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How to auction permits and predict the carbon price in Australia?

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Overview

- Project update
  - *Project 13: Designing environmental policy for Australia from an economic and social perspective*
- Update on auctioning discussion in Australia and experimental outline
- New topic: Prediction market to predict the carbon price in Australia

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Overview of topics

Topics	Team Members	Presentation
Auctioning versus free allocation		
Evaluation of the efficiency of the EU Emissions Trading Futures market	Oli Sartor Paul Twomey	EERH presentation
Impacts of Strategic Market Interaction and Initial Permit Allocation on the Carbon Price	Evan Calford Christoph Heinzel	AARES presentation (Wed. Session 9)
Distributional impacts of free allocation versus auctioning	Karsten Neuhoff (Cambridge Uni)	Chapter of Climate Strategies Report
Design of Greenhouse Gas Permit auction	AJ Bostian Paul Twomey	EERH presentation
Sanction design	Phillia Restiani	EERH presentation
Linkages among Emissions Trading Schemes(ETS)	Frank Jotzo (ANU)	EERH presentation
Prediction Market	AJ Bostian	EERH presentation
Potential interaction of renewable energy target and ETS (NEW)	Christoph Heinzel Iain MacGill	EERH presentation

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Overview of outputs

Topics	Status of publications	Workshops
Auctioning versus free allocation		
Evaluation of the efficiency of the EU Emissions Trading Futures market	Working Paper in progress	
Impacts of Strategic Market Interaction and Initial Permit Allocation on the Carbon Price	Working Paper forthcoming	
Distributional impacts of free allocation versus auctioning	Chapter of Climate Strategy Report	September 2008
Design of Greenhouse Gas Permit auction	1st Draft	November 2007
Sanction design	Working Paper on theory part forthcoming	
Linkages among Emissions Trading Schemes(ETS)	2 Publications	April 2008
Prediction Market	Working Paper in progress	
Potential interaction of renewable energy target and ETS (NEW)	Just started	

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How to auction?

- Many different options exist to design the auction: sealed-bid vs. open-bid, dynamic vs. static, uniform price vs. pay as your bid...
- Challenge:
  - Multi-unit, multi-item (different vintages) auctions
  - Trade-off between simple vs. complex design and efficiency for the type of good (e.g. Simultanious auctions seem to be favoured in a multi item setting when partial substitution is possible)
- White Paper: Simultaneous clock auctions with intra-round and proxy bidding held monthly
- CERF/EERH-Project: Test different designs experimentally to see if complexity outweights efficiency, compared to the more simple design

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Main findings literature review

- Many accepted and important results from single-object auctions have been proven not to generalise to the multi-object case
- Most authors only vary the number of items Mishra and Parkes (2007) or units demanded like Miyake (1998), Armstrong (2000), and Mishra and Garg (2006), but rarely both
- Simultaneous versus sequential auctions: sequential auctions are more susceptible to various types of collusive behaviour (Sherstyuk and Dulatre, 2008)

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Ascending Clock Auction

- Auctioneer publishes total available quantity, initial reserve price and further schedule of price offers
- Participants hand in demand bids for the reserve price
- Auctioneer reveals total demand
- As long as total demand > total available quantity auction goes on
- Demand bids cannot increase
- Auction ends when total demand ≤ total supply
- Final price: **uniform pricing:** p_t=if total demand = total supply or p_{t-1}= if total demand < total supply (normal case)
- All bidders receive their quantity of last round (normal case)
- The remaining supply is allocated proportional according to residual bids at p_{t-1}

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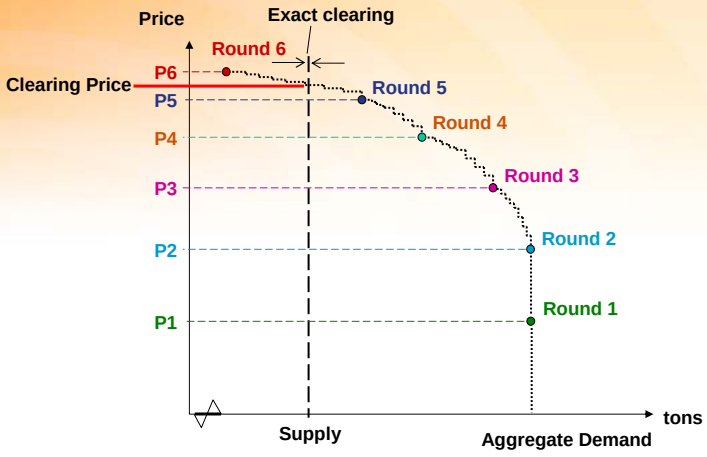
Ascending clock auction with intra-round bidding



