Evaluating Commitment Period Reserve: An Experimental Approach

COP8

New Delhi, India

October 25, 2002

Takao Kusakawa and Tatsuyoshi Saijo

kusakawa@iser.osaka-u.ac.jp saijo@iser.osaka-u.ac.jp

Global Industrial and Social Progress Research Institute (GISPRI), Tokyo, Japan,
ISER, Osaka University, Osaka, Japan,
Research Institute of Economy, Trade and Industry (RIETI), Tokyo, Japan; and
Climate Design, Tokyo, Japan

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 (…)."

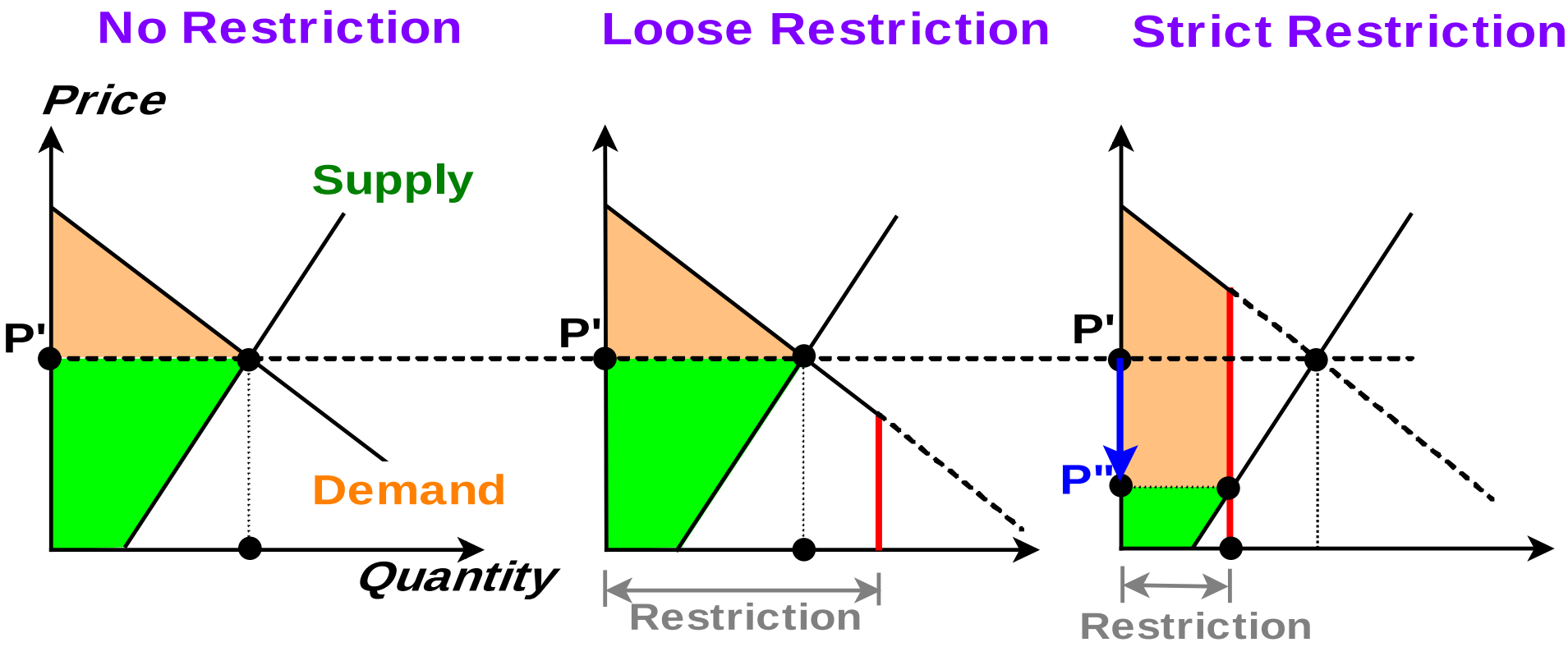
⇓

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

⇓

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

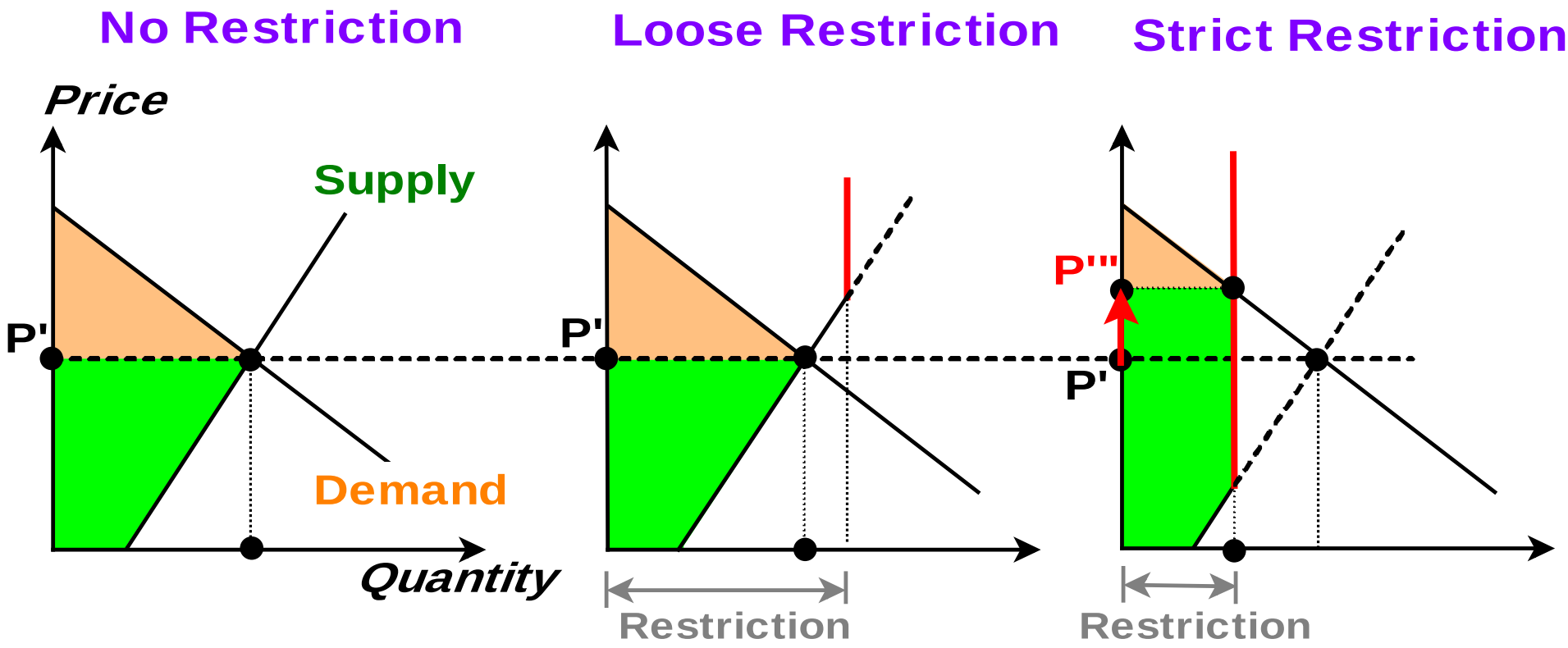
(i) Restriction on the purchase of permits:
Strict restriction => Price goes down



: Benefit to the buyer : Profit to the seller

(ii) Restriction on the sale of permits:

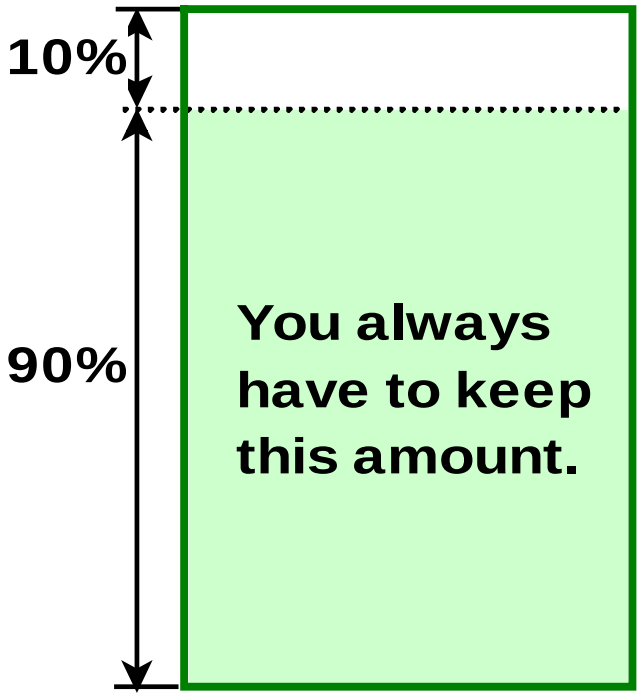
Strict restriction => Price goes up



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."

