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**Effects of Ownership and  
Financial Status on  
Corporate Environmental  
Performance**

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# Does state ownership and private ownership differ?



- Recent research: Effects of different ownership structures on standard measures of corporate financial performance, such as revenue and capital investment, in TE.
- This study: Effects of different ownership structures on corporate environmental performance

# Policy Question



- Do the environmental and economic performance goals differ?
- Are the environmental goals and economic efficiency goals complements or substitutes in the design of privatization?

# Alternative Hypotheses - 1



- Private owners more effectively reduce costs
  - as well as pollution costs, if there are any
- Emissions represent costs
  - indicate an inefficient use of inputs,
  - generate emission charges (at least in CZ),
  - prompt need for costly end-of-pipe treatment,
  - induce regulatory authorities to impose costly penalties
    - fines, and
    - enforce regulations to modify production processes with a final threat of shutting down

# Alternative Hypotheses - 2



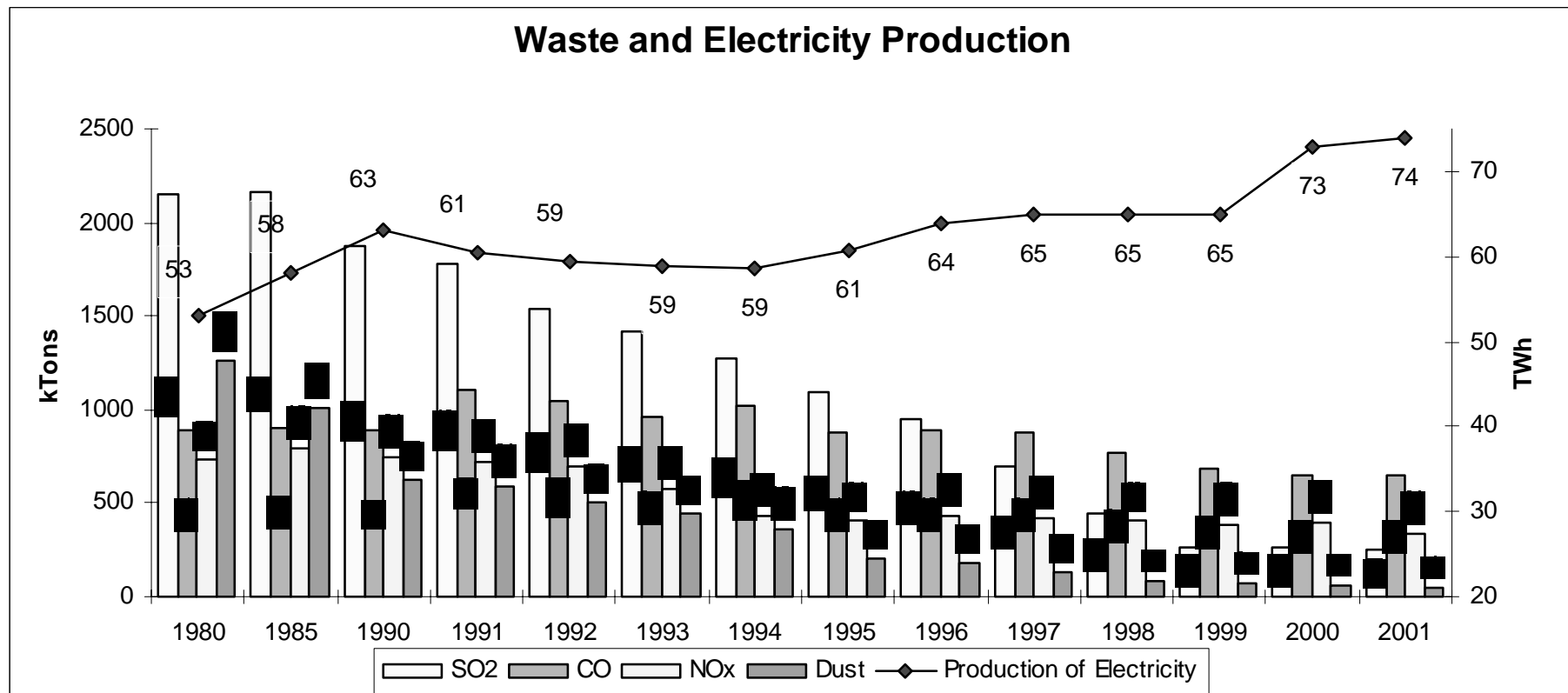
- Preferences for better environmental stewardship may differ by ownership structure
- Independent of cost concerns
  - state may express a greater concern for the environment by reducing emissions more effectively than private owners

