Privatization and Opening the Capital Markets in the Czech and Slovak Republics

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Abstrakt

Na privatizaci v České republice je pohlíženo jako na nesmírně důležitou část balíku reforem spolu se stabilizací a liberalizací. Podpora privatizace od veřejnosti i parlamentu je důležitým předpokladem, který zajišťuje, že si proces i nadále zachovává vysoké obrátky. Česká republika tak nastoupila bezprecedentní cestu, vedoucí nejen k velice rychlému vzniku soukromého sektoru, který vyrostl prakticky z nuly až na současné dvě třetiny produkce HNP, ale zároveň proces velké privatizace umožnil vznik kapitálových trhů obchodujících s více než tisíci akciemi.

Autoři dále popisují hlavní charakteristiky a vztahy souvisejících procesů. Speciální pozornost je věnována oprávněnosti a racionalitě procesu kupónové privatizace pod zorným úhlem nově vytvořených kapitálových trhů.

Abstract

Privatization in the Czech Republic has been seen as an extremely important part of the reform package together with stabilization and liberalization, and is supported by both the public and parliament; an important consideration is ensuring that the process maintains its momentum.

The Czech Republic has embarked on an unprecendented path that has lead to a very rapid emergence of its private enterprise sector, risen from scratch to two thirds of GNP. In addition, the process of large privatization has enabled capital markets to emerge with thousands of shares traded. The main characteristics and relationships of related processes are described by the authors; special attention is paid to the rationality of voucher bidding in the light of newly created capital markets.

1. Introduction

The CSFR's privatization program, now divided into the individual programs of the Czech and Slovak Republics, has been the most unique part of its reform strategy. In addition to more than 100,000 property-restitution claims settled, over 30,000 small firms were auctioned in small privatization and 4,000 out of 6,000 large firms are being privatized in the first and second waves of large privatization, to be completed by the end of 1994. In the mid-1980s Czechoslovak state-owned enterprises (SOE's) accounted for 96.7% of the national economy; only 0.7 % of NMP came from the non-farming private sector. Between 1991 and 1992, the Czech private-sector grew from 10.6% of GDP to 19.5%. By the last quarter of 1993 fully 67% of the national economy was private. During these years of rapid privatization, foreign participation has played an important role. Total FDI amounted to $561 mil. in 1993 alone, $2053 million in total for the years 1990-93.

As far as the problems of privatization can be judged, it is clear that there have been many. But no process of such large-scale economic change can be problem-free. Several problems and loopholes were addressed by the amendment to the Law on Large Privatization (year). Large-scale privatization laws spread privatization schemes across several methods, including voucher distribution, direct sales, public auctions, tenders, and other means of property transfer. This variety, however, was not part of the originally conceived, voucher-dependent privatization program. As a consequence, the far greater number of case-by-case decisions led to many unforeseen problems. Czech privatization has involved a combination of standard methods with other processes designed to compensate for factors peculiar to Czechoslovakia. The initiative fell to those proposing to privatize an enterprise, who would choose from a variety of means of privatization; ultimately the responsible governmental agency would select a "most appropriate" method. Bottom-up privatization acquired the support of the booming population of small and medium-sized entrepreneurs.

In adopting its large privatization policy, the Czechoslovak government and Parliament decided, by act 92/1991 (passed in February, 1991), to speed up the course of large-scale privatization of SOE's, including state farms (1/3 of all agricultural land). Overall, large privatization has been divided into two waves. The government made rough lists of enterprises to be privatized in each wave. Final proposals for each wave are made by the branch ministries. Some enterprises -- roughly 15% -- are not to be privatized at all or to be privatized later, to 5-10% of property to be privatized through restitution, 10% through

transformation of cooperatives and 15% through transfer to municipalities. Thus large privatization covers 55-60% of the property of large enterprises. The objective was to privatize enterprises quickly and to allow new owners (and not the government) to take on the tasks of restructuring. There have been only a few exceptions to this policy so far especially in "strategic" sectors, or where natural monopolies persist--steel, the mining industry, and telecommunications. Restructuring for these industries, including organizational changes prior to privatization, tends to involve heavy governmental particpation.

Originally, most privatization projects were to be fairly simple projects, with greater concentration on voucher schemes than any other method, and with the Ministry of Privatization taking a rather passive role in approving these proposals. An excessive number of competing proposals, however (three competing projects, on average, were submitted for each basic project in the first wave), required a greater variety of means of privatization. Moreover, the volume of the work involving evaluation and approval transfered a greater degree of authority to the relevant ministries.

The flexibility of the Czech privatization--privatizing the economy through a variety of methods--casts doubt on the so-called "privatization dilemma," or the trade-off between detail (the "Hungarian" approach of negotiated sales) and speed (mass privatization through vouchers). In reality, it is not so dichotomous: the voucher method, unique to the Czech Republic, is merely one of an array of techniques used. Wherever it has been selected by Czech governmental authorities an applied to particular industries, an in-depth review of alternative options preceded.

2. The Pros and Cons of Optional Privatization Techniques

The basis of Czech and Slovak privatization is speed. The **voucher method**, originally envisaged by Vaclav Klaus's Federal Ministry of Finance, was intended to be the main instrument for guaranteeing that a large volume of state property would pass quickly into private hands. The essence of the method is as follows: state property is being transferred into the ownership of private persons not for money but in exchange for investment vouchers. Each citizen over the age of 18 may buy investment vouchers--1000 points of investment "money" with limited maturity--for a registration fee of 1000 Kcs both in the first and second waves ($34, 25% of the average monthly wage). These vouchers entitle every citizen to bid for ownership of shares of any company privatized by the voucher method in either wave, or to allocate their investment

points to an investment fund which makes investment decisions for them and holds a diversified portfolio. The original Czechoslovak voucher method involved simultaneous bidding for all supplied shares (of 1500 companies) in several rounds.

In addition to speed, the voucher method solves several other problems at once. First, it guarantees that a maximum number of domestic citizens can participate in the process despite the lack of capital among the population. Second, it is perceived as a method that is fair to all participating individuals. In addition, each individual is able to participate in decisions about capital with respect to his own preferences. Also, investment privatization funds are able to evolve in a natural manner, and not as state administered entities. Finally, the high number of new (both on companies' and funds' side) investors create new constituencies in favor of a market economy. This is very important in a country with a history of successful capitalism, but which, under socialism, had one of the highest rates of state ownership in Central Eastern Europe.

A brief discussion of the chief difficulties expected with this form of privatization is needed. It was argued that the wide dispersion of ownership could lead to a lack of corporate governance at a time when strong control was necessary to discipline firms. In the Czechoslovak case, however, investment privatization funds (IPF's) have grown to take a leading role in the investment of voucher points, and thus it seems like predictions that such a problem would arise were wrong (see below for more details on the IPF's), although it is still unclear how competently the IPFs themselves will be able to govern the enterprises in which they hold shares, and if the small shareholders in the funds can organize to influence management of the funds by means other than selling their shares.

Second, voucher privatization provides neither the enterprises nor the state treasury with needed finances. Little of the required capital for industrial restructuring is raised through voucher sales. On the other hand, voucher distribution doesn't add any additional burden caused by leveraged buyouts--very problematic given the high costs of information, limited investor knowledge, thin capital markets, and a lack of relevant legislation. Voucher purchases, in addition, raises no revenue in a time of potential budgetary shortfalls.

Other methods of privatization, of course, have their strengths and weaknesses. Public auction gains the highest possible returns for the government and guarantees fairness and transparency in determining the eventual owner. Nonetheless, it is hampered by the fact that there is not enough money among

the population and additional leverage can be dangerous. Also, an exclusive focus on the money a potential buyer is willing to pay means neglects other factors. A public auction or competition in which other criteria than money are used--willingness to maintain levels of employment, protect the environment, reinvest future profits, etc.--resolves some of these problems and is more sensitive to the character of the privatized property, but is more vulnerable to subjective decision-making, favoritism, and perhaps even corruption.

Direct sales, on the other hand, involve no competition among competing buyer. Rather, a sale is made to a pre-determined buyer. The Czech and Slovak republics bot require further approval of their respective Councils of Economic Ministers for direct sales to be made. Nonetheless, in cases where many different projects are submitted which all propose direct sale, the decision takes on the nature of a public competition anyway, and thus projects proposing direct sale are still encouraged.

Restitution, or the return of property to original owners or their heirs, was an important if not controversial part of all privatization projects, which had to either provide confirmation that restitution claims were met or a means of meeting restitution claims. To compensate for restitution demands, 3% of the value of every firm undergoing privatization has been set aside in a National Restitution Fund. The original property owners (physical persons only, not former shareholders) have also been given priority in buying back the parts of companies which are not subjected to restitution (i.e. parts which were newly erected after the firm was expropriated). Restitution has also had specific effects on agriculture that are not discussed here.Given the strengths and weaknesses of each type of privatization, the CSFR has adopted a system which allows a variety of privatization techniques, with a case-by-case review of proposed projects in order to select the most fitting method of privatization for each business unit involved. This system provides flexibility, but at the same time concentrates much decision-making power in the hands of the governmental project evaluators.

3. Privatizations to Date

As mentioned above, there have been **two waves** of privatization scheduled. Both waves are now under way--all privatization projects have been submitted for the first wave, and the Ministry of Privatization has approved the final first-wave projects. For the second wave, all projects were submitted by June 1992, except for selected branches of the economy (e.g., health care).

As of December 31, 1993 the Ministry of Privatization reportedly evaluated nearly 15,991 of the 23,475 projects submitted in the first and second waves, of which 6,801 had been approved, creating nearly 8,000 new business units from 2857 state owned enterprises (see Tables 1,2). 7,484 privatization projects remain to be reviewed. Further projects from the health care sector are expected to come under review soon. 7533 business enterprises have been delivered, from the first wave, to the National Property Fund. The total value of this property reached 871.6 bil. Kc, nearly US$29 bil.

The majority of projects approved since the beginning of 1993 have been standard sales--900 direct sales, 250 public tenders and 200 public auctions. By December, 1993 450 companies were newly privatized via methods C and D. Yet this has kept the share of property value approved for voucher privatization close to half of the total approved volume (see table 1) while vouchers were used in one quarter of privatizations.

