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"**Endogenous Ownership Structure: Factors Affecting the Post-Privatisation Equity in Largest Hungarian Firms** "

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ENDOGENOUS OWNDERSHIP STRUCTURE: FACTORS

AFFECTING THE POST-PRIVATISATION

EQUITY IN LARGEST HUNGARIAN FIRMS♣

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Abstract
Using a data set for 162 largest Hungarian firms during the period of 1994-1999 this paper explores the determinants of equity shares held by foreign investors and by Hungarian institutional investors.. We find evidence of a post-privatisation evolution towards more homogeneus equity structures, where dominant categories of owners aim at achieving controlling stakes. Here, the foreign investors and Hungarian institutional investors play the major role. In addition, focusing on firm level characteristics we find that the exporting firms attract foreign owners, who acquire controlling equity stakes. Similarly, the firm size measurements are positively associated with the presence of foreign investors. However, they negatively associated with 100% foreign ownership, since the marginal costs of acquiring additional equity are growing with the size of the assets. We interpret the results in light of the existing theory. In particular, following Demsetz and Lehn (1985) and Demsetz and Villalonga (2001) we argue that equity should not be treated as an exogenous variable. As for specific determinants of equity levels, we focus on informational asymmetries and (unobserved) ownership specific characteristics of foreign investors and Hungarian investors

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1. Introduction: endogenous equity

Much of the existing literature takes ownership variables as given, i.e. considers them exogenous. This approach has been typical for most of research on privatisation outcomes in the former state-owned enterprises in central and eastern Europe and the former Soviet Union (FSU). Thus, in the economics of transition research, arguments based on agency theory within a partial equilibrium framework have played by far the predominant role, with the development and testing of models describing the impact of the newly created structures of corporate governance on firm performance using large samples and statistical methods. A major theme of this research is that ownership change would create new incentives or impose new control structures upon managers of the former state-owned enterprises (SOEs) therefore forcing them to engage in restructuring strategies aimed at efficiency improvement (Boycko et al., 1995). A most important research issue is the question how newly privatised companies respond to internal and external factors causing organisational restructuring.

However, different theoretical models and empirical studies have provided different and conflicting answers to this question (see, for example: Bonin 1998 and World Bank 2000 for a discussion). In particular, there is a disagreement about the effects of new ownership structures on the extent and speed of enterprise restructuring. For example, managerial ownership has been found to have both positive (e.g., Aukutsionek et al., 1998; Filatotchev et al., 2000) and negative (e.g., Aghion & Blanchard, 1998; Blasi et al., 1997) effects on the likelihood of restructuring actions. Similarly, existing research on post-privatisation restructuring has identified ambiguity in the role of outside ownership. Outside investors have been found to have both positive (e.g., Pohl et al., 1997) and neutral (e.g., Aukutsionek et al., 1998) effects on the extent of restructuring and performance. Case-study evidence from large firms in the Slovak Republic presented by Djankov & Pohl (1998) indicated that rapid consolidation of outside ownership promoted enterprise restructuring after the initial privatisation stage. Carlin & Aghion (1996) argued that privatisation boosted 'reactive' restructuring, using evidence from

both Russia and Hungary, yet foreign ownership was required for 'deep' restructuring. However, a number of other publications have provided more ambiguous results. For example, using frontier production function estimation technique, Brada et al. (1997) did not find any links between privatisation and improvements in enterprise efficiency, using data from industrial firms in Hungary and Czechoslovakia. Frydman et al. (1997) concluded that product restructuring was not affected by differences in ownership structure using survey data from mid-sized firms in the Czech Republic, Poland and Hungary. A number of studies of ownership effects on firm restructuring and performance in the FSU provide similar results: differences in ownership structure and corporate governance variables, such as board composition were not consistently related to the extent and speed of strategic changes at the firm level in Russia (Blasi et al., 1997; Earle, 1998; Filatotchev et al., 1996), and Russia, Ukraine and Belarus (Estrin, et al., 1998; Filatotchev et al., 2000).

The ambiguity of results may indicate that the underlying theoretical assumptions are not entirely satisfactory. Some authors strongly point out that in economies in transition, privatisation seems to set in motion a process of ownership adjustment where ownership concentration and structure may be an outcome of various firm-specific factors such as size, performance, industrial affiliation, etc., as well as the firm's operating environment (see Filatotchev et al., 2001; Filatotchev and Mickiewicz, 2001). This dissenting strand in literature draws from Demsetz and Lehn (1985) and Jensen and Warner (1988), who provided both arguments and evidence for treating equity composition as endogenous. This has been recently reinforced by Demsetz and Villalonga (2001), who offer both the review of discussion and econometric evidence showing that the equity structure is determined by past performance and firm level characteristics. Diversity in equity structures may be considered as the equilibrium result, where different ownership structures are optimal for different categories of firms. In addition, the response of equity structures to firm-level characteristics is also affected by the characteristics of the capital market framework. Shleifer and Vishny (1997), La Porta et al. (1997, 1998, 1999, 2000a, 2000b), Filatotchev and Mickiewicz (2001) provide both

the theoretical models and empirical evidence that suggests that concentrated ownership and equity levels that guarantee control rights are an equilibrium response to imperfect capital markets. Yet, not many studies on post-privatisation outcomes in transition economies consider equity as endogenous. In a rare longitudinal study of 150 privatised companies in Russia, Aukutsionek et al. (1998) identified a selection bias when outside investors bought into relatively successful companies, which confirms that cross-sectional studies of privatisation effects on restructuring and performance are questionable from the theoretical and empirical points of view.

The purpose of this article is to investigate if the assumption of endogenous equity and control structures may explain the post-privatisation ownership adjustment in one of the most dynamic transition economies, Hungary. Using a data set for 162 largest firms (1994-1999), we show that the equity structures converge towards high homogeneity. Equity stakes held by foreign and Hungarian institutional investors are significantly related to factors such as the firm's size, export orientation, past performance and industry affiliation.

The paper is organised as follows. The following section presents an institutional background in Hungary, which is relevant to our research. Next, we provide a theory review that discusses possible determinants of equity structure, and develop a number of hypotheses. Section five offers an empirical account of the evolution of ownership structures towards higher homogeneity. Sections six and seven present methodology and econometric results for the determinants of equity levels. Section eight concludes.

2. Institutional background and privatisation in Hungary

Despite uneven macroeconomic performance during the 1990's, Hungary had attained a booming economy and became a frontrunner for EU accession (OECD 2000). In particular, performance improved after the inauguration of a classical macroeconomic stabilisation programme in 1995, due to better budgetary position, a sustainable external deficit, the adoption of the crawling peg exchange rate following initial devaluation, and a commitment to contain nominal wages. However, much of Hungary's economic success

is also due to deep microeconomic restructuring and institutional building, which started few years earlier, at least at the beginning of 1990's.

This section focuses on several aspects of this microeconomic adjustment, which places ownership changes in a wider context of institutional reforms, in particular, the characteristics of the privatisation process in industry.

Micro level adjustment began already in 1988 and accelerated at the beginning of 1990s. A solid legal framework was created by adopting new laws and institutions, which subsequently affected the stock exchange, accounting procedures and the bankruptcy process. The effects of the bankruptcy law introduced in 1991 were especially dramatic with thousands of firms being forced into bankruptcy proceedings. Although painful, the law rigorously enforced hard budget constraints upon firms (Gray et al. 1998; Halpern and Wyplosz 1998).

Yet, implementation of bankruptcy laws implied that the banking sector incurred heavy losses, making several bank restructuring programmes a necessary pre-condition for this sector becoming economically efficient in the mid 1990's.

The reforms had also implications for the welfare sector. Although unemployment rates have fallen dramatically, from a high of 12.3% in 1992 to 5.7% (as of July 2001),[1] the demand for social benefits and services has not been restrained, and Hungary remains one of the OECD countries with the lowest employment rates (Mickiewicz and Bell 2000).

Yet overall, the privatisation and enterprise reform may be considered successful, with approximately 80% of value added now being produced in the private sector. Already by 1997, there were only 456 companies held by the state from the 1857 existing state enterprises in 1990. Nevertheless, the privatisation agency (APVRt) has been criticised by the OECD for keeping its residual minority holdings and subsidising some loss making 'strategic firms' (OECD 2000, p.15).

Certain aspects of the Hungarian privatisation are unique to the region. The government has implemented "gradualist" privatisation in contrast to mass 'give away'

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[1] Hungarian Central Statistical Office data (October 2001).

voucher schemes.[2] The procedure was a slow, case by case sale process. Yet, unlike 'mass privatisation' and other forms of 'non-equivalent' privatisation, the proceeds were used to improve the budget position and decrease the country's debt burden. Furthermore, this form of privatisation attracted foreign investors - indeed, Hungary is now one of the major destinations in the region for an inflow of capital. In fact, the level of privatisation revenues per capita and FDI inflow are strongly correlated as demonstrated by EBRD (2000). Hungary is a transition economy characterised by both the highest privatisation revenues and inflow of FDI per capita.

