Lecture 5 (AO, 29 October 2009)

Environmental Policy in the Central European Context
Time: 3 p.m. – 6 p.m.

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Review - Interventionalist solutions to the Externality problem –
Pigouvian taxes and standards and charges
Schotter, Microeconomics, A Modern Approach (2nd edition), Chapter 17, Sections 17.3 & 17.4
Plott, Externalities and Corrective Policies in Experimental Markets

Experimental Evidence on Corrective Policies in Experimental Markets

Plott, Externalities and Corrective Policies in Experimental Markets, also Schotter, Section **17.4**

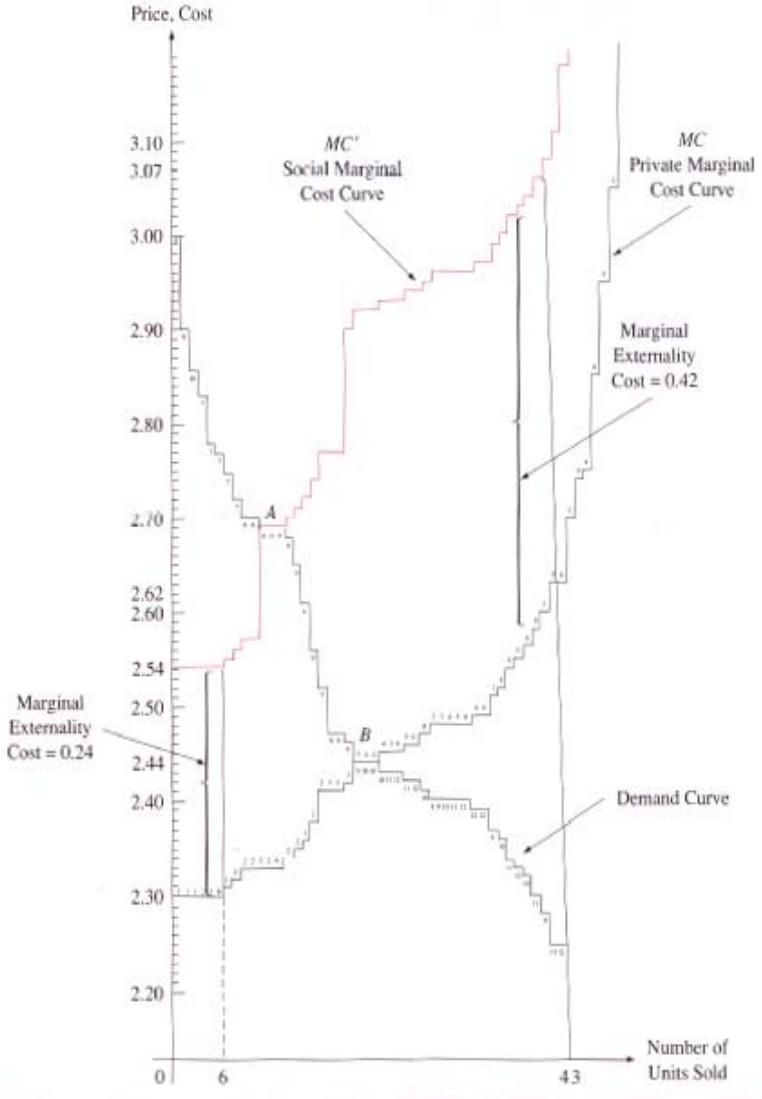
A series of experiments to evaluate how the interventionist solutions work

- market participants buy and sell units of a fictitious good using a double oral auction (*In such a **double oral auction** any potential buyer (seller) can make a verbal bid (offer) to buy (sell) a unit of the good at a specified price. Any seller (buyer) can accept a bid (offer). If a bid (offer) is accepted a binding contract is closed for a single unit at the specified price. Any ties are resolved randomly.*
- each buyer is paid a redemption value for every purchased unit according to a predetermined redemption schedule ⇔ induced demand curve
- each seller must pay a premium for each unit he sells according to a predetermined cost schedule ⇔ private marginal cost curve
- every completed transaction imposes an additional cost in all subsequent transactions ; the cost increases with the number of units sold ⇔ externality => social marginal cost curve

⇨ Figure 17.6 Schotter (Figure 3 in Plott)

FIGURE 17.6 **Plott's laboratory model of a market with an externality.**

Economic theory predicts that the market, if left alone, will ignore the externality and will reach its equilibrium at point *B*, where the private marginal cost curve *MC* and the demand curve intersect. Point *A*, where the social marginal cost curve *MC'* and the demand curve intersect, is the optimal solution for society.



- Note that after 6 units sold, the marginal externality cost is $.24, after 43 transactions (if they ever happened), it would be $.42
- Pareto optimal solution -- **point A** (13 units at price $2.69)
- without intervention -> theory predicts the competitive outcome “as with no externality” -> **point B** (24 units at price $2.44)

- Charles Plott (p. 106):

    - ⇨ “Do markets with externalities behave in accordance with the law of supply and demand?” [Economists say, yes; policy makers say, no: “Why should the price and volume of a market be independent of the existence of externalities? … People are aware, sensitive, and concerned about others so why should they behave in such atomistic fashion? Intuitions, customs, ethics, and a host of instincts might guide us individually and as groups to behaviour other than that suggested by the model.”
    - ⇨ “How do pollution tax, pollution standard and pollution licenses compare as methods for correcting the externality?”

- 4 treatments (one baseline; one for each of the corrective policies)
- 2 sessions (markets) for each treatment, 6 buyers and 6 sellers in each market
- individual demands and costs are assumed to be unknown, only the optimum level of pollution and marginal social cost at the (social) optimum are known for the license and the tax policy

Social cost supply

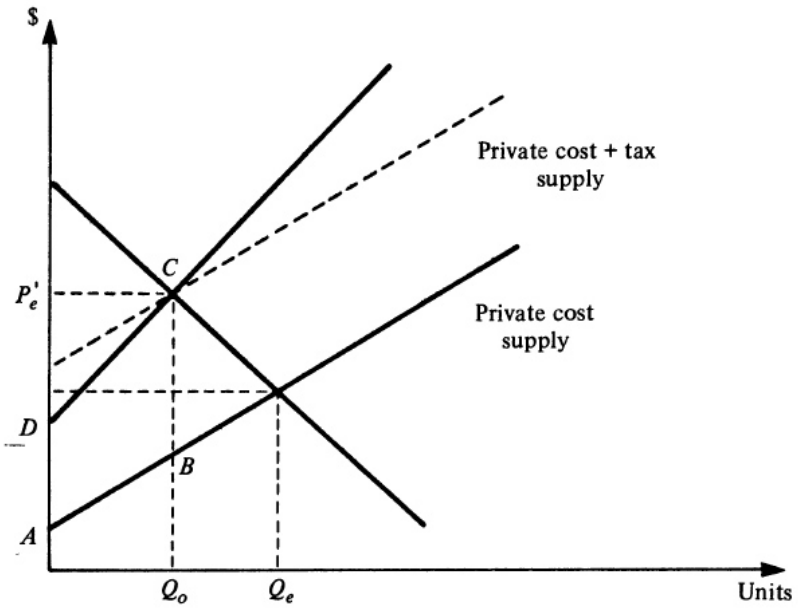


Fig. 2

1. **Market with externality** (no policy, 5 periods in each)
    - Baseline or benchmark, to see the market solution
2. **Pigouvian Tax policy** (6+7 periods)
    - the amount of marginal social cost is calculated at the optimum quantity Q_0, and is imposed as a per unit tax. Tax revenues are then redistributed back.
3. **Standards policy** (9+7 periods)
    - the ABCD area (welfare economics argument) is the amount of admissible pollution => STANDARD
4. **Permits policy** (10+12 periods)
    - only Q_0 permits exist and only licensed units can be produced
    - EQ: price of license = BC; market price of the good = P_e'; quantity = Q_0; licenses should be held by the low cost sellers

