



***Environmental Management, Performance & Innovation:
Comparing SME's with other Firms***

Presentation by

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at

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Objectives of the OECD Project

- Application of empirical analytical techniques in order to answer the following:
 - Do different policies (i.e. economic instruments, direct regulation, voluntary, information-based) result in different organisational and managerial responses within firms/facilities;
 - How can public authorities support the introduction of management practices which lead to improved environmental performance (including innovation); and,
 - How can scarce public resources be better targeted to ensure that both ‘leaders’ and ‘laggards’ face the right incentives to improve their environmental performance.
- Results discussed at OECD/EPA/EC Conference (June 14-15, Washington D.C.)

Specific Sets of Hypotheses

- The determinants of having in place an environmental management system or tools (Henriques et al 2005);
- The determinants of undertaking various investments to reduce environmental impacts (Johnstone et al. 2005);
- The determinants of investing in environment-related research and development (Arimura et al. 2005);
- The determinants of improving environmental performance through changes-in-production-processes rather than end-of-pipe abatement (Fronzel et al. 2005); and,
- The links between commercial strategies and performance and environmental actions (Darnall et al. 2005).

Questionnaire and Data

- Empirical assessment of public policy framework and environmental management, innovation and performance
- Observations from seven OECD countries (US, Canada, France, Norway, Hungary, Germany, Japan)
- > 4,000 facilities, 50 employees or more, all manufacturing sectors
- Rich characterisation of facility-level attributes and public environmental policy framework
- Influence of stakeholders, facility management structure and tools, commercial and economic factors

Number of Facilities in Sample

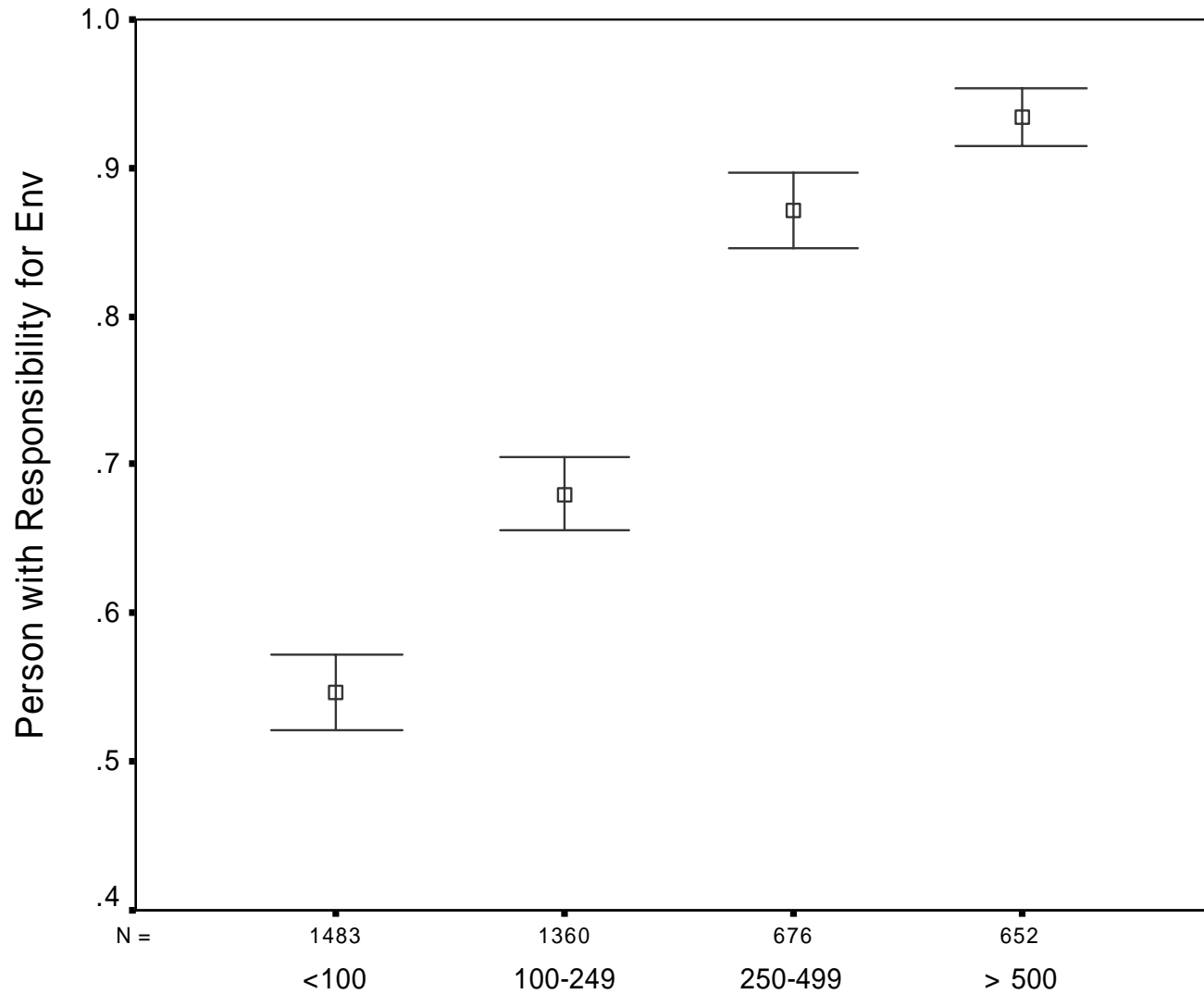
	CDN	FRA	DEU	HUN	JPN	NOR	USA	Total
50-99	76	85	351	66	661	155	96	1490
100-249	68	81	278	198	508	102	130	1365
250-499	62	39	130	101	178	36	130	676
>500	50	64	139	101	152	16	133	655
Total	256	269	898	466	1499	309	489	4186



