Carbon Policies and Corporate Strategy

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Outline

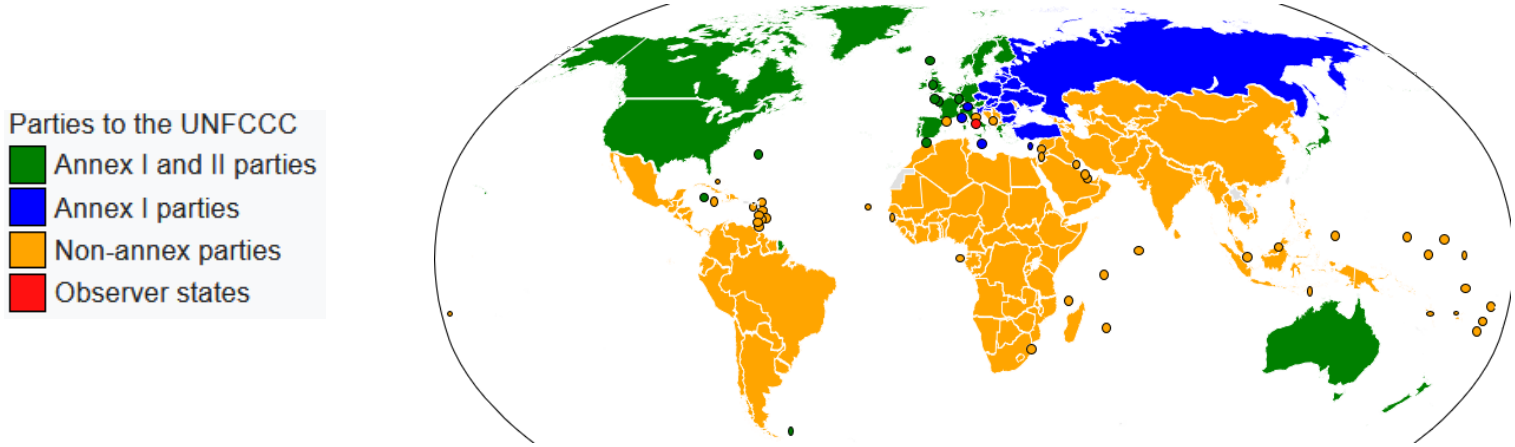
- Limits and advances of market-based government policies
- Corporate carbon strategies:
  - Why do more than following the rules, and do what?
  - Carbon targets
  - Voluntary disclosure
  - Internal Price of Carbon
  - Scope decisions
  - Voluntary offsets
- Corporate carbon strategies are intertwined with government policies, even when they go beyond mere compliance

Market-Based Carbon Policies

- Principle of market-based policies: decentralize decisions about decarbonization, for the sake of efficiency
  - Contrast to command-and-control: successful for 100% bans (CFC)
  - But efficiency is crucial for energy transition: gradual and at gigantic cost
- First principles for efficient carbon prices
  - I. marginal abatement cost the same everywhere
    - Requires a price signal, either carbon tax or cap-and-trade
    - In practice, large-scale emissions trading much harder under a tax system
  - II. universal and uniform carbon price (externality is uniform)
  - III. efficient intertemporal allocation of carbon reduction effort
    - cumulative stock of GHG matters: trade off abatement today and tomorrow
    - social cost of carbon (SCC) increases at appropriate discount rate (Hotelling), reflecting link between cost of decarbonization and long-term risk ("carbon beta")

Market-Based Policies and Kyoto

- UNFCCC process from Rio 1992 to COP26 always had a strong dose of market-based policies. As has EU policy and many national policies
- Kyoto 1997: start to large-scale carbon trading
  - Kyoto "flexible mechanisms": offsetting projects can be developed only by Non-annex countries (Clean Development Mechanism, CDM) and Annex I countries (Joint Implementation, JI)



