

# VOUCHER PRIVATIZATION, CORPORATE CONTROL AND THE COST OF CAPITAL: AN ANALYSIS OF THE CZECH PRIVATIZATION PROGRAMME

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## ABSTRACT

### Voucher Privatization, Corporate Control and the Cost of Capital: An Analysis of the Czech Privatization Programme\*

Voucher privatization programmes have been criticized for leading to excessively dispersed ownership and hence failure of control and insufficient corporate governance. We analyse the results of the five auction rounds of the Czech privatization programme and subsequent stock market developments. Contrary to prior fears, dominant investors did emerge in most cases. We then show that the presence of a dominant investor led to an above average share price after correcting for all publicly known differences between the various enterprises. We use information contained in the price dynamics of the auction rounds to show that this price difference was not due to inside information available to dominant investors only, but also to the anticipation of better governance in the presence of dominant investors. This led to a lower cost of capital (higher share price).

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## NON-TECHNICAL SUMMARY

Across the world privatization in post-socialist societies has been delayed by the typical legacy of socialism: a decapitalized private sector. Lack of private capital complicates privatization by severely limiting the potential set of new owners if cash-based methods are to be used. Voucher privatization methods aim at preserving the benefits of auction-based privatization, but stipulate the use of vouchers in this process; the problem of cash constraints has been resolved by charging a nominal fee. In this way the political, corruption and economic problems associated with straight give-away programmes can be avoided without limiting the group of owners to those who have managed to accumulate wealth under the old regime. To date voucher-based programmes have been applied on a large scale in Czechoslovakia (which split into the Czech Republic and Slovakia in January 1993) and in Russia.

Voucher programmes have been criticized for distributing ownership so widely that effective control over management becomes impossible. Any individual shareowner has too little an incentive to monitor himself and too great an incentive to free ride on other shareholders' monitoring efforts. This paper assesses this line of criticism based on the experience of the Czech Republic's voucher privatization programme implemented in 1993.

We exploit a unique feature of the actual auction procedure followed in the Czech and Slovak programmes. All firms in the first wave were auctioned off in at most five rounds, in a process designed to simultaneously exhaust all vouchers and sell all shares. In each round the ownership structure that was emerging from earlier rounds was public information. Investment funds, which had emerged spontaneously in the period leading up to the auctioning process, tended to buy early. Dominant foreign or domestic investors mostly came in even before the voucher process was set in motion (vouchers were given to Czech citizens only). Thus information about the presence of a dominant investor was typically already available at the time of the last round (in most but not all cases the fifth). We use these data plus early stock market quotations to assess whether concentrated ownership led, *ceteris paribus*, to higher share prices and investigate whether this was due to dominant investors' inside information or to the anticipation of better corporate governance in their presence.

The regression results are very clear: the presence of dominant investors in earlier rounds tends to boost share prices; and the larger the Investment Privatization Fund (IPF) contribution, the higher the price. Of the other

variables some perform as expected and some do not. Reported profitability has a positive impact on share prices, while a high debt-to-bookvalue ratio depresses share prices. At least in the auction rounds there was a size effect: given everything else, larger firms tended to be higher priced, somewhat counter to our prior expectations. But the key result is the strong positive effect on share prices of the presence of a dominant investor.

We repeated this exercise using later data on share prices from the stock market rather than from the auction rounds. These gave broadly the same results with some interesting modifications. The positive impact of a large presence of the National Property fund disappeared in the stock market regressions. The presence of a dominant foreign investor or of a dominant IPF still boosted share valuation, however, as it did in the earlier auction rounds. On the impact of a strong domestic investor, the results are less clear. Both in the regression using auction prices and the one using March 1994 stock market data, a significantly positive effect was found; but in the regression using December 1993 data, the relevant dummy was not significant.

Of course a positive impact of the presence of dominant investors could be related to more than expectations of improved corporate governance. One theory would be that dominant investors possessed inside information, and by buying early (which they did, as we demonstrate), they signalled their inside knowledge to uninformed outsiders. We show that this theory predicts that IPFs would on average pay less than the eventual (post-separation) market value. We then show this prediction to be counterfactual. Using the price at which the last share was sold as a benchmark, IPFs overpaid by 23%, rather than underpaid. We therefore conclude that the positive impact of the presence of dominant investors on share prices was due to expectations of better corporate governance, not to the fact that those investors possessed inside knowledge.

## 1 Introduction

Across the world privatization in post-socialist societies has been delayed by the typical legacy of socialism: a decapitalized private sector. Lack of private capital complicates privatization by severely limiting the potential set of new owners if cash based methods are to be used.

Different countries have responded to this problem in different ways. For example in Chile privatization was delayed until growth had created a new class of potential cash rich entrepreneurs. In Eastern Europe this approach is considered unacceptable by many if only because the degree of state ownership was so extreme prior to 1989. Thus it should not come as a surprise that the countries where state ownership was most pervasive were in the forefront of looking at other solutions (Russia, Czecho-Slovakia). A particular approach tried in the latter two countries aimed at preserving the benefits of auction based privatization but stipulated the use of vouchers in this process; the problem of cash constraints was resolved by handing them out for a nominal fee. In this way the political, corruption and economic problems associated with straight give-away programs would be avoided without however limiting the group of owners to those who had managed to accumulate wealth under the old regime. To date voucher based programs have been applied on a large scale in Czecho-Slovakia (which split up into the Czech Republic and Slovakia in January 1993) and in Russia.