Table 1: Project Submission and Approval, by jurisdiction, Czech Republic,Dec.31,1993	**Firms within branch:**				**Firms under Local Gover-nment/ Munici-pality and trade**	**Health and Other** **	**Total**
	Industry	**Other prod.**	**non-prod.**	**Agricult.**			
Total Projects, Wave 1	4422	684	256	3032	2737	218	113496
Total Projects, Wave 2	1865	871	154	1907	2128	5201	12126
Total Firms, Wave 1	924	165	75	549	658	33	2404
Total Firms, Wave 2	488	80	65	432	370	611	2046
Wave 1 Projects Reviewed	4350	660	205	2786	2336	177	10514
Wave 2 projects Reviewed	1547	852	141	1166	1039	732	5477
Total Projects Approved	2322	463	148	1985	1385	498	6801
Projects unreviewed	390	987	43	64	1490	4510	7484

Source: Czech Republic Ministry for Privatization

The Slovak Republic had received about 1,500 projects on 736 firms in the first wave, of which 430 were approved. By 1992, 874 projects were approved, valued at 165.3 bil. Kcs. Of those, 188 were approved for direct sale, 20 for public auction, 10 for public tenders, 7 for restitution, 95 for unpaid transfer, and the remaining 544 were directed to voucher privatization. First-wave projects which involve voucher privatization but are approved too late for the first wave of vouchers should be included in the second wave of voucher privatization.

At first, most of the projects that were approved in 1992 involved vouchers, simply because both republics hurried to evaluate voucher projects earlier than other projects in order to fulfil their quotas for voucher privatization. More recently, the same situation had been repeated in Czech Republic at the end of 1993 (see table 3).

TABLE 2: Data on Approved Privatization Projects in the Czech Republic, that were delivered to NPF by December 31, 1993.

Approved Method of Privatization	**Number of Bus. Units**	**Share of Units**	**Total Value of Property (million Kc)**	**Share of Property**
A: Public Auction	514	6.8	5,811	0.7
B: Public Tender	502	6.6	19,188	2.2
C: Direct Sale	1680	22.3	46,284	5.3
D: Commercialization into joint-stock structure	1680	23.5	754,263	86.6
E: Privatization of an already existing state owned joint-stock company included in D				
F: Unpaid Transfer to municipalities, pension funds, banks, or saving banks	2318	30.7	30,013	3.4
Voucher Privatization (out of D and E)				
Restitution	613	8.4	6477	0.7
Restitution with additional buyout	129	1.7	9527	1.1
TOTAL	**7533**	**100.0**	**871,563**	**100.0**

Data Source: Czech Republic Ministry for the Administration of State Property and its Privatization

The book value of corporations (754 bil.Kc) comprised 86.6% of the total value of property approved for privatization. A more detailed picture of joint stock companies privatization, as of August 1993 only, is presented in table 3. Vouchers clearly dominated (55.9% within D and E method), while both foreign and domestic investors (including restituted owners) played a marginal role. An important role should be played in future, however, by the state through its temporarily established National Property Fund (13.3%) and by municipalities (9.3%).

Table 3: Privatization of joint stock companies: method D and E (only by August 18, 1993)

Direction of Shares	Number of Bus. Units	Share of Units*	Total Value of Property (million Kc)	Share of Property*
Vouchers	1230	26.80	258,818.3	49.20
Foreign Investor	67	1.46	7,068.5	1.34
Domestic Investor	108	2.35	6,821.3	1.30
Restitutions	140	3.05	1,277.1	0.24
Temporary hold. of NPF	438	9.54	70,105.9	13.30
Permanent hold. of NPF	36	0.87	327.7	0.06
Intermediary	75	1.63	6,074.4	1.15
Municipalities	303	6.60	48,813.2	9.27
Method D and E	1294	28.14	465,327.5	88.40
TOTAL	**4589**	**100.00**	**526,457.5**	**100.00**

Calculations of authors. Data Source: Czech Republic Ministry for the Administration of State Property and Privatization

3.1. The first wave of voucher privatization

The supply side

By the deadline for approving projects for the voucher privatization (May 18, 1992), both Czech and Slovak republics had actually exceeded expected contributions (firms that were approved for vouchers but not prepared in time for the first wave will be privatized in the second wave later in 1992). The Czech Republic designated 943 joint stock companies' shares with nominal

(book) value 201 bil. Kcs ($7 bil.) for the first wave of voucher privatization, (actually, 216.7 bil. Kcs worth was approved for vouchers, but some will have to await the second wave) and the Slovak side provided 85 bil. Kcs ($3 bil.), including 487 joint stock companies. The total net value of property designated to the voucher privatization was thus about 300 bil. Kcs ($11 bil.), well above the originally planned 260 billion. In Slovakia, it was common for firms to allocate all of their property (except 3% of each enterprise, which is put aside for remuneration of restitution claims) to voucher privatization, while in the Czech Republic this practice was less common. In fact, Slovak enterprises undergoing voucher privatization allotted on average 74% of their equity to vouchers, while Czech enterprises allotted only 62%.

In the Czech Republic, almost 1,000 firms were involved in the voucher privatization. Of these firms, the most are from the Southern Moravian Region (196 firms) and from Prague (179). The most heavily represented branches are construction (132 firms) and processing of food and beverages (110). The branches with the smallest representation were chemical production (7) and production of leather goods (5). Also, five financial institutions were included; Komercni Banka (Commercial Bank), Zivnostenska Banka (Merchant Bank), Investicni Banka (Investment Bank), Ceska Sporitelna (The Czech Savings Bank), and Ceska Pojistovna (The Czech Insurance Company).

Originally, some critics had feared that the voucher process would be a "last resort" for firms which were not attractive for potential buyers, and thus that only the weakest firms would be privatized through vouchers. Interestingly, however, a recent survey by the Czech Statistical Bureau found quite the opposite. On average, the profitability of those enterprises involved in the voucher scheme is noticeably higher than the average among Czech firms (see table 4).

Table 4 Survey of Earnings of Enterprises in the Czech Republic, Jan-Oct. 1992			
	State Enterprises (Including Firms in Voucher Privatization)	**State Firms Being Privatized Through Vouchers**	**Share of Voucher Firms (%)**
Total Number of Firms	3,841	965	25.1 %
Total Earnings (Mil. Kcs)	88,620	29,669	33.5 %
Number of Firms Reporting Profits	2,478	782	31.6 %
Total Profits of Profitable FIrms (Mil. Kcs)	112,273	32,510	29.0 %
Number of Firms Reporting Losses	1,363	183	13.4 %
Total Losses of Loss-making Firms (mil. Kcs)	23,653	2,841	12.0 %
Sources: Czech Statistical Bureau, Lidove Noviny, Jan. 7, 1993			

About 25% of Czech firms have been designated to be privatized through vouchers, but these firms have made up over a third of all reported earnings of Czech firms (we return to this point later). In addition, voucher firms make up 31.6% of all profit-making firms in the Czech Republic, but only 13.4% of loss-making firms. Improvements in the performance of firms involved in the voucher process have been notable among firms in construction, some mineral mining, and food and beverage products. Utilities--electricity, gas, fuel, and water--and distribution firms have also been among the most profitable enterprises. We will test the role of profit on investors'decision-making later.

The ratio of supplied property between the two republics (2.29:1) corresponds to the ratio of voucher holders in the Czech Republic to those in the Slovak Republic.

In considering the features of supply side of voucher privatization one should analyze the updated data for the first completed wave that provide additional evidence. (see table 5). Of the total book value of relevant corporations (331 bil.Kč), vouchers represented an average of 61.4% (or 203.2 bil.Kč) with standard deviation of only 20%, ranging between a minimum level of 8% and a 98.8% maximum level of the total property. Permanent holdings of the NPF reached 13.3 % with a much larger relative variance, while temporary holdings were declared as low as 10%. Both foreign and domestic investors' roles,

including restitutions and proposed employee holdings were marginal and varied wildly. The differentiation fund represented an increase of privatized property due to the retained earnings during the privatization process itself, and KAD represented respective losses of worth. The aggregate nominal value has increased within this period (sometimes called "pre-privatization agony") in spite of many hesitations about "management risk". We cannot yet judge the market value of corporations; in the past three months, since the distribution of voucher privatized shares, 1000 companies shares have been offered through the Prague Stock exchange and through the RM-system (more on this point later).

Table 5 Updated data for Voucher Privatization (September 1993)

Type of share	Average %	Sum (million Kc)	Standard dev. %	Minimum %	Maximum %
Vouchers	61.44	203,248.9	20.44	7.98	98.76
Foreign Investor	1.64	5,434.5	10.27	0.00	79.32
Domestic Investor	1.40	4,638.5	8.63	0.00	77.00
Employee Holdings	0.85	2,794.9	2.27	0.00	10.00
Intermediary	1.81	5,997.4	6.85	0.00	72.00
Municipalities	2.75	9,085.4	4.22	0.00	86.55
Temporary hold. of NPF	9.96	32,963.5	12.39	0.00	82.00
Permanent hold. of NPF	13.34	44,122.0	4.71	0.00	85.34
Restitutions	3.00	9,926.2	0.91	0.00	27.52
Personal Restitutions	0.29	958.5	2.15	0.00	53.08
Additional Restitutions	1.84	6,086.0	4.26	0.00	72.00
Differentiation Fund	1.68	5,546.2	3.12	0.00	25.25
KAD	-	1,045.5	7.9*	0.0*	139.7*
Foundation Fund	0.00	5.1	0.03	0.00	1.00
Total Shares	100.00	330,895.8	1,856.0*	2.2*	53,521.0*

*Values in million of Kc

Calculations of Anton Marcincin. Data Source: National Privatization Fund of the Czech Republic

The demand side

Citizens had put off buying booklets until the last months, perhaps because they were not attracted by the official campaign. By January 10th 1993, only 2 million voucher booklets had been purchased in both republics, and it appeared

that the expected number of participants, 4-5 million (just a bit over a financial break-even of the procedure based on the proceeds from the registration fees), would not be attained. But then privately established investment privatization funds (IPFs) began their advertising campaigns unexpectedly early, promising options to buy back their shares if the voucher holders would invest into their funds, sometimes promising to pay back not the actual market value of portfolio, but ten-fold the registration fee of the coupon book. Expected book value per voucher holder at that time was close to 70,000 Kcs with 3-4 million expected participants.

The aggressive advertising barrage, the extravagant offers, and the impending end of the registration period attracted large crowds to the registration places and increased the number of participants to a level much greater than had been foreseen. The final number of registered voucher holders was 8.56 million citizens. **This massive scale of participation--nearly 3/4 of all eligible citizens--was quite unexpected**. The large number of participants was an extreme test of the capacity of the established Center for Voucher Privatization and its computer networks to function on a large scale.

Intermediaries in Voucher Privatization -- Investment Privatization Funds (IPFs)

An important role in the demand side of voucher privatization has been played by the recently established IPFs. These are funds organized in the first wave as joint-stock companies, which are allowed to collect voucher points from the public and invest them during the voucher privatization. Some of the funds were purely private, some were established by still state owned banks or joint-stock companies. By the end of the registration period, there were over 430 IPFs registered by commercial courts and the Ministry of Finance.

