

Ownership Changes and Investment in Transition Countries

Finance Working Paper N°. 169/2007

May 2007

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ECGI Working Paper Series in Finance

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This research was partly supported by a Marie Curie Intra-European Fellowships within the 6th European Community Framework Programme and by the Austrian National Bank. We thank the seminar participants for helpful comments at the corporate governance and investment workshop in Jönköping, at the NOEG annual conference and at the seminar of the Department of Economics at the University of Vienna.

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Abstract

We estimate accelerator-cash flow models for 25,000 firms in 15 transition economies over the period 1993-2003, and find that (1) investment-cash flow sensitivities decline over transition years, which we attribute to a decreasing of asymmetric information and managerial discretion as capital markets and corporate governance standards develop. (2) After an ownership change, the investment-cash flow sensitivity declines, indicating that new owners reduce either cash constraints or managerial discretion or both. (3) For state owned firms, in early transition the investment-cash-flow sensitivity is negative, but in late transition the coefficient becomes positive. We interpret the first fact as being consistent with soft budget constraints, and the second with managerial discretion. (4) Privatised firms invest efficiently in the long run. (5) Foreign firms are less financially constrained than other firms.

Keywords: Investment, cash flow, ownership change, corporate governance, transition

JEL Classifications: G3, O16, P3

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I. Introduction

In transition economies, the efficient re-allocation of capital is crucial for the success of reforms. However, empirical studies on investment behaviour in the early transition reveal puzzling results. Some authors claim that “larger firms had virtually unlimited access to capital”.¹ Other authors show that “firms which made losses were not liquidity constrained and were still able to draw upon external funds”.² In a similar vein, a study on Russia reveals a negative relationship between internally generated cash flows and investment in members of financial-industrial groups.³

The observed investment patterns in the early transition, such as overinvestment by state-owned loss-makers, underinvestment by state-owned profit-makers, asset-stripping, and internal re-allocation of funds in firms affiliated to business groups, challenge traditional investment theories. In developed countries, the rationale for a low investment-cash flow sensitivity is that firms have proper access to external sources of finance due to their high reputational capital, low asymmetric information with external providers of capital, and low managerial discretion. In *early* post-communist transition, however, the rationale for the link between internally generated cash flows and investment can be found out in the peculiar institutional environment, namely: (1) the underdevelopment of the financial sector and its failure to provide an efficient allocation of funds leading to severe asymmetric information problems (soft budget constraint as a *system specific* problem), (2) the motivation of the state to bail out the state-owned banks providing soft loans (soft budget constraint due to *paternalistic motives*).

Soft budget constraint (SBC) was first observed by Janos Kornai in the Hungarian economy of the 1970s, a socialist economy experimenting with the introduction of market reforms. He explained SBC as one of the *system-specific* attributes of any socialist economy. “The budget constraint on a state-owned enterprise under the socialist system is soft, whereas the budget constraint on a private firm under the capitalist system is hard” (Kornai, 2000). At the beginning of the 1990s, the dominant state sector and financial centralisation made the high degree of the SBC inevitable.

Studies explaining SBC have focused on the political considerations, such as the desire of a “paternalistic” government to avoid socially costly layoffs or unemployment (see e.g. Kornai, 1980). Paternalism can be also seen to motivate the owners to bail out enterprises affiliated to large corporate organisations consisting of many units (e.g. Japanese *keiretzu*, Korean *jaebol*) in both

¹ See e.g. Lisal and Svejnar (2002) for the Czech Republic. This study explored data provided by the Czech Statistical Office over the period 1992-1998.

² Budina, Garretsen and de Long (2000) for Bulgarian firms over the period 1993-95. This study used the Amadeus dataset.

³ Perroti and Gelfer (2001).

developed and developing countries (see e.g. for India Majumdar, 1998). Thus, SBC has also *firm-specific* manifestations that can be found in any economic environment.

There are studies documenting hardening the budget constraint over transition years (Kornai, 2001). However, most papers on corporate investment behaviour in transition countries focused on the early transition period.⁴ A common approach for examining the impact of ownership on investment is to apply a rather narrow typology of owner identities classifying firms into three groups: state-owned, private, and foreign-owned.⁵ Few studies focus on broader corporate governance determinants of investment, and no study addresses the effects of ownership changes on investment in transition countries.⁶

In this paper, we empirically investigate four major questions. Which are the changes of investment patterns over transition years (1993-2003)? Is there evidence of a hardening of the budget constraint of state-owned firms over this period? Which are the effects of privatisation on the investment-cash flow sensitivity over transition years? How do different ownership categories (foreigners, financial institutions, and privatisation funds) determine investment behaviour?

The paper studies institutional determinants of investment performance of both listed and non-listed firms in 15 transition economies in Central and Eastern Europe (CEE) over the period 1993-2003. In particular, we estimate investment-cash flow models using the accelerator model of investment and augmenting it with cash flow terms. Investment-cash flow sensitivity proxies for (1) company financial constraints, since asymmetric information between the firm and external capital markets hampers the optimal investment or (2) financial slack, since corporate governance fails in some firms and growth-seeking managers use internal funds to invest beyond the optimal level.

Our study contributes to the literature of corporate governance and investment in transition economies: (i) presenting firm-level evidence for the major patterns of ownership transformation in

⁴ E.g. see the cited above Lizal and Svejner (2002) and Budina, Garretsen and de Long (2000); Konings, Rizov and Vandenbussche (2002) for firms in Poland, the Czech Republic, Bulgaria and Romania during 1994-99. Some studies examine late transition, e.g. see Mueller and Peev (2007) for 151 public firms in ten transition economies during 1999-2003.

⁵ Among recent contributions see e.g. for Hungary, Colombo and Stanca (2006) for 4333 firms over the period 1989-1999 and Perotti and Vesnaver (2004) for 56 public companies in the period from 1992 to 1998. Among the early studies, see e.g. Grosfeld and Nivet (1997) for 173 large firms in Poland during 1988-1994. The authors distinguished three types of enterprises: state-owned, “commercialised”, and privatised.

⁶ Perotti and Gelfer (2001) examine the controlling role of banks in financial-industrial groups in Russia. They study 71 public companies in 1995 and find a negative correlation between investment and cash flow in bank-led groups. The authors explain this result with extensive reallocation of funds and use of profitable firms as cash cows. Durnev and Kim (2003) study firm-level governance and transparency data on 859 firms in 27 countries (incl. five transition economies: China, Czech Republic, Hungary, Poland, and Russia). They find that in countries that are less investor friendly, firms adapt to the poor legal environment by establishing efficient governance practices themselves.

fifteen CEE countries over a ten years' period; (ii) suggesting hypotheses for the asymmetric information and managerial discretion consequences of ownership changes; (iii) examining the effects of ownership changes on company investment. Section 2 discusses the various hypotheses and the econometric modelling. Section 3 presents the data and sample characteristics. Section 4 analyses the econometric results. Section 5 scrutinizes the soft budget/asset stripping phenomenon by discussing state-controlled firms in more detail. Section 6 draws policy implications.

II. Hypotheses and Econometric Modeling

In the neoclassical model of investment, the neoclassical cost of capital and firm investment opportunities are the only determinants of investment. The usual criticism of the neoclassical approach is based on the overwhelming empirical evidence that internal cash flows co-determine investment. Many studies find a positive link between internally generated cash flows and company capital investment.⁷ Two theories have been put forward to explain investment dependence on corporate liquidity, e.g. the asymmetric information theory (AIT) Myers and Majluf, 1984; Fazzari et al., 1988 for the first empirical test) and the managerial discretion theory (MDT, Grabowski and Mueller, 1972).⁸ Both treat current cash flow as a proxy for the internal availability of funds. The asymmetric information theory assumes firms cannot reach their optimal investment level due to financial constraints (i.e. firms under-invest), while the managerial discretion theory predicts that firms reinvest too much of their internal funds and pay out too little in dividends (i.e. firms over-invest).⁹ We also assume that the better availability of internal cash flow is a proxy for lower financial constraints or lower perceived cost of capital for managers in transition economies under the assumption of a *hard budget* constraint.¹⁰

⁷ For a survey of empirical studies, see Chirinko, 1993; Mueller, 2003, p.177-79, and Gugler (2005). The literature on investment-cash flow regressions was criticized for a number of reasons, most notably by Kaplan and Zingales (1997, 2000) on the grounds that cash flow merely proxies for future investment opportunities, and thus a positive investment-cash flow coefficient does not say anything about cash constraints. This paper addresses this ambiguity in the interpretation of investment-cash flow coefficients by utilizing information on the ownership structure of the firm. For example, one cannot argue that a positive coefficient for a state-controlled firm proxies for their better investment opportunities. Thus finding cash flow induced investment of a state-controlled firm is indicative of managerial discretion.

