

# Investment Behaviour in Czech Voucher Privatization

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## Abstrakt

Studie analyzuje investiční chování individuálních investorů a investičních privatizačních fondů v první vlně kupónové privatizace na základě dat pro Českou Republiku. Nejprve jsou stručně shrnuty jednotlivé metody privatizace, použité v případě České Republiky a pravidla kupónové privatizace. Dále je předložena jednoduchá ekonometrická analýza. Ta ukazuje významný rozdíl mezi dvěma skupinami investorů - individuálními a institucionálními investory. Rozhodující otázka, kterou řeší zbytek studie zní: "Která z uvedených dvou skupin byla úspěšnější při investování svých kupónových bodů?". K zodpovězení této otázky je uvedeno několik metod, jak kvalitativních, tak kvantitativních. Na závěr je uvedeno několik možností, jak interpretovat výsledky.

## Abstract

The paper analyzes the investment behaviour of individual investors and privatization funds in the first wave of the voucher privatization using Czech data. It first summarizes privatization methods applied in the case of the Czech Republic and the rules of voucher privatization. Then a simple econometrics analysis is presented. It shows a significant difference between two groups of investors, namely individual investors and institutional investors. The crucial question which is put in the rest of the paper is: "Which group of investors was more successful in the investment of its voucher points?". There are several methods, both qualitative and quantitative, presented to answer this question. The paper concludes with several possible interpretations of the results.

## **I. Introduction**

Privatization is one of the key steps in the transition of post-socialist economies in Eastern Europe. The market economy, which is the goal of all these countries, cannot function without a significantly large private sector. The private sector cannot create itself without appropriate government policies, changes in legislation, political changes, establishment of capital markets.

The literature concerned with the modelling of privatization has been quite underdeveloped up to now, but it is reasonable to assume that it will become a fashionable topic in years to come. The majority of authors prefer to give policy recommendations to transition economies, but they are controversial, especially as the timing and importance of each step vary.

Tirole (91) could be used as a typical example of this type of literature. His paper starts with a description of the socialist economy, the role of incentives and the differences from western economies. Tirole breaks the transition process into four periods. The first is called the definition period, where firms are renationalized, a social safety net is created, a new system of laws is implemented and holding companies (funds, which will play the role of institutional owners) are created. The second is the private restructuring period, during which holding companies restructure firms; the government sets a timetable for trade liberalization and completes the legal system. Firms put modern accounting structures in place and foreign capital is attracted. The third period is the inception of the stock market where holding companies, newly created firms, other institutional investors, and, possibly, foreigners bite on each firm. The last is the market period. Markets for the firms' and holding companies' stocks are open to all citizens, foreigners and other investors. Trade liberalization is completed and the government loses its right to vote on the board of directors of the holding companies. Thus the domestic capital market starts to function.

The most related historical case to privatization in Eastern Europe seems to be the case of Chile. This is an even more interesting experience because of the total failure of the first nine years of the privatization program, and the surprising success of next newly designed privatization after 1982. Buchi (91) gives a good description of this process.

Chile was a small closed economy with a high degree of state ownership and had huge government intervention. After 1973 privatization started together with political, social, tax system and legislative changes. The main reason for the collapse of privatization in 1982 was the rise of interest rates in Latin America in combination with the fact that the majority of new owners had a huge debt. Standard selling of enterprises to the private sector was the reason for this indebtedness.

A substantial part of the private sector had collapsed, and enterprises were again in the hands of the government. After 1982 the new privatization program was based on give-aways and cheap selling of assets, soft loans, worker ownership and free transfer to funds. The sequence of steps was as follows:

- the creation of financial and capital markets
- the privatization of banks and funds
- the restructuralization and profit orientation of state firms
- the active creation of the private sector and its future support
- the privatization of firms

Buchi (91) summarizes the recommendations valid for the situation in Eastern Europe as follows: do not use the revenues from privatization for an improvement of government budget; demonopolize and restructuralize before privatization; sell cheaply or transfer; support the funds; create the legal background; do not be afraid of wide ownership, because management itself contacts the main owners and associates them together so that they will have sufficient ownership power to make appropriate decisions.