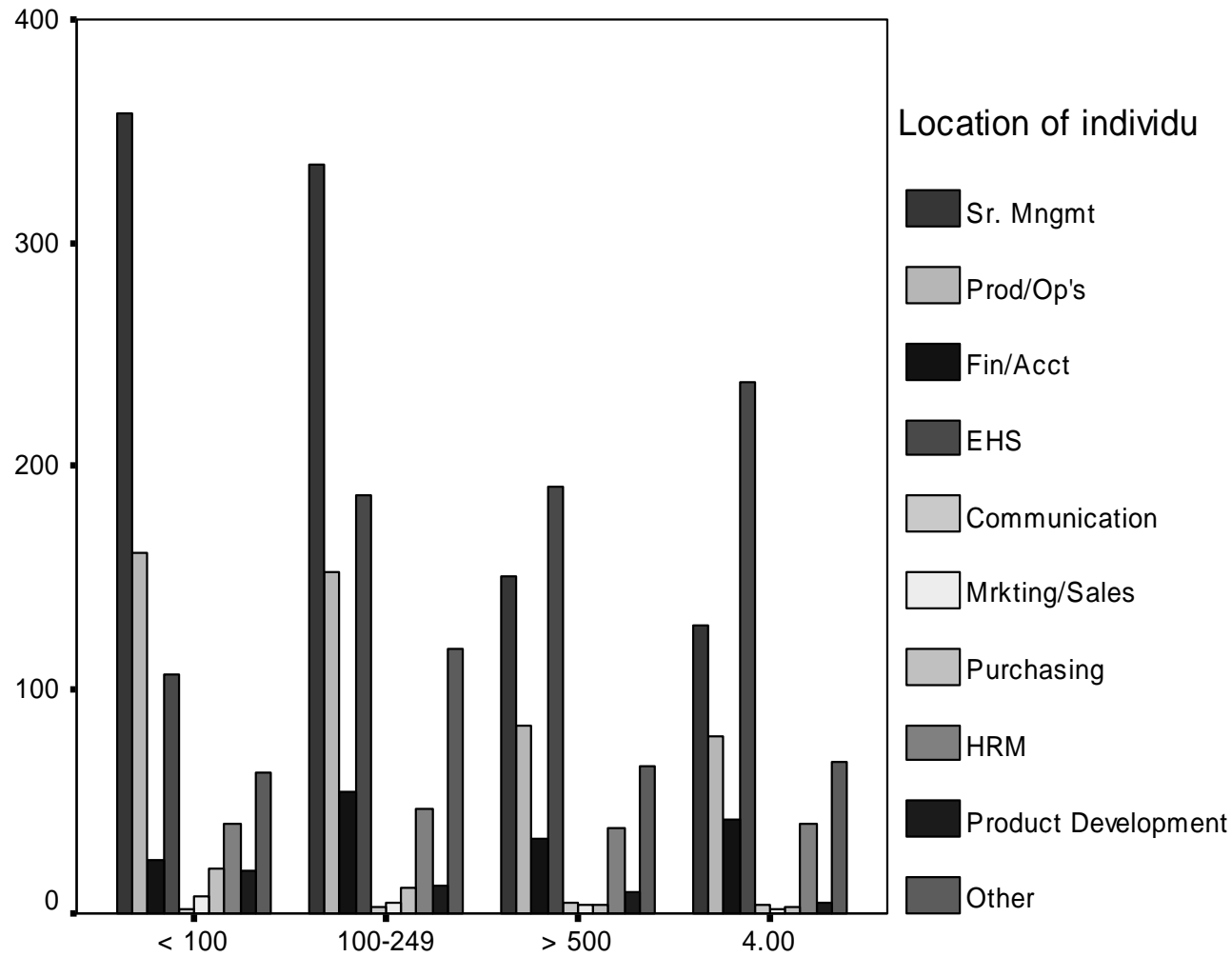
Analytical Framework

- Discrete choice (binary or score variables) – less demanding of respondents --> good response rate and more reliable
- Multivariate analysis - correlation between explanatory variables addressed
- Simultaneous/system - decisions relating to variables of interest taken interdependently
- Selection models – some ‘latent’ omitted variables correlated with dependent and (at least one) explanatory variable