Permits policy (here are the graphs from Plott's article)

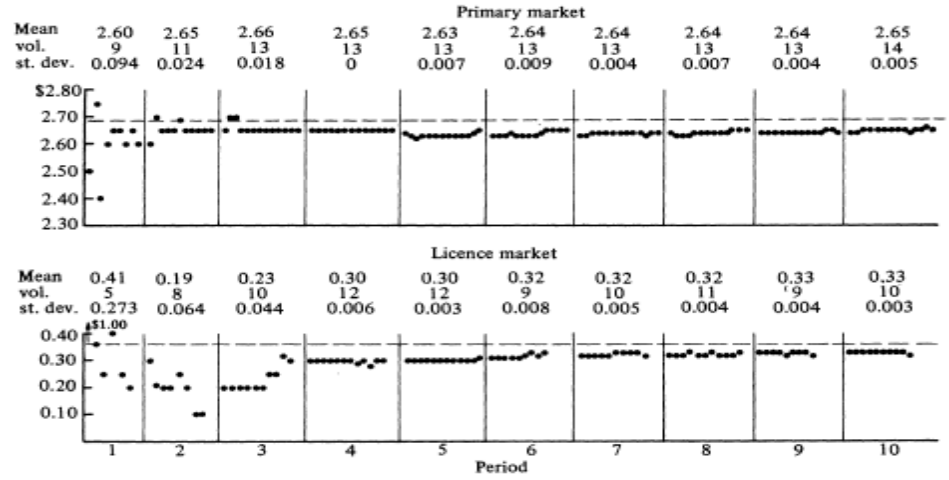


Fig. 10. Session 7, time series of contract prices.

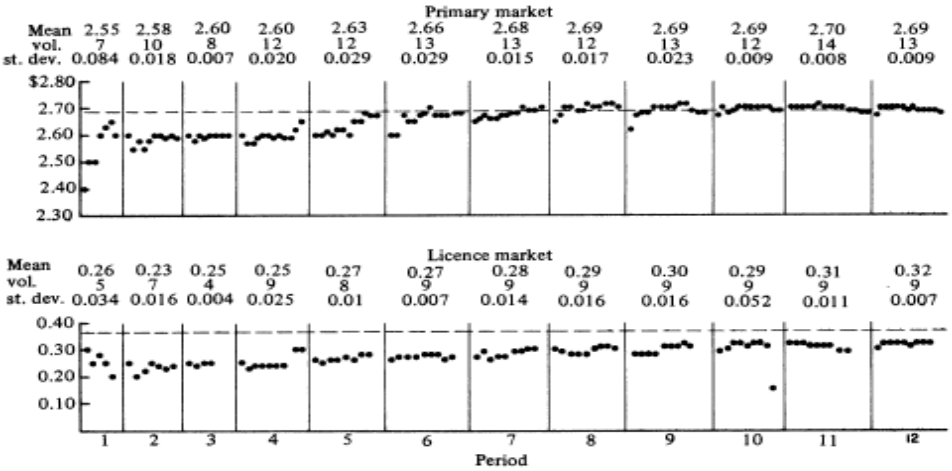


Fig. 11. Session 8, time series of contract prices.

- at the top of each Figure, see the mean price and the number of units sold in each period
- PERMITS effective in pushing the volume down to the Pareto optimal level of 13, and price up to eq. level of 2.69
- ALSO the price per permit converged to the equilibrium level of $.36 ($2.69=$2.33+$.36)
- Session 8 convergence more obvious, session 7 series more stable, close to eq. levels
- more efficient than TAXES in terms of the surplus captured by subjects

CONCLUSION:

- the LEAST efficient is the unregulated market
- the MOST efficient is the license policy (which is only slightly better than Pigouvian taxes
- [efficiency here measured in fraction of joint surplus implemented]
- the standards policy is in the middle and all over the place
- [how can that be? "The standards approach is the one found most frequently in application. The current air pollution standards are a good case in point." (Plott 1982, p. 107)]
- Say Porter et al (2009, p. 190) "Among economists at least, the use of tradable emission allowances under an aggregate emission cap is generally considered a mature policy technology. It has become the default policy option in controlling a variety of large scale air emissions and is being increasingly considered for replacing inefficient source-specific regulation of water pollutants (Tietenberg, 2002). The same policy technology is also being used in fisheries regulation and elsewhere (National Academy of Sciences, 1999). In a competitive emissions market with low transaction costs, the initial allocation of rights will not affect the final use of the allowances. However, how the rights are allocated can have significant economic consequences through their effect on the entry and exit decisions and marginal tax rates (Goulder et all 1999)."

So, there …

What are current problems? That's what some of the readings for today are about …

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The design, testing and implementation of Virginia's NOx allowance auction☆

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ABSTRACT

We report on the design and testing of three auction mechanisms to maximize revenue and efficiency in the sale of two vintages of nitrous oxide emission allowances by the Commonwealth of Virginia in 2004. The three mechanisms considered were a combinatorial sealed bid (CSB) auction, a sequential English clock (SEC) auction, and a combinatorial English clock (CEC) auction. We find the SEC and CEC mechanisms to be superior the CSB when demand is relatively elastic.

"Among economists at least, the use of tradable emission allowances under an aggregate emission gap is generally considered a mature policy technology. It has become the default policy in controlling a variety of large scale air emissions and is being increasingly considered for replacing inefficient source-specific regulation of water pollution (Tietenberg, 2002). The same policy technology is also being used in fisheries regulation elsewhere (National Academy of Sciences, 1999)."

Competitive emissions market with low transaction costs =>

- Initial allocation of rights will not affect the final use of the allowances
- Initial allocation of rights can have significant economic consequences through effect to entry and exit decisions

Aside [from wikipedia, retrieved 2009_03_12]

Health effects

NO_x react with ammonia, moisture, and other compounds to form nitric acid vapor and related particles. Small particles can penetrate deeply into sensitive lung tissue and damage it, causing premature death in extreme cases. Inhalation of such particles may cause or worsen respiratory diseases such as emphysema, bronchitis it may also aggravate existing heart disease.[4]

NO_x react with volatile organic compounds in the presence of heat and sunlight to form Ozone. Ozone can cause adverse effects such as damage to lung tissue and reduction in lung function mostly in susceptible populations (children, elderly, asthmatics). Ozone can be transported by

wind currents and cause health impacts far from the original sources. Millions of Americans live in areas that do not meet the health standards for ozone.