⁸ For recent studies applying both AIT and MDT, see Gugler, Mueller and Yurtoglu, 2004a.

⁹ Various proxies of financial constraints are used, like dividends payments (Fazzari *et al.* 1988); firm affiliation to business groups (Hoshi *et al.*, 1991); age, ownership concentration, and membership in an interrelated group (Chirinko and Schaller, 1995).

¹⁰ According to (Kornai *et al.*, 2003), the difference between a hard and soft budget constraint is as follows. A firm has a budget constraint: it must cover its expenditures out of its initial endowment and revenue. If it fails to do so, deficit arises. The firm faces *hard budget* constraint as long as it does not receive support from other organizations to cover its deficit.

However, the post-communist transitional process has two specific dimensions challenging the assumption of a hard budget constraint: business environment of a *soft budget* constraint in the early transition years and a process of *hardening* the budget constraint over transition. First, in the early transition, a soft budget constraint of state-owned firms was a common practice. Loss-makers had access to soft loans due to the support from the state-banks, “crony” political connections, severe asymmetric information, and a high managerial discretion. Potentially profitable state-owned firms were ruined by both the state tax authorities and their managers. Kornai *et al.* (2003) postulates that the main question is not why we observe soft budget constraints in socialist economies, but rather why the soft budget constraint is not more prevalent in capitalist economies. In the latter, government can credibly commit not to refinance enterprises due to institutional conditions like well functioning markets for liquidated assets, competition across enterprises, decentralization of credit, and the like.

Second, transition process can be seen as hardening the budget constraint (Kornai, 2001). This transformation has several features. (1) The first step was the introduction of the legislation for imposing financial discipline, e.g. bankruptcy laws and commercial laws to ensure that private contracts can be enforced, the development of the court system to ensure the efficient law enforcement, and the like. (2) Privatisation and the dominance of the private sector is a necessary condition for hardening the budget constraint, but not a sufficient one (Kornai, 2001). The crucial point is about the motivation of the new private owners to have fewer links with the state and fewer expectations of state assistance. (3) The tight macroeconomic policy (e.g. tight monetary and fiscal policy, introduction of currency board, and the like) were a necessary, but not sufficient condition for hardening the budget constraint. Restructuring of state-owned firms in order to ensure profitability was the other key factor. (4) Finally, the move from a centralised to a decentralised credit system is seen as a way how the budget constraint can be hardened (Dewatripont and Maskin, 1995). For example, Hungary was a successful story with fast decentralisation and privatisation of the banking sector to foreign investors in 1994-1995. In contrast, the financial crisis in Bulgaria in 1996-1997 was due to the delay of bank privatisation and establishment of “crony” links among the state-owned banks, government, and firms. Among all these factors, the development of the

The *soft budget* constraint occurs if one or more supporting organizations (e.g. government, banks) are ready to cover all or part of the deficit.

financial sector plays a crucial role for supply of funds to investment activities of non-financial firms.

Table 1 presents three indicators of the financial development of CEE countries over the period 1993-2003. (1) Private credit by deposit money banks to GDP measures the activity of banks in one of their main function: channelling savings to private investors (Beck *et al*, 1999). Most countries gradually increased domestic credit to the private sector, while Bulgaria, the Czech Republic and Slovakia had higher levels of credit activities measured as share of GDP in the early transition years. Compared to the corresponding figures for Germany and the United States, however, all the CEE countries experience low levels of banking sector financing of the private sector. (2) Stock market capitalization to GDP ratio is an indicator of the size of the stock market. As the table shows, there is a great diversity among transition countries. Slovenia and Poland had relatively steady development of their capital markets. However, the size of all stock exchanges in CEE region remained small compared to developed countries. (3) Finally, Table 1 presents the stock market turnover ratio as efficiency indicator of stock markets. It is defined as the ratio of the value of total shares traded and market capitalization. It measures the liquidity of a stock market relative to its size. Hungary and Poland experienced decreasing pattern of activity of capital markets over the period studied. As a whole, CEE capital markets have been slowly developing, but they remained less liquid than their counterparts in developed countries. In sum, over the studied period 1993-2003, there has been remarkable change of both banking sector and stock exchanges in CEE region, but the level of financial development is still considerably below the standards observed in developed countries.

Table 2 summarises our hypotheses about the major institutional determinants of investment, namely: (1) institutional and ownership change, (2) the preserving of state ownership, (3) privatisation, and (4) ownership categories. We may expect that asymmetric information problems decrease over time as financial sector develops. Managerial discretion may also decrease over time if the country institutional environment and firm corporate governance strengthens, although we put question mark for some firms, e.g. state-controlled firms. Thus, we test the hypothesis that the investment-cash flow sensitivity decreased over time for our samples of CEE firms.

Hypothesis 1. The investment-cash flow sensitivity decreases over time in transition countries.

Ownership changeability is a key element of enterprise reform in post-communist transition. However, studies of ownership and performance in developed economies usually assume that ownership structures are relatively constant for the given period of time during which the performance data are collected (several years routinely).¹¹ Moreover, the timing of the ownership information is sometimes counterintuitive. E.g. the ownership structure may be reported at the end of the studied period (see e.g. Gedajlovic and Shapiro (1998) who obtained ownership data for 1991 and key performance measures for 1986-91), or at the beginning of a lengthy period (e.g. Thomsen and Pedersen (2000) obtaining ownership data for 1990 and performance indicators for 1990-95). The practical considerations for this approach are the availability of ownership information.¹² There are few empirical studies on post-communist transition addressing ownership changeability issues.¹³

Potential motives behind ownership changes could be the inefficient investment behaviour by old owners. The old owners could be either cash constrained and not be able to finance all profitable investment opportunities, or they may be bad entrepreneurs either over-investing or engaging in asset stripping. New owners like a multinational firm could finance all profitable projects by own internal funds or good access to external capital markets, or they shape up corporate governance and invest optimally. In any case, the estimated cash flow sensitivity should decrease after ownership change. Thus, we obtain:

Hypothesis 2. The investment-cash flow sensitivity decreases after a change in ownership.

The typical change of property-rights of socialistic state-owned enterprises in the early transition was the so-called “corporatisation” or their transformation into companies with a hundred percent state participation (Peev, 1995). This was a transitory stage after the withdrawal of the state from firm affairs and before the firm’s privatisation. Managers of state-owned commercialised firms had a high degree of managerial discretion. On the other hand, state-owned firms had soft budget constraints (easy access to external funds provided by government, state-owned banks and other institutions, (Kornai, 2001). The soft budget constraint implies distorted investment behaviour in three major dimensions. First, overinvestment by loss-makers having access to soft loans by state-owned banks, the latter bailed out by the government. Second, underinvestment by potential profit-makers due to financial re-allocation by the government to support loss-makers. Third, asset-

¹¹ See Mueller *et al.* (2003).

¹² For evidence that ownership concentration is stable over a few years, see also Köke (2001) for the case of Germany in 1993-97; Gedajlovic and Shapiro (1998) for Canada in 1986-91, or Morck *et al.* (1988) for the US.

¹³ See e.g. Jones and Mygind (1999) for ownership change in Estonia; Grosfeld and Hashi (2003) for the Czech Republic and Poland; Mueller *et al.* (2003) for Bulgaria.

stripping (decapitalisation) of assets. In all the cases, internally generated cash flows are either not relevant for investment decisions or we may expect a negative relation between investment and cash flow. We expect these problems to be particularly severe in early transition. The progress of institutional and financial reform may however lead to a hardening of budget constraints even for state-owned firms. The conventional managerial discretion may then lead to a positive investment-cash flow sensitivity. We test:

Hypothesis 3. State-owned firms display zero or negative investment-cash flow coefficients in early transition years, while in late transition this relation becomes positive.

The common view is that privatisation should harden the budget constraint. Boycko *et al* (1996) present a model in which privatisation effectively drives a wedge between managers and politicians. In this model, privatisation leads to “depolitization” and makes too costly for politicians to subsidise the firms. Thus we test:

Hypothesis 4. After privatisation, there is no relation between investment and internally generated funds.

The long-run company survival depends on access to investable funds and innovation. In transition countries, a common view is that firms controlled by foreign investors have easier access to external finance and Western markets. We thus expect less severe asymmetric information problems in firms under foreign control compared to domestic firms. Financial owners may also mitigate the asymmetric information problems between managers and external capital markets. However, both foreign and financial owners themselves may suffer from agency problems. We remain open the question about their managerial discretion problems and make no predictions about its change (Table 2). This research follows the conventional approach applied in most previous studies and tests the “strong” form of the view on the role of foreign investors and financial institutions on investment decisions.

