Auctioning of CO_2 Emissions Allowances in Phase 3 of the EU ETS

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Agenda

- Background
- Auction plans of EC
- Example
- Auction: Criteria, types, products
- Experiences with GHG auctions
- Proposition for Phase 3 (2013-2020)
- Summary

Background

Background

Previous experiences with the EU ETS (before 2012)

- Grandfathering (GF) generates wrong incentives to participants
- Negotiations over € 27 (47) Mrd per year in Phase 1 (2)
- Waste of resources because of complex NAPs (government, firms, consultants, engineers, research, etc.)
- Nobody satisfied!
- Price crash in April 2006
- Carbon leakage
- …

“Refine and improve the EU ETS”
=> “Climate action and renewable energy package”

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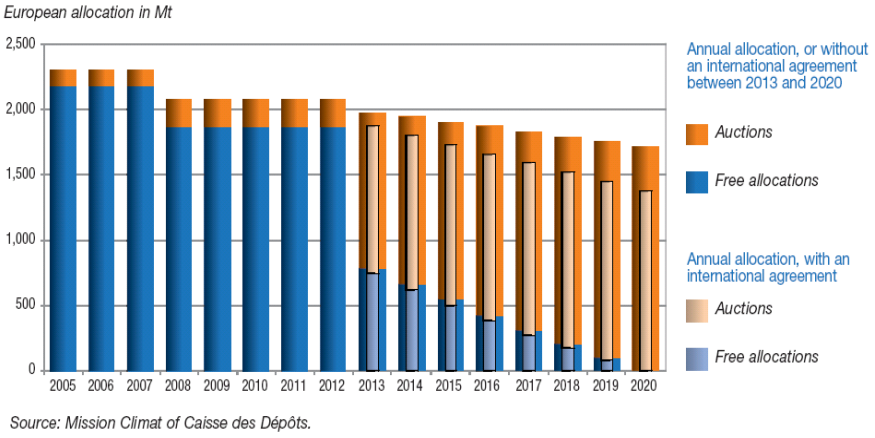
Auction Plans of EC

Auction Plans of EC (original Commission proposal)



Source: Mission Climat of Caisse des Dépôts.

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Auction Plans of EC

Conclusion

- Phase 3: two third of total allowances are auctioned
- Uncertainty w.r.t. liquditiy in the secondary market
  - Banking Volumen?
  - Negative tradeoff between degree of liquidity and auction volume
- Secondary spot and futures market probably thin

⇒ Necessity of auction that can deal with associated uncertainties of all plausible market scenarios

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Example

Example (n = 5)

Assumptions

- Total *bau* = 1,000 t CO_2, | Cap = 900 t CO_2 => p^* = 10 €
- Uniform pricing rule (p_A = market clearing price)
- Participants bid their whole demand at individual MAC

Firm			GF+A			GF+DA			A		
i	bau_i	MAC_i [€]	s_i	q_i	a_i	s_i	q_i	a_i	s_i	q_i	a_i
1	200	50	160	40	0	160	40	0	0	200	0
2	200	40	160	40	0	160	40	0	0	200	0
3	200	30	160	20	20	160	40	0	0	200	0
4	200	20	160	0	40	160	40	0	0	200	0
5	200	10	160	0	40	160	-60	100	0	100	100
Auction price p_A [€]			30			10			10		

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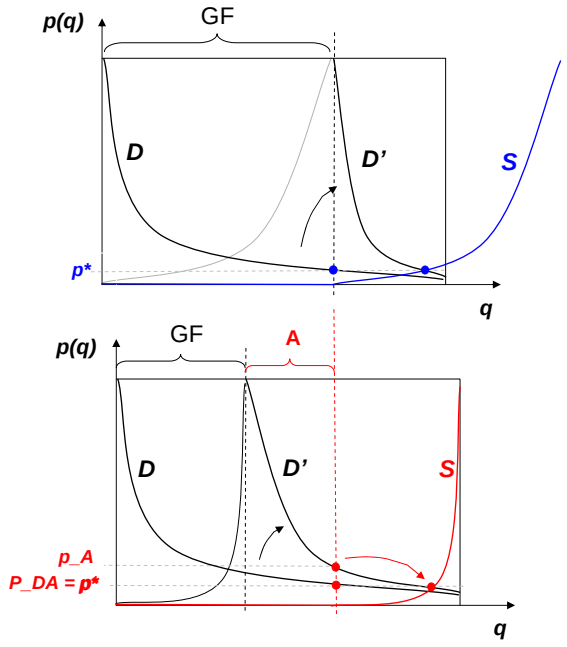

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Auction: Criteria, Types, Products

Auction Criteria

Information efficiency

- Correct (early) price signals
- Reduction of uncertainties (abatement decisions, SM)