NO_x also readily react with common organic chemicals, and even ozone, to form a wide variety of toxic products: nitroarenes, nitrosamines and also the nitrate radical some of which may cause biological mutations.

[edit] Regulation and emission control technologies

The Kyoto Protocol, ratified by 54 nations in 1997, classifies N_2O as a greenhouse gas, and calls for substantial worldwide reductions in its emission.[5]

As discussed above, atmospheric NO_x eventually forms nitric acid, which contributes to acid rain.[6] NO_x emissions are regulated in the United States by the Environmental Protection Agency, and in the UK by the Department for Environment, Food and Rural Affairs.

Technologies such as flameless oxidation (FLOX) and staged combustion significantly reduce thermal NO_x in industrial processes. Bowin low NO_x technology is a hybrid of staged-premixed-radiant combustion technology with a major surface combustion preceded by a minor radiant combustion. In the Bowin burner, air and fuel gas are premixed at a ratio greater than or equal to the stoichiometric combustion requirement.[7] Water Injection technology, wherby water is introduced into the combustion chamber, is also becoming an important means of NO_x reduction through increased efficiency in the overall combustion process. Alternatively, the water (e.g. 10 to 50%) is emulsified into the fuel oil prior to the injection and combustion. This emulsification can either be made in-line (unstabilized) just before the injection or as a drop-in fuel with chemical additives for long term emulsion stability (stabilized). Other technologies, such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) reduce post combustion NO_x.

The use of Exhaust gas recirculation and catalytic converters in motor vehicle engines have significantly reduced emissions.

Porter and colleagues (from here on: Porter+) study

- sale of 3710 allowances for emission of nitrogen oxides (NOx) in fiscal years 2004 (1,855) and 2005 (1,855) using a sequential English auction format (that's different from the auction format discussed so far); 1,855 allowances account for about 8 percent of the annual total allotment. Where do the other allowances go? … to firms in recognition of their historical "rights to emit" … the 8 percent were set aside for distribution among new sources of NOx emissions .. originally meant to be handed out for free … but then budget crisis struck …
- part of a cap-and-trade system of pollution allowances that involves Virginia and 18 other states in the eastern U.S.; allowances are freely tradable throughout the 19-state region … there is an active private market …
- one of the first cases where emission allowances were auctioned to maximize government revenue
    - auction mechanism designed, tested, implemented by Porter+
    - brought DEQ/Commonwealth of Virginia $10.5 million, 19 percent above target revenue of $8.8 million
    - tight time constraint (from first time Porter+ were contacted to required delivery time, about two months)
    - transparency of the pricing rule critical
        - option 1: discriminatory (or "pay-as-you-bid")
            - this poses ex post problem to participants since nearly all participants included in final allocation realize that they could have had the licence to pollute for less …
        - option 2: uniform pricing
            - this might pose a problem to the government because public is likely to find out what bidding prices were and how much the government left on the table (keeping information secret not an option due to Virginia's Freedom of Information Act)
        - auction mechanism rules had to be simple since complicated bidding and allocation rules might scare potential buyers off (hence combinatorial clock auction problematic from the outset); one important complicating factor was the asymmetric substitutability of the two kinds of allowance involved
            - Emitters cannot borrow against future issuances of allowances
            - Allowances are "bankable", i.e., allowances used in 2004 can be used in 2005 but …
            - … use of banked allowances subject to restrictions meant to control the rate of their use in a given year (e.g., if region-wide carried-over licenses exceed 10 percent of the total regional budget – the "banking threshold" – then only a fraction of the carried-over licenses may be used, the remainder gets devalued (can be used for cover half of the emission amount in the issue year). See example on p. 192.

- in early March, local exchanges were trading 2004 allowances for about $2,000 and 2,005 allowances for about $3,500

- Which auction mechanism / pricing rule to use, was the question:
"DEQ selected initially a combinatorial clock design, the complexity of the implementation proved prohibitive in the available timeframe, and ultimately a sequential clock was implemented instead." (p. 191) Why? (And why does it make the question of the pricing rule moot)?

  - Auction Design:
    - Coventional wisdom:
      i. The design of auctions matters (Klemperer JEP 2002, What Really Matters in Auction Design; Binmore & Klemperer EJ 2002, The Biggest Auction Ever: The Sale of the British 3G Telecom Licenses).
      ii. Substitute goods (such as the 2004 and 2005 allowances) ought to be offered simultaneously.
      iii. Auctions ought to be iterative so that the prices discovery process can work its magic.
    - Three auction mechnanisms (out of many, many) were investigated:
      i. Sealed bid (first-price auction) without iteration
      ii. Iterative English (second-price auction)
        1. simultaneously linked clocks
        2. sequential

Sneak preview of results:

Combinatorial pay-as-bid sealed bid auction would have captured 61 % of surplus

Assuming unitary elasticity:

Combinatorial or sequential clock option would generate about the same

Assuming higher degrees of elasticity:

Sequential and combinatorial clock option yield 71 % and 74 %, respectively

Interestingly, the allocative for all of them is 95 percent or better.

allocative efficiency (95 percent in all cases)

This result is interesting for the simple reason that the final recommendation of the report for the Regional Greenhouse Gas Initiative (RGGI) on auction design for selling CO_2 emissions allowances I 2009 suggest the implementation of uniform price sealed bid auction ! See www.rff.org or www.rggi.org for lots of great material including an excellent example of experimental economics at work (Addendum [to the November 2007 report]: Response to Selected Comments April 2008) More on this below.

Sealed Bid auction (combinatorial), “CSB”

- allocation to the highest bidder on a pay-as-bid basis
- standard PQ bids replaced by “Any/Or” (AO) bids (which were of form (p04,Q04 |p05,Q05), meaning up to so many allowances of a particular vintage at maximally the given price as an either one or the other condition, or some linear combination of the two, as long as both Q04 and Q05 are mentioned as positive; a simple example is given on p. 193)
- solvable per mixed integer program for optimal quantities and proportions
- attractive format because known to potential bidders (although presents participants with ex-post explanatory problem, as mentioned)

3.2.1. Clock auctions (combinatorial and sequential) – “English” clock auction, “ECA”

- bidding process that gives feedback to bidders (about other bidders’ valuations etc.)
- clock runs up prices, bidders just bid quantities (i.e., their right to make bids prices is taken away)
- note that this auction format determines the (uniform) pricing rule
    - believed to encourage greater revelation of bidders’ willingness to pay relative to pay-as-bid rule
    - solves the already mentioned ex-post predicament for bidders who realize that they could have had the license for less
    - also, since it stops revealing bidders’ demand at the market clearing price, it generates no information about true willingness to pay and therefore money left on the table.