The significance of the role of the IPFs is tremendous. In the so-called "zero wave," during which voucher holders were able to entrust their points to the various Investment Privatization Funds, 5.8 million people (over 2/3 of those involved in the voucher privatization) chose to designate all of their one thousand investment points to IPFs, and a further 420,000 allotted part of their points to IPFs. In total, IPFs received 72% of all vouchers in circulation, about 6.13 billion investment points (see table 6).

Together, the ten largest IPFs controlled about 51% of all investment points and about 72% of all points that were allocated to IPFs. Investment privatization funds obtained not only substantial part of investment points (6,111,812,300--71.35%--of 8,565,642,000), but consequently also shares of joint-stock companies privatized in the first wave of the voucher privatization. If one

TABLE 6 Structure of Groups of Funds in the First Wave, Based on Size of Funds		
Size of Fund (investment points)	**Number of Funds**	**Share of Total Points**
Over 100 Million	13	62.5 %
10-100 Million	65	26.7
5-10 Million	43	4.9
Under 10 Million	308	5.9
Total	**429**	**100.0 %**

Source: Own calculations.

concentrates on founders of the funds resp. investment groups (M.Mejstřík, J.Mládek and A.Marcinčin recognized 343 founders) rather than on the funds only (429 funds), the following can be obtained:
The largest founder (CSP) collected 950,432,200 inv. points (15.55%, where 100% are points collected by all funds) (see Table 7), 2.(IB) 724,123,600 points (11.85%), 3.(HCC) 638,548,000 points (10.45%), 4.(VUB) 500,587,700 points (8.19%), 5.(KB) 465,530,300 points (7.62%), 6.(CP) 334,040,900 points (5.47%), 7: (SIB) 333,045,400 points (5.45%), 8(SSK) 168,864,400 points (2.76%), 9.(CA) 166,256,000 points, 10. (PPF) 117,624,300 points, 11.(ZB) 117,541,500 points, 12. (SLP) 116,682,500 points and 13.(AG) 111,087,900 points. Thus, the 13 largest founders collected 4,744,364,700 investment points (77.63%) while other 330 founders collected only 1,367,447,600 points (22.37).

It is clear, that in the hands of the relatively small number of founders of privatization funds lay a substantial portion of the Czech and Slovak economies. It can be seen that a number of the founders are banks, private or partly/fully owned by the state. In general, future shareholders appear to have put most of their faith in traditional monetary institutions, which have a wide network of affiliates and large advertising capacity. These institutions also have the largest number of financially trained experts, although it remains to be seen whether or not they actually have enough know-how to oversee the acquisition of property worth "billions". The importance of the funds as owners of companies is increased by the fact that they maintain and "organizational" advantage over other shareholders--typically small investors or the Fund of National Property.

Unfortunately, until the late (April 28, 1992) passage of regulations, there was very limited regulation for IPFs, given only by the rules regulating establishment of IPFs (as joint-stock corporations) or by ad hoc governmental

decrees. These rules provided only very weak regulation, and this problem was widely criticized (see Mejstrik, Kyn, et.al.). The principles included into the Law on Regulation of IPFs--a disclosure rule, diversification requirements, prevention of conflicts of interest, rules regulating operation, etc.--were not applied in time. Full prospectii of IPF's, with full disclosure of capital stock, personal history of members of the board, and descriptions of operational charges, are rarely publically available. In fact, it was disclosed that many IPFs had appointed to their boards of directors governmental officials directly involved in the voucher privatization procedure. Finally, the April 28, 1992 Law on Investment Funds and Corporations addressed this issue.

Now, the following question will arise: Having computed percentage holdings of 29 largest founders in each company, can we say, that concentrations are due to some random selection of companies or due to specific investors' behaviour? (Why are some companies shares concentrated in the hands of a very few funds while others are more dispersed.) Similary, the total number of funds holding company's shares differs.

Table 7: 13 largest privatization funds'groups

Fund	Points acquired	%TPF[1]	%TP[2]	Shares held[3]	%TSF[4]	%TS[5]
CSP	950,432,200	15.60	11.10	21,375,611	12.20	7.7
IB	724,123,600	11.90	8.45	13,594,068	7.27	4.9
HCC	638,548,000	10.50	7.45	15,225,108	8.65	5.5
VUB	500,587,700	8.19	5.84	11,985,444	6.81	4.3
KB	465,530,300	7.62	5.43	11,931,808	6.78	4.3
CP	334,040,900	5.47	3.90	7,623,311	4.33	2.7
SIB	333,045,400	5.45	3.89	10,986,751	6.24	4.0
SSK	168,864,400	2.76	1.97	7,707,865	4.38	2.8
CA	166,256,000	2.72	1.94	3,610,773	2.05	1.3
PPF	117,541,500	1.92	1.37	4,920,213	2.80	1.8
ZB	117,541,500	1.92	1.37	1,885,287	1.07	0.7
SLP	116,682,500	1.91	1.36	4,362,299	2.48	1.6
AG	111,087,900	1.82	1.30	3,941,916	2.24	1.4
Total	**4,744,364,700**	**77.63**	**55.39**	**119,149,916**	**67.71**	**43.0**

1, Percent of investment points acquired by all funds. (100%=6,111,812,300 points)
2, Percent of all investment points (100%=8,565,642,000 points).
3, Number of shares in Fund's portfolio. Nominal value = Shares held*1000 Kč or Ks
4, Percent of shares held by all funds. (100% = 175, 975,880 shares. 277,711,577 shares were sold in the voucher privatization. The residual (101,731,697 shares) is held by individual investors.)
5, Percent of companies' shares offered in the voucher privatization. (100%=277,711,577 shares.)
Source: A. Marcincin's calculations

4. Ownership structure generated by the voucher scheme

The most critiqued feature of the voucher scheme was the expected high dispersion of new owners of joint stock companies. 8.56 million citizens took part in the voucher privatization in order to buy shares in 1491 companies. Therefore it seemed inevitable that each company would have thousands of shareholders, none of whom would be not able to influence individually corporate management and performance. The shareholders would have to

organize themselves to some sort of shareholders interest groups, and this takes time especially in a post-communist country. Till then, pre-voucher privatization owners with very small stakes (like management, employees, restituents) or in some cases the National Property Fund (i.e. a state organization) and direct investors (foreign investors in 51, domestic in 58 companies) would keep majority of voices on the general meetings.[1] Summing up, majority of companies privatized by the voucher method would be again under control of present management untouched by the ownership transfer from government clerks to private investors.

However, not all citizens decided to invest individually. Indeed, a majority of them (72 %) invested their voucher points to the newly created investment funds. This can be understood as the first concentration of thousands of potentially small shareholders. Importance of the funds suggests, that ownership structures may not be so dispersed as initially anticipated. For a clearer picture of the possible ownership structure, let us consider the following two groups of shareholders:

(1) Shareholders who obtained (bought or received for free) shares prior the voucher process: Direct foreign or domestic investors, restituents, employees, managers, municipalities, banks and the National Property Fund (for temporary or permanent holdings).

(2) Shareholders who obtained their shares in the voucher process: Individual small investors and investment funds.

By the nature of the privatization method (842 companies offered more than 50% of their shares for vouchers), investment funds and individual investors are the most important owners. Funds have more than a 20% share in 787 companies, more than 50% in 334 companies. Individual investors, on the other hand, have more than a 20% stake in 739 companies, more than an 50% stake in 272 companies (see **Table 8**). The National Property Fund controls 23 companies with more than 50% stakes and has more than 20% stakes in 108 companies (shares in temporary holding) respective 9 companies (shares in permanent holding, see **Table 9**). Foreign investors control 19 and domestic (direct) investors 16 companies. If individual funds, or small groups of funds, rather than funds in total, are considered, the following numbers are obtained: the single largest fund (by which we refer to the funds having acquired the

[1]Recall, that if majority of shareholders is not present for the general meeting, a second general meeting may take place in the same day, attended by the present shareholders.

largest stake in a given company) has a greater-than-20% share in 102 companies. The group of the five largest funds effectively control 272 companies.

TABLE 8: Ownership structure of voucher investors							
Investors	50%	40%	30%	20%	16%	10%	0%
Small Individual Investors	272	411	559	739	821	911	949
Investment Funds	334	498	631	787	831	876	949
Single Largest Fund	0	0	9	102	481	747	949
Second Largest Fund	0	0	0	7	164	482	946
Third Largest Fund	0	0	0	0	31	217	923
Two Largest Funds	2	25	319	673	775	860	949
Three Largest Funds	85	279	543	753	809	870	949
Four Largest Funds	196	408	605	769	822	873	949
Five Largest Funds	272	470	622	782	823	875	949
Total Vouchers	842	897	920	939	943	946	949

Number of companies, where given investor owns more than 50%, 40%,..., 0% of their shares. For example, there are 842 companies offering more than 50% of their shares for vouchers. Whole group of funds acquired more than 50% of shares in 334 companies.

TABLE 9: Ownership structure of non-voucher investors							
Investors	50%	40%	30%	20%	16%	10%	0%
Foreign investors	19	22	34	38	40	45	51
Domestic direct investors	16	17	28	38	42	48	58
Temporary hold. of NPF	21	27	50	108	155	182	293
Permanent hold. of NPF	2	3	7	9	11	11	21
Shares to be sold by banks	2	6	15	24	39	50	61
Additional Restitutions	2	4	5	7	9	11	52
Transfers to Municipalities	1	1	1	4	11	26	181

Number of companies, where given investor owns more than 50%, 40%,..., 0% of their shares. For example, foreign investors have stakes in 51 companies. Fund of National Property owns more than 20% of shares in 108 companies.

4.1 Relative importance of shareholders

The previous analysis demonstrates the importance of individual shareholding. Their collective disadvantage, however, is simply that this highly disparate group of citizens does not typically attend general meetings of their companies, and thus their relative importance is diminished. The following analysis of relative strength was made: first, a group of possible shareholders was defined. The group contains eight non-voucher investors (such as foreign and domestic investors, the NPF) and the 10 largest funds (again, as measured by stakes in each enterprise). The group of 18 investors is big enough to include almost all shareholders with stakes greater than 1%. Assuming that individual small shareholders are not able to use their voting power in unison (and this is what actually happens), thus we can say that they have negligible relative importance for corporate governance. The relative importance of other shareholders is then calculated by the formula for weighted stakes, where '*k*' stands for shareholder and '*j*' for company:

$$Weighted\ stake_j^k = \frac{Stake_j^k}{\sum_{k=1}^{18} Stake_j^k} * 100 \qquad \textbf{(1)}$$

The rationale behind this formula is explained in Example 1.

