

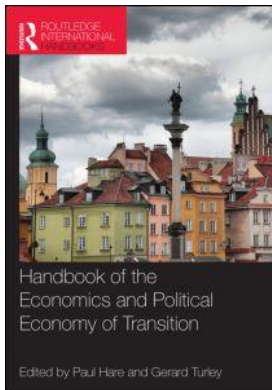
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Publisher: *Routledge*

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Handbook of the Economics and Political Economy of Transition

Paul Hare, Gerard Turley

Pyramid State Ownership and Control in the Czech Republic

Publication details

<https://test.routledgehandbooks.com/doi/10.4324/9780203067901.ch23>

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Published online on: 25 Apr 2013

How to cite :- Evžen Koenda, Jan Hanousek. 25 Apr 2013, *Pyramid State Ownership and Control in the Czech Republic from*: Handbook of the Economics and Political Economy of Transition Routledge
Accessed on: 21 Mar 2023

<https://test.routledgehandbooks.com/doi/10.4324/9780203067901.ch23>

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PYRAMID STATE OWNERSHIP AND CONTROL IN THE CZECH REPUBLIC

Evžen Kočenda and Jan Hanousek¹

Introduction and motivation

State ownership and its transformation has been a feature that is an inherent part of the transition experience and led to the emergence of corporate pyramid structures in various transition economies (Ma *et al.*, 2006; Chernykh, 2008; Kočenda and Hanousek, 2009). In general, a corporate pyramid is a group of firms whose ownership structure follows a top-to-bottom direction of control, where the ultimate owner is at the top and exerts its control over firms at successive lower levels. This fractal-like pattern of ownership can proliferate to several levels. The key characteristic of a corporate pyramid is a separation between ownership and control, which lends the ultimate owner leveraged power over minority shareholders. La Porta *et al.*, (1999) show that corporate pyramids are widespread around the world but these structures are more often present in emerging markets (Khanna and Yafeh, 2007).

Existing studies report a significant presence of the state in European firms (La Porta *et al.*, 1999), whose control potential further increases when direct control is augmented by control through golden shares (Bortolotti and Faccio, 2006). The literature on the extent of state control in the pyramidal framework in transformation economies is scarce, but for example Chernykh (2008) provides evidence for a dramatically high level (37–48 per cent) of state control over the sampled Russian firms. Ma *et al.* (2006) describe the emergence in China of business groups in which a state-owned firm as the largest shareholder can exert power over the rest of the companies in a business group. The formation of these pyramid-like corporate structures was intentional, to allow the state extensive control as well as to facilitate the transition itself (Yiu *et al.*, 2005).

Following the above account the identification of the extent of integrated state control is important because the state as ultimate owner can exert great political influence over the economy. Properly identifying the extent of state control is also important owing to the potential negative effects stemming from the conflict between political costs and agency costs. For example, when pursuing non-economic objectives, firms with state control would be less likely to innovate and restructure their line of production or they might intentionally delay restructuring.

In this contribution we analyse the development of integrated state control in Czech companies, which also involved the emergence of corporate pyramid structures. Integrated state control can emerge as a result of extensive privatization, which has occurred in numerous countries. Such an arrangement appeared in the Czech Republic, where industrial holding companies emerged out of the former centrally-planned units, sometimes with 15–30 horizontally and

vertically linked plants and subsidiaries. These companies were voucher privatized and restructured using government subsidies. The remaining shares were bought at a discount by new management teams and consortia of Czech banks. Voucher privatization led to the creation of large, diversified investment funds, often indirectly run by banks, which controlled linked enterprises (Khanna and Yafeh, 2007).

We complement the existing literature by introducing an accurate method to assess the extent of control by an ultimate owner and by producing evidence of the state being in control of a web of seemingly private companies within a corporate pyramid-like structure in the Czech Republic. Our detailed analysis of the data shows that the direct control of the state was significant and was further enhanced via golden share holdings. We conclude that integrated state control was not effectively used by the state, a finding that indicates the inefficiency of a state bureaucracy. Although the amount of state control is significant in the data, we do not find evidence of integrated state control employed to an extent similar to corporate structures in Russia or China.