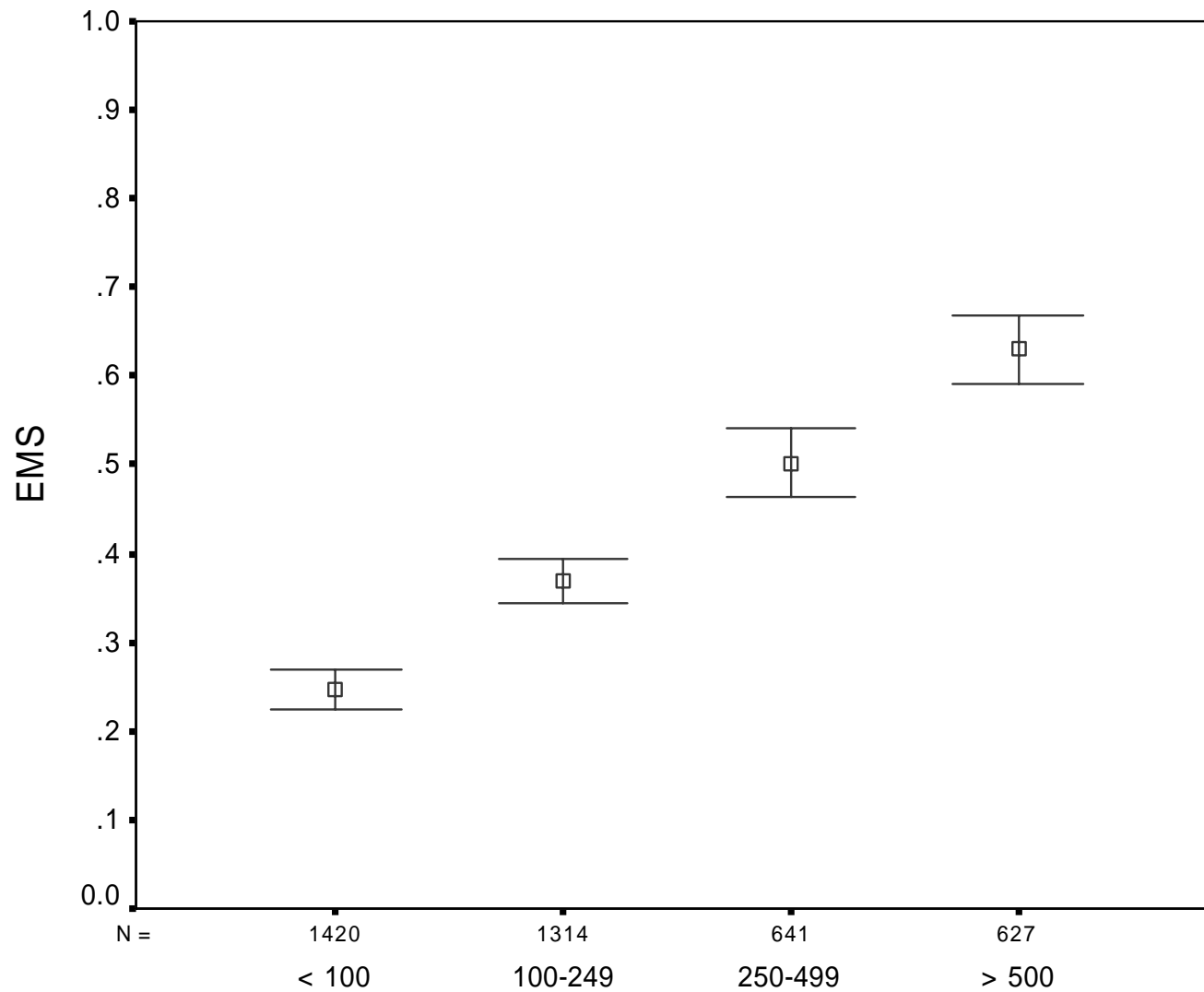
Designated Responsibility



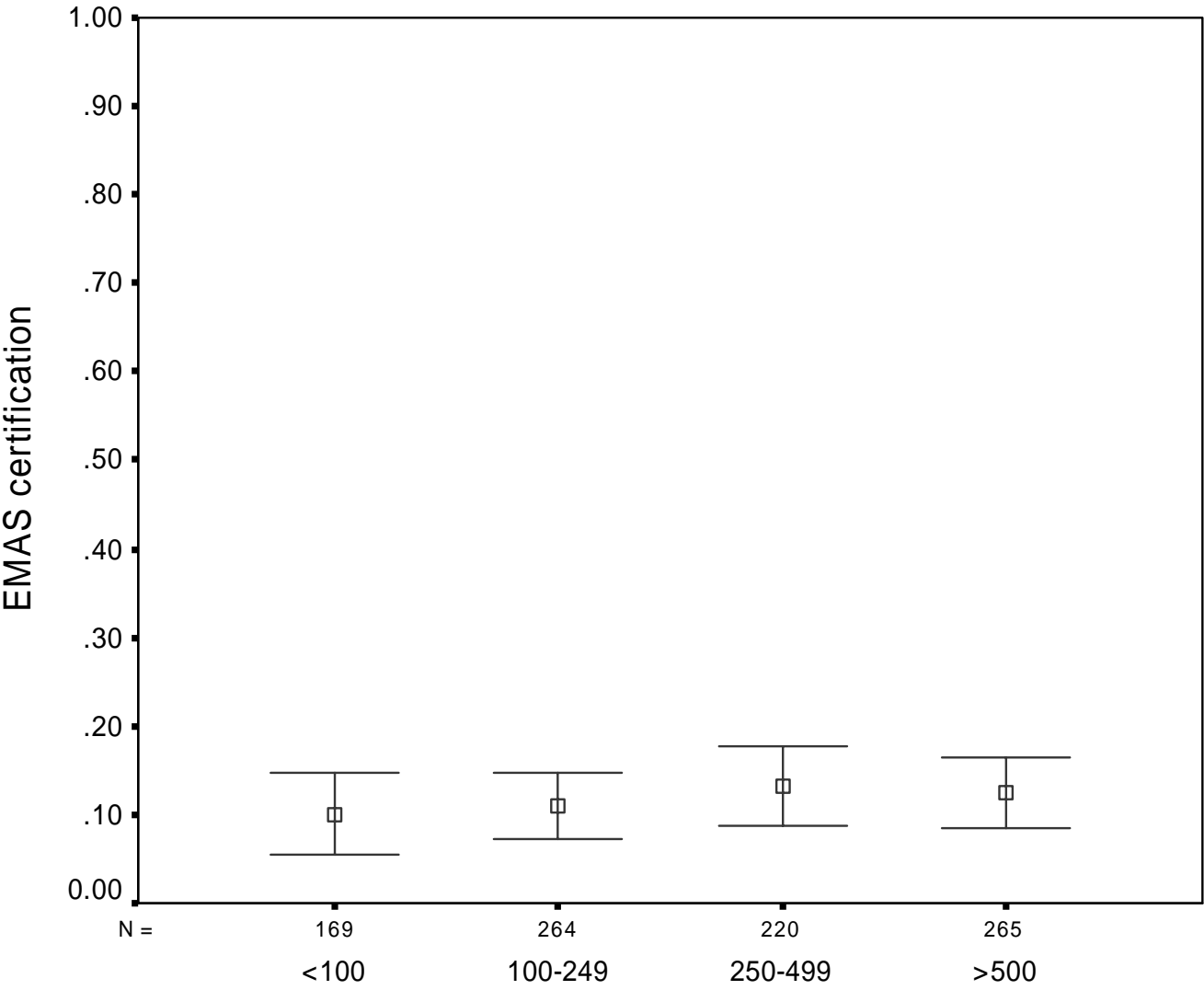
Location of Responsibility



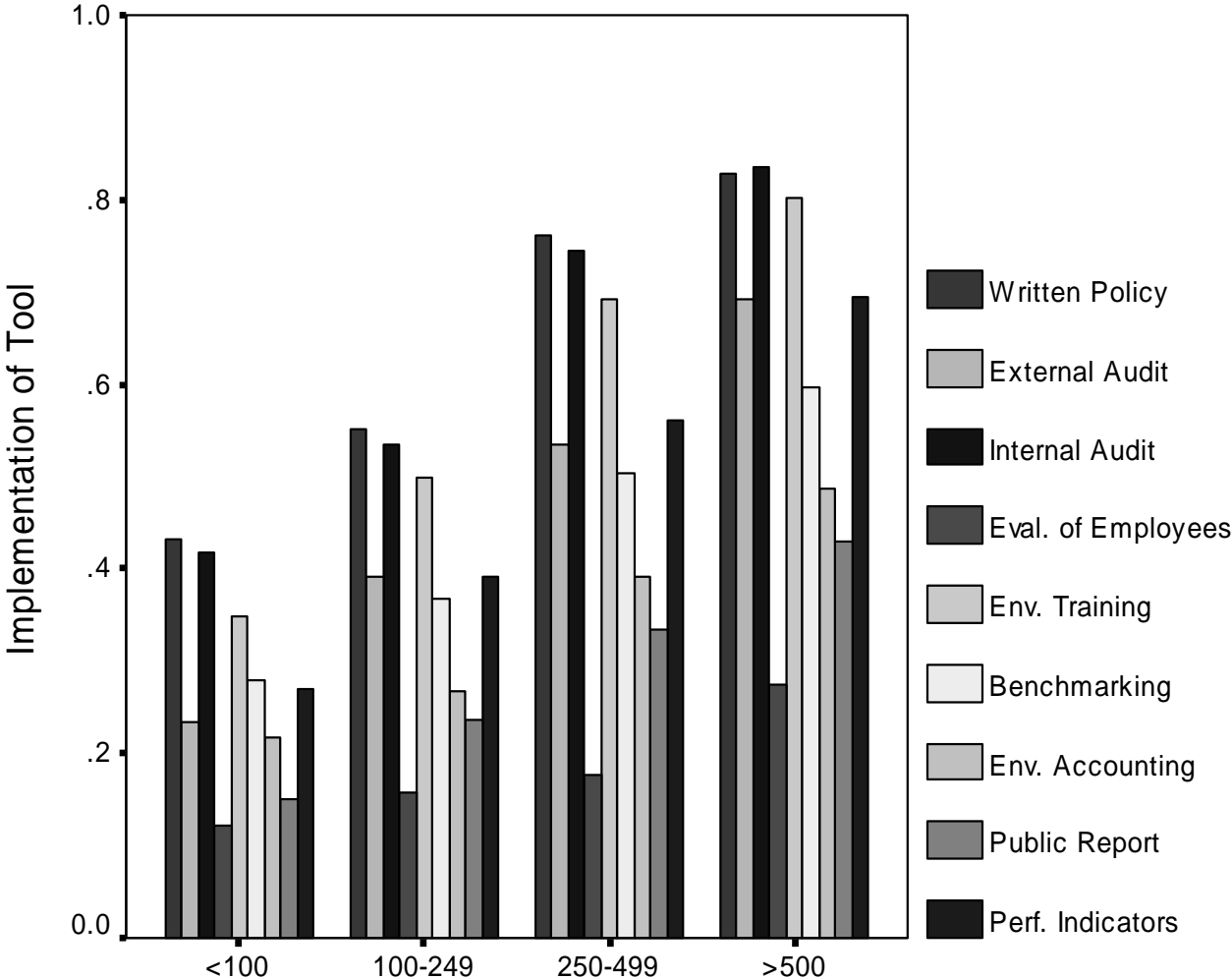
Environmental Management Systems



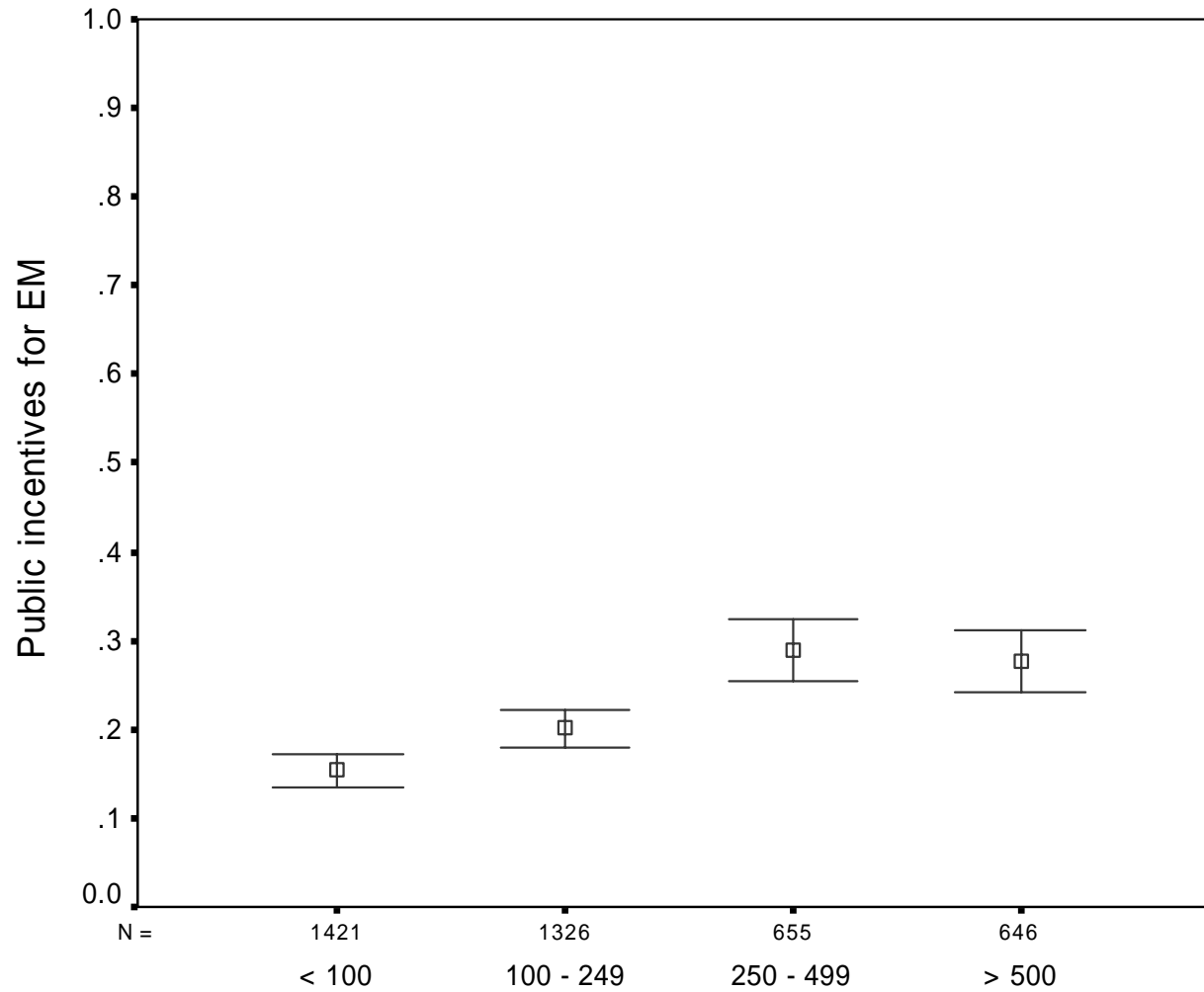
EMS Certification



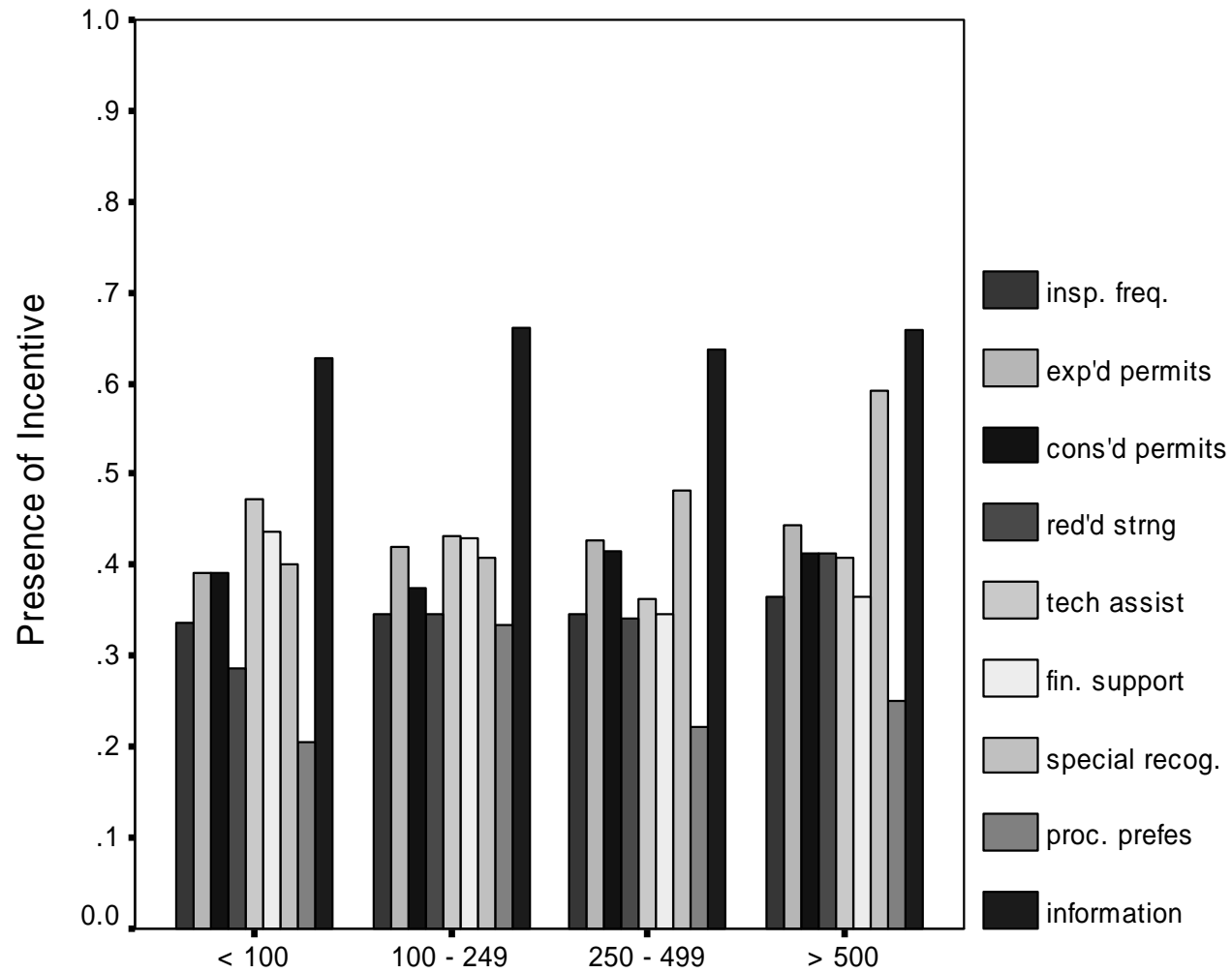
Presence of EM Tools



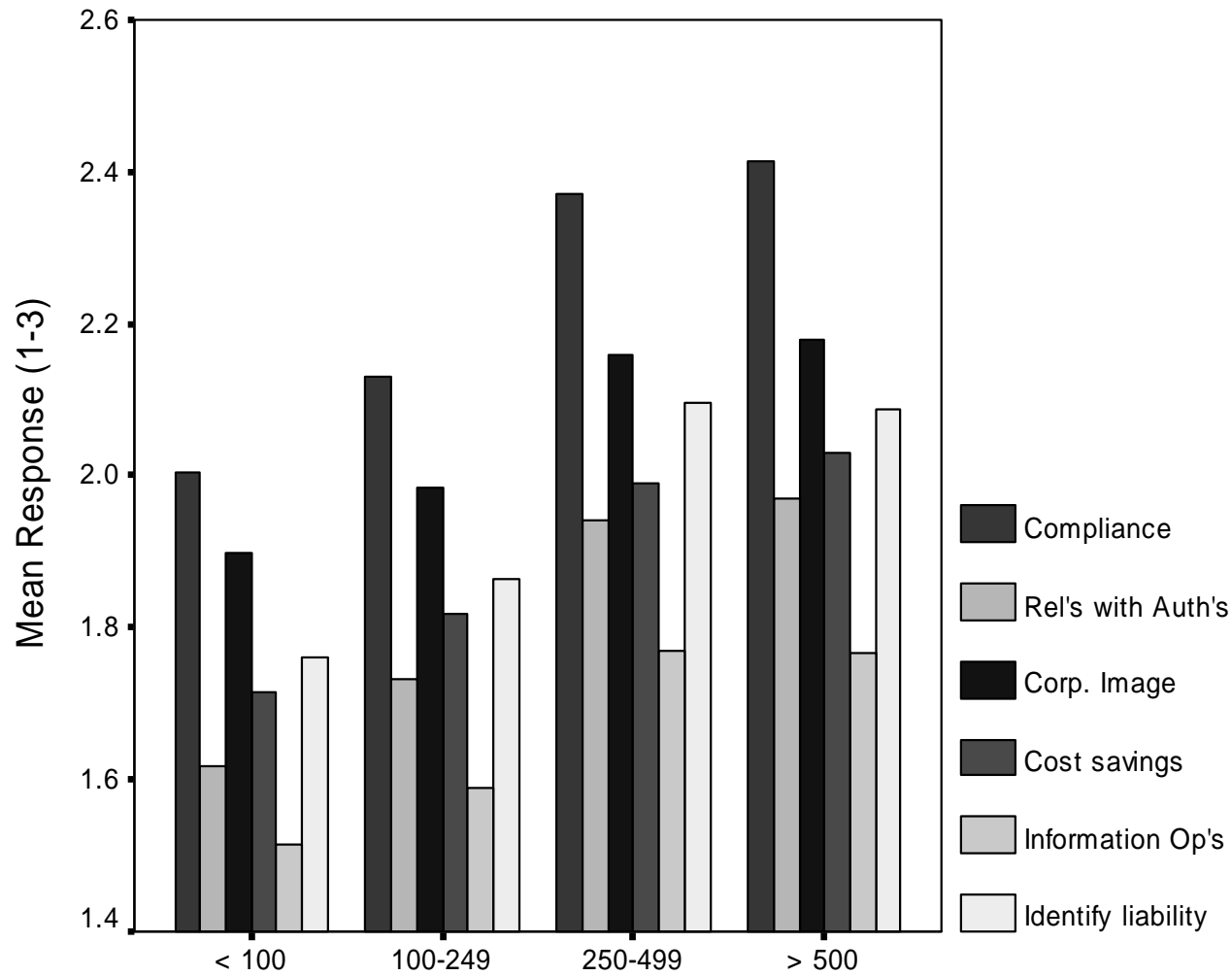