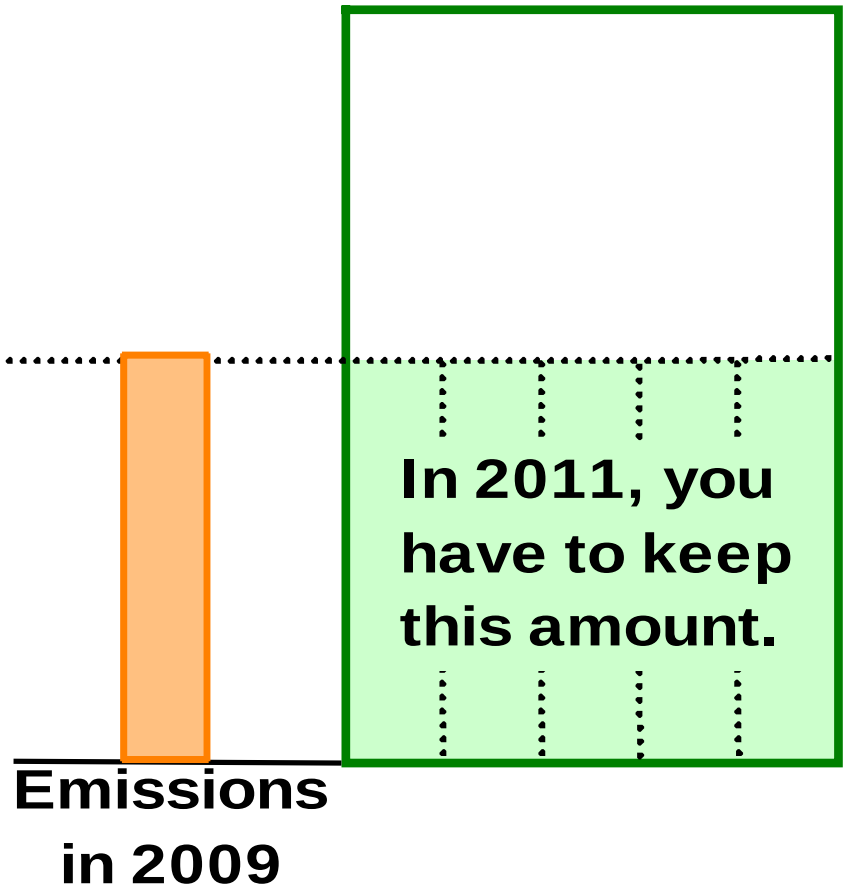
CPR (a) from 2008 to 2012



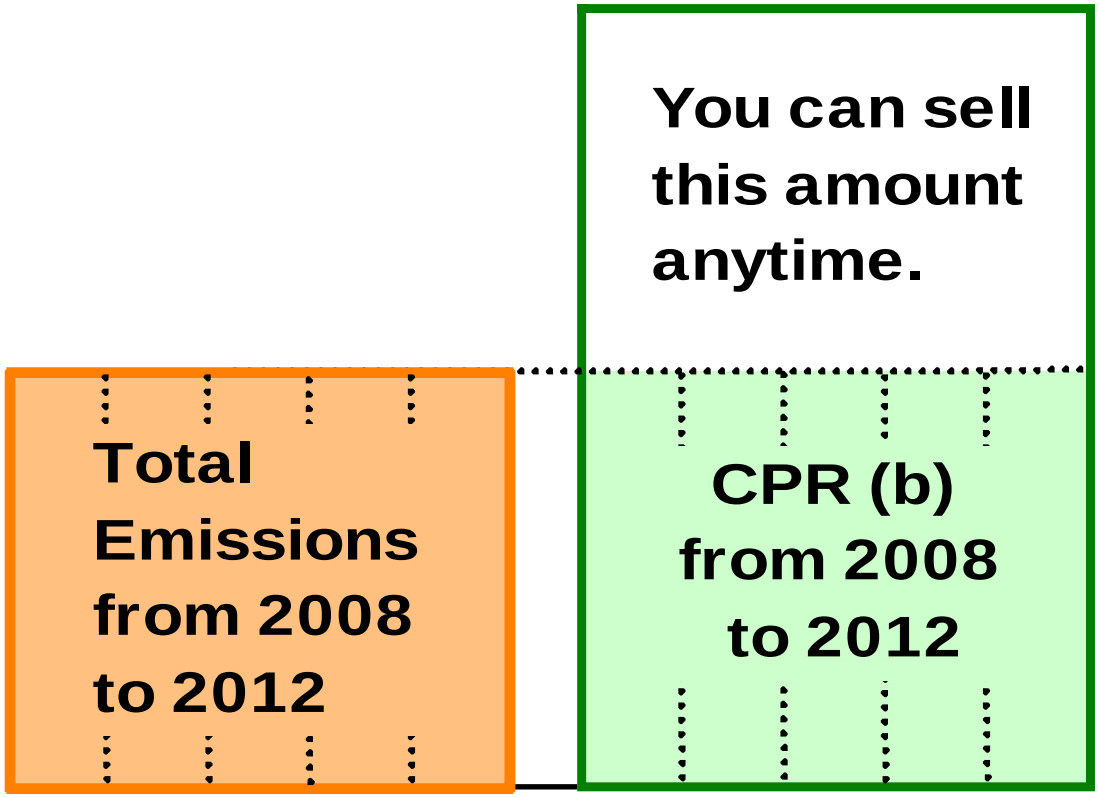
: Assigned Amount for 5 years

: Commitment Period Reserve

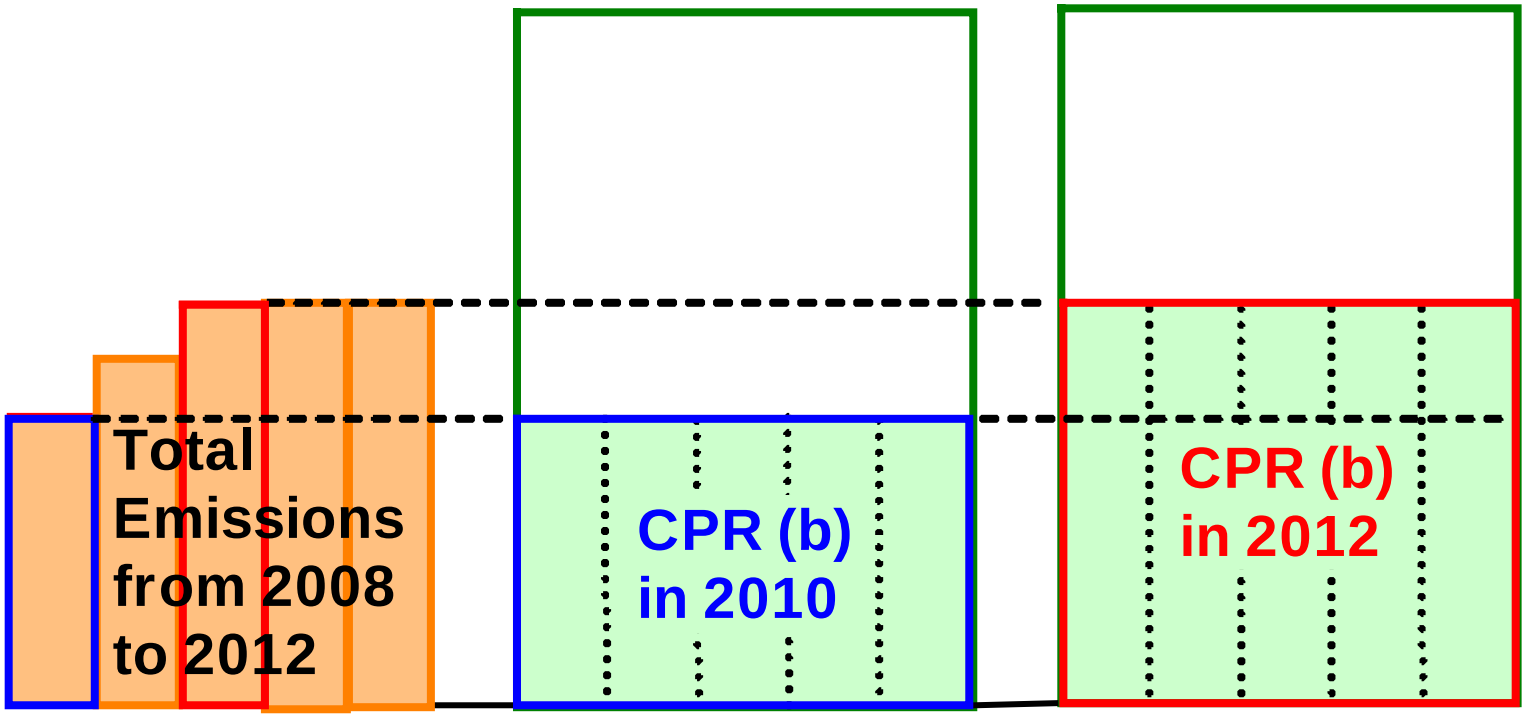