Control in the pyramid and data

The interrelated ownership structure within the state pyramid is illustrated in Figure 23.1. On the top layer we identify the three main institutions through which the state is able to execute control. The key institution is a generic ‘State Privatization Agency’ that was established in all transformation economies under different names in order to administer state property. In the Czech Republic this agency was called the National Property Fund (NPF). Second, municipalities received various ownership stakes as free property transfers and became stakeholders in numerous companies, mainly in utilities and transportation. In many firms the stakes of municipalities were parallel with those of the NPF. Finally, other state agencies became stakeholders in

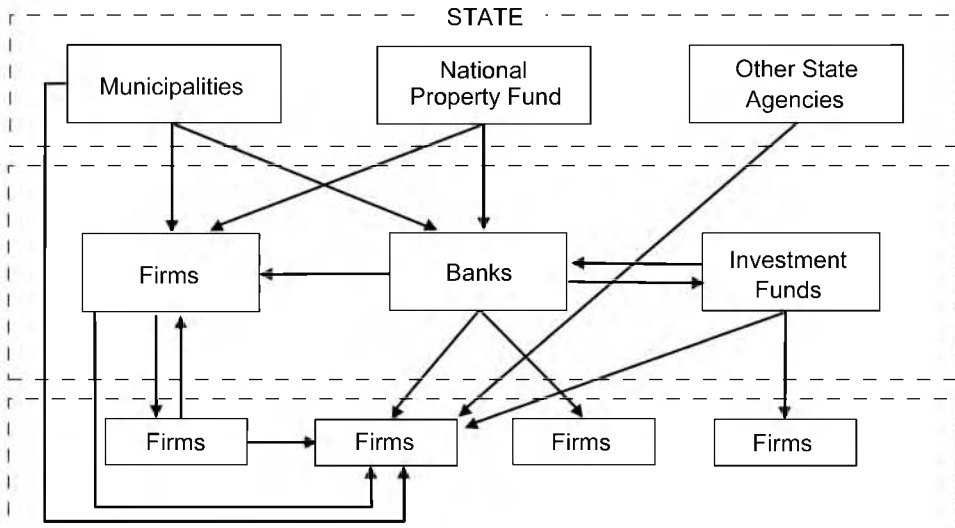


Figure 23.1 Ownership structure within the state pyramid

Source: Springer, *Economic Change and Restructuring*, Aug. 2011, ‘State ownership and control in the Czech Republic’, Kočenda, E. and J. Hanousek, with kind permission from Springer Science+Business Media B.V. Note: Investment funds were first established in countries that used a voucher scheme to privatize part of the state assets.

firms where the state needed to protect or to strengthen its interests. The description of the multiple presence of the state via different authorities is similar to that in Russia and China but the use of the control potential is different.

The next layer down shows industrial and financial companies in which the state is an owner. These are standard industrial, manufacturing or trading companies labelled as firms, various financial institutions labelled as banks, and privatization investment funds, specifically set up during the privatization scheme, labelled as investment funds. The ownership rights of the state with respect to the businesses in the three categories are denoted by directional arrows. The lowest layer allows us to begin unveiling the extent of the state pyramid. As a general rule, firms own stakes in other firms but do not own stakes in banks or investment funds. This is a result of the post-privatization arrangements and does not have any natural economic rationale behind it.

A further result of the privatization scheme is the dominant presence of banks in investment funds because it was primarily banks that established the investment funds as a tool to acquire ownership stakes in privatized firms. Stakes of investment funds in banks are less frequent and have developed over time through the process of investment funds rearranging their portfolios. Both banks and investment funds own stakes in firms as a rule, either directly or indirectly. Arrows pointing from banks and investment funds toward firms at the top (first) and lowest (third) levels denote the potential for cross ownership: control in the third-level firm via the first-level firm. Of course, the stylized nature of the arrangement in Figure 23.1 does not preclude the possibility of a stake in a firm on the second level as well.