The privatisation process in Hungary was co-ordinated by the State Property Agency (SPA) created in March 1990.[3] It was responsible for both management and supervision of the ownership transformation. The shares in state enterprises were transferred to the SPA, which was then entitled to exercise ownership rights and appoint a board of directors. The process implied initial ('pre-privatisation') transformation of state enterprise into a corporate form, supervised by the SPA, outright divestment or transfer of assets of state owned enterprise to a new joint stock company of equivalent value.

The Hungarian government adopted an activist approach. Firstly, a significant privatisation programme was initiated in January 1990. 20 large superior performing companies were valued by international consultants and offered for sale. Yet, that programme was not a success as valuations turned out to be time-consuming and difficult and the SPA attempted to obtain unrealistically high prices, especially as recession unfolded and affected the financial position of the selected companies. This early negative experience had been important, as it demonstrated a difficulty of privatisation via flotation and therefore implicitly limited the future role of widespread shareholder ownership. It turned the attention of the policymakers to search for strategic investors. Direct state involvement remained a defining feature of the privatisation programmes and the majority of subsequent methods relied on sales for cash. Moreover, Hungary created a very liberal climate for foreign investors. Already prior to transition, Hungary enjoyed a

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[2] Hunya (1997) argues that mass privatisation schemes were used in those countries, where the denationalisation of the former state own firms was the primary objective and governments faced potential problems with political support for privatisation. In addition, mass privatisation schemes might have inflationary impact via the wealth effect.

[3] Later becoming the Hungarian Privatisation and State Holding Company, APVRt.

history of strong outward orientation with partnerships with foreign firms (Iakova 2000, Oszlay 1999). Frydman et al (1993b) document that it was strengthened at the beginning of 1990s, allowing repatriation of profits and one hundred percent foreign ownership (pp. 178). The structure of Hungary's FDI is also interesting. At the beginning of transition, FDI was mainly in food, textiles and metallurgy sectors, where less skilled labour is needed. Yet in more recent years FDI is flowing to high tech industries, such as machinery and equipment, chemical and the auto industry sectors as the Hungarian workforce has managed to meet the demand for skilled labour (Mickiewicz et al. 2001).

Thus, reasons for Hungary's success in obtaining high FDI inflows lie in both macroeconomic policy and institutional reforms: Hungary enjoys relative macroeconomic stability, solid property laws and satisfactory financial regulations. The capital market performance improves significantly between 1998 and 2000 and Hungary overtook Poland with the highest market turnover to market capitalisation ratio (Pajuste 2001). Also, Hungary remains at the top of the list in terms of legal indicators, as assessed by the European Bank for Reconstruction and Development (EBRD 2000, Annex 2.2).

3.   Factors affecting equity composition

As already discussed, a number of authors have suggested that firm characteristics may determine its ownership structure. The relevant indicators include size, investment needs, industry, location, export potential, etc. In other words, a firm's ownership structure is an equilibrium response to an individual firm's operating characteristics and its competitive environment (Short, 1994), and the direction of causality between ownership and firm characteristics is not entirely resolved by papers using cross-sectional variations in ownership. In particular, Dyck (2000) suggests that the lack of promising investment projects is perhaps a greater problem in developing and transition economies than differences in ownership structures. Firms with attractive investment opportunities may have issued new equity whereas firms with unattractive investment opportunities may have had no need to do so. Thus, resulting equity structure is implied by the investment opportunity, not vice versa.

A fast growing literature on optimal ownership structures of firms depending on the levels of 'private benefits of control' (e.g., Grossman and Hart, 1988; Harris and Raviv, 1988) has also extended research beyond the conventional US/UK environment and has recently become a focal point of theoretical and policy debates. This research is particularly important for countries with relatively low protection of minority investors and where expropriation of minority shareholders by the controlling shareholders is extensive. However, the willingness of controlling shareholders to expropriate minority investors is constrained by their financial incentives. Following the agency framework developed by Jensen and Meckling (1976) a number of authors link these incentives with equity ownership by controlling shareholders which enhances their interest in a non-distortionary distribution of dividends. Other things equal, ownership concentration should lead to lower expropriation, and, as a result, countries with poor investor protection would typically exhibit more concentrated control of firms than do countries with good investor protection (La Porta *et al.,* 2000). Dyck (2000) suggests that dispersed ownership structures in transition economies are unstable and relatively costly, and provides evidence that countries that had dispersed ownership at the time of privatisation, such as the Czech Republic, report steady increases in concentration over time. This evidence is consistent with the assumption that concentration may be a substitute for legal protections in providing the functions of corporate governance (La Porta *et al.,* 1998), and, therefore, is an endogenous factor.

The International Business research has also generally acknowledged an endogeneity of ownership structures when considering factors affecting equity investment by foreign firms in domestic companies. This research is focused on the competitive advantage of the investing firm, relative to other firms located in the host country. In addition, as markets have become more liberalised there is a growing need for firms to engage in FDI in order to protect their existing or specific advantages, or to acquire new dynamic ownership advantages. Building on a resource based view of the firm, Dunning (2000) examines the firm's internal capabilities and resources in terms of their ability to maintain and upgrade these advantages, and their ability to locate their value added

activities in countries, which allow them to create and acquire new specific advantages (see Kogut and Chang, 1991).

In addition, the internalisation theory (Buckley and Casson, 1976) suggests that the *"greater the net benefits of internalising cross border intermediate product markets, the more likely a firm will prefer to engage in foreign production itself,"* (p164). Dunning recommends a reassessment of the static organisational theory and an integration of the transaction based and innovation based theories of the firm. In line with this, Ethier and Markusen (1996) argue that new trade theory does not consider internalisation and the enforcement of contracts or the fact that multinational enterprises are often linked to knowledge based capital, which can be easily transported to other locations, at little cost relative to physical capital. In addition the same authors adopt a model which employs the association between foreign direct investment and the high tech sector, along with a factor for choice of how the firm services a foreign market, which considers exporting, licensing and establishing a subsidiary. This allows them to present the international equilibrium, which determines both the pattern of specialisation and the market mode. One of their important findings is that the desire to protect knowledge-based capital may promote direct investment, as opposed to licensing. Moreover, this issue is most critical not just in the high tech sector, but specifically in relation to firms, which may create competition to the investing companies in the international markets, e.g., local firms with significant export potential. Therefore, in the longer term, the transfer of knowledge without ownership may result in enhanced competition against investors. High transaction costs of the arm's length technology transfer lead to direct investment rather than subcontracting (Buckley and Casson 1998). Additionally, transaction costs may be higher and the protection of intellectual property via contracts can be relatively more difficult in a transition country, where the legal framework is still undergoing a process of reform and reinforcement.

This argument is consistent with a view, which may be attributed as early as Penrose (1956), which highlights that foreign investment is likely to flow to those *"newer, ...faster growing and more profitable industries,"* (p.216). Dunning and Lundan (1998) use and extend the Porter diamond (1990) and their study of 145 largest industrial

corporations show that FDI is flowing to knowledge intensive and high tech sectors. Similarly, Dahlquist and Robertsson (2001) find that in Sweden FDI is attracted to the engineering, chemicals and pharmaceutical industries, and is under represented in the paper and pulp sectors.

A different strand of literature points out informational asymmetries as an important factor, which affects the structure of foreign investment. In particular, Kang and Stulz (1997) examine the home equity bias in Japan. By using the Merton (1987) hypothesis , they show that investors invest in securities they know about. Kang and Stulz find a positive relation between foreign ownership and exporting by local firms. Similarly, in a recent study of foreign ownership in Sweden, Dahlquist and Robertsson (2001) find that foreign investors are drawn towards those firms with a presence in international markets. As heavy exporters are usually known abroad, export intensity can be a proxy for this international profile factor. In the transition context, Lankes and Venables (1997) found that from their survey of emerging economies, 71% of foreign investors claimed that the main function of FDI was to export from the region.

Informational asymmetries may explain not only why exporting firms are typically preferred by foreign investors, but also the preference for larger firms, as more information is available on these firms. The bias towards larger firms is confirmed by Dahlquist and Robertsson (2001). Yet firm size may be a characteristic which attracts FDI for several other reasons. For example, foreign equity holders may be attracted to larger firms due to the advantages associated with economies of scale and scope. Kang and Stulz (1997) find in the Japanese case of foreign ownership that foreign investors tend to gravitate towards large firms. Those authors argue that size is a proxy for several positive attributes: it can represent international standing, transparency and liquidity of shares, and widespread ownership.

Performance is also expected to be a possible factor in determining the level of foreign equity of a firm. The Dahlquist and Robertsson (2001) study reveals that foreign investors exhibit a preference for better performing firms, and their cross section and

pooled analyses show that firms with higher current ratios[4] are associated with foreign equity, as it reflects the firm's ability to meet short term payment requirements. Also, Kang and Stulz (1997) document that foreign investors hold disproportionately more shares of firms with good accounting performance, measured by return on assets. Yet, the attractiveness of returns is conditional on risk: Dahlquist and Robertsson (2001) demonstrate that foreign investors show a weaker preference for risky firms with high past returns than individual investors. Again, another important qualification relates to general characteristics of the host countries. In the transition economy environment, the financial performance measures may not provide good indicators for future results. Moreover, they may be less significant for strategic investors, who dominate in such environment.