Flexible Mechanisms: Outcomes

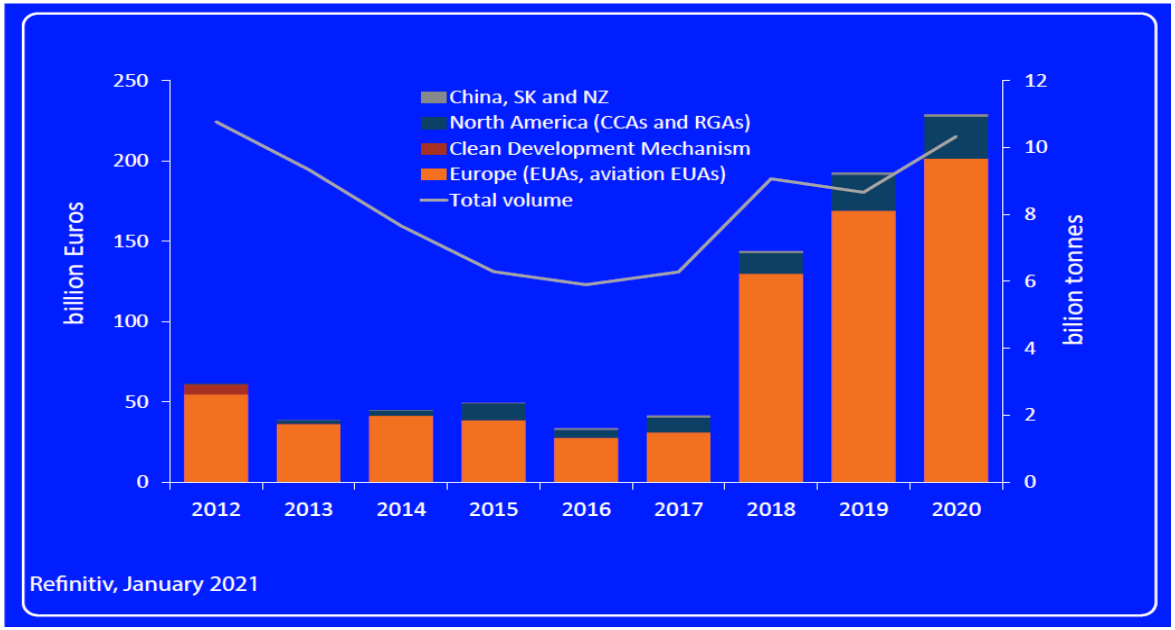
- Clean Development Mechanism in theory decently designed:
  - Additionality and verification core concerns from the start
    - CDM Executive Board approves projects, need to show additionality
    - project deemed additional if realistic alternative scenarios more economically attractive, or if CDM helps it to overcome barriers
- Active trading from 2005 to 2020
  - CDM: 2 Gt CO2e of certificates in 8,000 projects (111 countries)
    - > 60% issued by China, then India, Brazil, Uzbekistan
  - JI: 0.9 Gt CO2e of certificates in 64 projects (17 countries)
    - Mostly projects in Ukraine, Russia, Eastern Europe
  - Both certificates accepted by EU ETS since 2012
    - Market dominated by EU ETS: 80% bought by EU companies (buying 96% of allowed quota) = ~10% of total EU ETS allowances
    - prices collapsed after GFC (together with EU ETS), never recovered
    - Trading at $ 0.1-0.2/t CO2e after 2012

The Failure of the Kyoto Mechanisms

- CDM/JI achieved volume, but very limited additionality
  - CDM Executive Board largely captive to issuer interests: laxity compounded by difficulty to define additionality
    - baseline often depends on hypothetical scenario modeling, with reference to similar activities
  - DM countries had no emission target = absence of baselines
    - recipients got credits while hugely increasing emissions (China, India, Brazil)
  - only 2% of CDM projects (7% of CDM credits) were additional (SEI/Oeko-Institut, 2016)
    - many abuses with large industrial gas projects (HFC)
    - many coal power plants in CDM (at least 10GW, in CN + IN)

Markets for Carbon Cap-and-Trade

- Most important cap-and-trade markets in 2021:
  - EU ETS, since 2005
  - China: launched in July 2021, only covering energy, but soon industry. Nominally larger than EU ETS. Price collapse mimics early EU ETS.
  - California/Quebec (WCI, 2007) and 12 Northeast US states (RGGI, 2009)
  - South Korea (K-ETS) and New Zealand ETS



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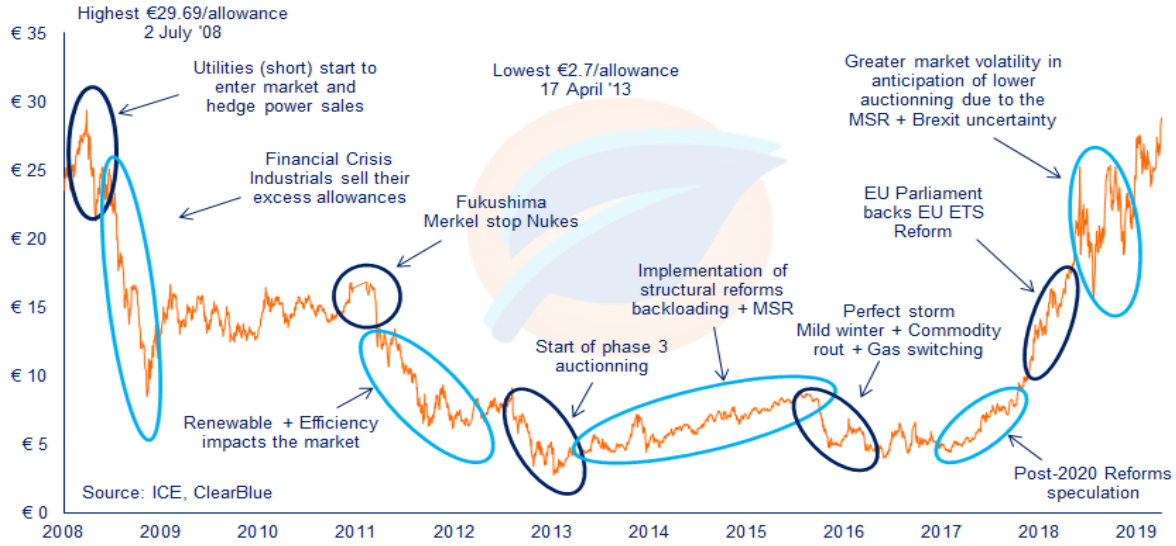
EU Emission Trading System (ETS)