To analyse the extent of state control we have assembled a data set on the extent of ownership in a large sample of Czech firms over the period from 1996 (one year after the privatization scheme officially ended in February 1995) to 2005 (the dismantling of the NPF). The data come from the archives of the NPF, the former Ministry of Privatization, the Prague Stock Exchange, the Centre for Securities in Prague, the commercial database *Aspekt*, and the Commercial Register of the Czech Republic. Our dataset was assembled from the above sources based on the unique organization identification number assigned to each firm. From our data we are able to isolate the specific extent of ownership represented by the state corporate pyramid as well as to distinguish various means of state direct and indirect control and the amount of assets under control. In this respect we are able to trace the development of state control in a large number of firms over time. As such, we work with a uniquely large sample that is by its size close to the total population of medium-sized and large firms in the economy. More detailed information on the sample size in each period is provided below along with our results on the extent of state control.

Formally, we describe the chain of control via voting rights in a manner similar to that developed by Chapple and Szafarz (2007), who, among others, voiced the idea that direct control by any type of owner could be complemented by indirect control rights. To analyse the full extent of a control mechanism we compute the extent of integrated ownership rights from the top of the control chain – the apex of the pyramid – towards each firm. The algorithm allows us to compute the extent of the integrated control of the state as an ultimate owner (top of the pyramid) in companies in our sample. When doing so we consider the succession of ownership levels down to the final potential level (ranging between eight and 12 levels) in a manner similar to Khanna and Yafeh (2007). This way we also control for cross-ownership, potential double ownership, etc. A detailed description of the algorithm to compute the extent of integrated state control is provided in Appendix 23.1.

In measuring the state control over a company we follow the approach of La Porta *et al.* (1999) and use total voting rights. In order to gauge the true control of the state we distinguish

between two categories of ownership concentration. First, we use a threshold of 50 per cent, which conforms to the International Financial Reporting Standards (IFRS) as well as to the Czech company law in terms of majority ownership. The second, less conservative, threshold is 25 per cent, which conforms to the methodological approach used by the firm-level database Aspekt. Other studies used a 20 per cent threshold (e.g. La Porta *et al.*, 1999), but we prefer 25 per cent threshold as it is in line with the relatively high ownership concentration present in Czech firms (Hanousek *et al.*, 2007).

Further, besides the direct control associated with the number of shares held, state control may also be executed by other means. The most effective is the ‘golden’ share. Such an instrument, in the form of a single share with special status, allows the state to use a *veto* right to prevent any major changes in a company where the state holds such a share. Utility companies are a typical example of state control through the golden share, but not the only example, as the golden share has been part of the ownership structure in other industries as well.

Finally, we distinguish the control over smaller and larger firms. The size, and hence the importance, of a company might influence its ability to generate business tax revenues and dividends, to provide employment and therefore income tax revenues, and to provide economic opportunities for suppliers who also provide employment and generate taxes. Thus, control over larger companies creates a potential for achieving various economic and non-economic objectives. We calculate the various degrees of state control using the total assets of a firm as a proxy for its size. The total assets are preferred to sales since firms were privatized (in both privatization waves) in various proportions of their assets (Hanousek and Kočenda, 2008). This approach allows us to infer the extent of state control over the large and important firms in the economy and consequently the extent of wealth that is controlled by the state through direct as well as pyramidal ownership channels.

Specifically, for each year we calculate the summary values of total assets (of firms) under state control. The overall value of these assets V in a given year t is the sum of the absolute values of the total assets of firms where a state position exists:

$$V_t = \sum_{j=1}^N V_t^j$$

First, we begin with the sum of the assets under direct control based on majority voting rights. Specifically:

$$V_t^D = \sum_{j=1}^N A_{jt} [State \geq 50\%]$$

defines the sum of the absolute values of the total assets of firms in year t in which the state held more than a 50 per cent share (A_{jt} is the accounting value of the total assets of firm j where the state has such a direct stake in year t). Second:

$$V_t^P = \sum_{j=1}^N A_{jt} [Pyramid \geq 50\%]$$

defines the sum of the absolute values of the total assets of the firms in year t that were under integrated state control via a pyramid structure. Finally, we define a similar value for a structure that combines control via the pyramid and golden share together as:

$$V_t^{PG} = \sum_{j=1}^N A_{jt} \{ [Pyramid \geq 50\%] \wedge [GoldenShare] \}$$

