

Third North American Symposium on Assessing the Environmental Effects of Trade

BUSINESS ENVIRONMENTAL DECISIONS IN THE CONTEXT OF THE FREE TRADE AGREEMENT

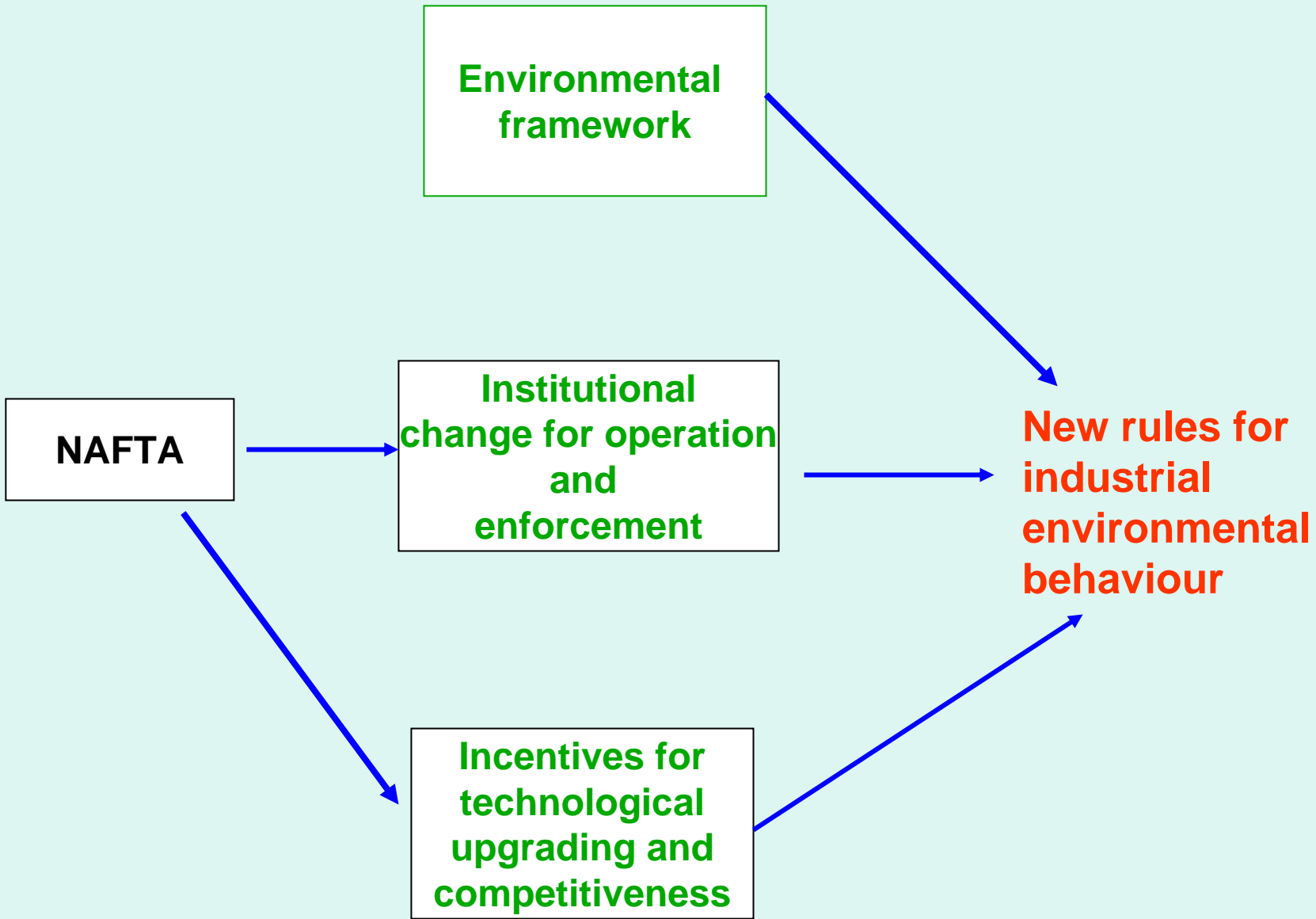
**Lilia Domínguez-Villalobos
Flor Brown-Grossman**

