Table **Summary of Outcomes**		
Hypothesis	Supported?	Comments/Exceptions
Favorable to EI		
1. *Static efficiency*. EI instruments are more efficient than CAC instruments. *EI instruments are more cost-effective* in obtaining a given emissions reduction.	Yes	Overall, economic incentives are more cost-effective than command-and-control approaches to pollution control.
2. *Information requirements*. Generally, EI instruments require less information than CAC instruments to achieve emission reductions cost-effectively.	No	All policies turned out to require much information.
3. *Incentives for innovation and technology adoption.* The real advantages of EI instruments over CAC are only realized over time, because unlike CAC policies they provide a continual incentive to reduce emissions, thus promoting new technology, and they permit a maximum of flexibility in the means of achieving emission reductions.	Yes	This often shows up not in patentable innovations, but in site-specific changes to equipment and operating practices.
6. *Administrative burden*. CAC policies have higher administrative costs. During the pre-implementation phase, greater information is required to prepare emission standards.	No	Overall, the evidence on this hypothesis is quite mixed. Although there is some evidence that administrative burdens associated with CAC rules are higher than for EI-based rules, there are also a number of counter examples.
11. *Adaptability.* Compared to CAC instruments, EI instruments can be changed more quickly and easily in response to changing environmental or economic conditions.	Yes	But many primarily CAC policies show adaptability by adopting EI instruments.
12. *Cost revelation.* With EI instruments, it is easier to observe the cost of environmental regulation.	Yes	

Favorable to CAC		
4. Effectiveness. CAC policies achieve their objectives quicker and with greater certainty than EI policies.	No	Considerable support for the view that EI policies achieve emission reductions more rapidly and with greater certainty than CAC.
5. *Regulatory burden*. Regulated sources will tend to prefer CAC instruments to EI instruments, because of the strong possibility that they have to pay more under EI even though the social costs may be less.	Yes	The only major EI instruments that have been adopted have overcome this problem by designing instruments to be revenue-neutral (i.e. grandfathered tradable permit systems or recycling of effluent tax revenues)
7. *Hot spots and spikes.* The performance of all pollution-abatement instruments is seriously compromised for pollutants with highly differentiated spatial or temporal effects, but more so for EI than for CAC instruments.	Yes	
8. *Monitoring requirements.* The monitoring requirements of EI policies are more demanding than those of CAC policies because they require credible and quantitative emission estimates.	No	Monitoring requirements of both instruments have been exacting.
9. *Tax interaction effects.* Adverse tax interaction effects are likely to be larger with EI instruments than CAC instruments achieving the same emission reductions.	Yes	But revenue from EI policy can be used to reduce distortionary taxes and offset at least part of the price impact of the regulation.
10. Effects on altruism. Economic incentives encourage the notion that the environment is "just another commodity" and reduce the willingness of firms and citizens to provide environmental public goods voluntarily.	No	

Source: adapted from Harrington, Morgenstern and Sterner (2004), *Choosing Environmental Policy: Comparing Instruments and Outcomes in the U.S. and Europe*, Resources for the Future Press, Washington, D.C.

Table
Comparison of Policy Instruments in the Case Studies

Case	EI elements	CAC elements
US Acid Rain: 1990 Clean Air Act, Title 4	Marketable permits distributed to existing power plants (1990)	BACT for new power plants (1977) RACT for existing plants (1977) New Source Review (1977)
EU Acid Rain German Large Boiler SO2 Ordinance		Stringent technology based standards for utility boilers
US NOx Emissions 1990 Clean Air Act, Title 4	NOx SIP call institutes trading program (2000)	Technology-based standards for existing utility boilers (1990 Clean Air Act Title 4)
EU NOx emissions FR and SE NOx emission fee	NOx emission fees, automatically recycled to industry based on output FR: $40/tonne SE: $3,000/tonne	FR and SE: emission permits required for all sources
US Lead in motorfuel:	Supply side: Trading and banking of permits through inter-refinery averaging (1982-1987)	Supply side: Introduction of catalysts in new vehicles (1975) Refiners required to make unleaded fuel available (1974) Lead-content standards for all refiners (79-82) Demand side: Prohibition of leaded fuel in cat-equipped vehicles, enforced by inlet restrictors
EU Lead in motorfuel	Demand side: Differential fuel taxation, making leaded fuel more expensive than unleaded. (1985 SE, AT, all EU countries by 1990)	Supply side: Introduction of catalysts in new vehicles (1986) Mandated availability of unleaded fuel (1984 DE,SE, 1989 EU) Prohibition of leaded fuel in cat-equipped vehicles, enforced by inlet restrictors (1985-90)
US Industrial water pollution Effluent Guidelines	Direct dischargers (1972): State tradable permit programs in water-quality-limited river basins (e.g. Fox River, Wisconsin; Neuse River, North Carolina) Indirect dischargers (1972) Tradable rights to POTW capacity (New Jersey) Sewer surcharge fees on BOD, TSS, various measurements of nitrogen – applied by most POTWs	Direct dischargers: NPDES permits based on Technology-based Effluent guidelines (in effluent-limited streams) More stringent standards in water quality limited streams Indirect dischargers. Federal pretreatment standards for some industries and pollutants Local limits for other industries

EU Industrial water pollution NL Surface Water Pollution Act	Pollutant discharge fees primarily for oxygen-demanding substances	Discharge permits issued by district water boards
US TCE NESHAPS, Clean Air Act	Within-facility emissions bubble Early adoption incentives	MACT standards for hazardous pollutants
EU TCE DE: Emission standards NO and DK: Emission tax SE: Product ban	Production tax (NO, DK)	Technology-based standards (DE) Production (SE)
US Ozone-depleting substances (ODS)	Response to Montreal Protocol (1987): Tradable permits for production and consumption of ODS Excise tax on ODS	Pre-Montreal Protocol Prohibitions in specific applications (e.g. aerosols and foams) (1979-1987) Labeling requirements in individual states (1975) Response to Montreal Protocol (1987): Prohibition of small-quantity sales SNAP rules (governing replacement of ODSs)
EU Ozone-depleting substances	Response to Montreal Protocol (1987): Tradable production or import permits By firms within EU member states Between member states Individual country actions: AT: deposit-refund system for refrigerants DK: tax on ODS SE: fee on successful applications for exemptions	Pre-Montreal Protocol Aerosol bans in NO and SE (1979) Response to Montreal protocol Comprehensive controls in AT, DK, FI, DE, IT, NL, SE No comprehensive legislation in FR, GR, IR, PO, SP, UK

Source: adapted from Harrington, Morgenstern and Sterner (2004), *Choosing Environmental Policy: Comparing Instruments and Outcomes in the U.S. and Europe*, Resources for the Future Press, Washington, D.C.