However, voucher programs have an inherent problem that has led many to strongly criticize this approach (Bolton and Roland (1992)). Ultimately, the goal of privatization is to efficiently match managers and state-owned assets and provide a set of incentives that will lead those managers to run the firms efficiently. However, the information and incentive problems inherent in the structure of a firm are such that managers left to their own devices are unlikely to do the latter without effective control mechanism in place (Hart (1993)). The criticism is that voucher programs, by distributing ownership so widely, would prevent effective control over management. Any given shareowner has too little incentive to monitor himself and too much incentive to free ride on other shareholders' monitor efforts. It is this particular line of criticism that we assess in this paper based on the experience in the Czech republic with the voucher privatization program implemented in 1993.

The literature on the Czech and Slovak privatization program has been largely descriptive (cf Anderson (1994), Earle, Frydman and Rapaczynsky (1992), Shafik (1993), and, in particular Dlouhy and Mladek (1994)). This descriptive bend is understandable given the short time period that has elapsed since its execution: the auctions were finished in December 1992, with the actual transfer of the shares not taking place until June 1993. But the data of the various rounds are now available as are early stockmarket returns. It is, of course, still too early to look at actual behavior by managers and the different owners that emerged from the process. That is why we take a more indirect approach to the governance question, exploring the link between ownership structure and cost of capital.

We exploit a unique feature of the actual auction procedure followed in the Czech and Slovak programs. All firms in the first wave were auctioned off in at most five rounds in a process designed to simultaneously exhaust all vouchers and sell all shares. In each round, the ownership structure that was emerging from the earlier rounds was public information. The investment funds, that had emerged spontaneously in the period leading up to the auctioning process, tended to buy early. Dominant foreign or domestic investors mostly came in even before the voucher process was set in motion (vouchers were given to Czech citizens only). Thus information about the presence of a dominant investor was typically already available at the time of the last round (in most but not all cases the fifth). We use these data plus early stockmarket quotations to assess whether concentrated ownership led, *ceteris paribus*, to higher share prices and investigate whether that was due to inside information of the dominant investors or to the anticipation of better corporate governance in their presence. The results do not support the academic criticism that has been levied against the voucher program. We show that in many cases dominant investors did emerge; that very fact has led to anticipations of better governance and hence higher share prices (lower cost of capital).

The remainder of this paper is organized as follows. In Section 2 we briefly describe the main features of the Czech and Slovak voucher privatization program (a more detailed description can be found in Dlouhy and Mladek (1994) or in Shafik (1993)). Section 3 analyses the bidding dynamics and the evolving ownership patterns as the rounds progressed. Section 4 looks at the key question, does the presence of a dominant investor lead to a lower cost of capital? Section 5 investigates (and rejects) an

alternative explanation of the results, that dominant investors had inside information. Section 6 concludes.

## 2 The Czech and Slovak Privatization Program.

Privatization in Czech-Slovakia was the cornerstone of a sweeping reform program in what was one of the most centralized economies of the Eastern block. It was designed to bring about quick and massive privatization, in the hope to jump start a competitive market and proper enterprise governance and make the whole reform process irreversible. The framework for privatization was defined by the Small Scale Privatization Act (approved by the federal parliament in October 1990) and Large Scale Privatization Act (approved in February 1991). Voucher privatization was the most important method used in the large scale privatization program (for details on the whole large scale privatization program see e.g. Burger and Mejstrik (1993)). The voucher program covered slightly over 60% of all firms, weighted by bookvalue, that were sold in the so called "first wave" executed in 92/93.

### 2.1 Supply and Demand sides of the voucher market

Supply side. Privatization project proposals by enterprise managers (known as basis projects) and by anybody else (known as competing projects) were submitted to the founding ministries of those enterprises. All projects, whether the founding ministry agreed with the proposal or not, were subsequently passed on to the Ministry for Privatization, which was ultimately responsible for the final approval of the projects. Approved projects which involved for part or all of the firm the voucher method were submitted to the Center for Voucher Privatization, the executor of the voucher method. Enterprises involved in the process had to establish themselves as joint-stock companies fully owned by the Fund of National Property (FNP; controlled by the parliament). In the end, the shares of 988 Czech and 503 Slovak enterprises were offered to the public through the mean of vouchers.

Demand side. All adult citizens of Czecho-Slovakia were eligible for buying a voucher booklet containing 1000 investment points at a nominal fee of 1000 Kcs and a

registration fee of 35 Kcs. The points so obtained would be the only "money" used on the voucher market. The investment points could be used only within the five rounds of voucher privatization and had no value afterwards. Extensive information on the enterprises on offer was published in the newsletter "Kuponova privatizacia" and made available on diskettes. The promotion campaign of the CVP did not really catch on, however until the program was jumpstarted by advertisements of entirely new, spontaneously created institutions, the Investment Privatization Funds (IPF). These funds, all privately owned, offered to swap investment points for shares in themselves; voucher book holders who did this thus transferred the right to use the vouchers to the funds. The public could buy IPF shares in "round zero" only. The IPFs advertized heavily to attract voucher holders.

The IPFs were crucial to the success of the voucher program. Enthusiasm for the program took off after the IPFs offered what in effect amounted to free put options on their shares: they typically guaranteed a value of at least 10,000-15,000 Kcs per booklet, or between 10 and 15 times the purchase price, after one year. Before the put option offer, sales of voucher books were stagnating at about 2 million; but in the end 8.6 million of the Czechoslovak citizens took part in the voucher privatization program, individually or through the 438 funds, to buy 299.40 million shares.

## **2.2 Five rounds of the voucher privatization**

After introduction of the firms on offer and registration of the IPS and individuals who wanted to take part in the auction process, round "zero" started. The vast majority of the citizens participating (78%) exchanged their investment points for shares of IPFs (438 funds were created, but only 429 of them actually entered the process). We will refer to those who entered the process on their own account as small investors.