- Energy and thermal plants > 20 MW, energy-intensive industries (cement, steel, …): 11,000 plants, ~40% of EU emissions, mainly CO_2
- Too generous allowance allocations (weak Kyoto commitments)
  - insufficient anticipation of improved carbon intensity & energy mix
  - price crash in 2008: emissions count reveals oversupply + GFC
    - not fixed for 10 years, tightening of system after 2013 too reluctant



Source: Matthew James, energypost.eu

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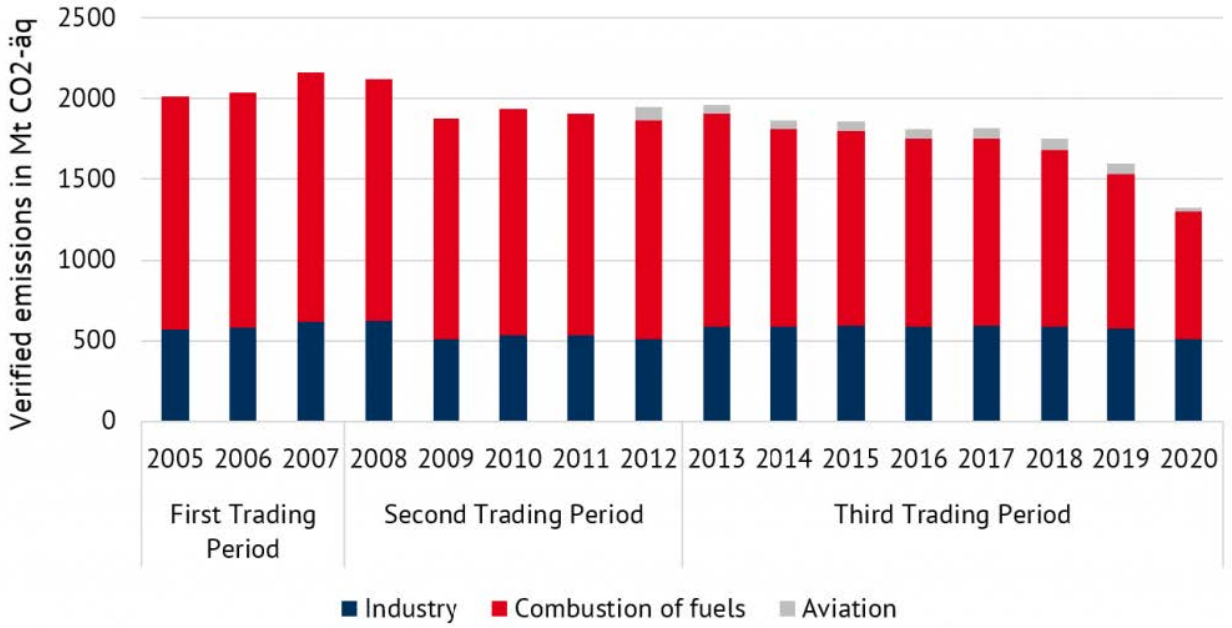
EU ETS: A Painful History, But Advances

- Serious attempts to fix only in 2017, with strong price reactions
  - Market Stability Reserve (MSR) since 2019 to tackle oversupply
    - MSR withdrawal in 2019 = 24% of total allowances
  - Increase annual reduction rate to 2.2% p.a. since 2021
- Decline of verified emissions: 2008: 2.1 Gt; 2019: 1.5 Gt
  - Mostly because of switch in electricity: coal to gas and renewables
  - After 15 inglorious years: world's most successful cap-and-trade system



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"Fit for 55"