Hypothesis 5. Firms controlled by foreign investors have a weaker relation between investment and internally generated funds than firms controlled by domestic investors.

Hypothesis 6. Firms controlled by financial institutions have a weaker relation between investment and internally generated funds than firms controlled by non-financial owners.

Finally, firms controlled by privatization funds have ownership structures similar to corporate pyramids. Pyramid ownership structures consist of a chain of owners with an ultimate owner who has control over a firm through a controlling stake on each level. The literature reveals

that the typical agency issues include expropriation of small shareholders through income shifting (Morck, Stangeland, and Yeung, 2000), tunnelling (Johnson et al., 2000), and large shareholder entrenchment. Thus, in firms controlled by privatisation funds we expect high managerial discretion, since ultimate control is diffuse and many privatization funds have still preserved their close ties to the state increasing potential agency problems. On the other hand, studies show that corporate pyramids are involved in redistribution activities among affiliated firms substituting the inefficient external capital markets. We remain open the question about the asymmetric information problems in firms controlled by privatisation funds (Table 2). Assuming the conventional view that these firms suffer from severe agency problems, we test:

Hypothesis 7. Firms controlled by privatization funds display a stronger relation between investment and internally generated funds than other firms.

Investment models usually differ in how they: (i) identify investment opportunities of the firm and measure the marginal returns on investments; (ii) measure the cost of capital. A recent overview of empirical studies applying different investment theories ranks the performance of four investment models (accelerator, neoclassical, q-model, and cash flow) and concludes that: "...On the marginal return side, quantity variables like output as implied by the accelerator theory seem to outperform both price variables and expectations variables like Tobin's q. On the cost of capital side, cash flow outperforms the various measures of the neoclassical cost of capital. The best equation for explaining investment at the firm level probably combines accelerator and cash flow variables." (Mueller, 2003, p. 179-180).

We test the hypotheses presented above by estimating a simple investment accelerator-cash flow model, linking cash flow (a proxy for liquidity), sales growth (a proxy for investment opportunities) and ownership structures to investment. All of the independent variables are lagged one period to avoid their being partly endogenous. Financial variables are scaled by the firm's capital stock to eliminate size effects. The basic equation may be written as:

$$I_t/K_{t-1} = a + b*(CF_{t-1} / K_{t-1}) + c*1/time*(CF_{t-1} / K_{t-1}) + d*(S_{t-1} / K_{t-1}) + e*(S_{t-2}/K_{t-1}) + \mu_{it} \quad (1)$$

where I is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). K is the book value of capital stock measured by tangible fixed assets. CF is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), S is average total

annual sales (item 25). By estimating (1) for different sub-samples of firms we can test the hypotheses discussed above. We test the *change* in the impact of cash flow on investment over time by including an interaction term of cash flow and one over time.¹⁴ A positive coefficient on this interaction term implies that as time progresses the interaction term puts consecutively less weight on cash flow. Thus a positive coefficient indicates declining connection of cash flow to investment over time. Since we define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003, the cash flow influence in the year 1995 is estimated as the sum of the coefficients on CF/K and $1/time*CF/K$ with $time = 1$, that is $b + c$. In the year 2003, we estimate a cash flow influence of $b + 1/9*c$. In the long run, as *time* goes to infinity and the interaction term disappears, the cash flow influence is estimated to be b .

III. Data and Sample Characteristics

The main databases that we will use are the 1997-2005 versions of *Amadeus*. This is a Pan-European financial database, containing balance sheet and ownership structure information on over 250,000 major public and private companies in all sectors in more than 30 European countries. To be included in *Amadeus* companies must comply with at least one of the following criteria: (i) their turnover must be greater than 10 million EURO; (ii) the number of their employees must be greater than 150; and (iii) their total assets must be greater than 10 million EURO.

Table 3 presents summary statistics on the main variables used in the subsequent regression analysis. We have information on more than 25,000 firms from 15 CEE countries giving rise to over 200,000 observations. The balance sheet data start in 1993 and end in 2003. The balance sheet and income statement data were deflated using yearly national inflation rates as well as exchange rates to convert from USD. For comparison reasons, sales and total assets are in constant 1995 USD. The average (median) firm has 60 Mio USD (2.5 Mio USD) in sales. The average (median) firm displays an investment to capital stock ratio of 31.5% (1.9%), and cash flow to capital stock ratios of about 56.6% (14.2%). While the average firm grows at a 72% rate (sales), median firm sales actually stay constant or even shrink slightly over the sample period. All this implies that there are some firms that are particularly successful to invest, earn cash flows and grow, however that the median firm is not. Moreover, there is a lot of variation across countries with the lowest median investment rate in Romania (-14%) and the largest in Hungary (21%).

¹⁴ See Mueller (1986) for a similar approach.

Panel B of Table 3 depicts the variables of main interest across years. As can be seen, median investment rates are particularly low (and negative) in the early years of transition, that is until the year 1997. From 1998 onwards, median investment rates are positive. A breakdown of investment rates by country and year reveals that the de-capitalization was particularly severe in Bulgaria, Romania, Russia and Ukraine in this early phase of transition.

Table 4 provides summary statistics on ownership concentration and identities of largest owners in both listed and non-listed firms. The ownership data start in 1995 and end in 2005. Ownership concentration as measured by the share of the largest owner is very high with a mean of 67.9% and a median of 70%. The high degree of ownership concentration is typical also for developed countries in Continental Europe.¹⁵ Moreover, the breakdown of ownership concentration by years indicates that the concentration of ownership remains high throughout the sample period.

Panel B of Table 4 displays a breakdown of largest owner types. We distinguish between domestic firms (domestic non-financial firms and holdings), domestic financial institutions (banks, insurance companies, etc.), domestic families, the state and state agencies (incl. privatization funds), and foreigners (mostly foreign firms). We define a company to be in dispersed ownership if the largest owner holds less than 10% of the outstanding shares. On average, domestic firms control 26% of firms, domestic financial institutions only 1.7%, families 15%, the state or state agencies 33%, and foreign firms 21.6%. Only 3.4% of firms have no shareholder with more than 10%. Again, there is a lot of variation across countries and time. This picture changes over time (Panel C, Table 4). While in the early years of transition state control is prevalent in all countries (around 60-80% in 1996/97)¹⁶, state control diminishes to 10-20% in 2003-2005. At the same time, the domestic corporate sector as controlling party gains in importance.

Panel D of Table 4 displays a transition matrix of the evolution of largest owners for a balanced sub-sample of 3,642 firms from 1996/1997 to 2001 and thereafter.¹⁷ Ownership/control transformation occurs in about 55% of firms (1989/3642). Some major tendencies of ownership transformation are: First, the key driving force for ownership transformation was privatisation. Ownership change was observed in more than half of the state owned firms (444/825) and about

¹⁵ For empirical evidence on the high ownership concentration of listed firms in Western Europe, see e.g. Gugler, Mueller and Yurtoglu, 2004b.

¹⁶ There are only few observations for 1995, so one should discount the numbers for this year.

¹⁷ For a similar transition matrix describing ownership transformation see Jones and Mygind (1999) for Estonia and Grosfeld and Hashi (2003) for the Czech Republic and Poland.

70% of privatisation fund-controlled firms (1188/1682). Second, the state sold its assets mainly to domestic non-financial firms (247/825), domestic holding companies (73/825) and foreign non-financial firms (49/825). Third, in “secondary” privatisation mainly domestic non-financial firms (684/1682), foreign non-financial firms (199/1682) and domestic families (132/1682) bought the controlling stakes. Fourth, ownership transformation within the private sector occurred at a moderate rate and most cases involved ownership transfers from domestic non-financial firms and families to foreign firms.

IV. Empirical Evidence on Investment-Cash Flow Sensitivity

Table 5 presents the main results on our investment-cash flow regression model. The table compares OLS, firm fixed effects, and GMM estimates with and without a ($1/time$) times cash flow interaction term (see above). Since equation (1) contains no lagged dependent variables, and the sales and the cash flow terms are predetermined, OLS is consistent. If, however, the capital stock follows a partial adjustment process, a lagged dependent variable should be included and OLS would be inconsistent in the presence of unobserved firm-specific effects. The GMM model estimates equation (1) augmented by a lagged dependent variable using systems GMM estimator developed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). This estimator eliminates firm effects by first-differencing as well as controls for possible endogeneity of current explanatory variables. Endogenous variables lagged two or more periods will be valid instruments provided that there is no second-order autocorrelation in the first-differenced idiosyncratic error terms. The Sargan tests do not suggest rejection of the over-identifying restrictions at conventional levels for either control category. While there is evidence of first order serial correlation in the residuals, the AR(2) test statistics reveal absence of second order serial correlation in the first differenced errors and thus that the instruments are valid.