# Alternative Hypotheses - 3



- State-owned firms may feel less to pressure to control emissions if state regulators are reluctant:
  - State is not enforcing the environmental limits in case of state-owned firms
  - State enforces the emission limits, however it does not punish the management for wasting firms' finance resources on pollution fines

# Motivation



# Ownership and Performance



- Effects of different ownership structures on standard measures of corporate performance:
  - (1) basic investor categories,
  - (2) threshold level for reporting ownership shares, and
  - (3) concentration measure based on the single largest shareholder.

# Effects of Ownership Structure on Corporate Performance



- Frydman et al. (1999)
- Djankov (1999) ownership and enterprise restructuring in NIS.
- Claessens and Djankov (1999) ownership and corporate financial performance
- Kocenda and Svejnar (2002) ownership and post-privatization financial performance
- Megginson and Netter (2001) comprehensive survey on privatization

# Links between Financial and Environmental Performance - 1



- Konar and Cohen (2002) environmental performance and financial performance captured by firm's market value
- Gottsman and Kessler (1998) environmental performance and financial performance - compare financial returns of S&P 500 against three sub-samples

# Links between Financial and Environmental Performance - 2



- Bosch et al. (1998) federal environmental enforcement and stockholder wealth
- Klassen and McLaughlin (1996) environmental performance awards and equity returns
- Austin et al. (1999) environmental performance and financial performance
  - "green" vs. "brown" categories
  - "black" vs. "red" categories

# Stylized Facts - 1



- Does successful financial performance begets or undermines good environmental performance ?
- Firms finance all investment with retained profits
  - Successful financial performance may generate internal financial resources that can be used to fund improvements in the firm's ability to reduce pollution

# Stylized Facts - 2



- Interesting pattern of ownership structures due to the chosen privatization methods
- Some key sectors in our study remain heavily state-controlled
- The Czech Republic had a substantially degraded environment
  - poor ambient air quality and air pollution is a large environmental problem of public concern in the Czech Republic (World Bank, 1992)

