

# **Evaluating Commitment Period Reserve: An Experimental Approach**

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# 1. Background of CPR

## Kyoto Protocol (1997):

Article 17 “(...) The Parties included in Annex B may participate in emissions trading (...). Any such **trading shall be supplemental to domestic actions** (...).”

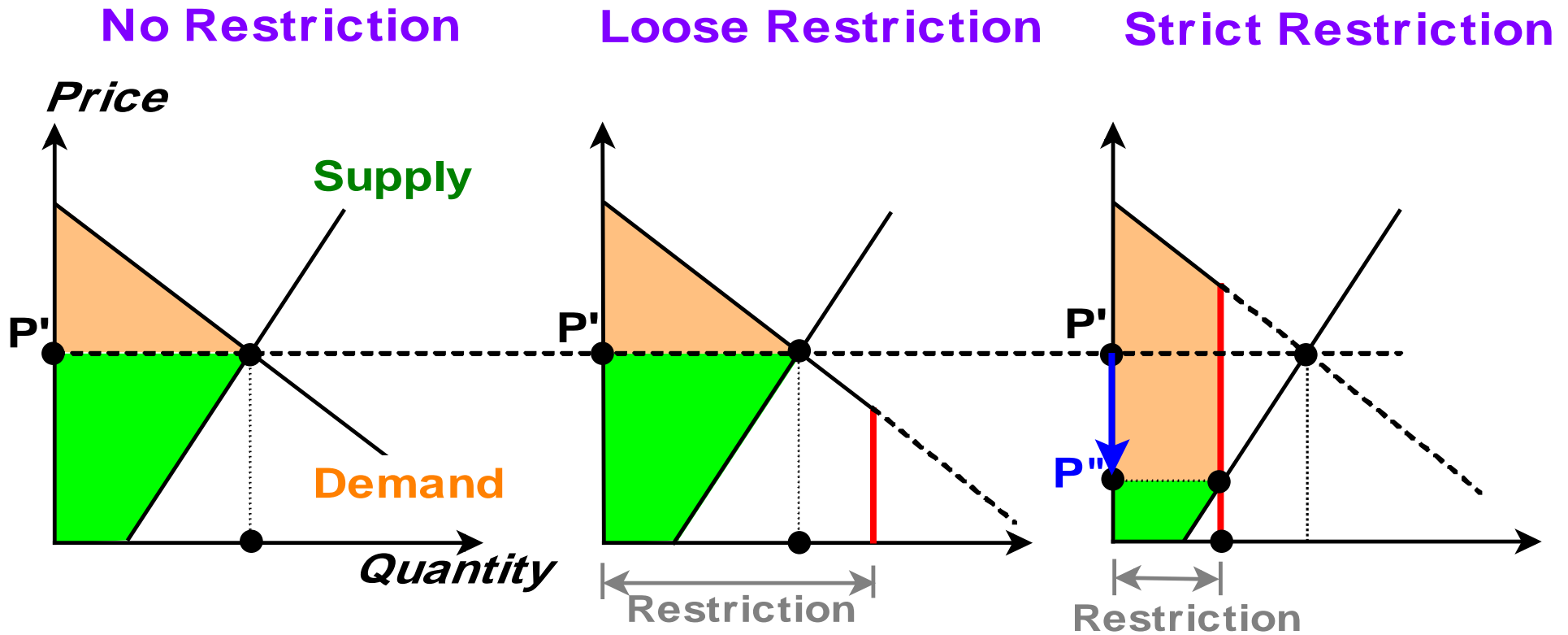


(i) Restriction on the **purchase** of permits  
(EU proposal (1999))



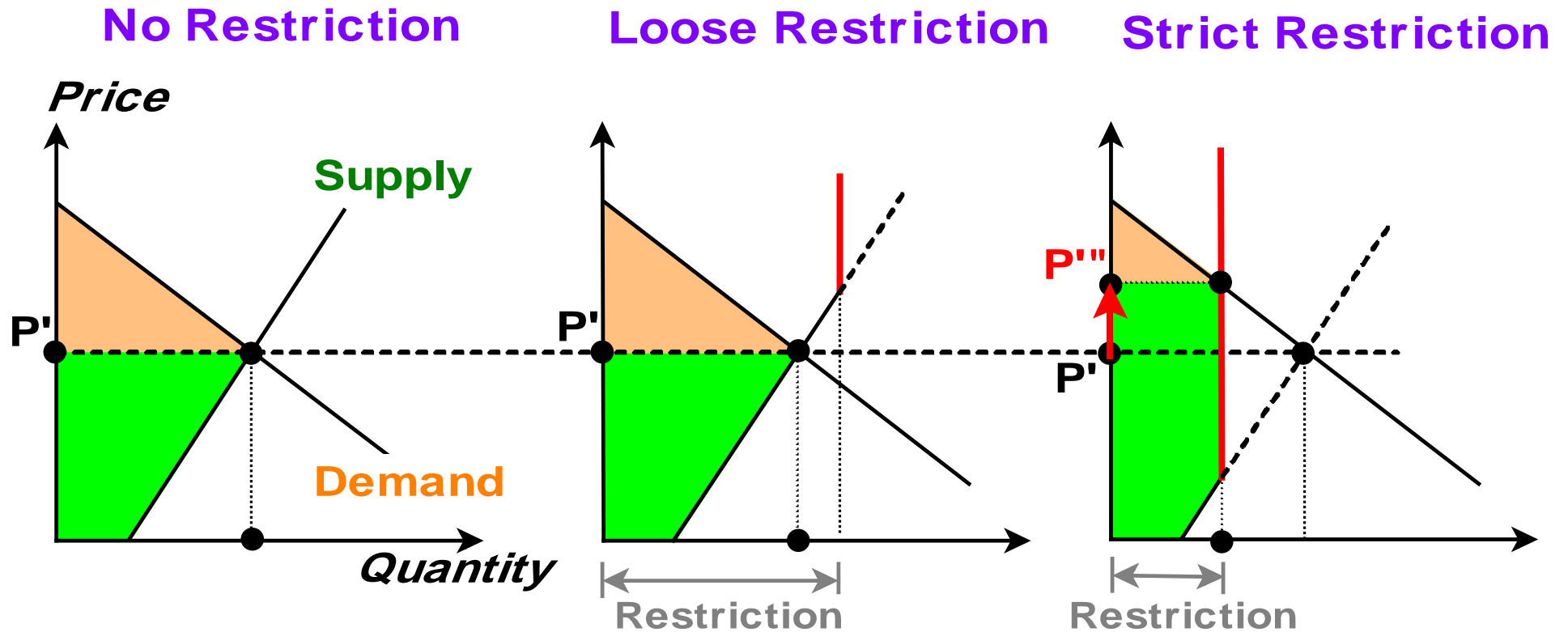
(ii) Restriction on the **sale** of permits  
(Marrakech Accord (2001))

(i) Restriction on the **purchase** of permits:  
 Strict restriction => **Price goes down**



: Benefit to the buyer       : Profit to the seller

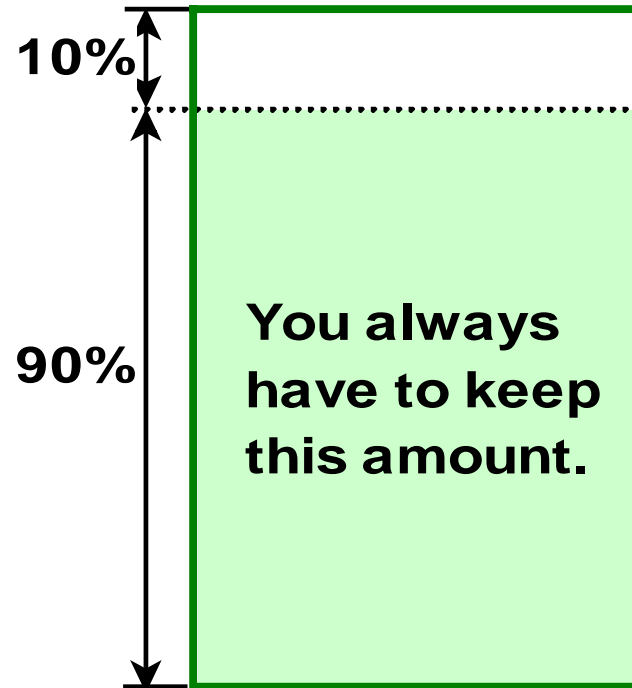
(ii) Restriction on the **sale** of permits:  
Strict restriction => **Price goes up**