The models perform satisfactorily with the sales accelerator and the cash flow terms taking on the expected values and being highly significant. The year dummies on the early years indicate negative conditional investment rates compared to 2003 (the constant can be interpreted as the conditional investment rate for 2003). The R^2 is 11% in the pooled OLS regression, which is satisfactory for a regression with 12 explanatory variables and more than 90,000 observations. Moreover, the inclusion of more than 25,000 firm dummies -while increasing the R^2 to 48% and the adjusted R^2 to 27% - does not change the main results on the cash flow terms. Likewise, the main

results carry over from OLS or fixed effects to GMM estimation. The coefficient on CF/K is 0.097 ($t = 12.40$) for the whole pooled sample declining to around 0.07 ($t = 6.48$) with firm fixed effects and to 0.05 ($z = 9.65$) for the GMM estimates.

As already mentioned, asymmetric information (AI) is very high in transition economies and AI problems should be particularly high in the early years of transition. Hypothesis 1 states that AI should decline over time in CEE countries. Therefore, we expect a positive coefficient on an interaction term of $1/time$ and cash flow: as time progresses this interaction term puts consecutively less weight on cash flow, thus a positive coefficient indicates less connection of cash flow to investment in later years. Since we define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003, the cash flow influence in the year 1995 is estimated as the sum of the coefficients on CF/K and $1/time*CF/K$ with *time* = 1, that is around 0.37 for the OLS estimates (0.30 fixed effects, 0.22 GMM). In 1996 the cash flow influence is estimated at (OLS) $0.018+1/2*0.355 = 0.2$ and so on. In the year 2003, we estimate a cash flow influence of just 0.057. In the long run, as *time* goes to infinity and the interaction term disappears, we would not expect cash constraints, but a zero cash flow coefficient. This is what we observe ($b = 0.018$; $t = 1.18$ for the OLS results).¹⁸ This is the pattern we expect if (1) cash flow is predominantly a proxy for the internal availability of liquidity and (2) asymmetric information problems vanish over time in CEE countries. Therefore, Hypothesis 1 is corroborated for our sample of CEE countries.¹⁹

Hypotheses 2-4 focus on the effects of ownership transformation on investment- cash flow sensitivities. We identify firms that had the same largest owner type in the first and last year of our data set and term this sub-sample "stable", and compare it with firms changing the type of their largest owner and term them "non-stable" (Table 6). We apply the same procedure for ownership change from state to other owners through privatisation (Table 7).

Table 6 shows that stable ownership firms display a much larger investment-cash flow coefficient of 0.08 ($t = 3.99$) compared to unstable ownership firms, which have one of 0.022 ($t = 1.34$) for the whole period. A similar result is observed for the GMM estimates. This is what one expects if inefficient investment behaviour plays a role for ownership change. Both types of firms'

¹⁸ We observe similar results when run yearly cross sectional regressions.

¹⁹ However, these results mask important differences across countries: the $1/time*CF$ interaction term is significantly positive in the Czech Republic, Hungary and Romania, it is negative (however insignificantly so) in the Ukraine and Serbia, and it is positive but insignificant in the rest of the countries. These results are available upon request.

sensitivities significantly decline as time elapses as indicated by the positive and significant interaction term of $1/time$ and cash flow, however only for the OLS estimates. With GMM, only non-stable ownership firms exhibit a decreasing cash flow influence on investment over time. Thus, as $t \rightarrow \infty$, we predict that firms that experienced a control change do not display positive investment-cash flow sensitivities. It appears that new owners induce efficient investment behaviour. This observation is consistent with the general impression that capital markets and corporate governance systems in CEE countries improved considerably in the last years, and it is also consistent with the evidence on the positive effects of privatization (i.e. ownership change) on productivity.²⁰ The reasons for the beneficial effects of new owners include the better access to external capital and the improved monitoring.

Table 7 compares stable state ownership firms with privatised firms, where we restrict the privatized firm sample to those firms that were “really” privatized and not merely put into the ownership of a privatisation fund. The transformation appears to be much harsher for privatized firms than for those firms that stayed under state control, since all year dummies indicate larger drops in investment rates over time. Firms that remained under state control display a highly *negative* investment-cash flow sensitivity in the period until 1998, and they eventually settle at a sensitivity of 0.34 ($t = 2.35$). With GMM, we even get the result that state-controlled firms display a *negative* cash flow influence over the whole period pointing to soft budget constraints problems. Thus, hypothesis 3 is partly corroborated. State-owned firms presumably enjoy soft budget constraints in the early years of transition and suffer from the classical managerial discretion problem thereafter. We present further discussion in section 5. Privatized firms, on the other hand, appear to invest efficiently, corroborating hypothesis 4. Their cash flow coefficients are insignificant in all specifications pointing to a low cash flow-investment sensitivity.

Table 8 presents the results of testing Hypotheses 5-7 on the effects of ownership identities. Hypothesis 5 states that foreign controlling owners should alleviate cash constraints compared to domestic controlling owners. This is confirmed by the empirical evidence (Panel A of Table 8). The cash flow coefficients for domestic-controlled firms are positive, statistically significant and much higher than the cash flow coefficient for their foreign-controlled counterparts for the whole period in both OLS and GMM estimates, 0.082 ($t = 4.15$) and 0.068 ($z=6.95$) versus 0.003 ($t = 0.23$) and -0.035 ($z= -1.88$). Moreover, while the cash flow influence on investment in foreign-controlled

²⁰ See e.g. Djankov and Murrell (2002).

firms decreases at a very rapid pace over time (the coefficient on the $1/time*CF$ term is 0.57 with GMM), the investment of domestically controlled firms is projected to remain cash flow induced (at 0.07). GMM estimates for foreign controlled firms show a negative relationship between cash flow and investment. For the purposes of this study, we may speculate that the observed reallocation of funds among firms - subsidiaries of foreign parents - might be partly explained by the presence of capital market imperfections in transition countries and access to finance from other units of the multinational network.²¹ We leave this result for further research.

Hypothesis 6 assumes that financial controlling owners should alleviate cash constraints *vis a vis* non-financial owners. This hypothesis is not corroborated (Panel B, Table 8). The cash flow coefficient is 0.1 for OLS estimates (0.15 for GMM, respectively) and significant for financially-controlled firms. It appears that domestic banks are not able to play the role yet which foreign owners (banks or firms) can play for their controlled firms.

Finally, hypothesis 7 states that firms controlled by privatisation funds invest more cash flow induced not because these firms were cash constrained, but due to managerial discretion. The right part of Panel B in Table 8 reports a positive OLS cash flow coefficient (0.11, $t = 1.78$). With GMM, however, we estimate a negative cash flow effect. Thus, for firms controlled by privatization funds cash flow coefficients are changing signs pointing to possible endogeneity problems of OLS estimates. The negative cash flow coefficient could be partly explained by financial redistribution among firms affiliated to privatisation funds.

V. Soft Budget Constraint of State-Controlled Firms

Hypothesis 3, state-owned firms enjoy soft budget constraints in the early years of transition, was corroborated, but the observed negative investment-cash flow coefficients require further analysis to identify the types of inefficient investment behaviour. We may separate a negative investment-cash flow coefficient due to (1) high investment in loss-making firms (overinvestment) based on soft loans from state-owned or "crony" banks, (2) low investment in profit-making firms (underinvestment) and (3) de-capitalisation (asset-stripping), when the investment rate is negative.

Table 9 presents the sample of firms with stable state ownership over the period 1996-2003. The first three panels of the table describe summary statistics of the whole sample and the sub-

²¹ See e.g. Carlin et al., 2006.

samples of loss-making and profit-making firms. The asset-stripping is typical for 1996, the first year in this sample. While we are sure that it was also typical before 1996, we have not sufficient data for the early transition years. The sub-sample of loss-making state-owned firms show striking characteristics consistent with soft budget constraints. The loss-makers are firms with (i) slightly higher than average investment rate, (ii) very low internally generated cash flows, (iii) bad investment opportunities measured by the growth of sales, and (iv) higher indebtedness.

