Moderating Price Volatility By Adding Market Controls: Unintended Consequences

Andrew Stocking, Ph.D.
Market Design Economist
Congressional Budget Office
January 31, 2011

Not for Citation

The views expressed in this paper are those of the author and should not be interpreted as those of the Congressional Budget Office.

Presentation Outline

Concerns

- Prices will exceed acceptable levels
- Prices will fall and not incent innovation
- Systemic risk
- No transparency
- Allowance bubbles
- Manipulation

Considered Limits

- Price ceiling
- Price Floor
- Prohibit Derivatives
- Prohibit Speculators

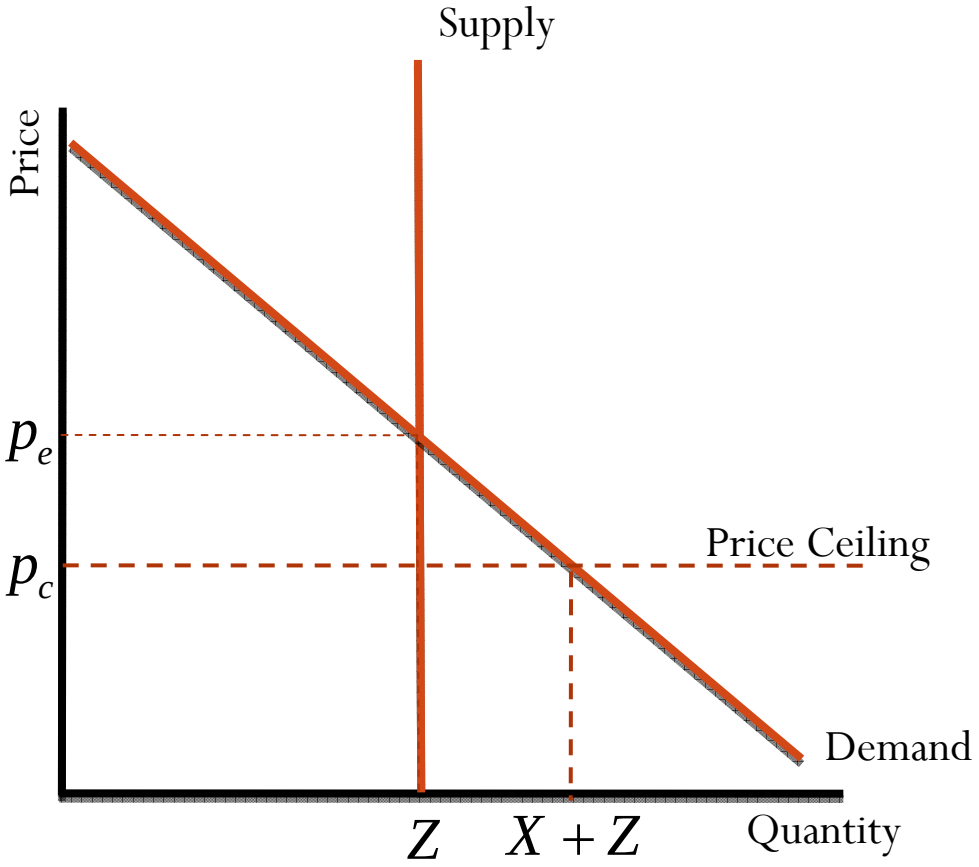
For more information

- Congressional Budget Office. *Evaluating Limits on Participation and Transactions in Markets for Emissions Allowances*. December 2010.

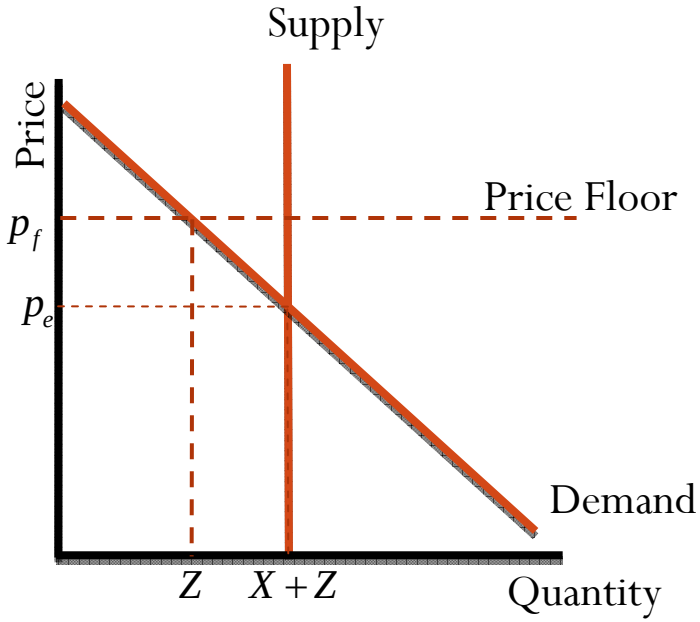
- Congressional Budget Office. *Managing Allowance Prices in a Cap-and-Trade Program*. November 2010.

- Andrew Stocking. *Unintended Consequences of Price Controls: An Application to Allowance Markets*. CBO Working Paper 2010-06. September 2010.

Implementing Price Control Through Supply Management

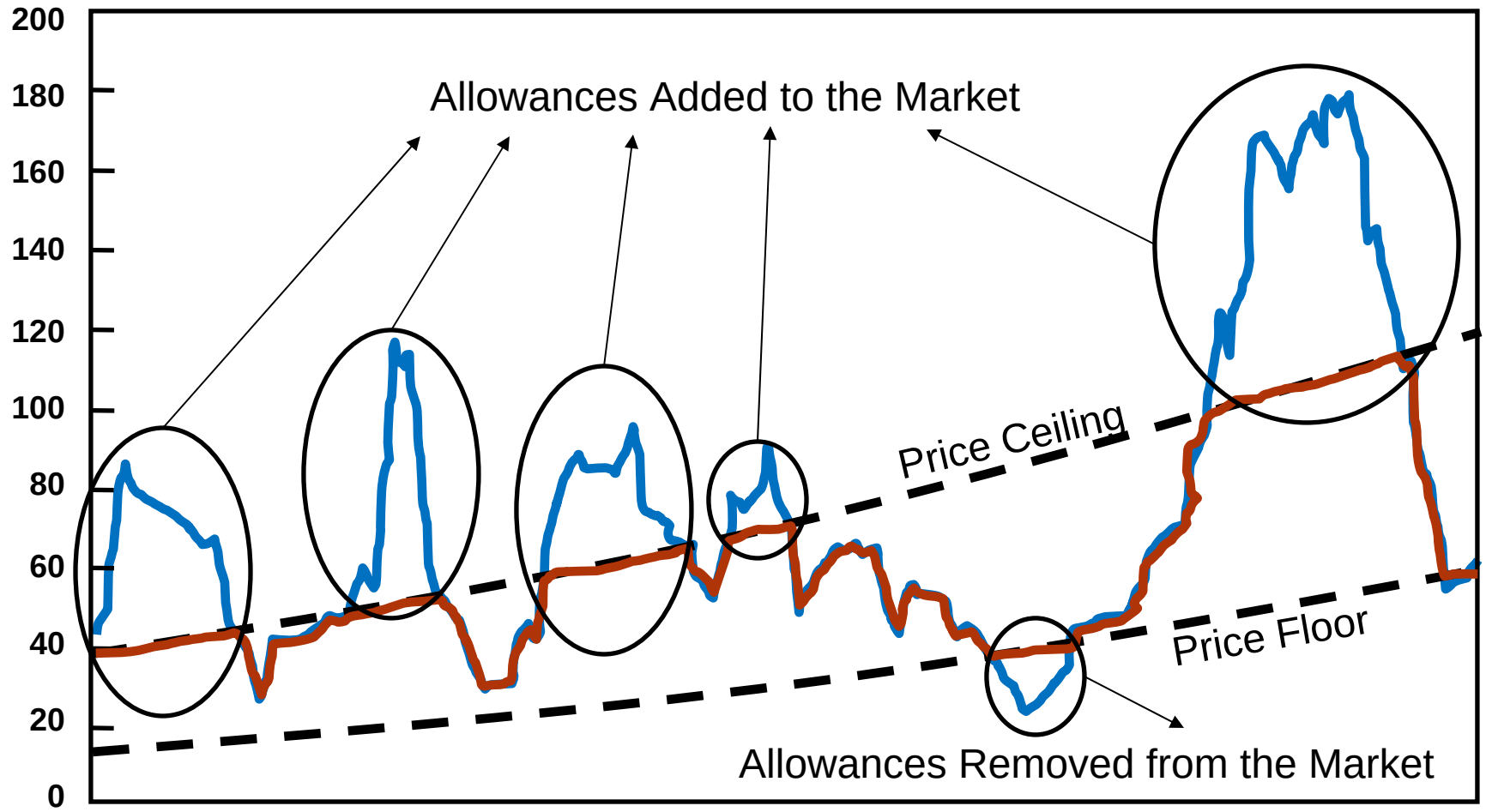


New Allowances = *X*



Removed Allowances = *X*

Price Ceilings and Floors (a.k.a. the Safety Valve)