Two way to do this:

- Sequential English (SEC) auctions
    - one vintage first, then the other second
    - no simultaneous price discovery process but simple
- Combinatorial English (CEC) auctions
    - simultaneous price discovery process but complex
    - both vintages at same time (two clocks running at same time)
    - as long as total quantity demanded for a vintage is greater than its supply, clock continues to increase
    - three modifications (of minor importance for us, …)

Experimental design

4.1 Demand configuration

- demand configuration apparently not well-known: is there a dominant auction mechanism (one that is the best across all environments – “elastic” and “ineleastic”, each with four “value environments”)
- if that not the case, then the DEQ has to make the “parallelism” call (i.e., it has to determine which of the investigated environments is closest to “real world”)

4.2. Experimental implementation

- 25 sessions with 11 – 12 volunteer subjects randomly selected from the George Mason University graduate and undergraduate population.
- usual procedure: subjects were randomly seated, given instructions [see fn 19 !!!], and all without reference to NOx, emissions, pollution or any other situation specific element
- Experiment was computerized
- Communication was forbidden “to prevent collusive behavior”
- Subjects received a “show-up fee” , remainder was based on decisions they made]
- Experiment took about two hours, average earnings were about $47.30

Table 2
Treatment design and summary of data collected.

Treatment	Sessions	Subjects	Observations
CSB (combinatorial sealed bid)	8	96	120
SEC (sequential English clock)	11	132	88
CEC (combinatorial English clock)	6	69	75
Total	25	297	283

- prior to each auction, subjects were assigned between 3 and 9 redemption values for one or both abstract goods … thereby being told at precise cash value they could redeem each unit purchased in each auction (each value was for exactly one allowance of one vintage)
- subjects had no information about others’ values (as probably true in the real-world)
- … imperfect substitutability …
- three treatments (corresponds to the three auction mechanisms tested), for all the same value environments

4.3. Treatment design

- each auction executed yielded one observation on the auction treatment being tested
- observations from first demand cycle (four auctions) excluded from data analysis because of likely effects of “learning of the first kind” (subjects understanding the laboratory setting rather than reacting to the given incentive)

Results

Aim was to estimate revenue and allocative efficiency under the three auction formats

- revenue measured as revenue in a given round normalized by the maximum possible surplus in that round
- efficiency measured as sum of values satisfied by the final allocation normalized by the sum of values that would be satisfied by the optimal allocation

Results come from random effects models which use revenue and efficiency data as dependent variables and as primary independent variables dummies indicating the auction mechanism used in a given observation (SEC, CEC, CSB is implicit) plus various controls … (not of importance for us right now)

5.1.2. Revenue results
5.1.2.1. The CSB outperformed both English clock designs in inelastic environments.
5.1.2.2. Elastic demand increased revenue in both English clock mechanisms, but not in the CSB.
5.1.2.3. Differences in CE prices between allowance vintages impact revenue generation in the CEC and SEC but not the CSB.
5.1.2.4. High minimum bids (reserve prices) increased revenues, but this was somewhat offset by unallocated units.
5.1.2.5 There was no learning from cycle to cycle.

5.1.3. Efficiency
5.1.3.1. Efficiency across mechanisms is comparable irrespective of the environment.
5.1.3.2. A high minimum bid rule slightly increases efficiency, but is quickly counteracted by unallocated units.
5.1.3.3. Learning occurred only in the SEC treatment.

Conclusions

- Experiments are being used (and that is probably for a good reason) to inform public policy decisions
- The Virginia NOx allowance auction had to be implemented on an extremely tight time line … three important effects:
    i. It forced state administrators to make very quick decisions
    ii. It forced selection of an easily implemented auction design that would be attractive to potential participants
    iii. Limited opportunities for involvement of outside parties in the process
- RFP for brokerage services to implement an auction was published May 17, for ten-day period; contract signed with the one firm that also recommended an English clock auction rather than all those (others) that proposed SB auction; see fn 26); it seems that the experimental results by Porter+ delivered in late April 2004 [which had not been published by May 17], swayed administrators.
- Auction held on June 24
    i. 2004 allowances sold in the morning at $2,325 (up from r-price of $1,900)
    ii. 2005 allowances sold in the afternoon at $ 3,425 (up from r-price of $2,900)

- The advantages of test-bedding a new application are:
    i. Exploration of parameter space when there are no empirical guidelines to identify the parameters (e.g., demand elasticity for allowances)
    ii. Comparing revenue and efficiency of auction formats makes for better informed decisions.
    iii. Increases confidence in process and outcome
    iv. Might facilitate the final choice of a contractor to run the auction
    v. All that at relatively low cost (less than 1 percent of the revenue, i.e., about $100,000)

Auction Design for Selling CO_2 Emissions Allowances Under the Regional Greenhouse Gas Initiative. **Holt et al. October, 2007 – orginal report – see www.rff.org -- was 130 pages long. Interestingly, it recommended a uniform-pricing sealed-bid auction for CO_2 Emissions Allowances Under the Regional Greenhouse Gas Initative . That ‘s interesting because in Australia the government has decided on using simultaneous clock auctions.**

Auction Design for Selling CO_2 Emissions Allowances Under the Regional Greenhouse Gas Initiative. **Holt et al. October, 2007**

Addendum: Response to Selected Comments

Charles Holt, William Shobe, Dallas Burtraw, Karen Palmer, Jacob Goeree, Erica Myers

April 8 2008

Summary: A final report summarizing research on auction design for RGGI was submitted to the New York State Energy Research and Development Authority (NYSERDA) in November 2007. Subsequently several constructive comments and suggestions have been made by interested parties. This addendum to the November 2007 report contains reactions to some of these comments, including some new findings based on research done subsequent to submission of the Final Report. The main issues addressed in this addendum are (1) the choice of auction design (clock versus sealed bid) and how this affects the efficiency of the auction and the ability of parties to collude, (2) variations on design for clock auctions, and (3) auctions that combine different vintages of allowances.

To summarize the main results:

- In laboratory auctions with communication among participants, successful collusion is more effective in clock auctions than in discriminatory and uniform price auctions.

- An analysis of the 'chat' (instant message communications between bidders prior to submitting bids) indicates that clock auctions facilitate collusion by allowing bidders to focus on a single dimension (quantity reductions).

- The effects of this collusion are reflected in clock prices at or near reserve price levels, with subsequent trading at much higher prices in the spot markets.

- Results of our new experiments, conducted subsequent to the Final Report, indicate that the provision of information about the quantity of demand after *each round* of a clock auction does not improve price discovery of these auctions.

- This type of demand reduction in clock auctions echoes the striking results reported by Goeree, Offerman, and Sloof (2006) in a much simpler environment with full information provided about quantities demanded during the auction.

- The New England and New York ISO proposal that allowance owners be able to offer allowances for sale in the RGGI auction has definite advantages. We have different suggestions about how this might be implemented. The uncertainty of supply that results can help reduce the potential of collusion.

- Since RGGI allowances are bankable, a bid for a later vintage could be treated as a request to purchase *either* a later vintage *or* an earlier vintage, whichever is less expensive. Interpreting bids in this manner prevents a price inversion in which the uniform price for the later vintage is higher than the price for the earlier vintage, although theory suggests this price inversion is inefficient and would not occur in the secondary market. This addendum describes a simple procedure for combined vintage auctions that implements this idea.

A brief aside on the Australian situation:

The *White Paper*, and its predecessors, drew on a number of papers enumerated in the attached literature review list, most prominently (see pp. 9 – 7 *White Paper*) the Evans & Peck (July 2007) report on auction design which was commissioned by the National Emissions Trading Taskforce and of which two of the present authors (Betz and Seifert) were key contributors.