Panel D of table 9 reports the OLS regression results for both state-controlled loss-makers and profit-makers (we discuss only the OLS results since the GMM results are mostly consistent but since sample sizes are very low give rather imprecise estimates). The results strongly corroborate the soft budget constraint/asset stripping hypotheses in state-owned firms. Loss making state-controlled firms display a significantly negative investment-cash flow sensitivity in the early years of transition (which is the sum of the two cash flow coefficients, around -2 (!) in 1996), turning positive only after the year 2000 (i.e. the cash flow influence is $0.52 - 1/5 * 2.49 \approx 0$ in the year 2000). Moreover, we predict for these firms a positive investment-cash flow sensitivity from then on, which is consistent with managerial discretion. State loss-makers that are highly indebted (due to access to soft loans) are even more extreme: they have a statistically significant investment-cash flow coefficient of nearly -4 (!) in 1996 ($= 1.43 - 5.52$), and settle spending actually more of their cash flows as time goes to infinity ($b = 1.43$). The difference from those firms that are not highly indebted suggests that the main channel of softening the budget constraint is actually via soft loans. On the other hand, a pattern of *underinvestment* is observed for state profit-makers, which are less indebted. The coefficient on CF/K is positive in the early period and settles at essentially zero as time elapses. Thus, for our sample of state-owned firms over the period 1996-2003, we identify overinvestment of loss-makers as the major factor explaining the negative investment-cash flow sensitivity. The access to soft loans and the consequent high indebtedness of these firms is a specific form of the soft budget constraint over the studied period.

VI. Conclusions

We may outline several policy conclusions of our study presenting empirical evidence on the investment-cash flow sensitivities in CEE countries over the period 1993-2003. First, our estimates show that this sensitivity declines over time: asymmetric information and/or managerial discretion problems were more severe in the early years of transition and their effects were

decreasing over transition. We conjecture that the external capital markets and corporate governance institutions have been gradually developing in CEE countries.

Second, we find significant differences in the investment-cash flow sensitivity when ownership of the largest shareholder and therefore control changes. Generally, the sensitivity declines after a control change consistent with lower AI and/or MD problems of new owners.

Third, systematic differences arise when the state preserves its control on firms during transition years. In early transition there was a *negative* investment-cash flow sensitivity for state-owned firms, which we explain by soft budget constraints and/or asset-stripping. The major type of the inefficient investment behaviour was *overinvestment* of highly indebted state loss-makers.

Fourth, we also find empirical support for the efficient effects of privatisation on company investment decisions. Privatized firms do not display a significantly negative investment-cash flow sensitivity anymore after privatization.

Finally, we present empirical evidence that the identities of owners do matter. Foreign-controlled firms display a smaller investment-cash flow sensitivity than domestically-controlled firms. Thus, the results support the view that foreign owners mitigate asymmetric information problems between external capital markets and company managers. However, the expectations for the role of financial owners were not corroborated. It appears that domestic banks are not able to play the role yet which foreign owners (banks or firms) can play for their controlled firms. Our estimates also show that firms under stable control of privatization funds over the period 1995-2003 display financial redistribution activities. We leave for further research the questions about the efficiency of this redistribution as well as the financial redistribution activities of subsidiaries of foreign owners.

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Table 1. Financial sector development in transition countries (1993-2003)

Private credit by deposit money banks to GDP (%)													
	BG	CZ	EE	HR	HU	LT	LV	PL	RO	SI	SK	DE	US
1993	61.2		7.0		28.9			18.6		19.3		96.1	51.0
1994	48.3	69.2	10.7	25.0	24.9	13.4	14.7	16.7		20.1	44.3	98.7	50.0
1995	35.0	66.5	11.9	28.5	22.4	13.2	10.7	15.2		21.8	36.1	100.9	51.6
1996	34.6	66.7	14.7	29.0	20.8	11.4	6.4	18.0		24.9	38.5	105.3	52.5
1997	21.6	67.7	19.7	31.3	21.4	9.8	7.7	20.1	8.1	25.4	47.6	110.1	53.1
1998	8.9	63.6	22.9	37.8	22.9	10.3	11.3	22.3	8.6	27.6	53.0	114.4	55.1
1999	10.9	55.8	23.6	38.8	24.1	12.0	13.6	23.8	8.5	30.7	53.0	116.6	57.2
2000	11.6	49.9	22.6	36.0	27.5	11.9	15.2	25.7	6.4	33.6	51.5	117.3	59.9
2001	13.0	42.7	23.4	38.3	31.7	11.1	18.5	27.2	6.3	35.6	43.6	119.1	62.7
2002	16.7	34.2	25.0	44.8	33.3	12.3	22.9	27.9	7.1	37.1	37.3	118.5	62.6
2003	22.4	29.5	29.2	49.9	37.8	16.8	29.3	28.1	8.0	39.2	35.0	117.4	62.5

Stock market capitalization to GDP (%)													
	BG	CZ	EE	HR	HU	LT	LV	PL	RO	SI	SK	DE	US
1993					1.8			1.7				20.8	73.3
1994	0.3				2.9			2.9				22.4	73.2
1995	0.4	19.8		2.9	4.6	1.5	0.0	2.9	0.2	2.5	6.2	21.4	81.5
1996	0.4	27.7		8.9	8.5	6.5	1.4	4.5	0.2	2.4	8.3	26.3	99.3
1997	0.0	26.4		18.0	22.5	13.3	4.0	7.1	0.9	5.8	9.4	35.5	120.1
1998	3.9	21.1	15.6	17.3	31.0	12.7	5.4	10.5	2.2	9.7	6.5	44.8	142.5
1999	6.6	19.3	21.2	14.1	31.8	10.2	5.3	15.1	2.5	10.7	4.8	60.0	163.6
2000	5.3	19.6	31.6	13.8	29.1	12.0	6.2	17.6	2.7	11.9	5.6	72.8	163.5
2001	4.2	16.4	27.6	15.0	21.5	11.5	7.6	15.4	4.0	13.5	6.6	63.9	145.7
2002	4.0	16.9	12.4	15.5	17.5	9.3	7.5	13.7	7.1	16.2	6.9	44.7	120.8
2003	6.3	18.3	2.1	16.7	17.4	12.9	8.1	15.3	8.8	20.7	7.1	37.0	117.5

Stock market turnover ratio (%)													
	BG	CZ	EE	HR	HU	LT	LV	PL	RO	SI	SK	DE	US
1993					14.1			147.2				74.5	69.5
1994	7.0				22.1			177.0				98.3	69.6
1995	7.8	33.1		8.5	17.2	39.5		70.9	0.2	69.0	69.5	109.0	85.4
1996	0.1	49.8		12.8	41.7	9.0	16.2	85.4	7.2	82.4	134.9	122.7	92.5
1997		47.4		9.5	74.9	17.9	34.7	78.6	87.1	31.2	108.9	71.4	102.9
1998	2.3	36.8	113.2	2.8	110.8	15.8	24.0	53.7	66.4	34.7	72.4	79.3	105.4
1999	6.3	36.6	24.2	2.6	94.6	26.1	11.9	46.1	35.4	32.4	48.6	64.4	123.4
2000	8.7	59.8	18.9	7.4	89.1	14.8	48.5	49.3	23.2	20.7	81.6	78.5	199.8
2001	12.4	33.5	13.4	4.0	43.4	15.0	26.2	25.8	16.1	30.2	69.9	120.0	198.7
2002	27.7	48.3	5.4	4.2	51.5	13.5	17.5	22.3	12.5	27.7	45.9	139.1	202.5
2003	15.8	52.4	18.2	4.8	57.3	8.2	15.6	26.6	8.8	12.6	28.7	129.3	121.3

Source: WB Database on Financial Development and Structure.

Note. BG-Bulgaria; CZ-Czech Rep.; EE-Estonia; HR-Croatia; HU-Hungary; LT-Lithuania; LV- Latvia; PL-Poland; RO-Romania; SI-Slovenia; SK-Slovak Rep.; DE – Germany; US – United States.

Table 2. Summary of Hypotheses

Hypothesis	Ownership/ Control	Investment/ Cash flow Coefficient	Asymmetric Information (AI)/	Managerial discretion (MD)
1	All firms	decreasing	decreasing	decreasing (?)
2	Ownership change	decreasing	decreasing	decreasing
3	State early transition	0 or negative	soft budget constraint/ asset stripping	high
	late transition	positive	hardening budget constraint	high
4	Privatization	zero	hardening budget constraint	decreasing
5	Foreign owners	zero	low AI	?
6	Financial institutions	zero	low AI	?
7	Privatization fund	positive	?	high

