

The future of carbon markets and their interconnection

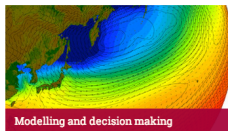
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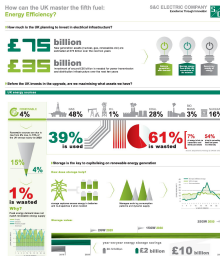
Grantham Research Institute at LSE

The GRI is a multi-disciplinary ESRC Research Centre at the London School of Economics, chaired by Lord Nicholas Stern.



Carbon trading and finance at GRI

- Mechanism and ETS design
 - 1 EU, Australia, CA, China;
 - 2 ETS market oversight;
 - 3 Linking ETSs;
 - 4 Climate finance.



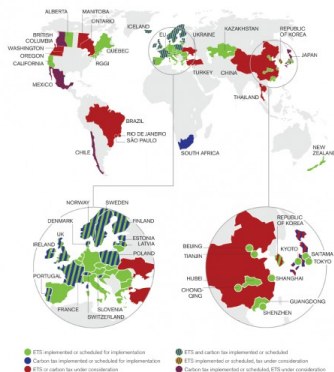
- Energy economics
 - 1 Technology adoption and innovation;
 - 2 Low-carbon energy;
 - 3 Electricity market reform;
 - 4 Energy security.

Agenda

- International carbon markets
- Why linking?
 - Economic and political motivations;
 - Practical considerations.
- Carbon dating (based on LSE research work)
 - The key factors that determine when linking is beneficial;
 - Carbon dating in the real world.
- How linking? Existing links and the Paris Agreement
 - Bottom-up linking concepts and initiatives (WBG, WTO, UNFCCC).

International carbon markets

Figure 2: Summary map of existing, emerging, and potential regional, national and subnational carbon pricing instruments (ETSs and tax)³⁴



³⁴ Carbon pricing instruments are considered "implemented" or "scheduled for implementation" since they have been formally adopted through legislation.

- World Bank (2015) identifies one region consisting of 31 nations, eight individual nations and 23 sub-national jurisdictions implementing Emission Trading Systems (ETSs).
- A bottom-up policy architecture where ETSs interact can be a significant element of the global climate change policy framework in the future.

Why linking?

- Economic motivations
 - Abatement costs being minimised across a larger pool of regulated firms;
 - Improved liquidity resulting in decreased transaction costs, and
 - Lower overall price variability and thus reduced price uncertainty (depending on who is the linking partner, more on this later).
- Political motivations
 - Linking locks-in ETS as (one of) the local regulatory choice(s) to control emissions
 - Thus the risk of regulatory capture (against ETS) is reduced;
 - Contributes to a level playing field that can facilitate international cooperation
 - Alleviates competitiveness concerns among economies;

Practical considerations

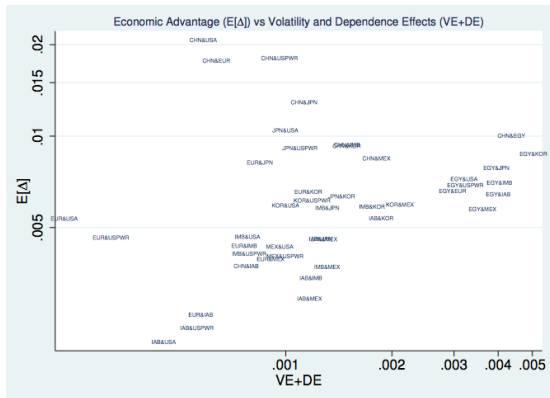
- Need for regulatory changes to ensure regimes are compatible:
 - Monitoring, reporting and verification (MRV) of emissions.
 - Enforcement and penalty mechanisms.
 - Registry system.
 - Cost containment mechanisms.
- You need to choose the right partner!
- May be easier to link systems which are designed from the start to be linkable (see CA and Quebec under the WCI platform).

Enter 'carbon dating'

- There is a missing opportunity when markets operate independently.
 - If companies in different markets were able to trade, they could make savings every time the price of permits varied across markets.
- In a recent paper we analysed the potential cost savings when previously isolated markets are linked.
 - Title of the paper: *Carbon dating: When is it beneficial to link ETSs?*
- Our study examined how key factors characterizing the jurisdictions determine whether linking carbon markets, what we call *carbon dating*, is worth it.
- So, what does make a good carbon date?

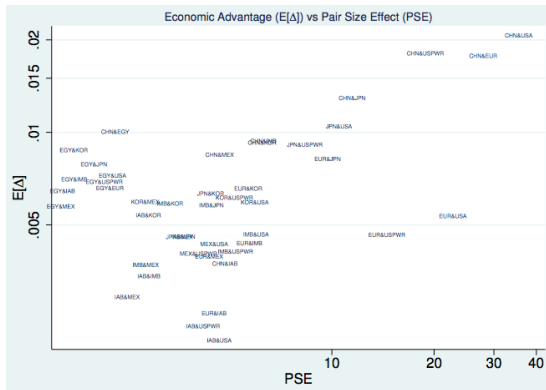
Opposites attract

- We found that opposites attract. A country prefers the demand in its partner's market to be more variable (it changes over time) and inversely related to its own (my demand is up when yours is down).
- This makes the gains from trading larger.