CPR (b) in 2011 (Emissions in 2010 are not known yet.)



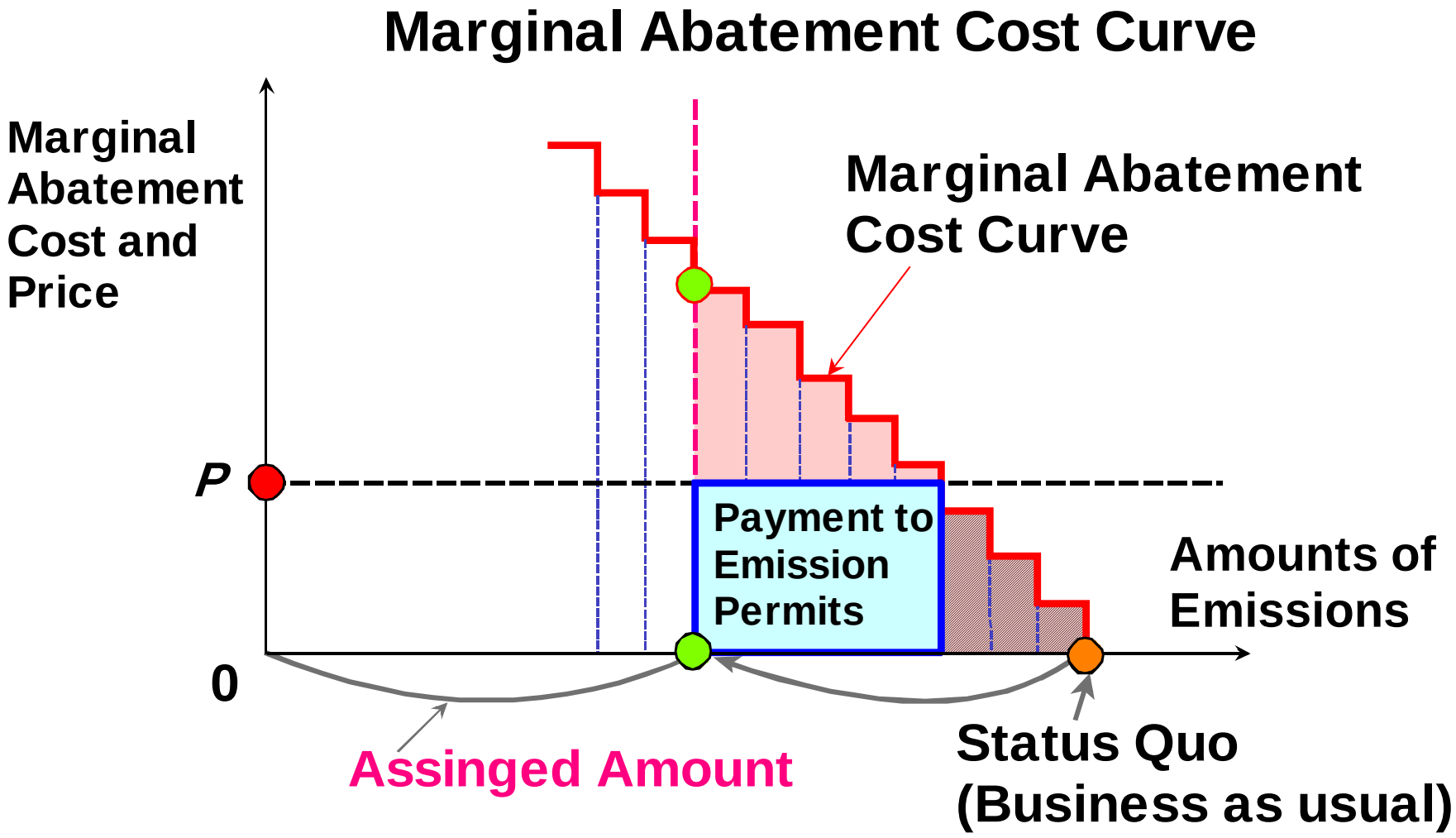
Emissions are constant.
=> Restriction is always inactive.
(= you can sell all the surplus anytime.)