# Stylized Facts - 3



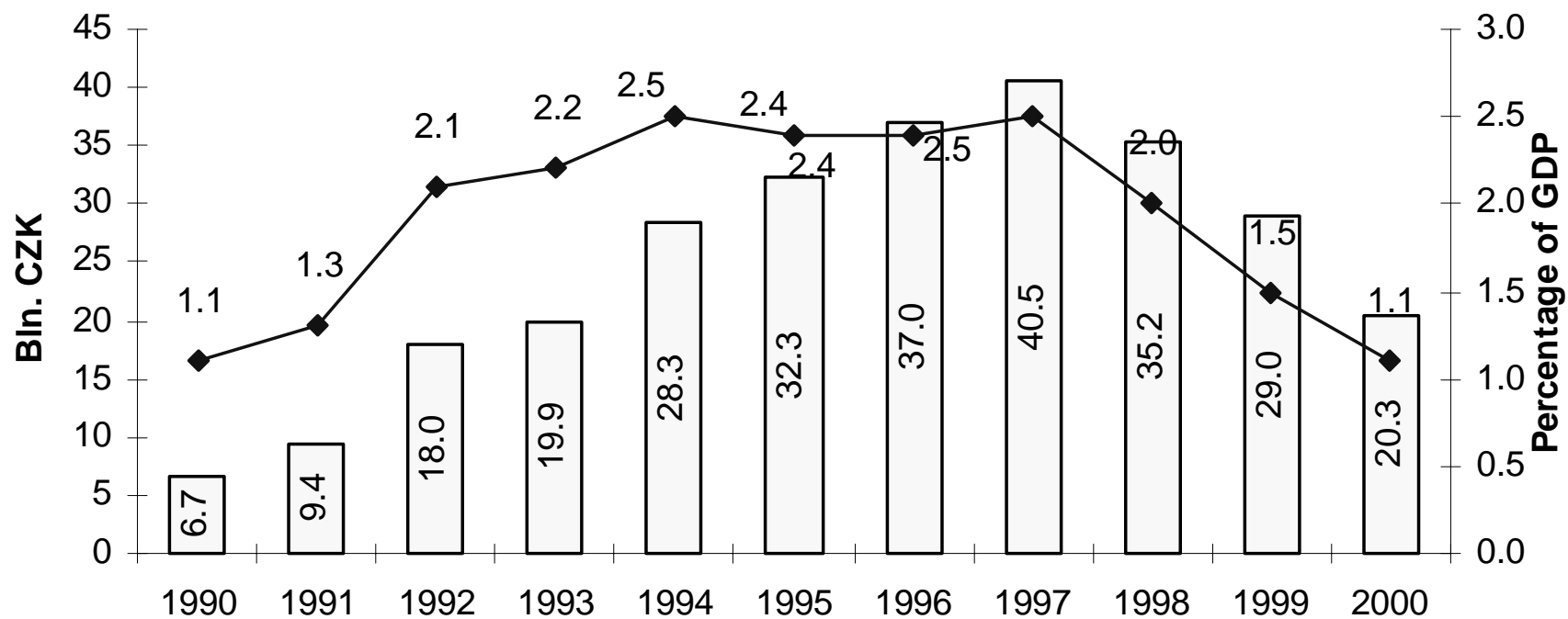
- Czech government has taken strong and successful steps to reduce air emissions substantially during the period 1991 to 1998
- Overall decline in economic activity was accompanied with a reduced domestic energy demand
  - energy production has not declined

# Stylized Facts - 4



- Introduction of new pollution control laws (e.g., 1991 Czech National Air Act)
  - firms' pollution control efforts, and
  - fuel switching
- European Union (EU) standards to qualify for membership
- New emission standards were put forward
  - Major polluters had a temporary relief till January 1999.