**Marrakech Accord (2001):  
Restriction on the sale of permits**

**“Each party (...) shall maintain (...) a **commitment period reserve** which **should not drop below 90 per cent of the party’s assigned amount (...), or 100 per cent of five times its most recently reviewed inventory, whichever is lowest.**”**

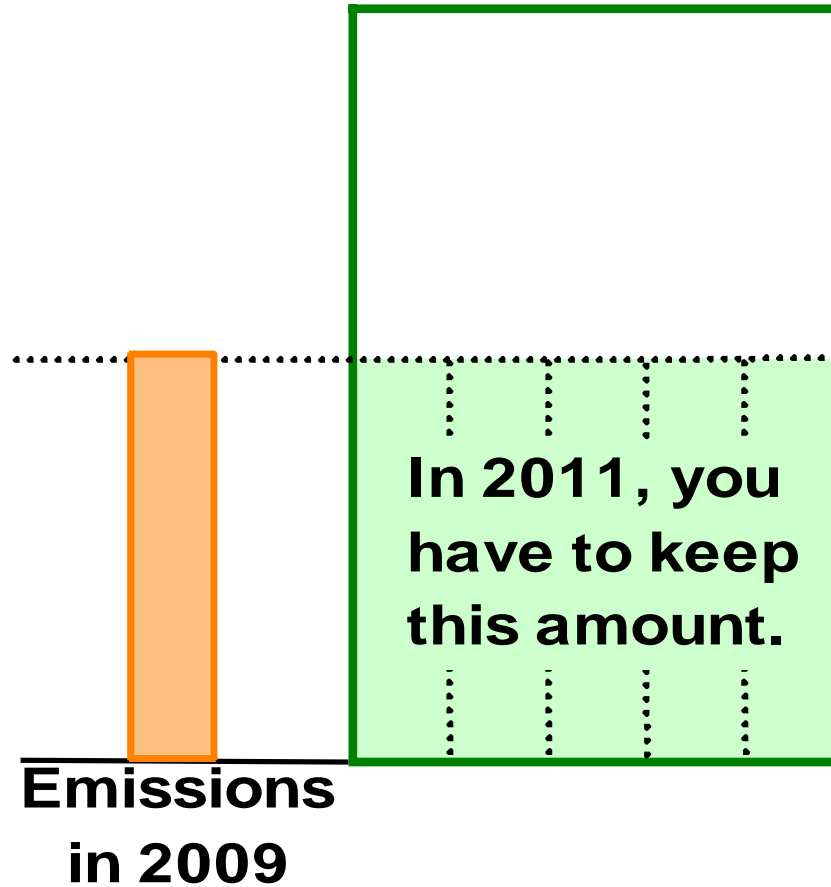
## CPR (a) from 2008 to 2012



: Assigned Amount for 5 years

: Commitment Period Reserve

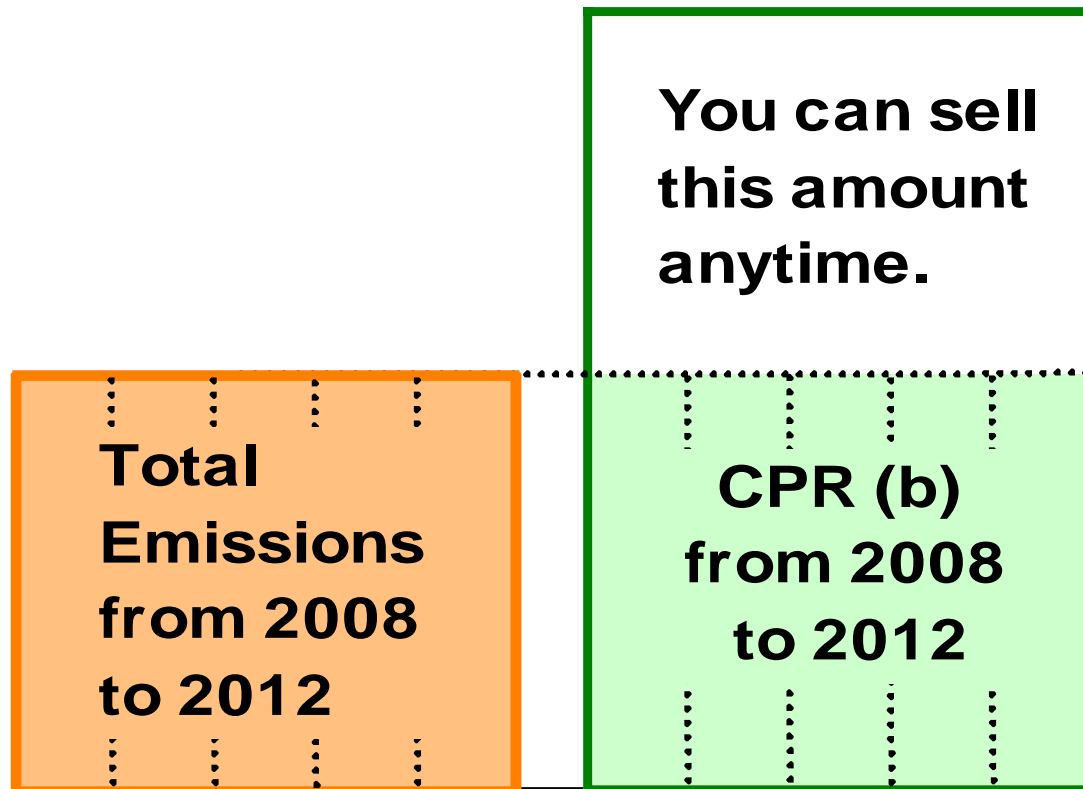
**CPR (b) in 2011 (Emissions in 2010 are not known yet.)**



**Emissions are constant.**

**=> Restriction is always inactive.**

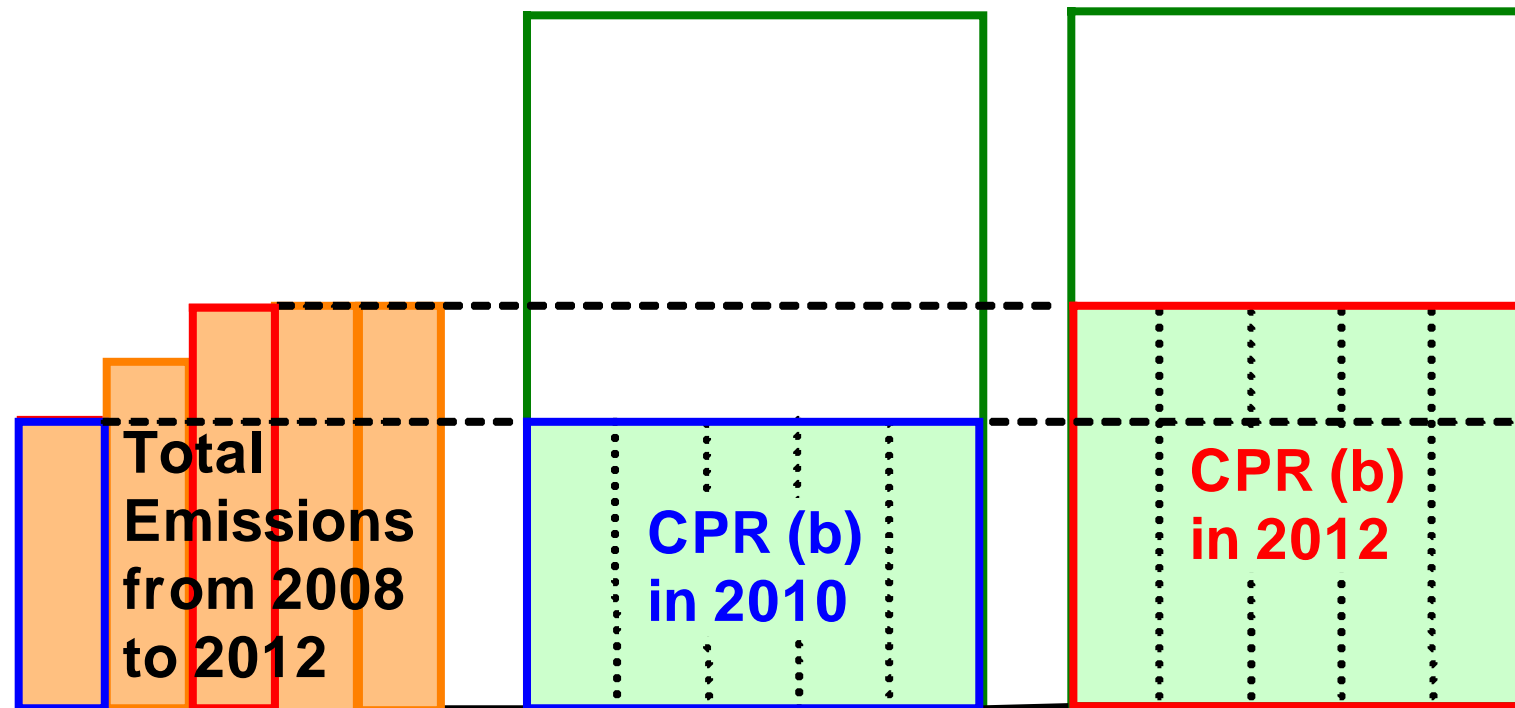
**(= you can sell all the surplus anytime.)**