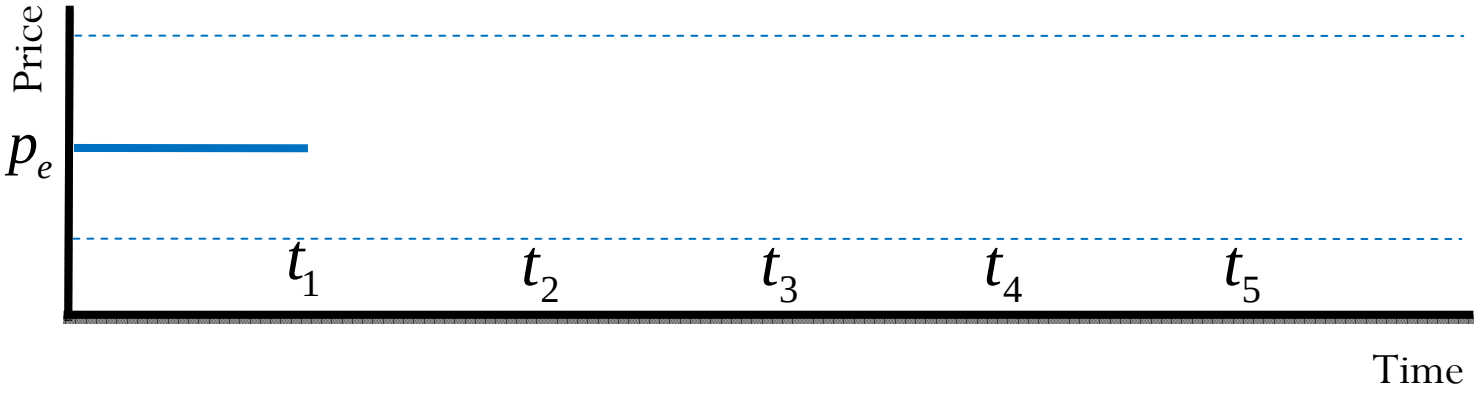
Behavioral Effects of Price Controls

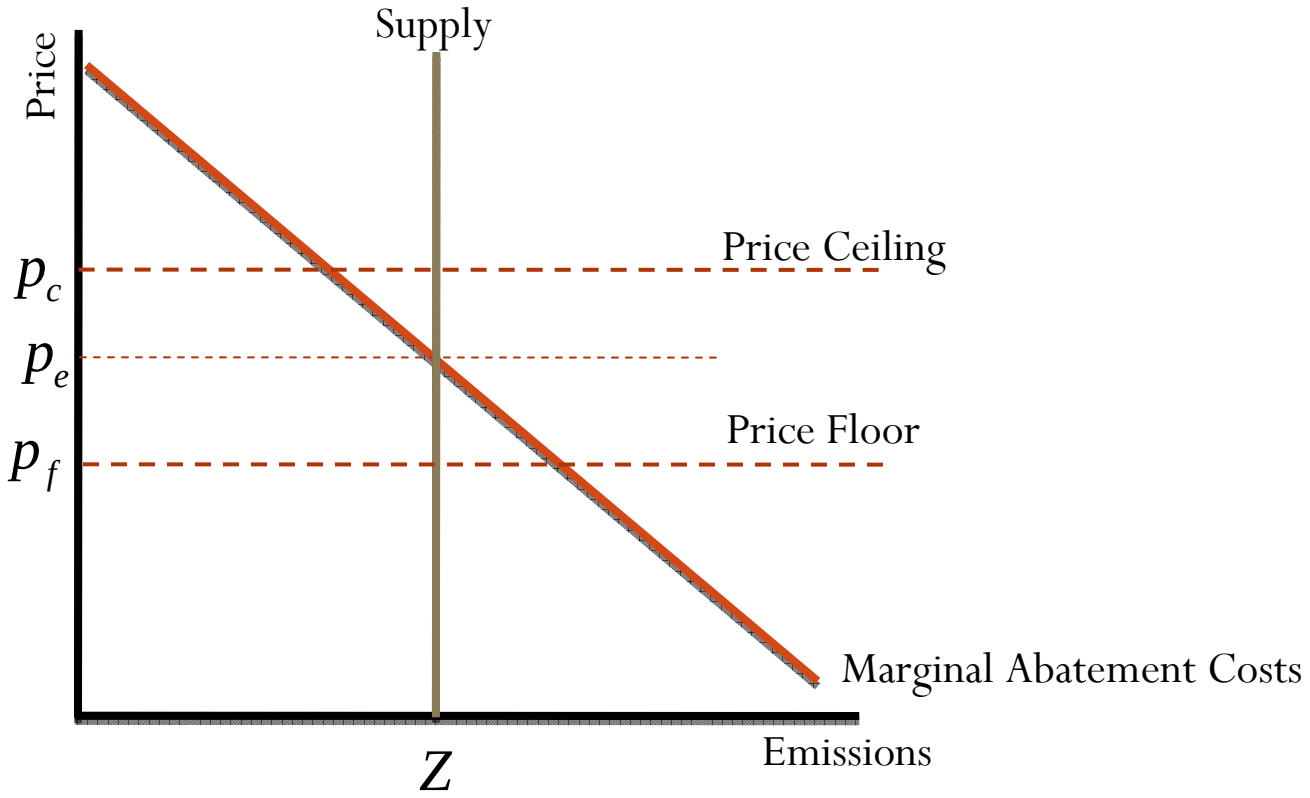
- Price behavior near the ceiling/floor
  - Krugman, (QJE, 1991)
  - Target zone has stabilizing effect ***if credible zone***
- If not credible: Speculative attacks at exchange rate target zone floor
  - Mexican Peso (Dec 22, 1994), Thai Baht (July 2, 1997), Malaysian Ringgit (July 14, 1997), English Pound (Sept 16, 1992)
  - Volatility near boundary increases as you introduce uncertainty about credibility of government to maintain boundary
- Likely that allowance price ceiling can be credible, given de minimis cost of printing allowances
- Other experience with price controls
  - Tin market collapsed in 1985 because International Tin Council couldn't maintain the floor
  - Gold prices actually increased faster given potential for unannounced price management (threat of govt release caused extractors and speculators to require a higher rate of return to hold gold)
  - California Electricity Prices (price ceiling)

