



# Price Responsive Allowance Supply, Policy Sequencing, and the Pathway to Net Zero

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Cost Containment and Market Stability in Global Carbon Markets  
CEPR/EAERE Climate Policy Webinar Series

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# Roadmap

1. How regulations, economic uncertainty, and emissions markets interact
2. Cost management positions carbon markets to amplify (rather than erode) the contributions from sector-based regulatory policies
3. The North American approach involves auctions with price floors and price steps => price responsive allowance supply
4. My thesis: cost management plays a bigger role than limiting price variability...

...Cost management in carbon markets is essential to sequencing policy to ratchet up ambition toward net zero



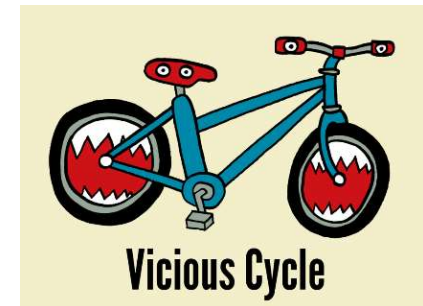
## Stylized Facts

- Economists advocate for comprehensive carbon pricing as the most efficient approach to achieve climate policy goals
- For practical reasons, carbon pricing has usually taken the form of carbon markets. Why?
  - Treaties require unanimity for taxes (EU)
  - Extension of existing regulatory authority (US)
  - More powerful focal point for advocacy (everywhere)
  - Having markets set prices is politically easier than voting to set prices
  - Caps prevent backsliding



## Background

- Despite economic advice, most emissions reductions in jurisdictions globally result from sector-based policies
- Regulatory policies reduce carbon market prices and erode the payoff to market-driven investments
  - Low carbon prices spawn a crisis of confidence, attracting yet greater regulation
- Further, many policy advocates argue that economists have *gotten in the way of or slowed down* meaningful carbon policy
- One reason this sometimes could be true is the waterbed effect



## How do Regulations and Emissions Markets Interact?

With a fixed quantity of emissions allowances, emissions reductions from companion policies (regulations) lead to *the waterbed effect*

- Regulations and individual efforts cause prices to fall and emissions to go up somewhere else, or the allowance bank grows large!
- Expectations for the market and the value of market-driven investments are undermined



“The Waterbed Effect”

➤ Investments require getting the *prices* right and getting expectations right



# Business and Policy Makers are Especially Concerned about High Prices

- Prices could rise unexpectedly (e.g., energy crisis)
- Highly volatile prices also could threaten program durability
- However, low carbon prices have presented the more common challenge



# Prices in Carbon Markets



ICAP Allowance Price Explorer

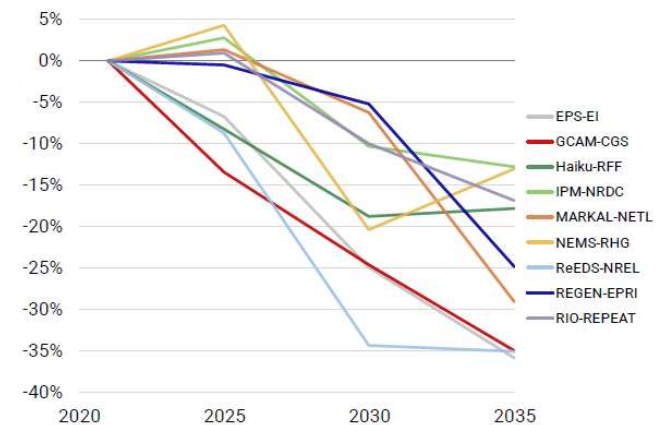
\$/ton

Program interventions have been necessary to keep prices away from zero



# Policy Choice around Carbon Pricing

- A carbon tax would avoid the waterbed effect and stabilize prices (too stable), but would introduce greater emissions uncertainty
- However, an adjustable carbon tax will always be behind the market in responding to new information
- Uncertainty is endemic. E.g., a recent comparison of nine models of power sector response to the US Inflation Reduction Act illustrates a wide range of possible outcomes
- Markets are built for uncertainty(!)... but substantial variations in allowance prices undermine market confidence and erode expectations about program durability