Allocation efficiency

- Highest willingness to pay (MAC) wins auction

Simple and transparent

- Low TC as incentive to participate in auction (lesson from NAP I/II)
- Complex bidding strategies do not generate advantages
- Simplest strategy wins: „Bid MAC“ (minor effort)

Generation of auction revenue

- Reduction of distortionary taxes
- Promotion of CO_2 reducing projects

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Auction Types

Early Auction
- Conduction well before operational start of ETS (e.g. RGGI)
- Reduction of uncertainties (abatement decision, SM)

Advance Auction
- Auction of allowances for future trading phase(s)
- Equivalent to standardized futures markets

Spot Auctions
- Auction of allowances for current trading phase

Governmental Auctions
- Direct sellings into the market via financial institutions

⇒ **EU ETS:** Mixture of Advance and Spot Auctions

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Auction Product

Characterization
- Phase *t* allowances (Spot Auction)
- Phase *t*+1 allowances (Advance Auction)
- Unlimited banking is allowed
  - Perfect substitutes within one trading phase
  - $p_{spot} > p_{adv}$ (almost substitutes)
- Weak complements (dependent on investment decision)
- "Common Value" good (uncertainty w.r.t. MAC for regulator and firms)

⇒ **Common Value multi-unit auction for (almost) identical goods**

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Experiences with GHG Auctions

Experiences with GHG Auctions

	SO_2	NO_x	UK	Irl/H	D	RGGI	Aus	PH. 3
Auction volume [%]	2.8	5	7	< 2.6	9	100	~ 60	~60
Criterion								
Information efficiency	x				x	x	x	x
Allocation efficiency	x				x	x	x	x
Simple and transparent	x				x	x	x	x
Revenues	x	x	x	x	x	x	x	x
Auction design								
One-sided (o)/ double (d)	d	o	o	o		o	d	d
Static (s)/ dynamic (d)	s	d	d	s		s	d	d
Uniform (u)/ discriminatory (d)	d	u	u	u		u	u	u
Auction type								
Early (e)/ Spot (s)/ Advance (a)	e.s.a*	s,a	a	s		e,s,a*	e,s,a*	s,a*
Governmental					x			

* Simultaneous Auction

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Proposition for Phase 3

Proposition for Phase 3

Simultaneous dynamic uniform double auction

- "Simultaneous two-sided ascending clock auction"
- **Simultaneous**: Guarantees better efficient prices ($p_{spot} > p_{adv}$)
- **Dynamic**: Reveals constantly public info. about price development => Underscores reliable price signals
- **Uniform**: Simple, transparent, fair, incentive to bid MAC
- **Double**: Prevents from biased sample of ETS participants
- **Open**: Increase of liquidity
- **Reservation price:** Guarantees positive prices

Transaction cost

- High at the beginning (consulting, training)
- Electronic implementation reduces TC (Climex)

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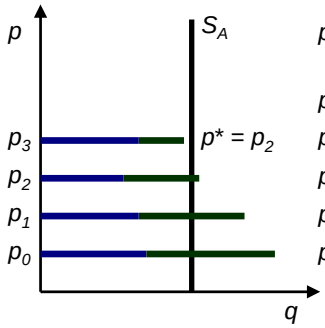
Simultaneous dynamic uniform Auction

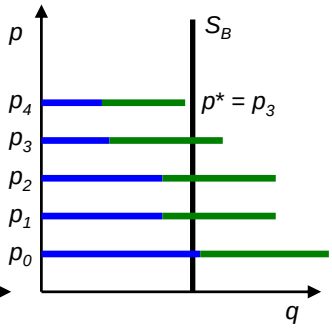
Example

Two products, j = A, B | Two bidders, i = blue, green

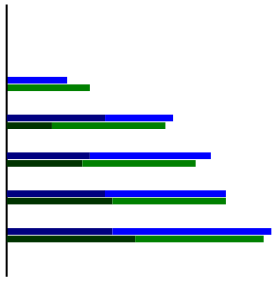
Auction for product A



Auction for product B



Bidder's total demand



For all bidders i:

$$\sum_j d_i^j\left(p_t^j\right) \leq \sum_j d_i^j\left(p_{t-1}^j\right)$$

Summary

Summary

- Phase 3: two thirds of total allowances are auctioned
- Auction is embedded in already existing ETS
- Uncertainty w.r.t. liquditiy in secondary market
  ⇒ Neg. tradeoff between degree of liquidity and auction volume
- Secondary Spot and Futures markte probably thin
- Necessity of auction that absorbs uncertainties of all scenarios
  =>Simultaneous dynamic uniform double auction
- Experiments!!!
- Practical implementation: Use of existing infrastructure (e.g. trading platform of ECX, EEX, Eurex)
- Germany: implementation of static one-sided auction planned

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