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Frequency, timing issues of auctions

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Content

- Frequency and timing of auctions: advantages and disadvantages
- Auctioning and secondary markets
- Selling or auctioning a small share of permits
- Frequency and timing of auctions in past auctions
  - SO2 (Acid Rain, US)
  - NOx (State Implementation Plan SIP Call, US state Virginia)
  - EU ETS (phase 1)
    - Ireland
    - Hungary
- Frequency and timing of auctions proposed for different schemes
  - EU ETS (phase 2)
  - RGGI
  - Australia
- Comparison
- Questions

What are the questions?

- **Spot auctions**
  - **When should they occur?**
  - **Should they be announced?**
  - **How often should spot auctions be run?**
  - **How should permits be distributed over auctions?**
- **Advance auctions**
  - **When should they occur?**
    - **How far in advance should they take place? Only 3-4 years or really long term e.g. 20 years**
  - **How often should advance auctions be run?**
  - **How should permits be distributed over auctions?**
  - **How many different vintages should be auctioned in each advance auction?**

Differences in units

- EU ETS
  - Permits are valid for one phase (compliance period), allocated yearly, are bankable
- Australian proposals
  - Annual permits (vintage) allocated in advance, bankable (restrictions may apply)
- RGGI
  - Annual bankable permits (vintage) and three year control periods (will be extended to four years if stage two price ($10 per ton in 2005 dollar terms) is triggered).

Spot and advance auctions

- Advantages of **spot auctions** :
  - generate regular price signals for the secondary market and thus lower its uncertainty
  - guarantee permit supply for buyers and new entrants.

- Advantages of **advance auctions**:
  - set early price signals for the future.
  - ensure that permits are in circulation before the compliance year for which they are valid. This gives greater certainty to investors interested in investing in infrastructure with longer lead times and long lifetimes. However, if permits can be banked investors might buy current vintages to secure future investment. The disadvantage will be that they will have to pay higher prices
  - Trading permits of future vintages compared to trading futures or forwards has the advantage that those permits can be traded spot without any risk premium.

Frequent or less frequent auctioning

Advantages of frequent auctioning

- Value of each auction is relatively small. This reduces risk of short-squeezing the market or market power, especially if secondary market is not liquid.
- Revenues will reflect permit prices over time.
- Matches demand profile, reduces cash flow implications and reduces price risk because contracts can be signed with better price information
- Might increase participation and ensure liquidity for new entrants
- Might allow more flexibility
- Has less impact on secondary market (each auction will have lower volume and less impact)

Frequent or less frequent auctioning

Disadvantages of frequent auctioning

- Decreases the auctioning volume at the beginning
- Lowers the price signal effect
- Reduces the liquidity of the secondary market (unless it is used to hedge against uncertainties of auctions).
- May increase the risk of collusion.
- Leads to higher transaction costs for administrative body

Distribution over time

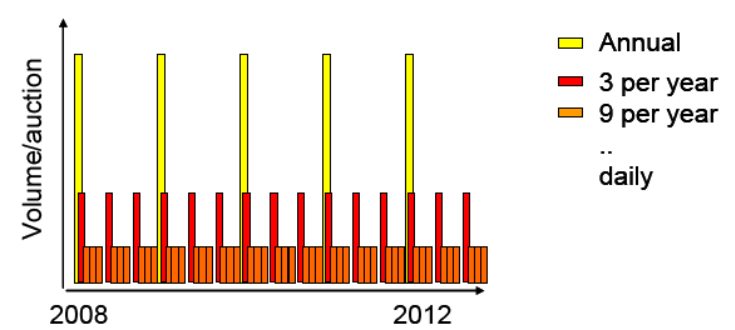


Figure 6 Homogeneous distribution of allowances across auctions

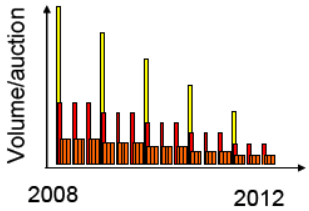


Figure 7 Front-loaded allocation of allowances across auctions

Source: Neuhoff 2007

Liquidity of secondary market

- **Primary market**: issuance of permits, initial allocation
- **Secondary market**: market in which the seller is not the original owner of the permit
- Definition of **liquidity** of the secondary market: ability to convert emissions permits into cash through sale or to purchase additional permits when market participants desire. The market allows large transactions without a substantial change in market price.
- Liquidity is not the same as volume traded in the secondary market!

