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Working Paper Number 170
May 1998

Comments Welcome

Presented at the International Workshop in Transition Economics
A CEPR/WDI Workshop Hosted by CERGE-EI
Prague, 9/12 July 1998

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Privatization, Ownership Structure and Transparency

How to Measure a Real Involvement of the State¹

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Draft May 15, 1998

Abstract: The paper suggests a methodology for evaluation of a direct and indirect property distribution and of a transparency of a property structure in an economy. The methodology is applied on the analysis of property structure of the banking sector in the Czech Republic.

Keywords: Control, direct distribution, indirect distribution, nilpotent matrix, primary owners, secondary owners, transparency

JEL Classification: C60, L33, K11

¹ This research was undertaken with support from the European Commission's ACE Programme 1996, project No. P96-6252-R. Submitted for the International Summer Workshop in Transition Economics, CEPR/CERGE-EI/WDI, Prague, 9-12 July 1998.

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1. Introduction

While the Czech Republic was in fact exceptional in etatization among other socialist countries with only 3% of GDP produced by private sector in 1990, in 1996 private sector contribution to GDP was estimated on 90%.³ Rapid privatization, especially voucher program (J. Kotrba and J. Svejnar, 1994), which offered citizens chances to purchase shares in large companies at nominal prices, met with popular enthusiasm. Within two years (1993-1994) nearly every Czech was a shareholder; indeed, the Czechs were the largest per capita shareholders of any country in the world, including United States (A. Schwartz, 1997). In 1996 the Czech government publicly announced that transition is over and post-transitional period has started.

Illusions began to vanish two years ago. Then, the Czech public first learned that several managers of the funds designed to invest the public vouchers were instead systematically stealing from their own investors. The Czech Ministry of Finance recently enumerated 15 techniques for stealing.⁴

But that's the least of it. The Czech public is now learning that dishonest operators have systematically squeezed the assets from many of the country's best companies, its municipalities and its banks (private and state owned). The new word was introduced for the dishonest operators - tunnelers. The tunnelers have achieved their wealth primarily through the corrupt collusion or, at the very best, the benign neglect of the state (A. Schwartz, 1997). All of that was formally legal.

What was wrong? This development seemed to confirm the belief that rapid privatization was not the mass distribution of national wealth but the private appropriation of national wealth. The question is: was there a way to prevent it?

The author has no ambition to answer this question. He would rather address the following problem: How to measure, what is a real share of the state in "almost completely" privatized economy? For what fraction of national property the state is still responsible. How to measure how "transparent" or non-transparent the ownership structure is?

In this paper we are presenting very fresh and "unpolished" results of methodological character, based on some simple mathematical considerations. Using some elements of the theory of matrices we are proposing the way how to determine the direct and indirect property distribution and degree of transparency of an ownership structure. Then we are applying the methodology on the core of the Czech banking sector to quantify the real property rights, which are different from the primary distribution of different actors' shares.

³ Report of Ministry of Finance of the Czech Republic on the Law on Capital Market Regulation, 1997. For comparison: Hungary 25% in 1990 and 75% in 1996, Poland 31% in 1990 and 78% in 1996 (F. Turnovec at al., 1998).

⁴ One of the common techniques: The investment fund managers sell company shares in the portfolio to dummy companies at absurdly cheap prices. The dummy companies sell the shares on the market. The dummy companies deposit the ensuing profits into overseas bank accounts. The fund investors are left with nothing.

2. Who Owns What? An Elementary Arithmetics of Property Distribution

Let us consider two types of economic agents: the primary owners, who can own, but can't be owned (citizens, citizens' non-profit associations, state), and the secondary owners, who can be owned and at the same time can own (companies, corporations).

Let

- m be the number of primary owners, $i = 1, 2, \dots, m$,
- n be the number of secondary owners (companies), $j = 1, 2, \dots, n$,
- s_{ij}^0 be the direct share of the primary owner i in the secondary owner j (as a proportion of total number of shares),
- t_{jk}^0 be the direct share of the secondary owner (company) k in the secondary owner (company) j .