# Investment in Environmental Protection

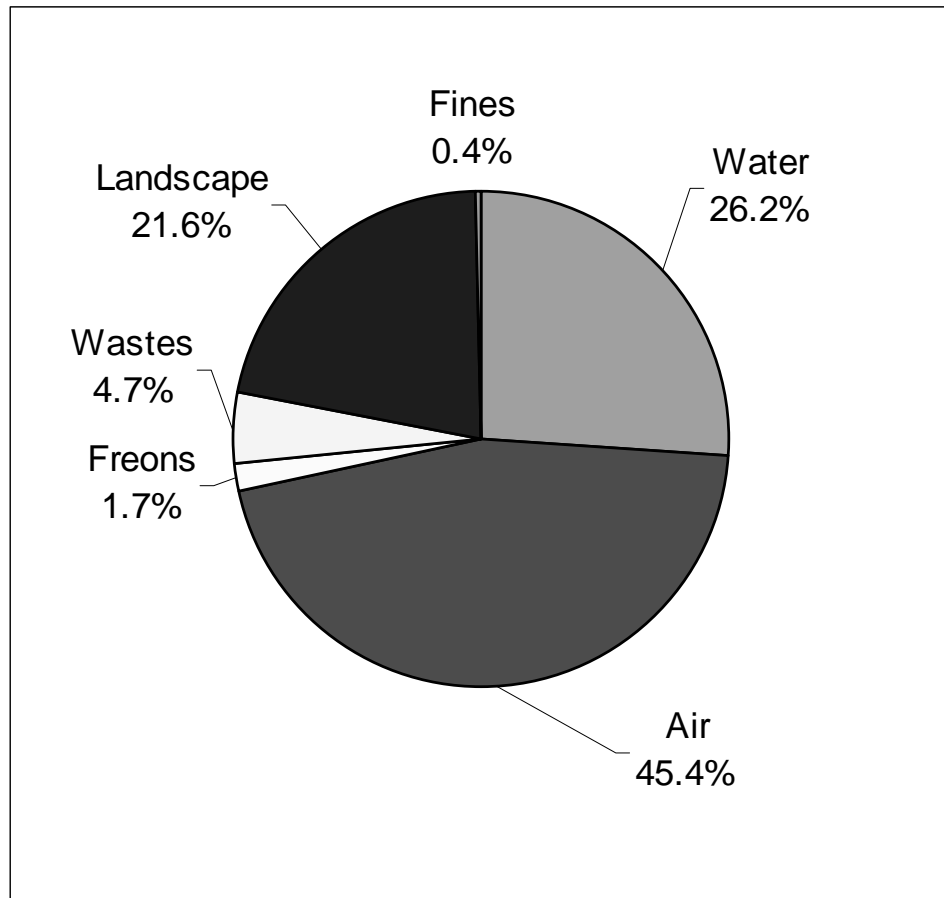


# Pollutants (Emissions Register)



- carbon monoxide (CO),
- sulfur dioxide (SO<sub>2</sub>),
- particulate matter (PP), and
- nitrous oxides (NO<sub>x</sub>)

# Pollution Charges Composition In 1999



# Types of Investors (Owners)



- (1) state,
- (2) investment funds,
- (3) citizens,
- (4) portfolio companies,
- (5) bank (direct ownership),
- (6) strategic investors (other companies),
- (7) foreign investors, and
- (8) dispersed private investors

# Types of Investors (Owners)



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	Mean	Std. Deviation
State Ownership share (%)	6.14	16.65
Strategic Investor Ownership share (%)	27.77	30.41
Individual Citizens Ownership share (%)	5.72	16.88
Bank Ownership share (%)	0.99	5.70
Portfolio Company Ownership share (%)	2.17	9.02
Investment Funds Ownership share (%)	12.80	20.12
Foreign Ownership share (%)	7.61	20.64
Concentration: Single Largest Shareholder (%)	45.34	22.22

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# Granger Causality Tests



- Emissions never Granger-cause profits
- Profits Granger-cause emissions.
  - p-values of these tests oscillate around the 10% critical level
- Emissions never Granger-cause production
- Link from production to emissions cannot be safely rejected

# Effect of Financial Performance on Environmental Performance



- Basic Model 1 - Absolute Emissions:

$$p_{it} = \alpha a_{it} + \gamma y_{it} + \beta \pi_{i,t-1} + e_{it} , \quad (1)$$

- Basic Model 2 - Relative Emissions :

$$(p/y)_{it} = \delta a_{it} + \eta y_{it} + \theta \pi_{i,t-1} + u_{it} , \quad (2)$$

- *Financial success begets better environmental performance*
- *Production increases relative emissions*
  - *firms face diseconomies of scale wrt. pollution?*

# Effect of Financial Performance on Environmental Performance - 2



RHS Variable	Absolute Emissions	Relative Emissions
<b>Fixed Effects</b>		
Production / Fixed Assets	0.336 *** (0.053)	0.832 *** (0.299)
Lagged Profit / Fixed Assets	-0.391 (0.306)	- 3.199 ** (1.273)
<b>Random Effects</b>		
Production / Fixed Assets	0.313 *** (0.019)	1.193 *** (0.163)
Lagged Profit / Fixed Assets	- 0.506 *** (0.154)	- 7.453 *** (1.274)
Hausman Fixed vs. Random	0.843	7.597 **
[significance level ]	[0.839]	[0.022]
No. of Firms / No. of Observations	564 / 2173	564 / 2173

# Effects of Ownership Structure on Environmental Performance - 1



- Expand models with ownership structure:

- Model 1:

$$(p/a)_{it} = \alpha + \gamma (y/a)_{it} + \beta (\pi_{i,t-1} / a_{it}) + \omega W_{it} + \rho C_{it} + e_{it}$$