Source: Peter Cramton presentation 2007

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Timing and frequency

Box 9.9: Possible timing of auctions and proportion of permits available at each auction in 2009-0 to 2011-12

	Financial years																							
	2009-10						2010-11												2011-12					
Vintage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010-11				1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16						1/16
2011-12					1/16	1/16	1/16												1/16	1/16	1/16	1/16	1/16	1/16
2012-13						1/16	1/16												1/16					
2013-14			Transition				1/16												1/16					
2014-15																			1/16					

Note: Entries represent the fractions of permits from each vintage year cap excluding administrative allocations.

At most 4 simultaneous clocks

Problem of demand shifting between clocks, therefore mobility rules

Source: White paper 2008

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Experimental outline (treatments)

	Clock	Sealed-Bid
Sequential *Oldest to newest*		Highest rejected bid
Simultaneous *Unlinked*		Highest rejected bid
Simultaneous *Linked*	Mobility rule	Bin sorting

Compare efficiency of those different auction types

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Prediction market

- Why do we need a prediction market for CPRS?
  - Early price is important as investment takes time
  - Future markets will not be liquid at the beginning
- Wisdom of Crowds: A case in which the information needed to generate a forecast is held collectively, not by any single individual.
  - Aggregation problem: How can the collective information be aggregated into a forecast?
  - A Prediction Market uses a competitive market to aggregate collective information.
- Why Does This Work?
  - Markets are belief aggregators by nature.
  - Eliminates cheap talk in the forecast.
  - Forecast is based on the marginal trade, which is typically better informed than the average opinion.

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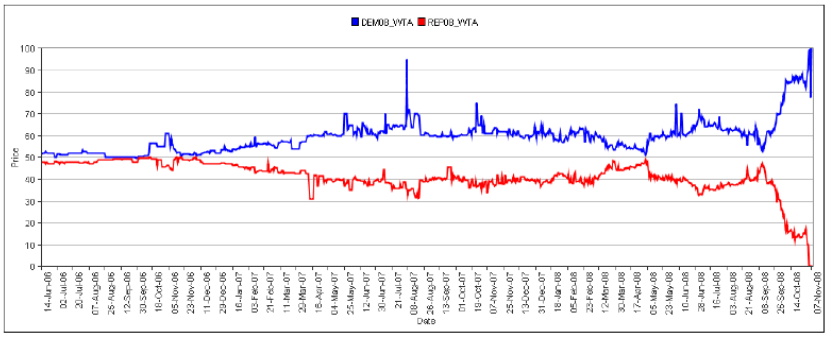
Prediction market for US elections

2008 Presidential "Winner Take All" Market



Source:
http://iemweb.biz.uiowa.edu/quotes/Pres08_Quotes.html.

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Prediction Market on CPRS price

Prediction Markets involve trading Shares of Events.

Multi-Event Winner Take All market to forecast the price of CPRS permits at the first auction.

- Event 1: Auction price is $0 to $9.99.
- Event 2: Auction price is $10 to $19.99.... etc.

- Shares pay $1 if the Event occurs, $0 otherwise.
- Share prices interpretable as the probability of the Event occurring.
- Provides a forecast about the likelihood of all prices, not just a point forecast.
- Runs from Early 2009 to first auction (tentatively Early 2010).
- To start early 2009 (sorting out legal details with Bank partner)
- A Rare Operationalisation of a Pure Prediction Market:
  - Open to anyone in Australia.
  - Participants use their own money, up to $500.
  - No transactions fees. Not-for-profit Ethics approved.
- Joint us for the prediction market: www.ceem.unsw.edu.au

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