- "Fit for 55" EU Commission proposal in July 2021, part of EU Green Deal
  - 37% reduction from 2019 to 2030 (55% from 1990). 61% from ETS sectors
  - EU ETS reforms:
    - Steeper annual decline of allowance, by 4.2% p.a. (from 2.2%)
    - CBAM and gradual end of grandfathering (currently, 30% still grandfathered)
    - strengthen MSR
  - Include shipping in EU ETS: for large ships calling at EU ports
  - Aviation: intra-EEA flights in EU ETS since 2012, end free allowances in 2027
    - But CORSIA for extra-EEA flight: fully relies on voluntary carbon offset markets
  - Create second ETS for road transport and buildings
    - with cap that declines annually, to reach 43% reduction 2005-2030
    - no free allowances
    - possible merger with main ETS, after "a few years of functioning"
  - Social Climate Fund + Energy Efficiency, Renewables, Tax Directives
- Before and after announcement: strong market reaction on EU ETS

CBAM

- Carbon Border Adjustment Mechanism: addresses carbon leakage
  - For limited number of sectors: steel, cement, fertilizer, alu., power
  - financial adjustment based on EU ETS carbon price
    - after adjusting for carbon price in country of origin and intra-EU free allocations
    - importers need to buy certificates
  - start in 2023, fully phased in by 2026. Then EU ETS free allowances decreased by 10% a year
  - Progress on global political acceptance: G20 final communiqué mentions need to coordinate on carbon pricing schemes

COP 26: Agreement on Article 6

- Art. 6 of Paris Agreement: New instrument of global carbon trading
  - no agreement at earlier COPs: Kyoto failure largely to blame
- Deadlock since based on two ideas that do not mix well: carbon trading and North-South equity
  - SDM (sustainable development mechanism) resembles CDM
  - but important differences: all countries now have emission target
    - some safeguards against double-counting, preventing seller countries cannot count credit to own GHG target
  - EU countries insisted on CDM credits not being carried forward to Paris framework, but didn't prevail at COP26
  - missed opportunity for a universal carbon price: reluctance of EU and divisions will prevent it becoming the basis for globally linked ETS

Mixed Carbon Price Signals

- Governments do not want to implement carbon prices
  - fear of political repercussions when energy prices of increase
    - even though solutions exist to redistribute carbon revenue to large majority
  - political realities favor the use of hidden carbon taxes and subsidies
  - result: contradictory price signals and capital misallocation
    - E.g., the implicit carbon price in the EU vehicle fleet standard is at least 600€/t CO2, while carbon offsets can be purchased at 2€/t CO2e
    - current dual approach (in France), with carbon tax of 44€/t for non-ETS
- Avenues for better carbon prices (Gollier and Reguant, 2021):
  - build carbon policy around ETS as anchor price
  - introduce price band/collar ("safety valve")
    - or at least a price floor, as in UK ETS
    - Needs expansion of MSR to full-fledged carbon stability agency

Corporate Carbon Strategy

- Do more than compliance, and what?
- Carbon targets
- Disclosure
- Internal Price of Carbon
- Scope decisions
- Voluntary offsets

The Stakeholders of Carbon Strategies

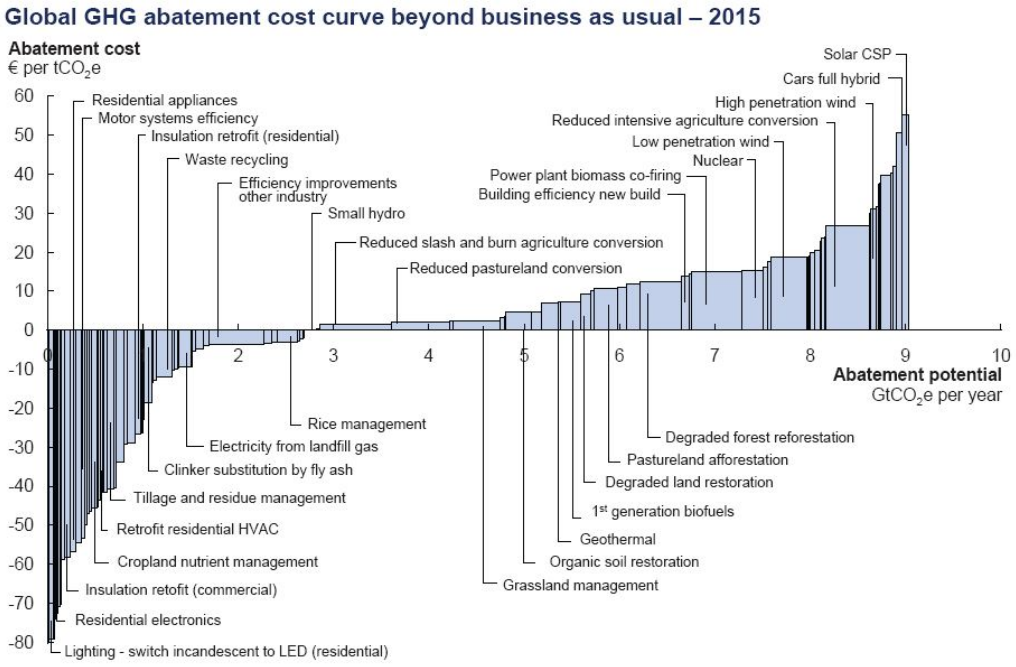
- A variety of motives behind voluntary carbon policies :
  1. A corporate CSR conviction: putting weight on social value besides profits
  2. Stakeholder model: because being attention to stakeholders serves shareholders well (“strategic CSR”)
  3. Because of shareholder CSR preferences
  4. anticipation procures strategic advantage
- What are sound motives?
  - 1. only works because of 3. (shareholder CSR preferences)
  - 2. and 4.: yes, but beware the competition