## **II. Overview of Privatization Methods Applied in the Case of the Czech Republic**

The experience of Poland and Hungary shows that small businesses are relatively easy to privatize. This is the reason for the division of the privatization process into two different schemes - small privatization and large privatization.

The basic principle of small privatization is that all domestic and foreign firms and all domestic and foreign individuals can make a privatization proposal to every state-owned firm, or some part of it, or a proposal to join several state owned

firms together. The privatization proposal is judged by the privatization committee established on the local base from deputies of municipalities, employers associations, financial offices, etc..

The main privatization methods applied in small privatization are public auctions (more than 85% of the property), direct sales to predetermined investors, and transfers to municipalities.

The basic principle of large privatization is similar - additionally, the managers of firms which were selected for large privatization are obliged to make a so-called basic privatization proposal. Appreciation of different privatization proposals is done by branch ministries who make comments, then by the Ministry for Privatization, and the final decision is taken by the government.

Methods applied to large privatization are public tenders, direct sales, sales through intermediators (banks), transfers to municipalities, and voucher privatization. All the methods are, by law, on the same level of importance.

There is no artificial boundary between the property selected for large- and small-scale privatization. There are some firms sold for more than 100 mil. crowns in small privatization, and firms with a value inferior to 5 mil. crowns accepted for large privatization.

A relatively independent method of privatization is restitution. It has its own rules and its own procedures (see Kotrba, Svejnar (93)).

One important part of the economic reform is voucher privatization. The main economic reasons for its application are that it is relatively quick, and is a substitute for the financial market, which is usually not well developed in Eastern European countries. Politically, it is said to create positive attitudes of the public to privatization, and it is based on equity grounds.

From the investor's side the procedure for voucher privatization is as follows: at first he has to pay 1000 crowns (about \$30) as fee for covering the expenditures of the transfer of the property through vouchers, and he receives the voucher book with 1000 points; then he is free to choose one or more of about 400 investment privatization funds (IPF's) or decide to invest individually; if he decides to invest individually, he is free to choose from about 1500 firms for which prices are adjusted for different privatization rounds on the basis of demand and supply. In practice 72% of investment points were in the hands of IPF's, and about 50% of investment points in the hands of the 20 largest IPF's.

There are two rules restricting the behaviour of IPF's. The investment privatization fund cannot own more than 20% of the privatized firm. In the case when the demand for a particular firm exceeds the supply up to 125% the demands of IPF's are cut proportionally and the demands of individual investors are fully satisfied.

### III. Econometrics Analysis of Voucher Privatization

Experimenting with the data we determined those variables which seem to be important for determination of the price of shares measured in voucher points. Although, we cannot monitor all variables which investors took into account, we have all the information which was published by the organizers of voucher privatization. The variables used here are:

FOREIGN	% of shares specified for the preselected foreign investor
DOMESTIC	% of shares specified for the preselected domestic investor
INTERMED	% of shares specified for direct sale through the intermediary
II	% of shares bought by individual investors
IPF	% of shares bought by investment privatization funds
P91	the profit of the firm in 1991 divided by TNS
P9190	the change in profit between 1990 and 1991 divided by TNS
D91	the debt of the firm in 1991 divided by TNS
D9190	the change in debt between 1990 and 1991 divided by TNS

where TNS stands for the total number of shares (used in order to exclude differences in the size of firms) and it is the sum of FOREIGN, DOMESTIC, INTERMED, II, IPF, the employee ownership, the state ownership, the restitution, and the free transfer to the municipalities.

The effect of D9190 is on the border of significance as we shall see later. Surprisingly, INTERMED has a significant effect and we do not have sufficient explanation for it. Maybe investors had some insider information about the future buyer of shares specified for the direct sale through the intermediary. Even more surprisingly, investors did not pay attention to changes in the number of employees.

At first we analyzed the cross-correlations in order to exclude multicollinearity from the model. Results are given in Table 2. High levels of correlation appear for P91 and P9190, which does not damage the model because we can look to the regression coefficient of these two variables together (both refer in some sense to the effect of the profitability). Another high correlation is between D91 and D9190, and the explanation is the same as for the profitability. The correlation between II and IPF is small enough to enable us to distinguish separate investment strategies for individual investors and IPF's.