Table 3: Summary statistics
Panel A: Main variables by country

Country	Nobs	Sales (\$)		Total assets (\$)		I/K		CF/K		DSAL	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
BA	44	4105	1562	17956	1493						
BG	27,282	3406	511	3712	453	0.256	-0.007	0.463	0.090	0.693	-0.065
CS	1,649	13087	4936	50692	6825	0.276	0.053	0.442	0.099	0.750	0.029
CZ	26,968	14428	3874	17819	3685	0.349	0.050	0.666	0.168	0.799	-0.005
EE	2,960	10381	5875	10790	3052	0.488	0.136	1.134	0.327	0.760	0.070
HR	4,774	16093	5583	31079	6900	0.444	0.065	0.531	0.143	0.846	0.041
HU	13,319	39752	6279	24733	3546	0.591	0.207	1.041	0.313	1.088	0.069
LT	4,474	10767	3881	10870	3095					0.299	0.042
LV	2,312	9445	4467	9769	2063	0.473	0.175	0.258	0.247	0.586	0.074
PL	35,550	26209	7955	22545	4958	0.348	0.104	0.554	0.199	0.243	-0.003
RO	53,547	5278	940	8874	916	0.340	-0.139	0.625	0.130	1.017	-0.015
RU	13,102	767124	3952	85540	3606	0.209	-0.037	0.474	0.154	0.924	0.042
SI	1,494	35949	15955	35416	15825	0.243	0.080	0.304	0.170	0.187	-0.009
SK	296	74067	30275	128938	31149	0.252	0.033	0.582	0.173	0.984	-0.011
UA	20,641	8057	889	13497	1711	0.134	-0.028	0.196	0.069	0.511	-0.006
Total	209,161	60835	2487	19538	2206	0.315	0.019	0.566	0.142	0.727	-0.001

Panel B: Main variables by year

Year	Nobs	Sales (\$)		Total assets (\$)		I/K		CF/K		DSAL	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1993	3,993	14415	1698	18609	2204			0.351	0.043		
1994	10,371	9558	1453	13193	2392	-0.014	-0.441	0.546	0.059	0.492	-0.118
1995	14,890	10544	1826	12801	2027	0.249	-0.119	0.893	0.109	2.057	0.041
1996	16,546	10284	1869	11737	1810	0.287	-0.111	0.734	0.142	0.696	0.011
1997	19,102	14279	2115	20662	1599	0.197	-0.057	0.737	0.167	0.311	-0.108
1998	22,824	13278	2488	27215	2037	0.437	0.042	0.510	0.138	0.585	-0.028
1999	26,163	10914	2061	17402	1758	0.352	0.023	0.502	0.129	0.510	-0.023
2000	28,854	14391	2360	17136	1969	0.295	0.002	0.481	0.157	1.019	0.025
2001	27,534	14193	2590	17721	2149	0.316	0.016	0.512	0.175	0.716	-0.004
2002	22,634	18674	4044	23220	3228	0.380	0.096	0.532	0.160	0.644	0.029
2003	16,250	36731	5520	31706	4345	0.305	0.060	0.509	0.156	0.593	0.048
Total	209,463	60835	2487	19538	2206	0.315	0.019	0.566	0.142	0.727	-0.001

Note. BA-Bosnia & Herzegovina; BG-Bulgaria; CS-Serbia & Montenegro; CZ-Czech Rep.; EE-Estonia; HR Croatia; HU-Hungary; LT-Lithuania; LV- Latvia; PL-Poland; RO-Romania; RU-Russia; SI-Slovenia; SK-Slovak Rep.; UA-Ukraine; ** \$ - million USD; I/K investment divided by capital stock; CF/K cash flow divided by capital stock; DSAL sales growth rate

Table 4: Summary statistics on the ownership and control pattern in CEE countries**Panel A: Ownership concentration by country and by year (%)**

Country	Nobs	Mean SH1	Median SH1	Year	Nobs	Mean SH1	Median SH1
BA	18	75.6	100.0	1995	123	74.2	90.0
BG	16,033	71.1	80.0	1996	5,928	71.0	70.0
CS	357	70.3	75.0	1997	7,519	65.6	70.0
CZ	10,161	64.5	60.0	1998	4,675	61.9	60.0
EE	658	78.3	98.7	1999	5,844	66.2	68.0
HR	1,780	73.5	96.3	2000	10,002	65.1	67.0
HU	5,547	65.7	66.0	2001	5,699	63.8	66.0
LT	1,536	48.0	43.8	2002	15,874	68.8	74.9
LV	753	67.8	70.0	2003	7,048	72.1	86.0
PL	9,875	76.9	99.9	2004	12,708	73.2	90.0
RO	20,888	64.5	70.0	2005	4,548	62.0	61.7
RU	5,801	61.8	56.0				
SI	408	58.2	60.0	Total	79,968	67.9	70.0
SK	88	69.3	70.0				
UA	5,806	72.6	99.5				
Total	79,968	67.9	70.0				

Note: SH1 largest shareholder;

Panel B: Type of largest shareholders by country (share)

Country	Domestic firm	Domestic bank	Family	State	Foreign	Dispersed
BA	0.000	0.059	0.765	0.059	0.118	0.000
BG	0.216	0.005	0.080	0.575	0.088	0.036
CS	0.433	0.046	0.390	0.075	0.017	0.039
CZ	0.385	0.033	0.209	0.081	0.289	0.004
EE	0.326	0.033	0.000	0.025	0.607	0.009
HR	0.425	0.054	0.115	0.049	0.290	0.068
HU	0.206	0.023	0.300	0.032	0.412	0.027
LT	0.267	0.033	0.429	0.039	0.154	0.078
LV	0.164	0.011	0.322	0.023	0.434	0.046
PL	0.251	0.024	0.169	0.206	0.332	0.018
RO	0.158	0.005	0.154	0.455	0.191	0.038
RU	0.614	0.082	0.003	0.035	0.147	0.119
SI	0.295	0.164	0.036	0.214	0.267	0.025
SK	0.207	0.057	0.000	0.011	0.713	0.011
UA	0.468	0.006	0.018	0.391	0.066	0.051
Total	0.256	0.017	0.148	0.329	0.216	0.034

Note: Dispersed largest shareholder holds less than 10%;

Panel C: Type of largest shareholders by year (share)

Year	Domestic firm	Domestic bank	Family	State	Foreign	Dispersed
1995	0.065	0.037	0.019	0.439	0.411	0.028
1996	0.066	0.012	0.017	0.789	0.100	0.015
1997	0.131	0.009	0.102	0.653	0.077	0.028
1998	0.158	0.010	0.093	0.519	0.186	0.034
1999	0.260	0.018	0.133	0.398	0.162	0.029
2000	0.271	0.014	0.193	0.314	0.175	0.034
2001	0.263	0.012	0.238	0.184	0.262	0.042
2002	0.272	0.021	0.183	0.173	0.322	0.028
2003	0.276	0.039	0.195	0.097	0.357	0.035
2004	0.330	0.012	0.144	0.233	0.251	0.029
2005	0.565	0.024	0.069	0.097	0.147	0.099
Total	0.256	0.017	0.148	0.329	0.216	0.034

Panel D. Transition Matrix of Largest Owners 1996/97 - 2001/2005

Largest Owner 1996/97	Largest Owner 2001 or after											
	1	2	3	4	5	6	7	8	9	10	11	Total 96/97
1.Holding	26	10	0	4	2	0	0	0	1	11	0	54
2.Firm	15	265	5	16	8	7	0	0	2	55	8	381
3.Financial	1	8	9	2	0	0	0	0	3	8	0	31
4.Family	1	14	2	193	0	2	0	0	1	24	5	242
5.State	73	247	6	7	381	39	0	0	3	49	20	825
6.Priv.Fund	18	684	14	132	82	494	4	0	10	199	45	1,682
7.Insiders	0	7	0	0	0	0	0	0	1	0	1	9
8.Cooperative	0	6	0	0	0	0	0	3	0	0	0	9
9.ForeignFin	0	2	0	2	0	0	0	0	5	4	0	13
10.ForeignOth	1	24	0	9	0	2	0	0	5	253	10	304
11.Dispersed	2	30	1	17	1	8	0	0	1	8	24	92
Total	137	1,297	37	382	474	552	4	3	32	611	113	3,642

Note. The largest owner holds at least 10% of ownership stakes. Type of owners: 1. Non-financial holding company; 2. Non-financial firm; 3. Financial institution (bank, insurance company, mutual fund, other); 4. Family; 5. State; 6. Privatization fund; 7. Insiders (managers and employees); 8. Cooperative; 9. Foreign financial institution; 10. Foreign non-financial; 11. Dispersed – the largest owner holds less than 10% ownership stake. The start of ownership transformation – 1996/1997; the end of ownership transformation 2001 and thereafter.