Then the $n \times m$ matrix

$$S_0 = (s_{ij}^0)$$

where the row j expresses shares of the primary owners $i = 1, 2, \dots, m$ in the secondary owner j , and the column i expresses the shares of the primary owner i in the secondary owners $j = 1, 2, \dots, n$, will be called a matrix of primary property distribution, and the $n \times n$ matrix

$$T_0 = (t_{jk}^0)$$

where the row j expresses shares of the secondary owners $k = 1, 2, \dots, n$ in the secondary owner j , and the column k expresses shares of secondary owner k in the secondary owners $j = 1, 2, \dots, n$, will be called a matrix of secondary property distribution. The couple

$$(S_0, T_0)$$

characterizes an initial property distribution in an economy.

Clearly

$$\sum_{i=1}^m s_{ji}^0 + \sum_{k=1}^n t_{jk}^0 = 1$$

for any $j = 1, 2, \dots, n$, or

$$S_0 e_m + T_0 e_n = e_n$$

where e_n is an n -dimensional column vector of 1's.

If $T_0 = 0_{nn}$, where 0_{nn} is the $n \times n$ zero matrix, then we have a very simple and transparent structure, when only the primary owners own the companies and there exists no cross-ownership. However in real economies we don't have such transparent structures, and that can lead to ridiculous situations when it is not so easy to see who owns what. If a

primary owner A has a share in a secondary owner B, secondary owner B has a share in secondary owner C, and secondary owner C has a share in secondary owner D, then there exist direct ownership relations between A and B and B and C, and indirect ownership relations between A and C, A and D and B and D. If moreover D has a share in B, then situation is completely unclear. The problem is how to evaluate direct and indirect property relations and to identify, what part of company C is owned by primary owner A etc.

Assuming $T_0 \neq 0_n$ let us consider a primary owner i . Clearly, his total share in the company (secondary owner) j is given not only by his direct share s_{ij}^0 in j , but also by indirect share following from the shares of secondary owner j in the other companies. This can be expressed as

$$s_{ij}^1 = s_{ij}^0 + \sum_{k=1}^n t_{jk}^0 s_{ki}^0$$

Considering a secondary owner k , his effective share in the company j is given by appropriate fractions of the shares of the company j in other companies and by fractions of shares of other companies he is co-owning in company j :

$$t_{jk}^1 = \sum_{r=1}^n t_{jr}^0 t_{rk}^0$$

In matrix form we have

$$S_1 = S_0 + T_0 S_0, \quad T_1 = T_0 T_0 = T_0^2$$

It is not difficult to prove that this remains to be a distribution, i.e.

$$S_1 e_n + T_1 e_n = e_n$$

where e_n is an n -dimensional column vector of 1's.

So, considering cross-ownership relations we can obtain decomposition of property on direct (following from registered shares of primary owners) component and indirect component (following from cross-ownership relations). We shall call distribution (S_0, T_0) a distribution of zero degree, and the distribution (S_1, T_1) a distribution of the first degree. Clearly it holds that

$$S_1 \geq S_0, \quad T_1 \leq S_0$$

Now, having a new distribution (S_1, T_1) taking into account indirect relations, we can repeat all our considerations and produce a distribution of the second degree as

$$S_2 = S_1 + T_1 S_1 = (S_0 + T_0) + T_0^2 (S_0 + T_0 S_0)$$

$$T_2 = T_1 T_1 = T_0^4$$

etc., in general case

$$S_r = S_{r-1} + T_{r-1}S_{r-1}$$

$$T_r = T_{r-1}T_{r-1}$$

In such a way we can generate a fundamental property distribution that expresses an intuitively self-evident fact: all property should be in a final instance owned only by the primary owners, citizens and state, who own, directly or indirectly, the secondary owners, firms and companies.

Example 1

In Table 1 we are giving a particular property structure with the three primary owners P_1, P_2, P_3 , and the three companies C_1, C_2, C_3 (secondary owners).