Do More Than Compliance, and Do What?

- Corporate CSR policies and governments compete for same objectives: internalize externalities and provide public goods
- What principles for an efficient assignment of roles?
  - Subsidiarity: CSR policies only socially beneficial when corporations more efficient than gov. in producing public goods (Besley and Ghatak, 2007)
  - No priority for government, but efficient division of labor: for each issue, more efficient party should be in charge:
    - government when private actors would be ineffective (coordination problems, need for coercive enforcement)
    - corporate actors when governments fail: political inertia, lobbies and capture, limited territoriality, inefficiencies in public decision-making
    - failure of public carbon policies an object lesson
  - Corporate actors (and financial markets) have a role to play in overcoming government resistance and failure
    - carbon pricing, international agreements

Carbon Targets: "Net Zero 2050"

- 73% of European companies have a carbon target (Fitch). Many target "Net zero 2050". Is it a good thing?
- Yes: Long-term quantity goals matter (see NDCs, Fit-for-55). GHG emissions the single most measurable ESG objective.
- But abatement costs differ: net zero 2050 for everyone cannot be efficient



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

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Detailed Carbon Targets

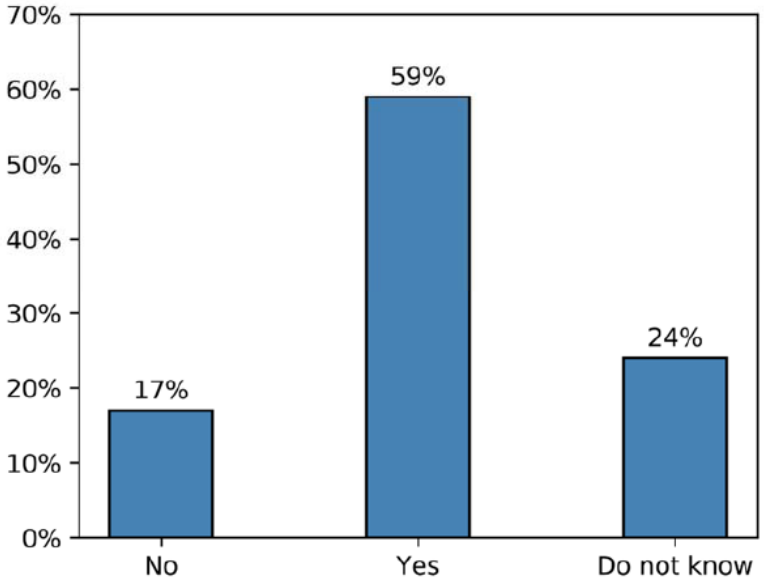
- Fixing carbon targets:
  1) Carbon targets should be and sector- or company-specific:
     - Targets should be fixed in accordance with SCC: hard-to-decarbonize companies will still emit when others already at negative emissions
     - The right targets are specific to each activity and granular
  2) Targets need a detailed strategy and verifiable annual milestones
     - If not, carbon target is leaving the job to successors
     - volume and carbon intensity metrics (uncertainty re. growth and scope)
     - Beware of metric shopping: continuity, backwards reporting, scope
       - ESG asset managers will always report more impressive carbon reductions than there will be in reality