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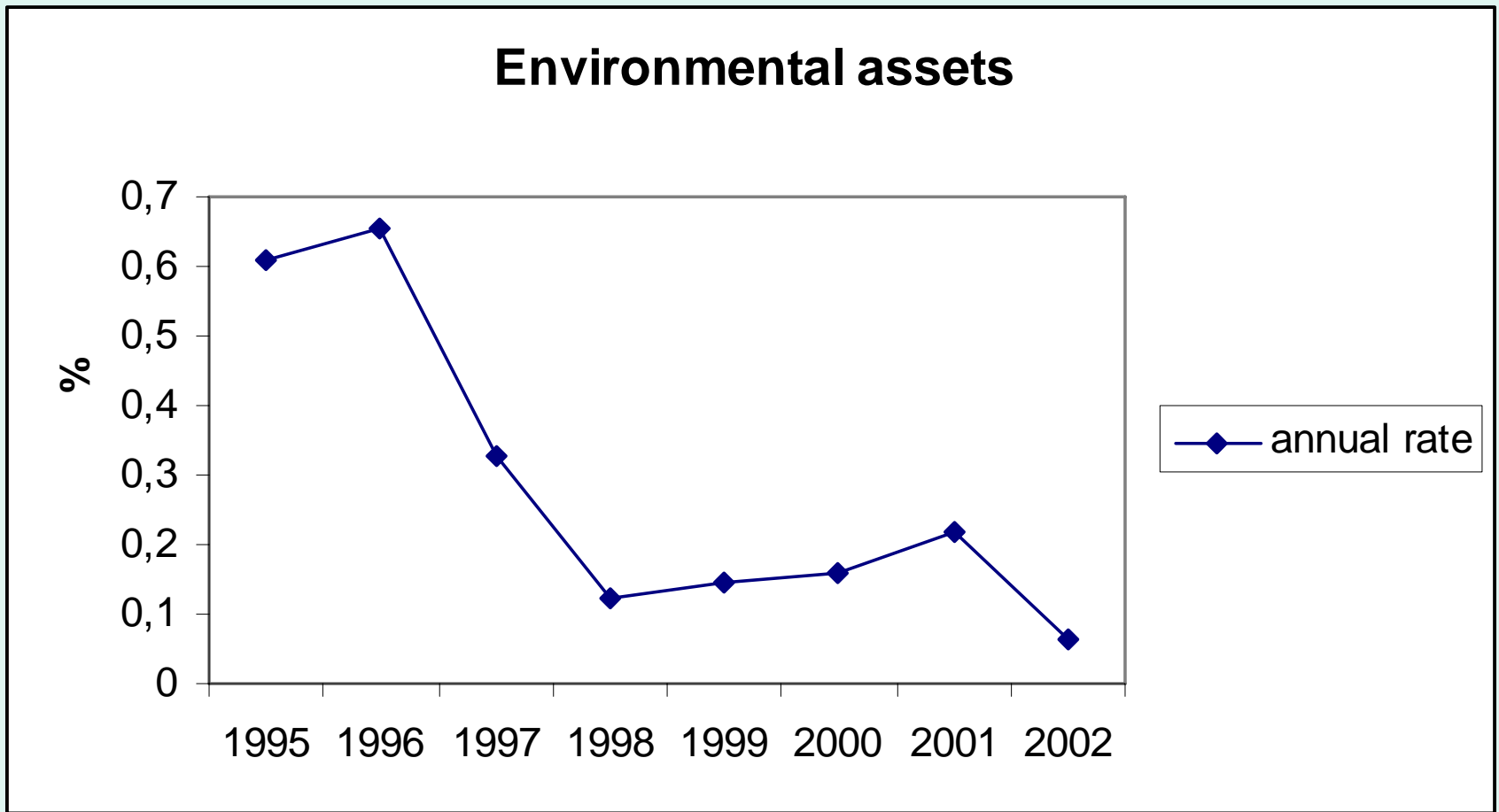
Objective