Ex. 1: A company is owned by four shareholders, k = A, B, C and Individual small shareholders. Shareholder A owns 10% of shares, B has 10% and C has 20%. The rest, 60% is owned by "thousands" of individual shareholders, unable to influence individually any decision of the investors A, B and C. Shareholder C has the same voting power as shareholders A and B together. Therefore, relative power of C is 50% of all voices, A has 25% and B has also 25% of all voices.

Results of this calculation are presented in the **Table 10**. The importance of all investors increased, especially of the funds. A single fund would control 146 companies, a group of five funds can control 754 companies.

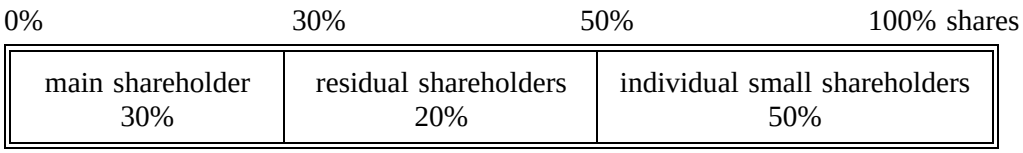
TABLE 10: Relative power of investors, adjusted.					
Investors	50%	40%	30%	20%	0%
Foreign investors	33	40	45	45	51
Domestic direct investors	24	30	40	47	58
Temporary hold. of NPF	56	88	135	173	293
Permanent hold. of NPF	3	7	11	11	21
Shares to be sold by banks	12	17	30	47	61
Additional Restitutions	4	6	7	11	52
Investors	50%	40%	30%	20%	10%
Single Largest Fund	146	231	442	737	895
Two Largest Funds	473	644	782	974	916
Three Largest Funds	669	760	847	892	918
Four Largest Funds	727	790	860	897	918
Five Largest Funds	754	809	867	900	918
Six Largest Funds	761	817	869	902	918
Ten Largest Funds	768	821	872	903	919

In order to display better the real importance of investors, shares of individual small shareholders were proportionally distributed to other shareholders by the formula 1. In such a case, a single largest fund has under its control 146 companies.

4.2 Test for high ownership concentration

Returning to the criticism concerning high dispersion of ownership, we can argue on the basis of the last calculations, that (i) even if no small individual shareholder cares about his company, there are always other investors, like funds, foreign investors, etc. who have enough a share (or relative importance) to have a majority of all voices and so to exercise necessary corporate control; (ii) where small individual shareholders are able to use their voices effectively, corporate control is more probable.

Figure 1: Definition of three groups of shareholders



Main shareholder: The largest shareholder, single or small group. Small individual shareholders are excluded from this group. Residual shareholders: All shareholders, except of the main shareholder and small individual shareholders.

Should ownership concentration be low or high? We define three groups of shareholders (see **Figure 1**). In each company one can find, with the exception of the small individual shareholders, one or a few (two, three) large shareholders. We refer to them as "the main shareholder". If their shares, as well as the shares of the small individual investors, are deducted from 100% of the company shares, the "residual shareholders'" stake is obtained. Usually, there are large numbers of these residual investors. The following hypothesis may be tested: the concentration will be higher the greater the likelihood that (1) the main shareholder (or the group of main shareholders) has more than 50% of the company's shares, or (2) the main shareholder has less than or equal to 50% of the company's shares and small individual shareholders have so large a stake that, together, all residual shareholders have a lower stake than the main shareholder.

The first criterion is obvious. The second is based on the following example:

Ex.2: A is the largest shareholder in the company with 30% stake. We call him the main shareholder. Small individual shareholders have 50% stake and all other shareholders (residual) have 20% stake. Therefore, the concentration of ownership is high, since the main shareholder has more shares than all residual shareholders. This can be written by the condition:

$$Main\ sh.\ stake \leq 50\% \wedge Small\ sh.\ stake \geq 100 - 2 * Main\ sh.\ stake \quad \textbf{(2)}$$

The results for both criteria are presented in the **Table 11**. The group of the four largest shareholders (again, except small individual shareholders) can control 912 companies, while a group of five can control 919 companies. In other words, 97% of all companies can be controlled by the coalition of the five largest shareholders. The second part of the table demonstrates the importance of investment funds. If they decide to cooperate, a group of five funds could control 720 companies, i.e. 76%.

TABLE 11: Test for high ownership concentration			
Largest shareholders, group of	Criterion 1	Criterion 2	Total
Three	279	574	853
Four	446	466	912
Five	536	383	919
Largest funds, group of	Criterion 1	Criterion 2	Total
Three	85	495	570
Four	196	477	673
Five	272	438	720

4.3 Conclusion - Beyond voucher distribution

Investor shares from the first wave were registered at the Central Securities Registry, issued to their new owners (both individual investors and investment privatization funds -- IPFs) by June 1993. Although no paper has been issued, all IPFs were to inform their shareholders of their holdings and of how and when their shares would be issued.

It was generally expected that the official transfer of shares to private hands would not be conducive to effective corporate governance. First, The main logistical complication involved in the organization of shareholder meetings was accomodating the several thousand shareholders which might have attended. Yet, only a few, mainly core investors (see part 4 above) actually attended shareholders' meetings. Second, there were, as well, expectations of protracted agency problems; that voucher privatization and the dispersed ownership structures it created would allow managers to maintain control over enterprises. But investment privatization funds with more than 70% of corporate shares became more involved in corporate decisons, including the firing of directors (sometimes without replacement), and the altering of production specifications.

5. The Role of the Stock Market in Czech republic in establishing Corporate Governance

We now turn our attention to the other primary mechanism of corporate governance in privatizing firms--the capital market.

5.1. Prague Stock Exchange

Between 1871 and 1938, the Prague securities exchange traded continuously. After World War II the operation of the exchange was not restored and in 1952 it was officially abolished.

Trading on the current Prague Stock Exchange (PSE) officially began April 6, 1993. The quotation of prices and the matching of orders to buy or sell and computation of the market price of individual securities is done automatically. Trading occurs once a week through approximately fifty registered stock exchange members.

Contracts concluded on the stock exchange are settled according to the principle "delivery against payment". Clearing is carried out by the Czech National Bank in its Clearing Center. Coverage of the risks arising from the transactions is one of the services provided by the Guarantee Fund. A graphic description of the system of trading on the exchange is provided in Figure 2.
In the first period - until June 22 - only nine bonds were traded. The price movement is not significant, but turnovers had risen rapidly (see Figure 4). All transactions are now done in "dematerialized" form, meaning that all bonds and shares, as well as their transactions, are registered in a computer. In this second period the stock exchange operates with previously traded bonds and with hundreds of shares from voucher privatization. The turnover therefore had risen rapidly. (Because of technical problems arising from the limitations of tradability of some shares, not all of 987 Czech join stock companies taking part in voucher privatization could be traded from the above date--650 on 22 July.)

5.2. RM-system

The RM-system (RMS) functions as a logical continuation of voucher privatization. Hundreds of registration offices from voucher privatization spread all over the country offer to make transactions directly to all people without any bookmakers or intermediaries. All participants in voucher privatization, moreover, have an open account registering their shares. The graphic description of the trading system of RMS is given in Figure 3. Trading in the RMS was approximately once monthly beginning July 18, although the actual period of trading was shortened in preparation for twice-a-month trading.

5.3. Comparison of PSE and RMS

Consider an investor--any legal person or physical person older than 18, domestic or foreign--pondering a foray into the Czech securities markets. He may either operate directly through RMS or as a registered member of the PSE. The main advantage of the PSE is the relatively short period required for transactions. For a non-member of the PSE it will take about one week from the specification of an order until its final settlement. The same procedure in RMS takes about three weeks.

Transaction costs can be prohibitive. On the PSE transactions tend to be significantly cheaper for registered members, but registration is quite costly and therefore advantageous only for relatively large and permanent investors. Non-members can invest on the PSE only through registered investors who frequently require a fixed minimum provision. On average the charged percentage for a transaction up to fifty thousand crowns is about 1.3%, for a transaction up to one million about 1%, and less than 1% for larger transactions.

In spite of the willingness of the RMS to present itself as a small-investors exchange, its services are more expensive for smaller transactions. The registration of an order requires a flat fee--35 crowns. The commission for small transactions is 2%. Services of the RMS are cheaper once the 1 million-crown level is reached.

On the PSE, an investor, if not registered, must find a registered member (rather easy since all large banks are registered members of the PSE), specify his order, and pay on a bill a sum corresponding to his order he wants to buy. The RMS procedure is a bit more complicated. The investor places his order at one of 500 registration offices around the country, and if he wants to buy, he should go to Investiční Banka and pay money to the special bill. The advantage of this procedure is that all participants of voucher privatization are used to the regular contact with registration offices. Even the form for specification of the order is very similar to that one from voucher privatization.

A consistent peculiarity of the Czech capital market is the significant price difference for identical issues on the PSE and RMS. Even price trends for the same company stock differ between exchanges. Both systems started with price levels reflecting the appreciation of issues in the voucher privatization. The initial prices on RMS reflected the average price of the issue in voucher points. The value of one thousand voucher points (the amount granted each participant) appreciated by 30 thousand crowns (corresponding to the book value of

privatized companies).

The relationship between the appreciation of shares in voucher privatization and the initial prices on the PSE was not so tight. There were three bands of issues based on the prices from voucher privatization, but only a single price for each band. Due to the higher frequency of trades on the PSE, price rises have been greater. Initially there were only small changes of prices allowed which paralysed the PSE. New regulations allow prices to move 20% in either directions under the condition that some transition occurs. If there is no demand the issue price decreases by 50%. The opposite move occurs in the case of no supply. Where there is both no demand and no supply the price remains unchanged.

The price mechanism adopted by RMS is not publicly known. Price intervals valid for the next round per each share were published, but the price mechanism significantly changed after the forth round, and indeed, prices now rise even in the case of excess supply. Nevertheless, the RMS tends to chronically undervalue stocks, while the PSE tends to overvalue them. Prices on the RMS fell in the latter half of 1993, while prices for similar issues rose on the PSE. After September the demand for shares on the RMS increased rapidly, which was not able to absorb high volumes (see Figure 5). The four-week trading period on the RMS was replaced by a two-week period.

5.4. Problems and perspectives of the Czech capital market

Illiquidity contunues to plague the capital market. Despite substantial capital flows from foreign investors, the market remains largely under-capitalized; the Czech population is simply unaccustomed to investing, and institutional investors are severly handicapped. On the RMS a rigid price mechanism, and the inordinately long time required to complete transactions, have frozen the market. Though the PSE is modeled after similar bourses all over the world, the advantage of the RMS is that it allows investors the privilege of direct communication with the capital market for a surprisingly small fee. The RMS will soon change its trading system from periodic auctions (with long intervening gaps) to a continuous auction. The completion of the second wave of voucher privatization, along with share sales by the National Property Fund, will add hundreds of issues to the system. Still, supply-side infusions cannot alone cure the liquidity squeeze.