Voluntary Disclosure

- Should we expect companies to adopt efficient voluntary disclosures?
  - Wide heterogeneity in voluntary reporting :
    - Only 18% of firms wordwide with voluntary carbon disclosure in 2018 (Bolton and Kacperczyk, 2021)
    - 50% of US companies have only boiler plate ESG disclosure (SASB)
  - Obstacles to efficient voluntary disclosure:
    - manager incentives and cost of disclosure
    - concerns about competitors when disclosing voluntarily
  - Ultimately, again, shareholders/institutional investors are key:
    - Shareholders may not feel concerned, have difficulties to express voice
    - But mechanisms help investors overcome these obstacles :
      - investor coordination and common ownership
      - preferences of ultimate investors
      - portfolio reallocations, exert pressure in favor of disclosure

Institutional Investors: Voluntary Disclosure

- Ilhan, Krueger, Sautner, Starks (2020): survey of > 400 large asset managers: Support for disclosure, willing to engage, corr. with belief that carbon mispriced
- Larger institutional ownership is associated with more carbon disclosure



% willing to engage firms on carbon disclosure

	Scope 1 disclosure			
	(1)	(2)	(3)	(4)
Total IO foreign	0.33***		0.28***	
	(3.22)		(2.87)	
Total IO local	0.12		0.14*	
	(1.56)		(1.94)	
High social norms IO foreign		0.56***		0.42***
		(4.58)		(3.89)
High social norms IO local		0.29***		0.27***
		(3.77)		(3.80)
Low social norms IO foreign		-0.06		0.05
		(-1.04)		(0.70)
Low social norms IO local		-0.02		0.02
		(-0.56)		(0.51)
Controls	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Year FE	No	No	Yes	Yes
Industry-Year FE	No	No	Yes	Yes
Country FE	No	No	No	No
Obs.	23,942	28,347	23,924	28,338
Adjusted R^2	0.14	0.16	0.22	0.22

Source: Ilhan et al. (2021)

IO = institutional ownership

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Mandatory Disclosure: UK Evidence

- Analysis of the effects of disclosure mandates helps to understand limits of voluntary disclosure:
  - if voluntary disclosure efficient, new mandates, optimal or not, should not increase value (value constant or decreasing)
- 2013 UK disclosure mandate of GHG emissions for LSE-listed companies
  - Jouvenot and Krueger, 2021: Firms cut GHG emissions by 16% and emission intensity by 21%, reducing energy usage (also Downar et al., 2021; Grewal, 2021)
    - Address identification: compare UK firms to Cont. European firms
    - Question: why do firms reduce emissions? Three findings:
      - Effect of institutional investors: reduce holding in high-emission firms
      - Positive announcement returns for firms that reduce GHG more
      - Post regulation, higher operating costs for emission-intensive firms
  - Bolton and Kacperczyk (2021) compare to UK firms voluntarily disclosing before as control sample. Find reduction in cost of capital
    - The effect is due to change in emissions, not disclosure per se
- Similar 2010 US GHG disclosure mandate: 8% reduction (Tomar, 2021)

Benefits of Disclosure Mandates

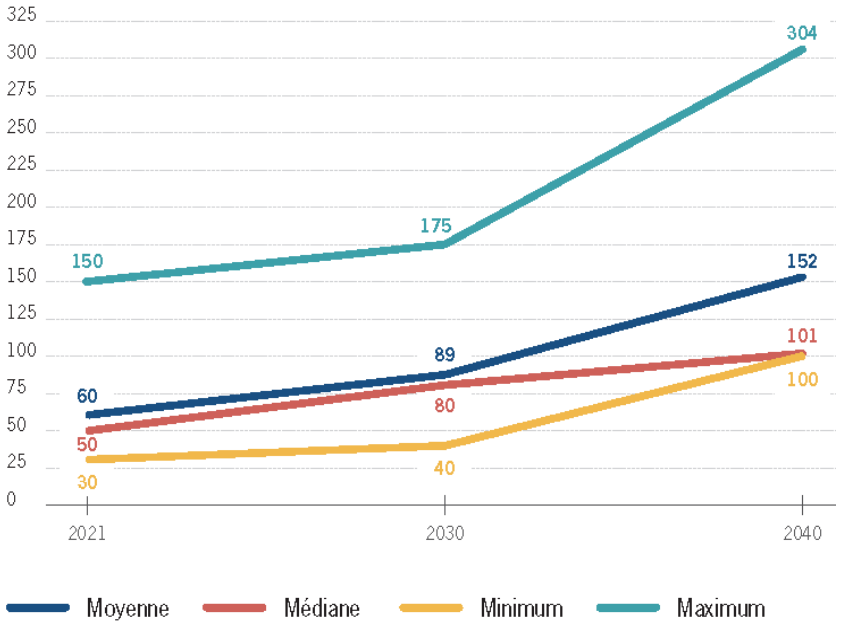
- Many initiatives in favor of mandatory or standardized disclosure:
  - TFCD, EU CSRD of 2021, SASB, IFSR launching ISSB, …
- "*Most academic studies find that firms tend to expand and adjust CSR activities subject to disclosure requirements*" (Christensen, Hail, Leuz, 2021).
- Benefits of mandates disclosure mostly accrue from standardization of disclosure (Christensen, Hail, Leuz, 2021)
- Disclosure mandates are useful when they :
  - are enforceable and allow stakeholders to hold firms accountable
  - offer benefits to investors and stakeholders when processing information and comparing with benchmark firms
  - introduce industry-customized benchmarks in disclosures
  - reduce cost of capital or improve liquidity