Table 23.1 State control over firms (state represented by the National Property Fund)

Year	Total Number	Extent of the control		
		Direct	Pyramid	Pyramid and Golden Share
(a) Majority voting rights of at least 50 per cent				
1996	814 [100%]	102 [13%]	103 [13%]	NA [NA]
1997	479 [100%]	70 [15%]	70 [15%]	158 [33%]
1998	321 [100%]	54 [17%]	54 [17%]	139 [43%]
1999	269 [100%]	53 [20%]	53 [20%]	134 [50%]
2000	241 [100%]	52 [22%]	52 [22%]	130 [54%]
2001	193 [100%]	41 [21%]	42 [22%]	94 [49%]
2002	159 [100%]	35 [22%]	35 [22%]	73 [46%]
2003	143 [100%]	30 [21%]	31 [22%]	63 [44%]
2004	122 [100%]	26 [21%]	26 [21%]	55 [45%]
2005	104 [100%]	25 [24%]	25 [24%]	54 [52%]
(b) Voting rights of at least 25 percent				
Year	Total Number	Extent of the control		
		Direct	Pyramid	Pyramid and Golden Share
1996	814 [100%]	210 [26%]	210 [26%]	NA [NA]
1997	479 [100%]	145 [30%]	146 [30%]	225 [47%]
1998	321 [100%]	96 [30%]	96 [30%]	168 [52%]
1999	269 [100%]	80 [30%]	80 [30%]	150 [56%]
2000	241 [100%]	76 [32%]	76 [32%]	146 [61%]
2001	193 [100%]	63 [33%]	63 [33%]	107 [55%]
2002	159 [100%]	46 [29%]	46 [29%]	82 [52%]
2003	143 [100%]	37 [26%]	38 [27%]	73 [51%]
2004	122 [100%]	31 [25%]	31 [25%]	62 [51%]
2005	104 [100%]	29 [28%]	29 [28%]	60 [58%]

Source: Springer, *Economic Change and Restructuring*, Aug. 2011, 'State ownership and control in the Czech Republic', Kočenda, E. and J. Hanousek, with kind permission from Springer Science+Business Media B.V.

Notes: Total Number denotes number of firms where state has any voting rights. Direct defines control through 50% and 25% voting rights, respectively.

Numbers in brackets denote percentages with respect to the base that is Total Number in respective year.

Pyramid defines control through chain of successive voting rights of 50% and 25%, respectively. Golden Share defines control through this instrument.

Extent of state control

State control over firms

The control potential of the state pyramid is presented in Tables 23.1–23.4. We begin with a simple account and in the first two columns of Table 23.1a, we show the number of firms in which the State, represented by the National Property Fund, had any voting rights. The number in each year constitutes a 100 per cent base for relative comparison, which is presented in

parentheses immediately following the absolute numbers throughout the table. As the economic transition progressed the absolute number of firms with a state presence decreases. In the third column we show that the number of firms that the state controlled directly through its (at least) 50 per cent majority voting rights decreases over time as well. The relative proportion increases, though. The control ability of the state in the pyramid is essentially the same as its direct control, both in absolute and relative terms. This indicates that control through the pyramid did not enhance direct control. However, the control ability doubles when golden shares are accounted for.

In Table 23.1b, we present the results of the control potential when a 25 per cent voting-right threshold is considered. As one might expect, the direct control of the NPF increases with this less conservative threshold. The increase is considerable during the second half of the 1990s but after 2001 it is only moderate. Pyramidal control is surprisingly not enhanced by the lower threshold. The golden share, on the other hand, exhibits a strong effect so that the control potential of the NPF over time at least doubles with respect to its direct control (with the exception of 1996). One point we can learn from Table 23.1 is that the pyramid structure in which the NPF represents the state as the ultimate owner does not seem to add much to its direct control potential. On the other hand, the instrument of the golden share is an important mechanism that enhances the control of the state considerably.