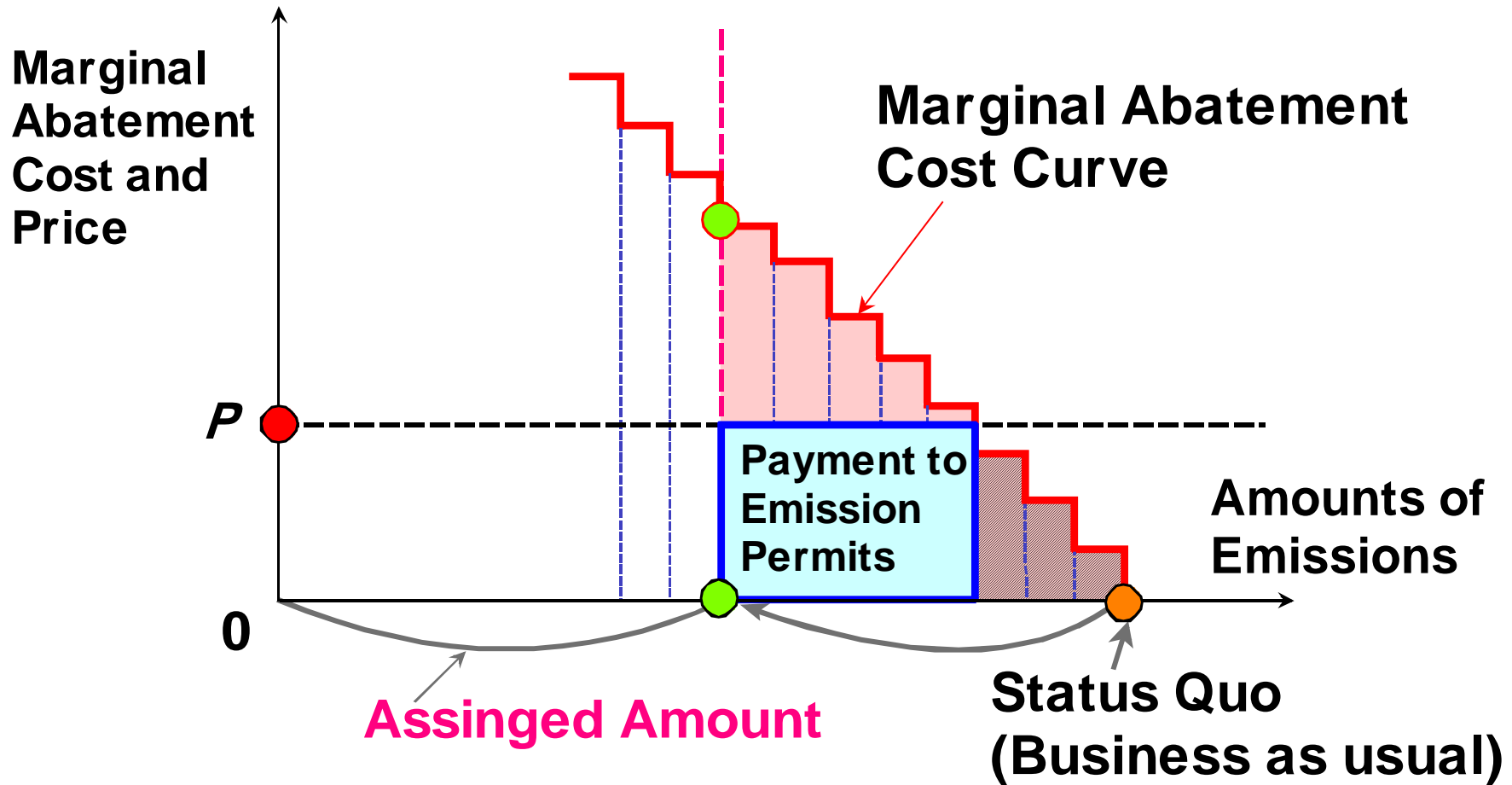
Emissions are not constant.