4.   Hypotheses

On the basis of existing research and characteristics of the institutional framework, as discussed above, we derived the following set of hypotheses:

I.   We shall expect that the equity structures evolve towards higher homogeneity, with the dominant role of foreign direct investors.

II.   a/ Foreign direct investment will be focused on companies where informational asymmetry is relatively low. It implies that larger companies will have relatively higher equity ownership by foreign investors.

b/ On the other hand, size may prevent foreign investors from acquiring dominant stakes.

We wish to test those two hypotheses separately – namely, for impact of size on foreign investors presence and for impact of size on dominant stakes of foreign investors.

III.   Both presence and high equity stakes of foreign investors will be associated with high export intensity. Conversely, the opposite is likely to be true for domestic institutional investors.

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[4] The current ratio is equal to current assets/current liabilities.

Two potential explanations relate to exports. On the basis of data set we cannot distinguish between them. First focuses on the informational barriers – exporting companies are more visible. This is the same theoretical argument, which relates to size (Ia). Second argument is related to the assumption that the foreign owners have specialised export-enhancing resources, which they want both to protect and to acquire future gains from investment.

Conversely, we expect that in case of domestic market oriented companies (e.g., companies with a lower export intensity), 100% foreign ownership is less likely, as foreign investors will seek access to specialised knowledge of Hungarian institutional investors, creating links via joint equity.

IV. Foreign investors will acquire large equity stakes in companies characterised by a high level of productivity in the past. Again, this may be linked to the informational asymmetry problem. Unlike domestic investors, it is more difficult for the foreign investors to assess net present value of the company on the basis of more idiosyncratic information.

4. Adjustment towards homogeneous ownership structures

To verify the hypotheses, we use the database of 162 largest Hungarian manufacturing companies during the period of 1994-1999. The financial and economic data corresponds to publicly available information, in particular to data published annually in the Hungarian magazine "Figyelo". However, this database was supplemented by the records on equity holdings by different classes of owners, which was collected as part of the ACE-Phare Project P-981048 by the team at the Hungarian Academy of Science co-ordinated by Peter Vince in early 2001.

Figures 1-4 presented in the Annex illustrate the evolution of the ownership structure between 1994-1999, showing both shares of different categories of owners in total capital of all companies and equally weighted average shares of different categories of owners. Due to earlier privatisations, the share of state equity in largest Hungarian firms decreased to about one third, already by 1994. The process of privatisation continued during the next few years, and, as a result, the government share became

negligible by the end of 1990's (Figure 4). For 1999, there is only one company in the sample, which has not been privatised yet. In addition, there are just a few companies with minority government stakes to be privatised later, and one company for which the government retained 'long-run' minority equity holdings, implying that its equity is not expected to be sold in a foreseeable future. State share in total capital was higher than the average (equally weighted) share at the beginning of the period. It indicates that larger companies were privatised slower than their smaller counterparts.

Foreign investors continued to be the main beneficiaries of the privatisation process. To assess the direction of evolution in ownership structures, we computed time-paths for two indicators:

- the average share of foreign owners in firm's equity: $\dfrac{\sum\limits_{i=1}^{n} \dfrac{f_i}{e_i}}{n}$ and,

- the total share of foreign owners in aggregate value of equity (capital): $\dfrac{\sum\limits_{i=1}^{n} f_i}{\sum\limits_{i=1}^{n} e_i}$,

where n represents the total number of companies, e_i relates to the total value of a firm i equity and f_i represents the value of equity held by foreign investors in a firm i.

An average share of foreign owners in equity was 56% already in 1994 (first of the indicators, as defined above) and their share in total capital amounted to 44% (second indicator). The difference between the two implies that foreign capital was initially flowing to small companies, which is simply a result of the initial privatisation choices. Yet, as the privatisation process continued, the share of foreign equity in total capital increased to 73% and the equally weighted average increased to 69%. Thus, the equilibrium result for this class of owners indicates a preference for larger companies. It is interesting to notice that the share of foreign investors stabilises after 1997, meaning that foreign investors consolidate their holdings. The average share even decreases marginally in 1999 (Figure 1). When the evolutions of foreign ownership and state ownership during the period is taken together, it is reasonable to suggest that foreign

investors achieved their equilibrium level of equity holdings. This kind of adjustment towards final equilibrium makes the period of 1994-1999 an interesting period to analyse.

The second important group of investors, who participated in the privatisation process were Hungarian domestic enterprises. Their holdings are much lower than those of foreign investors, however they visibly played a far more active role at later stage of privatisation, as compared with the earlier period. This is confirmed by the fact that their average holdings increases from 16.5% to 22.5% between 1994 and 1999. The share in total capital increases as well, but at a less dramatic pace, from 11.5% to 13.0%. Again, the difference between the two indicators results from higher shares of domestic institutional investors in smaller companies. Overall, the significance of domestic institutional (and typically relational) investors rose during that period (Figure 3).

Finally, one more interesting class of ownership is insider equity. As may be seen from Figure 2, equity holdings of insiders in Hungary were very small, as opposed to some other neighbouring economies, Poland in particular.[5] Moreover, the average share of insiders decreased significantly in the recent period, from 1.7%-1.8% in the period 1995-1997 to just above 1% in 1999. The share in total capital of all companies is even lower and amounted to 0.6% in 1999. That indicates a stronger presence of insiders equity in smaller companies.

The evolution of shares in total capital and average shares of equity for different classes of owners suggest an interesting post-privatisation ownership dynamics that can be identified at the disaggregated level. This is illustrated by Figures 5-10. First, Figures 5 and 6 present a comparison of the distribution of foreign investors equity shares for 1994 and 1999. The structure in the latter year is far more dichotomous – firms with either 100% or zero foreign ownership dominate. How this evolved can be identified from the Figure 9, which presents a scatter diagram comparing the foreign investors shares for 1994 and 1999 for the same companies. Points close to the diagonal represent companies, where the share of foreign owners remained similar in this period. Few foreign firms decreased their equity holdings, including four which withdrew completely (represented

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[5] On the role of insiders in Polish privatisations, see Baltowski, Mickiewicz, 2000.

by points on the horizontal axis). However, the increase in equity dominates, which is reflected by the distribution on the scatter diagram skewed towards the upper left corner. It is noticeable that in many firms where foreign investors had majority stakes already in 1994, they have also increased their holdings up to 100% in the subsequent period. In addition, there were several new entries, as reflected by points on the vertical axis. Yet, these firms were different in terms of initial equity levels acquired by foreign owners.

Similarly, we may illustrate an equity acquisition strategy by domestic institutional owners, using Figures 7-8 and 10. Here, the pattern of change is different, but the trend towards more homogenous structures is also present. When Figure 7 (1994) is compared with Figure 8 (1999), the similar proportion (the majority of companies) have no investment by Hungarian enterprises. However, for those, which have Hungarian investors, the holdings by Hungarian corporations increase significantly. This is also reflected by the 1994-1999 scatter diagram (Figure 10). However, it is also interesting to notice that the group of companies with zero holdings by Hungarian institutional investor is not the same in 1994 and 1999 – this is reflected in a significant number of points being located on both horizontal and vertical axes. It is clear that Hungarian corporations were more active in adjusting their investment structure, and the direction of adjustment differ for various groups of firms. Again, the scatter diagram is skewed towards upper left corner, which means that the increase in equity is more frequent, yet it is noticeable that a number of other investors sold their holdings entirely, as represented by the points on the horizontal axis. Thus, the general direction of change is consistent with the first group of investors (foreign) –i.e. it reflects adjustment towards a more homogeneous structure of ownership. Therefore an interesting research question remains: which factors affected the levels of equity ownership chosen by the investors?

6.   Variables
As clear from the data characteristics presented in the previous section, we encounter a serious non-normality problem in terms of the distribution of share ownership. That is easily confirmed by standard tests of normality. For our main variable of interest, the share of foreign capital in equity, the Kolmogorov-Smirnov test (with

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Lilliefors significance correction) detects divergence from normality, which is highly significant at the 0.001 level. This is illustrated by Figure 11, which shows the actual distribution as contrasted with normal distribution (represented by the diagonal).

As a result, this non-normality problem prevents us from using the OLS regressions as an estimation method. Therefore, we used two methods of estimations:

/1/ Logistic regression.

Here, we defined five categorical variables, to be used in subsequent estimations:

For00du: this indicator corresponds to the companies with (non-zero) presence of foreign investors amongst equity holders.

For50du: indicates companies with majority holdings by foreign investors.

For100du: indicates companies with 100% foreign ownership.

Hen00du: relates to companies with presence of Hungarian institutional investors.

Hen50du: indicates companies with majority holdings by Hungarian institutional investors.

