CARBON PRICING FOR CLEAN INNOVATION

Antoine Dechezleprêtre

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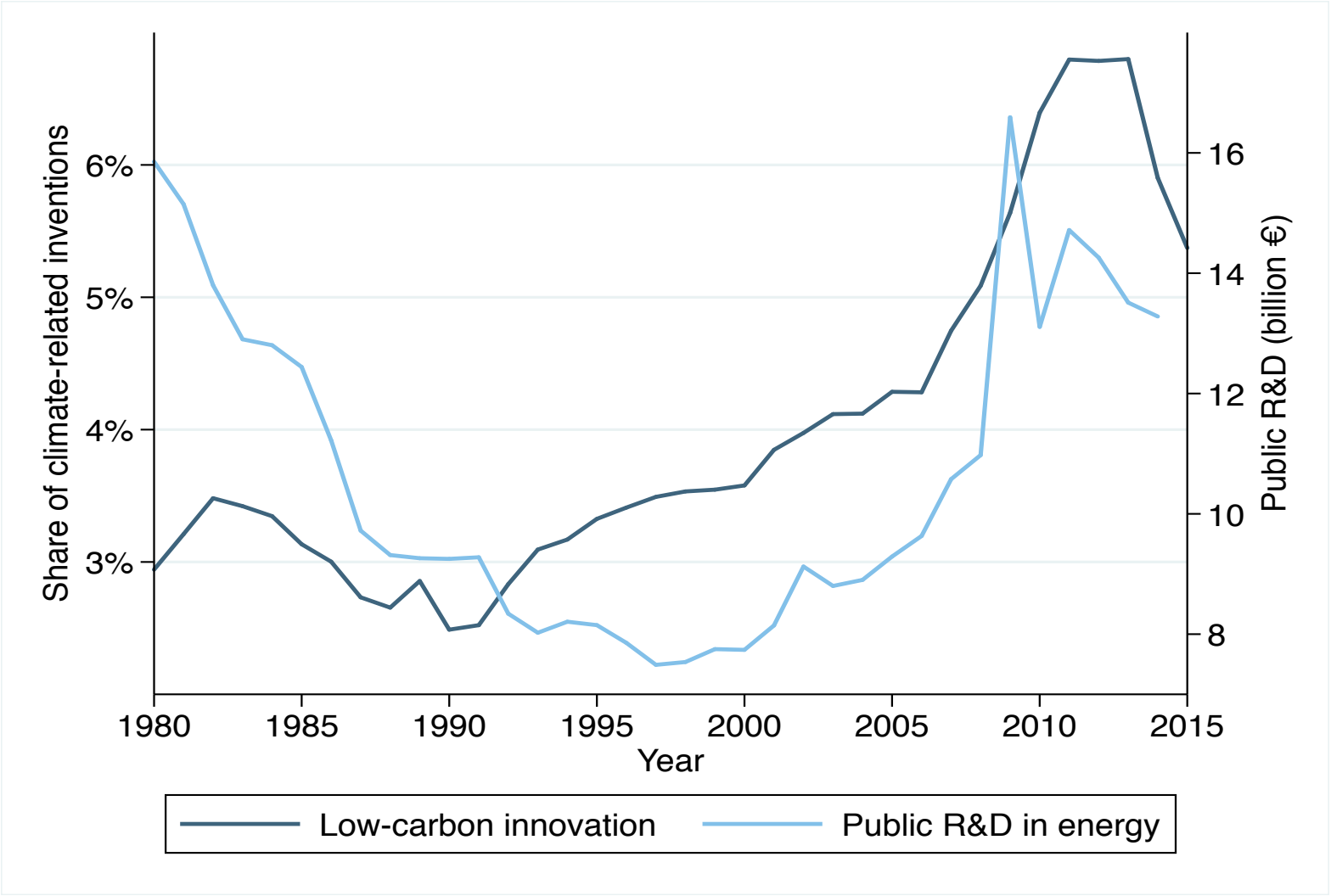
BETTER POLICIES FOR BETTER LIVES