Our final regression equation for the average price of the share (AP) is:

$$\begin{aligned}
 AP = & 79.14 + 1.01*FOREIGN + .36*DOMESTIC + .62*INTERMED - \\
 & (11.2) \quad (5.3) \quad (2.5) \quad (2.7) \\
 (*) & .64*II - .59*IPF + 49.59*P91 + 7.69*P9190 - 5.02*D91 - 4.47*D9190 \\
 & (-6.5) \quad (-6.4) \quad (13.6) \quad (10.8) \quad (-3.3) \quad (-1.6)
 \end{aligned}$$

R<sup>2</sup>= .35

with t statistics in brackets.

The regression equations, which describe the investment decisions of individual investors and IPF's separately, cannot include variables II and IPF because their values were known only ex post. The estimated equations for the average price of the share bought by individual investors (APII) and for the average price of the share bought by IPF's (APIPF) are the following:

$$\begin{aligned}
 APII = & 30.14 + 1.49*FOREIGN + .85*DOMESTIC + 1.13*INTERMED + \\
 & (16.1) \quad (7.9) \quad (6.4) \quad (4.9) \\
 (**) & 50.68*P91 + 7.88*P9190 - 5.75*D91 - 3.48*D9190 \\
 & (13.2) \quad (10.5) \quad (-3.6) \quad (-1.2)
 \end{aligned}$$

R<sup>2</sup>= .30

$$\begin{aligned}
 APIPF = & 29.72 + 1.38*FOREIGN + .79*DOMESTIC + 1.07*INTERMED + \\
 & (16.9) \quad (7.8) \quad (6.3) \quad (4.9) \\
 (***) & 51.36*P91 + 7.99*P9190 - 4.99*D91 - 4.98*D9190 \\
 & (14.2) \quad (11.4) \quad (-3.3) \quad (-1.8)
 \end{aligned}$$

R<sup>2</sup>= .31

with t statistics in brackets.

Negative coefficients before II and IPF can be interpreted as a decrease of the price with an increase in the percentage of the property privatized through vouchers. The smaller coefficient before II has two interpretations: individual investors were more successful in the investment (they bought when the price was lower), or that individual investors invested in worse firms with objectively lower prices. Standard econometrics is not able to distinguish between these two effects.

Comparing (\*\*) and (\*\*\*) we can conclude that individual investors were more concerned about the powerful owner (higher coefficients before FOREIGN, DOMESTIC, and INTERMED), and less about the profit and the change in profit. They paid more attention to the value of the debt, but less to its dynamics, which might reflect their limited capabilities to consider too many criteria.

#### IV. Individual Investors versus IPF's

Investment funds play a very important role in every western developed economy and voucher privatization increased the natural speed of the development of these funds several times. The most important feature of IPF's is that they concentrate the ownership. There would be such dispersed ownership without IPF's that any real control of management would not be possible.

IPF's are also supposed to be more economically educated and represent owners with a longer time span. Their ability to concentrate information and produce appropriate decisions should be higher than for individuals. A division of risk using a widespread portfolio is also considered as a desirable feature.

But there are reasons not to invest through IPF's. The number of funds is so high that it is highly probable that some funds will go bankrupt. Also the dividend can be significantly lowered because of double tax (on dividends of firms plus on dividends of IPF's) and high payment to a fund for the management of the portfolio (see Table 1).

As mentioned above, we are not able to distinguish from our regressions whether individual investors were more successful in the investment (they ordered shares in the right time), or whether they invested in really bad firms (objectively cheaper firms). So, standard econometrics does not help us to compare the relative success of strategies of the investment. For this purpose we made a deeper analysis of the data and developed some other methods of the comparison.

There was a clear pattern of IPF's to invest in more expensive firms. Individual investors preferred less expensive firms (see Figure 1). The preference of cheaper

shares can be interpreted as a more risky investment strategy of small investors, which is, from the point of view of standard economic theory, perverse behaviour.