Table 1

	P_1	P_2	P_3	C_1	C_2	C_3	total
C_1	0.4	0.2	0.1	0	0.3	0	1
C_2	0.55	0.25	0	0.2	0	0	1
C_3	0.3	0.3	0.2	0.1	0.1	0	1

In our case

$$S_0 = \begin{pmatrix} 0.4 & 0.2 & 0.1 \\ 0.5 & 0.25 & 0 \\ 0.3 & 0.3 & 0.2 \end{pmatrix}$$

and

$$T_0 = \begin{pmatrix} 0 & 0.3 & 0 \\ 0.2 & 0 & 0 \\ 0.1 & 0.1 & 0 \end{pmatrix}$$

Matrices S_0 and T_0 are providing the zero degree distribution. Taking into account indirect relations we receive a more precise distribution of the first degree:

$$\begin{aligned}
 S_1 &= \begin{pmatrix} 0.4 & 0.2 & 0.1 \\ 0.55 & 0.25 & 0 \\ 0.3 & 0.3 & 0.2 \end{pmatrix} + \begin{pmatrix} 0 & 0.3 & 0 \\ 0.2 & 0 & 0 \\ 0.1 & 0.1 & 0 \end{pmatrix} \begin{pmatrix} 0.4 & 0.3 & 0.1 \\ 0.55 & 0.25 & 0 \\ 0.3 & 0.3 & 0.2 \end{pmatrix} = \\
 &\begin{pmatrix} 0.4 & 0.2 & 0.1 \\ 0.55 & 0.25 & 0 \\ 0.3 & 0.3 & 0.2 \end{pmatrix} + \begin{pmatrix} 0.165 & 0.075 & 0 \\ 0.08 & 0.04 & 0.02 \\ 0.095 & 0.045 & 0.01 \end{pmatrix} = \begin{pmatrix} 0.565 & 0.275 & 0.1 \\ 0.63 & 0.29 & 0.02 \\ 0.395 & 0.045 & 0.01 \end{pmatrix}
 \end{aligned}$$

and

$$T_1 = \begin{pmatrix} 0 & 0.3 & 0 \\ 0.2 & 0 & 0 \\ 0.1 & 0.1 & 0 \end{pmatrix} \begin{pmatrix} 0 & 0.2 & 0 \\ 0.2 & 0 & 0 \\ 0.1 & 0.1 & 0 \end{pmatrix} = \begin{pmatrix} 0.06 & 0 & 0 \\ 0 & 0.06 & 0 \\ 0.02 & 0.03 & 0 \end{pmatrix}$$

The distribution of the first degree see in Table 2. We can continue to generate distributions of higher degrees to look for a final distribution of the property among primary owners.

Table 2

	P ₁	P ₂	P ₃	C ₁	C ₂	C ₃	total
C ₁	0.565	0.275	0.1	0.06	0	0	1
C ₂	0.63	0.29	0.02	0	0.06	0	1
C ₃	0.395	0.345	0.21	0.02	0.03	0	1

3. Transparency

The word "transparency" (with respect to a property distribution) is frequently used without being properly defined. Let us try an exact definition. To do that we shall start with a bit of matrix algebra.

A square $n \times n$ matrix A is called to be nilpotent to index k when $A^{k-1} \neq 0_m$ and $A^k = 0_m$, k being a positive integer. It can be proved that if A is nilpotent to index k , then $k < n$ (J. W. Archibald, 1968).

A square $n \times n$ matrix A we shall call a pseudo-nilpotent if

$$\lim_{k \rightarrow \infty} A^k = 0_{nn}$$

and for any positive integer k $A \neq 0_{nn}$.

If we accept as an axiom that finally any distribution of property is distribution among the primary owners only, then transparency of a particular distribution can be measured by the distance of primary distribution from the final distribution taking into accounts all degrees of indirect links.

In our iterative process of identifying of indirect property relations

$$S_r = S_{r-1} + T_{r-1}S_{r-1}$$

$$T_r = T_{r-1}T_{r-1}$$

we can establish that the degree of transparency can be measured by the number of iterations $r = 0, 1, 2, \dots$ that lead to a final distribution with $T_r = 0_{nn}$.

The maximum transparency is achieved when $T_0 = 0_{nn}$. In this case primary distribution is transparent in the sense that any property is related to primary owners only and no indirect relations appear.