In Table 23.2 we present data in the same structure as in Table 23.1, but here the state is defined broadly and covers the NPF, other state agencies, and municipalities. The numbers in Table 23.2a, are in a sharp contrast to those presented in Table 23.1. The extent of state presence is greater and decreases at a much slower rate over time. More importantly, the number of firms that are under the direct control of the broadly defined state steadily increases and the proportion of these firms in the sample reaches 56 per cent in 2005. As in Table 23.1, control through the pyramid with a 50 per cent voting right threshold enhances the control ability of the state only a little but the golden share drives considerable increases in control. In panel (b) we present the control potential for the 25 per cent threshold, where the direct control in the early period is doubled when compared to the 50 per cent benchmark, but declines somewhat towards the end of the research period. The importance of pyramidal control is only marginal throughout the period but the golden share enhances the control over about an additional 10 percentage points of firms. These findings are in line with evidence from both developed (Bortolotti and Faccio, 2006) as well as transition economies (Chernykh, 2008).

State control over total assets of firms

Since the simple number of firms under state control does not account for the size of firms and their importance we next analyse the control over the assets of the firms. The total assets of the firm can be considered as a proxy for the size of each firm in the NPF portfolio as well as firms were privatized based on various proportions of their assets (Hanousek and Kočenda, 2008).

In terms of the volume of assets of firms where the state had voting rights, a decreasing trend can be seen in Tables 23.3 and 23.4. This pattern is paralleled in the evolution of assets over which the state as the NPF had majority voting rights (Table 23.3). Needless to say, the broadly-defined state manages to control directly a larger share of those assets (Table 23.4). We see that the volumes of assets the state was able to control directly were decreasing over time from initially very high levels. The gradual decrease was at a slower rate in the case of the state defined broadly (Table 23.4) when compared to the position of the NPF (Table 23.3). An increase in controlled assets is evidenced only in 1996 for both definitions of the state (50 and 25 per cent). Increases in the property controlled through the pyramid and golden share are found to be more important, especially over the years 1997–2002. This finding hints at the

Table 23.2 State control over firms (state defined broadly as a combination of the NPF, municipalities, and state agencies)

(a) Majority voting rights of at least 50 per cent				
Year	Total Number	Extent of the control		
		Direct	Pyramid	Pyramid and Golden Share
1996	889 [100%]	133 [15%]	136 [15%]	NA [NA]
1997	570 [100%]	122 [21%]	125 [22%]	213 [37%]
1998	436 [100%]	128 [29%]	131 [30%]	217 [50%]
1999	406 [100%]	143 [35%]	147 [36%]	228 [56%]
2000	413 [100%]	163 [39%]	166 [40%]	244 [59%]
2001	411 [100%]	180 [44%]	184 [45%]	237 [58%]
2002	404 [100%]	194 [48%]	197 [49%]	236 [58%]
2003	417 [100%]	206 [49%]	209 [50%]	241 [58%]
2004	411 [100%]	215 [52%]	218 [53%]	245 [60%]
2005	394 [100%]	221 [56%]	224 [57%]	253 [64%]
(b) Voting rights of at least 25 per cent				
Year	Total Number	Extent of the control		
		Direct	Pyramid	Pyramid and Golden Share
1996	889 [100%]	262 [29%]	262 [29%]	NA [NA]
1997	570 [100%]	213 [37%]	214 [38%]	296 [52%]
1998	436 [100%]	188 [43%]	188 [43%]	262 [60%]
1999	406 [100%]	191 [47%]	191 [47%]	262 [65%]
2000	413 [100%]	214 [52%]	215 [52%]	282 [68%]
2001	411 [100%]	236 [57%]	237 [58%]	279 [68%]
2002	404 [100%]	240 [59%]	242 [60%]	276 [68%]
2003	417 [100%]	251 [60%]	254 [61%]	288 [69%]
2004	411 [100%]	260 [63%]	262 [64%]	291 [71%]
2005	394 [100%]	260 [66%]	263 [67%]	293 [74%]

Source: Springer, *Economic Change and Restructuring*, Aug. 2011, 'State ownership and control in the Czech Republic', Kočenda, E. and J. Hanousek, with kind permission from Springer Science+Business Media B.V.