We did not test for 100% ownership by Hungarian institutional investors, as the number of such companies is too small for the results to be meaningful.

The chosen levels for the categorical variables are not accidental. They reflect levels, which are important from the point of view of corporate control. 50% ownership represent a controlling shareholding, and 100% ownership level exclude any minority shareholders. Interestingly, we also tried 75% and 90%, the two levels which according to Hungarian law, give additional rights to dominant owners, such as excluding minority shareholders from the automatic right to be represented on the board and from access to all financial information on demand. Both proved to be significant, but the results were weaker as compared with those listed above.

/2/ Ordinal regression.

Here, we used the same thresholds, as defined above (plus one additional threshold for foreign investors, at ownership level equal to 90%), to create five ordinal groups for foreign ownership (*For*):

For = 0

0 < For < 50%,

50% < For < 90%,

90% < For < 100%,

For = 100%

Similarly, we defined three ordinal groups for the domestic institutional owners:

Hen = 0,

0 < Hen < 50%,

50% < Hen

As will be demonstrated, the results of the two methods are similar. However, we believe that separate logistic regressions are important, as the second method (joint ordinal regressions) masks important non-linearities in the impact of some independent variables, size in particular.

Selected independent variables correspond to the hypotheses formulated above. Following a design used by Demsetz and Villanonga (2001) we use averages of past values (in our case averages for 1994-1998) as we assume that investors rely on past information in their decisions concerning equity levels.[6]

We use a standard measure of the company size, which is:[7]

LOGASTav = logarithm of total assets

The significance of export is measured by export intensity, defined as:

XINTav = export revenue / total revenue from sales

In addition to the above, we introduce two performance measurements.

First, we used a financial performance indicator specified as:

ATPASTav = return on assets = after tax profit / total assets[8]

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[6] We also experimented with alternative approach, pooling all observations, and using independent variables lagged by one year, with fixed year effects, omitting the first year in addition to one year lost due to use of lagged independent variables. The results are similar to those obtained from our chosen specification, and they are available on request from the authors.

[7] See for instance Dhawan 2001.

[8] We also experimented with returns on sales. No results were affected. Both are correlated (see below) and we use the one, which is more standard in literature, for our specifications. Results with alternative specifications are available on request.

Taking into account possible inaccuracies in the measurement of assets, we also include another indicator of performance, which we expect to be more important as a potential indicator of the long-term net present value. The variable is a proxy of labour productivity, defined as:

LOGPRav = LOGSALav - LOGEMPav = LOG (Sales/Employment)

In addition, we introduced a set of control variables.

First is a share of sales of given company in its sector's total sales (**SECSALav**). To calculate this variable, we combined our data with the data set for sectoral sales in Hungary, developed by WIIW Institute in Vienna (for 1994-1998).

The second variable is a dummy for greenfield foreign investment (**BVG**). By introducing this variable, we want to verify if the difference between greenfield and brownfield investment mode had a systematic impact on the levels of equity chosen by dominant foreign owners.

Possible owner-specific effects that attract foreign investors may also be related to the sectoral characteristics. We capture those by sectoral dummies, where figures relate to corresponding NACE codes.

Two traditional / low tech sectors:

15 = food products (**Food**)
16,17,19, = other traditional, including textile *(Text)*

Three resource / scale intensive sectors:

20, 21 = wood and paper products (**Woodpap**)
23-25 = petroleum, chemicals, plastic (**Chem**)
26-28 = minerals and metals (**Met**)

Two high technology sectors:

29-32 = machinery (**Mach**)
34 = automotive (**Auto**)

And a residual category, omitted in estimations to avoid perfect muliticollinearity:

22, 36, 37 = other.

The primary reason for clustering NACE groups into more aggregate categories was to avoid variables with a low number of observations.

We also experimented with another aggregated classification of sectors, related to the distinction between 'high tech', 'resource and scale intensive' and 'traditional' sectors (Mickiewicz et al. 2001; Landesmann 2000). All other variables were robust to change in specification, however the aggregate sectoral dummies were insignificant, so we do not report those specifications. Even if negative, the result is interesting. It highlights that there is no sufficient evidence to indicate that the levels of equity shares held by foreigners are in 'high technology' sectors, as could be derived from some strands in literature, as discussed in section 2.

One additional problem we encountered with the data relates to the presence of missing values. By using Little's multivariate test of MCAR (Chi square = 372.48, p<0.000) we can reject the hypothesis that the data is missing in a completely random pattern. This suggests that techniques such as the EM algorithm are appropriate, as opposed to case wise deletion. Therefore, all subsequent estimations are based on the data set produced by the EM technique.

Before the final choice of the model, we also check for multicollinearity effects, using a pearson correlation matrix. The results are presented below.

Table 1. Correlations (Pearson) between independent variables.

		ATPAS TAV	XINTAV	LOGAST AV	LOGPR AV	SECSAL AV	LOGSAL AV	ATPSAL AV	LOGEM PAV
ATPASTAV	Corr.	1.000	.162*	-.102	.204**	-.041	-.003	.734***	-.158*
	Signif	.	.039	.197	.009	.606	.972	.000	.044
XINTAV	Corr.	.162*	1.000	.033	-.020	-.056	.067	.086	.080
	Signif	.039	.	.679	.804	.478	.399	.277	.310
LOGASTAV	Corr.	-.102	.033	1.000	.225**	-.030	.827***	.123	.638***
	Signif	.197	.679	.	.004	.707	.000	.118	.000
LOGPRAV	Corr.	.204**	-.020	.225**	1.000	-.006	.361***	.066	-.408***
	Signif	.009	.804	.004	.	.944	.000	.401	.000
SECSALAV	Corr.	-.041	-.056	-.030	-.006	1.000	.043	-.032	.047
	Signif	.606	.478	.707	.944	.	.583	.689	.553
LOGSALAV	Corr.	-.003	.067	.827***	.361***	.043	1.000	.128	.704***
	Signif	.972	.399	.000	.000	.583	.	.104	.000
ATPSALAV	Corr.	.734***	.086	.123	.066	-.032	.128	1.000	.075
	Signif	.000	.277	.118	.401	.689	.104	.	.343
LOGEMPAV	Corr.	-.158*	.080	.638***	-.408***	.047	.704***	.075	1.000
	Signif	.044	.310	.000	.000	.553	.000	.343	.

N=162.
*   Correlation is significant at the 0.05 level (2-tailed).
**   Correlation is significant at the 0.01 level (2-tailed).
***   Correlation is significant at the 0.001 level (2-tailed).

Focusing on the most significant correlations (0.001 level), we can identify three clusters. First, size variables (assets, sales and employment) are highly correlated. That justifies our decision to choose assets as the most standard single measure of size.

Second, the two financial measures (return on sales and return on assets) are highly correlated. We choose the second one for estimation, as it is more standard.

Third, predictably, employment and sales are strongly correlated with our proxy for labour productivity, which is derived as a ratio of the two. Again, that provides an additional argument for excluding employment and sales, as we have no specific hypotheses related to these two.

7. Estimation results

In Annex 1, we present the results of five specifications for individual logistic regressions related to the chosen threshold levels and two joint ordinal regressions, for both foreign investors and domestic investors.

The first three logistic regressions relate to the determinants of foreign investors presence,[9] majority share (i.e. above 50%) and 100% ownership, correspondingly. The

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[9] In this specification, we did not include the dummy for greenfield investment. Here, the variable is spurious, as by definition it is perfectly correlated with the presence of foreign owners.

next two models present estimation for presence and majority share of Hungarian domestic institutional investors. Finally, models six and seven present two ordinal regressions, for foreign share in equity and for domestic institutional investors' share in equity, correspondingly. The ordinal regressions combine several levels of ownership together as ordinal variable, taking into account only the levels, which has specific economic meaning, as discussed above (i.e. zero, 50%, 90%, 100%).

Both methods of estimation yield similar results, except where a variable changes sign for different levels of equity (that relates to size variable in particular). Unlike joint ordinal regressions, individual regressions for different level are capable to detect those differentiated effects.

Several results emerge from the estimations.

First, the size of the company (as measured by assets) seems to have a positive impact on the decision of foreign owners to enter (the corresponding variable is marginally insignificant, see Table A1). On the other hand, the same variable becomes clearly significant with the opposite sign, for determinants of 100% foreign ownership (Table A3). Of those two, the second (negative) effect seems to be relatively stronger. This is reflected by the negative and statistically significant sign for joint ordinal regression (Table A6).

It is interesting to notice that for Hungarian corporate investors, the size of company is also a highly significant factor associated with their presence. On the other hand, its impact becomes inconclusive at the 50% level. We could not test for 100% in this case, as there were too few companies with this type of ownership structure. The joint test of ordinal regression results in insignificant coefficient (Table A7).

Thus, we find strong supporting evidence for hypothesis IIa (positive impact of size, attracting both foreign investors and Hungarian institutional investors) and some support for Ib (size having negative impact on high levels of equity).