Table 5. Investment-cash flow sensitivity over transition: pooled sample, dependent variable: I_t/K_{t-1}

	OLS		Fixed effects		GMM	
	Coef	t-value	Coef	t-value	Coef	z-value
I_{t-1}/K_{t-1}					0.043	9.10
S_{t-1}/K_{t-1}	0.024	18.15	0.034	18.63	0.065	81.53
S_{t-2}/K_{t-1}	-0.008	-6.29	0.012	8.36	0.005	7.52
CF_{t-1}/K_{t-1}	0.018	1.18	-0.007	-0.42	0.004	0.41
$1/time*CF_{t-1}/K_{t-1}$	0.355	5.71	0.310	4.58	0.216	5.73
1995	-0.188	-7.09	-0.139	-5.86		
1996	-0.222	-16.00	-0.011	-0.71	-0.129	-5.21
1997	-0.269	-21.2	-0.159	-10.39	-0.242	-10.99
1998	-0.026	-2.12	0.020	1.38	-0.053	-2.72
1999	0.041	3.48	0.080	6.02	0.0001	0.01
2000	-0.022	-2.24	0.004	0.38	-0.058	-3.94
2001	-0.031	-3.36	-0.017	-1.74	-0.067	-5.40
2002	0.072	7.54	0.074	8.32	0.045	4.18
Constant	0.104	14.74	-0.127	-9.73	-0.025	-6.34
Nobs	90369		90369		59796	
Nfirms	25987		25987		20478	
R ²	0.111		0.481			
CF_{t-1}/K_{t-1}^*	0.097	12.40	0.066	6.48	0.050	9.65
Sargan test					0.22	
AR(1)					0.00	
AR(2)					0.40	

* From regression excluding $1/time*CF_{t-1}/K_{t-1}$.

Note. We estimate equation (1). Fixed effects is firm fixed effects. GMM is one-step GMM. "Sargan test" is the p-value of a Sargan-Hansen test of overidentifying restrictions; AR(k) is the p-value of a test that the average autocovariance in residuals of order k is zero. *I* is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). *K* is the book value of capital stock measured by tangible fixed assets. *CF* is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), *S* is average total annual sales (item 25). We define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003.

Table 6. The effects of ownership change on investment- cash flow sensitivity: Stable versus non-stable ownership: Dependent variable: I_t/K_{t-1}

	OLS: estimates				GMM: estimates			
	Stable		Non-Stable		Stable		Non-stable	
	Coef	t-value	Coef	t-value	Coef	z-value	Coef	z-value
I_{t-1}/K_{t-1}					0.019	1.99	0.017	1.33
S_{t-1}/K_{t-1}	0.016	6.42	0.028	5.98	0.052	34.8	0.096	39.23
S_{t-2}/K_{t-1}	-0.003	-1.15	-0.001	-0.36	0.007	5.19	0.011	4.13
CF_{t-1}/K_{t-1}	-0.003	-0.10	-0.085	-3.13	0.050	2.49	-0.129	-4.58
$1/time*CF_{t-1}/K_{t-1}$	0.404	2.62	0.527	4.21	0.061	0.84	0.566	5.04
1996	-0.342	-13.70	-0.403	-12.30	-0.160	-3.39	-0.162	-3.54
1997	-0.317	-12.70	-0.349	-10.10	-0.257	-6.18	-0.210	-5.08
1998	-0.151	-6.61	-0.223	-6.46	-0.127	-3.43	-0.115	-3.03
1999	-0.037	-1.53	-0.084	-2.38	-0.447	-1.38	-0.011	-0.32
2000	-0.072	-3.24	-0.151	-4.49	-0.073	-2.56	-0.091	-2.56
2001	-0.065	-2.91	-0.127	-3.89	-0.066	-2.61	-0.092	-2.58
2002	0.049	1.90	0.06	1.50	0.030	1.31	0.046	1.24
Constant	0.119	6.18	0.105	3.29	-0.038	-5.06	0.01	1.21
Nobs	17532		13287		13698		10827	
R ²	0.117		0.120					
CF_{t-1}/K_{t-1}^*	0.078	3.99	0.022	1.34	0.064	6.63	-0.01	-0.51
Sargan test					0.34		0.22	
AR(1)					0.03		0.01	
AR(2)					0.22		0.83	

Note. Stable: same largest shareholder type over sample period; Non-stable: change in largest shareholder type from 1996/97 until 2001/2003. * From regression excluding $1/time*CF_{t-1}/K_{t-1}$.

We estimate equation (1). Fixed effects is firm fixed effects. GMM is one-step GMM. "Sargan test" is the p-value of a Sargan-Hansen test of overidentifying restrictions; AR(k) is the p-value of a test that the average autocovariance in residuals of order k is zero. I is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). K is the book value of capital stock measured by tangible fixed assets. CF is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), S is average total annual sales (item 25). We define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003.

Table 7: The effects of ownership change on investment- cash flow sensitivity: State-stable versus privatised firms: Dependent variable: I_t/K_{t-1}

	OLS: estimates				GMM: estimates			
	State-stable		Privatised		State-stable		Privatised	
	Coef	t-value	Coef	t-value	Coef	z-value	Coef	z-value
I_{t-1}/K_{t-1}					-0.028	-1.37	0.003	0.13
S_{t-1}/K_{t-1}	0.02	2.56	0.026	2.05	0.075	15.24	0.070	14.73
S_{t-2}/K_{t-1}	-0.003	-0.41	-0.004	-0.44	0.013	2.82	0.003	0.73
CF_{t-1}/K_{t-1}	0.338	2.35	0.012	0.17	0.003	0.04	-0.013	-0.24
$1/time*CF_{t-1}/K_{t-1}$	-1.44	-2.10	0.026	0.11	-0.366	-1.53	-0.109	-0.58
1996	-0.593	-10.43	-0.825	-10.67	-0.308	-6.68	-0.276	-5.35
1997	0.115	2.36	0.064	0.79	0.328	7.63	0.442	8.64
1998	-0.093	-2.04	-0.207	-2.52	0.143	3.42	0.166	3.36
1999	-0.115	-2.68	-0.178	-2.20	0.092	2.26	0.124	2.70
2000	-0.139	-3.03	-0.270	-3.39	0.020	0.49	-0.006	-0.13
2001	-0.092	-1.92	-0.258	-3.32	0.019	0.42	-0.048	-0.95
2002	-0.066	-1.38	-0.014	-0.14	0.009	0.18	0.101	1.78
Constant	0.143	3.47	0.281	3.59	0.049	5.54	0.077	7.97
Nobs	2700		3032		2138		2746	
R ²	0.15		0.15					
CF_{t-1}/K_{t-1}^*	0.006	0.14	0.017	0.53	-0.092	-2.74	-0.042	-1.57
Sargan test					0.17		0.43	
AR(1)					0.00		0.00	
AR(2)					0.14		0.97	

Note. State-stable: state is the largest shareholder over the whole period; Privatized: largest shareholder changes from state to non-privatization funds. * From regression excluding $1/time*CF_{t-1}/K_{t-1}$.

We estimate equation (1). Fixed effects is firm fixed effects. GMM is one-step GMM. "Sargan test" is the p-value of a Sargan-Hansen test of overidentifying restrictions; AR(k) is the p-value of a test that the average autocovariance in residuals of order k is zero. I is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). K is the book value of capital stock measured by tangible fixed assets. CF is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), S is average total annual sales (item 25). We define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003.

Table 8: The effects of ownership identities on the investment- cash flow sensitivity
Panel A: Foreign versus domestic owners: Dependent variable: I_t/K_{t-1}

	OLS: estimates				GMM: estimates			
	Foreign		Domestic		Foreign		Domestic	
	Coef	t-value	Coef	t-value	Coef	z-value	Coef	z-value
I_{t-1}/K_{t-1}					-0.012	-0.52	0.019	1.90
S_{t-1}/K_{t-1}	0.006	1.18	0.016	6.79	0.030	7.18	0.052	34.87
S_{t-2}/K_{t-1}	0.006	0.97	-0.003	-1.49	0.009	2.15	0.007	5.35
CF_{t-1}/K_{t-1}	-0.050	-2.15	0.006	0.17	-0.142	-5.04	0.074	3.58
$1/time * CF_{t-1}/K_{t-1}$	0.298	2.20	0.373	2.43	0.574	4.83	-0.031	-0.40
1996	-0.101	-1.69	-0.336	-13.46	-0.157	-1.71	-0.154	-3.25
1997	-0.070	-1.14	0.313	-12.49	-0.123	-1.49	-0.255	-6.12
1998	0.012	0.22	-0.146	-6.39	-0.024	-0.32	-0.127	-3.44
1999	0.101	1.48	-0.032	-1.34	0.110	1.60	-0.046	-1.43
2000	-0.027	-0.59	-0.068	-3.05	-0.043	-0.67	-0.074	-2.62
2001	-0.013	-0.27	-0.061	-2.73	-0.039	-0.64	-0.068	-2.70
2002	-0.002	-0.05	0.053	2.09	-0.038	-0.62	0.030	1.29
Constant	0.144	4.00	0.26	5.92	-0.013	-0.87	-0.038	-5.03
Nobs	2138		17476		2138		13655	
R ²	0.07		0.12					
CF_{t-1}/K_{t-1}^*	0.003	0.23	0.082	4.15	-0.035	-1.88	0.068	6.95
Sargan test					0.25		0.33	
AR(1)					0.00		0.00	
AR(2)					0.86		0.12	

Note. Foreign: the largest shareholder is foreign investor; Domestic: the largest shareholder is domestic investor. * From regression excluding $1/time * CF_{t-1}/K_{t-1}$.