The Carbon Market Context

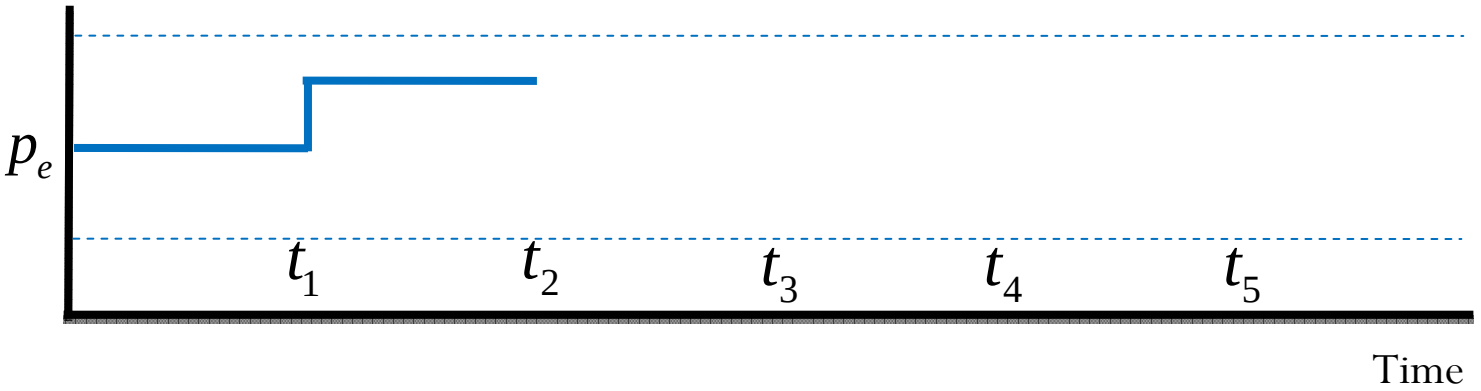
- Waxman-Markey (HR2454) - Strategic Reserve
  - Price Ceiling ($28) and Price Floor ($10) rising at 5% real (2009$)
- Kerry-Boxer (S1733) – Market Stability Reserve
  - Price Ceiling ($28) and Floor ($10) escalate at 5% real (KB ceiling 7% after 2017) (2005$)
- Kerry-Lieberman – Cost Containment Reserve
  - Price ceiling ($25) and Floor ($12) rising at 5% and 3% real, respectively (2009$)
- Nature of Supply for maintaining price ceiling
  - Sources of Supply (New / Taken from Future)
  - Size of Release (Limited / Unlimited)
  - Replenishing Allowances taken from future (Replace / Do not Replace)