Source: Primary/secondary market: Matthes/Neuhoff
Liquidity: Holt et al and Evans and Peck

Relationship of auctions vs. secondary market: impact on liquidity

- Positive impact on liquidity
  - Liquidity seems high since trading volumes are a multiple of the physical transactions required in EU ETS (5 times). Increased liquidity seems to be experienced in US T-Bond auctions.
  - Liquidity may increase if small companies have to pay for allowances - they are likely to take a larger interest in these costs and participate more actively in the market (not only for compliance).
  - As emitters have to pay for CO2 allowances, they are likely to take steps towards hedging risks associated with CO2 costs. This hedging demand is likely to increase the volume of market transactions and market liquidity.
- Negative impact on liquidity
  - SO2 market showed drying out of secondary market during early auctions. This might have been because of a long time-lag between bid submission and clearing price announcement and because auction was double sided, thus sellers used the auction instead of the secondary market.

Source: Matthes/Neuhoff 2007

Relationship of auctions vs. secondary market: impact on price

- Hypothesis: large supply of permits will reduce price on secondary market
- Empirical results: SO_2 and NO_x auctions do not support this hypothesis, auction price and spot price track closely
- Experimental results support empirical findings, auction and spot-market prices are close and show no regular pattern in the way that they differ

Source: Holt et al. 2007

Selling or auctioning small share of permits?

- Advantages of selling
  - simpler
  - lower transaction costs compared to auctions.
- Advantages of auctioning
  - operate effectively in conditions of low market liquidity (a characteristic of the immature market for EU allowances at present),
  - are highly transparent,
  - can potentially generate more participants compared to sales.

Source: ERM 2005

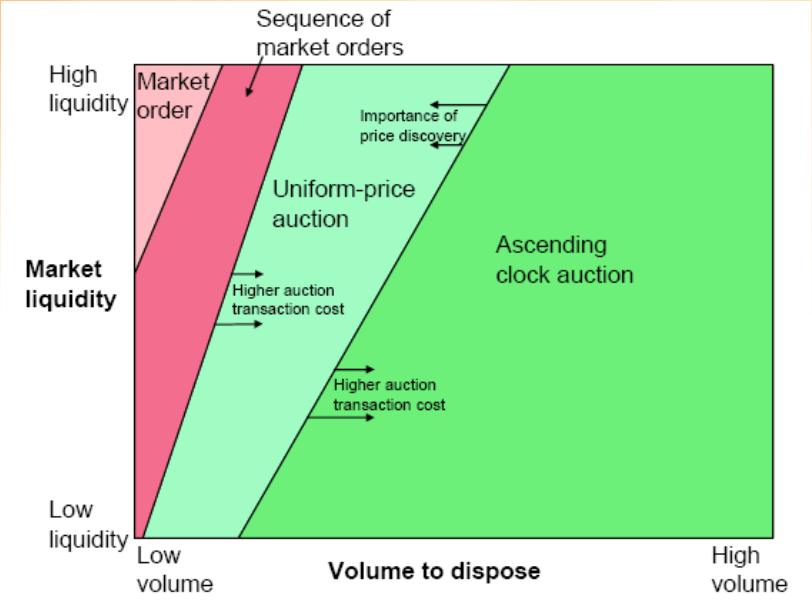
Selling or auctioning small share of permits?

An ascending clock auction is proposed if either of the following conditions hold *one month* before the scheduled auction event:

1. The volume to dispose of is more than 5 percent of the average daily traded volume over the last 5 days, according to the LEBA Carbon Index.
2. The volume to dispose of times the average sale price over the last 5 days, according to the LEBA Carbon Index, is more than £2 million.

Source: ERM 2005

Selling or auctioning?