This work seeks to analyze

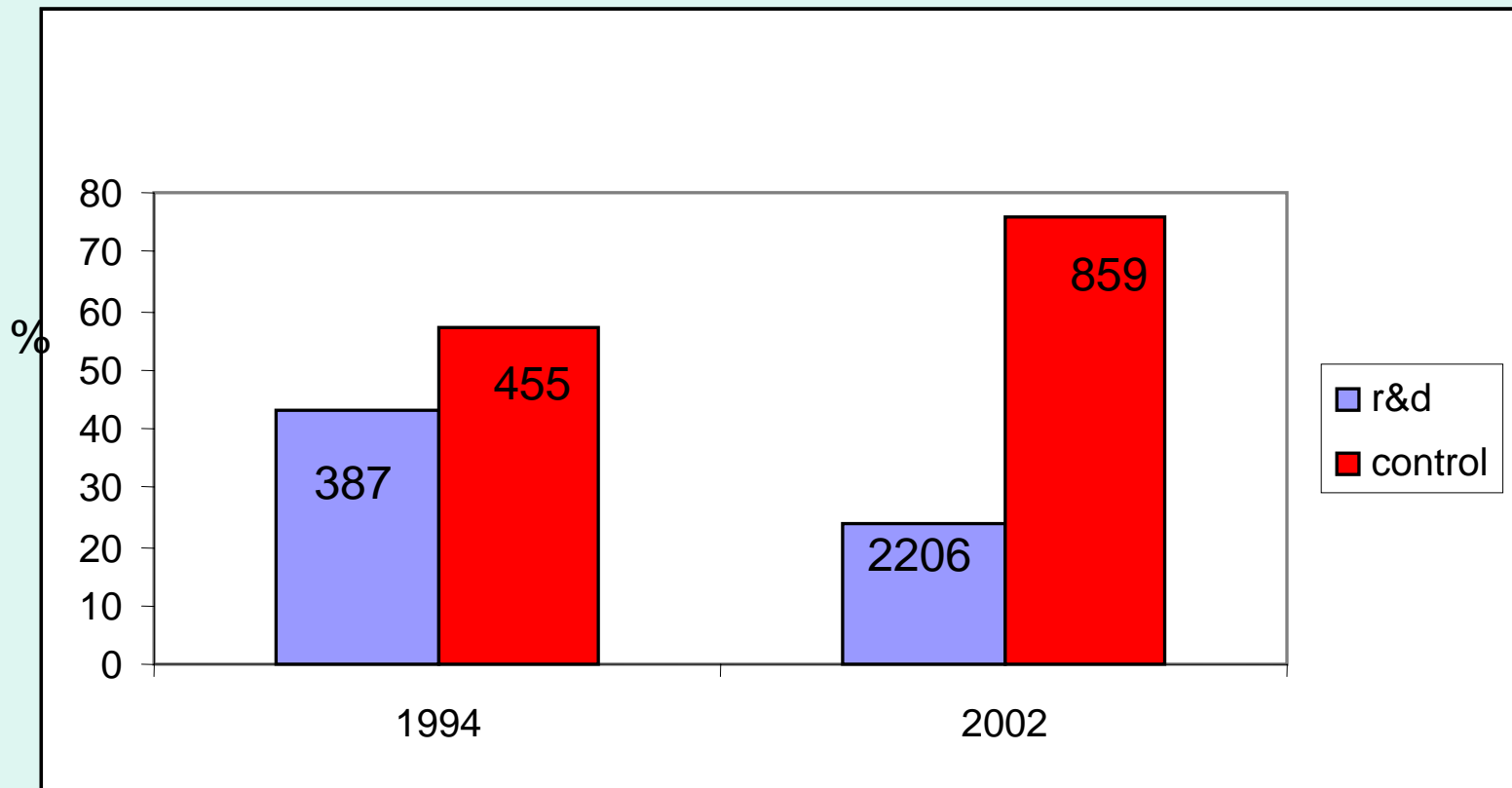
- The dynamics of environmental spending (1994-2002)
- Factors that have negatively or positively affected their environmental behavior.
- The information source for this report is the Annual Industry Survey covering 6000 establishments (around 70% of industrial GDP) from and 205 industrial classes.