Subsequently, and apparently during the *White Paper* drafting stage, the DCC commissioned Tradeslot Pty Ltd ("Tradeslot") to provide an additional report on the key design elements of auctions (auction type, advance auctioning of future vintages, auction timing and frequency, and timing of payments for permits) under Australia's CPRS (Tradeslot 2008). This study was published October 26, 2008. Throughout the study, Tradeslot emphasized implementation risks (price, demand, credit, systems) which were identified as primary DCC concern (Tradeslot 2008, p. 3).

The *White Paper* carefully integrates the studies by Evans & Peck and Tradeslot as well as numerous comments and other reports on related auctions emerging before its appearance (including the RGGI report of October 2007 but apparently not the April 2008 follow-up study; see Holt et al. 2007, 2008) and formulates a series of thirteen "policy positions" and statements on "operational features of the auction" (9-28 – 9-29).

Since the *White Paper* was published, auctions have taken place in EU countries (namely, Hungary, Ireland, UK Phase 2) as well as in the Northeastern of the United States (the RGGI initiative to which Holt et al. 2007, 2008 helped to lay the foundation).

Policy positions:

Policy position 9.1

Allocations will, over the longer term, progressively move towards 100 per cent auctioning as the Scheme matures, subject to the provision of transitional assistance for emissions-intensive trade-exposed industries and strongly affected industries. [White Paper p. 9-4]

Policy position 9.2

The responsible minister will be empowered to determine in a legislative instrument the auction policy and auction operation rules for calendar years 2010 and 2011.

The regulator will be empowered to determine in a legislative instrument the auction policy and auction operation rules from 1 January 2012 onwards.

The minister's determination will continue to have effect until it is replaced by an instrument made by the regulator. [White Paper 9-7]

Policy position 9.3

Auctions will be held 12 times throughout the financial year. [White Paper p. 9-13]

Policy position 9.4

The government will consult with industry on possible deferred payment arrangements for auctions of future vintage permits of a strictly limited and transitional nature. Options that involve the delivery of permits before final payment has been received, or that do not incorporate the payment of a deposit, will not be considered. [White Paper p. 9-15]

Policy position 9.5

At least one auction of the year's vintage will be held after the end of the financial year in the lead-up to the final surrender date. This will be within one month prior to the final surrender date.[White Paper p. 9-16]

Policy position 9.6

The first auction will take place as early as feasible in 2010, before the start of the Scheme. [White Paper p. 9-17]

Policy position 9.7

The Government will advance auction future vintages. [White Paper p. 9-20]

Policy position 9.8

Four years of vintages will be advance auctioned (current vintage plus advance auctions of three future vintages.) [White Paper p. 9-21]

Policy position 9.9

Advance auctions for each future vintage will be held annually. [White Paper p. 9-22]

Policy position 9.10

Subject to the lodgement of any required deposits and having a registry account, universal participation will be permitted at auctions. [White Paper p. 9-24]

Policy position 9.13

Entities receiving free permits will be able to sell these at auctions (double-sided auction design) occurring in calendar years 2010 [now: 2011] and 2011 [now: 2012]. [White Paper p. 9-28]

Operational features:

- ***Uniform pricing***
- ***Aggregate demand revealed each round***
- ***Proxy bidding***
- ***Publication of auction results as soon as possible***
- ***Reserve price***
- ***Internet auction platform***
- ***Parcel size***
- ***Activity rule***
- ***User training***

Hey, EU Environmental Policies: A short history of the policy strategies

Six Environmental Action Programmes (medium-term, strategic policy documents)

1973 – 1976, first EAP, second EAP 1977 - 1981

- following the first United Nations Conference on the Environment in Stockholm in 1972

- EC commitment to establish a Community environmental policy

- "the protection of the environment belongs to the essential tasks of the Community" (p. 18)

- in terms of a practical approach the first EAP (and the second EAP, too) advocated quality values for air and water

- "initial enthusiasm declined considerably during the periods of economic recession (1975 – 1978, 1981 – 1983)" although a number of directives (adhortations, game plans) were formulated (p. 19)

1982 – 1986, third EAP, fourth EAP 1987 – 1992

- new focus on benefits of risks of environmental policies to the Internal Market, "issue linkage between the internal market and environmental policies became a key driver for programming and activities" (p. 19)

- practice of environmental policies during the eighties was particularly concerned with clean-air policies, and noise and risk management for industrial sites

- 1987: environmental protection received its own chapter in the Treaty …

- " … a more **integrated approach [4th EAP]**. For the first time, environmental protection was not perceived as an additive, but rather as an integrated activity within the whole production process. … to reduce energy or material inputs and to close cycles, so that waste streams could be minimized. Furthermore, pollution control was to systematically control all environmental media (water, air and soil) and involve an evaluation of the problem causing substances. … '**sectoral approach**' .. For the first time, the evaluation of the **new, incentive based instruments**, such as taxes, subsidies or tradable emissions permits was announced." (p. 21)

- external factors set the agenda:

(1) the emergence of global threats such as climate change reached the official agenda

(2) the Community saw chance to become an international "leader", thereby strengthening European integration and the Commission's own role in international politics

(3) old regulatory (command and control) approach had been discredited, new regulatory approach had taken hold in Scandinavian countries, Denmark, Netherlands, and Germany

(4) at the end of the 1980s, "a mounting wave of environmentalism. Membership of environmental organizations increased considerably. Green parties were popular in several EU countries, and achieved good results at national levels and the European Parliament." (p. 22)

1992 – 1994, fifth EAP

- emphasis on sectoral approach, i.e. focus on industries that were particular culprits (transport, energy, agriculture, etc.)

- emphasis on new instruments, “especially on market-oriented instruments such as fiscal incentives or voluntary instruments, which strengthen producers’ and consumers’ own interests in environmental decision-making.” (p. 23)

- a new consensus-oriented approach

- setting of medium and long-term objectives for the reduction of some pollutants …

- unfortunately, roll-back 1992 – 1995, triggered probably by

(1) member states were not willing to follow paradigmatic change pushed by the Commission

(2) difficulties in ratifying the Maastricht Treaty contributed to more cautious attitude of European Commission

(3) The preference structure/focus in Germany changed because of the reunification and the emphasis on economic problems (high unemployment) that came with reunification; same true for countries that joined in 2004 (e.g., Visegrad 4 etc.)

but … sustainability remains on the agenda

- strengthened as Community target in the Amsterdam Treaty from 1997
- strengthened by Cardiff Process (an initiative for environmental policy integration moved forward by several presidencies
    - new complex and holistic framework legislation such as the Ambient Air Quality Directive, the Water Framework Directive, or the ICCP [Integrated Prevention and Pollution Control] Directive
    - “new target oriented legislation, setting maximum national emission ceilings for key pollutants, but leaving member states the freedom to choose how to achieve necessary reductions. ... With the 2003 Emission Trading Directive, another target-oriented policy, setting nationally differentiated CO2 targets – the so-called burden-sharing agreement – became legally binding.” (p. 25)
    - …
    - The introduction of many new environmental policy instruments (such as emission trading)… (p. 26)
    - New procedural legislation or the revision of existing legislation strengthening civil society rights, notably the three Aarhus pillars: freedom to information, participation rights and access to justice. (p. 26)