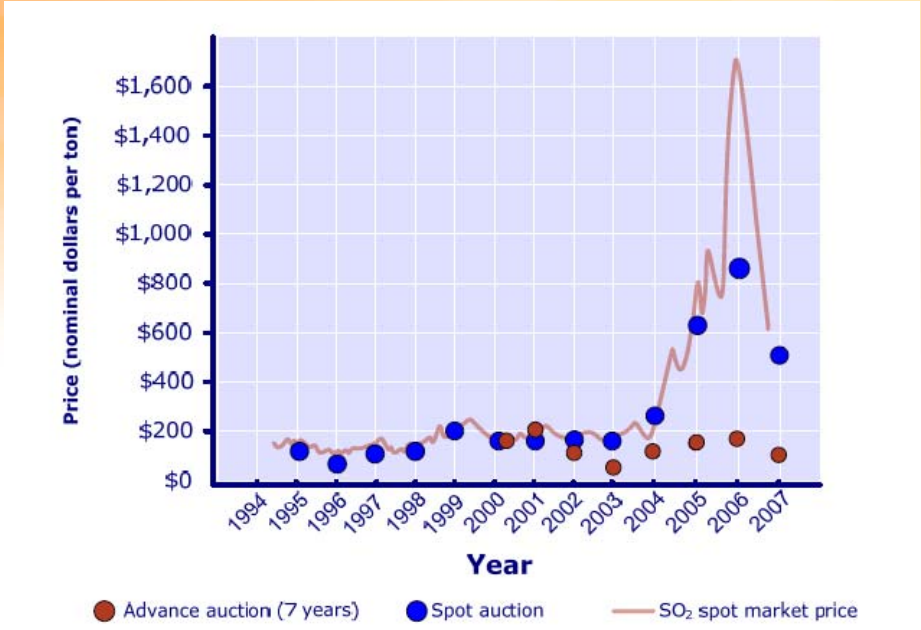
Source: ERM 2005

Experiences with past auctions

SO_2 Auction (Acid Rain programme)

- Scheme started 1995 (1st phase) for generators >100 MW and 2nd phase (2000) >25 MW
- 100% free allocation with 2.8 % mandatory auctioning (revenue recycled back)
- Auctions
  - Advance auctions:
    - 1993 (1995 and 2000 vintages)
    - 1994 (1995 and 2000, 2001 vintages)
    - 1995 to today: 7 year advance vintages
  - Annual spot auctions (every March)
  - Around 125,000 permits per auction (approx. 50% advance / 50% spot)

Price development - auction



2006 Clean Air Interstate Rule (CAIR) is announced which sets total caps to address transport of fine particles and ozone in the eastern United States

Lessons learnt from SO2 auctions

- Early auction was important to signal price and was more accurate than early bilateral trades or studies
- Auction only important in early years (e.g. early price signal and private selling), afterwards secondary market dominated (auction was informed by secondary market not the other way around)
- Spot auctions closely follow secondary market
- Advance auction was only effective in predicting the future market price before the regulatory change

NO_X Auction Virginia (2004)

- Part of NO_x SIP Call (19 States participate)
- 5% of allocation (1855 permits) to be auctioned in Virginia
- In June 2004: 2004 and 2005 vintages were auctioned
- Banking allowed but risk of depreciation

Lessons learnt from NO_x auction

- Spot and one-year advance auction
- Simultaneous clock auction recommended (based on experiments)
- Sequential English (ascending) clock auction (2004 first) implemented because of simplicity and time constrains
- Aim of high revenue achieved, price 5-7% above spot price on that day, no price decrease because of higher supply as predicted by traders
- Quick implementation and inexpensive to run (200,000 US$)

EU ETS Phase 1

- 4 Member States commit to auctioning for allocation
  - Denmark: 5% of budget (no auction so far)
  - Hungary: 2.5% of budget
  - Lithuania: 1.5% of budget (no auction so far)
  - Ireland: 0.75% of budget but 1.8% including NER
- More EU Member States committed to auction rest of New Entrant Reserve (NER)
  - No auction besides Ireland

Irish CO2 auction

- Auction budget: 1.2 Million t CO2
- In order to spread risk two separate auctions in 2006
  - 1st auction (250 kt), 2nd (963 kt)
- Aim of auction: finance administrative costs of scheme, minimise transaction costs, maximise participation and minimise strategic behaviour
- Sealed bid uniform price auction with a non-disclosed reserve price, demand schedule with up to 5 mutually exclusive bids
- Lot size of 500 EUAs to attract small emitters
- Pre-qualification requirements: valid account in registry, €3000 deposit