Each round consisted of three steps. First, the CVP would announce, per firm, the number of shares on offer and the asking price. Then investors would send in their subscriptions for shares to the CVP (via one of many registration offices). In the third step, the CVP calculated total demand based on the subscriptions received. If demand fell short of supply, all subscriptions were allocated at the asking price. If total demand for shares exceeded the available supply by up to 25%, individuals received their full subscription, and bids by IPFs were scaled back enough to bring total demand in line with



the available supply. However if total demand exceeded the number of shares by more than 25%, no sale was made at all in that round and all shares on offer were transferred into the next round.

For each firm, the number of shares equalled the bookvalue divided by 1000Kcs, so the nominal cash value of a share was 1000Kcs. In the first round, the price per share in terms of vouchers was arbitrarily set at 3 shares per 100 investment points across the board, so one voucher booklet was worth a nominal 30,000Kcs. In each subsequent round, prices were adjusted. Prices would fall for those firms where demand had fallen short of available supply in the previous round. And prices were adjusted upwards for those firms where demand exceeded supply by more than 25% in the previous round, so that all shares on offer in that previous round had been transferred into the current round. The size of the adjustment was done in a fairly ad hoc manner with as overriding objective to avoid unused vouchers by the time all shares were sold. No initial announcement was made on the total number of rounds, so as to discourage wait and see behavior, but there were many semi-official signals to the extent that there would be at most five rounds.

### **3 Price Developments and Bidding Dynamics**

The first round started on May 18th, 1992. As already indicated, prices of shares in terms of investment points were set equal for all enterprises; the 'market' was expected to differentiate as the process would unfold. To prepare the ground for the analysis of the relation between emerging ownership structure and share prices, we first look at the bidding pattern of the various groups and the ownership pattern that emerged (Section 3.1). We then assess the price dynamics as the rounds unfolded (3.2).

#### **3.1 Bidding Dynamics**

The precise timing of the various rounds is given in Tabel 1 below. All the time, the investor could observe changes in the prices and supply of the shares, as well as the success rate in obtaining shares of other investors. Importantly, the ownership structure established in previous rounds was fully known at the beginning of each new round. On November 17, the Center for Voucher Privatization announced that the fifth round would

be the final round.

Round:	Starting Date	End of Subscription	End of Round
0	February 17	April 26	
1	May 18	June 8	June 30
2	July 8	July 28	August 18
3	August 26	September 15	October 6
4	October 14	October 27	November 17
5	November 23	December 2	December 22

It is important to note that, as the rounds progressed, the various actors in the drama were exposed to different type of risks. The risk small investors were exposed to was simply to be left with unused investment points as the rounds came to an end. This would clearly involve a missed opportunity but not actual cash outlays. IPFs however had issued put options equal to between ten and fifteen times the purchase value of the voucher booklets and would run the risk of getting caught short if too many points would go unused.

This resulted in different intertemporal bidding patterns, as Table 2 indicates.

TABLE 2: The use of the investment points within the rounds.

#	Points (bill.)	Tot.demand	IPF's demand	SI' demand
1.	Remaining	8.53	6.13	2.40
	-Used	7.86 (92%)	5.84 (95%)	2.02 (84%)
	-Not used	0.67	0.29	0.38
2.	Remaining	5.55	3.80	1.75
	-Used	4.88 (87.9)	3.51 (92.4)	1.37 (78.3)
	-Not used	0.67	0.29	0.38
3.	Remaining	2.14	1.26	0.88
	-Used	1.99 (93.0)	1.25 (99.2%)	0.74 (84.1)
	-Not used	0.15	0.01	0.14
4.	Remaining	1.13	0.55	0.58
	-Used	1.00 (89)	0.55 (100)	0.45 (78)
	-Not used	0.13	0.00	0.13
5.	Remaining	0.62	0.29	0.33
	-Used	0.56 (91)	0.29 (100)	0.27 (82)
	-Not used	0.06	0.00	0.06

In each round, the IPFs used a larger fraction of the points still in their possession than small investors did. They set out using 95%, and, after a small dip in round two, essentially bid with everything they had in each subsequent round. In interpreting the Table, note that points remaining at the beginning of each round equal points not used in the previous round plus the points used unsuccessfully in the previous round. Of course the timing of offers does not necessarily coincide with the timing of purchases; if different groups had different success rates in the offer process, the two can diverge. This was clearly the case: IPFs effectively set in everything they had from round three onwards while small investors kept holding back about 20%. Nevertheless the IPFs held more shares than small investors right up to round 5. We therefore looked at the timing from a different angle, by focusing on actual purchases rather than offers.

To compare 'timing' behavior of funds and small investors, we calculate the 'Average Round' (AVR). AVR is defined as the sum of all the 'round' numbers in which a group made a purchase, with each 'round' number weighed by the fraction of that group's total number of shares bought in that specific round:

$$AVR = \sum_1^5 i \Psi_{i,k} , \text{ with } \Psi_{i,k} = S_{i,k}/S_k \quad (1)$$

$k = F$  (funds) or  $S$  (small investors).  $S_k$  is the total number of shares bought by the  $k$ -th investor and  $S_{i,k}$  the number of shares bought in the  $i$ -th round by  $k$ -th investor.

The outcome confirms that the IPFs not only bid more aggressively in the sense of using more of their points at each round, but also ended up actually buying earlier on average: the average round for IPFs was calculated at 2.08 and for small investors 3.01. Thus on average IPFs bought their shares a full round earlier than small investors. This is important since the ownership pattern emerging after each round was known at the beginning of each round. Detailed inspection suggests that by and large the IPFs tried to purchase a large number of shares in the beginning of the process while small investors purchased basically equal numbers of shares in each round.

