

Some Insights on Intertemporal Emissions Trading and Supply-Side Control Instruments

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based on joint works with Raphaël Trotignon

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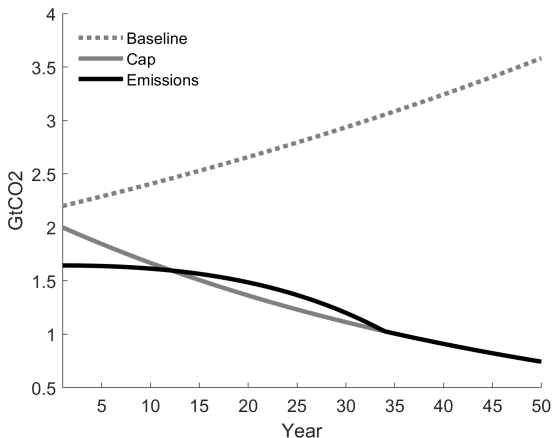
Climate Economics Chair

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Intertemporal Emissions Trading: Basic Tenets

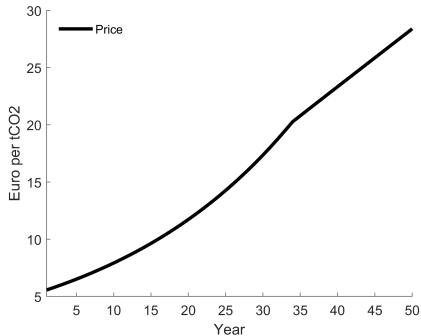
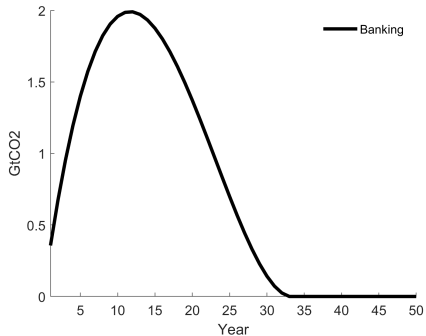
- Regulated firms can bank (store) unused permits for future compliance
→ reduction in regulation costs + some cushioning of demand shocks
- Cost minimizing firms accumulate a permit bank and draw it down later



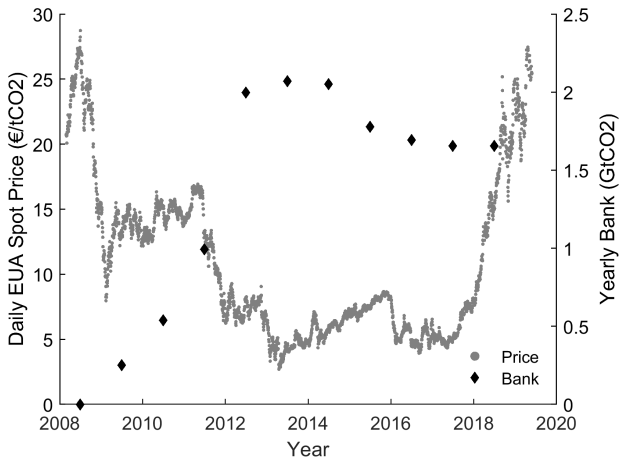


Intertemporal Emissions Trading: Basic Tenets

- Hotelling rule applies: how to best tap into a finite resource (permits)
→ in banking period: equalization of discounted MACs over time
- Role of firms' risk and managerial preferences, perceived stringency

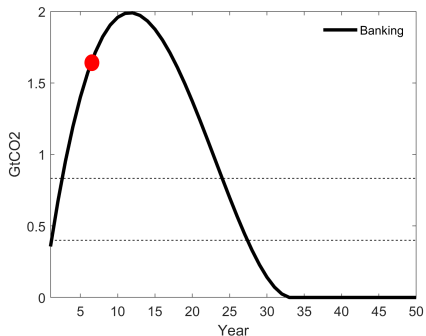


History of Price & Banking Levels in EU ETS



- Moribund market in 13-17 (crisis, companion policies, reg uncertainty)
- Since May 2017: +400% ↗ (MSR-driven massive supply squeeze)
→ expected stringency drives price formation, not «the surplus»