Hungarian auction

- Two auctions (11.12.2006 and 26.03.2007)
- 1.197 Million EUAs sold at clearing price of €7.42, 0.42 to 0.57 above price at secondary market
- Sell earlier higher revenue since price has dropped
- Shorter bidding phase (1 h)
- Don't announce reserve price
- Lower transaction costs to increase participation
- More transparency
- Suggestion: twice-a-week sale at ECX instead of auction (too little volume, Hungarian supply = 1.5 days volume)

Comparing timing and frequency

	SO2	NOX	Irish CO2	Hungarian CO2
Early auctions before scheme start	X			
Announced auction well in advance	X	X	X	
Announced auction shortly before conducting				X
Frequent auctions (more than once a year)			X	
Advance auctions	X	X		

Auction budget in Million EUAs p.a.	Phase I				Phase II	
	Auction share proposed	Auction share actual	Auction budget proposed	Auction budget actual	Auction share (%)	Auction budget
Austria	0.00%	0.00%	0	0	1.22%	0.40
Belgium (Flanders)	0.00%	0.00%	0	0	0.30%	0.18
Denmark	5.00%	0.00%	1.68	0	0.00%	0
Hungary	2.50%	2.50%	2.34	2.34	5.00%	1.49
Germany	0.00%	0.00%	0	0	9.00%	40.00
Ireland	0.75%+NER	1.81%	0.167	0.404	0.50%	0.11
Italy	0.00%	0.00%	0	0	5.70%*	12.00*
Lithuania	1.50%	0.00%	0.1838	0	2.79%	0.46
Luxembourg	0.00%	0.00%	0	0	(5.00%)	0.00
Netherlands	0.00%	0.00%	0	0	4.00%	3.70
Poland	0.00%	0.00%	0	0	1.00%	2.64
UK	0.00%	0.00%	0	0	7.00%	17.23
EU 27	**0.19%**	**0.12%**	**4.37874**	**2.7515**	**3.76%**	**78.217**

* Likely to be cancelled after Commission cut of Italy's NAPII

Comparison of Auction proposals

Proposal for EU (Matthes and Neuhoff)

- **Timing:**
  During trading period, no advance auctions
- **Frequency:**
  At least **monthly auctions** or even weekly if high percentage is auctioned and one auction for several Member States because:
  - The value of any individual auction is relatively small.
  - Emitters can buy allowances at times that match their requirements rather than determined by an exogenous schedule.
  - The risk of using the auction to exercise strategic behaviour seems to be smaller with frequent auctions.
  - Impact on secondary markets (where it would be negative in reducing liquidity) is limited.

Proposal for EU (Matthes and Neuhoff)

- **Distribution**
  Uniform distribution of permits over auctions because different groups need different distribution but weight between groups is unknown:
  - Front loaded: emitters selling output on forward contracts hedge the price risk of CO2 by buying allowances early on.
  - Uniform distribution: emitters selling products close to the time of production avoid open positions on CO2 by buying allowances close to their production time.
  - Back-loaded installations less concerned about CO2 price uncertainty. For example, because of limited emissions relative to turnover, might decide to buy allowances close to the compliance point.

Proposal for US RGGI (Holt et al.)

- **Timing**:

First auction to be held one year before scheme start

Advance auctions: Future allowances should be made available **four years** in advance of their vintage because:

  – Auctioning future vintages in advance should assist generators in their planning for future investments.

- **Frequency**

  The auctions should be held **quarterly** because:

  – benefits periodic price discovery

  – enhances liquidity without interfering with the performance of a secondary market.

Proposal for US RGGI (Holt et al.)

- **Distribution**:

  equal over all advance and spot auctions

		Regular Auction		Forward Auction	
Yr	Q	Vintage sold	% of vintage sold	Vintage sold	% of vintage sold
0	1	Y1	12.5%	Y2	16.67%
0	2	Y1	12.5%	Y3	14.3%
0	3	Y1	12.5%	Y4	12.5%
0	4	Y1	12.5%	Y5	12.5%
1	1	Y1	12.5%	Y2	16.67%
1	2	Y1	12.5%	Y3	14.3%
1	3	Y1	12.5%	Y4	12.5%
1	4	Y1	12.5%	Y5	12.5%
2	1	Y2	16.67%	Y3	14.3%
2	2	Y2	16.67%	Y4	12.5%
2	3	Y2	16.67%	Y5	12.5%
2	4	Y2	16.67%	Y6	12.5%
3	1	Y3	14.3%	Y4	12.5%
3	2	Y3	14.3%	Y5	12.5%
3	3	Y3	14.3%	Y6	12.5%
3	4	Y3	14.3%	Y7	12.5%
4	1	Y4	12.5%	Y5	12.5%
4	2	Y4	12.5%	Y6	12.5%
4	3	Y4	12.5%	Y7	12.5%
4	4	Y4	12.5%	Y8	12.5%
5	1	Y5	12.5%	Y6	12.5%
5	2	Y5	12.5%	Y7	12.5%
5	3	Y5	12.5%	Y8	12.5%
5	4	Y5	12.5%	Y9	12.5%