The starting point of the 6th EAP:

“Persistent so-called environmental problems such as climate change, the loss of biodiversity, or the overconsumption of resource require a broader approach beyond environmental legislation … “ (p. 27)

The 6th EAP adopts a very cautious approach. It identifies themes and principles. Specification takes place by strategies, which are partially frameworks for further frameworks. The political strategy of the 6th EAP is to postpone potentially contentious and controversial political decisions to later phases or to avoid them altogether by relying on cooperative approaches to environmental policy making. Cooperative approaches with industry, such as integrated product policies, the wider use of standardisation for environmental policies, voluntary agreements, cooperation with Member States' expert fora, or both (e.g. chemicals policy reform) rank high on the political agenda in order to manage complex risks, where knowledge both on the scale of the problem and on the availability of solutions is limited. It is evident that those new governance approaches relieve the legislator and strengthen the role of private and public professionals with specific technical skills. Furthermore the Commission is changing its key role from an initiator of legislation to a manager of policy processes. Environmental policy may hence lose its previous political profile and become more and more a theme for small specialist expert communities. Those communities are responsive to scientific evidence, but the selection criteria for representatives from civil society wanting to participate in those communities has also increased. The cooperative management of the policy processes is very demanding in terms of resources and staff and some processes simply fail to gain momentum because of insufficient public investment, Integrated product policy is certainly a case in point. So it is far from evident that cooperative arrangements deliver more than the traditional regulatory instruments. This applies especially to countries and situations where the negotiation capacity and expertise of public service and of environmental organisations is in the early stages of development. A further problem is that policy approaches become over complex. Holistic and integrated approaches promise to tackle and balance everything with everything at the same time. However the risk is that in the end they amount only to fine rhetoric on principles - and little action.

(p. 27)

Carter, Transforming enviromental policy: Does Europe lead the way (EP 2007)

- review of four books published in 2004, 2005, one of them by Toelke & Torgerson a second edition
- good review: integrative, comparative, reflecting
- all books about "environmental governance" – "an approach to environmental problems that involves decentralization, flexibility, a 'hands-of' approach to regulation, better integration of policy-making and greater dialogue and cooperation between government and non-state actors" (p. 523)
- "So where is progress towards environmental governance most advanced? In 1990, when the first edition of *Managing Leviathan: Environmental Politics and the Administrative State* was published, it was normal to look to the USA for leadership in environmental policy. Since then, as Paehlke & Torgerson observe … the emergence on the global stage of 'American exceptionalism' – first visible at Rio, then fulsomely embraced by George W. Bush, in his rejection of the Kyoto Protocol. Even … in the Clinton /Gore years …little [was done] for the environment. Today, few people now look to the US federal government for innovation in the environmental arena, although there are still interesting developments at state [e.g., California, see p. 528] and municipal levels. Instead, most observers turn to Europe – to the pioneer nations of northern Europe and to the European Union (EU) itself – for environmental leadership and innovation." (pp. 523 – 4)

- Dovers: good starting point, “the Australian provenance often shines through” (p. 524)

- Hatch; “adds to the growing literature on alternative, or ‘new’, environmental policy instruments. Its familiar premise … is that the traditional command-and-control approach to environmental regulation, employing regulation, employing uniform standards or specifying particular technologies or processes, has proven inadequate. Hence there is growing interest in alternative policy instruments. … nine case studies … such as the three German case studies … which together support the case for European innovation. Certainly, the willingness to use a greater number and a wider range of national eco-taxes in Germany and other European countries, notably as part of a climate change strategy to reduce greenhouse gas emissions, is unmatched across the Atlantic. Yet, as Gary Bryner shows, the US has taken the lead in the use of tradeable permits, and … there has been some diffusion and lesson-drawing from the US experience. Bryner concludes that emissions trading works best when, *inter alia,* it is based on accurate emissions information, the emission limits adequately protect the environment and the system is stable, predictable and rigorously enforced. These are lessons that the EU might note as it tries to manage its carbon emissions trading system, in which carbon prices have fluctuated wildly and several countries have issued far too many permits based on highly unreliable data. … reminder that policy instruments seldom work effectively when operating alone, but are better as part of a battery of tools and measures.” (pp. 524 – 5)

- Toelke & Torgerson: “ … the book’s strong commitment to deliberative democracy gives it a distinctive and radical edge … “ (p. 526)

- Jordan & Lieferink. “unlike the loose editorial reins that characterize the other two edited volumes, this is a carefully designed, tightly organized and systematic comparative analysis that investigates the ‘Europeanisation’ of environmental policy in 10 countries (nine EU member states and Norway). .. The book is a model for everyone planning a comparative study: … There is only limited evidence of convergence on a single European model of environmental policy. … there is only limited evidence of the EU influencing progress in some of the more innovative areas of environmental governance, such as the use of policy instruments. Those countries, including Denmark, Sweden, Germany, Netherlands and the UK, that have introduced a range of new policy instruments have generally not done so in response to EU pressure.“ (pp. 526 - 7)

- “Finally, in these contributions whilst Europe emerges as a leader in environmental innovation, its record is still somewhat patchy. There is no doubt that the large body of EU environmental legislations is more progressive and tougher than anything coming out of Washington (although perhaps not California), but, unfortunately, these books show only isolated examples of European innovation in terms of democratic and citizen initiatives or in the use of new policy instruments.” (p. 528)

Kramer, EU Enlargement and the Environment: Six Challenges

- written before the enlargement of the EU in 2004 (published in Spring 2004)

- a prospective entrant before admission had to adopt the *acquis communitaire (acquis)* – "'the common body of EU legislation' of which the environmental acquis [one of 31 thematic chapters] comprises an integral component. In the legal sense …. , 'it means the complete alignment of national legislation so that it complies 100 percent with the requirements of EU legislation. And not just on paper but of course also in fact. [Commission 1997b: 3]" (p. 290) -> transposition (incorporation into national legislation), implementation, enforcement [administrative capacity], [evaluation] … the latter two being "'the much more difficult nut to crack'" (p. 292, quoting Wallstroem)

- "the challenge is especially acute given the candidate countries must rely primarily on their own financial and other resources to meet it [they can at most count on about 5 percent of the cost being defrayed by EU contributions, see p. 295] – resources already severely strained in meeting numerous other demands including those entailed in the overall accession process." (p. 290)

- do accession countries meet those challenges? Remains an open question but probably not … "as EU officials themselves candidly admit, all of them attach a far lower priority to protecting the environment than their attachment to entering the EU as quickly as possible and in addressing what they consider much more pressing problems of economic revitalization and growth." (p. 291)

- a *quid pro quo* for being especially tough with them on such politically charged issues such as the free movement of labor and refugees?

