Structural Effects on Marginal Cost of Abatement

Questions:

-As emission quota becomes more strict, what happens to MAC?

- Why do some countries have higher MAC?

Hypothesis:

- The lower emission quota, the higher MAC
- MAC represent the tax rate of emission, then cheaper abatement options are used first

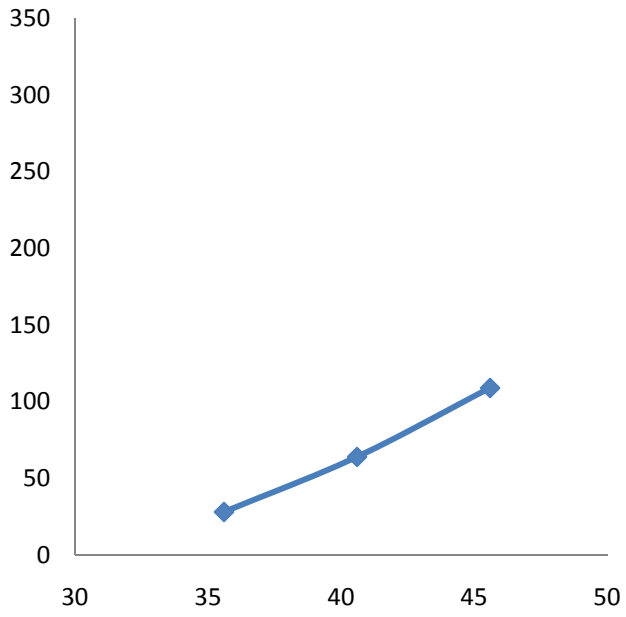
- Scenario & Shock:

  Reducing rate ↑ (=Quota ↓) => MAC ↑

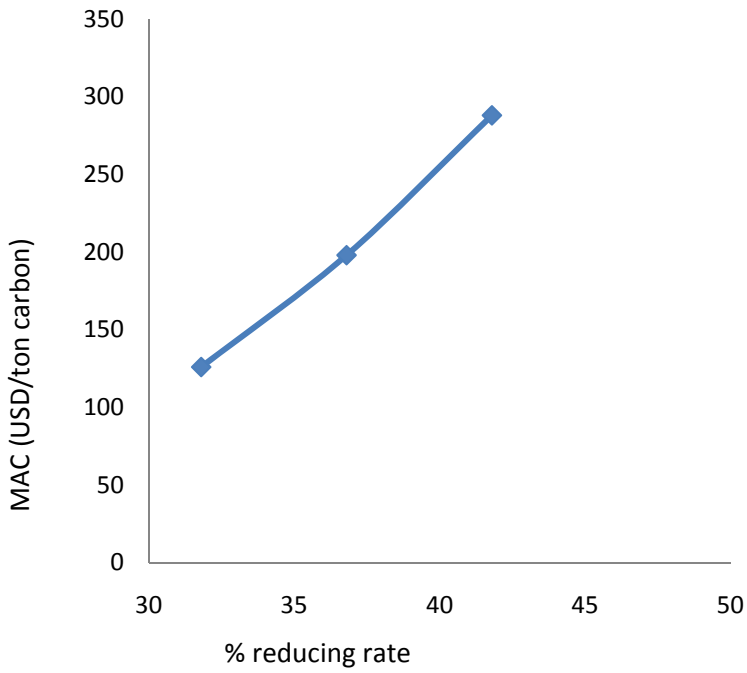
go2q	Emission reduction rate		
	baseline	5% reduction	10% reduction
usa	35.6	40.6	45.6
eu	22.4	27.4	32.4
jpn	31.8	36.8	41.8
roa1	35.7	40.7	45.7

MAC vs Reducing rate

USA



JPN



MAC line is positive shape:

- If emission reduction rate is increased, MAC is increasing

- Line shape

  The JPN's MAC line is steeper than USA's line

  It means that Japan's abatement cost is higher than USA

-> The Reason may be

  1) Q'ty of Emission per GDP unit of JPN smaller than USA

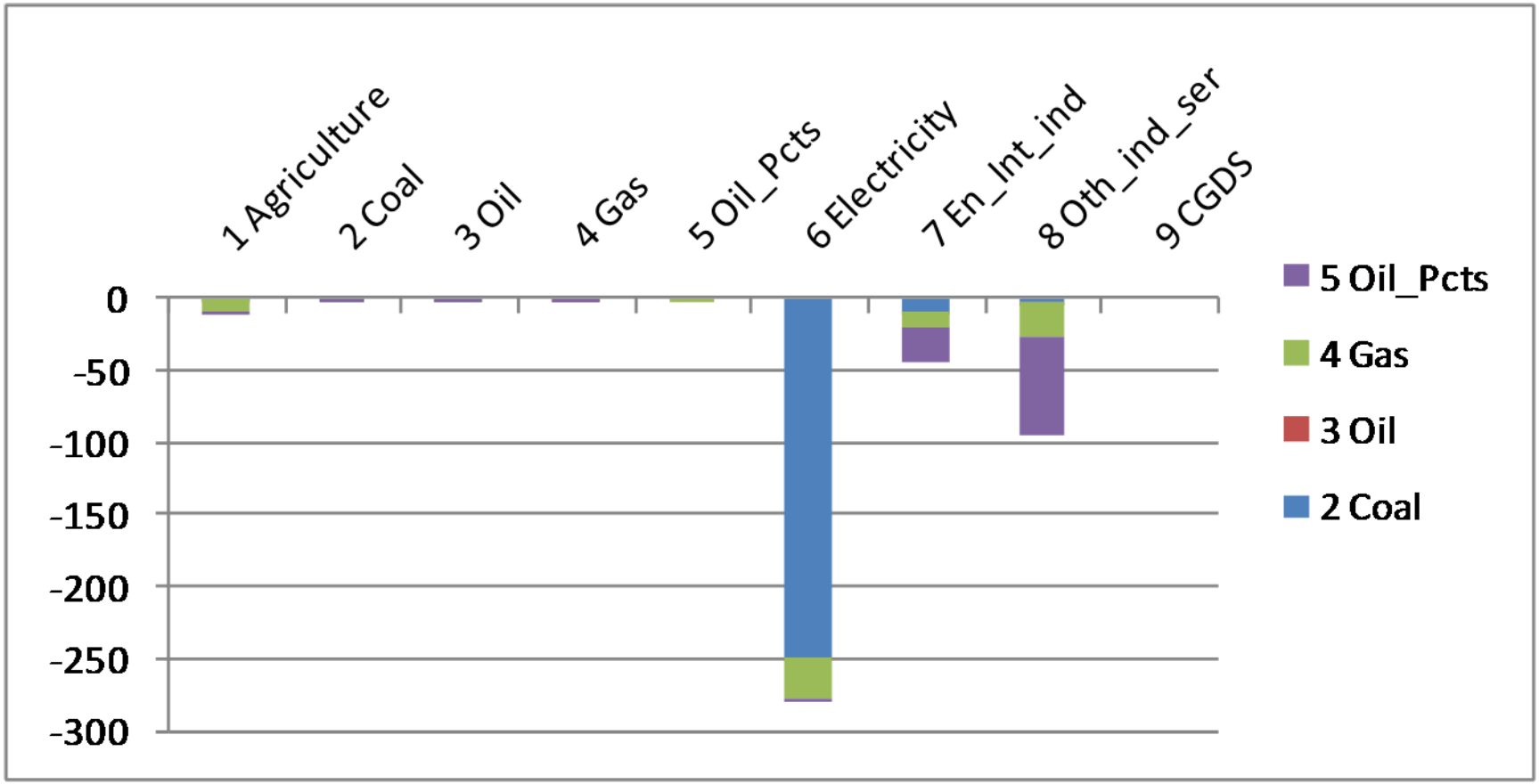
  2) Production structure(or technology of energy usage) is different

