Arbitrage Trading in Oil Markets

Oil as an asset, the Hotelling Theorem and arbitrage trading.

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Present value and efficiency

- Mechanisms for delivering benefits in the future
- Policy or physical asset
- Financial asset

Economics of exhaustible resources

- Willingness to pay (W2P) and price (P)
- Marginal extraction cost (MEC)
- Marginal social surplus (MSS)
  ⇨ *MSS = W2P – MEC*
- Example problem

Efficient allocation across time

- Two periods, 2007 and 2008
  - ⇨ $MSS_{2007} = PV(MSS_{2008})$
- Multiple periods
  - ⇨ $MSS_{2007} = PV(MSS_{2008}) = PV(MSS_{2009}) = \ldots$

Implications

- Two periods, 2007 and 2008

  ⇨ $MSS_{2007} = MSS_{2008}/(1+r)$

  ⇨ $P_{2007} - MEC_{2007} = (P_{2008} - MEC_{2008})/(1+r)$

  ⇨ $P_{2008} - MEC_{2008} = (P_{2007} - MEC_{2007})*(1+r)$

  ⇨ *Suppose MEC = 0*

  ⇨ $P_{2008} = P_{2007}*(1+r)$

  ⇨ *Example: r=10%, P_{2007} = $50*

  ⇨ P_{2008} = *$55*

Implications, continued

- Multiple periods

  ⇨ $MSS_{2007} = MSS_{2008}/(1+r) = MSS_{2009}/(1+r)^2 = \ldots$

  ⇨ $MSS_{2008} = MSS_{2007}*(1+r)$

  ⇨ $MSS_{2009} = MSS_{2007}*(1+r)^2$

  ⇨ $MSS_{2010} = MSS_{2007}*(1+r)^3$

  ⇨ *Prices should rise as well*

Returns to owners

- Royalty (R)
- $R = P - MEC$
- $R_{2007} = P_{2007} - MEC_{2007}$
- Sell when $R_{2007} > PV(R_{2008})$
- Hold when $R_{2007} < PV(R_{2008})$
- Equilibrium: $R_{2007} = PV(R_{2008})$

Market tools

- Futures

- Long positions
- Short selling

- Call options
- Put options