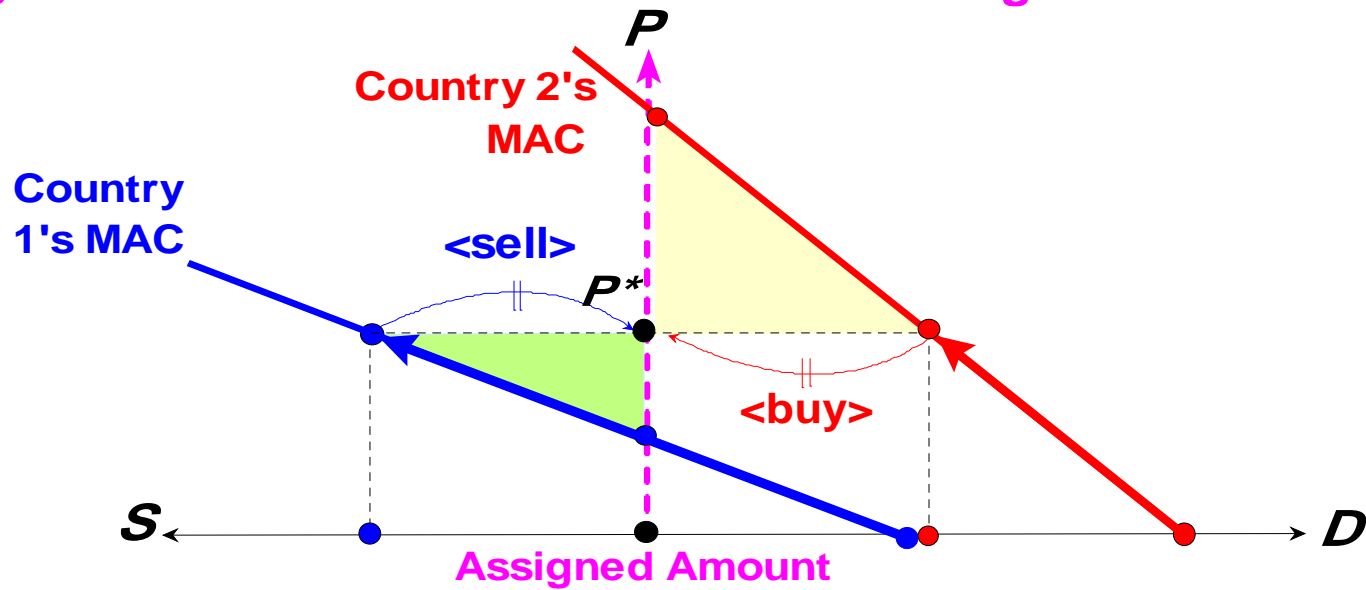
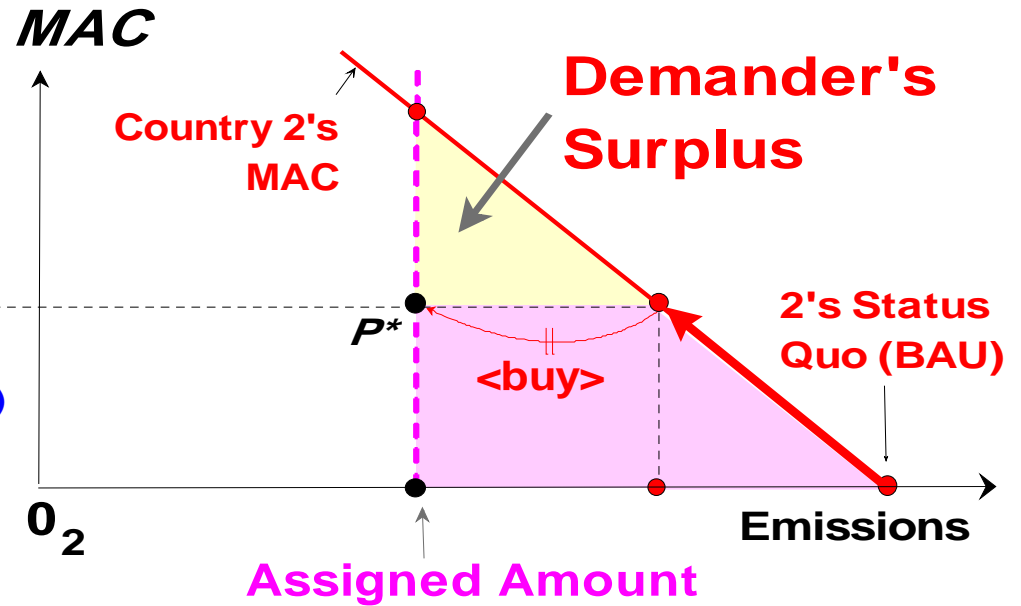
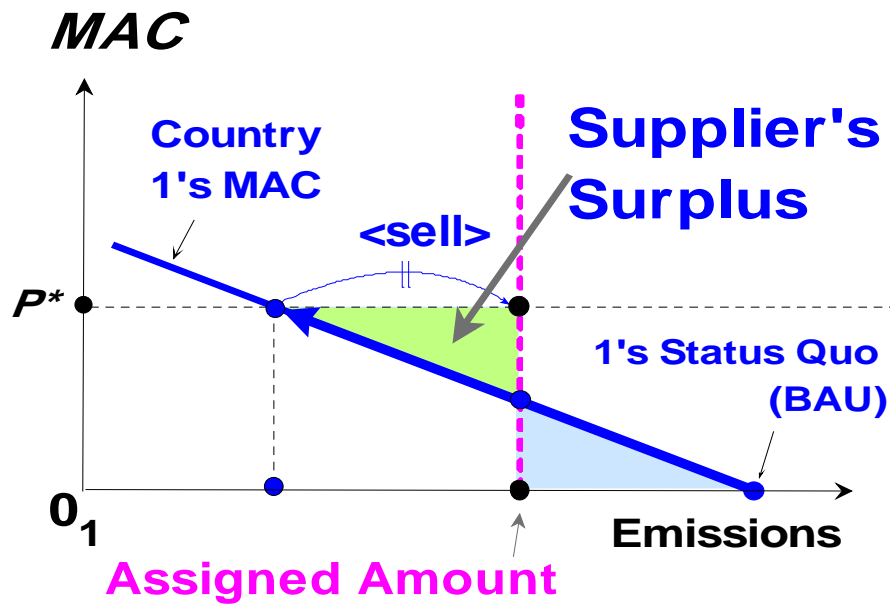
=> Restriction may be active in some years => Price  $\uparrow$  ?



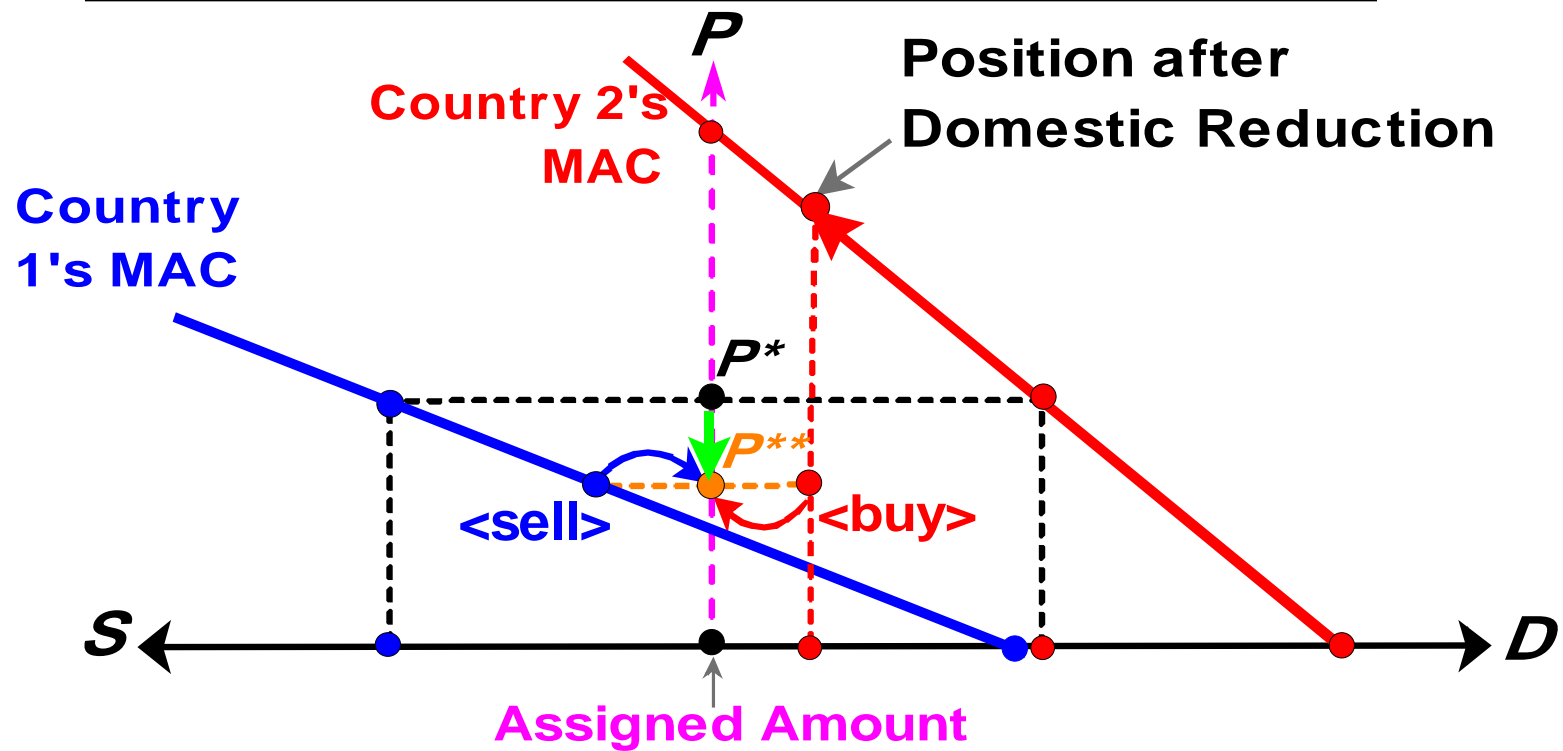
## 2. Emissions Trading

### Marginal Abatement Cost Curve





**Excessive reduction → Price drops**



**Point Equilibrium Price:**  
Market clearing price at each point of time

### 3. Experimental Design

- Ten student subjects in each session
- Used realistic marginal abatement cost curves
- We paid subjects money that was proportional to the earnings in experiment.