Difference in Power Sector Emissions from 2005  
(Bistline et al. 2023)





# The Economic Framework

- Weitzman (1974) framed the canonical perspective as quantities *versus* prices
- Roberts and Spence (1976) resolved the question in a hybrid system with prices and quantities jointly determined through an economic process in a sequence of markets each with its own price collar
- Two obstacles to Roberts and Spence:
  1. Historically, free allocation required government repurchase (Baumol & Oates)
  2. Thin markets and administrative complexity

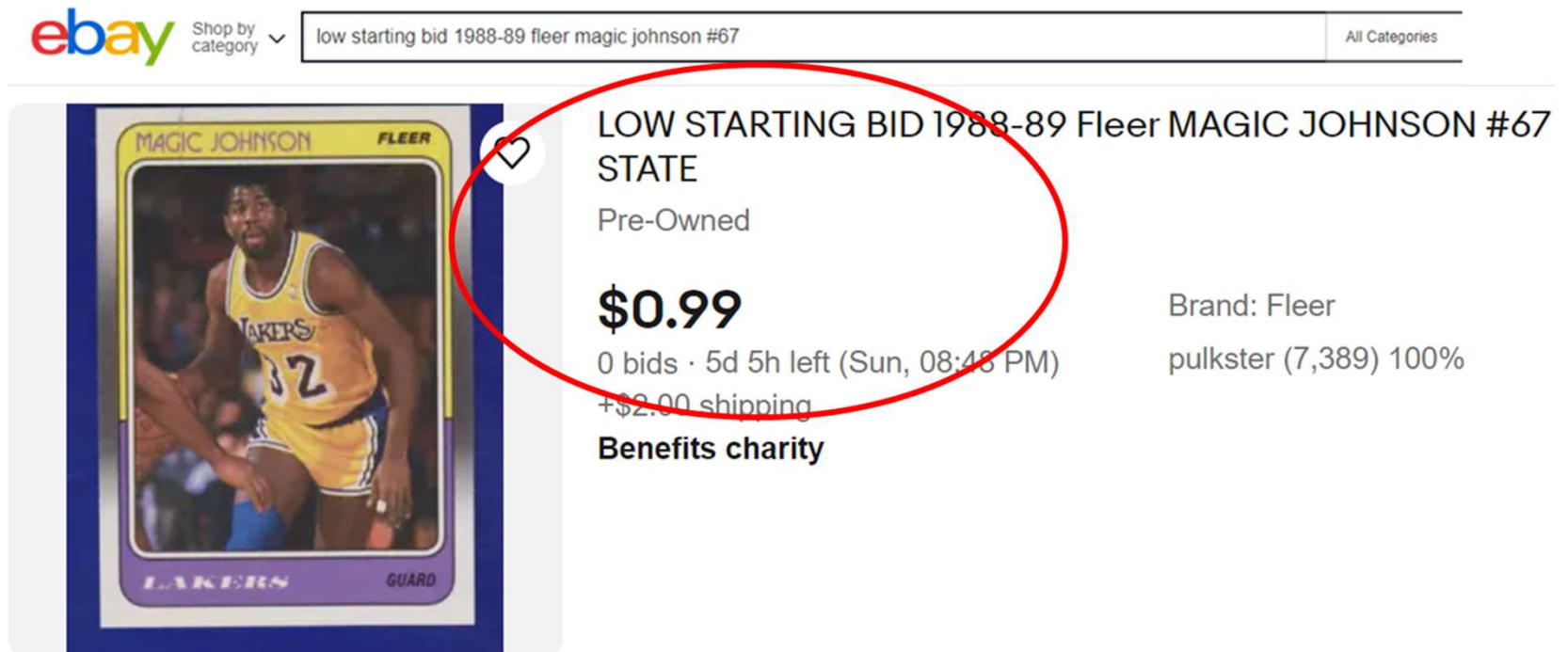


# New Institutional Models

- Two innovations make the Roberts & Spence approach practical:
  1. Auctions in place of free allocation (grandfathering)
  2. Reserve prices enable price floors & steps as best practice in auction design
    - Reserve prices also signal policy intentions and change expectations about the future distribution of prices that affect today's behavior (Salant et al. 2022, 2023)