One possibility of comparison is to use average prices. The average prices for these two groups over all firms (see Figure 2) do not refer to the success of individual investors but only to different strategies of investment. But it is possible to compare the average price of a share of one firm paid by IPF's with the average price of a share of the same firm paid by individual investors.

The number of firms with which IPF's were more successful (paid in average less for these firms' shares) is significantly higher than the number of firms referring to the success of individual investors (see Figure 3). But the comparison of nominal values of shares of these firms significantly favours individual investors. The fact that IPF's were more successful only in 1/3 of shares sold in voucher privatization is really surprising.

Looking at Figure 3 more carefully, we can see another strange outcome of the analysis. There is a relatively higher proportion of individual investors holding shares where IPF's were more successful. We do not have a clear interpretation of this fact, and it complicates the analysis even more.

It seems fair with respect to IPF's to also analyze the effect of the discrimination rule. The average amount of the reduction of the IPF's demands, in the case of the demand being higher than the supply but not more than 125%, was only about 5% (see Figure 4, first column). The upper bound of the losses for IPF's due to discrimination of IPF's is not the value of all these firms, but only the value corresponding to firms where the IPF's demand was reduced and individual investors were more successful (see Figure 4, second column). So, if we make the unrealistic assumption that in a case of no reduction (no discrimination) all these firms would turn from referring of individual investors success to IPF's success, then this would just cover the gap (in terms of the number of shares). In such a case both groups would be approximately equal in success (again in terms of the number of shares).

Up to now we have described the qualitative feature - it seems that individual investors were more successful in the ordering of shares - without any serious quantification. A possible, but not fully precise way of quantifying individual investors' success could be to average percentage difference from average prices of firms weighted by the number of shares bought by the group in a given firm. Applying this method leads to the result that the average price of the same share is about 5.36% cheaper for individual investors than for IPF's.

As an alternative method of quantification we can use the average percentage of minimum prices. By the term "minimum price" we understand the lowest price which was realized (some shares were really sold for this price) for each firm. We obtained the following numbers: the average share bought by IPF's costs 162.1% of a minimum price, and the average share bought by individual investors costs 151.7% of a minimum price.

The numbers show that both groups were not very successful in determining the optimal time to invest. However, individual investors again reached a better result. If we consider that the difference of the above mentioned percentages is 10.4% and that average prices were more than 150% of minimum prices it corresponds to about 6.5% difference in average prices. This number is pretty consistent with the 5.36% estimate from the first quantification.

There is one more element which it is necessary to take into account. After the fifth round some voucher points remained uninvested, and they cannot be used anymore. IPF's did not succeed in the investment of 0.3% of their amount of points. While individual investors did not succeed in 3.3% of their points. This significantly lowers the relative success of individual investors. But to be fair, it is necessary to mention that 0.3% of points of individual investors were not used in any round. A possible explanation could be the death of the corresponding percentage of individual investors, or their leaving the country. It seems better to reduce those 3.3% by this amount for purposes of comparison of the success.

Considering all the numbers (about 5.9% as an average from the two quantification (6.5% and 5.36%) minus 3.3% referring to uninvested points of individual investors plus 0.3% referring to points of individual investors which were not used in any round plus 0.3% referring to uninvested points of IPF's equals to 3.2%) we conclude that individual investors are more successful in the timing of the investment. IPF's

obtained for their average 100 points equivalent of about 97 (100 minus 3.2%) points of individual investors which really tried to invest.

## V. Conclusions and Open Fields

The analysis above does not show that the market value of a portfolio held by IPF's per investment point is lower than that of individual investors. It only shows that funds paid for their portfolio more than was necessary and more than individual investors paid for such a portfolio. The comparison of the market value of properties of both groups will show the final relative success. But such an analysis can only be done after the start of a stock exchange for these shares and some stabilization of prices of shares in the market.

There is one very strong hypothesis which could be tested: IPF's selected in advance only a part of firms where they were willing to invest, and they did not care about the other firms. Because of the relatively large size of IPF's, such predetermination of firms boosted up their prices. So, the demand curves of individual investors were nearly perfectly elastic, but the demand curves of IPF's were sufficiently less elastic to imply their failure. If such a hypothesis is correct, it implies that asymmetric information (the more detailed information of funds about a limited number of firms) led to the loss of the more informed group.