The market size of linking partners matter

- The smaller market tends to benefit most from cost savings.
- In practice, the most mutually beneficial links are likely to be between countries of a similar size, particularly if these markets are subject to different economic fluctuations.



Getting off to a good start

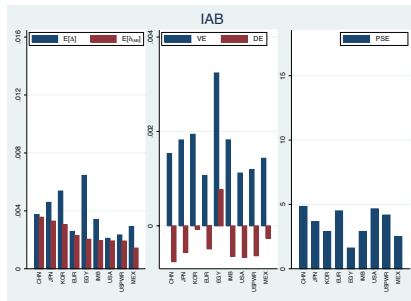
- Negotiating the partnership, harmonising market rules and setting up a platform for international transactions is complicated work, and no link will make economic sense if these upfront costs are too high.
- Conversely, if the costs are negligible, both partners will be better off (similar ETS design = negligible negotiation costs).
- This is likely the reason why negotiations between the EU and China have barely started whereas those between the EU and Switzerland have successfully concluded.

Carbon dating in the real world

- We used data from South Korea, various European countries, China, and the international aviation sector to model how each would benefit from wider carbon credit trading.
- We found the benefits of links between “large and similar” markets can be dwarfed by those between “small but different” markets. So instinctive decisions – such as trading with a large partner, or your neighbour – can actually end up having costly consequences.
- Under a few strong but not outlandish assumptions, it may appear to make sense for the international aviation sector to partner with the US because the latter is so large.
- But in our analysis it would make more sense for the aviation sector to partner with Korea, in part because they are so different from one another.

Are these factors relevant in reality?

- The left graph exhibits total benefits and jurisdiction benefits, the middle graph the volatility and dependence effects, and the right graph the size effect.



- Linking partners for jurisdiction in the title are ordered so that the link with the left-most partner is its most preferred, i.e. has the largest jurisdiction specific benefit.

Examples of link types

Systems involved	Type of link
California and Québec (Ontario and Manitoba intend to join the system)	Two-way
RGGI	Multilateral link among participating states
Tokyo and Saitama	Two-way
EU and Norway	Two-way (began with one-way link with Norway as buyer)
Intended link between Australia and EU	Intended to be one-way (with Australia as buyer) during first phase, evolving to a two-way link
EU and Switzerland (not entered into force yet)	Two-way

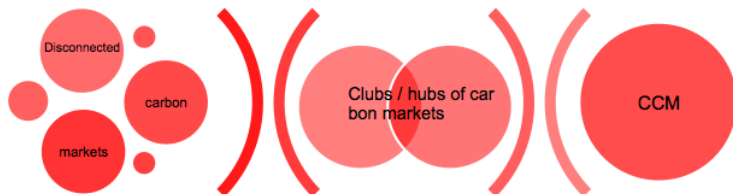
The Paris Agreement

- The Article 6 of the Paris Agreement contemplates three broad mechanisms:
 - ① cooperative approaches on a voluntary basis (Article 6(1)–(3));
 - ② a mechanism to contribute to the mitigation of greenhouse gases and support sustainable development (Article 6(4)–(7), “Cooperative Measures”); and
 - ③ a framework for non-market approaches (Article 6(8) and (9), “Sustainable Development Mechanism”).

Cooperative measures

- Cooperative Measures is a decentralised mechanism that allows voluntary bilateral and multilateral linkages of markets, for example, into a “carbon club”.
- These linked markets may be able to trade internationally transferred mitigation outcomes (ITMOs) in a manner supported by robust accounting to avoid double counting.
- It is clear that ITMOs are wider than the Kyoto Protocol concept of assigned amount units.
- We assume the generic nature of an ITMO is aimed at capturing multiple types of emission rights that may be the basis of the linkages established by two or more participating countries.

Bottom-up linking concepts



Linking by degrees

- A broader process incrementally aligning program elements
- Can be at regional, national, and international levels
- See [Burtraw et al \(2013\)](#), [Mansell & Munnings \(2013\)](#), who use this concept in reference to the pre-link phase

Clubs / hubs of carbon markets

- A multiplicity of clubs, each evolving around a set of initial commonalities
- Aimed at advancing the development of carbon markets & facilitating linking
- To avoid extreme fragmentation, some basic standards could be agreed at the international level
- See [Victor \(2015\)](#), [Haug et al \(2015\)](#)

Club of Carbon Markets

- To support the development, harmonisation and increased ambition of domestic carbon markets
- Can be in parallel to but outside of the UN climate talks
- Mutual recognition of carbon emissions units among members
- Provides a carbon market infrastructure needed to support linkages

Conclusions

- There is a missing opportunity when markets operate independently.
- Linking is always beneficial, but what does make a good ‘carbon date’?
 - opposites attract;
 - market size of linking partners matter;
 - negotiation costs could eat up all benefits.
- Carbon dating in the real world
 - “Large and similar” markets can be dwarfed by those between “small but different” markets.
 - This could make South Korean ETS a good linking partner.
- The Paris Agreement opens a new era in international climate action with much stronger support for ETSs.

Contact details

Thank you very much for your
attention.

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