Innovation: Key to green growth

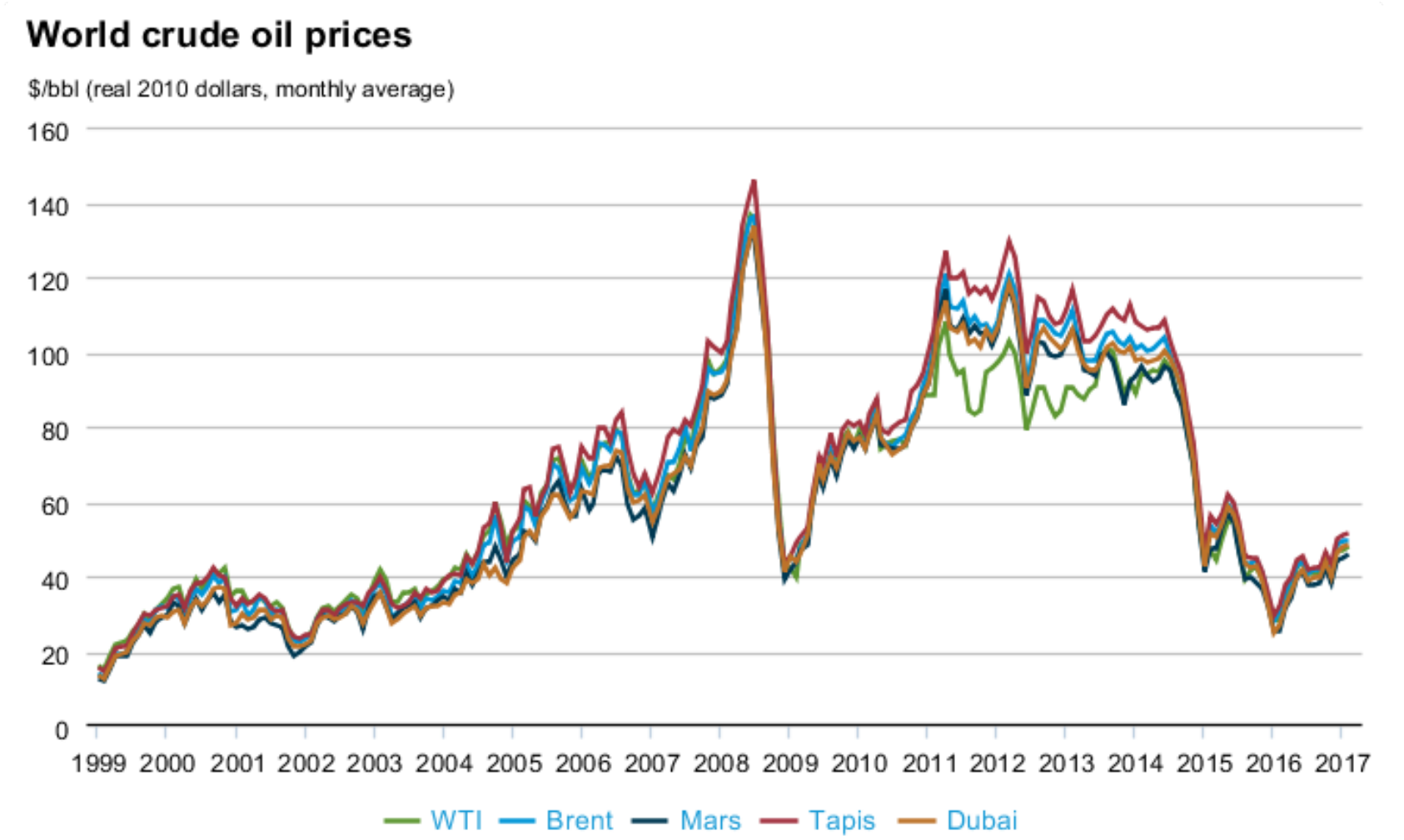
- To achieve long term decarbonization we need a large change in the mix of technology we use
- This requires massive investments in innovation
  1. Reducing the cost of existing technologies
  2. Developing new breakthrough technologies
  3. Making the switch possible with enabling technologies (smart grids, storage)
- Innovation in clean technologies is the only way to decarbonize while sustaining economic growth (IPCC 2014; OECD 2017)