Carbon Disclosure Strategy

- Corporate voluntary carbon disclosure creates benefits:
  - lower cost of capital, change in firm behavior, stakeholders
  - Mostly from changing behavior, bot disclosure per se
- While more disclosure will become mandatory, the detail and granularity likely will not
  - Consistency between detailed carbon strategy and granular disclosure is crucial (e.g., scope)
  - Strategic advantage: decarbonization leaders should have an incentive to disclose, and to disclose more than mandated

Internal Price of Carbon

- Adopting an IPC has become very popular
  - 33% of survey companies have an IPC, 50% of 500 biggest (CDP, 2020)
- Institut Montaigne (2021) report on use of IPC in France:



- Adopters laud role as tool for internal communication and focus
- want to keep control of their IPC and stress specificities (sector, international)
- hesitate to fully integrate in investment decisions and incentives
- emphasize its role in creating long-term predictability
- fears of loss of competitiveness are real
- Do not view it as instrument for external communication

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Good Practice on IPC

- IPC redundant when firm fully covered by carbon price (EU ETS)
  - The need for an IPC betrays lack of predictability of carbon price, its incompleteness, and the reality of organizations
- Even when regulatory carbon prices were first best: do not underestimate power of internal communication and incentives
  - Adopting both quantity *and* price targets is useful: price needed for decisions and incentives
  - One of the best uses is to continuously monitor the internal consistency of carbon target and IPC
- Adopt for incentives and investment decisions like a real cost
- Be transparent and steady. ESG raters and investors will appreciate

Good Practice on IPC (2)

- Companies should use an efficient IPC benchmark
  - The best benchmark for an IPC is the estimated SCC
- They should adopt IPC scenarii, in accordance with climate policy scenarios. Present long-term investment decisions depending on scenarios
- Companies need to be mindful of competitiveness
  - but that cannot be an excuse to lag behind
  - The energy transition will accelerate green creative destruction. Example: mobility.
  - The right response is not to save activities that become NPV-negative with socially efficient carbon prices, but to adjust corporate product portfolio

The Scope of Carbon Strategies

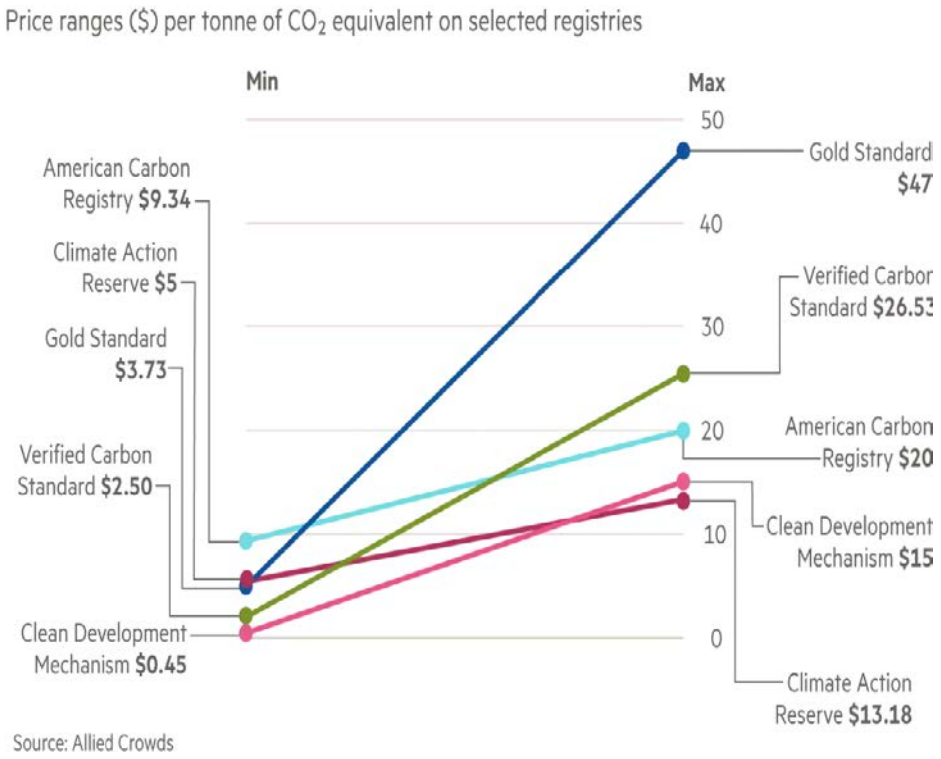
- What is the right scope of corporate carbon strategies: Scope 1, Scope 2, Scope 3?
  - Scope 1: direct emissions; Scope 2: energy/heat supply; Scope 3: include the value chain: upstream (and also downstream)
  - (there is no agreement how deep Scope 3 should go!)
- Companies tend to not apply IPC beyond Scope 1 (Institut Montaigne, 2021)
- Economic rationale is carbon leakage: when carbon is priced, substitutes without priced carbon become cheaper
- Fundamental trade-off: if the scope is too narrow, then there is a real risk of carbon leakage. If it is too wide, there is risk of double counting.
  - First principle: do not include the scope of entities that make decisions subject to efficient carbon prices (double counting)
  - But do include entities, upstream and downstream, that do not account for efficient carbon prices in their decisions