(1) CPR vs. Non-CPR

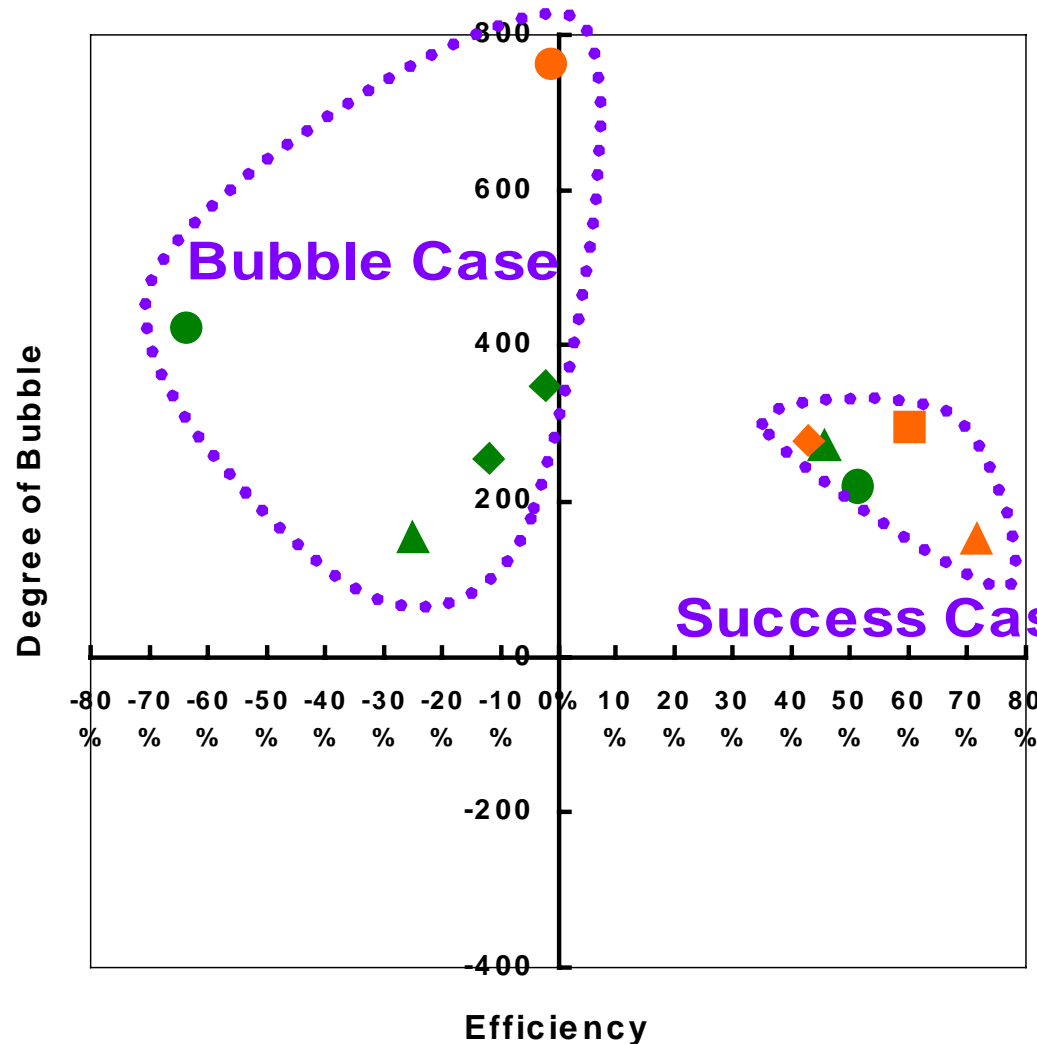
(2) **Bilateral Trading**: A pair negotiates the price and quantity  
((3) contract inf. open vs. closed)

vs.

<b>Double Auction:</b>	<b>Buyers' Bids</b>	<b>Sellers' Asks</b>
	(3) \$56, 20 units	(6) \$104, 15 units
	(1) \$86, 13 units	(4) \$92, 20 units
	(2) grabs (4)'s ask	
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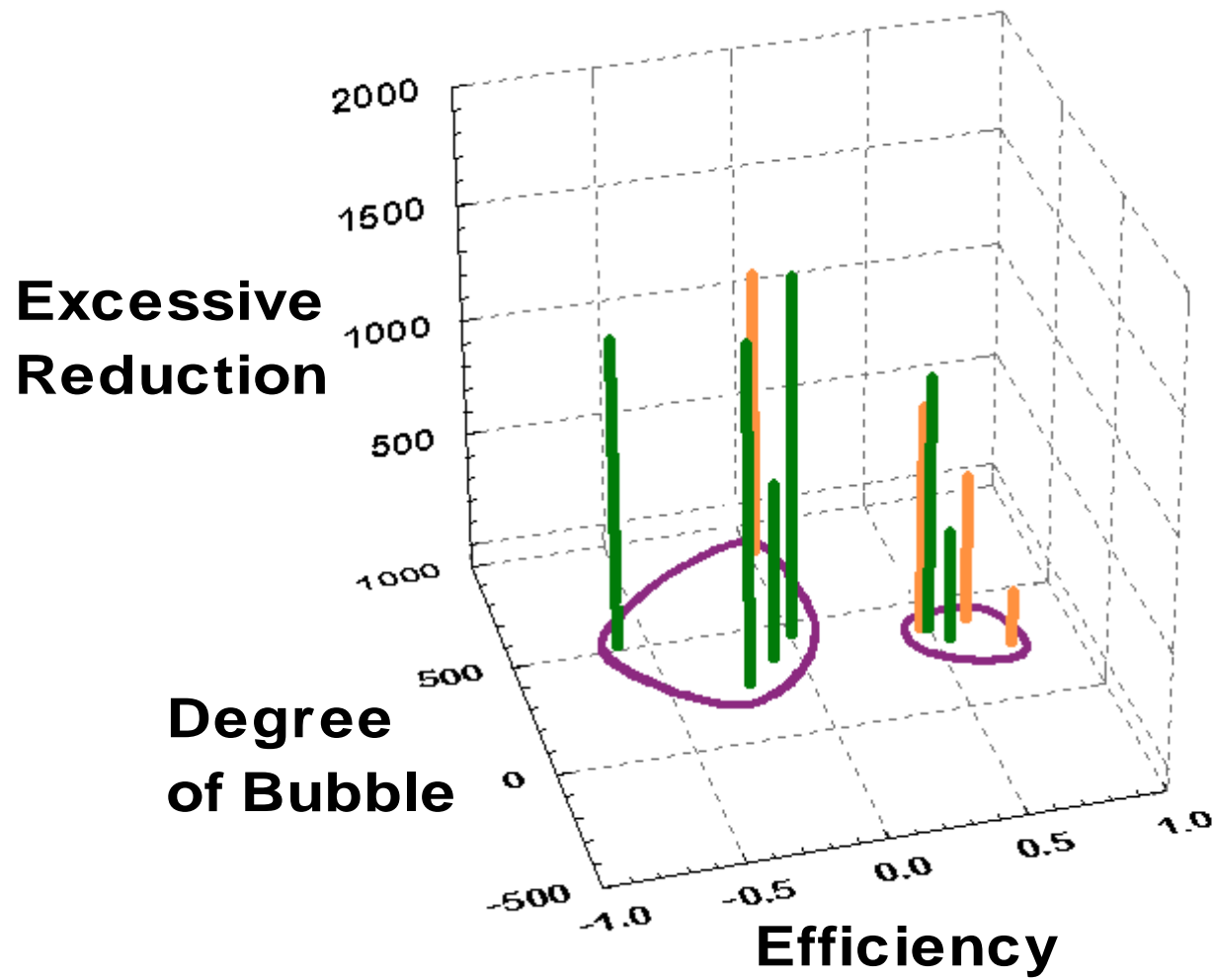
# 4. Results