EM Incentives



EM Incentives – Specific Measures



Motivations for EM



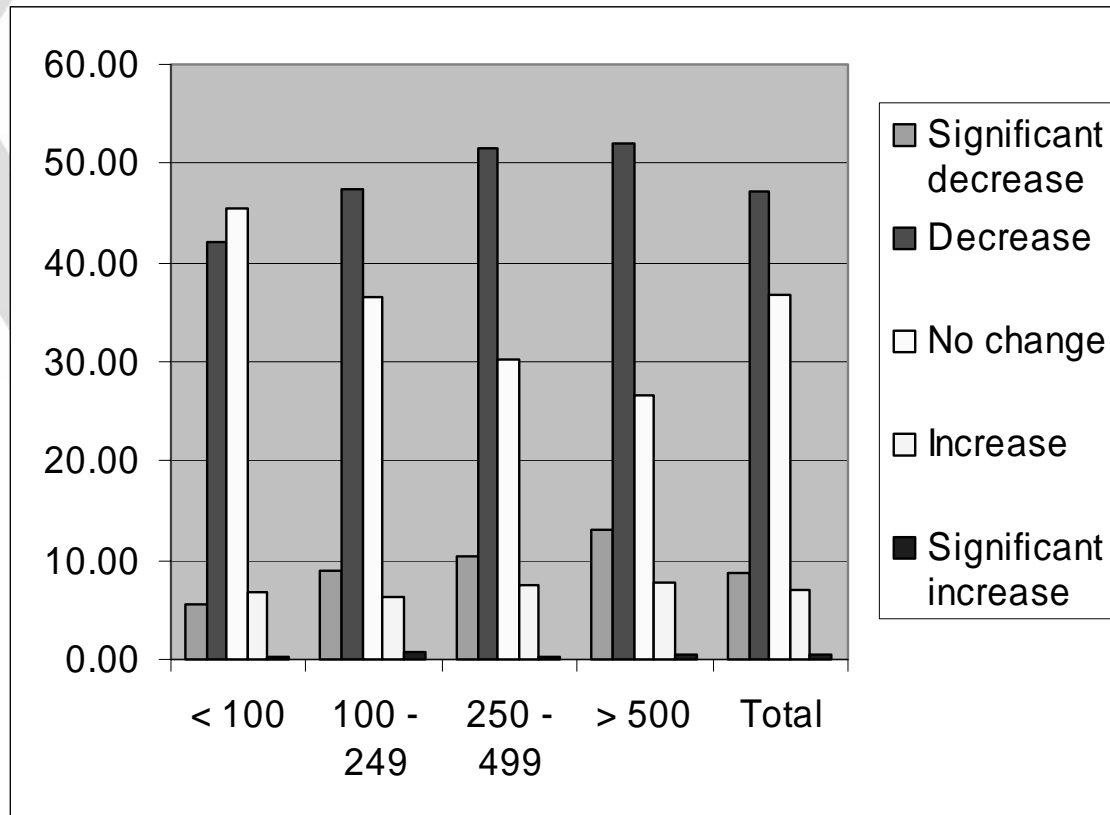
Determinants of Environmental Management

- Dependent variable: EMS, Certified EMS, EM Tools, Designated Responsibility
- Targeted EM incentives
 - positive influence of public policy incentives to introduce EM in general (although not certification)
 - however, at disaggregated level only financial support and perceived reduced inspection frequency appear to matter
- For general environmental policies
 - general application of technical assistance as a substitute
 - indeterminate results with respect to flexible vs. prescriptive policies
 - correlation of flexible instruments with senior management