Second, we expected that export-intensity might be either an indicator of the firm's higher visibility (lower informational barriers) or an indicator of export-orientation and

presence in foreign markets, where foreign investors have owner-specific advantages. In other words, foreign investors may be attracted by companies characterised by significant export-intensity. Our interpretation of this relates to the necessity to protect the transfer of the owner-specific knowledge and to secure ownership against possible competition from exports, given that transaction costs are high. On the other hand, it is clear that domestic institutional investors specialise in companies which are more oriented toward the domestic market. In all four models relating to foreign investors (Tables A1-A3 and A6), the corresponding coefficients for export intensity are consistently significant with expected signs (positive). It is also interesting to notice, that the higher levels of significance relate not to the presence, but to the cases of 50% and 100% equity levels by foreign investors (comp. Tables A1-A3, coefficients for *XINTAV*). It is clear that the issue of control is important in case of exporting companies.

On the other hand, Hungarian institutional investors tend to be attracted to companies with lower export intensity, but in this case the link is weaker and all corresponding coefficients are marginally insignificant (Tables A4-A6).

Thirdly, the variable representing financial indicators is consistently highly insignificant. It appears that in this economic environment, current financial indicators alone are not providing decisive information on the net present value of the companies and therefore they do not affect investment decisions by foreign investors.

On the other hand, past values of labour productivity seem to be a good indicator of performance, which is positively associated with higher levels of FDI. In all models, coefficients are highly significant, again with expected signs (positive for foreign investors). It is also interesting to notice, that the highest significance level relates to 100% ownership by foreign owners, indicating that they aim for exclusion of any outside ownership in companies characterised by highest levels of past performance.

As a mirror image of the results for foreign investors, the higher past values of labour productivity have negative impact on both presence and majority share in ownership by domestic institutional investors (Tables A4, A5, A7). Yet, we should be careful when interpreting this particular outcome. It may be simply indicative of the more general

problem faced by any comparative research on ownership variables and demonstrate the limitations of partial equilibrium analysis. Namely, the choices and actions by different classes by owners are never independent from each other. In the particular context of an open transition economy, with relatively fast privatisation process, the investors face disequilibrium situation, with under-priced equity. Additionally, being not restricted in terms of access to financial capital, foreign investors have clear advantage over domestic investors,. That relates in particular to the early stage of the privatisation process. Given that handicap, the foreign owners may have a first mover advantage, choosing the preferred companies. Thus, the capital market situation could be described by a specific bidding model, with foreign owners acting first due to their access to financial capital. This interpretation is particularly relevant for the group of companies we analyse that is the largest Hungarian manufacturing firms. If this interpretation is correct, the results for the Hungarian domestic institutional investors are affected by the choices made by foreign investors and should be treated with caution.

Fourthly, none of the models can identify any significant difference between greenfield and brownfield foreign investment projects. The mode of entry has no visible impact on the chosen levels of foreign ownership.

And finally, strategic focus on companies with a strong position on the domestic market has impact neither on presence nor on higher control levels by the two classes of investors we discuss. This can be explained as a corollary of the result related to export intensity. Significance of the second fact explains why the position of the company on the domestic market is not important.

8.   Conclusions

Our analysis demonstrates that the ownership structure of Hungarian firms is moving towards a higher degree of homogeneity and concentration. Institutional investors, both foreign and domestic, are emerging as two dominant classes of owners.

Moreover, the econometric results are consistent with assumption that the equity levels are endogenous factors. Our estimations of equity shares held by both foreign investors and domestic institutional investors confirmed the strands present in existing literature. The informational asymmetry may be a barrier to foreign investment and this is why larger companies are chosen, that is, those with more and superior quality information available. A similar argument relates to export-intensive companies, albeit this second result may also be interpreted in terms of the effort of foreign investors to protect the knowledge transfer, assuming that foreign investors wish to prevent their joint venture from becoming a competitor to them in the international market.

In addition, the foreign investors are both entering and building up high controlling stakes of companies characterised by high labour productivity. On the other hand, past financial results are not important. This is consistent with the literature on transition economies, which argues that financial indicators might be misleading, therefore labour productivity is a better proxy for expected future performance in such an environment (see Bornstein 2000 for an overview). Again, the fact that foreign investors are attracted to the companies characterised by previous positive results in terms of performance, can be explained by presence of informational asymmetry: foreign investors have to rely on available past information.

However, the novelty of our approach may lie elsewhere. In our empirical section, we focused on three important threshold levels of equity holdings: greater than zero, majority, and 100%. We demonstrate that the logic of equity investment decisions, i.e. relevant factors, are different for each threshold. One particularly interesting finding relates to the fact that while size is a factor attracting presence of foreign owners, it makes acquiring 100% stakes difficult. We obtained similar result for Hungarian institutional investors, as size becomes insignificant, once we consider a higher equity level.

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Annex 1: Estimation results

Table A1: Bivariate logistic regression
Dependent variable: presence of foreign investors (foreign share in equity > 0)

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
ATPASTAV	-.452	2.507	.033	1	.857	.636
XINTAV	2.164	1.057	4.188	1	.041	8.707
LOGASTAV	.554	.348	2.538	1	.111	1.741
LOGPRAV	.828	.409	4.100	1	.043	2.290
SECSALAV	.002	.007	.127	1	.721	1.002
FOOD	-1.850	1.220	2.297	1	.130	.157
TEXT	5.278	24.555	.046	1	.830	195.986
WOODPAP	-1.440	1.628	.782	1	.377	.237
CHEM	-.688	1.304	.278	1	.598	.502
MET	-2.249	1.277	3.098	1	.078	.106
MACH	-1.614	1.525	1.121	1	.290	.199
AUTO	-1.410	1.741	.656	1	.418	.244
Constant	-4.388	2.929	2.245	1	.134	.012

Omnibus Tests of Model Coefficients: Chi-square 25.4, df 12, significance 0.013
Overall accuracy of classification: 80.2%

Table A2: Bivariate logistic regression
Dependent variable: majority share of foreign investors (for. share in equity>50%)

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
ATPASTAV	-.388	2.146	.033	1	.857	.679
XINTAV	2.018	.877	5.293	1	.021	7.521
LOGASTAV	.118	.257	.210	1	.647	1.125
LOGPRAV	.933	.354	6.937	1	.008	2.541
SECSALAV	.003	.011	.104	1	.747	1.003
TRAD	-.322	1.276	.064	1	.801	.725
HT	-2.938	1.730	2.883	1	.089	.053
FOOD	-1.421	1.377	1.064	1	.302	.242
TEXT	5.489	14.958	.135	1	.714	241.920
WOODPAP	-.533	1.591	.112	1	.738	.587
CHEM	-1.131	1.269	.794	1	.373	.323
MET	-1.798	1.308	1.890	1	.169	.166
MACH	1.854	1.387	1.786	1	.181	6.385
AUTO	1.034	1.558	.440	1	.507	2.812
BVG	.487	.614	.628	1	.428	1.627
Constant	-2.425	2.413	1.010	1	.315	.088

Omnibus Tests of Model Coefficients: Chi-square 36.6, df 15, significance 0.001
Overall accuracy of classification: 73.9%

Table A3: Bivariate logistic regression
Dependent variable: 100% share of foreign investors (foreign share = 100%)

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
ATPASTAV	-1.753	1.869	.879	1	.348	.173
XINTAV	1.862	.809	5.296	1	.021	6.438
LOGASTAV	-.617	.240	6.611	1	.010	.540
LOGPRAV	.933	.301	9.623	1	.002	2.542
SECSALAV	-.001	.003	.157	1	.692	.999
TRAD	.400	1.039	.149	1	.700	1.493
HT	-1.206	1.488	.657	1	.418	.299
FOOD	-.747	1.079	.479	1	.489	.474
TEXT	2.081	1.521	1.870	1	.171	8.009
WOODPAP	1.589	1.289	1.520	1	.218	4.900
CHEM	-.167	1.055	.025	1	.874	.846
MET	.204	1.121	.033	1	.856	1.226
MACH	1.845	1.376	1.799	1	.180	6.330
AUTO	.211	1.445	.021	1	.884	1.235
BVG	.184	.528	.121	1	.728	1.201
Constant	.358	1.977	.033	1	.856	1.431

Omnibus Tests of Model Coefficients: Chi-square 43.5, df 15, significance 0.000
Overall accuracy of classification: 70.8%

Table A4: Bivariate logistic regression
Dependent variable: presence of Hungarian institutional investors (equity share> 0)

	B	S.E.	Wald	df	Sig.	Exp(B)
ATPASTAV	2.466	1.825	1.825	1	.177	11.772
XINTAV	-1.268	.773	2.688	1	.101	.282
LOGASTAV	.629	.229	7.566	1	.006	1.876
LOGPRAV	-.866	.296	8.535	1	.003	.421
SECSALAV	.002	.003	.223	1	.637	1.002
FOOD	-.115	.813	.020	1	.888	.892
TEXT	-2.589	1.350	3.677	1	.055	.075
WOODPAP	-2.685	1.343	4.001	1	.045	.068
CHEM	-.710	.851	.696	1	.404	.492
MET	-1.260	.881	2.047	1	.152	.284
MACH	-1.509	.991	2.321	1	.128	.221
AUTO	-.621	1.107	.315	1	.575	.537
BVG	-.419	.525	.636	1	.425	.658
Constant	-.739	1.782	.172	1	.678	.478