Notes: Total Number denotes number of firms where state has any voting rights. Direct defines control through 50% and 25% voting rights, respectively.

Numbers in brackets denote percentages with respect to the base that is Total Number in respective year.

Pyramid defines control through chain of successive voting rights of 50% and 25%, respectively. Golden Share defines control through this instrument.

preferences of the state to control the largest and most important firms directly rather than to engage in complicated schemes.

When we use the 25 per cent threshold the general results are similar to those for the 50 per cent one (Tables 23.3b and 23.4b). A specific feature to note is that the volumes of assets under state control are expectedly higher in the early years of the period under research but decrease to almost the same volumes as those measured with a 50 per cent threshold of voting rights. In both threshold cases the decrease is gradual during the 1990s and rapid after 2000.

Table 23.3 State control over total assets of firms (state represented by the National Property Fund)

(a) Majority voting rights of at least 50 per cent

Year	Extent of the control			
	Assets	Direct	Pyramid	Pyramid and Golden Share
1996	2310 [75%]	888 [29%]	895 [29%]	NA [NA]
1997	2230 [74%]	446 [15%]	446 [15%]	830 [28%]
1998	1850 [63%]	455 [16%]	455 [16%]	624 [21%]
1999	1780 [48%]	855 [23%]	855 [23%]	1020 [27%]
2000	1410 [33%]	966 [23%]	966 [23%]	1140 [27%]
2001	837 [18%]	520 [11%]	533 [12%]	676 [15%]
2002	768 [18%]	494 [12%]	494 [12%]	607 [14%]
2003	638 [13%]	438 [9%]	439 [9%]	484 [10%]
2004	552 [10%]	439 [8%]	439 [8%]	469 [9%]
2005	504 [7%]	395 [5%]	395 [5%]	426 [6%]

(b) Voting rights of at least 25 per cent

Year	Extent of the control			
	Assets	Direct	Pyramid	Pyramid and Golden Share
1996	2310 [75%]	1440 [47%]	1460 [47%]	NA [NA]
1997	2230 [74%]	1910 [63%]	1910 [63%]	1960 [65%]
1998	1850 [63%]	1650 [57%]	1650 [57%]	1710 [59%]
1999	1780 [48%]	1460 [39%]	1460 [39%]	1660 [45%]
2000	1410 [33%]	1090 [26%]	1090 [26%]	1330 [31%]
2001	837 [18%]	721 [16%]	721 [16%]	782 [17%]
2002	768 [18%]	565 [13%]	565 [13%]	670 [16%]
2003	638 [13%]	453 [9%]	454 [9%]	552 [11%]
2004	552 [10%]	440 [8%]	440 [8%]	471 [9%]
2005	504 [7%]	396 [5%]	396 [5%]	427 [6%]

Source: Springer, *Economic Change and Restructuring*, Aug. 2011, 'State ownership and control in the Czech Republic', Kočenda, E. and J. Hanousek, with kind permission from Springer Science+Business Media B.V.

Notes: Assets denote amount of total assets of firms where state has any voting rights.

Numbers in subsequent columns represent total assets of firms (in billions CZK) that the state is able to control. Numbers in brackets denote percentages with respect to total number of assets where state holds voting rights in a given year (Assets).

Direct defines control through 50% and 25% voting rights, respectively. Pyramid defines control through chain of successive voting rights of 50% and 25%, respectively. Golden Share defines control through this instrument.