## First Sessions

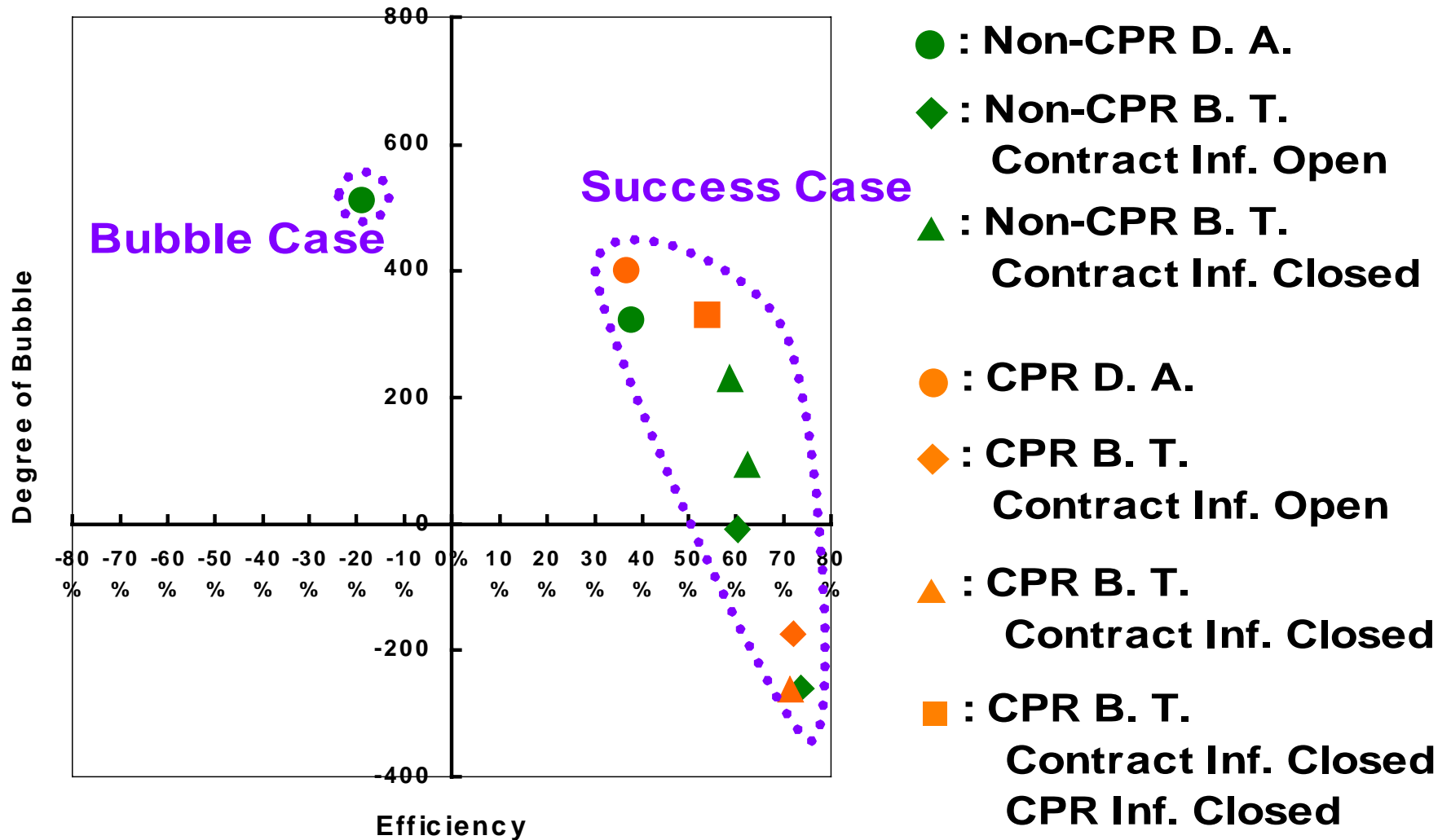


- : Non-CPR D. A.
- ◆ : Non-CPR B. T.  
Contract Inf. Open
- ▲ : Non-CPR B. T.  
Contract Inf. Closed
- : CPR D. A.
- ◆ : CPR B. T.  
Contract Inf. Open
- ▲ : CPR B. T.  
Contract Inf. Closed
- : CPR B. T.  
Contract Inf. Closed  
CPR Inf. Closed

