-owned firms tend to have *lower* levels of trade credit than do medium or small state-owned enterpises (Table 6). For this large state-owned enterprises, the bank loan variable is insignificant; however, the high adjusted R^2 of the regression suggests that this may be due to problems of multicollinearity. Interestingly, the results for small state-owned enterprises correspond more closely to the pattern found for private firms, i.e., negative signs on both the bank loan and trade credit variables. The medium sized firms represent an intermediate case in that bank loans and trade credit both have positive signs but are insignificant.

Table 6: Average ratios by ownership and size, 1994

	Private-Small	Private-Large	SOE-Small	SOE-Medium	SOE-Large
I/K	0.07	0.11	0.04	0.06	0.06
DY/K	0.03	0.02	-0.04	-0.01	0.01
CF/K	0.06	0.05	0.01	0.02	0.04
D/K	0.71	0.69	0.41	0.38	0.35
BL/K	0.29	0.33	0.18	0.18	0.18
TC/K	0.28	0.23	0.17	0.15	0.11
NBTC/K	0.14	0.12	0.07	0.06	0.06

For definitions see Table 1 and the Appendix.

The fact remains that for firms of comparable size (large private firms and medium state-owned firms) bank loans and trade credit have the opposite effect on investment behavior. This suggests that in 1994 these categories of firms may have had different access to finance. These results for one year do not take into account the different historical circumstances of these firms. In particular, the private firms either were newly founded after 1990 or had been privatized in the first phase of privatization. It may have been that the financial constraints faced by these firms in 1994 was symptomatic of greater financial discipline imposed on small, private firms. Or it may have been the result of having grown in previous years through debt issuance so that financial constraints were becoming gradually more binding. The state-owned category includes many firms that had been difficult to privatize initially, in part because of debt burdens. Some of these may have received support during the first years of transition in the form of continuing subsidies or debt relief. This may have helped to improve their financial condition and attractiveness to lenders.

Our ability to explore these issues is constrained by the fact that the Czech investment data is available to us for only 1993 and 1994. Until now we have focussed on 1994 since we are able to estimate accelerator models for that year only. However, in none of the estimates reported in Tables 2-4 was the change of revenues variable significant. Since this appears to be a very poor proxy for investment

prospects in transition, we can drop this variable from our regression and simply focus on the various financial variables and obtain estimates for both 1993 and 1994. This will give us some information on the evolution of financial constraints in the course of transition.

Table 7: Regressions with financial variables only, year 1993

	Full Sample		Private		State-owned		Cooperatives		International	
R^2	0.1262		0.2848		0.0648		0.1610		0.4002	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	Coef.	t-stat.	coef.	t-stat.
C	-0.031	-0.407	-0.292	-1.057	0.0478	4.296**	0.0707	3.687**	0.2123	1.981*
CF	0.3644	1.4094	0.6210	2.269*	0.2508	4.791**	0.3258	2.384*	-4.163	-1.473
BL	-0.062	-0.854	0.0905	0.759	0.0392	1.221	-0.068	-1.027	-0.057	-0.453
TC	0.6611	1.258	1.2908	1.276	-0.058	-1.966*	-0.184	-2.499*	0.5924	1.111
NBTC	0.1551	2.394*	0.3897	1.699*	0.1849	1.385	-0.068	-1.314	0.4204	1.266

Table 8: Regressions with financial variables only, year 1994

	Full Sample		Private		State-owned		Cooperatives		International	
R^2	0.3435		0.0574		0.5065		0.1738		0.0626	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	Coef.	t-stat.
C	0.0184	1.219	0.1301	4.747**	0.0157	1.361	0.0310	1.556	0.0558	0.789
CF	0.2686	5.372**	0.1393	1.905*	0.2007	3.564**	0.5055	1.887*	0.7256	2.519*
BL	0.0877	2.371*	-0.077	-1.730*	0.2007	2.239*	-0.069	-1.271	0.7256	2.519*
TC	0.1297	2.611**	-0.081	-1.786*	0.1139	2.239*	0.1061	0.681	0.1111	0.974
NBTC	-0.008	-0.148	-0.046	-1.120	0.1292	2.452*	0.0336	0.559	0.1008	0.560
					-0.052	-0.518			-0.062	-0.591