# Price Floors are Auction Reserve Prices



Shop by category ▾ low starting bid 1988-89 fleer magic johnson #67 All Categories

**LOW STARTING BID 1988-89 Fleer MAGIC JOHNSON #67 STATE**  
Pre-Owned

**\$0.99**  
0 bids · 5d 5h left (Sun, 08:48 PM)  
+\$2.00 shipping

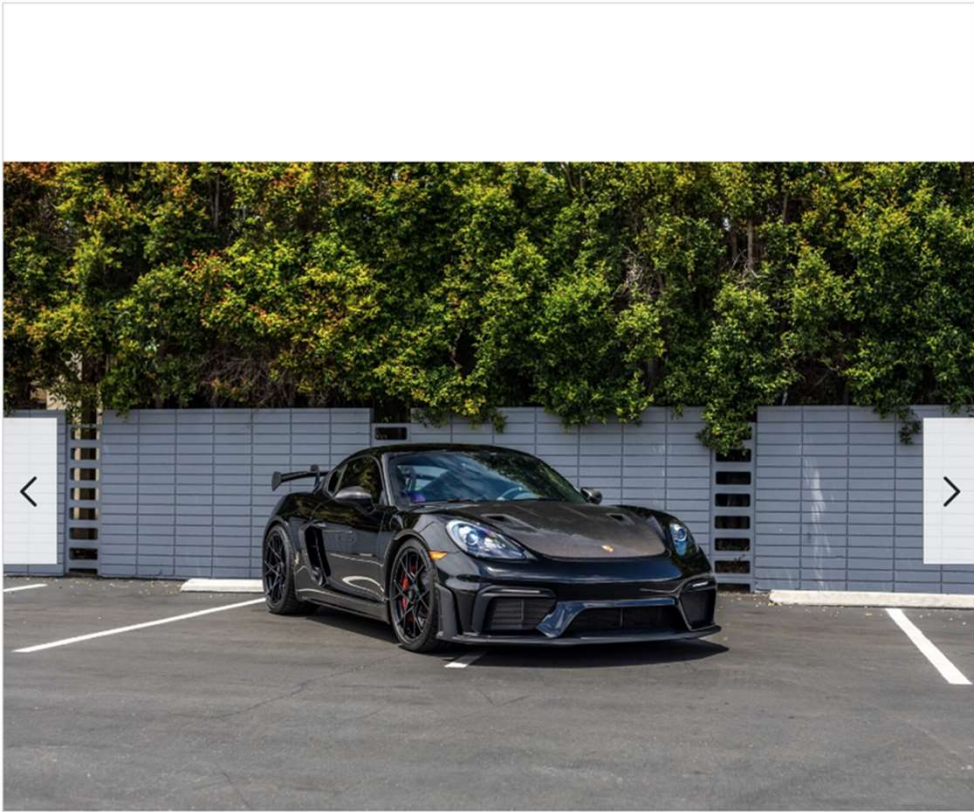
Brand: Fleer  
pulkster (7,389) 100%

**Benefits charity**

- Most auctions have them!



# For major transactions, reserve prices can be important!



## 2023 Porsche 718 GT4 RS Weissach

2023 Porsche 718 Cayman GT4 RS Weissach  
iLusso Exotics Costa Mesa Costa Mesa

6 watched in the last 24 hours

Condition: Used

Time left: 19h 49m | Wednesday, 11:19 AM

Current bid: **US \$75,100.00**

[ 5 bids ]

Reserve not met ⓘ

Place bid

Price: **US \$289,000.00**

Buy It Now

Immediate payment of US \$500.00 is required.