# First Sessions

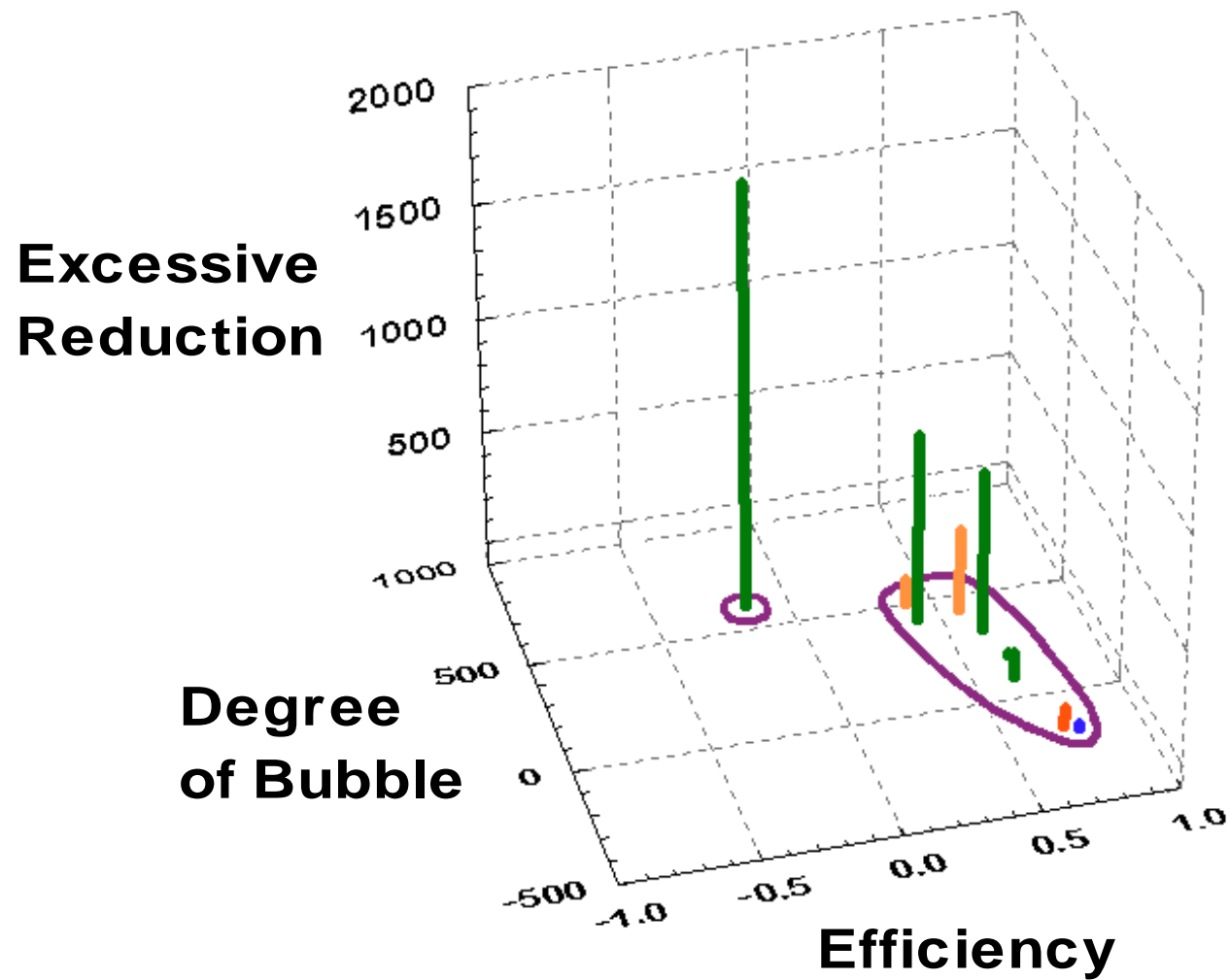


# Second Sessions

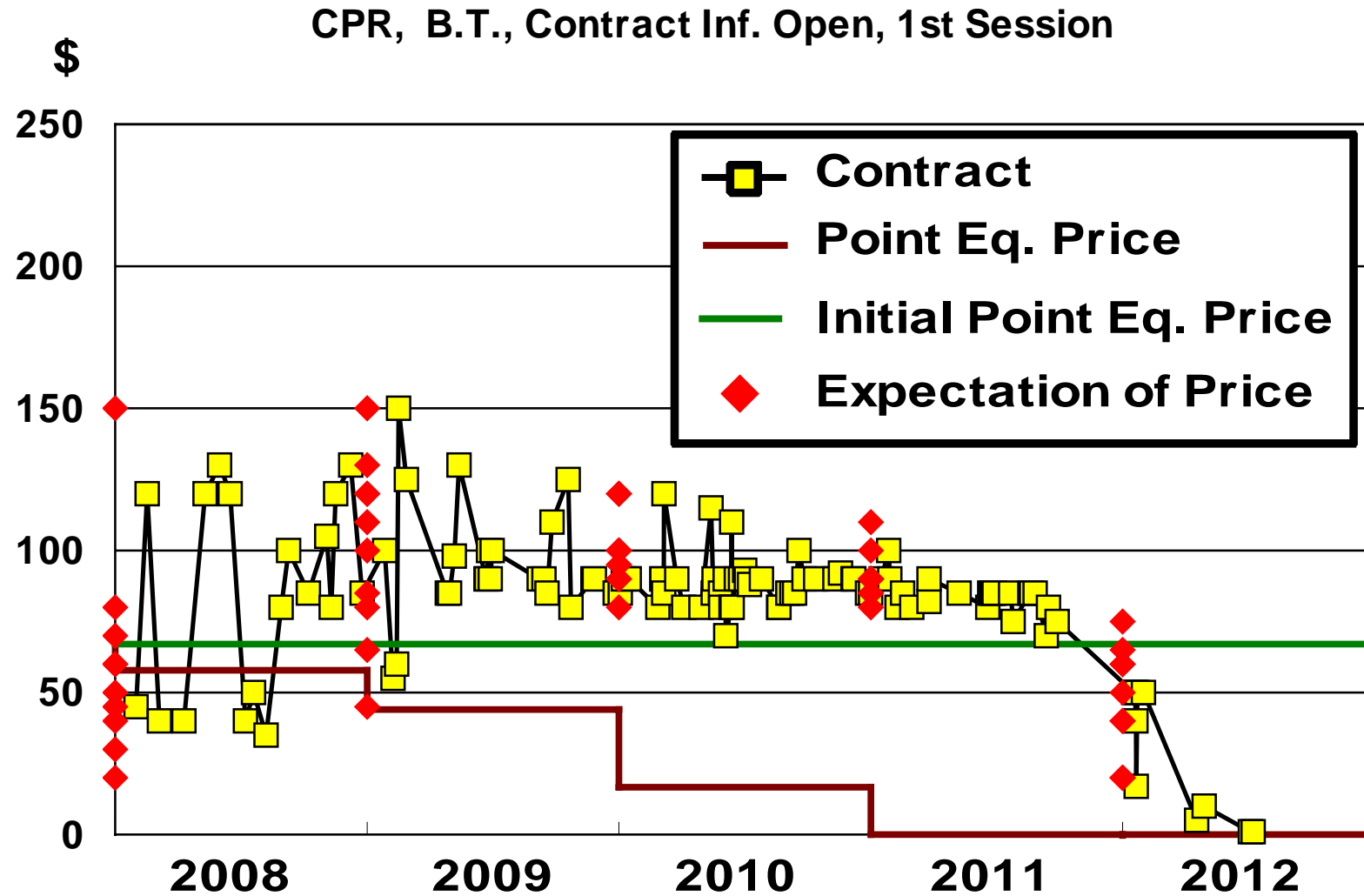




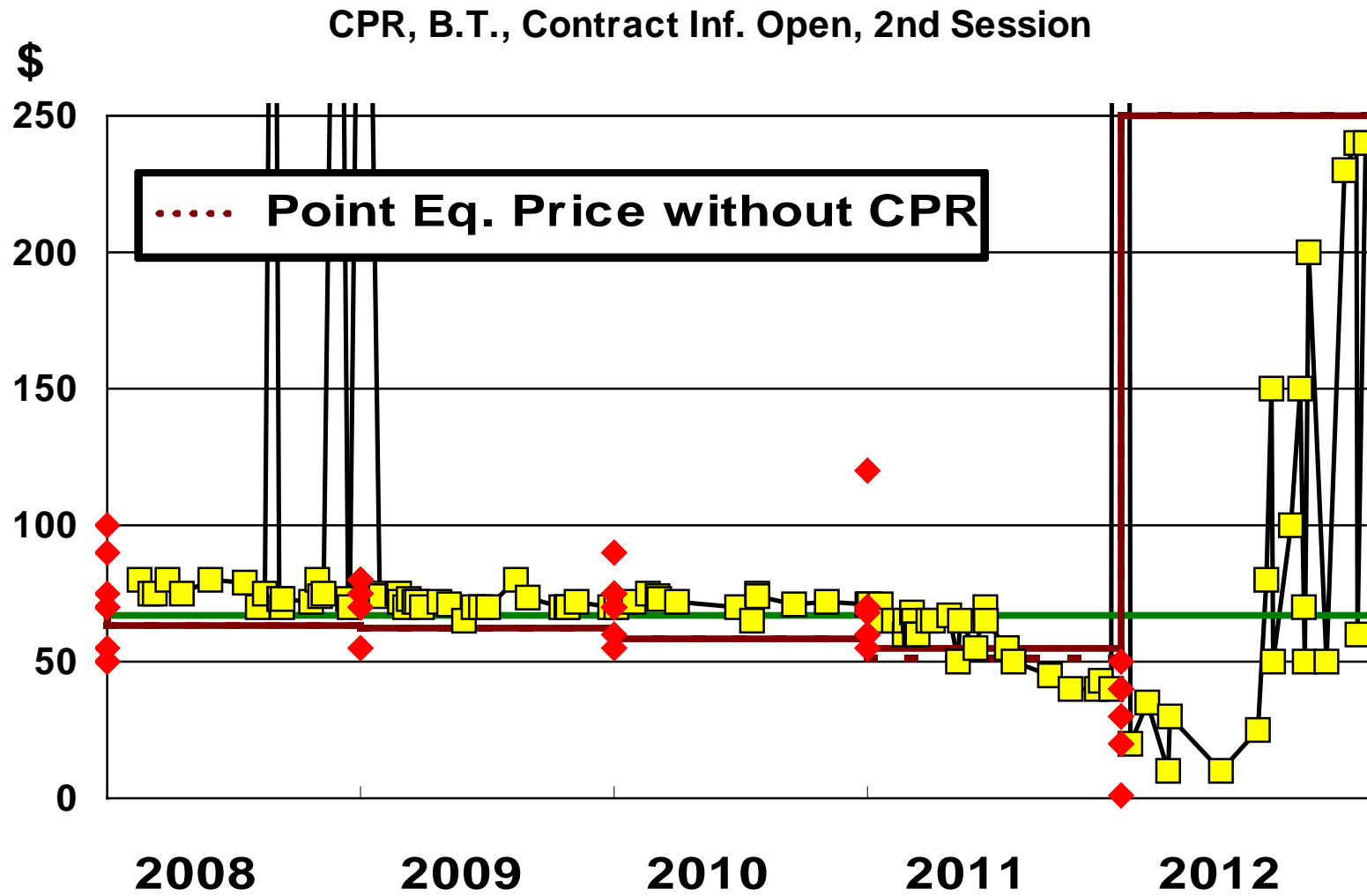
## Second Sessions



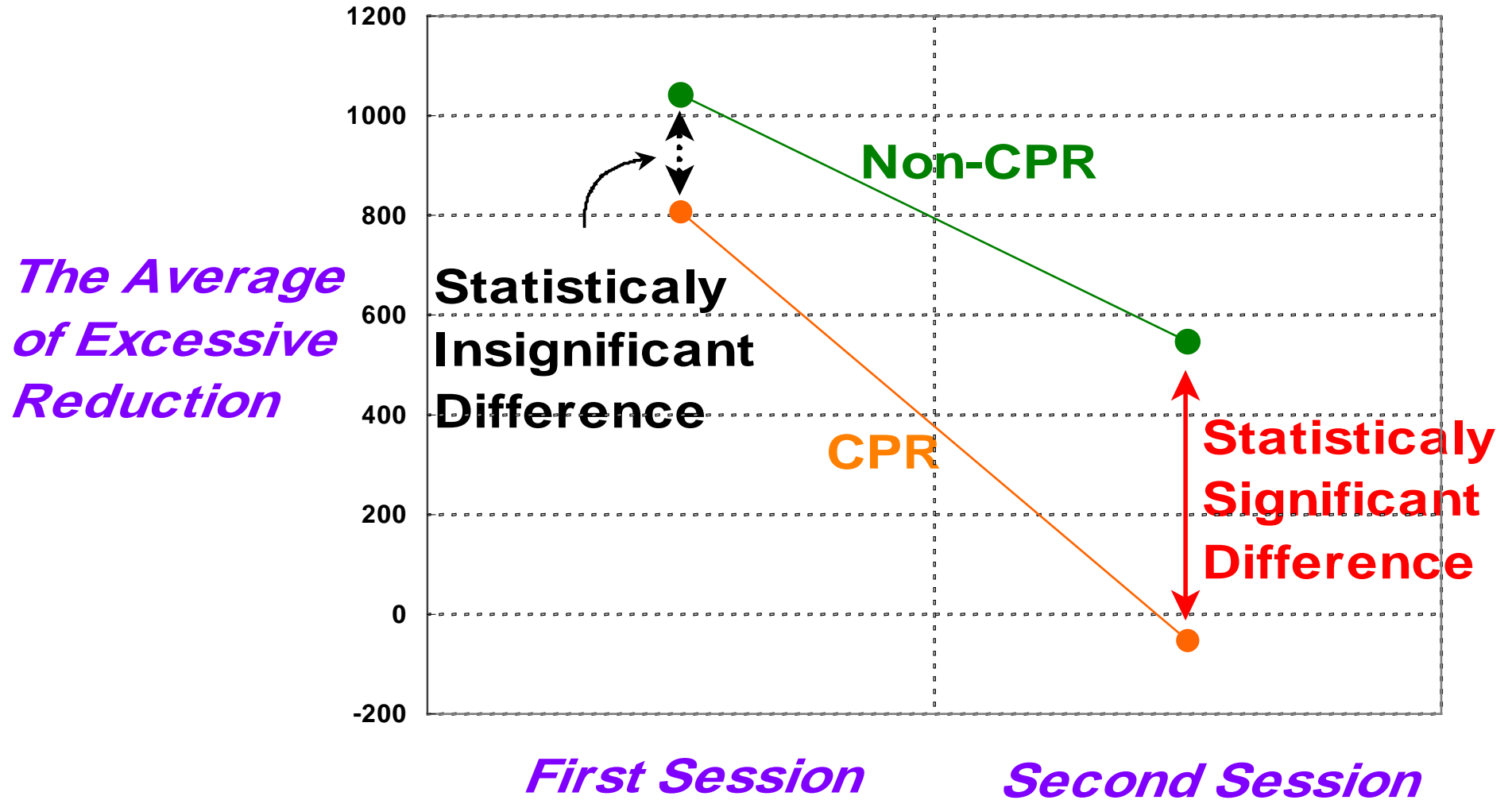
# Bubble Case



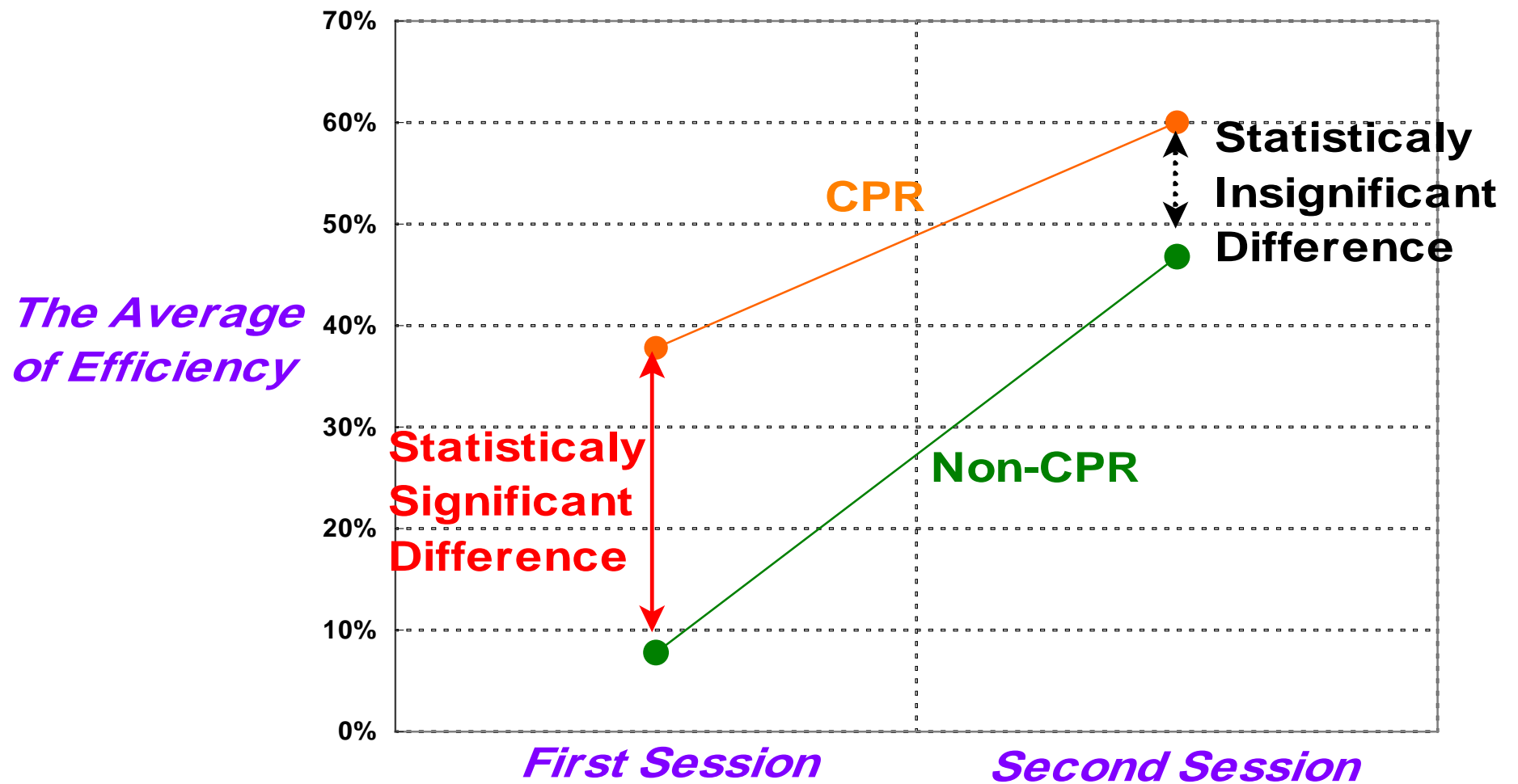
# Success Case



# CPR vs. Non-CPR: from the environmental viewpoint



# CPR vs. Non-CPR: from the economic viewpoint



	First Session	Second Session
Economic Efficiency	CPR > Non-CPR	CPR = Non-CPR
Environmental Integrity	CPR = Non-CPR	CPR < Non-CPR
The Average of Price	CPR = Non-CPR	CPR = Non-CPR
Quantity Traded	CPR < Non-CPR	CPR < Non-CPR

**Does CPR disturb optimal (=profit maximizing) transactions?**

**In two sessions of CPR experiment,  
CPR became strict restriction => Point Eq. Price ↑  
(for one country in a year)**

**In six sessions of CPR experiment,  
CPR was loose restriction throughout the session.**

In all the sessions of Non-CPR experiment,  
hypothetically calculated **CPR was loose restriction**  
throughout the session.

=> **CPR seldom prevents each country**  
**from carrying out optimal transaction.**



## **5. Conclusion**

**(i) Once countries are accustomed to emissions trading, Non-CPR system can attain higher emissions reduction than CPR system at almost the same cost.**

**(ii) CPR rule seldom restricts countries' selling behavior to maximize their profit.**

**=> We need not dare to use ineffective CPR system, which only entails monitoring cost.**