Scope Complexities

- Comprehensive scope definition the most complex:
  - Leakage effects are product-specific. Thus, so is the optimal scope
    - Example: entire supply chain in transportation if one link implements IPC and changes its prices/products
  - Many entities, upstream/downstream, affected by partial carbon price
  - Others exposed to carbon prices but ignore them (households!)
    - missing the low hanging fruit of energy conservation forever
  - Leakage effects can be indirect
- If carbon price was efficient and universal (and decisions rational), the scope problem would not exist (again!)
- The pursuit of the perfect carbon scope will always be imperfect. But no excuse for not trying:
  - Broad awareness that scope matters (e.g., “go local” movements)
  - Upstream not that hard to implement
  - Scope helps explaining decisions to shareholders and stakeholders

Markets for Voluntary Offsets

- ESG-driven demand gives these markets impetus
  - Private sector push: Taskforce on Scaling Voluntary Carbon Markets 2021 (M. Carney)



Independent offset providers (World Bank, 2020)

- American Carbon Registry (1996), 50 Mt CO2e, (CCS, forestry)
- Climate Action Reserve (2001), 69 Mt CO2e (waste/ind. gases/forestry)
- Gold Standard (2003), 97 Mt CO2e (renewable/fuel switch/energy efficiency)
- Verified Carbon Standard (2005), 410 Mt CO2e (renewable/forestry)
- Plan Vivo (Agriculture/forestry)
- ACR, CAR GS, VCR used by CORSIA.

Minimum carbon price in 2019: $3-$4/t CO2e (all 5 markets)
but large price variation, depending on project

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Demand for Voluntary Offsets

- ESG demand from corporates will dominate
  - Survey Refinitiv (2021):

"What do you think will be the main source(s) of demand for offsets (old and new units) in the period up to 2025?" N=27 for a total of 65 entries

Source: Refinitiv

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The Additionality Problem

- The problem of additionality: "*Avoidance offsets are essentially counterfactual claims: because of A's intervention, B did not emit the CO2, but would have done so otherwise*." (Bolton et al., 2021)
- The huge discrepancy between voluntary offset prices and efficient carbon price (SCC) is concerning
  - In principle, offset prices should converge towards dominant carbon price (EU ETS)
  - Lack of convergence shows problems with offset markets
- Recommendation on carbon disclosure of offsets: do not allow reporting of purchased offsets.
  - Only report negative emissions that were generated directly
  - Report separately from gross emissions

Should Companies Use Offsets?

- Hard to refute offsets outright: principle of emissions trading
- If carbon targets make sense, smooth carbon trajectory can be useful
  - Quality and additionality are key
  - History of CDM/JI/voluntary offsets pleads for extreme caution
- Certification of additionality/quality not solved: better steer clear
- If you must use offsets:
  - Use them only temporarily to smoothen corporate carbon trajectory
  - Be transparent about use of offset markets (volume, source, price). State economic reason for use of offsets
  - Choose high-quality projects and high-quality independent offset provider
    - Pick project directly and carefully
    - Check additionality, permanence, risk of overestimation and double-count (investment analysis, barriers analysis, common practice analysis)
    - Apply “discounts” for likely lack of additionality (Broekhoff et al., 2019)

Outlook

- Public carbon policies based on economics, but weak and inconsistent
  - need for international agreements and North-South divide
  - Fear of carbon prices
- Government policies and corporate carbon policies interact
  - CSR-oriented policies can fill gaps and overcome deadlocks
- Strong corporate carbon policies can create value
- The true source of competitive advantage is from innovation in decarbonization technology