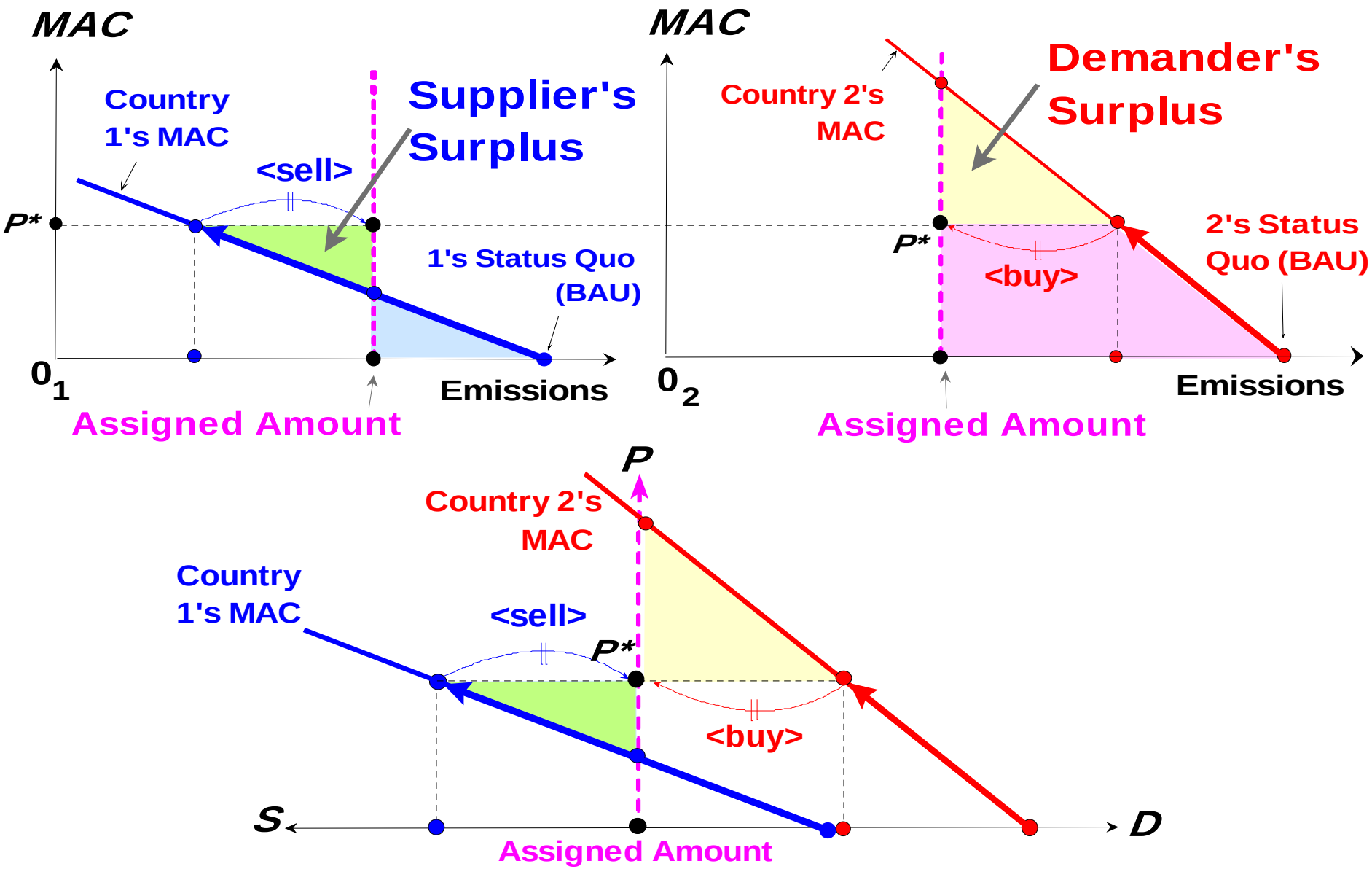


Emissions are not constant.
=> Restriction may be active in some years => Price ⇑ ?

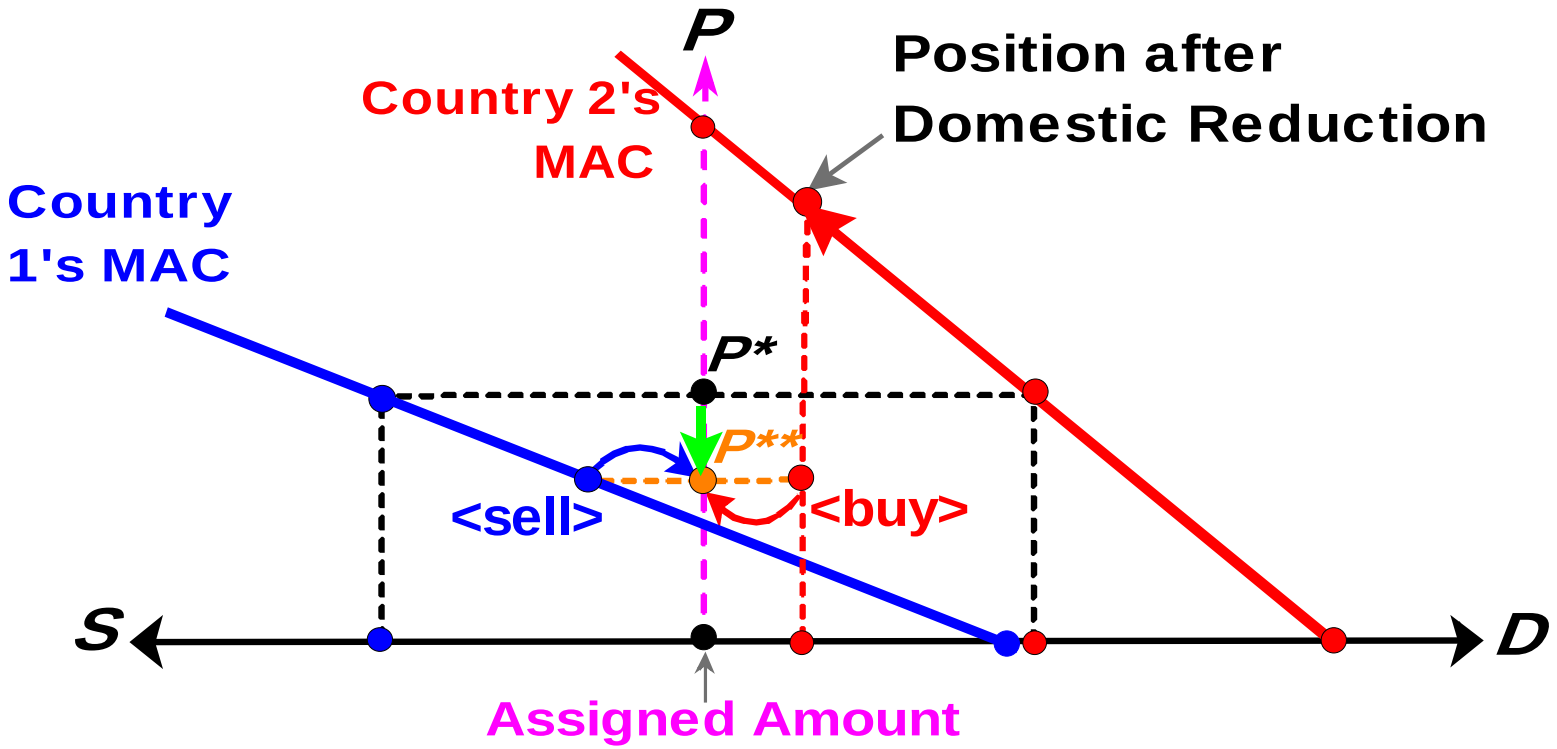


2. Emissions Trading




MAC
Country
1's MAC
<sell>
Supplier's
Surplus
P*
1's Status Quo
(BAU)
0 1
Emissions
Assigned Amount
MAC
Country 2's
MAC
Demander's
Surplus
P*
<buy>
2's Status
Quo (BAU)
0 2
Emissions
Assigned Amount
P
Country 2's
MAC
Country
1's MAC
<sell>
P*
<buy>
S
D
Assigned Amount

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)