Figure 2. The system of trading on the PSE

Legend: GF - Guarancy Fund, CC - Clearing Center of the Czech National Bank, SCP - Security Center
1a - instruction to sell
1b - instruction to buy
2a - order to sell
2b - order to buy
3 - confirmation of conclusion of the contract
4 - certification of conclusion of the contract
5 - statements of the contract concluded
6 - statements of the executed and non-executed transmission of the securities
7a - confirmation of the sale
7b - confirmation of the purchase
8 - instruction for clearing between stock exchange members
9 - information of non-executed transmission
10- result of the settlement
11 - administration of the Guaranty Fund.

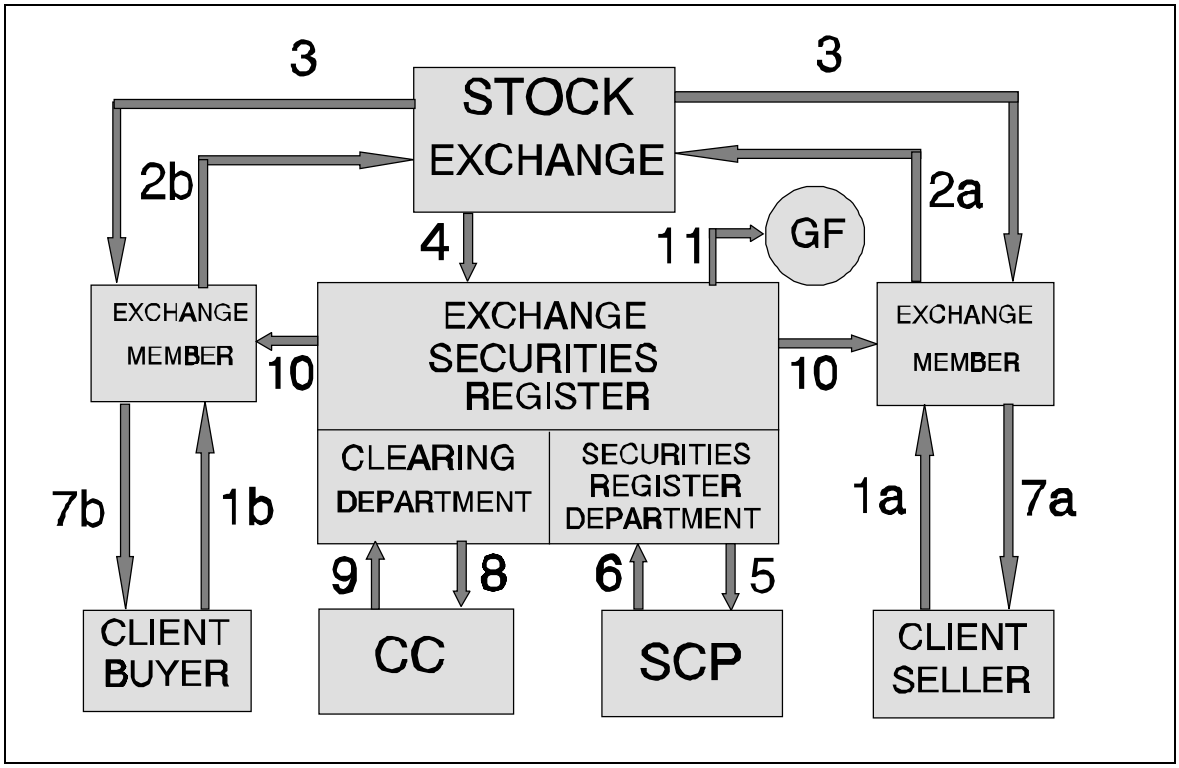
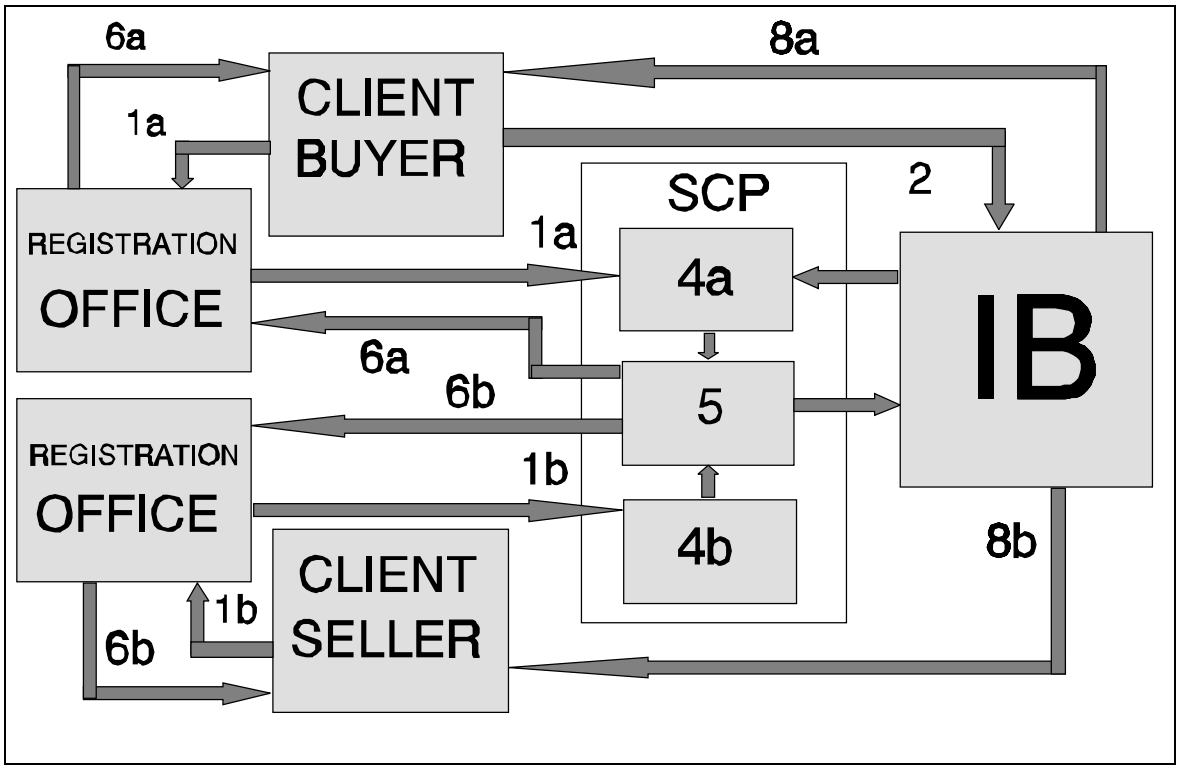
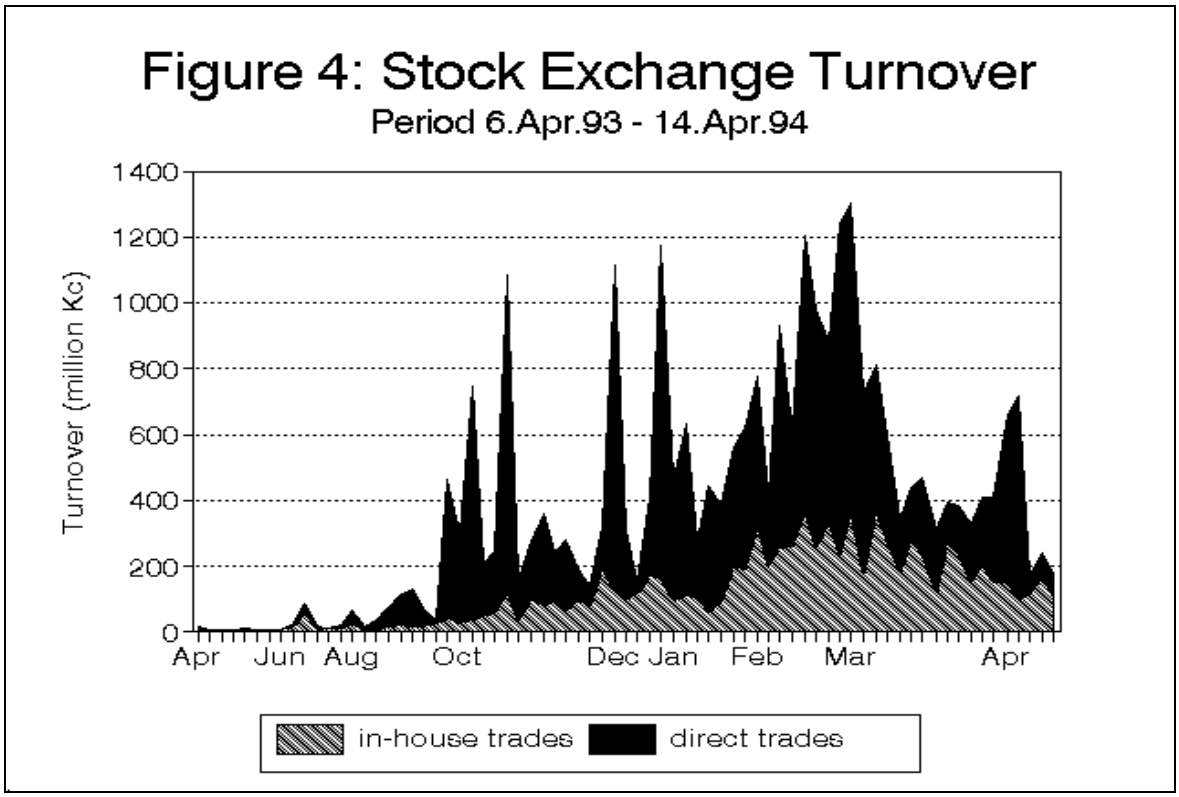