They also focused on different groups; Figure 1 lists the total shares bought by small investors and by IPFs ranked by the size of the underlying companies, in blocks of fifty after ordering the firms by initial bookvalue. The graph shows that individuals and IPFs bought roughly comparable number of shares in small enterprises, but that IPFs invested substantially more in larger ones.

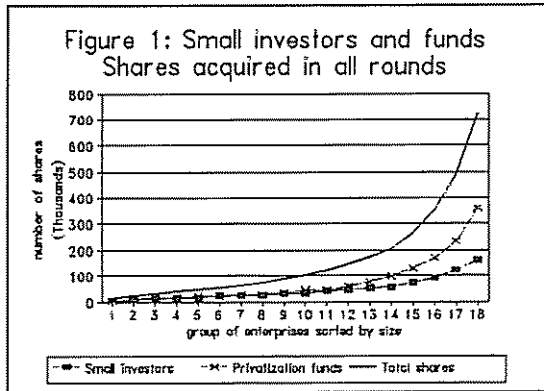


Figure 1

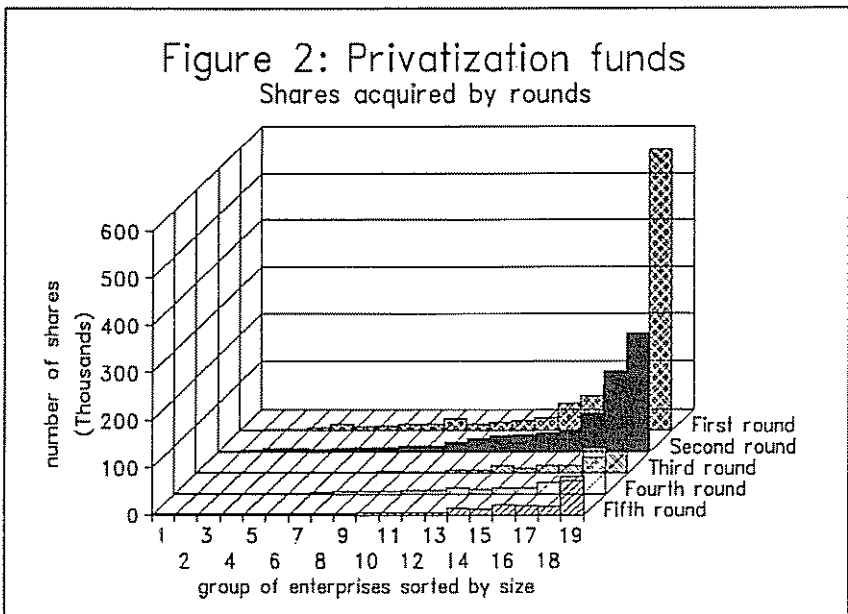
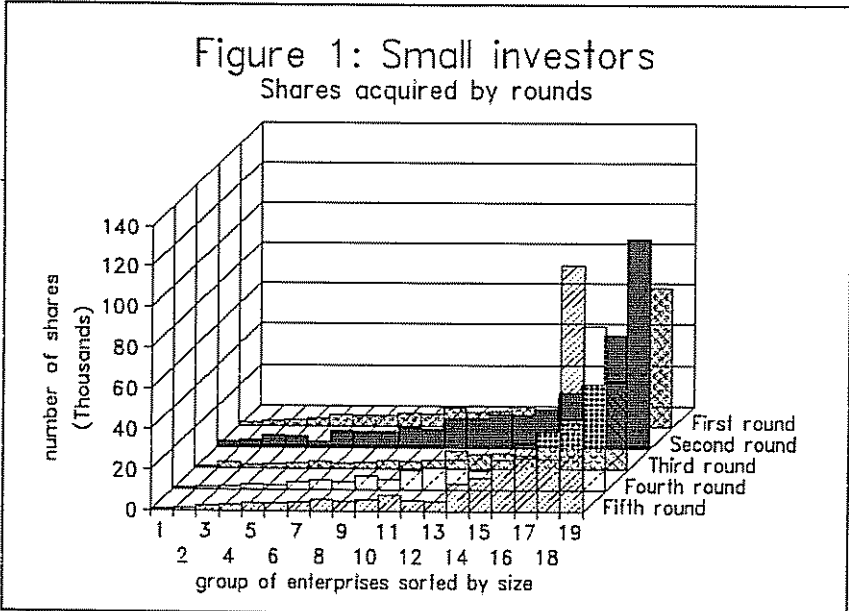


Figure 2

It is also revealing to look at the activities per round per group. The next two figures show for each group the share purchases in each round, also on the basis of a size ranking of firms. The pattern that emerges is interesting; IPFs went quickly for the large firms (mostly in round 2); private individuals had their peak purchases of shares in large companies much later, in round five only. They seem to have followed the IPFs at a safe distance in time.



The final statistics refer to the ownership pattern that emerged after all the firework was over. To what extent did dominant investors emerge, and who were those dominant investors? First of all, almost all the projects "voucherized" were voucherized for more than 50%, in most cases for much more. In more than half of them, IPFs own more than 40 of the shares (498 out of 949). But in only 9 cases did the largest group own more than 30%. In substantially more than half of the cases, the top IPF owned more than 15%. In most cases there were two or three large groups; in no less than 673 out of 949, the two largest groups owned over 20%. More details are given in Table 5 below.

**TABLE 5: Ownership structure of voucher investors**  
Number of enterprises where given investor has more than x% of shares.

Investors	>50 %	50- 40%	40- 30%	30- 20%	20- 15%	15- 10%	>0 %
Total Vouchers	842	23	19	4	3	3	949
Small Investor	272	139	148	180	82	90	38
Privatization Funds	334	164	133	156	44	45	73
Single Largest Fund	0	0	9	93	379	266	202
Second Largest Fund	0	0	0	7	157	318	464
Third Largest Fund	0	0	0	0	31	186	706
Two Largest Funds	2	23	294	354	102	85	89
Three Largest Funds	85	194	264	210	56	61	79

### 3.2 Price Dynamics

The next table summarizes price developments per round.