We shall say that a particular property structure (S_0, T_0) such that $T_0 \neq 0_{nn}$ is k -transparent, if in property distribution (S_k, T_k) of degree k it holds that $T_k = 0_{nn}$, while in property distribution of degree $k-1$ (S_{k-1}, T_{k-1}) it holds that $T_{k-1} \neq 0_{nn}$.

A property structure is non-transparent, if for any positive integer k it holds that $T_k \neq 0_{nn}$. Even in this case we can, however, identify an "almost final" distribution of the property among the primary owners, but only in limit, because $T_0 < E$ where E is the matrix of 1's implies that

$$\lim_{k \rightarrow \infty} T_k = 0_{nn}$$

Summing up, a property distribution (S_0, T_0) is k -transparent if the matrix T_0 is nilpotent to index $2k$. A property-distribution (S_0, T_0) is non-transparent, or ∞ -transparent, if the matrix T_0 is pseudo-nilpotent.

Example 2

Our property structure from example 1 is non-transparent, because the matrix

$$T_0 = \begin{pmatrix} 0 & 0.3 & 0 \\ 0.2 & 0 & 0 \\ 0.1 & 0.1 & 0 \end{pmatrix}$$

is pseudo-nilpotent, i.e.

$$T_0^2 = \begin{pmatrix} 0.06 & 0 & 0 \\ 0 & 0.06 & 0 \\ 0.02 & 0.03 & 0 \end{pmatrix}$$

and for any k $T_0^{2k} \neq 0_{nn}$.

Example 3

Let us consider a simple structure in Table 3.

Table 3

	P_1	P_2	P_3	C_1	C_2	C_3	total
C_1	0.6	0.2	0.1	0	0.1	0	1
C_2	0.4	0.1	0.2	0	0	0.3	1
C_3	0.3	0.3	0.4	0	0	0	1

In this case

$$T_0 = \begin{pmatrix} 0 & 0.1 & 0 \\ 0 & 0 & 0.3 \\ 0 & 0 & 0 \end{pmatrix}$$

$$T_1 = T_0^2 = \begin{pmatrix} 0 & 0.1 & 0 \\ 0 & 0 & 0.3 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} 0 & 0.1 & 0 \\ 0 & 0 & 0.3 \\ 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0.03 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

$$T_2 = T_0^4 = \begin{pmatrix} 0 & 0 & 0.03 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} 0 & 0 & 0.03 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

hence the structure from Table 3 is transparent of degree 2.

4. An Example: A Privatization Illusion?

Let w_j be the weight of a company j (e.g. the market value, value of assets etc.). Considering a distribution (S, T) of degree r , we can evaluate the corresponding distribution of the total property in an economy as

$$p_i^r = \frac{\sum_{j=1}^n s_{ij}^r w_j}{\sum_{j=1}^n w_j}, \quad d_k^r = \frac{\sum_{j=1}^n t_{kj}^r w_j}{\sum_{j=1}^n w_j}$$

where p_i^r is the share of the i -th primary owner and d_k^r is the share of the k -th company (secondary owner) in the total property according to distribution of the degree r . Let us illustrate on a simple example that a primary distribution of national property can significantly differ from the final distribution reflecting indirect links.

Example 4

Let us assume that an economy consists of the following 5 actors: the state S, group of individual investors M, two banks B1 and B2, investment fund F and a group of industrial enterprises I. In Table 4 we provide a hypothetical primary property distribution in such an economy.

Table 4

	S	M	B1	B2	F	I	total	weights
B1	0.6	0.3	0	0	0.1	0	1	10
B2	0.7	0.2	0.1	0	0	0	1	5
F	0	0	0	1	0	0	1	35
I	0	0.3	0	0	0.7	0	1	50
total share	0.095	0.19	0.005	0.35	0.36	0		

We can see that with respect to primary property distribution the total share of state on the national property is 9.5%.

In Table 5 we are giving the property distribution of degree 1 taking into account some indirect relations.

Table 5

	S	M	B1	B2	F	I	total	weights
B1	0.6	0.3	0	0.1	0	0	1	10
B2	0.76	0.23	0	0	0.01	0	1	5
F	0.7	0.2	0.1	0	0	0	1	35
I	0	0.3	0	0.7	0	0	1	50
total share	0.343	0.2615	0.035	0.36	0.0005	0		

In this case, considering some indirect links in cross-ownership, the share of the state increased to 34.3%.