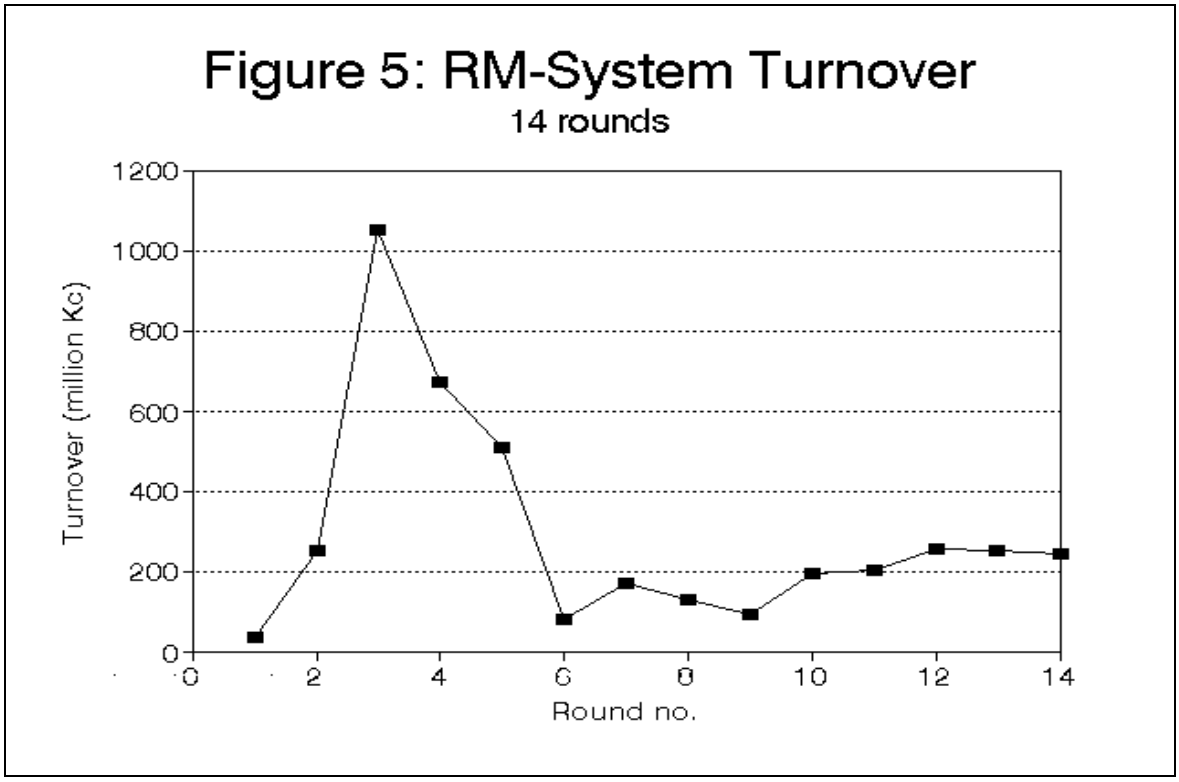
Figure 3. The system of trading on RMS

Legend: SCP - Security Center, IB - Investiční Banka (a commercial bank).
1a - instruction to buy
1b - instruction to sell
2 - payment to the account of SCP
3 - confirmation of the payment
4a - certification of the order to buy which is covered by money in the account, 4b - certification of the order to sell which is covered by shares in the account registering shares
5 - meeting of demand and supply of shares and computation of the equilibrium price
6a - statement of the execution of the command to buy
6b - statement of the execution of the command to sell
8a - payment to the client buyer of the remaining amount (the case of buying for cheaper price or not buying)
8b - payment to client seller (if some sale occurs).





Calculations by A.Marcincin



Calculations by A.Marcincin

6. Simulation Model: evaluation of companies in the voucher market and stock exchange.

We design an artificial voucher market to simulate new prices for company shares in the five rounds. The structure of trade was patterned after actual trading. Buyers were limited by the number of their voucher points and by the time horizon of five rounds. A seller would introduce his "goods". In equilibrium, all voucher points would be spent, all "goods" sold and prices would reflect both (relative) demand and supply. Therefore, it is of high interest to test if voucher prices really express some kind of rational investment behaviour of demanders, given supply of shares. Since some shares are traded on the stock-exchange, we can test if this "young" market price is positively correlated with the actual voucher price, adjusted for changes in companies performance in 1992.

6.1 Voucher price

Each round of the voucher privatization brought a new price for each company share if the supply was greater than zero (i.e. if company was not fully sold in the previous rounds). As a voucher "equilibrium" price we use the last-listed price of the shares, P_λ. This price would depend on (1) the total number of shares of each company--a proxy measure of company size and highly correlated with number of shares supplied for the vouchers, (2) company performance in the last years, (3) possibly the ownership structure for shares sold out of and prior to the voucher process, (4) industry branch and region, and (5) performance of the shares during the five (or less) rounds of trading. Also, we want to test (6) whether the price P_λ reflected some mimetic behaviour on the part of small individual investors. In other words, if funds bought shares of the company in the previous round, did small investors follow them in the next round, perhaps believing that funds had better information, that fund-purchases would somehow raise the market price of the shares, or that the expected flow of dividends would be high. Both points (3) and (6) get at the same question: does ownership structure matter for share price? We can represent this in the following way:

$$P_\lambda = a_0 + a_1(\text{total number of shares}) + a_2(\text{company performance}) + a_3(\text{ownership structure prior the voucher privatization}) + a_4(\text{industry branch and region}) + a_5(\text{performance of the shares on the voucher market}) + a_6(\text{shares funds bought prior the round } \lambda) + u$$

Before voucher privatization actually started, all interested parties could obtain extended information about all companies. For about 40 characteristic variables, some pre-selection was necessary where variables explained the same

characteristic or were highly correlated. As a reliable (internally and extrnally consistent) measure of company performance, we use three indicators: (1) profitability PROF = Profit91/Total number of shares (highly correlated with sales on capital), (2) indebtness DEBT = Debt91/Total number of shares, and (3) changes in the labour force for years 1991 and 1990 EMP = (Labour91-Labour90)/Total number of shares, good measure of the company performance. Decreases in the labour force may mean ongoing restructuring. Increases in the labour force would suggest that company is doing well. No change in labour force may call for no changes in company, caused either by bad management or simply by sufficient contracts. Since some shares of companies were offered to direct domestic (dummy variable DOM) or foreign investors (dummy variable FOR) prior the voucher privatization, and some shares remained under control of the National Property Fund (dummy variable NPF=1 if the NPF held more than 20% of shares--necessary because the NPF holds small stakes in about 1/3 of all companies), this could be good signal for small individual investors. For regions and industry branches, dummy variables were used. Some of them were skipped from the regression if insignificant. Changes in share prices on the voucher market is captured by changes in demand between the rounds: D21 = (Demand2-Demand1)/Total number of shares, and D32 = (Demand3-Demand2)/Total number of shares. The fifth round of voucher privatization was, for the majority of companies, also their last exercised price. Investors were advised to repeat their demands and prices were calculated so as to sell the maximum number of shares. Change in this prices is captured by dummy variable Round4 for shares sold-out in the regular fourth round. The results of the regression is presentd in **Table 12**.

TABLE 12: Regression estimates for voucher market share prices [log(P_i)]

variable	coefficient	*t*-statistic	variable	coefficient	*t*-statistic
constant	5.31	21.8	NPF	0.53	7.6
log(Total shares)	-0.25	-12.0	FSH	1.06	9.3
PROF	0.01	5.3	West Bohemia	0.17	2.1
$PROF^3$	-8E-7	-4.2	Light industry	0.30	4.7
$PROF^4$	2E-9	4.1	Service	0.42	3.8
DEBT	-1E-3	-2.6	D21	-1.04	-6.7
EMPL	14.82	1.66	$D21^2$	4665.52	8.0
FOR	0.61	4.8	D32	-2.47	-13.6
DOM	0.51	5.0	Round4	-0.46	-4.5

R^2 = 0.58, adj.R^2 = 0.57, number of observations 949.

The last exercised price was lower for large companies (measured by number of shares issued), higher for more profitable companies, and lower for indebted companies. The coefficient EMPL would suggest, that if a company could afford to hire more labour within the last year, it was a signal for a higher price of its shares. More demanded were also companies with certain ownership structures, particularly with the presence of direct foreign and domestic investors. More than 20% stakes of the National Property Fund were also a significant, positive price influence, perhaps indicating that investors believed investment in the care of the NPF were less risky. Very significant is FSH, share bought by funds prior the last round of selling shares of a given company, scaled by total number of shares. In the situation when small individual investors could observe only published data of companies (sometimes very rough data), they made their mind about good companies also by observing what shares the funds were buying. Belief that good ownership structure may bring higher prices of shares on the stock-exchange caused an increase of prices of companies owned by direct investors, the NPF, and very important funds (variable FSH). The region of West Bohemia is just next to border with Germany. Significance of the two industry dummies follows an opinion poll of the IVVM (Kuponova privatizacia no.7). Respondents answered they would invest to preselected industry branches, especially to the financial sector, light industry, trade and service. Very significant are variables capturing the development on the voucher market. When demand increased between the first and second, and second and third round (leading to the price overshooting), the last exercised price (recall, for majority of companies the fifth round) finally decreased. Companies, unsold for the excess demand in the first three rounds, could be bought relatively cheaply at the end. Of course, there was a high risk involved in this operation. If excess demand would appear also in the last round, voucher points would be lost. Companies sold-out in the fourth round (dummy variable Round4) were also significantly cheaper.

6.2 Stock-exchange price

The Prague stock-exchange, in our model, is represented as a standard bourse with the following restriction: only a selected group is permitted to trade on the voucher market, and each individual is limited by their number of voucher points. Are the stock-exchange price and the real share price correlated? We test for this using additional variables indicating changes in companies and sectors during 1992--net assets, change in profitability PROF = (Profit92-Profit91)/Net assets, change in sales SALES = (Sales92-Sales91)/Net assets, and industry-sector dummy variables. We should also test the possible significance of direct-investor presence for the real price. Whereas in the last regression we find a high correlation between the profit and sales, this is no longer true for 1992. We

had, unfortunately, very few observations forindebtness and investment data. Our sample also decreased from 949 observations (from voucher privatization data for 1990 and 1991) to 339 (stock-exchange and RM System data regarding company performance in 1992), representing a randomn sample (slightly over 30%) of the original population (987 companies privatized by vouchers).

TABLE 13: Regression estimates for stock-exchange share price [log(P_{SE})]

variable	coefficient	*t*-statistic	variable	coefficient	*t*-statistic
constant	2.74	5.4	Wood products	-0.41	-2.06
log(P_λ)	0.50	11.1	Construction	-0.19	-1.70
log(net assets)	0.15	4.2	Light industry	-0.24	-1.94
PROF	-0.007	-1.00	FOR	-0.04	-0.23
SALES	0.004	1.32	DOM	0.17	0.98
Food production	-0.48	-3.0	NPF	-0.12	-0.93

R^2 = 0.38, adj.R^2 = 0.36, number of observations 339.

Results suggest that voucher price is very significant, and that the artificial voucher market was able to achieve equilibrium prices similar to real prices. The incidence of higher prices for larger companies (measured by net assets) is rather surprising, but fully reflects price movement on the stock exchange. Perhaps a larger company is a safer investment, with a greater potential for competing on world markets. Both profit change (negatively correlated) and sales change (positively correlated) are not significant, but the signs of their coefficients suggests that investors focused more on increases in company sales rather than on the change of profit. More surprising is that neither the presence of foreign or domestic direct investors from the year 1991, nor ownership by the National Property Fund (negatively correlated!), is significant. It is probable, however, that there is some multicollinearity between the voucher price and the presence of direct investors.