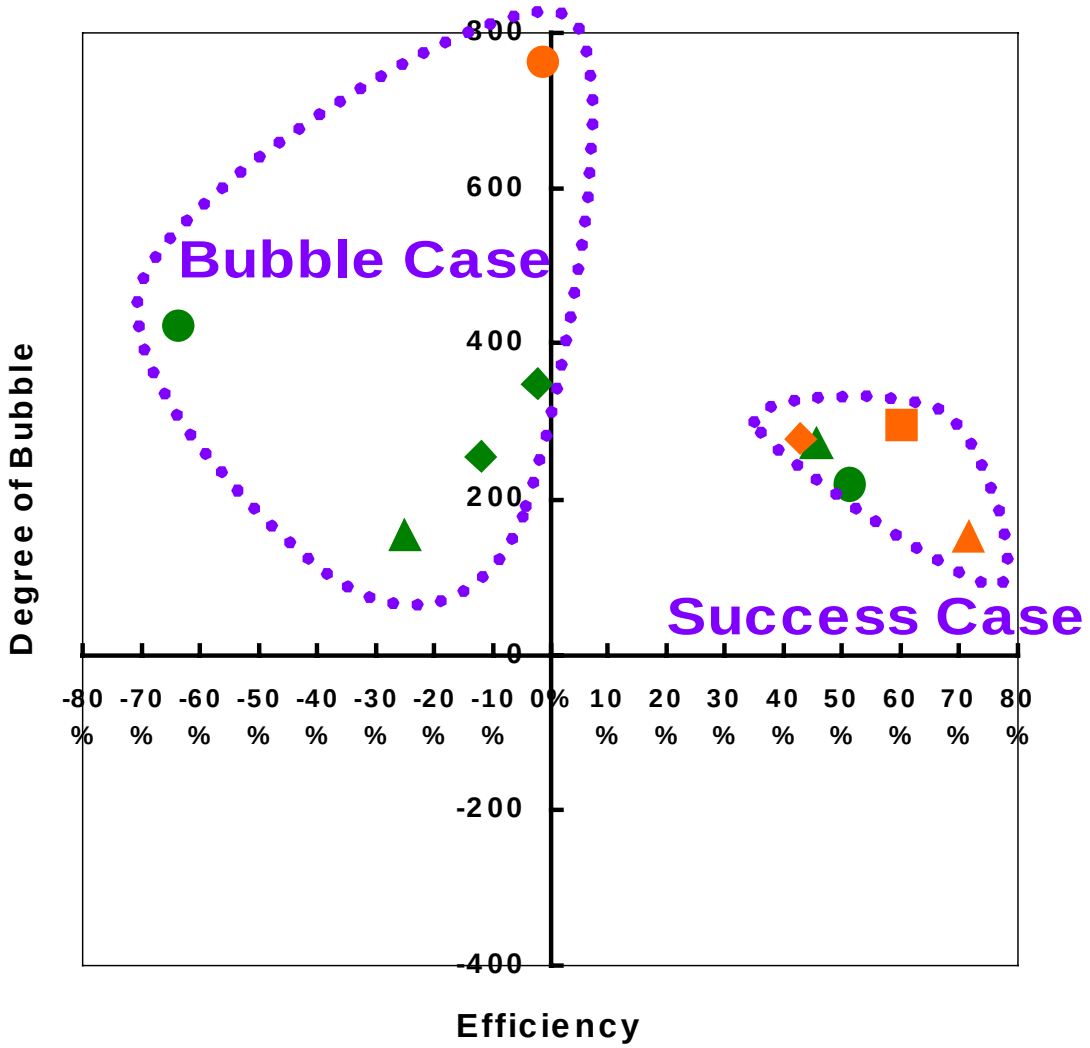
vs.

Double Auction:

Buyers' Bids	Sellers' Asks
(3) $56, 20 units	(6) $104, 15 units
(1) $86,13 units	(4) $92, 20 units
(2) grabs (4)'s ask	
:	:

4. Results

First Sessions



● : Non-CPR D. A.

◆ : Non-CPR B. T.
Contract Inf. Open

▲ : Non-CPR B. T.
Contract Inf. Closed

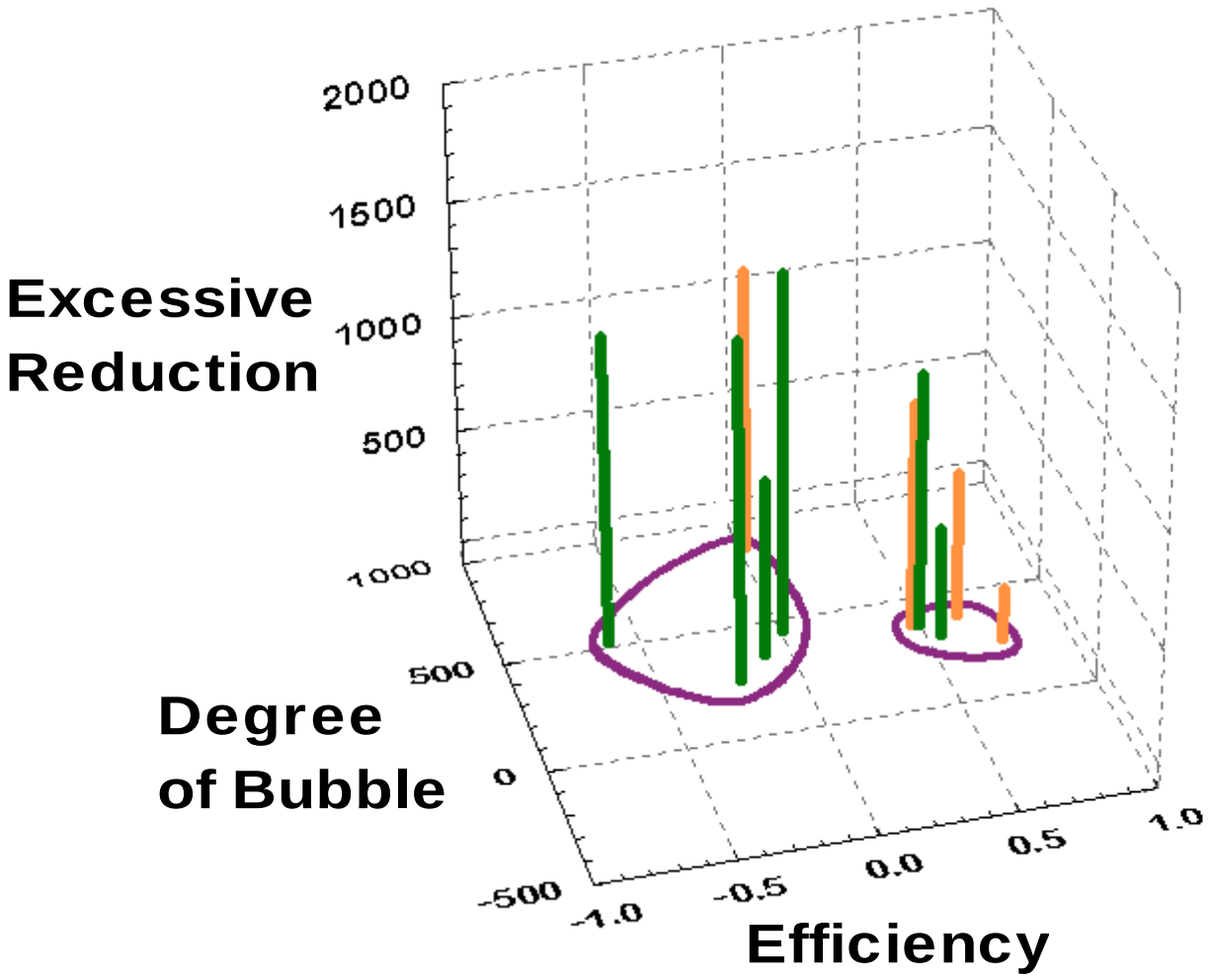
● : CPR D. A.