Omnibus Tests of Model Coefficients: Chi-square 41.0, df 13, significance 0.000
Overall accuracy of classification: 72.7%

Table A5: Bivariate logistic regression
Dependent variable: majority share of Hungarian inst. investors (share > 50%)

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
ATPASTAV	-.002	2.322	.000	1	1.000	.998
XINTAV	-1.866	.977	3.647	1	.056	.155
LOGASTAV	-.056	.285	.039	1	.843	.945
LOGPRAV	-.995	.406	6.007	1	.014	.370
SECSALAV	-.004	.022	.042	1	.837	.996
FOOD	.393	.842	.218	1	.640	1.482
TEXT	-7.223	24.585	.086	1	.769	.001
WOODPAP	-.465	1.367	.116	1	.734	.628
CHEM	-.493	.938	.276	1	.599	.611
MET	-.295	.961	.094	1	.759	.744
MACH	-.971	1.208	.646	1	.422	.379
AUTO	.590	1.274	.215	1	.643	1.804
BVG	-.255	.664	.148	1	.701	.775
Constant	3.167	2.381	1.769	1	.184	23.733

Omnibus Tests of Model Coefficients: Chi-square 28.2, df 13, significance 0.008
Overall accuracy of classification: 77.6%

Table A6: Ordinal regression. Dependent variable: share of foreign investors in equity (groups: FOR=0, 0<FOR<50%, 50%<FOR<90%, 90%<FOR<100%)

Variables	Estimate	Std. Error	Wald	df	Sig.
ATPASTAV	-1.150	1.547	.553	1	.457
XINTAV	1.539	.656	5.499	1	.019
LOGASTAV	-.391	.182	4.629	1	.031
LOGPRAV	.816	.246	11.055	1	.001
SECSALAV	4.526E-04	.001	.176	1	.675
[TRAD=.00]	-9.322E-02	.904	.011	1	.918
[HT=.00]	1.226	1.162	1.112	1	.292
[FOOD=.00]	.414	.900	.212	1	.645
[TEXT=.00]	-2.464	1.434	2.951	1	.086
[WOODPAP=.00]	-1.865	1.158	2.596	1	.107
[CHEM=.00]	.158	.848	.035	1	.852
[MET=.00]	-5.507E-03	.895	.000	1	.995
[MACH=.00]	-1.721	1.019	2.854	1	.091
[AUTO=.00]	-.514	1.087	.223	1	.636

Model Fitting Information: Chi-Square 42.9, df 14, significance: 0.000. Link function: logit.
Pseudo R-Square: Cox and Snell 0.233, Nagelkerke 0.251, McFadden 0.101.

Table A7: Ordinal regression. Dependent variable: equity share of Hungarian institution. investors. (ordinal variable; groups: HEN=0, 0<HEN<50%, 50%<HEN)

Variables	Estimate	Std. Error	Wald	df	Sig.
ATPASTAV	.722	1.679	.185	1	.667
XINTAV	-1.029	.722	2.027	1	.155
LOGASTAV	.166	.197	.712	1	.399
LOGPRAV	-1.035	.284	13.283	1	.000
SECSALAV	-1.343E-02	.028	.232	1	.630
[TRAD=.00]	.164	.997	.027	1	.869
[HT=.00]	.249	1.243	.040	1	.841
[FOOD=.00]	-1.058	.964	1.207	1	.272
[TEXT=.00]	1.352	1.460	.857	1	.355
[WOODPAP=.00]	.555	1.216	.208	1	.648
[CHEM=.00]	-.169	.974	.030	1	.863
[MET=.00]	.188	1.019	.034	1	.854
[MACH=.00]	.187	1.070	.031	1	.861
[AUTO=.00]	-1.502	1.138	1.742	1	.187

Model Fitting Information: Chi-Square 37.5, df 14, significance: 0.001. Link function: logit.
Pseudo R-Square: Cox and Snell 0.207, Nagelkerke 0.239, McFadden 0.115.

Annex 2: Figures

Figure 1. The evolution of share of foreign equity in Hungarian firms, 1994-1999
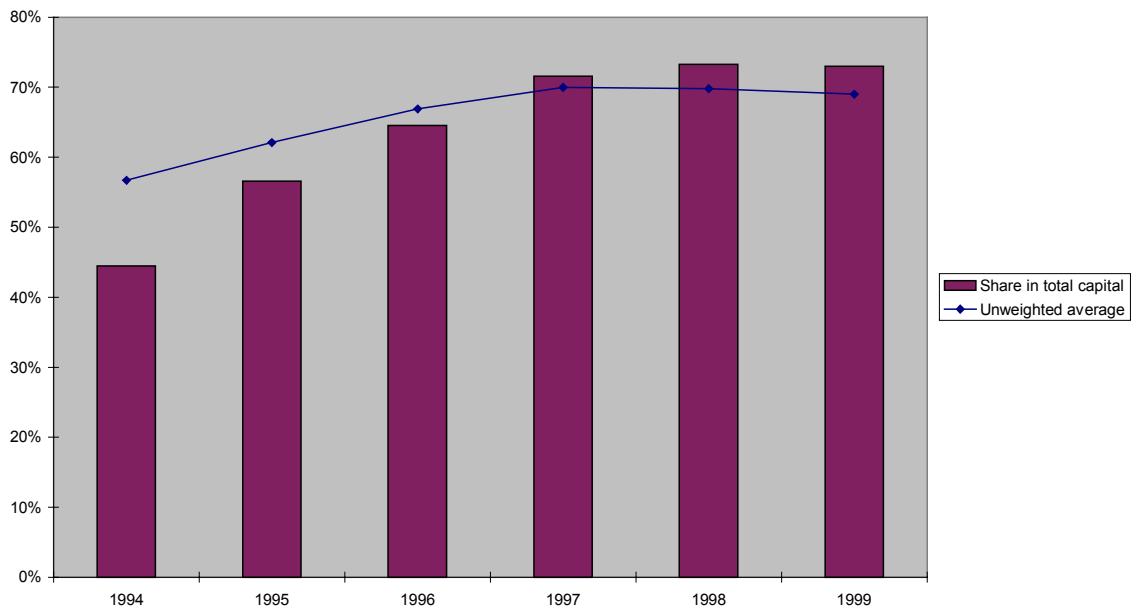
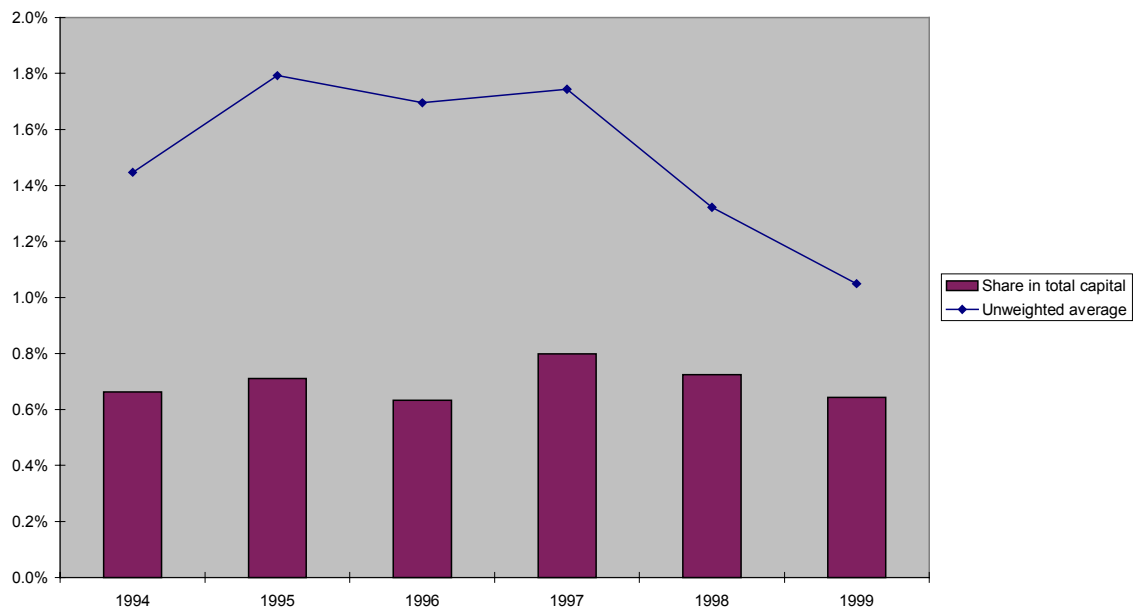**Figure 2. The evolution of share of insiders in Hungarian firms, 1994-1999**