2018 Reform & Market Stability Reserve



- MSR \equiv soft banking collar
 - adjusts auctions_t based on bank_{t-2} and bank_{t-1}
 - withdraws first, releases later

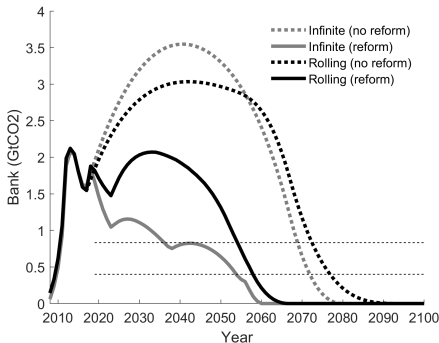
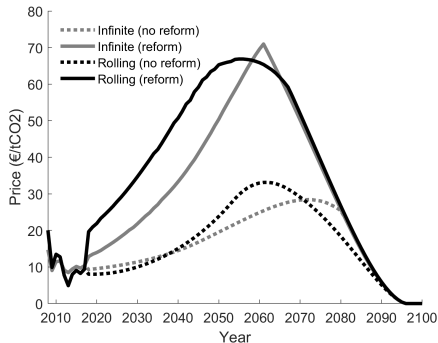
- How does the MSR affect firms' intertemporal decision making?

- Add-on cancellation mechanism \rightarrow cumulative cap is endogenized
- Impacts hinge on firms' behavior: horizon and responsiveness to MSR

Model & Calibration

- Rich variety of observed trading and compliance behaviors
 - autarkic compliance via banking & borrowing, active non-compliance entities
 - difficult to elicit firms' degree of and horizon for intertemporal optimization
 - various risk and managerial preferences to handle compliance and trading
- Firms can utilize infinite or rolling finite horizons (Goldman, 1968)
 - rolling horizons are a reality (std mgt process, fut maturities, reg uncertainty)
- Lack of conclusive evidence → Friedman's black box type of approach
 - infinite vs rolling horizons in how well they replicate 2008-17 outcomes
 - calibrate resultant of all firms' behaviors with usual representative firm model
- Two-step calibration in spirit of standard least squares MLE
 - infinite: $h = \infty^*$ $r = 7.06\%$ vs rolling: $h = 12y$ and $r = 3\%^*$
 - RH reconciles bank dynamics with implicit discount rates (+better on price)

Infinite vs Rolling Horizons & 2018 Reform



- Case with cancellation mechanism and full responsiveness of firms
 - reform impacts depend on firms' behavior (horizon and responsiveness)
 - 2018 price jump (partly) recovered by a rolling horizon
 - cumulative cancellations: 5 (infinite) vs 10 (rolling) GtCO₂
 - in WP: decompose impacts of (interaction between) LRF ↑, MSR, cancellation

2021 ETS Review & How to Raise Ambition?

- Raising ambition is at the core of current policy debate
 - national level: implement demand-reducing or cancellation policies, price floor
 - EU level: reinforce companion or non-ETS sector policies, **ETS review**
- General remark: How to express targets?
 - annual targets are tricky/misleading given intertemporal trading
e.g. reaching 0 emission in 2050 requires that the cap be zero before 2050
 - even more so true now that the MSR is in place
- Two ways of raising ambition within ETS perimeter
 - higher *Linear* Reduction Factor for the cap
 - reinforced MSR (augmented intake rate and thresholds)
- Not equivalent when firms utilize rolling horizons
 - transitional stringency as important as cumulative stringency if not more
 - MSR frontloads abatement effort: more effort perceived early on w.r.t. LRF_{eq}
- LRF-MSR interaction: complements or substitutes?
 - ambiguous: higher LRF induces shorter banking (and thus MSR intake) period

Thanks for listening

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Link to LSE WP: [Emissions Trading with Rolling Horizons](#)