- In any case, acquis makes for good rhetorical argument in the political national discourse, especially for environmental activists …

This study provides an overview of six challenges – most addressed at discrete points in these pages – with which the candidate countries must successfully cope if they are to fulfil the environmental *acquis* and do so in such a way that they 'crack' the even more fundamentally important 'nut' of building a sustainable environment in the region: (1) the *fiscal* challenge of providing requisite monies; (2) the *administrative* challenge of building both institutional and staffing capacity; (3) the *environmental* challenge of promoting a sustainable environment while fulfilling the *acquis*; (4) the *democratic deficit* challenge of ensuring substantive input for *Vox Populi*; (5) the *energy* challenge of reducing the excessive consumption of environmentally threatening liquid and, especially, solid fuels and coping with the dangers of obsolete nuclear power stations built in the Soviet era; (6) the *political* challenge of mobilising the support necessary to respond effectively to these foregoing challenges.

- notwithstanding these challenges, substantial progress has been made … (says Kramer)

- ad (1) the fiscal challenge (forgetting for the moment about nature and extent of transitional period):

TABLE 1

ESTIMATED ENVIRONMENTAL FINANCING NEEDS IN APPLICANT COUNTRIES

Country	Estimated Total (Millions of Euro)	Euro Per Capita
Bulgaria	8610	1117
Czech Republic	6600–9400	643–915
Estonia	4406	3095
Hungary	4118–10000	497–989
Latvia	1480–2360	620–989
Lithuania	1600	443
Poland	22100–42800	572–1107
Romania	22000	983
Slovakia	4809	888
Slovenia	2430	125
Total	79260–11001	–

Source: Developed from Commission [*2001b: Annex 2*].

Overall, the EU estimates that candidate countries on average must spend between two per cent and three per cent of gross domestic product (GDP) to ensure implementation of the environmental *acquis*. To place this task in perspective, consider what the following candidate countries spent on environment as a percentage of GDP in 2001: Czech Republic (1.04), Hungary (1.0–1.1), Lithuania (0.22), Poland (1.7), Romania (0.40), Slovakia (1.5) [*Commission, 2001c*]. In the EU itself, such expenditures now average about one percent of GDP. These data raise the pressing question of where the candidate countries will acquire the monies to fulfil their obligations.

important issue: “it seems clear that the private sector – both producers and consumers – will shoulder a heavy load in financing EU-related environmental investments. To this end, it becomes critical that candidate countries vigorously pursue the privatization of environmental services such as water and power supply and waste removal and the concomitant establishment of so-called full-cost recovery pricing – in plain English, the elimination of subsidies and the establishment of market-based prices – for them.” (pp. 296 – 7)

- ad (2) the administrative challenge:

  the “administrative capacity to transpose and, even more importantly, implement and enforce the environmental *acquis* is rapidly emerging as one of the key challenges confronting the applicant countries.” (p. 297) – enough said (obviously, this is also a question of money – down to availability of copying machines -- but not only, lots of organizational issues, and that on the regional and local level)

- ad (3) the environmental challenge:

  “ .. the challenge of promoting sustainable development remains a work in progress.” (p. 301)

- ad (4) the ‘democratic deficit’ challenge:

  “In CEE countries, as former President Havel of the Czech Republic has observed, strengthening Vox Populi has been a ‘difficult process’ with many public officials retaining the communist view of the citizenry as an adversary, not a partner, in the exercise of power. … the EU itself, even if unintentionally, has managed environmental accession in such a way largely to exclude CEE environmentalists from substantial meaningful participation in it. … initiative are underway to mitigate

this bleak situation … the EU has established a 'Public Right to Know Project' that works closely with environmental NGOs and private individuals to pressure CEE governments to establish minimum standards for public access to information regarding the environment." (pp. 302 – 3)

- ad (5) the energy challenge:

  energy intensities in CEE countries way too high (compared to old EU countries and US, e.g., five times higher in Bulgaria, and twice as high in Czech and Slovak Republics, in East Germany production and consumption increased yet CO2 emission were reduced by more than half after reunification), legacy of socialism/communism; heavy reliance on nuclear power (and nuclear power plants that are wanting in their quality).

- ad (6) the political challenge:

  Jehlicka & Tickle article: "after accession, the status of political will may become more problematic given that … the EU inevitably will have diminished leverage over the former applicant countries and the latter will have more opportunity to set their own agendas and priorities, including those towards the environment." (pp. 306 – 7)

  Are the lowest anticipated benefits (134 billion Euro) really upwards of 18 percent greater than the highest estimated costs (110 billion Euro) of fully implementing the environmental *acquis*? (p. 309)

TABLE 2

ESTIMATED AVERAGE ANNUAL BENEFITS OF FULL COMPLIANCE WITH THE ENVIRONMENTAL *ACQUIS*

Country	Average Benefits Per Capita (Euro)	Average Benefits as % of GDP
Bulgaria	154.5	10.9
Czech Republic	467	9.65
Estonia	196.5	6.2
Hungary	400.5	8.9
Latvia	136	5.85
Lithuania	216	8
Poland	331	8.85
Romania	246.5	17.35
Slovakia	376	11.45
Slovenia	343.5	3.65

Source: Developed from Ecotec Research and Consulting [*2001: 24*].

- Conclusion

  "This author is cautiously optimistic that the EU is evolving in ways – albeit at times hesitantly, erratically, and perhaps overly slowly – that will make it a much more 'environmentally friendly' institution than it is now. The clear thrust of this evolution is towards more openness, transparency, accountability and a greater utilization of market-based solutions to environmental challenges." (p. 310)

Schleich, Rogge, & Betz, Incentives for energy efficiency in the EU Emissions Trading Scheme (ETS) (31 pages)

EU ETS applies to installations in the energy and industry sectors … (but not non-ET sectors like household, tertiary, and transport); it is the world's largest emissions trading system and the first international trading system; it covers around 12,000 large greenhouse gas emitting installations in the energy and industry sectors … it covers about 50% of Europe's CO2 emissions and 40% of the total greenhouse gas emissions; the working of the system should be known: companies are issued – essentially for free and historic precedent -- emission allowances that they can trade. Essentially, they have to make sure to have enough allowances as production warrants, intertemporally smoothed.,

Authors

- analyze the National Allocation Plans (NAPs) of the 27 EU member states (MS) for phases 1 (2005 – 7),

2 (2008 – 12, coincides with the Kyoto commitment period), and 3 (2013 – 20)

- find that the price and cost effects for improvements in carbon and energy efficiency will be stronger in phase 2 than in phase 1 (but only because the European Commission reduced "substantially" the number of allowances to be allocated by the MSs)

- find that domestic efficiency improvements in the targeted sectors may remain limited since companies can make substantial use of credits from the Kyoto Mechanisms

"Nevertheless, there is still ample scope to further improve the EU-ETS so that the full potential for energy efficiency can be realized." (p. 1)

Abbreviations

BAT	best available technology
BM	benchmark
CCGT	combined gas cycle turbines
CDM	clean development mechanism
CHP	combined heat and power
CITL	community independent transaction log
CO_2e	CO_2 equivalents
EC	European Commission
ET	emissions trading
EU	European Union
EUA	European Union allowance
EU ETS	EU Emissions Trading Scheme
JI	joint implementation
KM	Kyoto Mechanisms (i.e. JI, CDM)
NAP	National Allocation Plan
VET	verified emissions table

"Because ET systems allow for static and dynamic efficiency, they are often considered to be superior to other types of regulation [such as taxes]." (p. 2)

- static eff: if all participants face the same marginal abatement cost, overall reduction costs are minimized

- dynamic eff: incentives to adopt/develop more energy- and carbon-efficient technologies

So much for the theory …

Some key design elements of the scheme are governed by the EU Emission Trading Directive (e.g., the total allowances budget available, or cap, and how they are allocated across countries) and others are determined by country-specific NAPs (e.g., how these allowances are allocated to individual installations, to what extent they are auctioned off etc.) A complication is the use of credits from Kyoto Mechanisms.