There are many other possible explanations of IPF's failure. There were five funds where the concentration of voucher points was very high (more than 6% of the total amount of points). These funds were very constrained in their investment by an obligatory upper bound of the share on a firm's property - 20%. They had to invest in at least every third firm, and it could explain their failure. On the other hand, there were hundreds of funds, which collected only a small amount of points, and they have no opportunity to make any future profit. The incentive of "small" funds was not strong enough to reach better results than individual investors. Unfortunately, our database does not allow us to distinguish between "small" and "large" funds.

It is also possible that the strong risk aversion of IPF's (willingness to invest only in stabilized firms with high enough past profits) had a higher negative impact than the positive impact of their advantages (better information, higher capacity etc.). Maybe in practice there is no comparative advantage of IPF's, because they have no experience and are not experts in this field.

The other explanations could be badly-designed rules of voucher privatization or unofficial associations of individual investors (not constrained by limitations on IPF's). But such explanations seem not to have high explanatory power.

**Table 1: Approximation of Net Dividends**

<b>Item</b>	<b>Individual Investors</b>	<b>IPF's</b>
Book value of property corresponding to average investor	33 000	33 000
Current average profitability of firms 10%	3 300	3 300
Gross dividend assuming 1/2 reinvestment of profit	1 650	1 650
Tax on dividend, 25%	413	413
Payment to management of IPF (up to 20% of profit of IPF)		247
Tax on dividend of IPF		248
Total	1 237 (\$43)	742 (\$26)

**Table 2: Correlation Coefficients**

	FOREIGN	DOMESTIC	INTERMED	II	IPF	P91
FOREIGN	1.0000					
DOMESTIC	-0.0500	1.0000				
INTERMED	-0.0188	-0.0497	1.0000			
II	-0.1226	-0.2219	-0.1539	1.0000		
IPF	-0.1639	-0.2520	-0.0814	-0.4448	1.0000	
P91	0.0557	0.2670	0.0204	-0.1120	-0.0672	1.0000
P9190	0.0139	0.0038	0.0125	-0.0759	0.0630	-0.7081
D91	0.0041	0.3659	-0.0113	-0.0551	-0.1148	0.2200
D9190	-0.0453	0.2788	-0.0099	-0.0396	-0.0899	0.2552
AP	0.2478	0.2635	0.1386	-0.2631	-0.1592	0.2953

	P9190	D91	D9190	AP
P9190	1.0000			
D91	0.0081	1.0000		
D9190	0.0130	0.7688	1.0000	
AP	0.0299	0.0063	0.0223	1.0000

Figure 1 depicts the different strategies of investment. Individual investors strongly preferred cheaper firms, while IPF's invested the most in firms in the middle of the price distribution. Firms are split into 10 groups with respect to average prices. Each group contains approximately 1/10 of shares. The first two columns have the following interpretation: the cheapest 10% of shares were sold for less or equal to 8.1 points per share, shares of this group represent about 21% of the total number of shares of individual investors, while only about 5% of the total number of shares of IPF's.