◆ : CPR B. T.
Contract Inf. Open

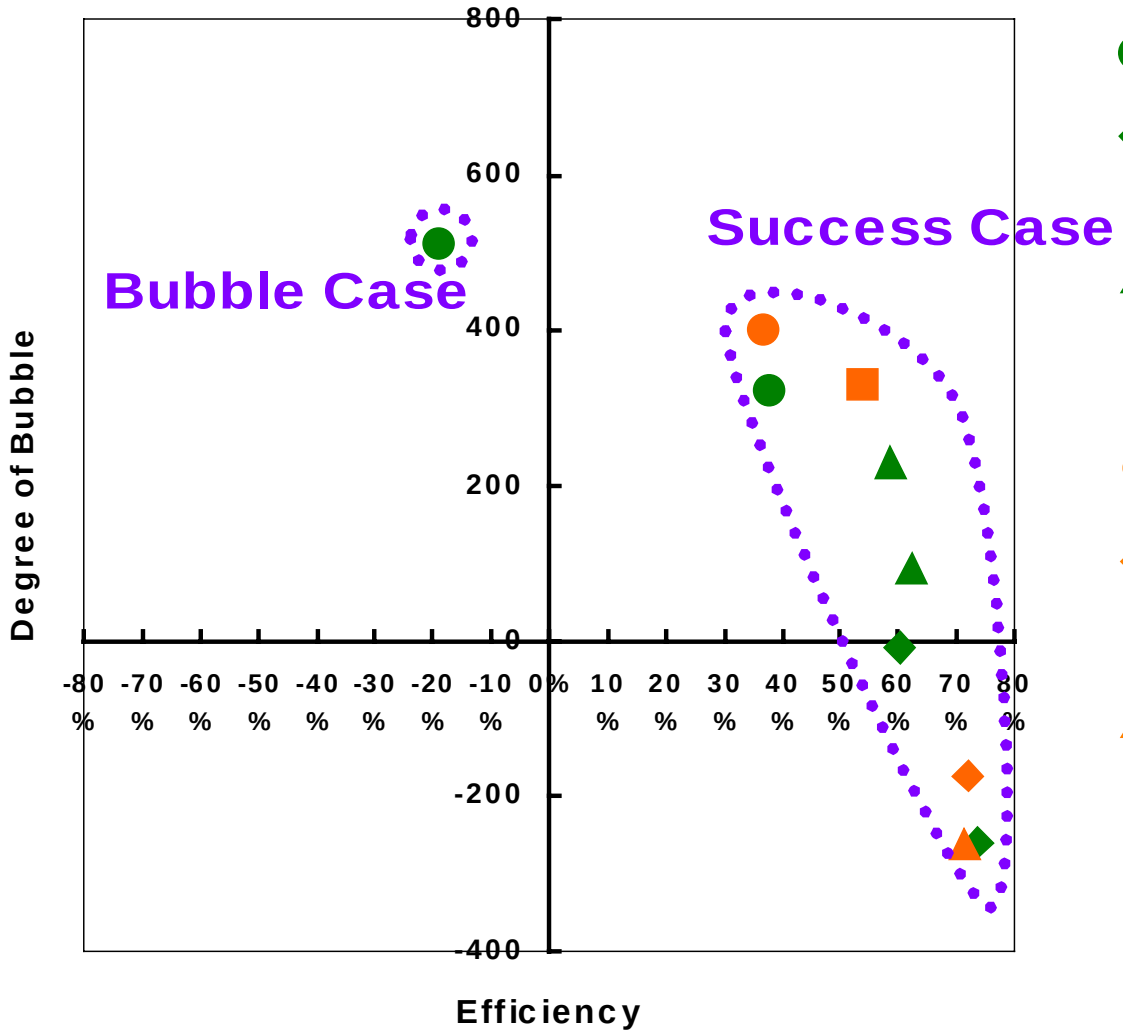
▲ : CPR B. T.
Contract Inf. Closed

■ : CPR B. T.
Contract Inf. Closed
CPR Inf. Closed

First Sessions



Second Sessions



● : Non-CPR D. A.

◆ : Non-CPR B. T.
Contract Inf. Open

▲ : Non-CPR B. T.
Contract Inf. Closed

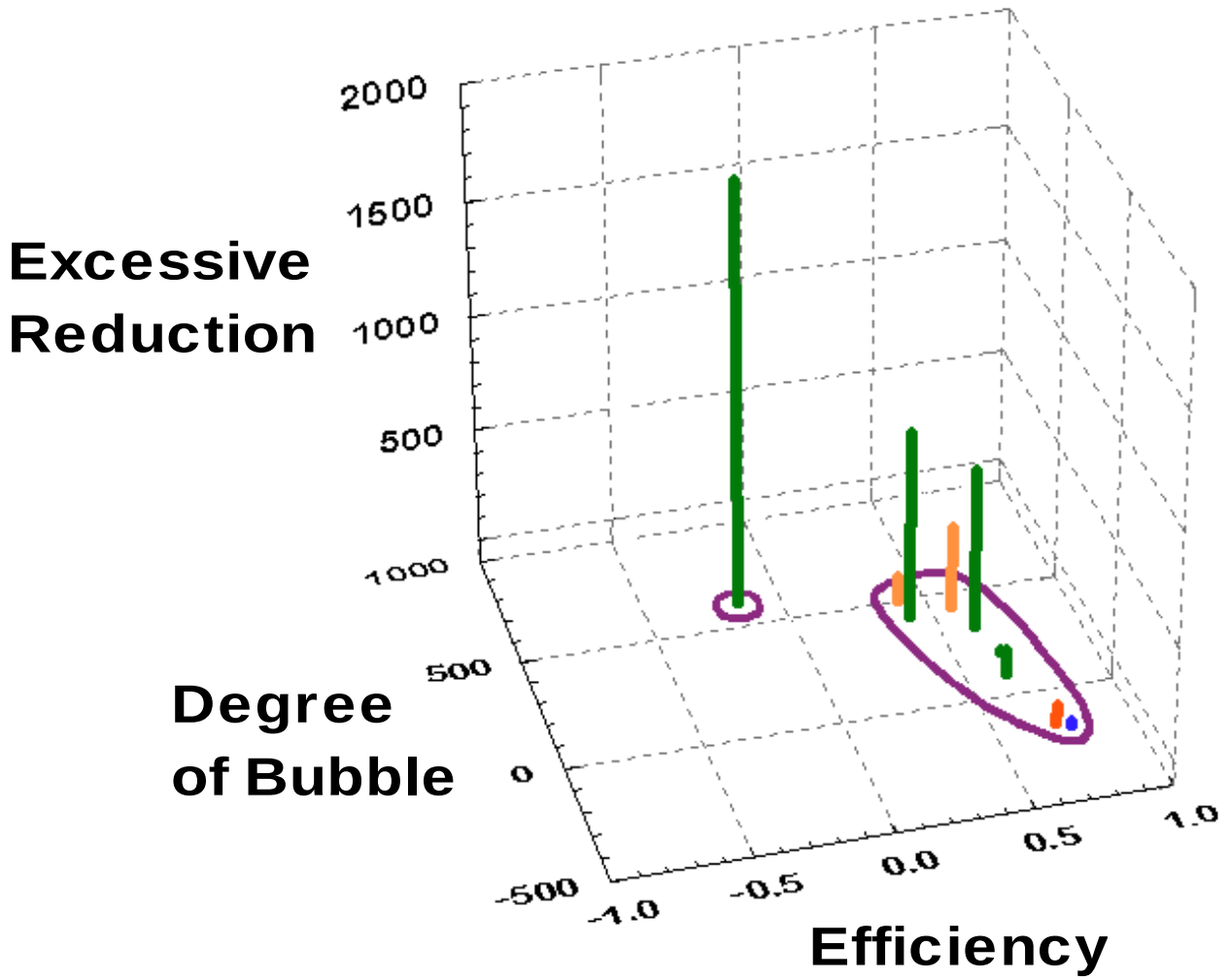
● : CPR D. A.