We estimate equation (1). Fixed effects is firm fixed effects. GMM is one-step GMM. "Sargan test" is the p-value of a Sargan-Hansen test of overidentifying restrictions; AR(k) is the p-value of a test that the average autocovariance in residuals of order k is zero. I is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). K is the book value of capital stock measured by tangible fixed assets. CF is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), S is average total annual sales (item 25). We define $time$ as taking on the value of one in 1995, two in 1996 and so on until a value of $time$ of 9 in 2003.

Panel B: Financial and privatization fund owners: Dependent variable: I_t/K_{t-1}

	OLS		GMM		OLS		GMM	
	Financial				Privatisation funds			
	Coef	t-value	Coef	z-value	Coef	z-value	Coef	z-value
I_{t-1}/K_{t-1}			-0.168	-4.08			-0.043	-1.53
S_{t-1}/K_{t-1}	0.002	0.20	0.008	0.86	0.014	2.55	0.060	13.90
S_{t-2}/K_{t-1}	0.009	1.21	0.006	0.57	0.003	0.63	0.007	1.57
CF_{t-1}/K_{t-1}	0.125	2.22	0.173	4.88	0.046	0.51	-0.321	-5.32
$1/time*CF_{t-1}/K_{t-1}$	-0.141	-2.36	-0.146	-1.21	0.326	1.25	1.539	4.78
1996	-0.134	-1.77	-0.091	-0.37	-0.205	-8.24	0.108	0.71
1997	-0.134	-1.83	-0.154	-0.70	-0.534	-22.13	-0.232	-1.73
1998	0.043	0.50	-0.196	-1.01	-0.200	-6.50	0.051	0.44
1999	0.211	2.29	0.069	0.43	-0.031	-0.89	0.164	1.67
2000	0.029	0.59	-0.146	-1.08	-0.089	-2.89	0.103	1.23
2001	0.094	1.25	0.116	1.04	-0.07	-0.18	0.171	2.29
2002	0.190	1.92	0.194	2.09	0.123	2.29	0.294	4.08
Constant	0.043	1.19	-0.005	-0.13	0.043	-1.86	0.004	0.15
Nobs	742		454		5584		3768	
R ²	0.12				0.15			
CF_{t-1}/K_{t-1} *	0.099	2.06	0.145	5.32	0.110	1.78	-0.058	-2.18
Sargan test			0.12				0.23	
AR(1)			0.00				0.00	
AR(2)			0.19				0.53	

Note. Financial: the largest shareholder is financial investor; Privatization fund: the largest shareholder is a privatization fund. * From regression excluding $1/time*CF_{t-1}/K_{t-1}$.

We estimate equation (1). Fixed effects is firm fixed effects. GMM is one-step GMM. "Sargan test" is the p-value of a Sargan-Hansen test of overidentifying restrictions; AR(k) is the p-value of a test that the average autocovariance in residuals of order k is zero. *I* is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). *K* is the book value of capital stock measured by tangible fixed assets. *CF* is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), *S* is average total annual sales (item 25). We define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003.

Table 9: Firms under state control over transition

Panel A: Summary statistics: All state-controlled firms

Year	Nobs	Mean I/K	Mean CF/K	Mean DSAL	Mean Debt/TA	Mean PL/TA
1996	455	-0.247	0.799	-0.572	0.299	-0.008
1997	818	0.378	0.197	1.014	0.195	0.020
1998	856	0.208	0.199	0.434	0.192	-0.026
1999	899	0.236	0.288	-0.122	0.218	-0.055
2000	582	0.073	0.893	-0.012	0.147	-0.025
2001	332	0.099	0.115	0.013	0.154	-0.009
2002	228	0.123	0.069	0.571	0.119	-0.002
2003	188	0.207	0.175	0.370	0.114	-0.005
All	4358	0.154	0.354	0.241	0.195	-0.017

Panel B: Summary statistics: Loss making state-controlled firms

Year	Nobs	Mean I/K	Mean CF/K	Mean DSAL	Mean Debt/TA	Mean PL/TA
1996	189	-0.254	0.053	-0.621	0.362	-0.112
1997	240	0.427	0.148	0.890	0.228	-0.076
1998	394	0.235	0.072	0.353	0.223	-0.117
1999	472	0.267	0.196	-0.256	0.260	-0.150
2000	229	0.058	-0.129	-0.071	0.179	-0.138
2001	113	0.043	-0.248	-0.076	0.183	-0.107
2002	66	0.172	-0.068	0.775	0.145	-0.097
2003	57	0.221	0.026	0.565	0.142	-0.095
All	1.760	0.165	0.033	0.112	0.236	-0.120

Panel C: Summary statistics: Profit making state-controlled firms

Year	Nobs	Mean I/K	Mean CF/K	Mean DSAL	Mean Debt/TA	Mean PL/TA
1996	266	-0.213	0.949	-0.506	0.255	0.059
1997	578	0.376	0.278	1.088	0.188	0.061
1998	462	0.191	0.254	0.491	0.156	0.047
1999	427	0.173	0.482	0.023	0.158	0.044
2000	353	0.090	0.144	0.032	0.124	0.046
2001	219	0.122	0.165	0.063	0.139	0.037
2002	162	0.102	0.243	0.488	0.110	0.037
2003	131	0.200	0.241	0.288	0.106	0.034
All	2.598	0.153	0.339	0.331	0.163	0.049

Loss making: PL/TA < 0; Profit making: PL/TA > 0

Panel D: OLS Regression results: dependent variable I_t/K_{t-1}

Loss making state-controlled firms						
	All		Highly indebted		Not highly indebted	
	Coef	t-value	Coef	t-value	Coef	t-value
1998	-0.756	-11.03	-1.086	-4.69	-0.679	-4.66
1999	0.022	0.26	-0.258	-1.20	0.354	1.95
2000	-0.167	-2.33	-0.313	-1.80	0.036	0.17
2001	-0.193	-2.84	-0.368	-2.04	-0.143	-0.95
2002	-0.170	-2.13	-0.308	-1.71	-0.048	-0.20
2003	-0.152	-1.92	0.038	0.15	-0.144	-1.08
S_{t-1}/K_{t-1}	0.029	2.01	0.142	3.95	0.103	1.73
S_{t-2}/K_{t-1}	-0.007	-0.60	-0.080	-3.07	-0.055	-1.74
CF_{t-1}/K_{t-1}	0.522	2.29	1.429	4.06	0.123	0.28
$1/time*CF_{t-1}/K_{t-1}$	-2.489	-2.17	-5.518	-4.43	0.233	0.09
Constant	0.185	3.03	0.265	1.57	0.122	0.90
Nobs	978		185		241	
R ²	0.154		0.463		0.107	

Profit making state-controlled firms						
	All		Highly indebted		Not highly indebted	
	Coef	t-value	Coef	t-value	Coef	t-value
1998	-0.509	-13.66	-0.439	-4.28	-0.418	-6.07
1999	0.177	4.43	0.043	0.43	0.154	2.29
2000	-0.018	-0.54	0.047	0.57	-0.072	-1.78
2001	-0.028	-0.92	0.042	0.62	-0.034	-0.95
2002	-0.076	-2.39	-0.092	-1.33	-0.059	-1.00
2003	-0.022	-0.56	0.189	1.32	-0.054	-1.25
S_{t-1}/K_{t-1}	0.011	1.33	-0.005	-0.53	0.001	0.10
S_{t-2}/K_{t-1}	0.002	0.34	0.016	1.36	0.001	0.06
CF/K_{t-1}	0.237	2.17	0.326	0.90	-0.114	-0.72
$1/time*CF_{t-1}/K_{t-1}$	-0.670	-1.83	-1.117	-1.03	1.849	2.23
Constant	0.085	3.42	0.091	1.54	0.104	3.60
Nobs	1648		232		506	
R ²	0.165		0.160		0.158	

Note: (Not) Highly indebted Debt/TA ratio larger (smaller) than median (0.13)

Note. We estimate equation (1). I is investment in property, plant and equipment measured by the change in the capital stock (proxied by tangible fixed assets – item 3, Amadeus data base, Formula of accounts and ratios) plus depreciation (item 42). K is the book value of capital stock measured by tangible fixed assets. CF is cash flow measured by net profit after tax (item 39) plus depreciation (item 42), S is average total annual sales (item 25). We define *time* as taking on the value of one in 1995, two in 1996 and so on until a value of *time* of 9 in 2003.

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