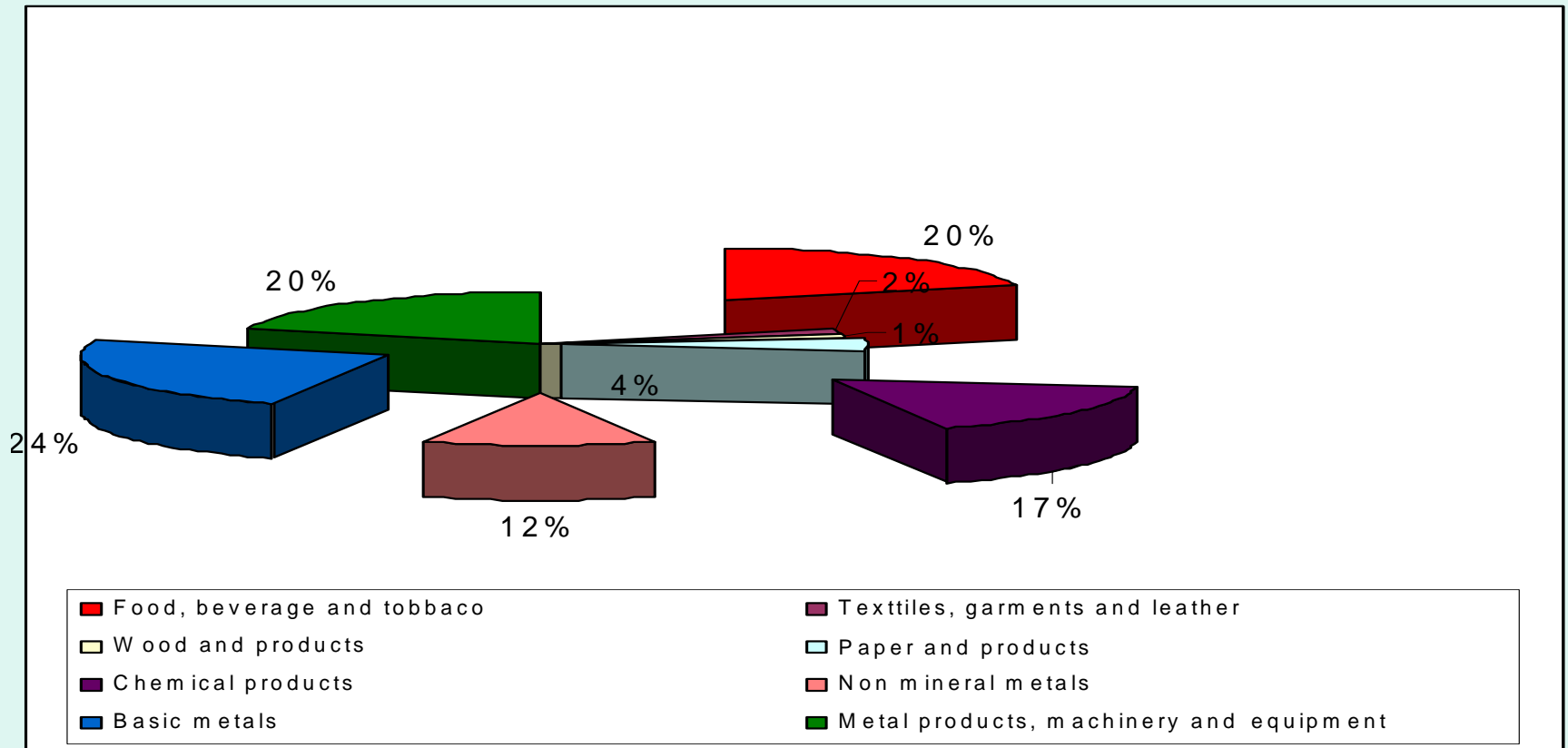
The dynamics of EA



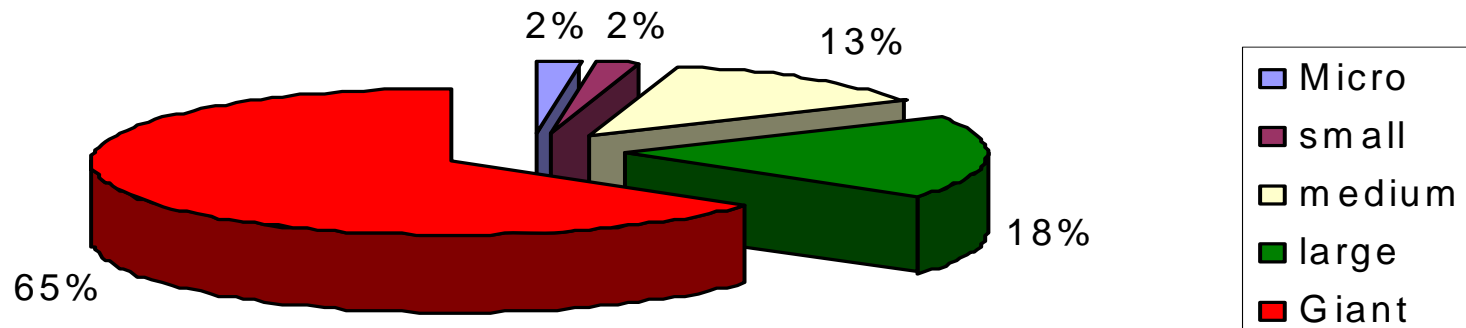
Changes in composition of EA:1994-2002



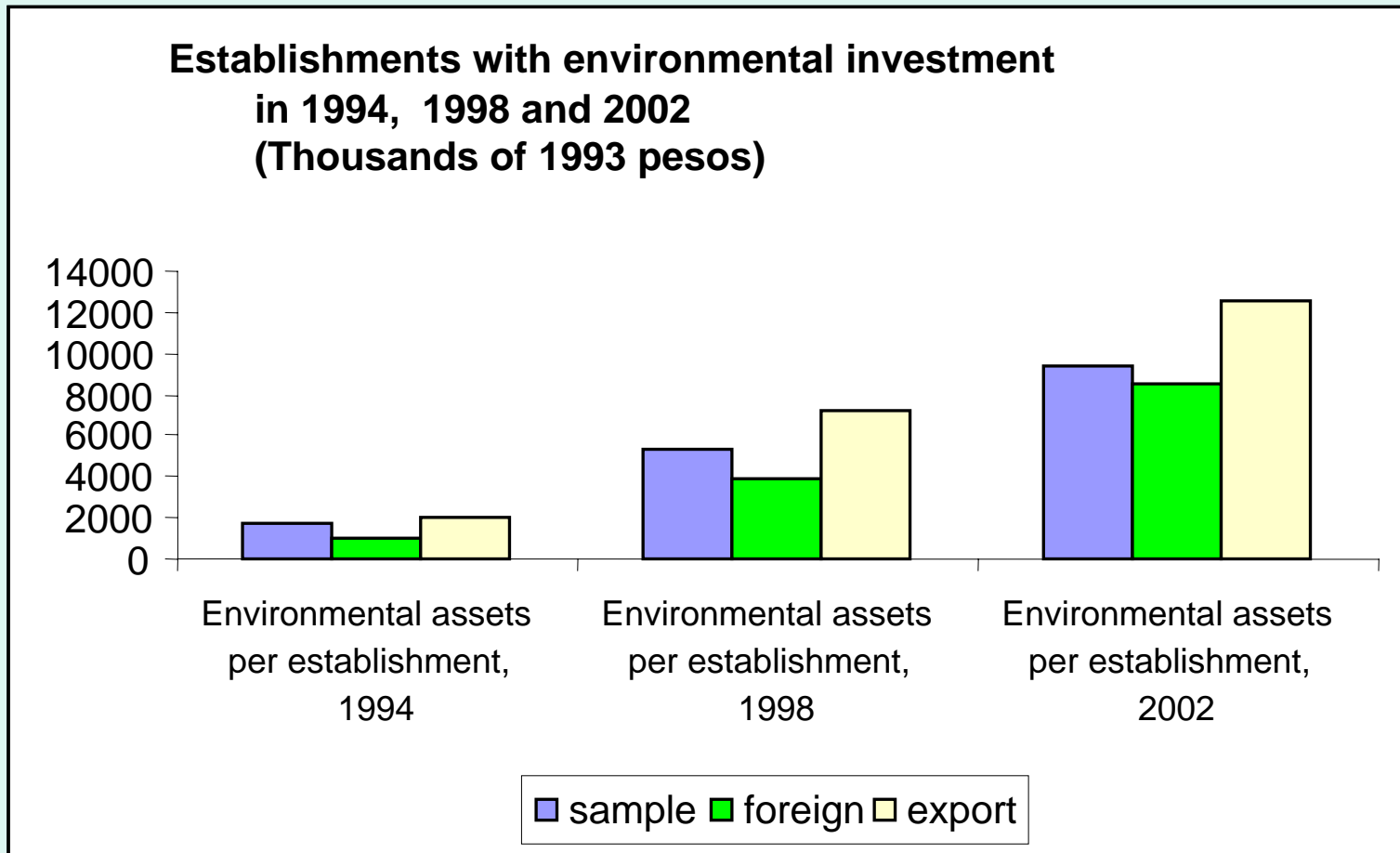
Distribution of EA by sector



Distribution by size



Selected group of proactive firms



The econometric model

Estimates of the environmental assets were made with a dynamic panel model using the GMM in one step.

A non balanced panel of 2 169 industrial establishments was used for the 1994-2002 period.

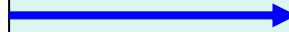
The dynamic panel techniques allow us to introduce lags in the endogenous variable as instruments and assume the strict exogeneity of the explanatory variables

Dependent variable: is value of capital invested or capital assets for environmental purposes

INDEPENDENT VARIABLES

Energy intensity

As an approximation of pollution levels, supposing that greater pollution requires greater compliance oversight.



We would expect this variable to be positively associated with the value of environmental investment.