◆ : CPR B. T.
Contract Inf. Open

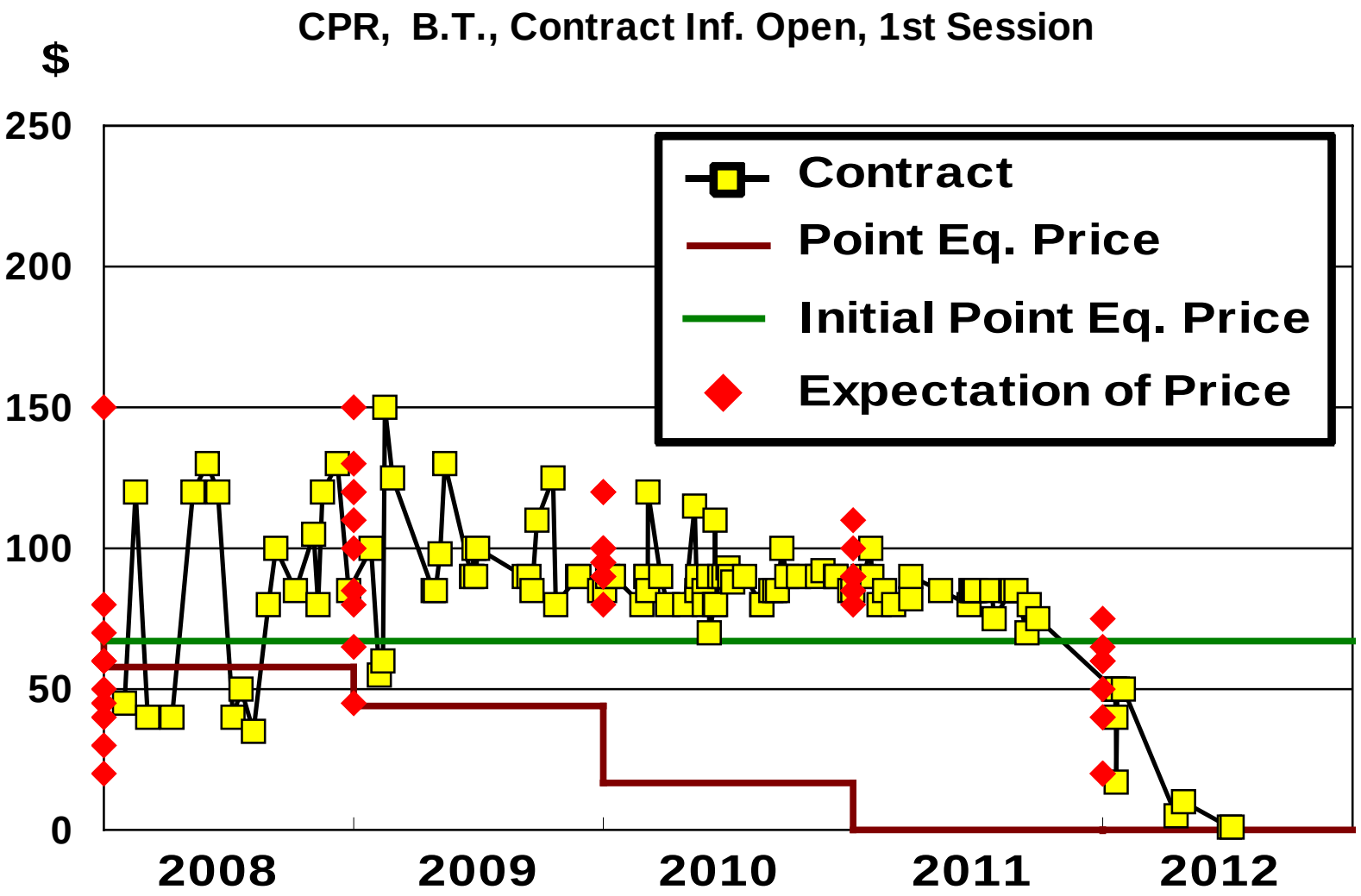
▲ : CPR B. T.
Contract Inf. Closed

■ : CPR B. T.
Contract Inf. Closed
CPR Inf. Closed

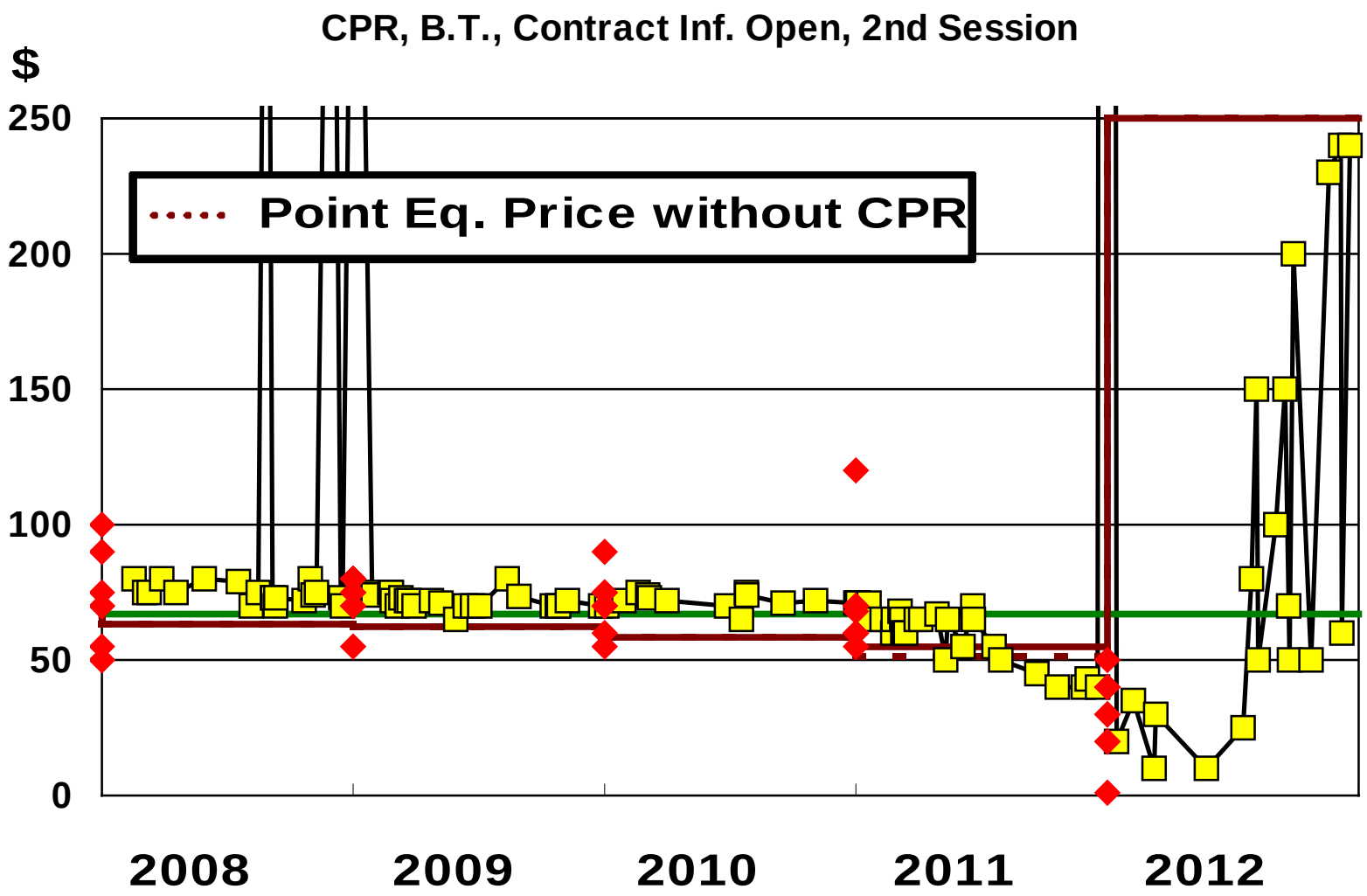
Second Sessions



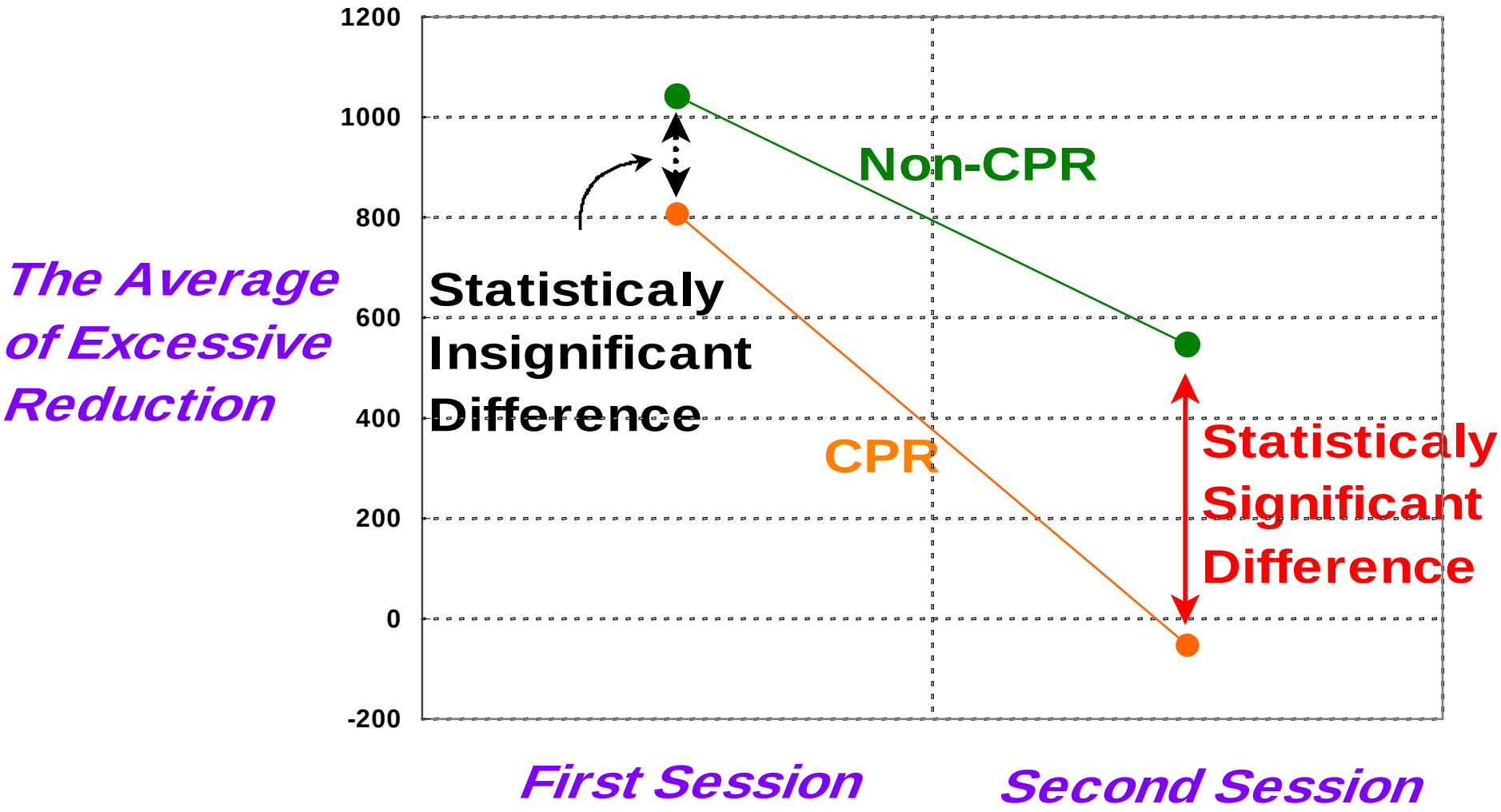
Bubble Case


CPR, B.T., Contract Inf. Open, 1st Session