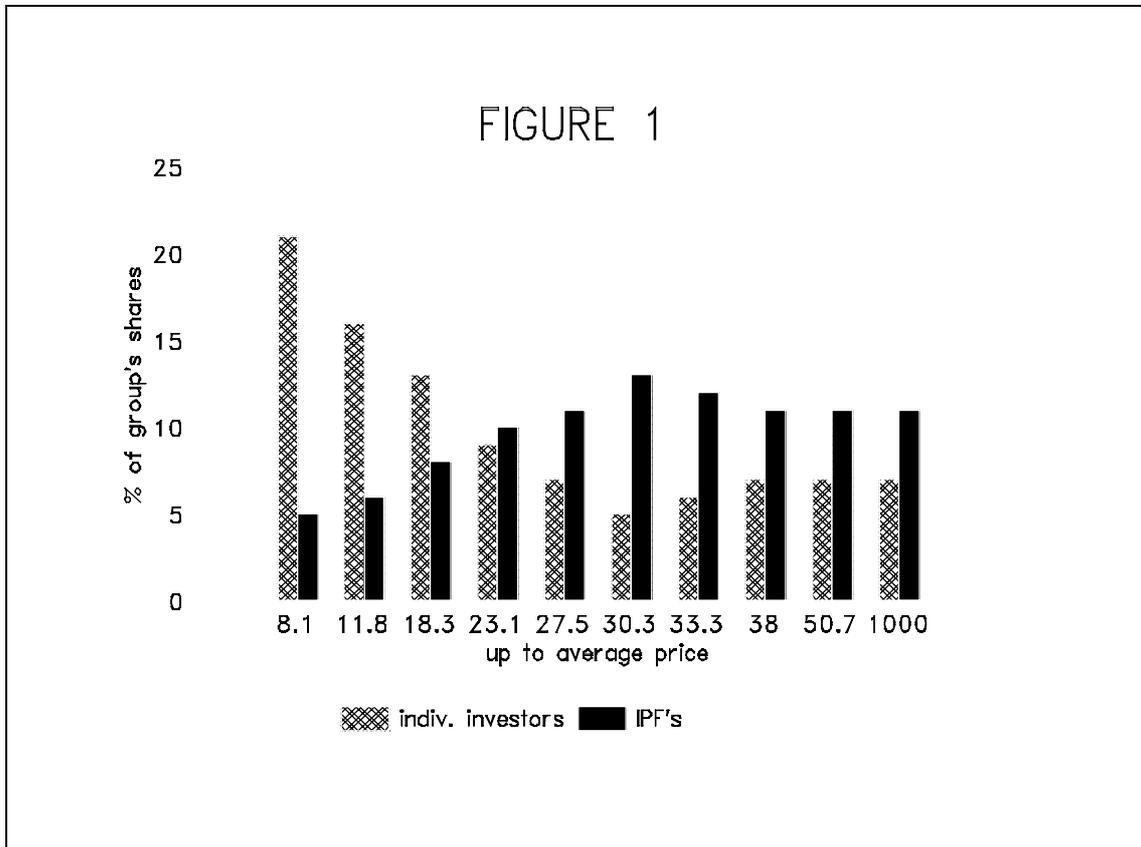


Figure 2 depicts total average prices.