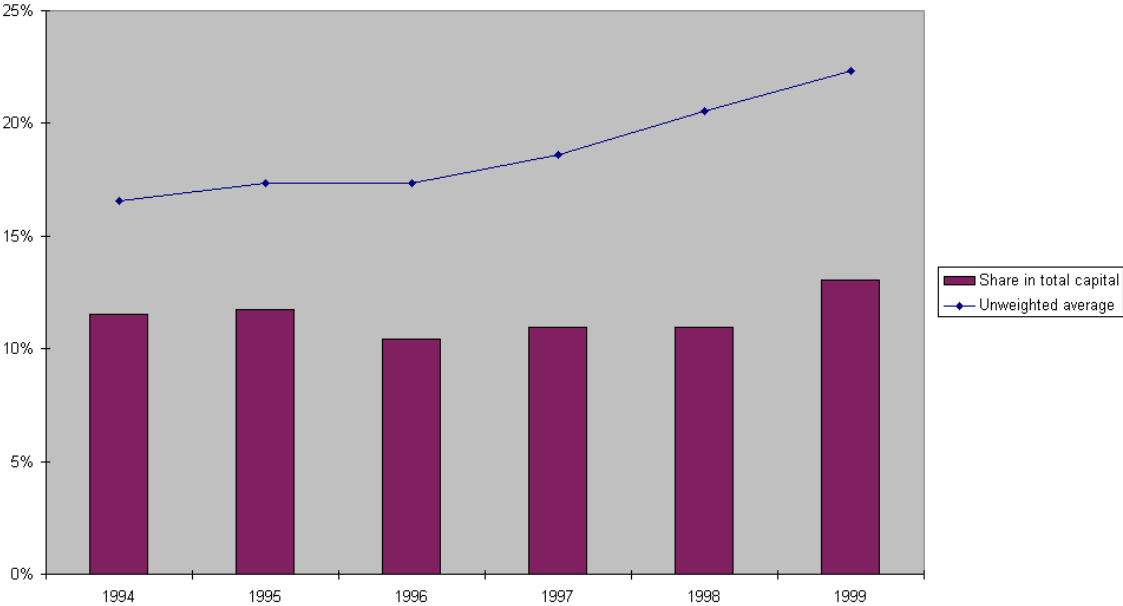**Figure 3. The evolution of share of domestic enterprises equity in Hungarian firms, 1994-1999**

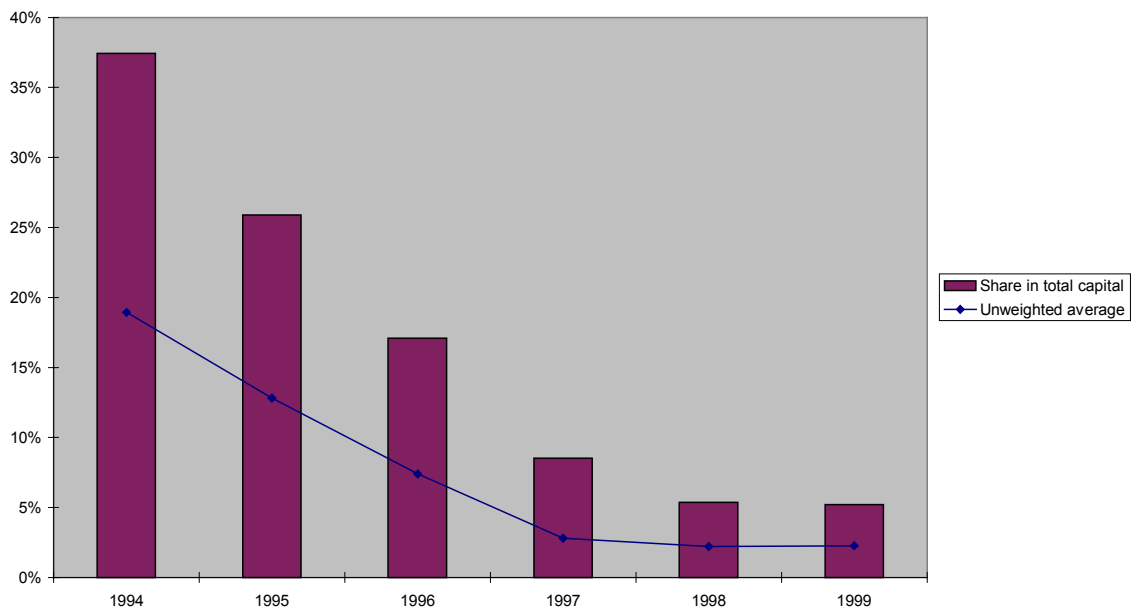**Figure 4. The evolution of share of state equity in Hungarian firms, 1994-1999**

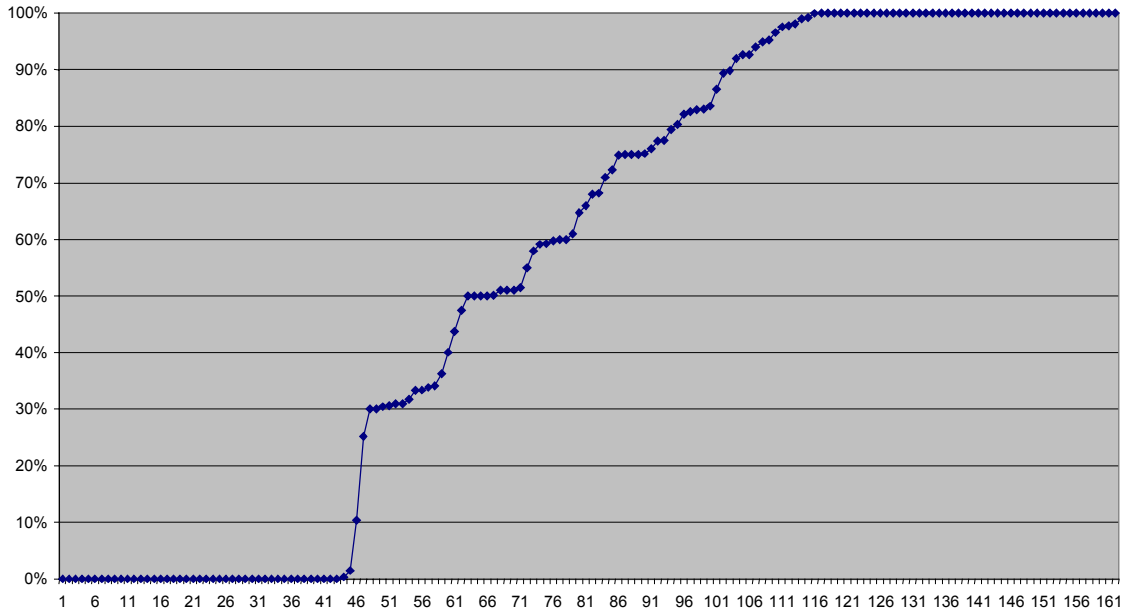Figure 5. Distribution of Foreign Capital Share in Equity, 1994