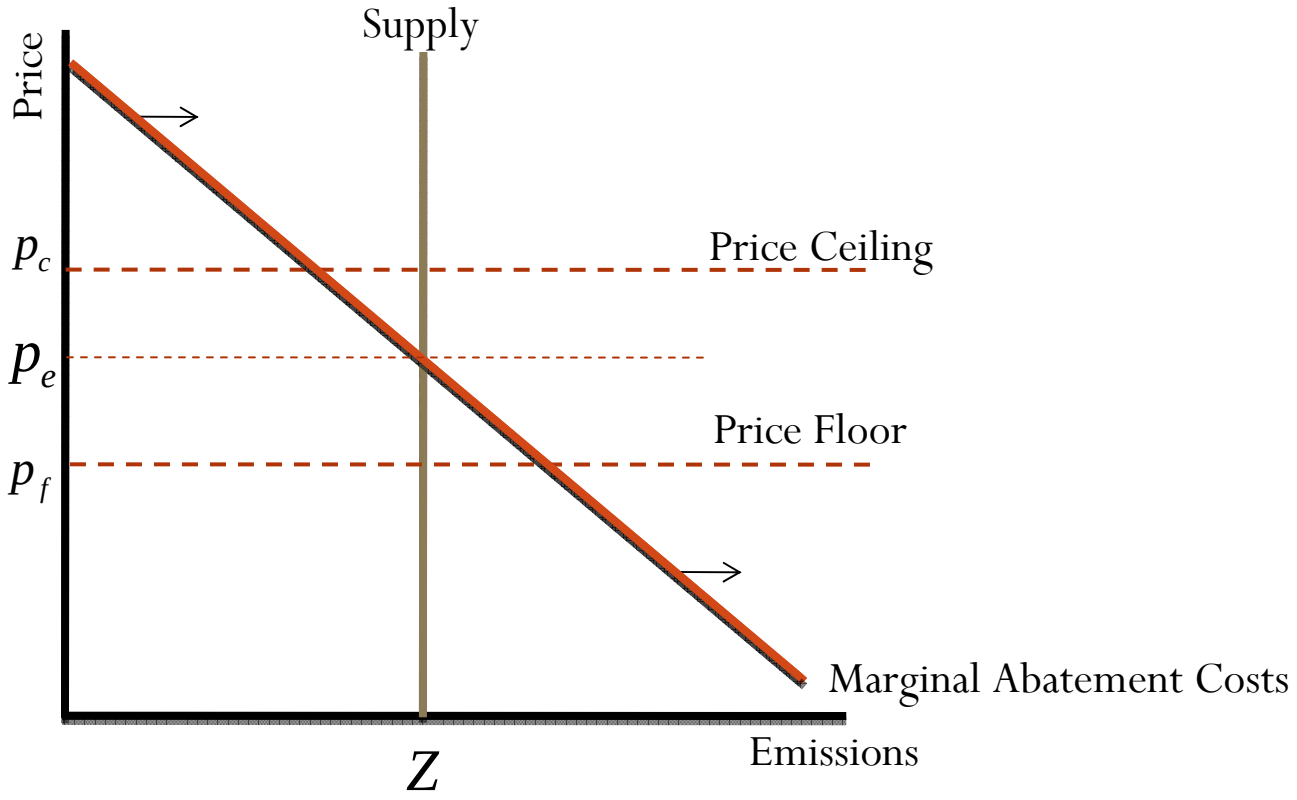
Price Path Asymmetry



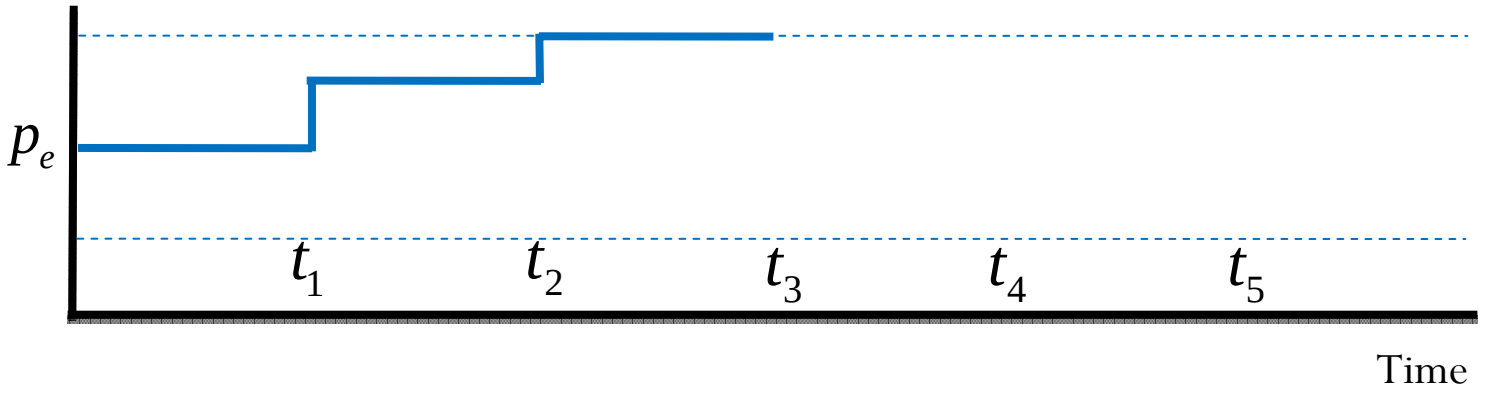


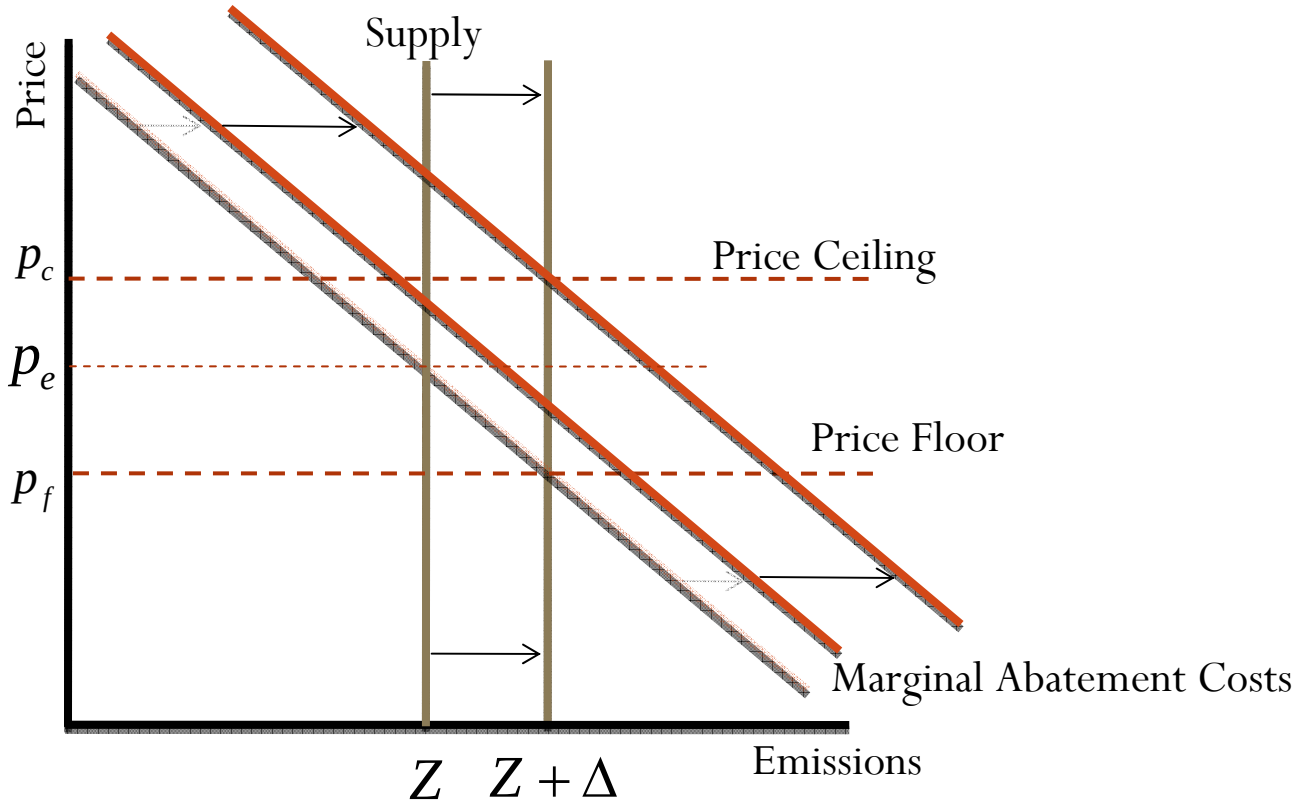
Price Path Asymmetry



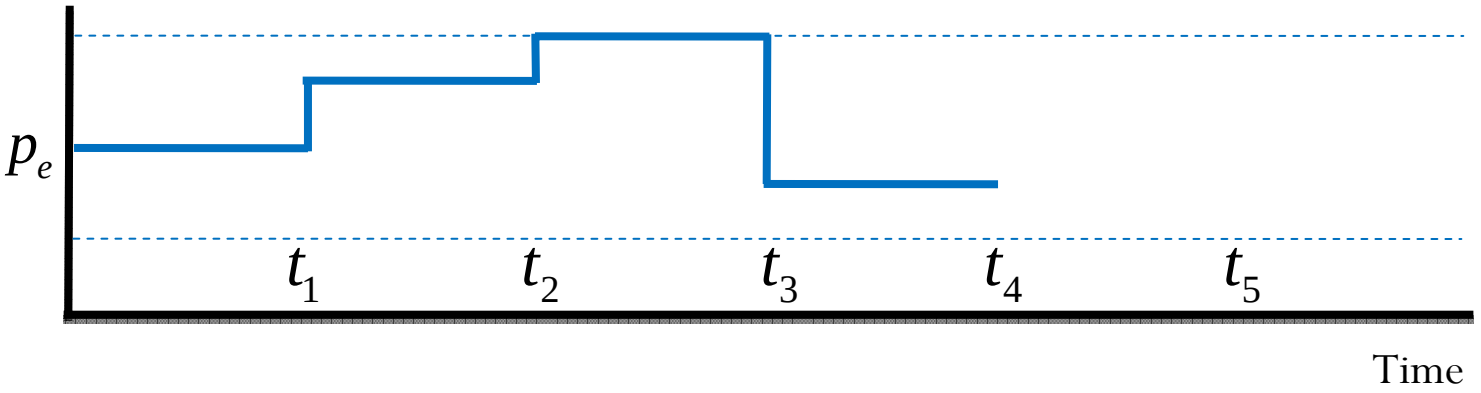


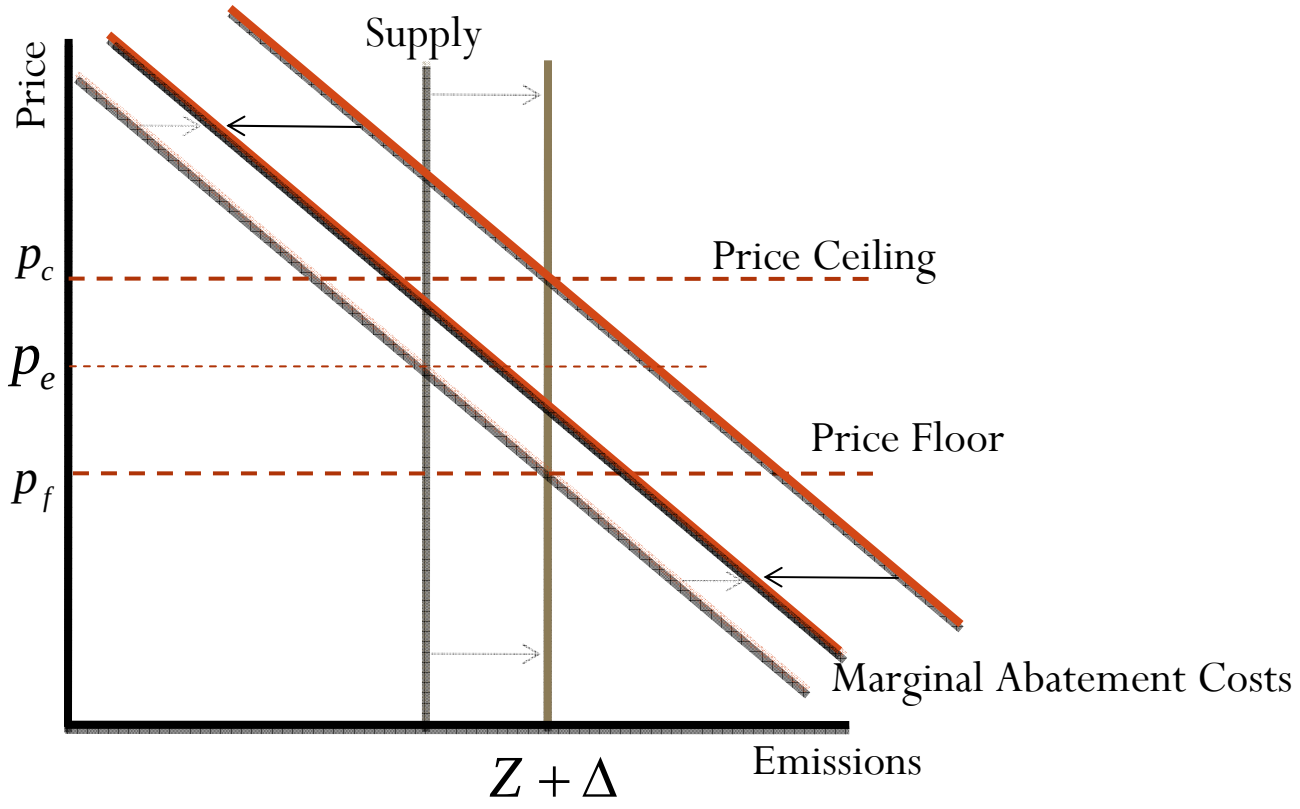
Price Path Asymmetry



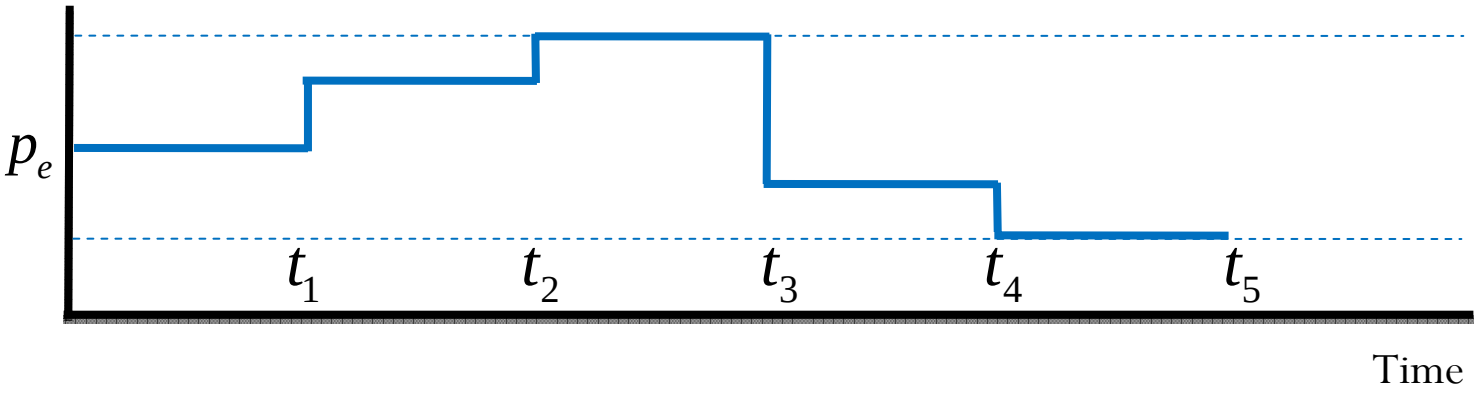


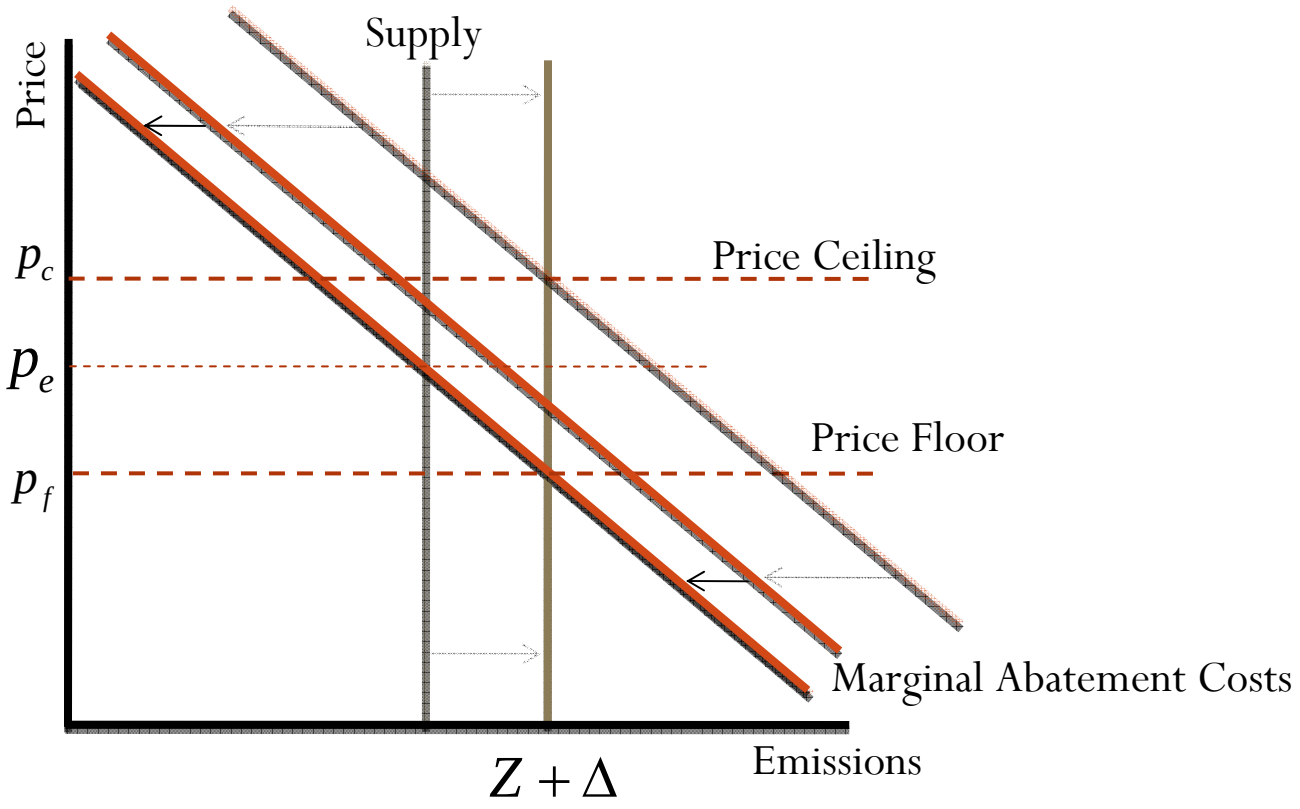
Price Path Asymmetry



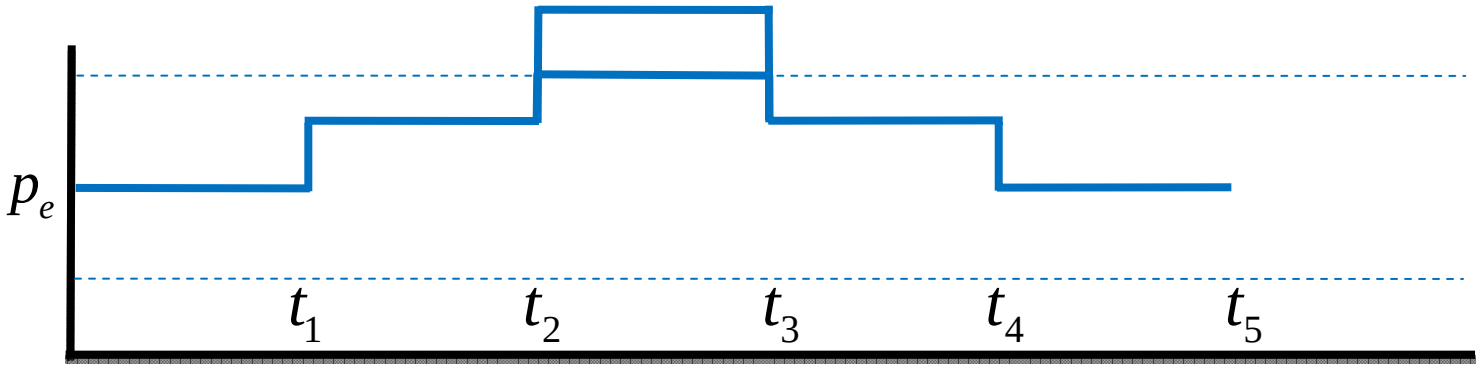


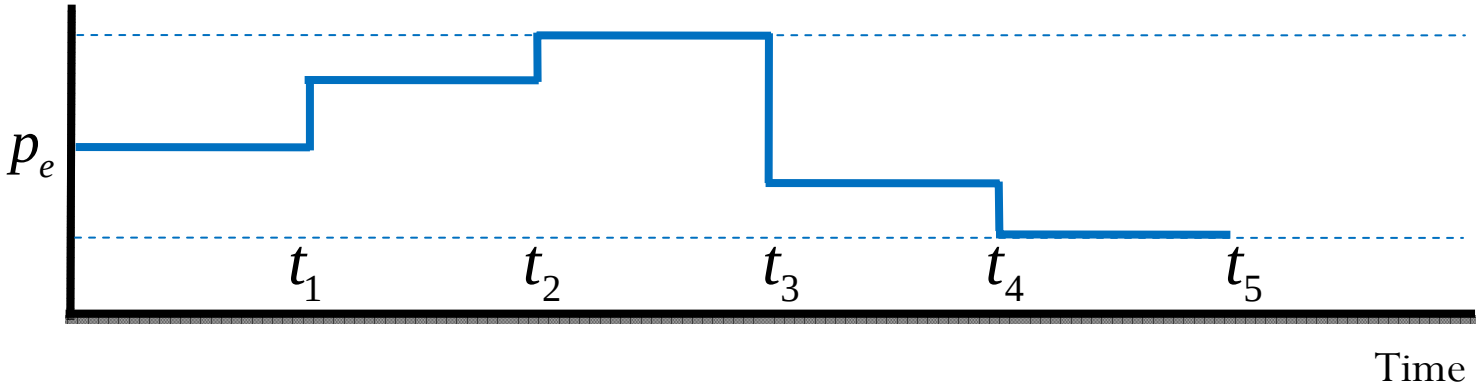
Price Path Asymmetry



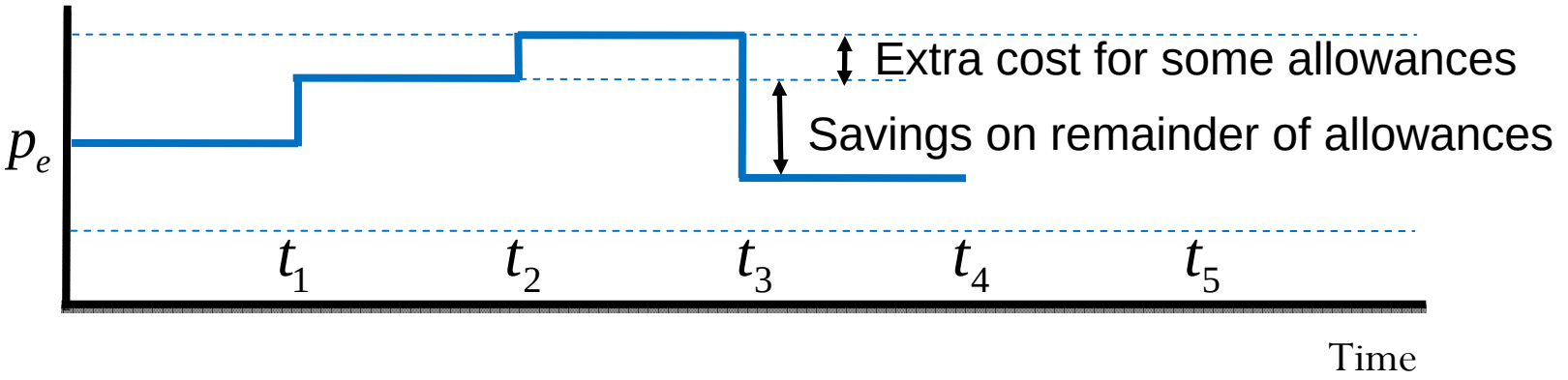


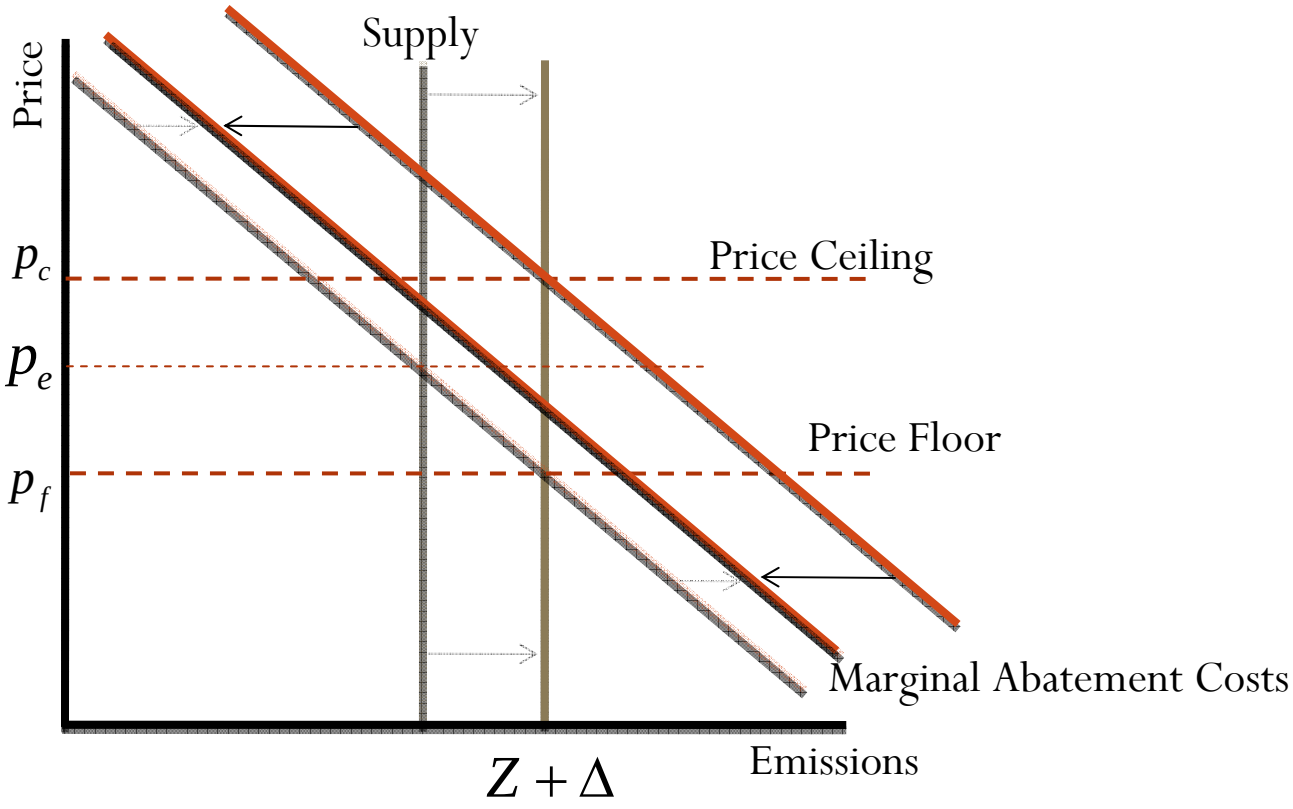
Price Path Asymmetry