The results of the regressions are given in Table 7 for 1993 and Table 8 for 1994. For private firms we see that in 1993 both bank loans and trade credit had positive effects on investment. Only in 1994 did these variables have a negative effect on investment. This pattern suggests that these firms faced more severe financial constraints as the transition proceeded. This may have contributed to the relative decline of investment activity for this category of firms from 15 per cent of capital stock in 1993 to 9 per cent in 1994. At least part of the reason for these tighter credit conditions in 1994 can be attributed to the fact that these firm were more highly levered at the outset of 1994 than one year previous. An additional reason may be that the investment boom of 1993 may have meant that the highest NPV projects were undertaken worsening the expected return on investment of the pool of projects requiring finance. As a consequence, the role of debt as a proxy for investment prospects was perhaps diminished over time.

During the same time, state-owned enterprises were facing more relaxed credit conditions, as indicated by the fact that the coefficients of bank loans and trade credit were greater in the 1994 regressions than in the 1993 regressions. In particular, the increase in the trade credit coefficient is significant at the 1 per cent level. Several factors may have been involved in this evolution. As already mentioned some of these enterprises had benefitted from improved financial condition through measure taken prior to their privatization. Furthermore, the process of privatization itself may have been useful for some of the firms in articulating a business strategy thus improving their attractiveness to potential lenders. A third possibility is that privatization was viewed as holding out the prospect of better management in the

future. Whatever the reasons, this category of firms appears to have become less financially constrained during the course of 1994.

Overall the results seem to support the idea that in the Czech Republic financial budget constraints were hardened *prior* to privatization and that privatization was associated with a *lessening* of agency problems impeding investment. This was reflected in the improved financial access obtained by late privatizers during 1994. The worsening of financial access in 1994 for private firms including those privatized early seems to be accounted for by the relatively high leverage of those firms.

5.   *Conclusions*

The overall finding of this study is that finance is an important determinant of investment for firms in a transition economy. In these economies enterprises seeking finance face obstacles because of agency problems or high levels of debt. Our results show that overcoming these obstacles is a key determinant of whether the firm will invest and grow. More surprisingly, we also find that past access to finance is a good proxy for the firm's future investment prospects. This supports the view that the financial sector is important for channelling information about investment prospects. Thus generally, our results support the view that financial development is an important part of transition policy.

Taken at their face value our results also suggest that ownership is an important determinant of access to finance. However, in our view this needs to be interpreted with some care. First, our data do not allow us to place firms in clean ownership categories. Furthermore, when we control for firm size, ownership effects are weakened. Still, we find that private Czech firms were more financially constrained in 1994 than were state-owned enterprises. This may have been because they faced greater credit rationing due to asymmetric information; however, we think that simpler explanation was that they were simply more highly indebted at the outset of 1994, suggesting that earlier in transition their financial access was *better* than for state enterprises.

A related point is that our results suggest that privatization can have a significant impact in channeling savings into investment. The *de novo* firms and those privatized early became more constrained in 1994, the time of the second wave of mass privatization in the Czech Republic. In contrast, firms which started out 1994 as state-owned became less financially constrained in the 1994. Privatization appears to have improved the relative attractiveness for lenders of borrowers in this second category of firms. This may have been the result of subsidies or debt write-downs prior to privatization. Or it may have been the result of a clearer definition of the firms' plans. Or it may have been in anticipation of better management under private ownership. We view all three explanations plausible in the Czech context, and our data do not allow us to discriminate among them.

While we have seen ample evidence of financial constraints which suggest that agency problems were a major preoccupation in the Czech Republic, we also can see signs that financial sector was operating in a way that was favorable for growth.