**TABLE 3: Price development in the voucher privatization**

Round i	2	3	4	5
$P_i = P_{i-1}$	28	83	107	164
$P_i \leq P_{i-1}$	598	470	511	375
$P_i > P_{i-1}$	323	396	331	410
$P_i \leq P_L$	596	753	777	949
$P_i > P_L$	353	196	172	0
$D_{i-1} < S_{i-1}$ and $P_i \leq P_{i-1}$	626	509	462	429
$D_{i-1} < S_{i-1}$ and $P_i > P_{i-1}$	28	135	49	181
$D_{i-1} > S_{i-1}$ and $P_i < P_{i-1}$	0	2	1	1
$D_{i-1} > S_{i-1}$ and $P_i = P_{i-1}$	0	42	155	109
$D_{i-1} > S_{i-1}$ and $P_i > P_{i-1}$	295	261	282	229

The first two rows of the table show that price increases were more prevalent

throughout than price decreases; apparently bookvalues systematically undervalued the assets being put on the block. The same picture emerges from the next block; the two rows there compare each round's price not with the previous round, but with the price at which the final share was sold,  $P_\lambda$ . One can arguably associate that price with the market's final valuation. More than half opened in round one at less or equal the final value. The last five rows indicate a curiosity: while by and large excess demand led to price increases and excess supply to lower prices, the table shows that there were a significant number of cases where the Government bucked the trend and raised prices in spite of a shortfall in demand. The reverse, lowering prices in the face of excess demand, barely ever happened: only in four cases overall.

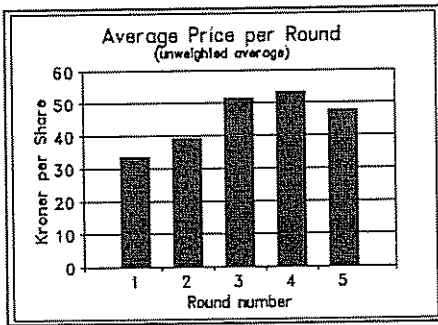


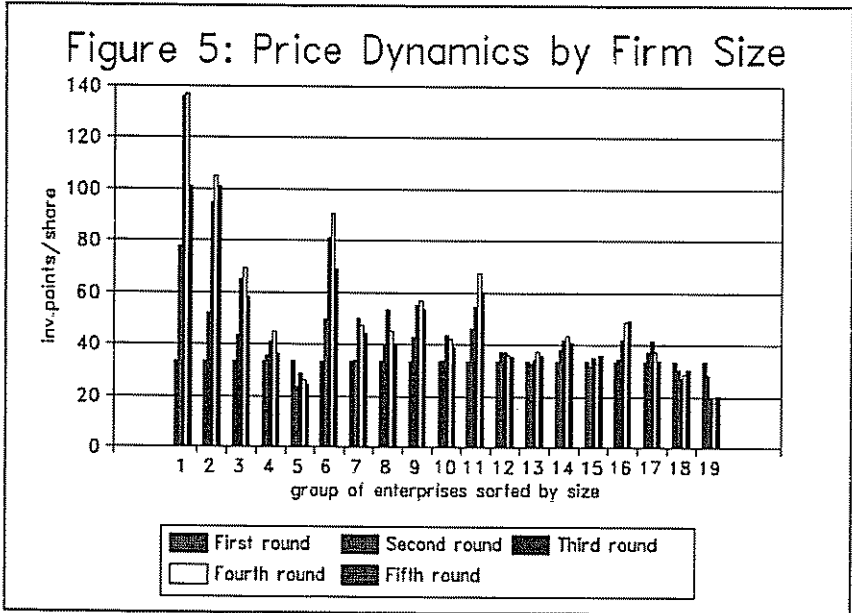
Figure 4

Does this mean that prices actually rose? Figure 4 shows that prices seem to have gone up initially and continued to go up, with a decline setting in at the last round only. So does this imply that IPFs, since they got in early, got in cheap?

That conclusion does not necessarily follow unless the IPFs bought into the "average firm". But in the previous section we saw that IPFs

tended to go in quickly for the big firms, with small investors delaying their purchases of the larger firms till the very end. Thus the "average" price dynamics may be misleading if it hides different patterns for small and large firms. The next diagram therefore compares price dynamics for different size of firms.

Figure 5 below shows that the averages do in fact hide significant variation across size classes. For all but the last two classes, the average dynamics figure gets it about right, with prices rising up to the last round. But for the two classes with the largest size firms, the pattern was reversed; prices fell after the initial jump in round 2. But the firms in those two classes were exactly the ones for which the IPFs bid heavily in the early rounds! Thus a more detailed analysis is necessary before one can conclude that IPFs, by getting in early, got in cheap. In fact we will see that the opposite was true.



#### 4 Ownership Structure, Inside Information and Corporate Governance

In the previous sections, we saw that IPFs tended to buy early. That implies that, as the rounds unfolded, the emerging ownership structure, or more precisely, the presence of investors owning large blocks, became known. An intriguing question is, whether this information had an impact on price structure. There are at least two reasons to expect it should. The first reason is related to the diluted share ownership problem referred to in the introduction. If the presence of a dominant investor leads to better control over management, indications from earlier rounds that a dominant investor would be present should be reflected in higher share prices in later rounds. Such an effect, if found, would of course not prove that concerns about diluted ownership are misplaced; after all IPFs still have to prove themselves in actual practice. It would indicate, however, that the market expected their presence to at least alleviate the problem enough to expect higher returns to shareholders in the future.