6.3 Conclusion

The general behaviour of voucher investors is rational and reflected in the voucher price. Although the voucher market has several limitations, the voucher price is the single strongest indicator of the future price on the stock-exchange.

7. Cluster analysis of interactions between voucher privatization, RM-system and the PSE

The three processes are well recorded by several databases which provide us with a large set of informative variables, from which we can model the influences of particular systems of variables on others. Economic theory on such matters, however, is limited, and thus it is difficult to deduce which variables will or will not influence the behaviour of the system. In simpler cases, basic causal modelling--analyzing matricies of variable-to-variable correlations--may construct a model explaning the sources of changes in the dependent variable. We have, in our dataset, more than fifty explanatory variables.

Thus we propose cluster and principal-components analyses of these sets of variables, which allows some interpretation of investor decision-making. Both methods are widely used in other social-scientific disciplines, and are increasing in popularity in econometrics. Principal-components analysis appropriates representive characteristics from an appropriate series of initial variable matricies into a single vector. Cluster analysis, on the other hand, is a sequential process, in which, at each step, the two variables most heavily correlated are merged into one new "cluster". The cluster may be used either to select representative variables from particular groups of variables, or they may be used to order variables based on their similarity, such that the first one is the most similar to the second one and most different from the last one in the ordered sequence. Simply put, clustering pinpoints explanatory variables very highly and very weakly correlated with the dependent variable. Clustering can provide a good "visual" interpretation of results. Its sequentiality, however, warrants caution; once a cluster is formed, it cannot be split; it can only be combined with other variables and clusters. Thus uncorrelated variables can sometimes merge indirectly.

We assume that all three systems are based solely on the public infomration in the dataset used in the previous section, disregarding any sort of private information of investors. The available information for each firm includes the following data: profit, debt, and sales separately for 1989, 1990, 1991 and 1992 and number of employees for 1989, 1990 and 1991. We normalize these numbers by using the total number of shares of a firm (TNS). Rather then using separate numbers for each year we employ the number for 1991 and the changes between 1992 and 1991, 1991 and 1990, and 1990 and 1989, which capture trends. The list of variables is given in Table 14. Since the completion of the first wave of voucher privatization in 1992, the data for that year were known only by investors in the capital markets established in 1993. Including

data for 1992 in the analysis of voucher privatization, however, can indicate expectations of investors about firm performance.

Table 14: Variables.

Name	Description of the variable
TNS	The total number of shares of a firm
E91	The number of employees in 1991 divided by TNS
ΔE91	The number of employees in 1991 minus the number of employees in 1990 all divided by TNS
ΔE90	The number of employees in 1990 minus the number of employees in 1989 all divided by TNS
ΔP92	The profit in 1992 minus the profit in 1991 all divided by TNS
P91	The profit in 1991 divided by TNS
ΔP91	The profit in 1991 minus the profit in 1990 all divided by TNS
ΔP90	The profit in 1990 minus the profit in 1989 all divided by TNS
ΔS92	Sales in 1992 minus the sales in 1991 all divided by TNS
S91	Sales in 1991 divided by TNS
ΔS91	Sales in 1991 minus the sales in 1990 all divided by TNS
ΔS90	Sales in 1990 minus the sales in 1989 all divided by TNS
ΔD92	Debts to banks in 1992 minus debts to banks in 1991 all divided by TNS
D91	Debts to banks in 1991 divided by TNS
ΔD91	Debts to banks in 1991 minus debts to banks in 1990 all divided by TNS
ΔD90	Debts to banks in 1990 minus debts to banks in 1989 all divided by TNS

Name	Description of the variable
Ownership structure:	
FOREIGN	The percentage of shares for the direct sale to a predetermined foreign owners
DOMESTIC	The percentage of shares for the direct sale to a predetermined domestic owners
FNPT	The percentage of shares for the transfer to The Fund of National Property for temporary period
FNPU	The percentage of shares for the transfer to The Fund of National Property for undetermined period
RESTIT	The percentage of shares for the transfer to restituents

Name	Description of the variable
INTERM	The percentage of shares for the transfer to an intermediator (usually a bank) which will sell it later
MUNIC	The percentage of shares for the free transfer to municipalities
EMPL	The percentage of shares for the sale to employees
Industries:	
IND1	Agriculture
IND2	Heavy industry an mining
IND3	Light industry
IND4	Construction
IND5	Transportation and telecommunications
IND6	Trade
IND7	R & D
IND8	Services, culture and education
IND9	Financial and state institutions
IND0	Others
Regions:	
REGPR	Prague
REGCB	Central Bohemia
REGSB	Southern Bohemia
REGWB	Western Bohemia
REGNB	Northern Bohemia
REGEB	Eastern Bohemia
REGSM	Southern Moravia
REGNM	Northern Moravia

Additional information is used regarding region, industry, and the percentage of shares transformed to non-voucher shareholders. We constructed 8 regional dummies, 10 industrial dummies and 8 variables reporting a percentage of shares transferred to non-voucher shareholders. The last 8 variables are not dummies in the pure sense, but they are in practice very similar, because their value is typically zero, and between one and ninety nine for other cases.

Suppose each system can be represented by the last price level. For voucher privatization we take the price in the last (fifth) round or, for such firms which sold in earlier rounds, the last realized price (VPPRICE). The RMS and the PSE we represent with the last price in 1993 (RMPRICE and PSPRICE, respectively).

The dendrogram (Figure 6.) shows how far or close are particular variables to the dependent variable. The most "uncorrelated" variables, for example, are ΔP90 (the first variable in the list) and REGSB (the last variable in the list). The last two variables are quite uncorrelated with the others (the rescaled distance when they merge is quite large, in other words, they are merged in one of lasts steps), while the first three are heavily correlated (they merge together very soon). The most important conclusion follows from the clustering of variables representing last price levels of systems. Figure 6 shows a large interdependence between pricing on the PSE and RMS, but not as close as suspected (the rescaled distance between variables RMPRICE and PSPRICE is surprisingly large). There are several variables in our dataset, in other words, which are closer to each other then the prices on the two existing capital markets.

The dendrogram indicates the final price in voucher privatization as the next variable merged with the cluster formed by prices on capital markets, but it is quite distinct. Note that the rescaled distance measuring the similarity of variables is in about the middle of its range when the cluster formed by all three prices is created. It is clear that there is an important difference between the price formation on voucher privatization and the price formation on capital markets. Moreover there is a difference between the RMS and the PSE. The arbitrage does not fully work there. Notice also the next closest variables to the cluster formed by prices. The most contributing variables to the price determination are EMPL than FOREIGN and then INTERM. All three refer to the impact of nonvoucher owners of firms. The existence of powerful owner established by a standard method of privatization contributes to the stock price.

Since the RMS is constructed as the continuation of voucher privatization using the same computer network and organized by the same firm (Podnik výpočetní techniky), the similarities allows us to apply the cluster analysis to compare the dynamic properties of both systems. Unlike the PSE, the reported data from RMS and voucher privatization include supply and demand for all periods and firms.

Thus we take variables reported in Table 14 and incorporate dynamic variables: demand, supply, and price for all periods. Then we run cluster analysis separately for RMS--variables from Table 14, along with supply, demand, and price for the 8 rounds of RMS trading in 1993 (RMSUPPLY1 .. RMSUPPLY8, RMDEMAND1 ..RMDEMAND8 and RMPRICE1 .. RMPRICE8). We apply the analogous procedure for voucher privatization data by clustering variables from Table 14., VPSUPPLY1 .. VPSUPPLY5, VPDEMAND1 .. VPDEMAND5 and VPPRICE1 .. VPPRICE5.
The difference in the number of periods is not crucial here. What complicates the comparison is the finiteness of voucher privatization and nonexistence of some final period for RMS. It follows that "supply" carries a different meaning for each system. While in voucher privatization the initially supplied shares are consumed over five periods and some are left (supply can be considered as exogenous to voucher privatization), the supply side in RMS is endogenously determined by decisions of investors in each period differently.

This inconsistency in the meaning of variables requires that we examine our conclusions from this cluster analysis more carefully. Results of clustering are reported in Figure 7 and Figure 8, for voucher privatization and the RMS respectively. While demand and supply are closely related in voucher privatization, they are sharply separated in the RMS. But let us concentrate on the formation of last prices - VPPRICE5 and RMPRICE8 - which we consider as representant of both systems.

The similarity across both systems is that prices are soon merged to one cluster and these clusters are merged with others for later clustering. This suggests that the most important variables for determining the last prices are the other-period prices of a particular system. The closest variables to the cluster formed by prices of RMS are identical to those mentioned in the description of Figure 6 - EMPL, FOREIGN and INTERM. This is not true for the cluster formed by prices in voucher privatization, because IND3 turns out be one of the three mostly related variables to this cluster.

The merging of prices inside the cluster differs significantly as well. The last price of the RMS is closest to the price one period before and then merged to the cluster formed by all remaining prices, to which the first round price is the closest. The merging of the last price of voucher privatization is nicely sequential--it merges, at first, with the price from the fourth round, later with that one from the third round and then with that one of the second round. One possible explanation of the last phenomenon could be that voucher privatization converged to some equilibrium price, but no straight convergence can be observed in the RMS. The capital market is closer to the random walk.

The main conclusion from the cluster analysis is that there are similarities between the three considered systems, but there are some barriers preventing the arbitrage to work fully, a matter for further research.

Figure 6. Cluster analysis using last prices of all three systems.