Exports

Pressure by stringent international customers

Exporting enterprises may be compelled to comply with environmental rules and make the necessary investments.



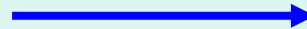
The expectation is to find a positive association between a firm's exports and its environmental investment

INDEPENDENT VARIABLES

Foreign ownership

Pressure from stockholders

Pressure may actually be higher in the case of multinational companies: a subsidiary's accident may further imply a fall in stock prices



We would therefore expect foreign enterprises to be more likely to make an environmental investment

Size

Positive scaling effect of environmental investment
Visibility
Availability of funds

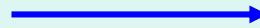


We would expect this variable to be positively associated with the value of environmental investment

INDEPENDENT VARIABLES

Sales Growth

A good performance may attract
external funds
encourage investment



We would expect this variable
to be associated with
environmental investments

Technological capabilities

Linear combination of four variables:
R&D spending,
Spending on patents, trademarks
and technical assistance,
investment in machinery,
wage and salary
payments



We would expect the presence of greater
technological capabilities to be associated with
increased environmental investments

The model specification

$$\text{Total environmental asset}_{it} = \alpha + \beta_2 \text{technological capabilities}_{it} + \beta_3 \text{energy int.}_{it} + \beta_4 \text{sales}_{it} + \beta_5 \text{size}_{it} + \beta_6 \text{exports}_{it} + \beta_7 \text{foreign assets}_{it} + u_{it}$$

where the *i* and *t* sub-indices indicate the firm and time, respectively

- Given the heterogeneity of expenditure among industrial divisions and changes through time, we decided to modify the specification to control for the differences among **divisions** and **time**. The advantage is to reduce the effects of omitted variables having some impacts in time or individuals