Price Path Asymmetry





Application to the carbon market?

- Are there ways to manipulate the market given potential designs of the price ceiling?
  - YES, but depends on specific design
- Is there a financial benefit to be had from manipulating the market?
  - POSSIBLY, depends on conditions, elasticities, and market structure
- Can the manipulation be implemented unilaterally or is a coalition needed?
  - MAYBE, depends on market structure

Deviation Modeling Results

Planning Horizon (PH)	No. Allowances Issued Over PH (millions)	Coalition (%)	Deviation (as % of Coalition Demand over PH)	Deviation (as % of Coalition Demand in 1st Yr)	Cost with No Deviation ($ billions)	Cost of Deviation Investment ($ billions)	Cost Under Deviation (excl. dev. Allowances ($ billions)	Annualized Effective Real Return on Deviation Investment
3	15,000	5	10	30	$18	$0.45	$17.7	11-16%
		10	10	30	$36	$0.90	$33.6	41-46%
5	25,000	5	10	50	$30	$0.75	$29.0	7-10%
		10	10	50	$60	$1.50	$56.0	23-26%
10	50,000	5	10	100	$60	$1.50	$58.0	4-6%
		10	10	100	$120	$3.00	$111.9	12-13%

More Information: Andrew Stocking. *Unintended Consequences of Price Controls: An Application to Allowance Markets.* CBO Working Paper 2010-06. September 2010.