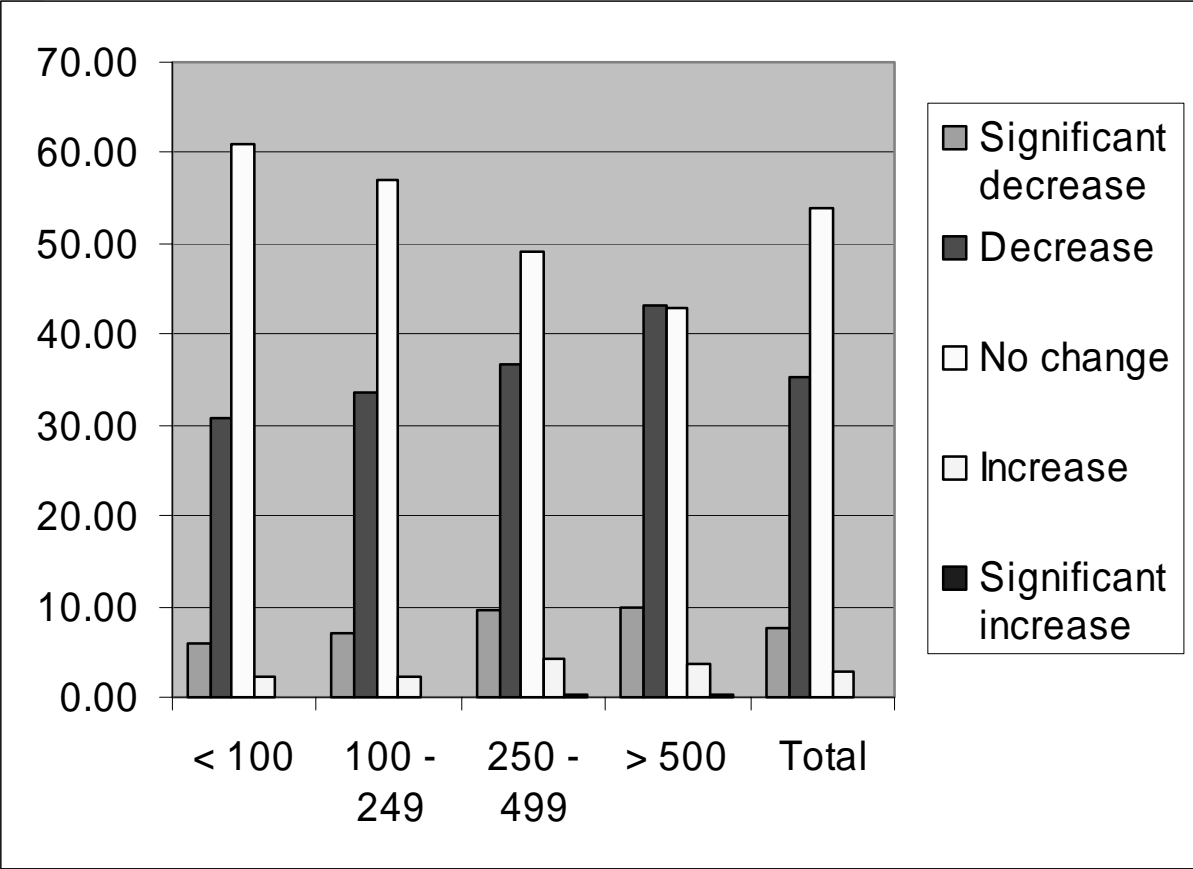
Determinants of Environmental Management (SME vs. Large)

- Dependent variable: EMS
- Tentative Results – Preliminary Estimation
- Main Differences for SME's
 - Multifacility variable
 - Competition on Bases of Relations with Buyers
 - Provision of Information by Public Authorities