Results of econometric model in panel form

Dependent variable: Environmental assets logarithm

Variable	Coefficient	“t”	Probability	Elasticity
LEnvironmental assets (-1)	0.07	10.2	0.00	0.07
Technological capability (dummy)	0.22	12.1	0.00	0.05
Size (dummy)	0.42	11.1	0.0000	1.25
L Exports	0.05	14.1	0.00	0.05
Foreign ownership (dummy)	0.23	2.03	0.042	0.05
L sales	0.16	5.35	0.00	0.16
Constant	-2.3	-9.5	0.00	
Division 1	0.61	7.06	0.00	
Division 2	0.10	2.20	0.028	
Division 3	0.24	3.50	0.00	
Division 4	0.65	10.4	0.00	
Division 5	0.57	9.14	0.00	
Division 6	0.90	12.1	0.00	
Division 7	1.15	6.29	0.00	
Division 8	0.30	7.60	0.00	
Division 9	0.01	0.25	0.80	
T1995	0.66	74.2	0.00	
T1996	1.25	92.8	0.00	
T1997	1.61	106	0.00	
T1998	2.04	118	0.00	
T1999	2.38	107	0.00	
T2000	2.63	111	0.00	
T2001	3.20	121	0.00	
T2002	3.36	138	0.00	

R² 0.33

Wald (joint): [0.000] ; Wald (dummy): [0.000] ; Wald (time): [0.000]

AR(2) test: [0.054]

Environmental investment decisions depend on

- Size
- Pressure from foreign shareholders
- Businesses' technological capabilities
- Business sales performance
- The need to comply with the standards required by customers in the international market
- Lagged environmental spending

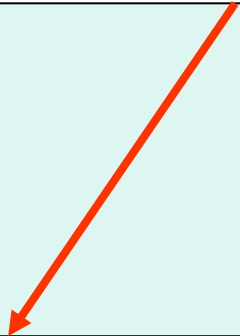
Econometric model limitations

- The possible influence of communities on business environmental decisions.
 - We were unable to obtain information on the regional location of establishments, which would have enabled us to relate such effect with education levels and demographic concentrations

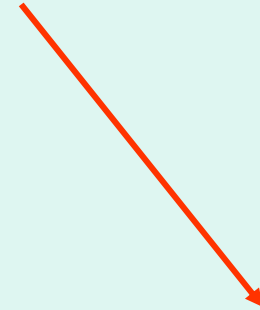
Econometric model limitations

- Variables are approximations
 - For example, in the case of regulation, it would have been much better to have information on environmental inspections.
- It would have been desirable to have a longer period
 - To measure the effect of NAFTA,, particularly before the agreement's entry into force. The EIA did not provide information on investment in environmental assets before 1994

The predictions that NAFTA would be associated with lax environmental behavior have not come true



The agreement's entry into force was associated with greater exports and a greater influx of foreign enterprises, it provided an incentive to increase environmental investment



NAFTA's entry into force and the accompanying rise in competition encouraged companies to improve their technological capabilities, such improvement also resulted in greater environmental investment

What is happening with the environmental behavior of Mexican companies?

- **Businesses make environmental investments as they become large enterprises and exporters**
 - A large part of manufacturing industry pollution (caused by larger companies) is being abated by their investments
- **Overly optimistic predictions of a NAFTA effect of a massive modernization process did not occur, and small business' existing weaknesses not only did not decline but even grew**
 - Most pollution widely caused by small and medium-size enterprises persists and is uncontrolled.

- Regulatory pressure is weak for micro and small business polluters
- the availability of small business loans has been limited
- Very limited use of economic instruments such as tax exemptions

Possible solutions

- Self regulation
- Expand credit programs
- Promote ecoefficiency programs among small firms
- Competitiveness and sustainability should be clearly integrated in public programs
- Incentives for environmental innovation