The detailed results on direct as well as integrated control of the state over the firms in the Czech Republic provide evidence that the state was primarily engaged in direct control. Arguably, the intention of the state to create special structures to effectively control firms and, hence, the economy was limited as opposed to empirical evidence from other transformation economies. Another realistic explanation for the less-than-optimal use of state control potential in Czech firms could be that the state bureaucracy in this particular era was not organized in a way to exploit all means of control that, for example, a corporate pyramid offers. Surely, the integrated control of the state via a pyramid as well as its enhancement by the golden share was found to be less extensive than for example in Russia or China. These two large countries have

Table 23.4 State control over total assets of firms (state defined broadly as a combination of the NPF, municipalities, and state agencies)

(a) Majority voting rights of at least 50 per cent				
Year	Extent of the control			
	Assets	Direct	Pyramid	Pyramid and Golden Share
1996	2430 [79%]	1000 [32%]	1010 [33%]	NA [NA]
1997	2350 [78%]	563 [19%]	563 [19%]	946 [31%]
1998	2020 [69%]	618 [21%]	620 [21%]	789 [27%]
1999	1980 [53%]	1040 [28%]	1040 [28%]	1200 [32%]
2000	1680 [40%]	1210 [29%]	1210 [29%]	1380 [33%]
2001	1130 [24%]	778 [17%]	792 [17%]	935 [20%]
2002	1090 [26%]	741 [18%]	743 [18%]	855 [20%]
2003	1020 [20%]	732 [15%]	735 [15%]	777 [16%]
2004	929 [17%]	735 [14%]	737 [14%]	763 [14%]
2005	935 [12%]	784 [10%]	785 [10%]	812 [11%]

(b) Voting rights of at least 25 per cent				
Year	Extent of the control			
	Assets	Direct	Pyramid	Pyramid and Golden Share
1996	2430 [79%]	1570 [51%]	1580 [51%]	NA [NA]
1997	2350 [78%]	2030 [67%]	2030 [67%]	2080 [69%]
1998	2020 [69%]	1820 [62%]	1820 [62%]	1880 [64%]
1999	1980 [53%]	1650 [44%]	1650 [44%]	1850 [50%]
2000	1680 [40%]	1350 [32%]	1350 [32%]	1590 [38%]
2001	1130 [24%]	998 [22%]	998 [22%]	1060 [23%]
2002	1090 [26%]	836 [20%]	836 [20%]	940 [22%]
2003	1020 [20%]	771 [15%]	772 [15%]	869 [17%]
2004	929 [17%]	760 [14%]	760 [14%]	788 [15%]
2005	935 [12%]	802 [11%]	802 [11%]	828 [11%]

Source: Springer, *Economic Change and Restructuring*, Aug. 2011, 'State ownership and control in the Czech Republic', Kočenda, E. and J. Hanousek, with kind permission from Springer Science+Business Media B.V.

Notes: Assets denote amount of total assets of firms where state has any voting rights.

Numbers in subsequent columns represent total assets of firms (in billions CZK) that the state is able to control. Numbers in brackets denote percentages with respect to total number of assets where state holds voting rights in a given year (Assets).

Direct defines control through 50 and 25% voting rights, respectively. Pyramid defines control through chain of successive voting rights of 50 and 25%, respectively. Golden Share defines control through this instrument.

run truly centralized economies, albeit not in all dimensions, while centralization in the Czech Republic was less strict. Chernykh (2008) shows that in Russia, both federal as well as regional governments participate actively and extensively in traded companies. A similar situation exists in China, where the state induced the emergence of business groups in state-owned sectors that have much in common with the classical corporate pyramid. These structures possess control over subsidiary companies and serve as government instruments to facilitate ownership reform and economic transformation as discussed in Ma and Lu (2005), and Yiu *et al.* (2005).

As our findings show, the Czech state bureaucracy apparently developed less efficient control enforcement methods than these two relatively more strictly centralized countries. Nevertheless, the control potential of the state in Czech firms remained substantial for a long period of time

(Hanousek and Kočenda, 2008) as the state has been giving up its positions in firms only gradually and through a lengthy process.

Concluding remarks

In this chapter we have analysed the extent of the integrated control of the state over privatized firms during the post-privatization decade (1996–2005) in the Czech Republic. During this period the integrated control potential of the state resembled a corporate pyramid, a corporate ownership structure found worldwide. We find that the control potential that a corporate pyramid offers is not large when the Czech state is considered as the ultimate owner at the top of the pyramid. The state favoured direct control provided by voting rights measured by a 50 per cent threshold and such control increased when a less conservative 25 per cent threshold was adopted. The use of the less conservative benchmark is fully justified since no other significant subject with a consistently higher share of voting rights was detected at the same time. While pyramidal control was not fully utilized, the golden share in the hands of the state substantially enhanced its ability to control firms in terms of their numbers as well as in terms of the assets they represent.