Global low-carbon innovation is *decreasing* when we need it the most



Source: author's calculations from EPO's PATSTAT database; IEA

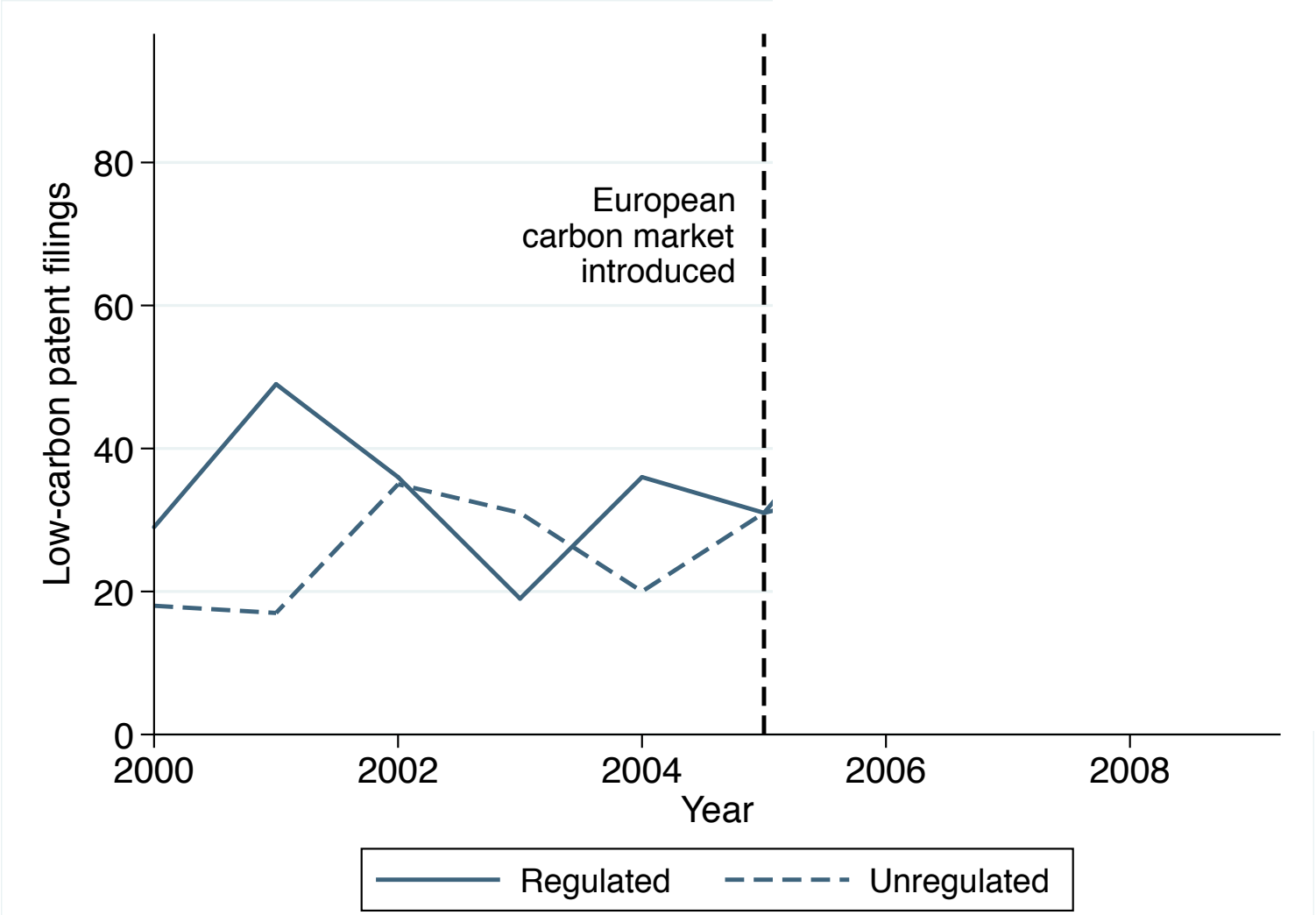
The culprit: Low energy prices



Restarting the low-carbon innovation machine

- Investment in low-carbon innovation is inhibited by two major issues:
  - Carbon can be emitted freely (*Pollution externality*)
  - The benefits from innovation cannot be fully appropriated by inventors (*Knowledge externality*)
- We need two policy instruments to address this efficiently:
  - Carbon pricing
  - Public support to R&D (subsidies, tax credits…)
- Carbon taxes/permits can be used to finance low-carbon R&D