Table 6 presents the property distribution of degree 2 taking into account some other indirect relations.

Table 6

	S	M	B1	B2	F	I	total	weights
B1	0.676	0.323	0	0	0.001	0	1	10
B2	0.767	0.232	0.001	0	0	0	1	5
F	0.76	0.23	0	0.01	0	0	1	35
I	0.532	0.461	0	0	0.007	0	1	50
total share	0.63795	0.3549	0.00005	0.0035	0.0036	0		

Comparing Table 4 and Table 6 we can observe a significant increase of the share of state on national property: from 9.5% to 63.795%. And we still don't have the final distribution, assigning the shares to the primary owners only.

This observation raises the question: what is a real share of state on total property (and real responsibility of the state as an owner) in "almost fully" privatized economy?

Indirect property distribution CR (1)

	FNM	CMB	MF	Mun.	BM	JRMG	PPF I	BHY	Nomura	MB	BTI	SR	others	CS	CP	KB	IPB	CSOB	SPF-C	SPF-V	PPF	PPF	PPF	PPF-KB	VS	total
CS	0.5722	0	0	0.1475	0	0	0	0.0008	0	0.0228	0.0023	0	0.177	0.0186	0	0	0.0174	0.0141	0	0	0.021	0.000	0.001	0.0008	0	
CP	0.384	0.0371	0.0274	0	0.0237	0	0.208	0	0.0086	0	0	0.0381	0.259	0	0	0	0	0	0	0	0	0	0	0	0.0136	
KB	0.5027	0	0	0.0023	0	0	0	0.1292	0	0	0	0	0.351	0	0.0088	0.007	0	0.0008	0.0004	0	0	0	0	0	0	
IPB	0.3149	0	0	0	0.182	0.0338	0	0	0.0502	0	0	0	0.419	0	0	0	0	0	0	0	0	0	0	0	0	
CSOB	0.1859	0.2651	0.1859	0	0	0	0	0	0	0	0	0.2578	0.065	0	0	0	0	0	0	0	0	0	0	0	0	
SPF-C	0.1323	0	0	0.0089	0	0	0	0	0	0.3	0	0	0.479	0	0.0253	0.007	0	0.0126	0.0063	0	0	0	0	0	0	
SPF-V	0.1319	0	0	0.0099	0	0	0	0	0	0.3	0.1	0	0.38	0	0.0252	0.007	0	0.0127	0.0062	0	0	0	0	0	0	
PPF	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PPF	0.0417	0	0	0	0	0	0	0	0	0	0	0	0.898	0	0	0	0.0237	0.0183	0	0	0	0	0	0	0	
PPF	0.2343	0	0	0	0	0	0	0	0	0	0	0	0.713	0	0	0	0.0174	0.0141	0	0	0.029	0	0	0	0	
PPF-KB	0.1414	0	0	0	0	0	0	0.0375	0	0	0	0	0.798	0.0044	0	0	0	0	0	0	0	0.004	0.0103	0.0084	0	
VS	0	0	0	0	0.411	0.427	0	0	0	0	0	0	0.162	0	0	0	0	0	0	0	0	0	0	0	0	