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Private firms had high levels of bank debt in 1993. By implication they must have been able to get early access to credit. In contrast, state-owned enterprises were less levered in 1993 and gained improved access during the process of privatization. This suggests that finance was reoriented relatively quickly toward private sectors investments and that this shift occurred even though institutionally the financial sector was still rather underdeveloped. This is consistent with evidence from Poland of a surprisingly fast shift of lending patterns in favor of private borrowers (Anderson and Kegels, 1997). Second, large state enterprises were less indebted in 1993 than were private enterprises. This may be due in part to the difficulties they found in gaining access to credit early in transition. That is, that budget constraints for state-owned enterprises seem to have been hardened relatively early in the Czech transition process. Financial access for these firms improved as their earning prospects improved, a pattern that one would expect within a well-functioning financial sector. Thus our evidence thends to support the "reduced agency cost hypothesis" mentioned in section 1.

Our focus here has been on investment behavior at the firm level; however, our results suggest some factors contributing to the turnaround of the Czech econonomy in 1993-94. We have found that in 1993 state enterprises had relatively low levels of debt and undertook relatively low levels of investment. In contrast, the *de novo* private firms and the state-owned firms privatized early invested heavily in 1993. This group of enterprises appears to have been the initial engine of growth leading the turnaround of the Czech economy. However, as these firms invested and became more indebted, they approached their debt capacity as indicated by the evidence we have found that they faced increasing financial constraints in 1994. Thus for growth to take off, it was crucial that the large segment of Czech industry still organized as state enterprises in 1993 begin to invest more heavily. We have presented evidence that in 1994 financial constraints for these enterprises were loosened. Note that this occurred in advance of the completion of privatization, suggesting that important steps in restructuring of enterprises can occur while these firms are still state-owned, if there is a clear *anticipation* of privatization. This is consistent with the evidence of restructuring by Polish state owned enterprises presented by Pinto, Belka and Krajewski (1994). The relatively low leverage of many large firms at the time of their privatization in 1994 suggested that they had the capacity to borrow and grow for some time to come. This may well have been an important factor contributing to the aggregate growth rates of 4.8 per cent in 1995 and 5.1 in 1996.

Finally, our study sheds some light on the effectiveness of certain policies for transition economies. First, the experience of the Czech Republic and elsewhere shows that the rapid liberalization of 1989-90 presented a significant shock which brought on economic recession. At the same time, liberalization created enormous growth opportunities for private enterprises in services and in other lines of business not covered by the state enterprise sector. However, given their recent birth and small size it was far from clear that these firms would have the access to finance needed for them to expand rapidly. We have found that in the Czech Republic they had indeed acquired this access prior to 1993. This was not the result of policies directed at improving finance for small and medium enterprises. Instead, it appears to have been the by-product of placing state owned enterprises under financial discipline. That is,

credit flowed to private firms because the state enterprise sector was brought under control.

A second, related insight concerns policies toward financial restructuring aimed at eliminating debt overhang. There was no general debt holiday for enterprises in the Czech Republic. Instead, financial restructuring was aimed at getting bad debts off the balance sheets of commercial banks by placing them in the Consolidation Bank which handled the debts of various enterprises on a case by case basis. At the same time subsidies for state enterprises were severely reduced. The combined effect of these measures was that by 1993 the state enterprises were relatively little indebted. This prepared the way for improved financial access that would allow them to invest in the future. Thus debt overhang can be overcome without reliance on programs of direct debt relief for enterprises.

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Appendix: Data description

Y = Operating income = Revenue from sold goods + other operational revenue
DY = Delta operating income = Operating income in t - operating income in t-1
I = gross Investment
K = Stock of capital at the beginning of the period = Total assets + depreciation - gross investment
CF = Cash Flow = Profit/Loss current year + depreciation
D = Total Debt at the beginning of the period = Long payable + short payable + bank loans
BL = Bank loans at the beginning of the period = Total bank loans
TC= Trade Credit at the beginning of the period = Total trade credit
NBTC = Non Bank Debt and non Trade Credit at the beginning of the period = D - BL -TC