However, there is another interpretation possible. If IPFs had superior information about the likely prospects of companies, for whatever reason, and were known to have that information, one would also expect them to bid early and their presence in early rounds to lead to a higher eventual share price. If the inside information story is behind whatever share price effect of IPF ownership there is, that price difference has no obvious implication for the issue of diluted shareownership. It is thus of importance to distinguish between these two competing explanations if a shareprice effect does exist.

In what follows we first investigate whether the emergence of a dominant shareholder in earlier rounds had a positive impact on prices later on. We then develop a simple test to distinguish between the two competing explanations offered.

#### 4.1 Ownership structure and Market Valuation

We use as indicator of market valuation the price at which the last shares were sold ( $P_{\lambda}$ ). We are interested in testing whether this price reflects an impact of different ownership structures, to the extent they were known before that final round. Thus, if  $\lambda = 5$ , as it is in most cases, all information on ownership structure available up to round 4 (inclusive) is used; if  $\lambda = 4$ , i.e. the shares were sold out in round 4, only information available up to round 3 (inclusive) is used, and so on.

We consider two sets of explanatory variables which may be important for evaluation of companies. First, those concerning the companies themselves. Examples are size as measured by total number of shares offered initially<sup>1</sup>, profitability, indebtedness, increase in the labor force over the past three years, sectors and regions (only one out of seven appeared to be significant) and ownership structure. The second set of variables is related to the company performance on the voucher market. Those are indicators for funds' ownership, dummies for the last round ' $\lambda$ ' and the ratio of demand for shares in the  $i$ -th round and supply in the subsequent round, scaled by the same ratio for the market as a whole. The dummy for  $\lambda$  attempts to capture "hot stocks", i.e. stocks that were sold out early. The relative excess demand variable similarly tracks whether a particular stock was unusually oversubscribed, with "unusual" defined with respect to the overall market

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<sup>1</sup> Note that there was a one-to-one relation between initial bookvalue and number of shares offered.

imbalance. For our regression, data on 949 out of 988 Czech companies were available. We do not have comparable information on the Slovak companies in the program. The specific list of variables is as follows.

List of variables

LPLAM	Log of P $\lambda$ : price at which the last share was sold.
LNSHARES	Log of company's total number of shares
PR/E	Profit in 1991 (before the privatization), divided by total number of shares.
D/E	Debt in 1991 divided by the total number of shares.
EMPL/E	labour in 1991 minus labour in 1990, divided by total number of shares.
FOR	Dummy for presence of foreign investor.
DOM	Dummy for presence of domestic investor
NPF	Dummy for > 20% stake of the National Property Fund (in other words, dummy for relatively significant state ownership)
FSH	number of shares bought by funds prior the last round ' GRAD divided by the total number of company shares.
West Bohemia	Dummy for West Bohemia region.
AD1S2	Demand for company shares in the 1-st round divided by supply of company shares for the 2-nd round, scaled by total demand for all companies in the 1-st round divided by supply of all company shares offered in the 2-nd round. If supply for company shares in the second round was zero, AD1S2 = 0. AD2S3, AD3S4, AD4S5 are calculated in similar fashion.
IND1,..., IND9	Dummy for sectors (9 out of 10 sectors): 1. Agriculture, 2. Heavy Industry, 3. Light Industry, 4. Construction, 5. Transport and Telecommunications, 6. Trade, 7. R&D, 8. Service, 9. Finance and Defence.
Round1	Dummy for ' $\lambda$ ' = 1, i.e. the last shares were sold in the first round. Similarly for Round2 and Round4. Round 3 was not significant

TABLE 4: Results of regression for  $\log(P\lambda)$ 

variable	coefficient	t-statistic	variable	coefficient	t-statistic
constant	4.65	6.10	AD4S5	0.001	3.1
Llog (total shares)	-0.31	-14.1	IND1	1.35	1.85
Profit	0.017	10.3	IND2	1.33	1.83
Profit3	-6E-7	-3.6	IND3	1.80	2.5
Profit4	2E-9	3.0	IND4	1.16	1.60
DEBT	-2E-3	-4.0	IND5	1.11	1.51
EMPL	11.92	1.35	IND6	1.47	2.0
FOR	0.83	6.7	IND7	1.05	1.40
DOM	0.45	4.4	IND8	1.97	2.7
NPF	0.53	7.4	IND9	1.67	2.3
FSH	1.22	9.8	West Boh.	0.20	2.5
AD1S2	0.014	6.2	Round1	0.73	5.0
AD2S3	0.012	7.4	Round2	0.32	3.0
AD3S4	0.009	6.1	Round4	-0.46	-4.5

$R^2 = 0.591$ ,  $\text{adj.}R^2 = 0.579$ , number of observations 949.

The regression shows that companies that sold out early (in the first two rounds) were more expensive than those sold later, which is may be not a surprising result. The coefficients of ADiSi also confirm that the system was run in a sensible manner; excess demand in earlier rounds led to upward pressure in later rounds, although the price setting authorities seem to have had a more dampened response to excess demand in later rounds; the coefficients on ADiSi decline as the round number increases.

But the core result is the finding that companies with dominant investors present early on tended to be more expensive later on. Companies partially bought by funds were demanded more, and end up more expensive, than average, and the more so the larger the IPFs stake. There is a similar, strongly positive effect associated with the known presence of foreign and domestic (non-IPF) dominant investors. All this fits in the hypothesis put forward sofar; the strong positive effect of a large stake by the National

Property Fund (NPF) is less obviously interpretable. One view could be, that the NPF was thought to maintain a stake in the "crown jewels".

We repeated similar regressions later on using actual stockmarket quotations. Clearly all variables related to auctioning dynamics ceased to be relevant. We used two data sets, one for December 1993 and one for March 1994.