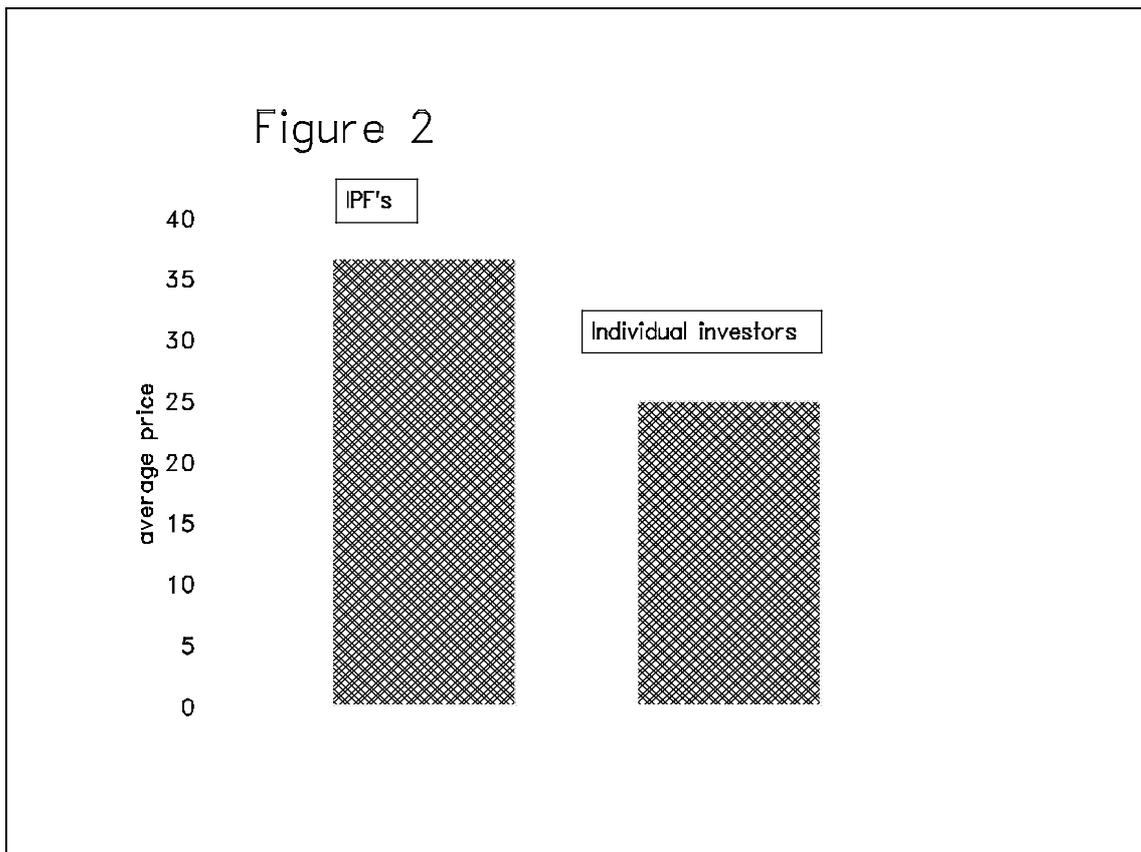


Figure 3 divides all shares into 3 groups with respect to the relative average price of IPF's and individual investors. The third column has the following interpretation: there are 367 firms where individual investors are more successful, and the number of shares of all these firms is about 107 million, from which about 33 million are bought by individual investors.