The state pyramid in the Czech Republic likely suffered from the dispersed nature of the state at the top of the pyramid, where various state bodies could not efficiently interact to pursue control. This is opposed to, for example, institutional arrangements in China, where state-owned business groups, when compared to government agencies, have direct rights to collect the economic income generated by their affiliated companies and also have greater incentives and capability to closely and effectively monitor the managers of the group members (Ma *et al.*, 2006).

The results inferred from our extensive data set provide hard evidence that the state indeed remained an important owner of privatized firms for a considerable period of time. Its reluctance to vacate its ownership positions is in striking contrast with the lack of capacity to push corporate performance evidenced in Kočenda and Hanousek (2009). Lack of focus and inter-agency cooperation as well as the simple inefficiency of the state bureaucracy are the most likely reasons behind our findings.

Our results are relevant to ownership and corporate governance issues in transition economies in general. State pyramids can be quite effective tools of control in economies where the state promotes their existence with the clear objective of using the pyramid structures for various purposes including control of managers, push for increased and improved tax collection, influence on corporate governance, etc. This is counterbalanced by the fact that well-functioning state pyramids signify less than complete privatization and economic transformation, though. These features might affect the decisions of foreign investors, rating companies and financial institutions. Future developments will show what course countries with state pyramids will take.

Appendix 23.1

Following Chappelle and Szafarz (2007), we compute the extent of state control in firms. First, let d_{ij} denote the share of direct cash-flow rights that firm i holds in firm j . Then the n -square matrix $D = (d_{ij})$ represents the *direct cross-ownership rights* in the data set of n firms. To prevent potential errors owing to dispersed ownership we limit the ownership rights calculation by stating that:

$$\sum_{i=1}^n d_{ij} \leq 1$$

for $j = 1, \dots, n$.

An integrated ownership via a structure such as a corporate pyramid can be constructed as a sum of all direct and indirect ownership links via a matrix approach. The matrix of integrated ownership $P = (p_{ij})$ is defined as:

$$P = \text{diag} \left\{ I - \sum_{i=1}^n d_{ij} \right\} \sum_{s=1}^{\infty} D^s = \text{diag} \left\{ I - \sum_{i=1}^n d_{ij} \right\} (I - D)^{-1}$$

In the above equation the diagonal matrix factor is a necessary scaling factor of

$$\sum_{s=1}^{\infty} D^s = (I - D)^{-1}$$

that prevents an implausible extent of control greater than 100 per cent.

We suggest measuring the direct control over companies by using a conservative majority threshold of 50 per cent and specify the following ownership–control matrix:

$$c_{ij} = \begin{cases} 1, & d_{ij} > 0.5 \\ 0, & \text{if } \exists k \neq i : d_{kj} > 0.5 \\ d_{ij}, & \text{otherwise} \end{cases}$$

In the above definition we also control for the existence of a majority owner k and in this way we eliminate the double counting of controlling stakes. Simply said, in the case of a 50 per cent majority owner, other stakes have no real controlling power. The rule can be generalized to different controlling thresholds. Finally, we define the control extent P of the integrated, or ultimate, owner in a corporate pyramid as:

$$P = \text{diag} \left\{ I - \sum_{i=1}^n c_{ij} \right\} \sum_{s=1}^{\infty} C^s = \text{diag} \left\{ I - \sum_{i=1}^n c_{ij} \right\} (I - C)^{-1}$$

The above approach is versatile enough to enable analysis of the true extent of control of any type of owner, including that of the state in partially privatized companies.

Note

- 1 A substantial part of this chapter was written while Evžen Kočenda was a Visiting Fellow at the Center for Economic Studies (CES) at the University of Munich, whose hospitality is warmly acknowledged. We are grateful to Lucy Chernykh, Iraj Hashi, and presentation participants for valuable comments. Financial support from GAČR grant No. 403/12/0080 is gratefully acknowledged. The usual disclaimer applies.

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