Source: Holt, Charles et al. 2007

Proposal for US RGGI (Cramton)

Figure 4. Recommended auction schedule

Auction date		Vintage							
Year	Qtr	09	10	11	12	13	14	15	16
2008	Aug	1/4	1/6	1/6					
	Nov	1/4	1/6		1/8	Steady State:			
2009	Feb	1/8	1/6			4 forward +		4 spot	
	May	1/8		1/6		each vintage			
	Aug	1/8			1/8				
	Nov	1/8				1/8			
2010	Feb		1/8	1/6					
	May		1/8		1/8				
	Aug		1/8			1/8			
	Nov		1/8				1/8		
2011	Feb			1/8	1/8				
	May			1/8		1/8			
	Aug			1/8			1/8		
	Nov			1/8				1/8	
2012	Feb				1/8	1/8			
	May				1/8		1/8		
	Aug				1/8			1/8	
	Nov				1/8				1/8

	Share
Spot	50%
Forward	50%
1 year ahead	1/8
2 years ahead	1/8
3 years ahead	1/8
4 years ahead	1/8

Only two auctions in 2008 (August and November) with forward sale compressed for 2009-2011 compliance period.

Source: Peter Cramton 2007

Australian proposals (NETT)

- **Timing**:
  - **First auction** before start of the scheme after first period of monitoring to ensure that necessary information is available
  - **Last auction** of one vintage within reconciliation period to give companies with unforeseeable shortage possibility to buy
  - **Advance auctions**: Future allowances should be made available **three years** in advance of their vintage:
    - to help establishing a future market
    - assist future investments (3 years is lead time for investments)
  - Premiers' Task Group recommends "A small number of future-dated permits, beyond 2020, would also be periodically auctioned in order to promote the establishment of liquid forward markets." Such far into the future auctions might bear high price uncertainty which might reduce participation to speculators and lead to "bad price signals".

- **Frequency**
  The auctions should be held **quarterly** :
  - To minimise transaction costs
  - enables both price and quantity risk management
  - assist government to generate higher revenues if prices are volatile

Australian proposal NETT

Distribution:

- Slightly front-loaded (20% in advance vs. 15% in spot)

Figure 5.3: Timing, frequency and distribution of permits across auctions

Auction date Year	Qtr	Financial Year of Emission Permit Vintage 10/11	11/12	12/13	13/14	15/16	16/17	17/18	18/19
2009	Aug								
	Nov	20%							
2010	Feb								
	May	20%	20%		20%				
	Aug	15%							
	Nov	15%							
2011	Feb	15%							
	May	15%	20%	20%		20%	4 products available at auction		
	Aug	s_i	15%						
	Nov		15%						
2012	Feb		15%						
	May		15%	20%	20%		20%		
	Aug		s_i	15%					
	Nov			15%					
2013 after review	Feb			15%					
	May			15%		20%		20%	
	Aug			s_i	15%				
	Nov				15%				
2014 after review	Feb				15%				
	May				15%		20%		20%
	Aug				s_i	15%			
						etc			

Comparison of proposals

- EU ETS is missing early auctions before scheme start or advance auctions (EU ETS different units because of phase approach)
- Trend to at least quarterly auctions
- Not more than 3-4 years of advance auctions proposed
- Number of auctions of one vintage depends on total auction share
- Equal or slightly front-loaded distribution of permits across auctions

Questions

- Do we need each vintage in each auction?
  - What is the additional information?
- Does it make sense to vary auction design
  - Depending on the share of auctioning (full, small share, double vs. one sided auctions)?
  - With time period in which is auctioned (early auctions different to later auctions)?
- When (which proportion of auction vs. free allocation) would it be preferable selling on the market instead of auctioning?
- How far in advance does it really make sense to auction?

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