Understanding the Price of Carbon

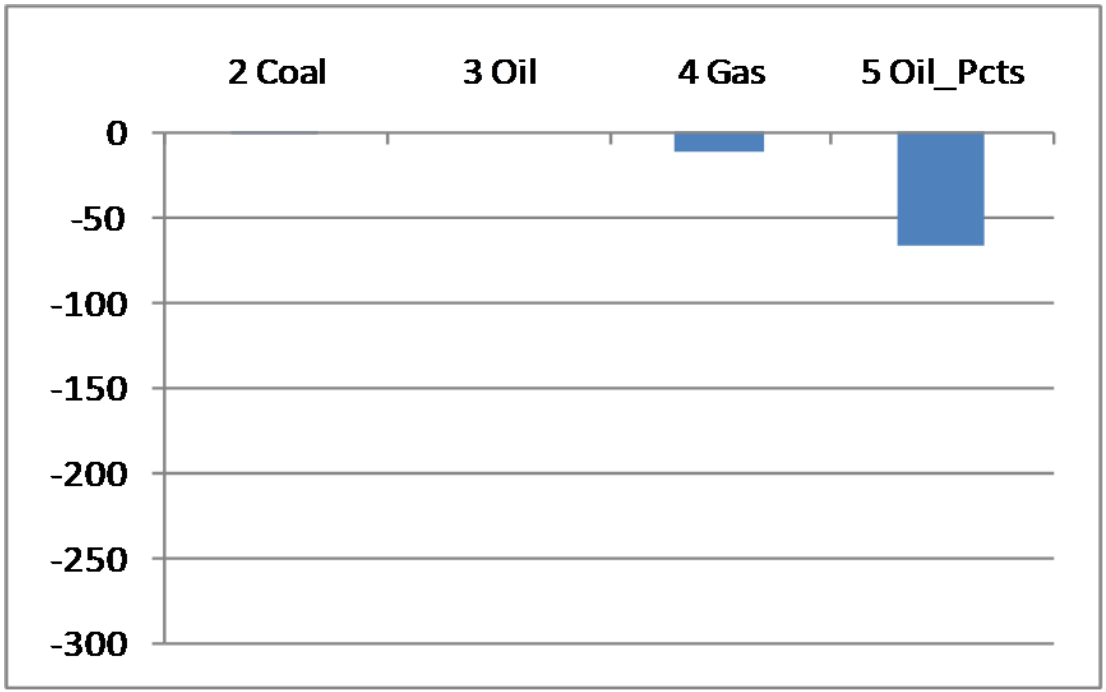
- We know that it has to do with the structure of the economy
  - If it is easier to substitute away from energy intensive goods, then the cost of abatement is lower
  - An emergent property of many equations
    - Shadow price of carbon constraint