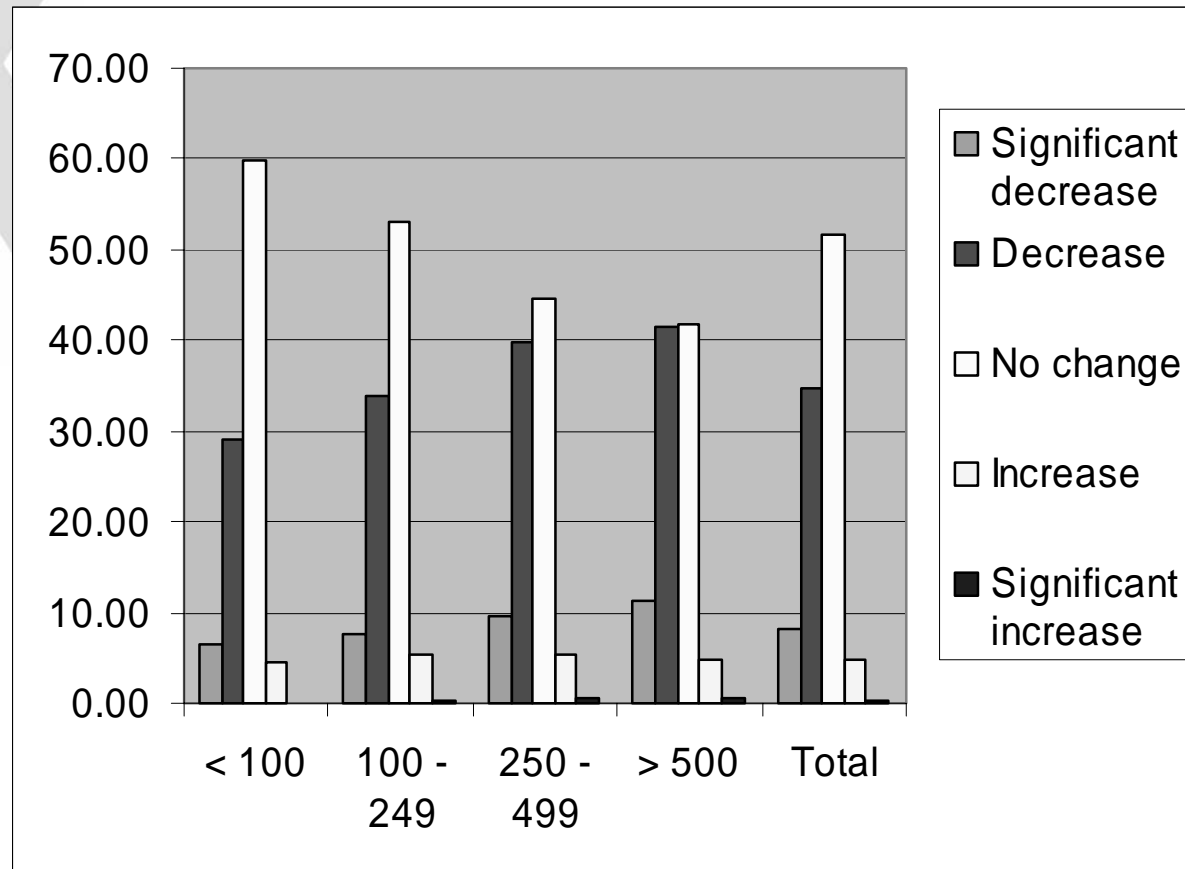
Solid Waste



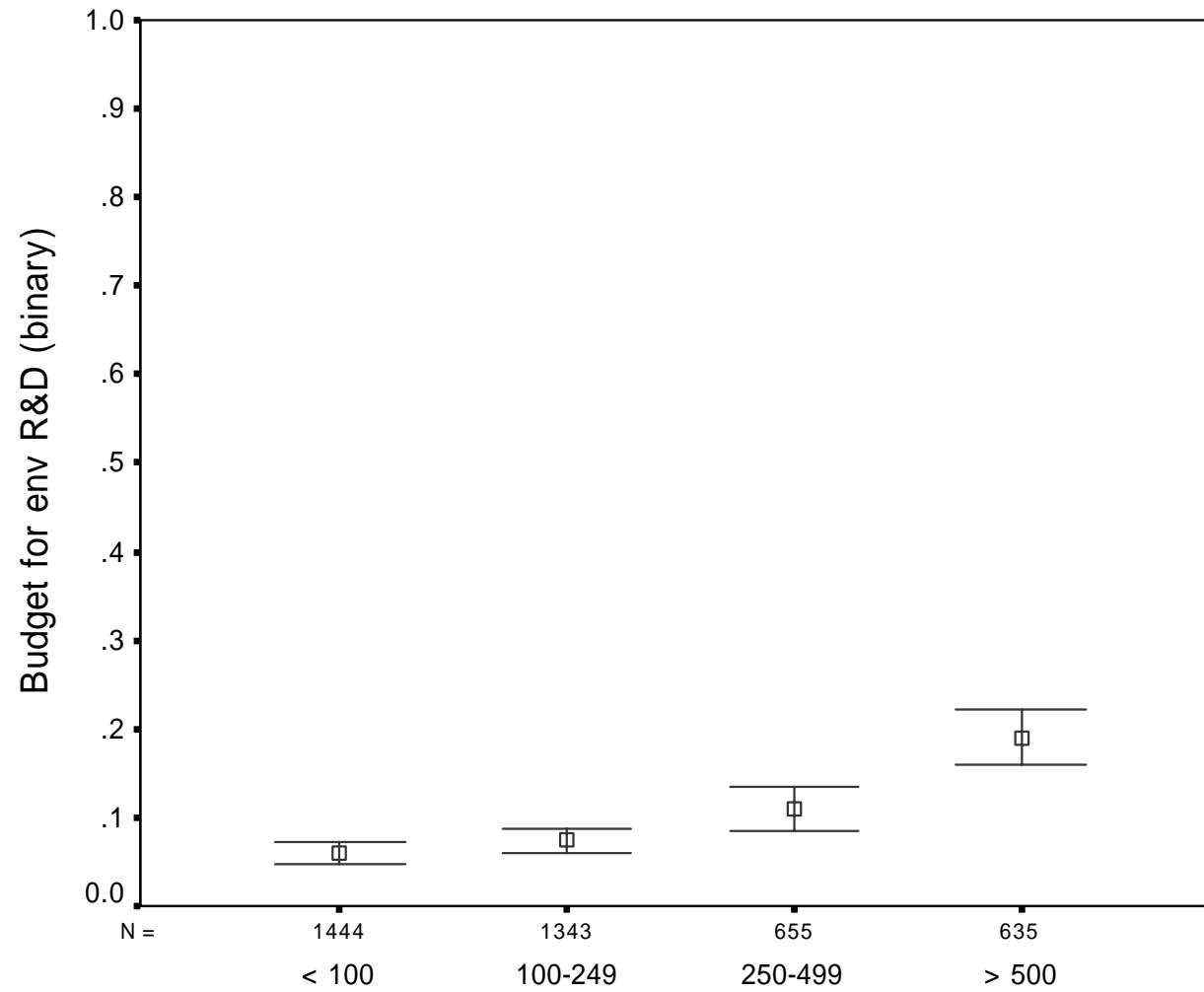
Air Pollution



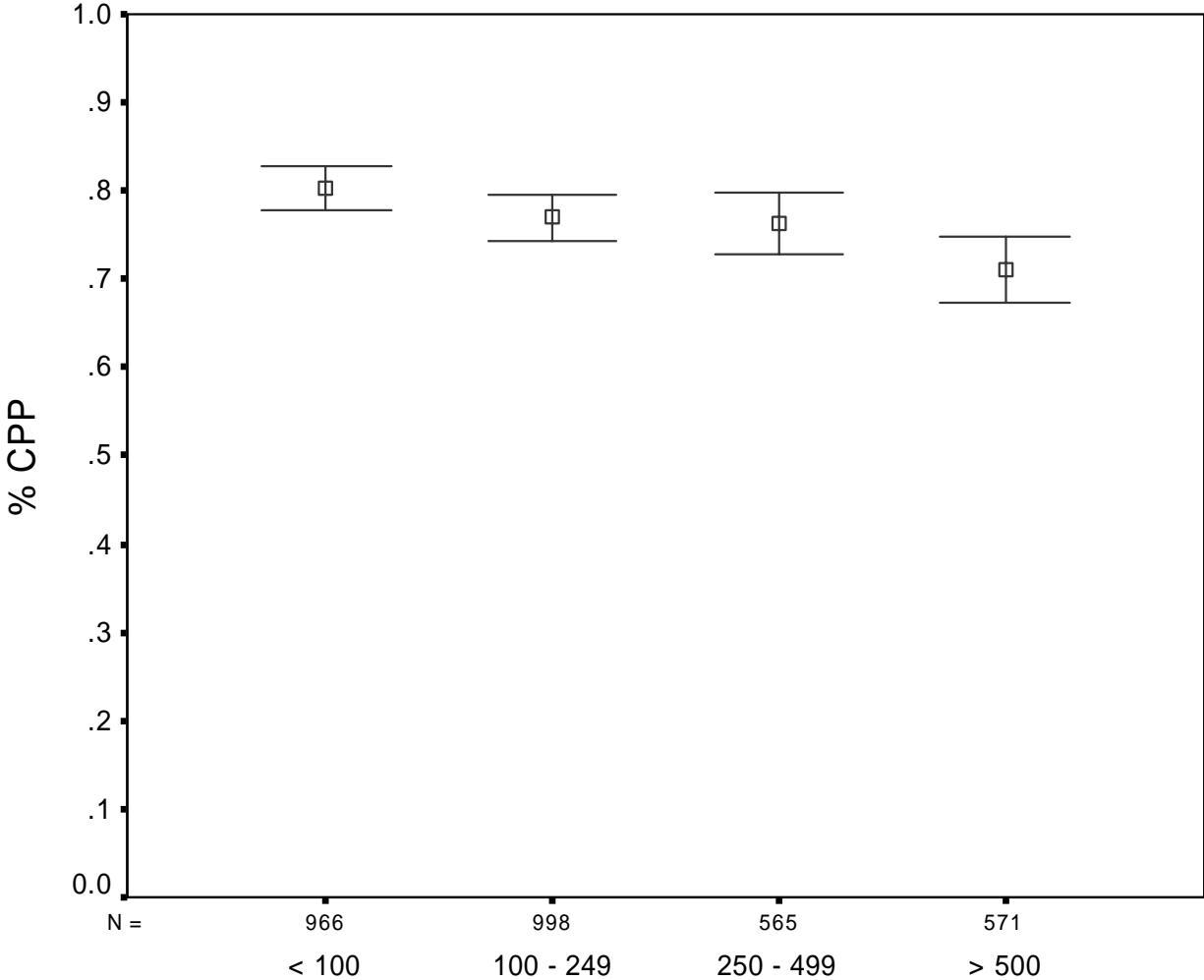
Wastewater Effluent



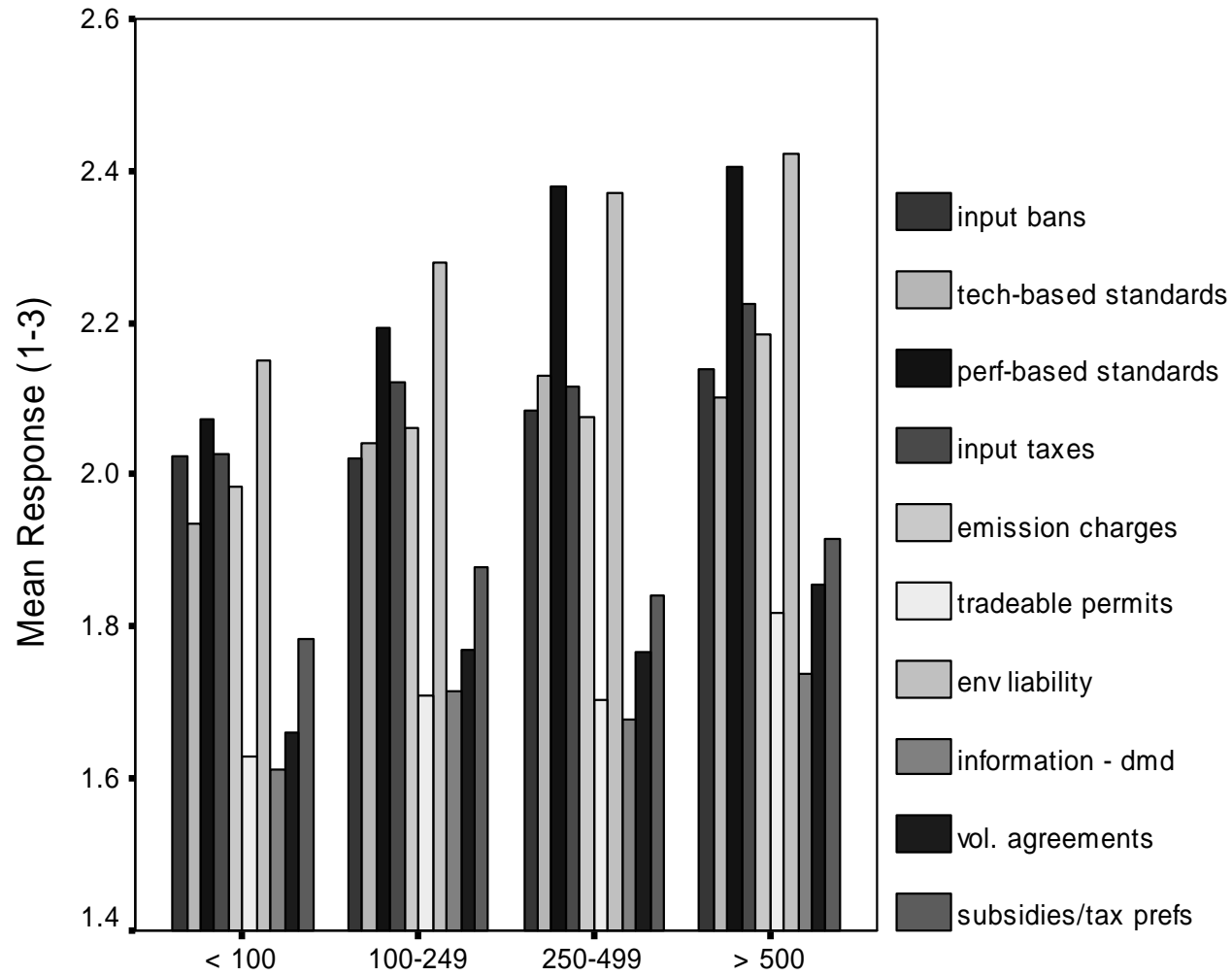
Environmental R&D



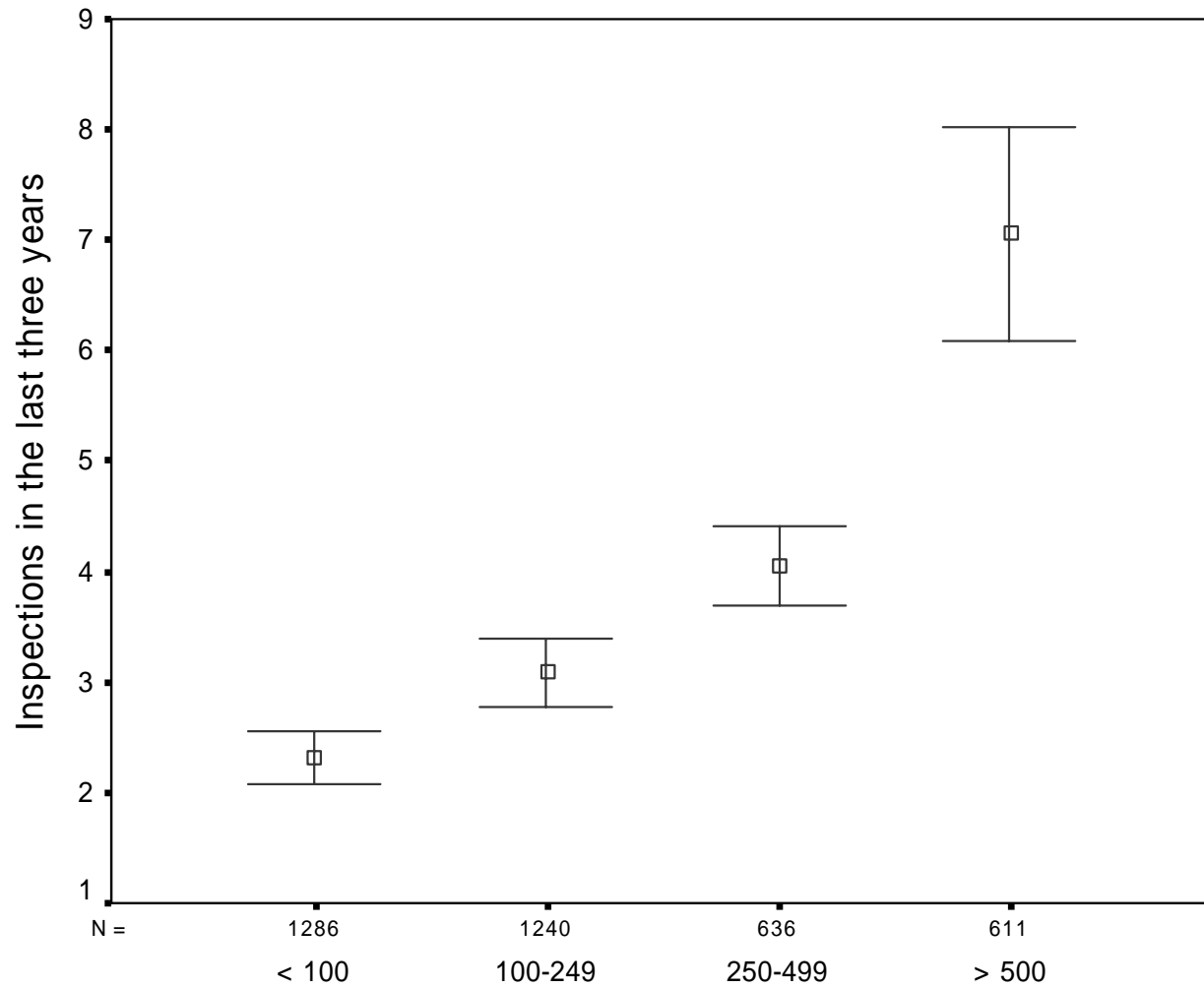
Cleaner Production



Influence of Policies



Inspection Frequency





Who gets Inspected?

Results of Univariate Probit

- Larger firms more likely, but only significant > 500 employees
- More stringent is perceived policy stringency (endogeneity issue)
- Firms in some sectors (fuel products, chemical products, rubber/plastics) and countries (USA, Germany) more likely
- Environmental management/responsibility not used for targeting of inspections
- Market scope, quoted on stock exchange, etc... not used for targeting of inspections

Determinants of Environmental Performance

- Dependent variables: self-reported change in performance and 'concrete' investments (bias and corroboration)
- Perceived policy stringency dominant influence and inspection frequency also very important
- Instrument choice less important – although clearest result is of positive influence of performance standards > technology standards (sometimes negative)
- Environmental management has a positive influence (particularly certified and duration), but less so when 'endogeneity' addressed in estimation
- Potential for perverse effects of environmental management systems not strongly confirmed

Determinants of Environmental Performance (SME vs. Large)

- Dependent variables: Air Pollution, Water Pollution, Solid Waste Generation
- Results are broadly similar between SME's and other firms
- However in more sophisticated models (bivariate), the role of EMSs and designated environmental responsibility emerges as more significant for SME's
- In addition, the role of the public policy framework (perceived stringency, inspection frequency, and instrument choice) makes a difference

Conclusions

- Database as a rich source of information on links between public policy and environmental management, innovation, and performance
- Preliminary results cast light on role of policy stringency and instrument choice as well as direct and indirect policy incentives
- In other areas, need for further analysis:
 - targeted work on SME's or particular sectors
 - role of inspections and enforcement
- Development of panel database would allow for more reliable estimation and testing of further hypotheses