$
250
200
150
100
50
0
2008
2009
2010
2011
2012
Contract
Point Eq. Price
Initial Point Eq. Price
Expectation of Price

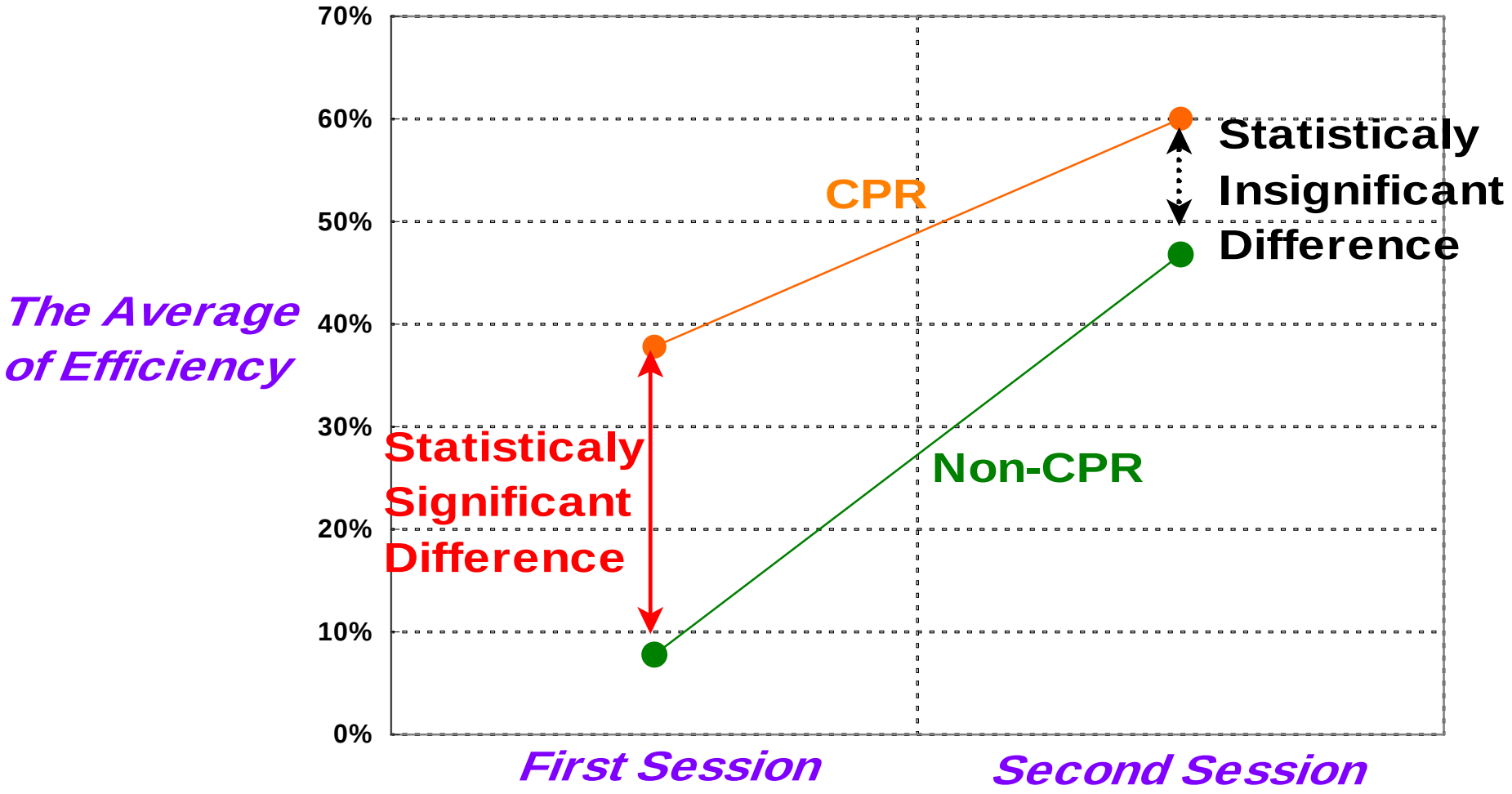
Success Case



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
Enviromental 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.