- Model 2:

$$[(p/y)/a]_{it} = \delta + \eta (y/a)_{it} + \theta (\pi_{i,t-1} / a_{it}) + \sigma W_{it} + \phi C_{it} + u_{it}$$

# Effects of Ownership Structure - Summary



- Ownership is individually insignificant
- Ownership is jointly insignificant
- *Is any type of ownership different?*

# Effects of Ownership Structure - Detail Analysis



- Difference between the various private ownership categories and state ownership
- Concentrated and diffuse ownership
  - compare strategic investors to investment funds, individual citizens, portfolio companies, and banks.
  - compare foreign investors to investment funds, portfolio companies, individual citizens, strategic investors, and banks.

# State Ownership vs. Other Types



Private Ownership Category	Coefficient Difference	Standard Error	P-value
<b>Based on Absolute Emissions (Fixed Effect Estimates)</b>			
<b>Investment Funds</b>	<b>0.0078</b>	<b>0.0031</b>	<b>0.012</b>
Individual Citizens	0.0027	0.0028	0.338
Portfolio Companies	0.0019	0.0043	0.659
Bank	0.0022	0.0041	0.600
<b>Strategic Investors</b>	<b>0.0042</b>	<b>0.0022</b>	<b>0.059</b>
Foreign Investors	0.0037	0.0028	0.187
Joint Test $F^2(6)$	8.317		0.216

# Effects of Ownership Structure - Detail Analysis Summary



- Private ownership in general does not matter,
- State ownership appears to matter.

# State Ownership and Ownership Concentration - Summary



- Financial performance begets good current environmental performance
- Greater production increases absolute emissions and firms face diseconomies of scale
- Greater ownership concentration leads to better corporate environmental performance
- Greater state ownership leads to better environmental behavior

# State Ownership and Ownership Concentration - Results



RHS Variable	Model 1B Absolute Emissions		Model 2B Relative Emissions	
	Fixed Ef.	Random Ef.	Fixed Ef.	Random Ef.
Production / Assets	0.494 *** (0.154)	0.295 *** (0.017)	0.963 ** (0.395)	1.275 *** (0.139)
Lagged Profits / Assets	- 0.701 * (0.425)	- 0.925 *** (0.152)	- 3.33 ** (1.63)	- 4.31 *** (0.675)
State Ownership (%)	- 0.0048 ** (0.0020)	0.0049 * (0.0027)	- 0.0210 * (0.0062)	- 0.0148 (0.0137)
Concentration: Largest Shareholder	- 0.0045 * (0.0025)	- 0.0015 (0.0020)	- 0.0013 (0.0066)	- 0.0025 (0.0099)
Hausman Fixed vs. Random [significance level]	10.36 [0.110]		0.77 [0.979]	

# Summary of Results - 1



- Successful financial performance improves future environmental performance
- Higher state ownership actually improves environmental performance relative to all other investor types
  - even though the state apparently retained ownership in more polluting industries
- Beyond the effect of state ownership:
  - no type of private ownership significantly affects environmental performance

# Summary of Results - 2



- Overall, the type of owner does not affect environmental performance as long as the analysis controls for production levels, sector-specific effects, and financial performance.

# Summary of Results - 3



- Ownership structure does not directly affect environmental performance; it only indirectly affects environmental performance by influencing financial performance.

# Summary of Results - 4



- In contrast, concentrated ownership, as measured by the single largest shareholder, improves the environmental performance, consistent with the notion that concentrated power allows an owner to manage better costs, including environmentally-related costs.

# Policy Recommendations



- Large firms seems to pollute more both in relative and absolute terms =>
  - favor smaller firms
- Favor concentrated ownership
- Financial performance begets environmental performance =>
  - Privatization can follow economic performance goals wrt. environmental protection as well

# Policy Question - Answer



- Environmental and economic efficiency goals seems to be complements in the design of privatization.
- They do not contradict each other =>

There is no trade-off