### Stock exchange prices - December 1993

Almost immediately after the end of the voucher privatization, the shares started to be traded on the Prague Stock Exchange (for details see Lastovicka, Marcincin and Mejstrik (1994)). We again include two sets of variables, the first one capturing various aspects of underlying firm performance, and the second one capturing ownership structure.

#### List of variables:

Log (PSE93) Log of average share price by the end of December 1993

LNA Log of company's net assets, December 1992

PROFIT Profit in 1992, divided by net assets

SALES Sales in 1992, divided by net assets

FOR Dummy for presence of foreigner investor

DOM Dummy for presence of domestic investor

NPF Dummy for >20% stake of the National Property Fund

FSH Number of shares bought by funds prior the last round 'λ', divided by the total number of company shares.

IND2,.. Dummy for sectors: 2. Food production, 3. Beverages and tobacco, 5. Textile, clothing and leather goods, 6. Wooden goods, 8. Construction and construction materials, 10. Machineries, 12. Energy, 14. Trade, 17. Jewellery, glass and ceramics.

**TABLE 5** Results of regression for  $\log(P_{SE93})$ 

variable	coefficient	t-statistic	variable	coefficient	t-statistic
constant	5.02	14.2	NPF	0.155	1.49
LNA	0.033	1.24	IND2	-0.136	-1.11
PROFIT	5.04	10.8	IND3	0.898	5.12
SALES	0.16	1.55	IND8	-2.87	-3.24
FOR	0.82	5.9	IND14	-0.126	-1.11
DOM	0.095	0.68	IND17	0.63	3.20
FSH	0.48	3.32			

R2 = 0.461, adj.R2 = 0.466, number of observations 433

The regression coefficients on variables proxying for company performance are largely as expected; profits are more important than sales, and the company size effect seems to have disappeared. Large companies do not get a higher share price than small companies, but more profitable ones are quoted higher than less profitable ones. The coefficients on ownership variables are interesting. The positive effect of non-IPF domestic investors and of the presence of the NPF has faded away. But the presence of a dominant foreign investor and a significant IPF presence still have a significantly and strongly positive impact on share pricing.

#### Stock exchange price - March 1994

By the end of March 1994, more companies were traded on the stock exchange, so that we could increase number of observations from 433 to 612 (Availability of financial data on companies was the only limitation which prevented us from using all companies traded). We ran the same regression as for December 1993 (Table 6 below).

The results for March 1994 are broadly in accord with the results for December 1993. Profits rather than sales are what matters; and the presence of dominant foreign or IPF shareholding blocks still has a strongly positive pressure on share prices. A difference is that the dummy for the presence of dominant domestic investors has again turned significant, as has the variable capturing the size effect. The dummy capturing a large NPF stake remains insignificant.

**Table 6** Results of regression for log (PSE94) without the  $P_{\lambda}$ .

variable	coefficient	t-statistic	variable	coefficient	t-statistic
constant	3.87	11.8	IND2	-0.24	-1.79
LNA	0.13	5.19	IND3	0.77	4.20
PROFIT	5.66	12.1	IND5	-0.24	-1.39
SALES	0.067	0.65	IND6	-0.16	-1.14
FOR	0.97	6.70	IND8	-0.38	-4.20
DOM	0.40	3.12	IND10	-2.74	-2.87
NPF	0.097	1.02	IND14	-0.37	-3.56
FSH	0.49	3.38	IND17	0.67	3.16

$R^2 = 0.431$ , adj. $R^2 = 0.417$ , number of observations 612.

### 5 Ownership effects on share prices: inside information or anticipations of better corporate governance?

The regression results presented in Section 4 establish unambiguously that the presence of a dominant non-government investor has a positive impact on share prices. The interpretation is, without further information, not obvious however; since in most cases the dominant investor came in early, the inside information explanation mentioned earlier cannot be ruled out. If dominant investors possess inside information and are known to do so, the mere fact of them buying into a company sends a signal to uninformed outsiders. We need more information to solve what amounts to an identification problem. In what follows we first show that a test can be based on the price dynamics as rounds unfold (section 5.1); we then apply this test to our data (Section 5.2).

#### 5.1 Inside Information and Share Price Dynamics

Consider a firm whose value can be either high or low depending on information, summarized in parameter  $\alpha$ , the value of which is known to insiders only. Insiders obviously have no incentive to reveal their information before they themselves have acted on it. Consider next a two stage auctioning process. In round 1, outsiders have no knowledge about  $\alpha$ , they just have a prior distribution which we assume to be binomial:

$$Prob(\alpha = \alpha_H) = \pi, Prob(\alpha = \alpha_L) = 1 - \pi; \alpha_H > \alpha_L \quad (2)$$

Thus the round 1 valuation for both types of firms is:

$$V_1 = \pi V(\alpha_H) + (1 - \pi)V(\alpha_L); V(\alpha_L) < V_1 < V(\alpha_H) \quad (3)$$

Insiders have a clear incentive to buy early; they can actually cash in on their inside information because  $V_H - V_1 > 0$ . At the same time, low quality firms are overvalued:  $V_1 > V(\alpha_L)$ . Therefore insiders will only buy high quality firms. On the assumption that profit opportunities will not remain unexploited unless regulation prevents arbitrage, all high quality firms will attract a dominant investor, and no low quality firms will. We therefore get complete separation: the presence of a dominant investor acts like a signal to outsiders about the quality of the firm<sup>2</sup>. So in round 2 we get:

$$V_2 = \begin{cases} V(\alpha_H) & \text{for } \alpha = \alpha_H \\ V(\alpha_L) & \text{for } \alpha = \alpha_L \end{cases} \quad (4)$$

Thus outsiders who come in late (in round 2) will pay more for firms where insiders have bought in during round 1 than those insiders have paid. It is furthermore easy to show that outsiders should be indifferent between bidding early or late under risk neutrality, but will bid late if their degree of risk aversion is positive. In both cases this translates in an "average bid period" later than the "average bid period" for the IPFs, since they are expected to bid early.