USA – Carbon Reductions by Sector

MAC = 126 USD/ ton C

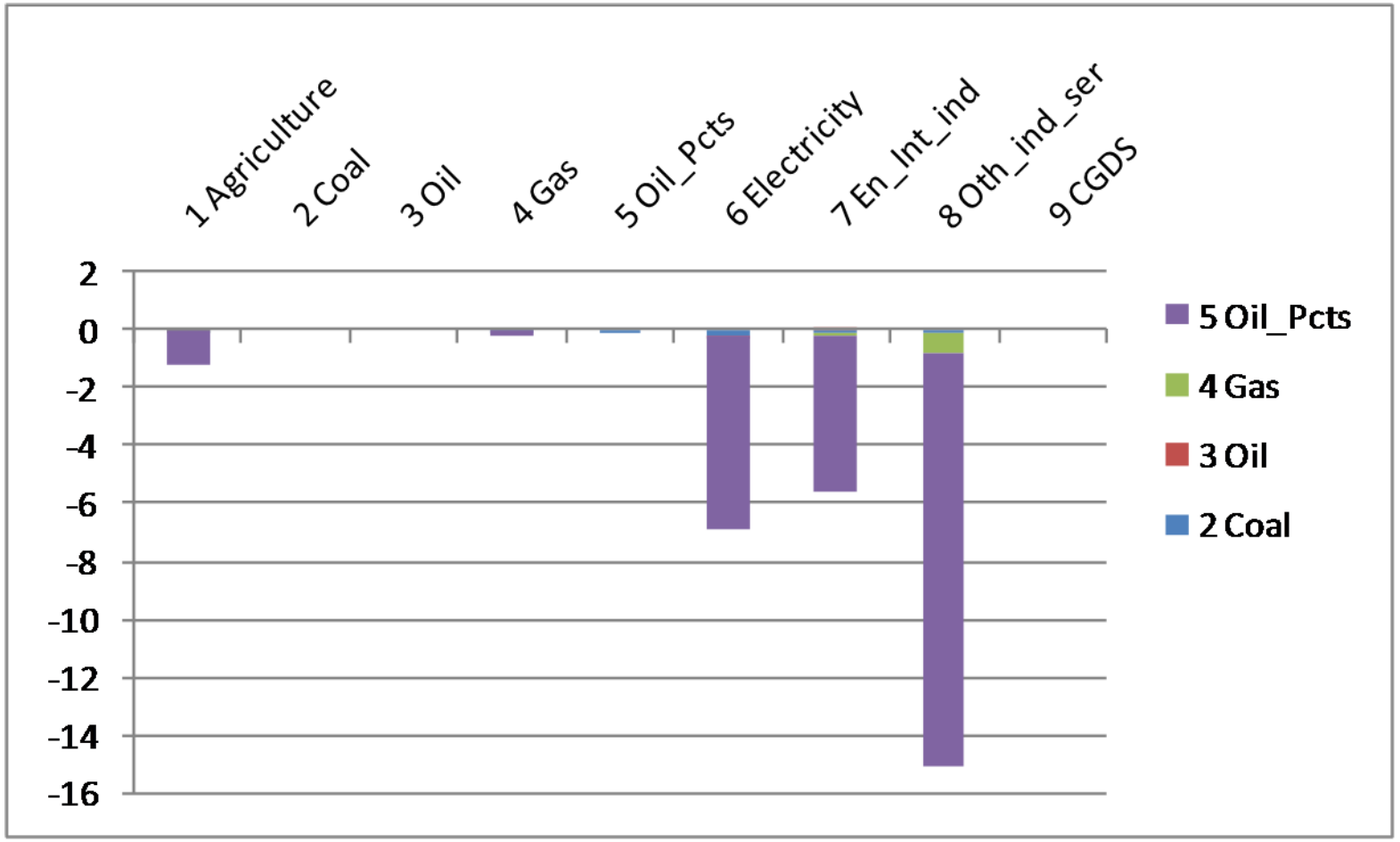


USA – Carbon Reductions by Private Consumption

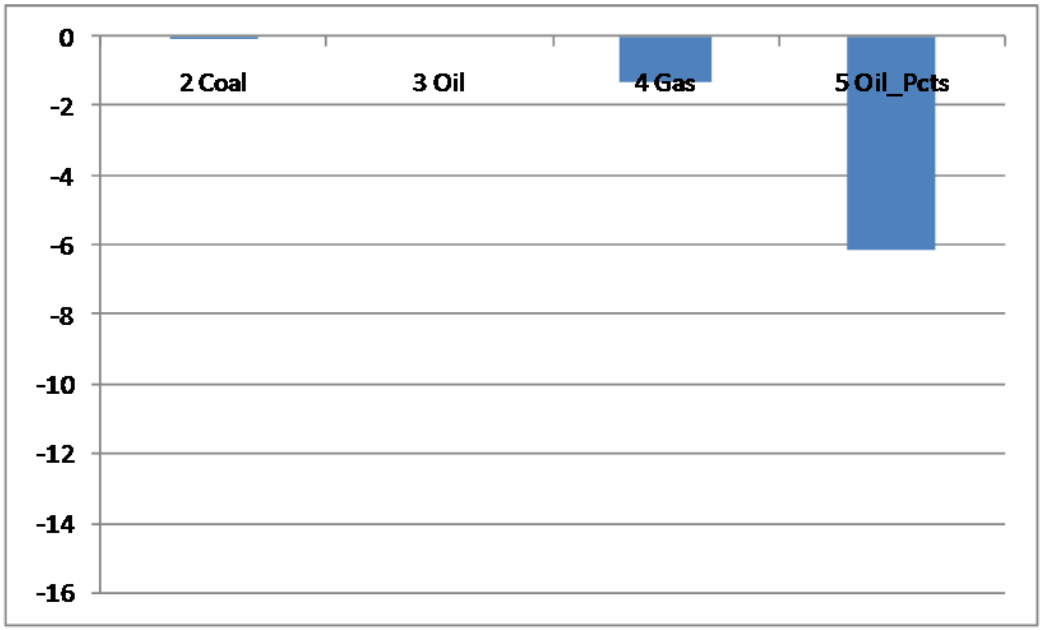


Japan – Carbon Reduction by Sector

MAC = 222 USD/ ton C



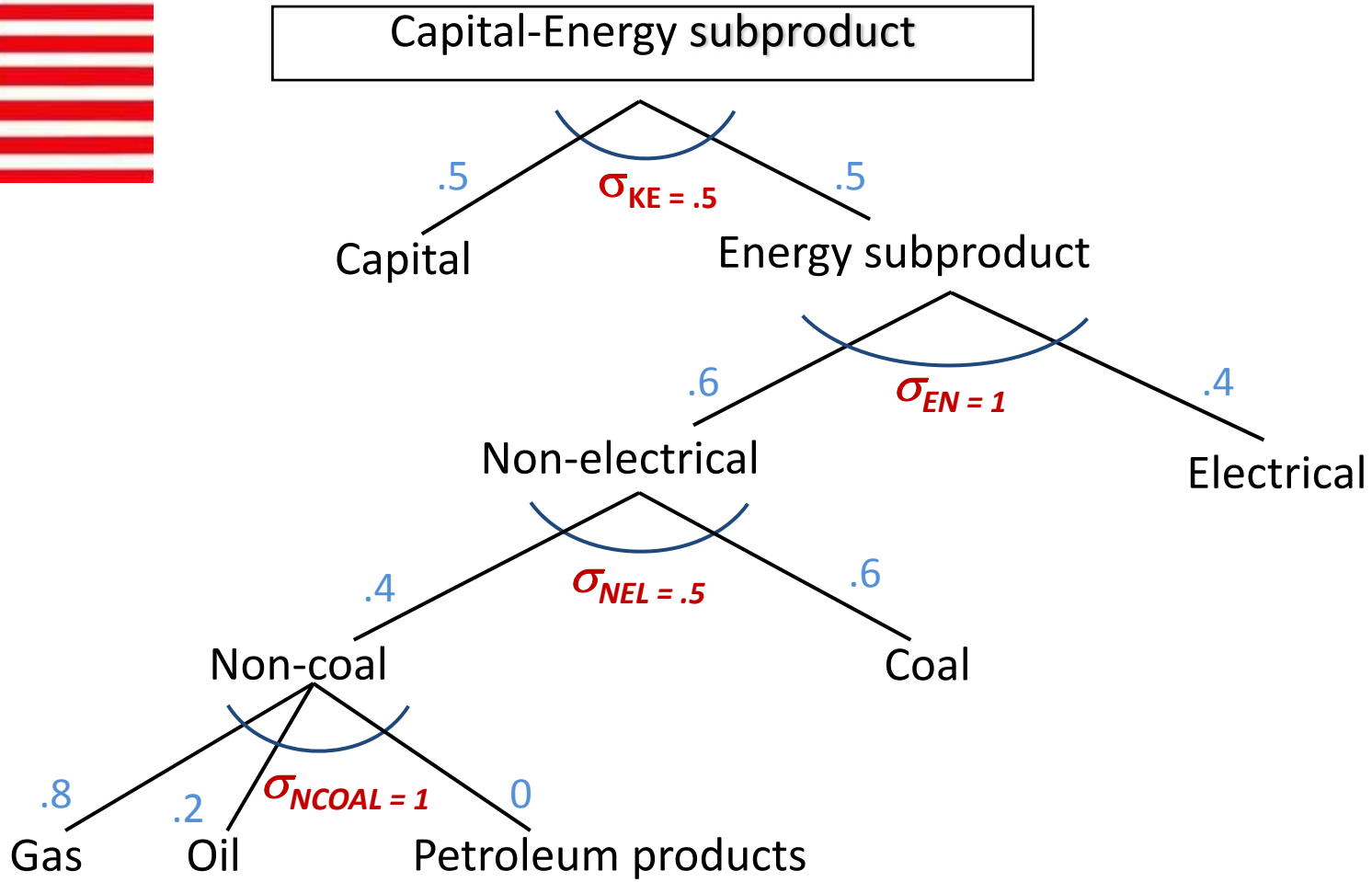
Japan – Carbon Reduction by Private Consumption



What is different about these economies?

- Elasticity of substitution between energy intensive goods and others is determined by cost shares and CES parameters
- CES parameters are constant across regions and experiments…
- … Therefore, the cost shares determine the actual cost of substitution

USA Electricity Sector



Japan Electricity Sector

USA Electricity Sector

Whole Sector = -7%

Japan Electricity Sector

Whole Sector = -2.7%

Lower Cost Shares Require Greater Price Signal to Change Quantity