Table 8
Property distribution of the first degree in
the Czech banking sector

Direct (primary) property distribution CR

	PNM	CNB	MF	Man.	BH	JRING	PPF1	BNV	Nature	MB	BTI	SR	others	CS	CP	KB	IPB	CSOB	SPIF-C	SPIF-V	PPF	PIF	PIF	IPF-KB	VS	Total
CS	52.8	0	0	14.75	0	0	0	0	0	0	0	0	11.95	0	10.1	2.8	0	0	0	0	0	0	0	0	0	100
CP	30.25	0	0	0	0	0	0	0	0	0	0	0	17.71	0	0	0	17.18	14	0	2.5	0	0	0	0	0	100
KB	48.74	0	0	0	0	0	0	12.92	0	0	0	0	29.83	1.53	0	0	0	0	0	20.86	0	0	0	0	0	100
IPB	31.49	0	0	0	14.97	0	0	0	5.02	0	0	0	40.66	0	0	0	0	0	0	0	1.21	3.557	2.21	0	0	100
CSOB	19.59	26.51	19.59	0	0	0	0	0	0	0	0	25.78	8.53	0	0	0	0	0	0	0	0	0	0	0	7.86	100
SPIF-C	0	0	0	0	0	0	0	0	0	30	0	0	44.95	25.05	0	0	0	0	0	0	0	0	0	0	0	100
SPIF-V	0	0	0	0	0	0	0	0	0	30	10	0	35.01	24.99	0	0	0	0	0	0	0	0	0	0	0	100
PPF	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
PIF	0	0	0	0	0	0	0	0	0	0	0	0	86.2	0	13.8	0	0	0	0	0	0	0	0	0	0	100
PIF	20.37	0	0	0	0	0	0	0	0	0	0	0	68.53	0	10.1	0	0	0	0	0	0	0	0	0	0	100
IPF-KB	0	0	0	0	0	0	0	0	0	0	0	0	70.99	0	0	28.01	0	0	0	0	0	0	0	0	0	100
VS	0	0	0	0	41.1	42.7	0	0	0	0	0	0	18.2	0	0	0	0	0	0	0	0	0	0	0	0	100

Table 7
Primary property distribution in the Czech banking sector

Indirect property distribution CR (3)

	FNM	CNB	MF	Mun.	BH	JRNO	PPF I	BNY	Nemura	MB	BTI	SR	others	CS	CP	KB	IPB	CSOB	SPF-C	SPF-V	PPF	PIF	IPF-KB	VS	total
CS	0.5923	0.0038	0.0028	0.1504	0.0032	0.0008	0.022	0.0007	0.0009	0.0233	0.0025	0.0037	0.181	1.5E-07	0	0	1.4E-07	1.2E-07	0	0	2E-07	4E-08	1.1E-08	8.8E-09	0
CP	0.384	0.0071	0.0274	0	0.0313	0.0058	0.209	0	0.0068	0	0	0.0061	0.261	0	0	0	0	0	0	0	0	0	0	0	0
KB	0.509	0.0003	0.0002	0.0023	0.0002	4E-05	0.001	0.1301	8.9E-05	0.0004	3.8E-05	0.0002	0.356	0	2E-08	8E-09	0	0	8.8E-09	4.2E-09	0	0	0	0	1.5E-08
IPB	0.3149	0	0	0	0.182	0.0036	0	0	0.0502	0	0	0	0.418	0	0	0	0	0	0	0	0	0	0	0	0
CSOB	0.1959	0.2651	0.1859	0	0	0	0	0	0	0	0	0.2578	0.065	0	0	0	0	0	0	0	0	0	0	0	0
SPF-C	0.1484	0.001	0.0007	0.0077	0.0008	0.0001	0.005	0.0009	0.0002	0.3058	0.0008	0.0009	0.497	0	2.1E-07	8E-08	0	0	8.8E-08	4.7E-08	0	0	0	0	1.4E-07
SPF-V	0.148	0.001	0.0007	0.0078	0.0008	0.0001	0.005	0.0009	0.0002	0.3058	0.0008	0.0009	0.398	0	2.1E-07	8E-08	0	0	8.8E-08	4.7E-08	0	0	0	0	1.4E-07
PPF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PIF	0.053	0.0051	0.0036	0	0.0043	0.0008	0.029	0	0.0012	0	0	0.005	0.868	0	0	0	0	0	0	0	0	0	0	0	0
RIF	0.2425	0.0037	0.0028	0	0.0032	0.0008	0.021	0	0.0009	0	0	0.0008	0.722	0	0	0	0	0	0	0	0	0	0	0	0
IPF-KB	0.1477	7.4E-05	5.5E-05	0.0007	8.2E-05	1.2E-05	0.000	0.0377	1.7E-05	0.0001	1.1E-05	7.2E-05	0.813	4.8E-08	0	0	5.7E-08	4.8E-08	0	0	7E-08	2E-09	8.1E-09	9.8E-09	0
VS	0	0	0	0	0.411	0.427	0	0	0	0	0	0	0.182	0	0	0	0	0	0	0	0	0	0	0	0