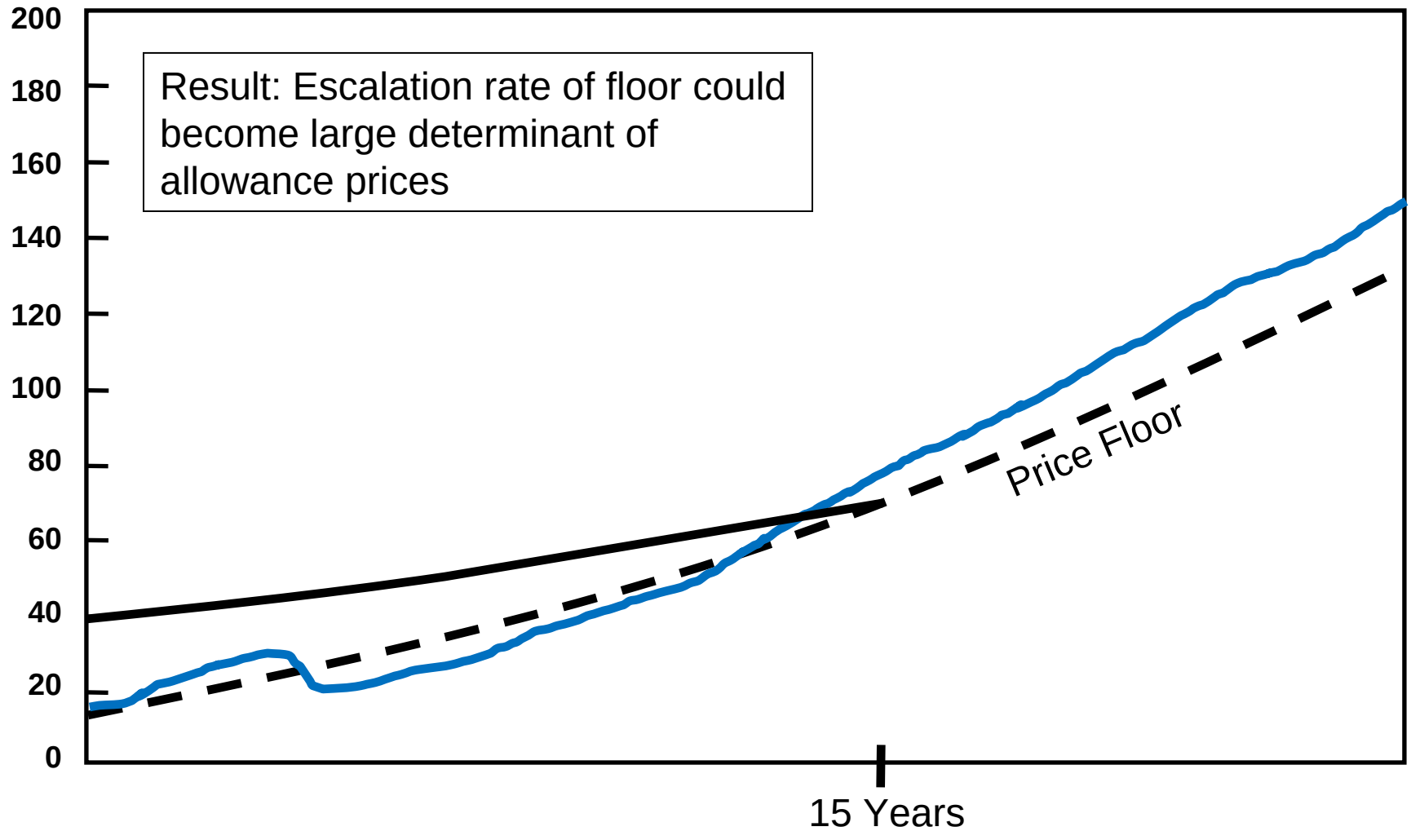
Price Floor

- Intended to increase the stringency of the cap when the price approaches the floor
- Implementation
  - Introduce new allowances with reserve price (auction)
  - Program administrator stands ready to buy at floor price (credibility issues?)
- Design of the Price Floor
  - Floors rise at a given real rate (5% WM/KB, 3% KL)

More Information: Congressional Budget Office. *Managing Allowance Prices in a Cap-and-Trade Program.* November 2010.

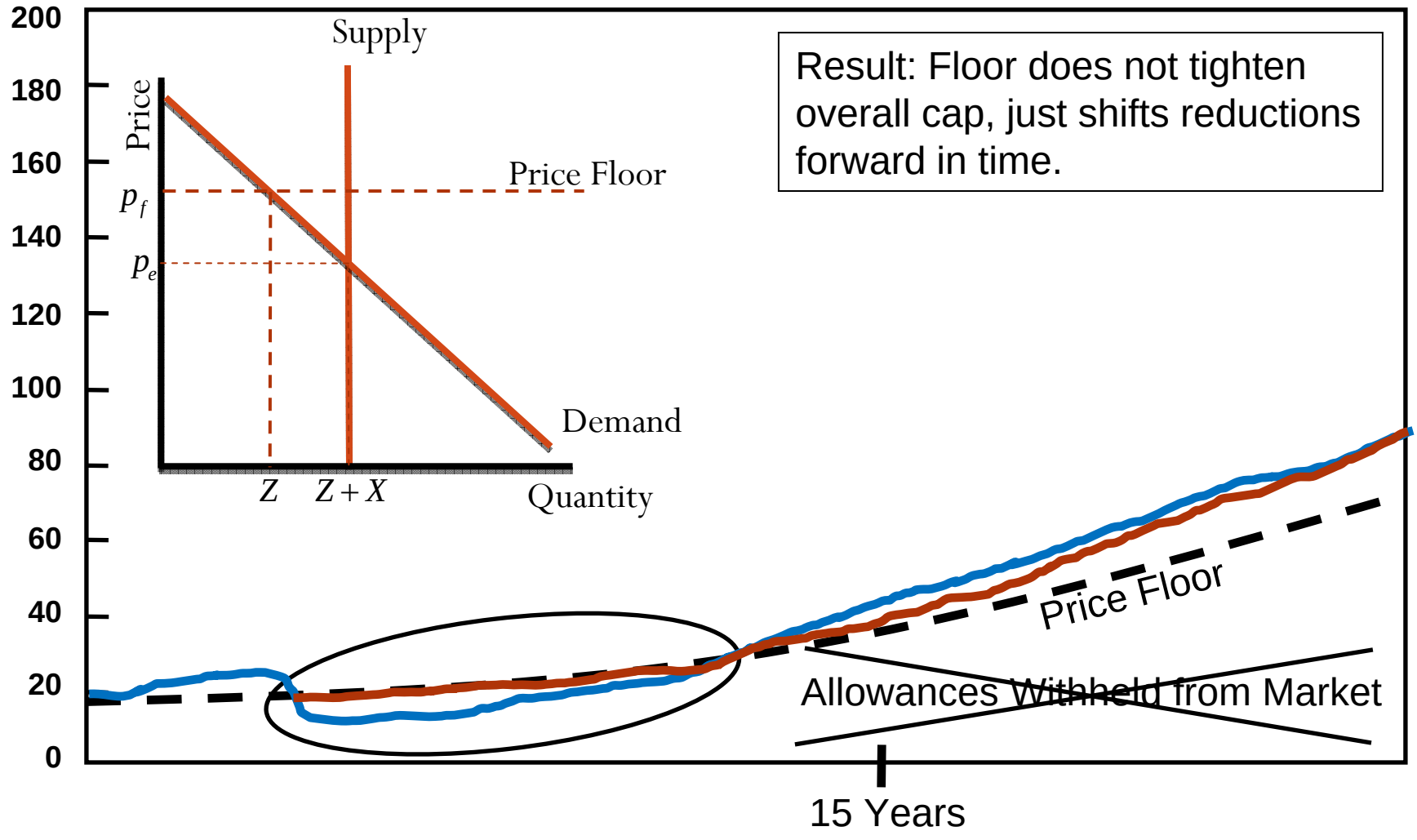
Price Floors

(Escalation Rate > Risk Free Rate)



Price Floors

(Black-Scholes Put Option for Floor Allowances)



Part II: Limits to Speculators and Derivatives

Addressing concerns about:

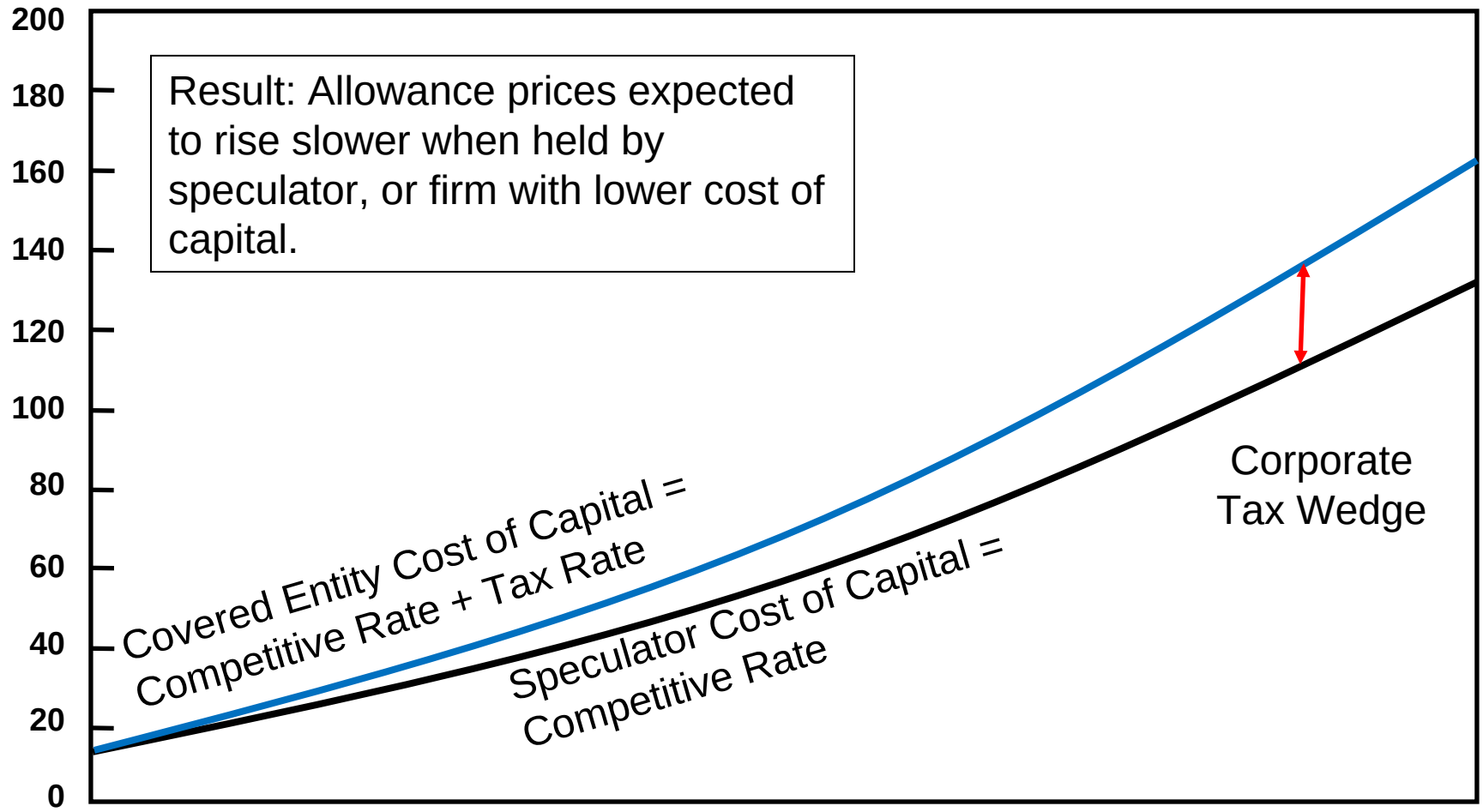
1) Systemic risk;
2) Lack of transparency;
3) Allowance bubbles; and
4) Manipulation

More Information: Congressional Budget Office. *Evaluating Limits on Participation and Transactions in Markets for Emissions Allowances.* December 2010.

Limiting Market Participation

- Benefits of speculators
  - Increased liquidity
    - Lower bid/ask spreads
    - Speculator decision to buy/sell not correlated with covered entity need to buy/sell allowances
  - More information (from diverse sources)
    - Profit from bringing accurate information to the market
  - Holding banked allowances
    - Banked allowances tie up capital
    - Speculators have lower cost of capital (no/limited corporate income taxes) relative to covered entities

Two Firms: Two Capital Costs



Prohibiting Speculators

- Reduced liquidity and increased volatility
  - If a few participants accounted for large fraction of market, increased ease of manipulation
- Removing class of traders who profit by providing services to market would create profit incentive for remaining traders
  - Or create incentive for excluded traders to purchase small covered entity
- Increased concentration of risk by covered entities could have unintended consequences
- Enforcement difficult

Alternatives to Prohibiting Speculators

- Position limits
  - Expanded use under Dodd-Frank
- Circuit breakers
  - Expanded use following May 6, 2010 flash crash

Limiting Transactions

- Some proposals to limit derivatives
- Benefits of derivatives
  - Allowance derivatives allow covered entities to manage price volatility risk
    - Lower transaction costs than buying allowances and holding them
  - Short sales could dampen/reduce bubble formation

Possible Market Responses to Derivatives Prohibition

- Hedge risk using correlated commodities (e.g,. natural gas or oil)
  - Not prefect hedge
  - Introduces other asset variability into allowance prices
- Move allowance derivatives to overseas markets outside U.S. regulatory authority
- Enforcement difficulty

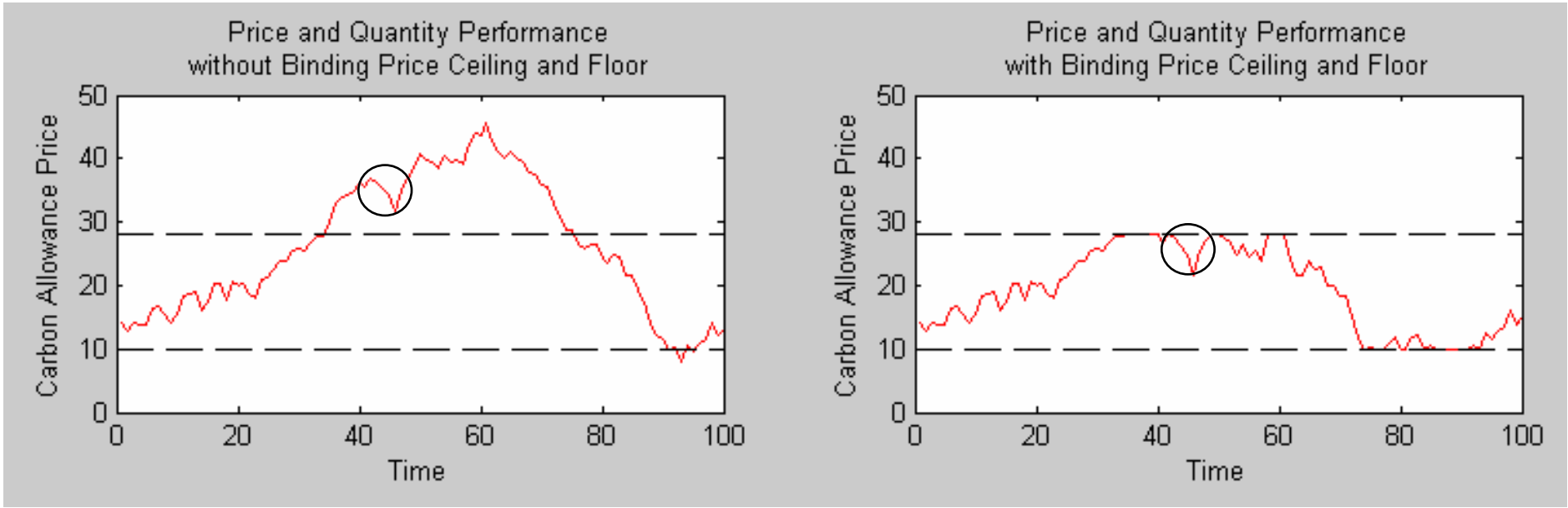
Alternatives to Prohibiting Derivatives

- Reliance on Centralized Clearing
  - Heightened market transparency and stability
- Trading Through Formal Exchanges
  - Increased transparency and standardization
- Increased Regulation of Over-the-Counter Trading
  - Improved tracking
  - Increased margin requirements

Thank you!

All of CBO's work on climate change is available at:
www.cbo.gov/link/cc

More Complicated Information Environment



Prices simulated by random draws