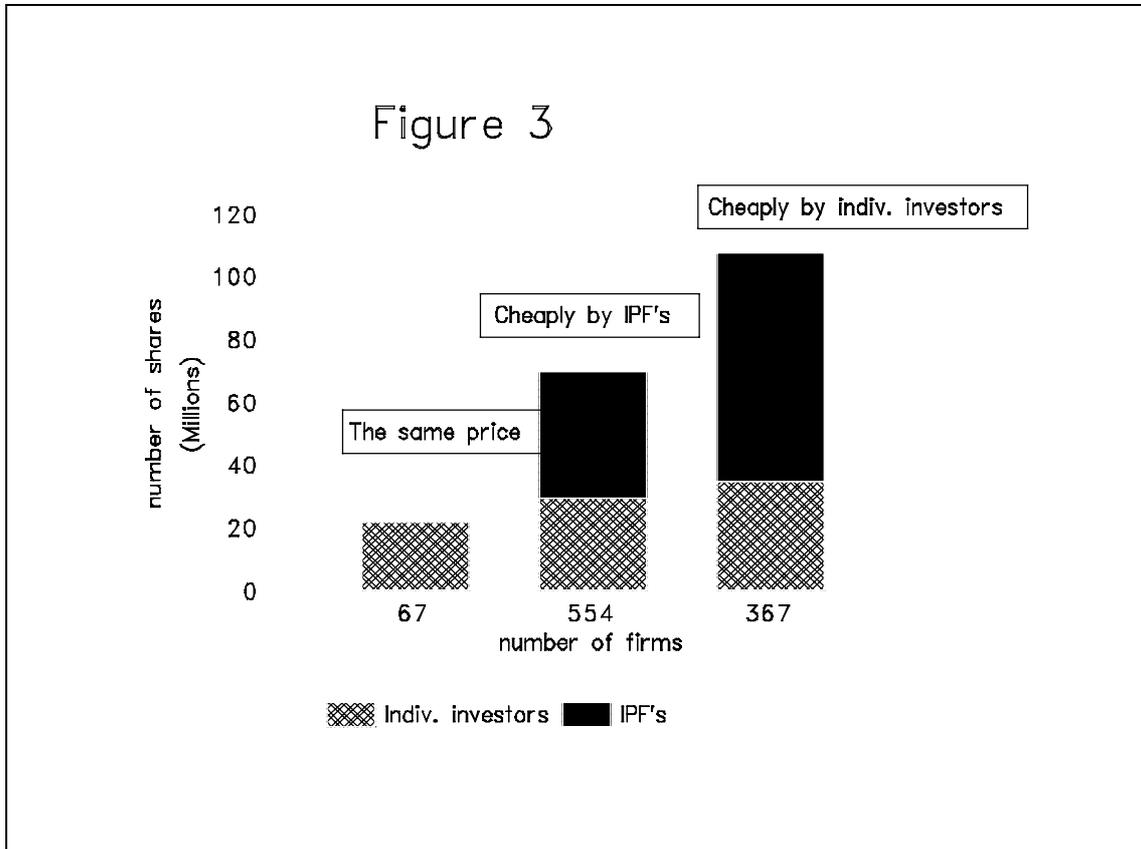
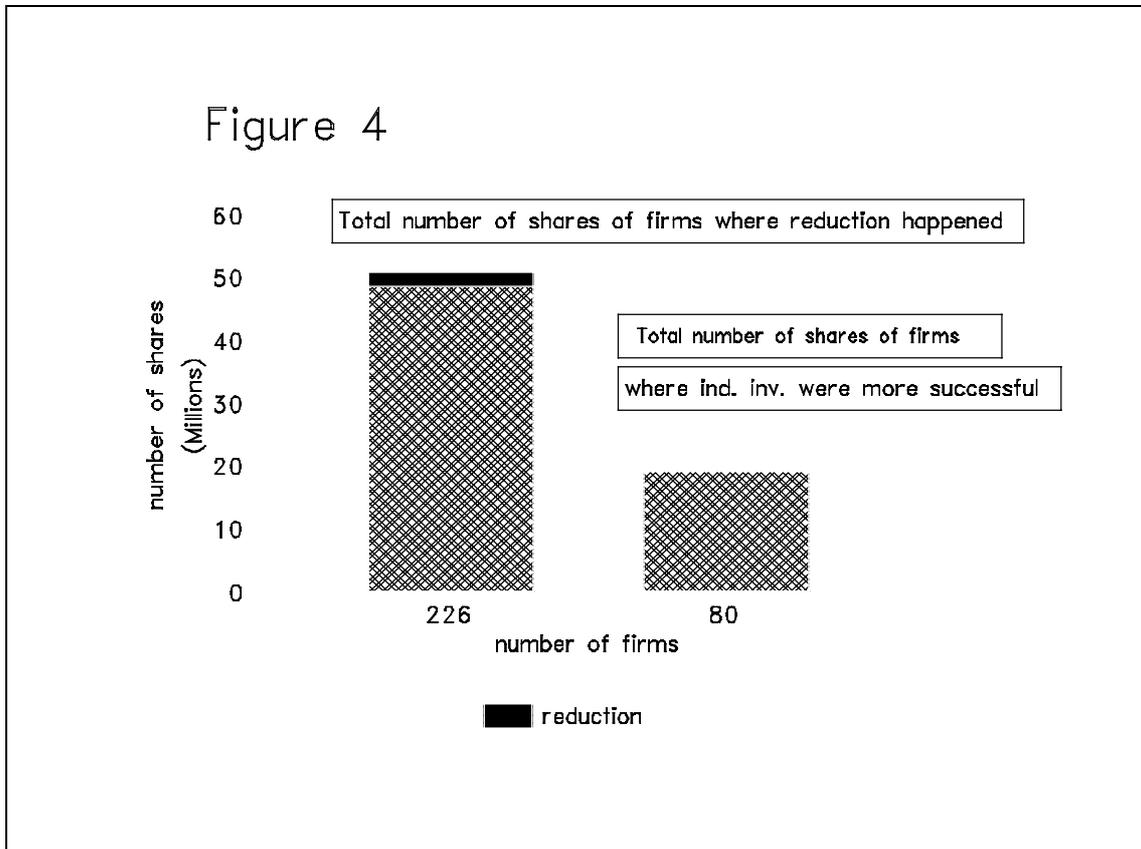


Figure 4 deals only with firms where a reduction of the demands of IPF's took place. The average reduction for these firms is about 5% of the total number of the firm's shares. The second column shows the number of shares of those firms, where reduction happened and the firm was bought cheaply by individual investors.



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