Table 10
Property distribution of the third degree
in the Czech banking sector

Indirect property distribution CR (2)

	FNM	CMB	MF	Mun.	BH	JRNG	PPF I	BHY	Nomura	MB	BTI	SR	others	CS	CP	KB	IPB	CSOB	SPF-C	SPF-V	PPF	PIF	RIF	IPF-KB	VS	total	
CS	0.5818	0.0037	0.0026	0.1504	0.0032	0.0008	0.021	0.0037	0.0008	0.0232	0.0025	0.0036	0.181	0.0004	0	0	0.0004	0.0003	0	0	0.000	0.000	0.000	0	0	0	0
CP	0.364	0.0371	0.0274	0	0.0313	0.0058	0.208	0	0.0068	0	0	0.0381	0.201	0	0	0	0	0	0	0	0	0	0	0	0	0	
KB	0.5088	0.0033	0.0032	0.0023	0.0022	0	0.001	0.1301	5.8E-05	0.0003	3.8E-05	0.0002	0.356	0	7.6E-05	8E-05	0	0	2E-05	0.8E-08	0	0	0	0	0	0	0
IPB	0.3148	0	0	0	0.182	0.0336	0	0	0.0022	0	0	0.418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CSOB	0.1828	0.2651	0.1828	0	0	0	0	0	0	0	0	0.2578	0.085	0	0	0	0	0	0	0	0	0	0	0	0	0	
SPF-C	0.148	0.0008	0.0017	0.0377	0.0017	0	0.005	0.0008	0.0002	0.3057	0.0006	0.0008	0.487	0	0.0005	0.000	0	0	0.0002	0.0001	0	0	0	0	0	0	
SPF-V	0.1477	0.0008	0.0017	0.0378	0.0008	0	0.005	0.0008	0.0002	0.3057	0.1008	0.0008	0.397	0	0.0005	0.000	0	0	0.0002	0.0001	0	0	0	0	0	0	
PPF	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PIF	0.053	0.0051	0.0038	0	0.0043	0.0008	0.029	0	0.0012	0	0	0.005	0.888	0	0	0	0	0	0	0	0	0	0	0	0	0	
RIF	0.2425	0.0037	0.0028	0	0.0032	0.0008	0.021	0	0.0008	0	0	0.0036	0.722	0	0	0	0	0	0	0	0	0	0	0	0	0	
IPF-KB	0.1474	0	0	0.0007	0	0	0	0.0377	0	0.0001	1.1E-05	0.813	0.0001	0	0	0	0.0003	0.0003	0	0.000	2E-05	7.1E-05	4.4E-05	0	0	0	
VS	0	0	0	0	0.411	0.427	0	0	0	0	0	0	0.182	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 9
Property distribution of the second degree
in the Czech banking sector

We can see, that the state shares are significantly higher taking into consideration indirect links than in the primary distribution and the system is non-transparent, because the matrix T_0 of primary distribution among secondary owners is pseudo-nilpotent: its powers converge to zero matrix, but they will never be zero.

6. Concluding Remarks

The proposed methodology suggests some possibilities how to quantify relevant properties of ownership structures.

There can be a significant difference between primary "face" image of the property structure and real position of the subjects of property rights. Empirical evidence indicates that a real share of the state in the Czech banking sector (and the state responsibility as well) is significantly higher than it looks like on the basis of primary property distribution.

The general conclusion is that formally privatizing $x\%$ of former state property might still keep state responsible for much more than $(100-x)\%$ of it, taking into consideration indirect property distribution.

Existing evidence indicates that rapid Czech privatization was a rather complicated way how to switch from inefficient, but more more than less transparent public property to still not very efficient and at the same time more less than more transparent public property. Privatization illusion and resignation of the state on exercising property rights and absence of a reasonable doctrine of a temporary state capitalism contributed to present problems of the Czech economy and the Czech society (A. Schwartz, 1997).

The author is aware of the fact that his paper addresses only a small fragment of the problem of ownership and control structures. An agenda for future research is to apply the proposed methodology on the control structures, that are given not by shares only, but by voting majorities, coalitions of owners etc. (R. Maeland, 1991, G. Gambarelli, 1994).

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