Carbon pricing encourages low-carbon innovation

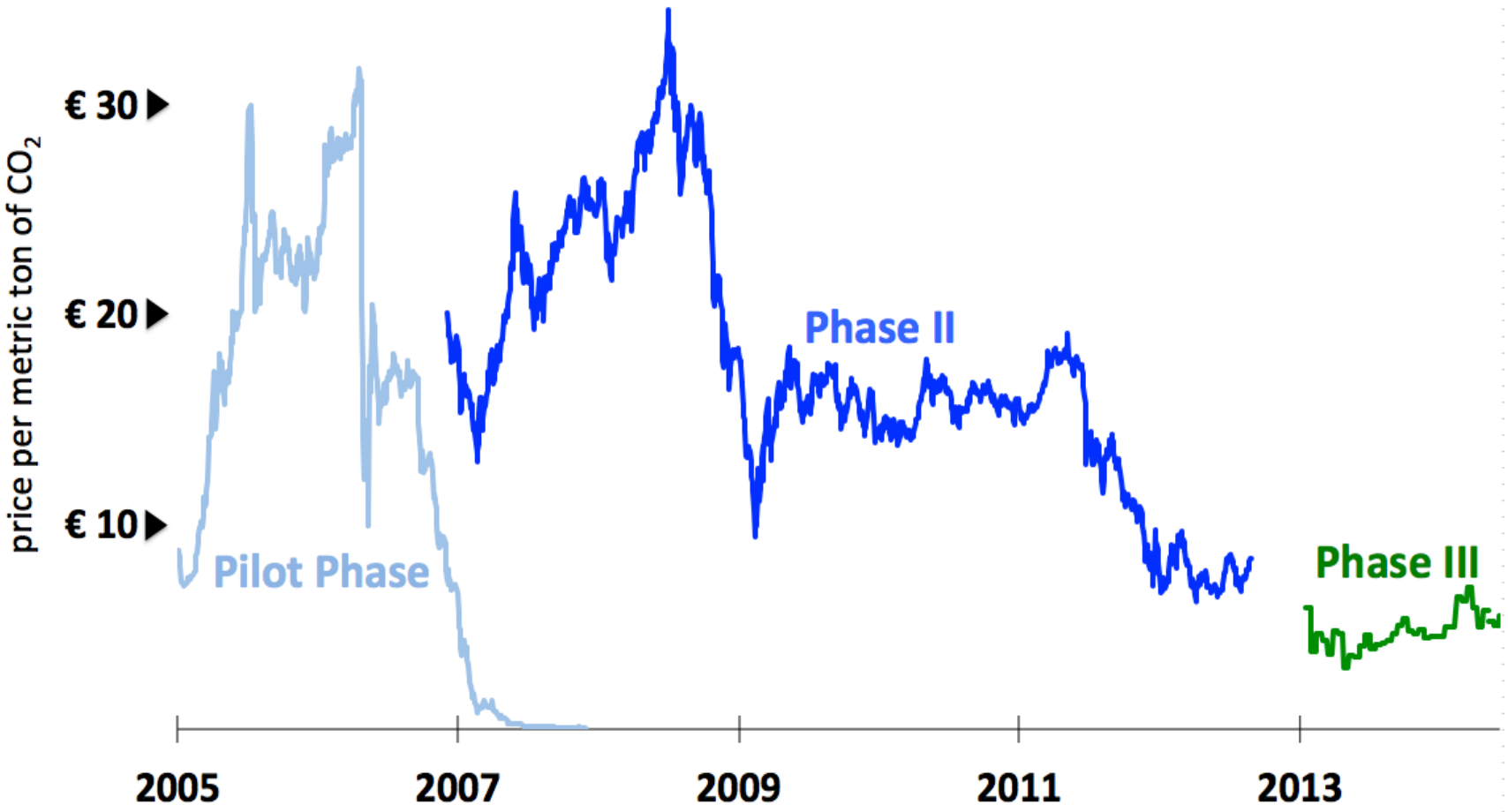


Source: Calel & Dechezleprêtre, 2016.

High-enough carbon pricing is key

- The EU ETS had a strong impact on low carbon innovation by regulated companies (+30% low-carbon patents)
- The impact is concentrated at the beginning of Phase 2… **when prices were meaningful**
- Globally, 70% of carbon emissions are not priced at all and 4% are subject to a price above €30/tonne (OECD, 2016)

Price of EU ETS allowances 2005-2015



Competitiveness concerns

- Asymmetric climate policies can lead to small negative impacts on trade, investment & employment
  - In energy-intensive, trade-exposed sectors
- These impacts are small compared to other determinants of trade and investment location
  - Impacts overplayed, but firms legitimately voice their concerns
- In fear of potential adverse competitiveness effects, recent climate policies shield industrial sectors from full regulatory costs

Designing policies compatible with efficiency improvements

- Trying to protect losers is legitimate
- But risk of creating perverse incentives that discourage efficiency and are incompatible with long term objectives
  - Ex: CO2 intensity of the European cement sector **+5%** 2011-2014 because of free allocation rules (Branger et al. 2015)

➢ Level the playing field at the consumption level (eg consumption tax)

Carbon pricing is not enough

- The market favours lower-cost technologies: direct support for new low-carbon technologies is necessary
- How much? IEA recommends 5-fold increase in public R&D spending across OECD countries
- At what level? Multinational
  - Ex: Benefits from subsidized R&D much higher for Europe as a whole than for individual countries

Using carbon pricing to fund low-carbon R&D

- Politically attractive
- Large revenues
  - EU ETS €4bn/year in revenues from auctioning
  - At €11/tonne, directing 10% of the revenues from auctioned EU ETS emissions allowances into low-carbon innovation would double public R&D funding in Europe by 2025
- Existing EU programmes: NER 300, NER 400. Scaling up needed

Potential issues

- Commitments to fund R&D should be long term (like carbon emission caps) and funding needs to be stable (sudden spikes not useful)
- R&D subsidies need to be combined with high carbon price
  - Ex:€1 bn for CCS under European Energy Programme for Recovery but all projects abandoned because of low carbon price

➢ Combine with carbon price floor (eg reserved auction price)?

Conclusion

1. High enough carbon pricing is key to encourage low-carbon innovation
2. Competitiveness provisions can distort incentives
3. Increasing direct support for low-carbon R&D is necessary
4. Carbon pricing can provide sustained funding, but stability is critical

For more information:

antoine.dechezlepretre@oecd.org

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