Figure 6. Distribution of Foreign Capital Share in Equity, 1999
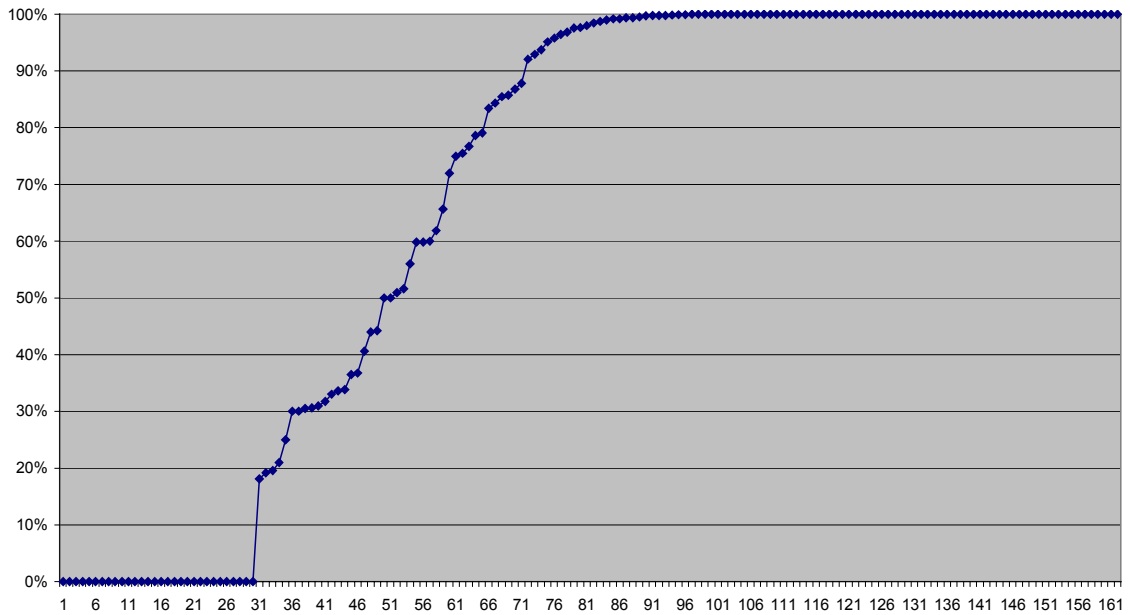
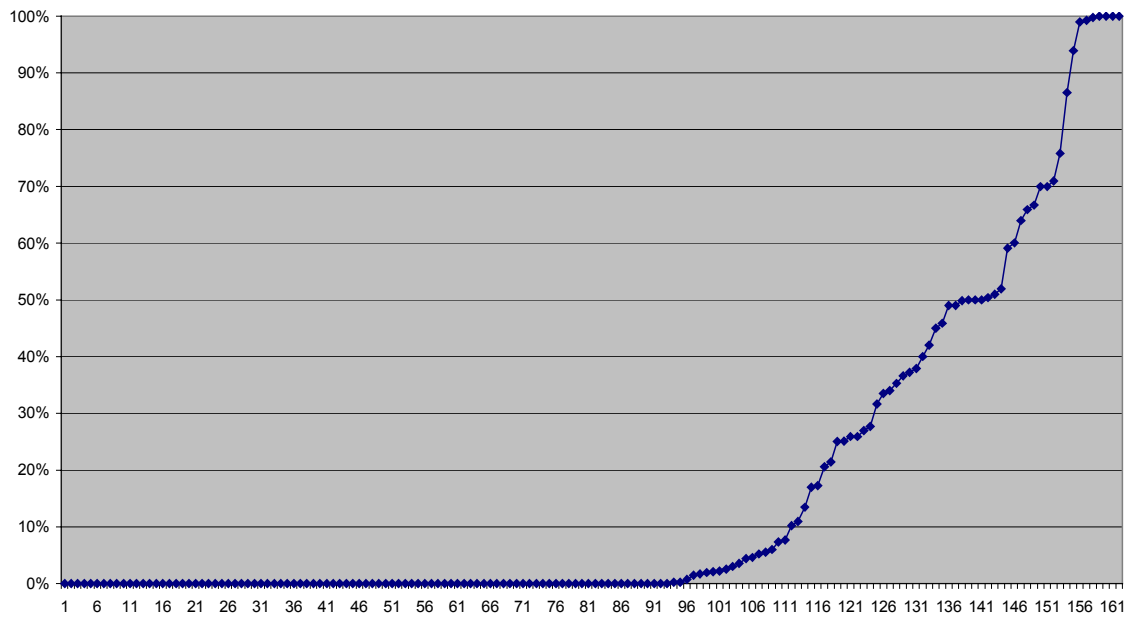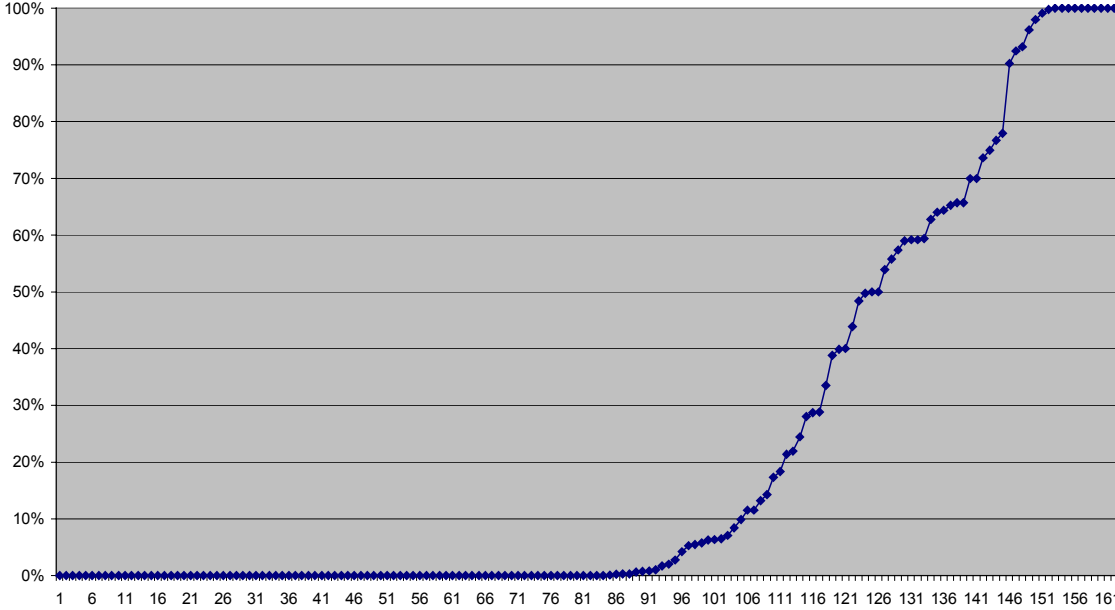Figure 7. Distribution of Hungarian Institutional Investors' Share in Equity, 1994

Figure 8. Distribution of Hungarian Institutional Investors Share in Equity
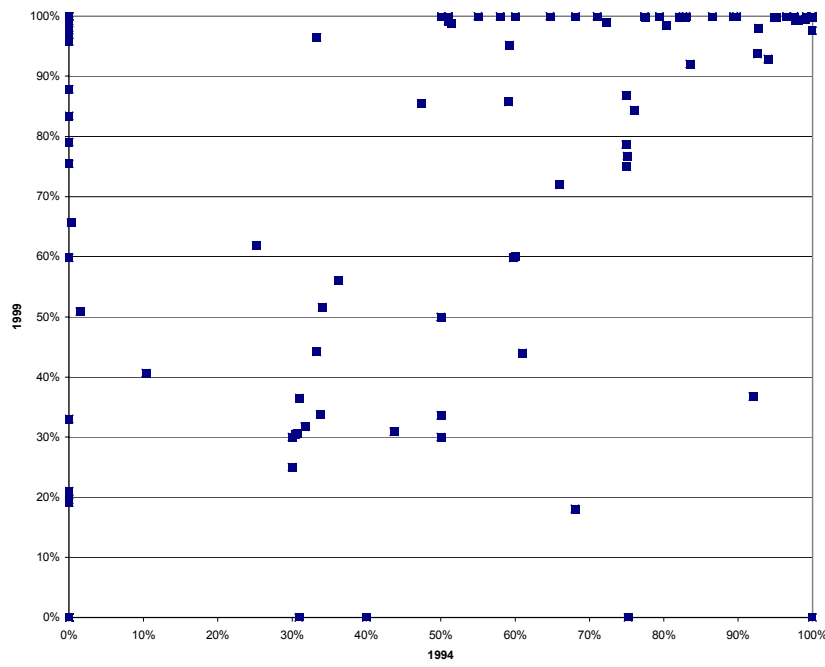
Figure 9.
Scatter Diagram:
Share of Foreign Capital
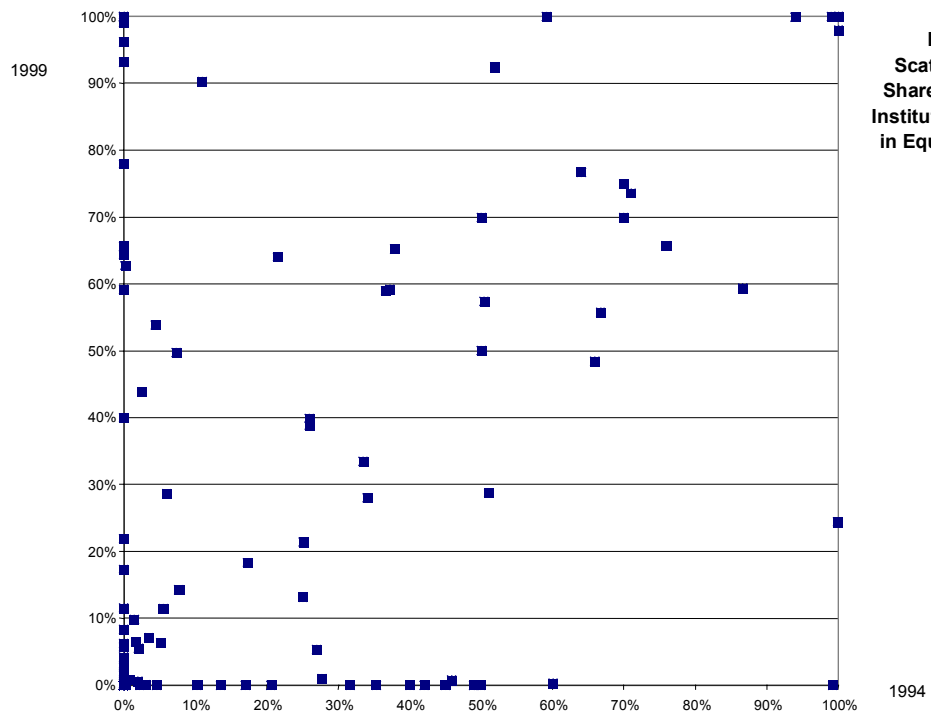**in Equity, 1994 and 1999**

**Figure 10.
Scatter Diagram:
Share of Hungarian
Institutional Investors
in Equity, 1994-1999**

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