♥ Add to watchlist

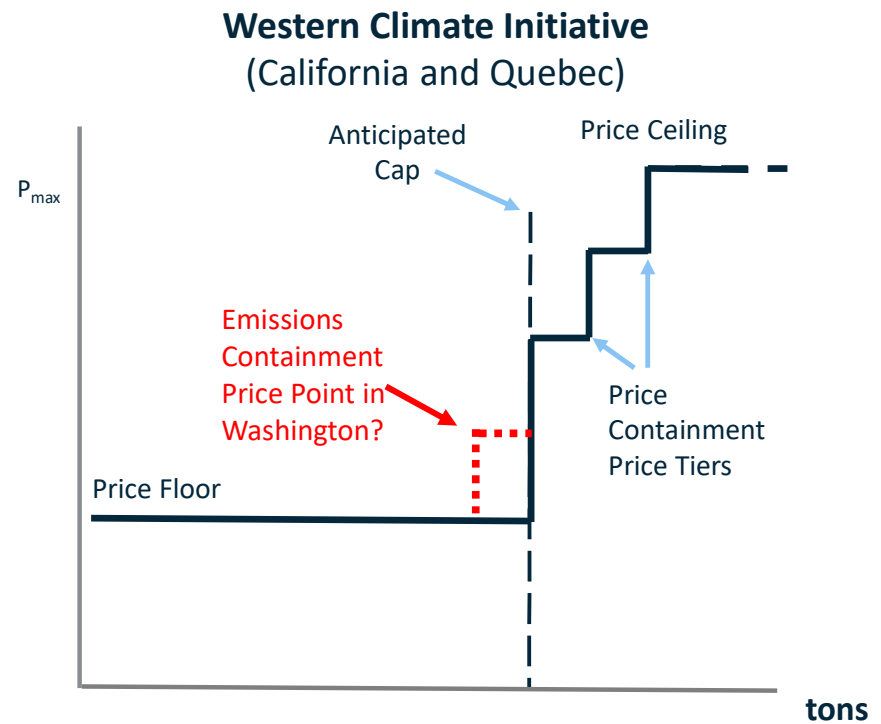
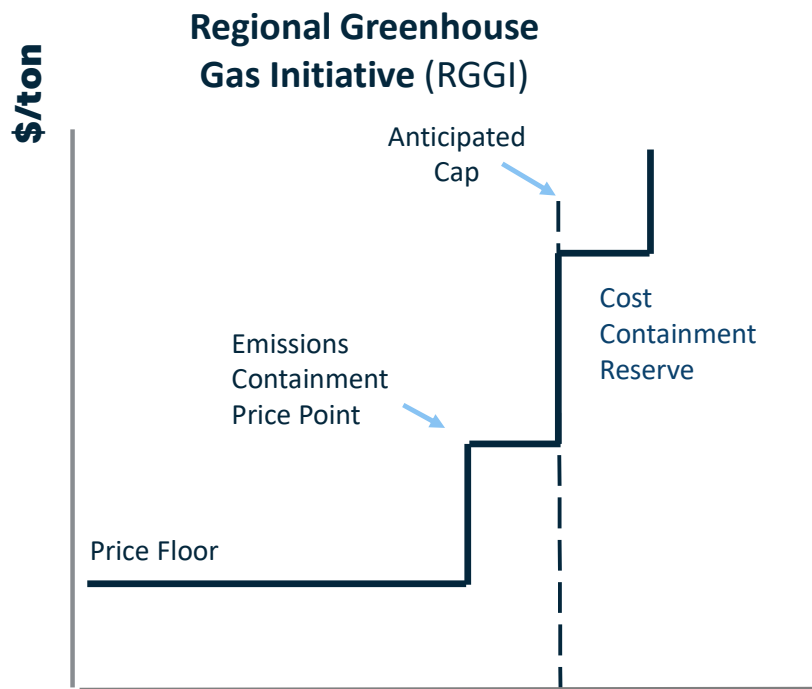