Thus the theory predicts that if IPFs acted on inside information, and were known to do so, (A) IPFs should bid early; (B) Outsiders will on average bid later than IPFs; and (C) IPFs will pay less than outsiders. The corporate governance theory is compatible with (A) and (B) but has no implications for (C). We have anyhow already seen that (A) and (B) are satisfied in the data; but since both theories are compatible with that outcome,

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<sup>2</sup> Insiders clearly have an incentive to bid  $\epsilon$  above  $V_1$  so as to get all shares. Regulation prevented the IPFs from doing this however; their stake was limited to 20% (10% per individual fund and 20% per group of funds under control of a single entity).

it does not help us with identifying which one is right. So everything hinges on (C). If (C) is accepted, we still do not know anything, since (C) could obtain under both theories; but if (C) is rejected, the insiders theory is ruled out. We therefore look at the overpayment issue in the next subsection.

## 5.2 Did IPFs over- or underpay?

Since different prices were used in each round, it was possible to buy the same share for different amount of investment points depending on the round the shares were bought in. The price  $P_{\lambda_j}$  (the last used price for enterprise 'j') is used as the "equilibrium" price, the marginal value of the enterprise per share. On this measure, investors who paid more than  $P_{\lambda_j}$  were overpaying for their shares, while investors who paid less than  $P_{\lambda_j}$  "underpaid". Formally we define a measure of overpayment OP, indexed by investor type  $k$  (IPF or small investor) defined as follows:

$$OPP_j^k = \sum_{i=1}^{\lambda-1} \frac{(P_{i,j} - P_{\lambda,j}) \text{Shares}_{i,j}^k}{\text{Shares}_j^k * P_{\lambda,j}}$$

Shares of enterprise 'j' bought by investor class  $k$  satisfy the obvious adding up constraint:

$$\text{Shares}_j^k = \sum_{i=1}^{\lambda} \text{Shares}_{i,j}^k \quad (6)$$

The results are summarized in the Table below. The table indicates that both over- and underpayment took place, but that the majority of the IPFs over paid. Moreover, when weighted by the share of each purchases in the overall value bought, IPFs overpaid on a netto basis by a substantial amount: 23%. This amount was substantially larger than the corresponding amount for smaller investors. Overpayment is in strict conflict with the insiders theory; we therefore conclude that the good-governance theory is the most likely explanation of the fact that firms with known dominant investors are priced higher, given everything else, than firms without such a presence.



TABLE 7: Other measure of Overpayment				
range	Small investors	Small inv. %	Funds	Funds%
1 - max	31	3.3	95	10.0
0.5 - 1	134	14.1	128	13.5
0 - 0.5	340	35.8	291	30.7
-0.5 - 0	353	37.2	333	35.1
min - -0.5	91	9.6	102	10.8
positive OP	505	53.2	514	54.2
negative OP	444	46.8	435	45.8
Total	949	100.0	949	100.0
Average Overpayment	0.11		0.23	

## 6 Conclusions

A major point of criticism against voucher privatization methods has been the fear that they lead to shareownership too diffused to expect effective shareholders control over management. It is obviously too early to pass final judgment on this matter, but the Czech experience so far seems to suggest the early academic criticism may have been overly pessimistic.

The voucher program took off only after the spontaneous creation of Investment Funds, through which individual shareholders were aggregated into larger blocks. Whether that will lead to better governance, only time will tell; in this paper we take a more modest approach. We assess whether share prices tended to be higher when it was known that dominant investors were present, and whether that was due to anticipations of better corporate governance in that case. The Czech voucher program allows for a unique experiment because auctioning took place in a series of rounds; aggregate information on the structure of ownership emerging in earlier rounds for each firm was made public prior to each new round. This allows for a sharp test of the relation between ownership structure and share valuation, assuming reasonable proxies are found for other factors

influencing share valuation.

The regression results are very clear: presence of dominant investors in earlier rounds tends to boost share prices; and the larger the IPF contribution, the higher the price. Of the other variables some perform as expected and some did not. Reported profitability has a positive impact on share prices, while a high debt-to-bookvalue ratio depresses share prices. At least in the auction rounds there was a size effect: given everything else, larger firms tended to be higher priced, somewhat counter to our prior expectations. But the key result is the strong positive effect on share prices of the presence of a dominant investor.

We repeated this exercise using later data on share prices not from the auction rounds but from the stockmarket. These gave broadly the same result with some interesting modifications. The positive impact of a large presence of the National Property fund disappeared in the stockmarket regressions. However, presence of a dominant foreign investor or of a dominant IPF still boosted share valuation, as it did in the earlier auction rounds. On the impact of a strong domestic investor, the results are less clearcut. Both in the regression using auction prices and the one using March 1994 stockmarket data, a significantly positive effect was found; but in the regression using December 1993 data, the relevant dummy was not significant.

Of course a positive impact of the presence of dominant investors could be related to more than expectations of improved corporate governance. One theory would be that dominant investors possessed inside information, and by buying early (which they did, as we demonstrate) signal their inside knowledge to uninformed outsiders. We show that this theory predicts that IPFs would on average pay less than the eventual (post-separation) market value. We then show this prediction to be counterfactual. Using the price at which the last share was sold as a benchmark, IPFs overpaid by 23%, rather than underpaid. We therefore conclude that the positive impact of the presence of dominant investors on share prices was due to expectations of better corporate governance, not to the fact that those investors possessed inside knowledge.

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