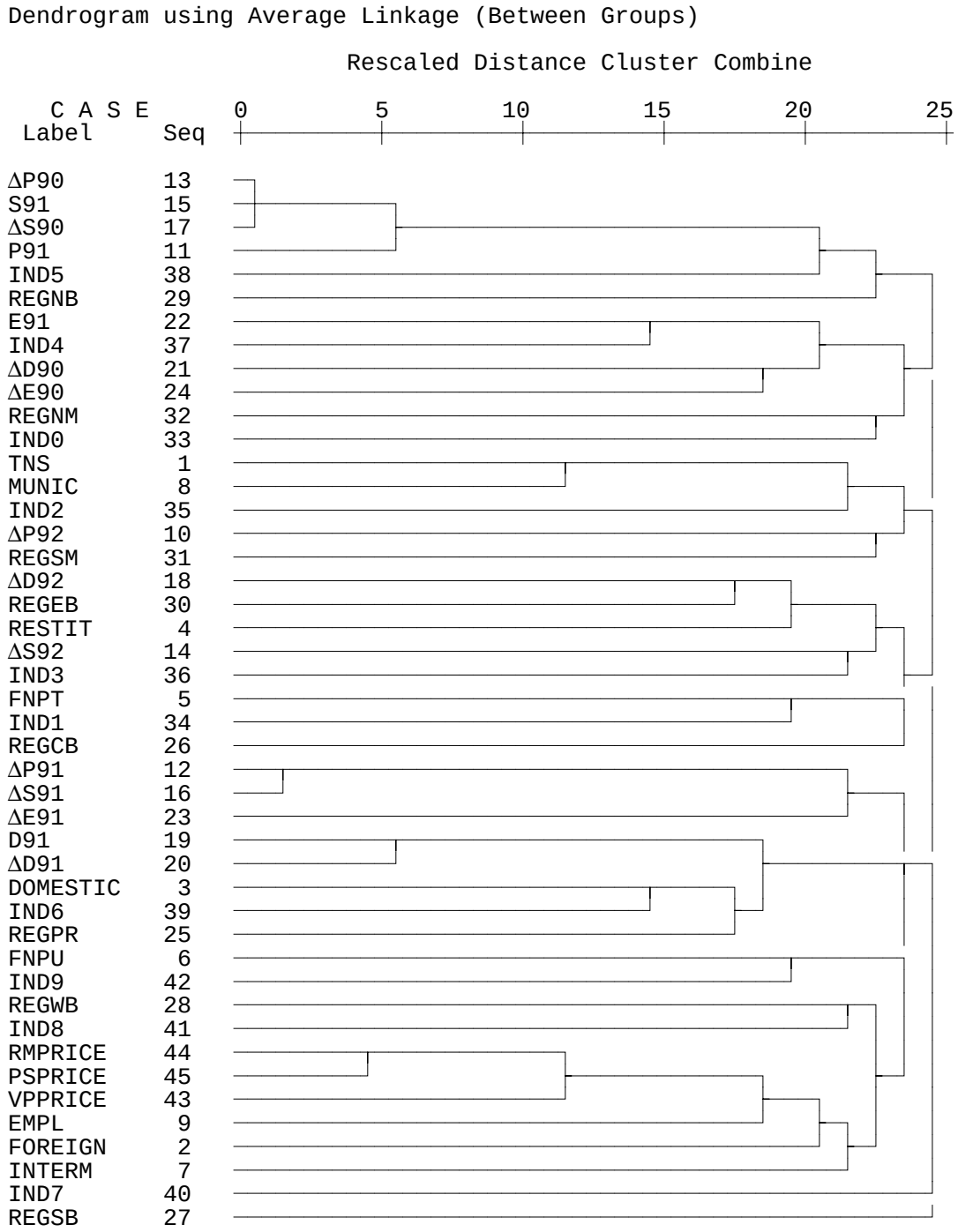


Figure 7. Cluster analysis using dynamic variables of voucher privatization.

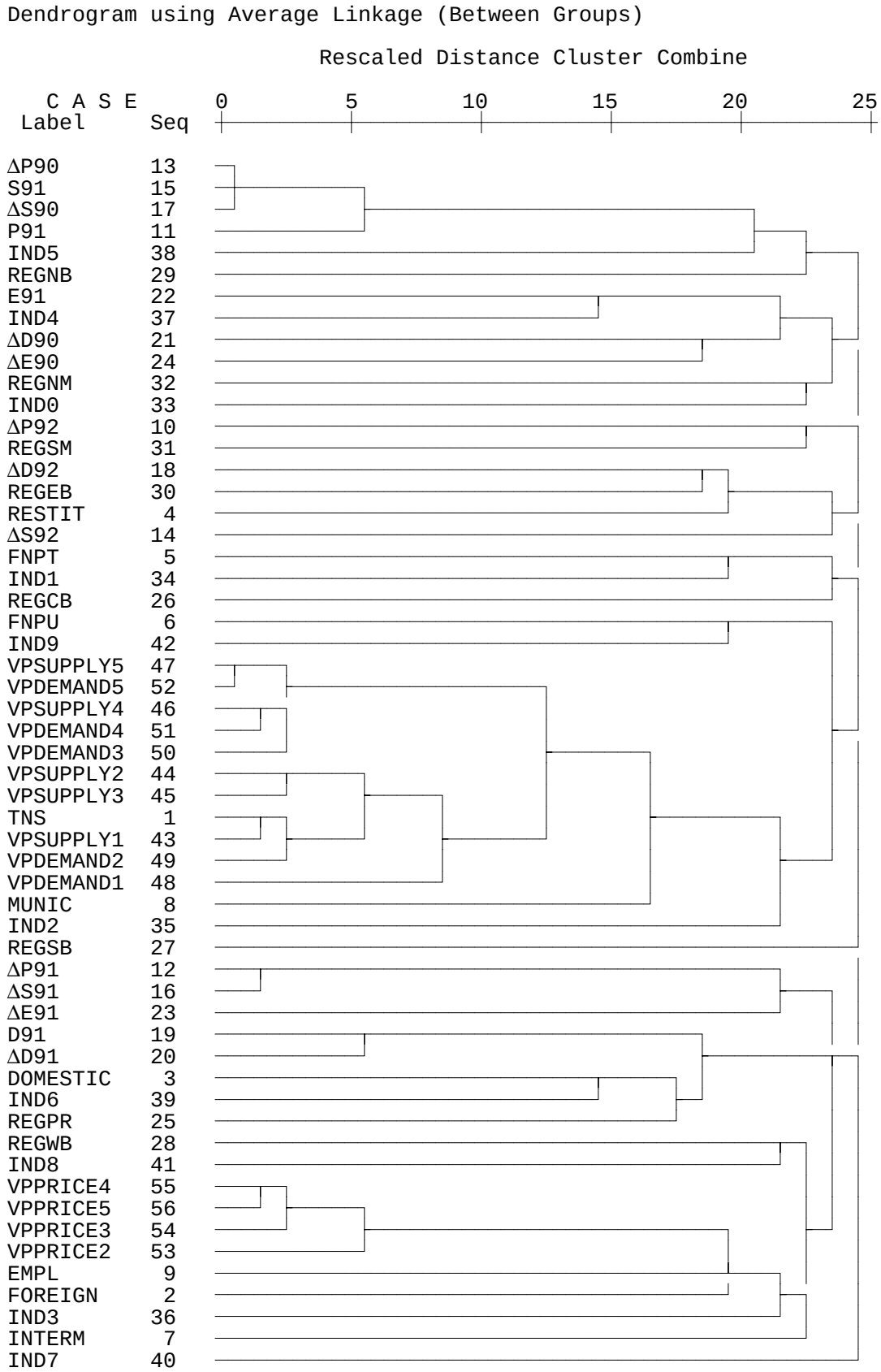
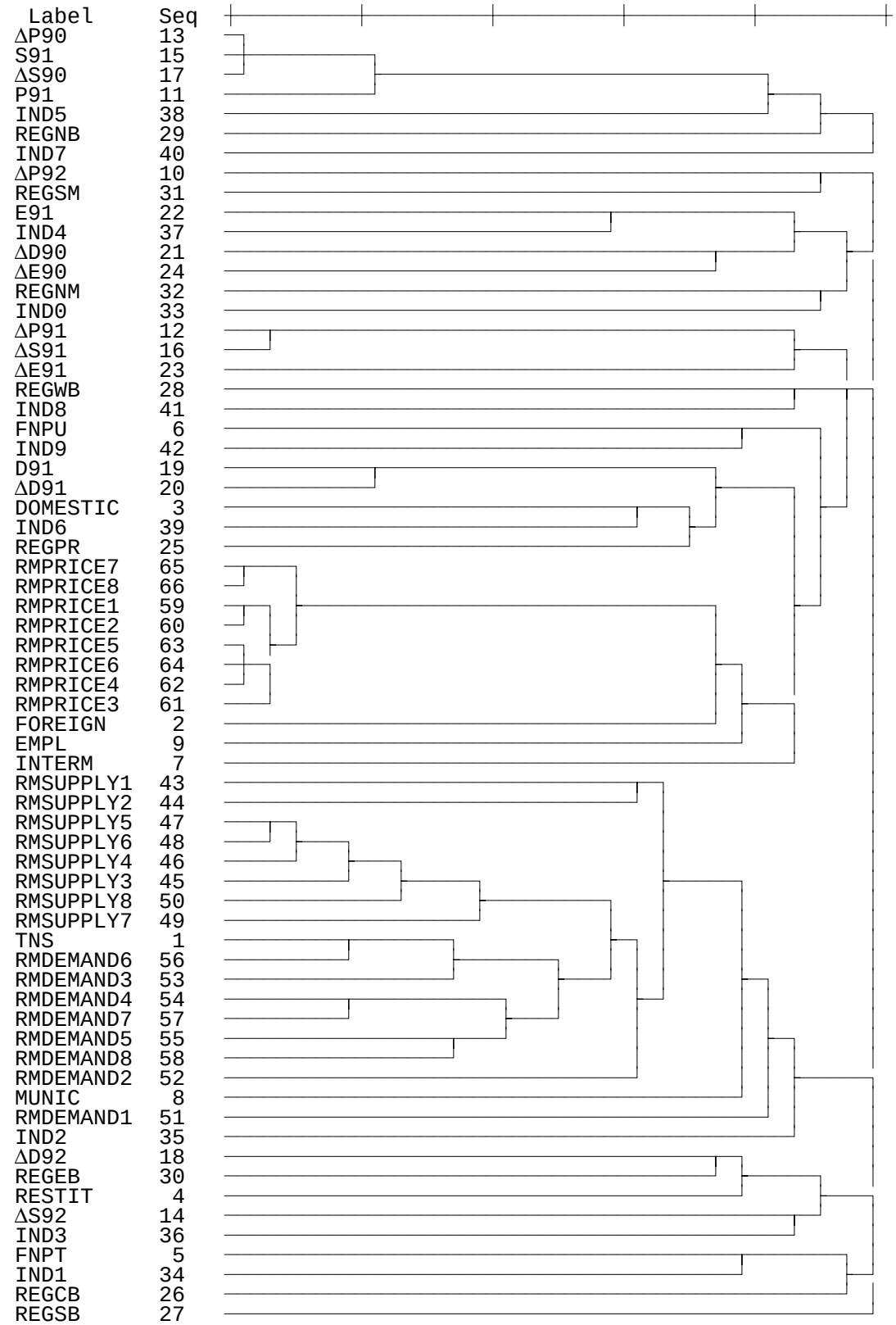


Figure 8. Cluster analysis using dynamic variables of RMS.



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