## So Far, Policy Makers Have Relied Primarily on Administrative Adjustments to Allowance Supply

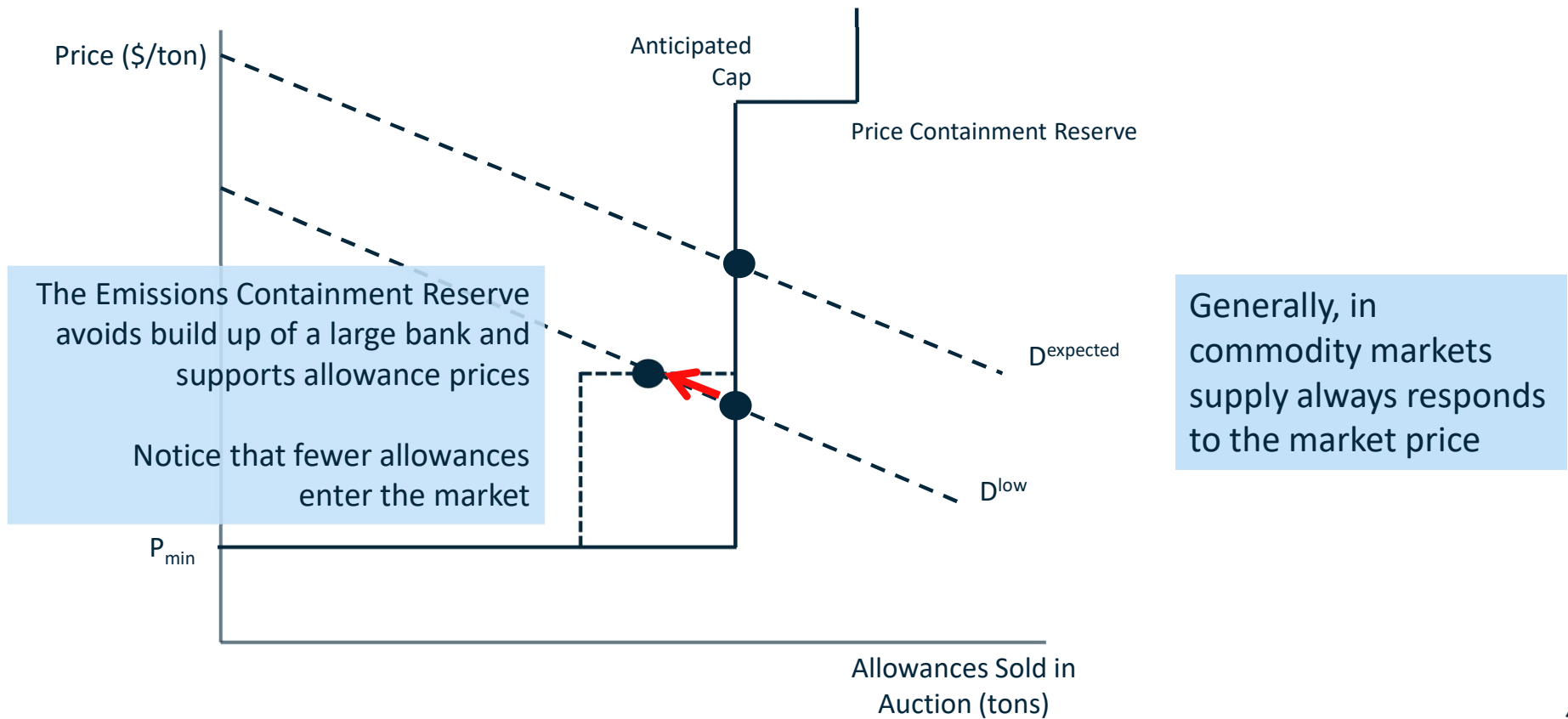
- Bank (supply) adjustments in EU, RGGI, CA
- However, transparency & market confidence point to a rule-based rather than administrative approach
- The EU ETS introduced a rule-based, quantity-based market stability reserve (MSR) <to be addressed by other speakers>
- The North American approach has involved price floors and price steps



# Price-Responsive Allowance Supply in Emissions Markets (Quantities *with* Prices)



# Automatic Market Adjustments Through a Supply Schedule with an Emissions Containment Reserve



# Price Responsive Allowance Supply

Environmental markets seek to mimic the efficiency of two-sided commodity markets

- Instantaneous information updating
- Improved price discovery
- Reduces price and revenue variability
- Stronger basis for private sector investment

However, the standard textbook design is a one-sided environmental market

➤ Price-responsive supply: quantities *with* prices

Replace the emission cap with an explicit emission supply schedule

- As in every other commodity market
- Neither prices nor quantities are fixed

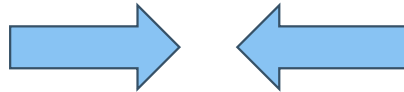




## Two-Sided Emissions Markets

- Notionally, the allowance supply schedule might approximate the marginal damage schedule
  - Equates to nearly a flat, fixed price, or tax? (Pizer 2002)
- However, conceptualize a policy maker's dilemma