“More stringent ET budgets will lead to higher prices for European Union Allowances (EUAs) and thus greater incentives to improve energy and carbon efficiency, ceteris paribus. In the first phase, these incentives were low since the ET budgets turn out to be rather lenient, resulting in low prices for EUAs.” (p. 3)

There are various ways to come to that conclusions (“stringency criteria”):

The difference between the notified (and approved) ET budgets for phase 2 to

- verified historical emissions in 2005
- the size of the ET budgets in phase 1
- projected emissions in 2010

“For phase 1, verified emissions data revealed that very few countries allocated EUAs in 2005 below the actual 2005 emission levels of the ET sector (Austria, Greece, Italy, Ireland, Spain, and the UK). As a consequence of this surplus allowance, in May 2006, prices for EUAs plummeted from around Euro26/EUA to around Euro10/EUA and to well below Euro1/EUA towards the end of the first trading period. According to Kettner et al. (2007), the surplus for 2005 amounts to about 100 million EUA. Since the emission level in the absence of the EU ETS cannot be determined (it is counterfactual), the real extent of possible overallocation cannot be determined.” (p. 4) Ellerman and Buchner (2008) suggest that “a substantial part of the surplus may have resulted from abatement activities.” (p. 4) In other words, the ETS as such might have spurred innovations/abatement activities, and hence was more effective since trading prices seem to suggest. (That may be so – see analogue of self-regulatory organizations trying to stave of regulatory action.)

“Nevertheless, the surplus of EUAs and the correspondingly low price provided little additional incentive to improve energy and carbon efficiency in phase 1. Together with high uncertainty about governments’ commitment to long-term targets, this meant that firms were not strongly motivated to develop energy-efficient and low-carbon technologies and service in phase 1 (Montgomery 2005).” (p. 4)

“For phase 2, therefore, the Commission developed its own criterion, based on 2005 verified emissions data, economic growth, and carbon intensity trends. Applying this criterion has led the EC to require budget cuts in all but four of the assessed plans (Denmark, France, the UK, Slovenia). … The EC reduced the total cap by 10.4% … In absolute terms, the budget adjustments were highest for Poland and Germany. In percentage terms, the budgets of Latvia (~56%), Estonia (~48%), and Lithuania (~47%) were reduced the most. … The required budget cuts were much higher for the new EU-12 MSs (… -25.4%) than for the EU-15 MSs (… -4.1%).” (pp. 4 – 5)

“The European Commission not only adjusted the ET budgets but also set a maximum amount of credits from Kyoto Mechanisms that companies may use to cover their emissions. … Whether companies will purchase

these credits crucially depends on their costs relative to the price for EUAs which in turn depends on the stringency of the ET budgets.“ (p. 5)

For details of the stringency of ET budgets (according to the three stringency criteria discussed earlier), see pp. 5 – 8, especially Figures 1 – 3.

“In conclusion, the price and cost incentives to improve energy and carbon efficiency are likely to be substantially higher in phase 2 than they were in phase 1. However, the need for domestic emission reductions via improved energy and carbon efficiency in the energy and industry sectors may still be rather low. … .” (p. 7)

Incentives for energy efficiency at the micro level (the cap etc. being the macro level):

- [Assessment based on economic theory]
- Auctioning vs free allocation for existing installations
    - Economists prefer auctions to gratis allocation because (p. 10)
        - the “polluter-pays” principle holds
        - windfall profits [which come about when companies pass on additional marginal costs to consumers] are avoided, which might have public policy implications.
        - auction revenues could be used for other purposes, including funding for R&D or investment in energy- and carbon-efficient technologies
        - the correct pricing that comes out of auctions, increases the incentives to innovate
- Carbon costs pass through in the power market
    - Higher product price resulting from the pass through of carbon costs translate into stronger incentives for energy efficiency on the demand side. (p. 10)
- Early price signals and planning reliability for investment
    - Auctioning off part of the budget right at the beginning of the trading period may generate robust early price signals that reflect the scarcity of allowances on the market since participants base their bidding behavior on their marginal abatement costs. (p. 11)

“ … auctions tend to be associated with higher innovation effects than the typical grandfathering, where allowances are allocated free of charge based on historical emissions. Allocating allowances for free, however, is politically more palatable sicne the costs for companies directly covered by the EU ETS are lower.” (p. 12)

The reality … (p. 12)

- Directive allows MSs to auction off up to 5% of the ET budget in phase 1 and up to 10% in phase 2
- Phase 1 only Denmark, Hungary, Ireland, and Lithuania took that option to some extent.
- Phase 2 about one third of the MSs have declared their intention to take that option to some extent.
- Total auction share in the EU ETS around 0.2 percent in phase 1
- Total auction share in the EU ETS around probably around 3 percent in phase 2, and that number driven by high level of auctioning in Gemany and the UK.
- Most MSs allocate allowances to existing installations for free based on historical emissions (based on 2005 data).

The conclusions

"Our analysis at the macrolevel suggests that, on average, ET budgets for phase 2 are about 12.8% lower than historical emissions in 2005, 12.9% lower than the budgets in phase 1 (2005-2007), and 15.7% lower than projected emissions in 2010. Thus the ET budgets for phase 2 are much stricter than for phase 1. … Prices for EUAs for phase 2 of currently around Euro20 support this view. … The tighter budgets for phase 2 are primarily the outcome of the EC's decision to substantially cut the ET budgets in the notified NAPs [a centralized setting of the cap, AO] rather than the result of MS' efforts to curtail greenhouse gas emissions using the EU ETS. … according to the EC's proposal for phase 3, the future EU ETS will no longer require NAPs. Instead, there will be an EU-wide cap which corresponds to a reduction of 21% in 2020 compared to 1990 emission levels (or 14% compared to 2005 levels), … " (p. 15)

"Phase 3 is scheduled to last for 8 years (2013-2020) rather than five. … Since longer phases better match companies' investment cycles and reduce uncertainty about the profitability of new investments, they are likely to increase the diffusion and development of carbon- and energy-efficient technologies. Longer phases, however, also limit the system's flexibility to react to unexpected developments, such as technological breakthroughs, sudden changes in climate policy, or improved knowledge about the causes and effects of climate change. … " (p. 16)

"To sum up, the incentives for carbon and energy efficiency generated through the EU ETS have significantly improved at the macrolevel, but only slightly at the microlevel between phase 1 and phase 2. The EC's proposal for phase 3 implies increased incentives for carbon and energy efficiency, in particular at the microlevel. … " (p. 17)