Aspiration  
[Net Zero]



Policy Constraints

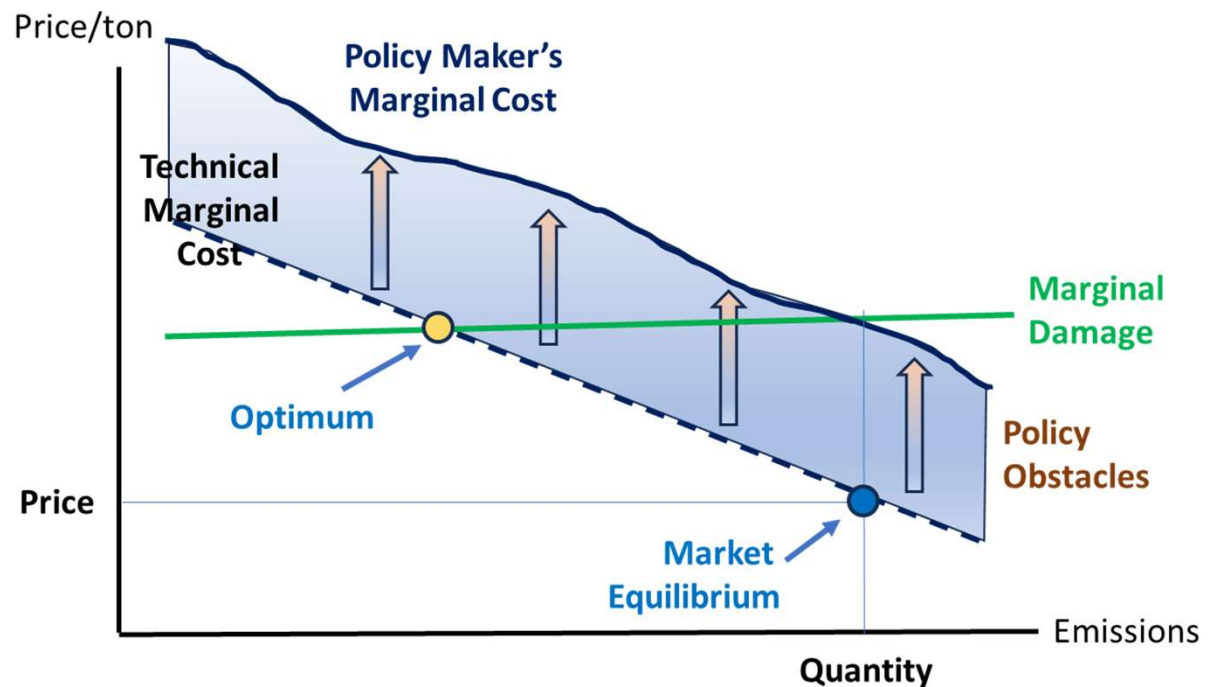
- Rent incumbents
- Technology cycles
- Economic competition
- Limited political capital
- Distributional outcomes (perceptions)
- Missing institutions
- Etc.



# Taking Economic Thought to Policy Relevance

- Weitzman & others imagine an identifiable policy optimum

Conceptualize instead the **policy-relevant marginal cost schedule** to include political costs. These costs are responsive to changes in technology, institutions, coalitions, politics, and the economy.



*The impediment to action advances action.  
What stands in the way becomes the way.*

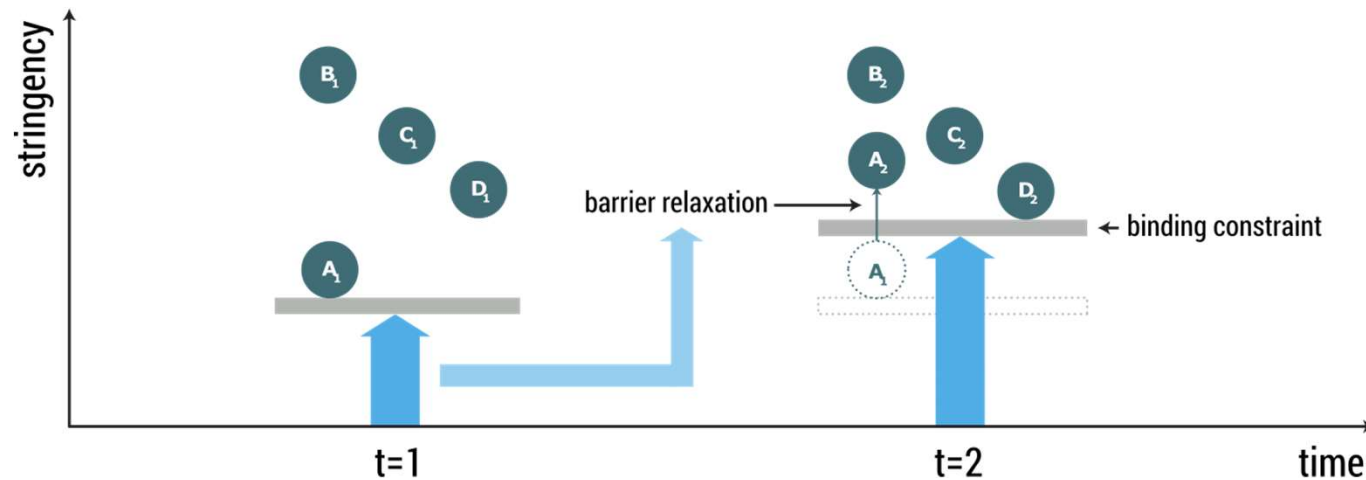


Marcus Aurelius, 121-180 AC

- Policy makers can be expected to attempt to *reduce* costs through technology, infrastructure, policy coordination among jurisdictions, building political coalitions, subsidies, etc.



# Policy Sequencing to Ratchet Up Ambition



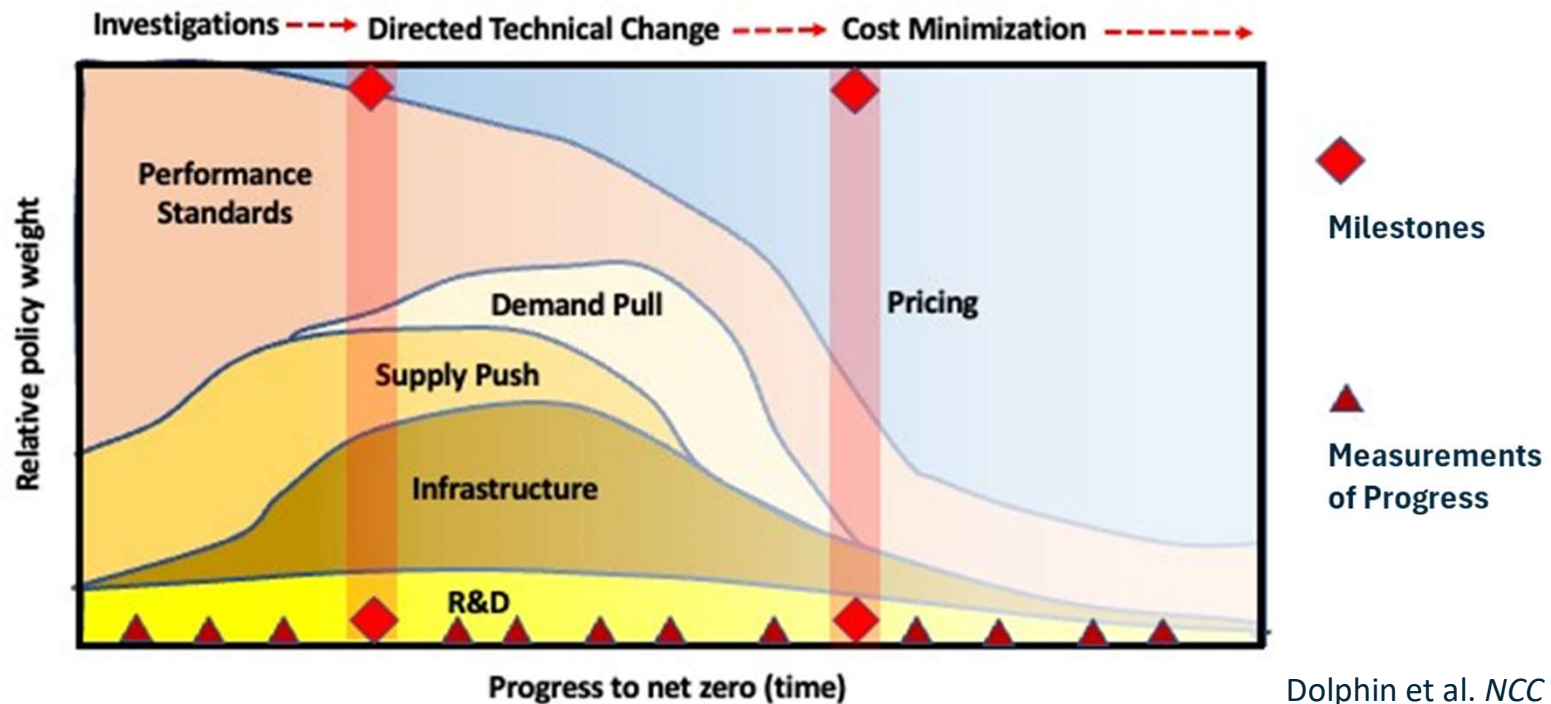
**Policy sequencing** is an approach in which the barriers to future, more stringent climate policy guide current policy choices to the end of overcoming these barriers over time

Sector policies and other actions seek to address the obstacles that drive a wedge between the marginal abatement costs and marginal political costs

Pahle et al. NCC 2018



# Cost management is necessary to grow the influence of carbon pricing



Cost management is necessary to ratchet the climate target to accommodate and amplify the role of sector-based policies



## In summary,...

Regulatory policies endure and are essential, although they are less efficient than pricing

The challenge for economics is to infuse greater efficiency into the climate policy portfolio

The most successful policy frameworks integrate economic approaches and regulation

Price responsive allowance supply gives policy makers a tool to solve the political economy

- It enables ongoing contributions from sector-based policies to create the precondition that enables more ambitious binding emissions reduction targets.
- But for this to happen, the carbon market must ratchet ambition over time and especially as costs fall due to policy and innovation.

Hence (properly designed) cost containment mechanisms are important to the functioning of markets, and important to increasing ambition and achieving long-term emissions goals.





## Thank you.

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# Designing Automatic Price-Responsive Supply Adjustment

1. Adjust supply instantly or through separate sales?
  - RGGI – coincident with the auction
  - CA and WA – a separate sale several weeks after the auction
2. How to populate the allowance price containment reserve?
  - RGGI – from outside the cap
  - CA and WA – from future year emissions budgets under the cumulative cap
3. What to do with unsold allowances?
4. How quickly do APCR allowances become available in the market?
5. Does the price floor and ECR apply to all sources of supply (free and auctioned)?





# Insights from the Literature

- Policy Sequencing
  - Pahle, Burtraw, Edenhofer et al. (2018); Meckling, Sterner, Wagner (2017); Meckling et al. (2015); Beh et al. (2015); Asturias et al. (2016); Pierson (2000), North (1990); Arthur (1994), Lipsey and Lancaster (1956)
- Optimal policy design with uncertainty
  - Relative slopes matter for instrument choice: Weitzman (1976)
  - Combine Ps and Qs: Roberts and Spence (1974), Pizer (2002), Burtraw et al. (2022)
  - Adjusting taxes: Aldy (2019), Hafstead and Williams (2017)
  - Real world proposals: Aldy and Pizer (2009), Murray et al (2009)
- Other features to manage cost volatility
  - Banking: Cronshaw and Kruse (1996), Rubin (1996), Kling and Rubin (1997), Fell et al. (2012a), Pizer and Prest (2016), Weitzman (2018)
  - Offsets: Fell et al. (2012b), and others
  - Linking: Burtraw et al. (2013), Jaffee et al. (2009), Bodansky et al. (2015), Flachsland et al. (2009)
- Two-sided cost containment
  - Investment incentives: Burtraw, Palmer, Kahn (2010), Grull and Taschini (2011), Salant, Shobe, Uler (2022, 2023)
  - Two-sided reserves: Fell et al. (2012)

