Border Measures & Barriers to Entry in Primary Energy

James L. Smith
RFF & Southern Methodist University
Distribution of proved oil reserves

Distribution of proved reserves in 1991, 2001 and 2011

Percentage

- Middle East
- S. & Cent. America
- North America
- Europe & Eurasia
- Africa
- Asia Pacific

1991 Total 1032.7 thousand million barrels

2001 Total 1267.4 thousand million barrels

2011 Total 1652.6 thousand million barrels

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World oil production increased by 1.1 million b/d in 2011, with OPEC accounting for nearly all of the increase despite a 1.2 million b/d reduction in Libyan production. The US had the largest growth in non-OPEC supply for a third consecutive year. World oil consumption increased by roughly 600,000 b/d. All of the net growth came from emerging economies in Asia, South & Central America, and the Middle East, offsetting declines in Europe and North America.
Distribution of proved gas reserves

Distribution of proved reserves in 1991, 2001 and 2011
Percentage

- Middle East
- Europe & Eurasia
- Asia Pacific
- Africa
- North America
- S. & Cent. America

1991 Total 131.2 trillion cubic metres

2001 Total 168.5 trillion cubic metres

2011 Total 208.4 trillion cubic metres
World natural gas production increased by 3.1% in 2011. While the US saw the largest national increase, the Middle East recorded the largest regional increment to production. Production growth in Russia and Turkmenistan was partly offset by a large decline in European production. Natural gas consumption increased by 2.2%, with below-average growth in all regions but North America. The European Union experienced the sharpest decline in natural gas consumption (~9.9%) on record.
Major gas trade movements

Major trade movements 2011
Trade flows worldwide (billion cubic metres)

Source: Includes data from Cedigaz, CISStat, GIIIGNL, Poten, Waterborne.

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Distribution of proved coal reserves

Distribution of proved reserves in 1991, 2001 and 2011
Percentage

- Europe & Eurasia
- Asia Pacific
- North America
- Middle East & Africa
- S. & Cent. America

1991: Total 981780 million tonnes

2001: Total 984453 million tonnes

2011: Total 860938 million tonnes


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Coal was again the fastest-growing fossil fuel. Global production grew by 6.1%. The Asia Pacific region accounted for 85% of global production growth, led by an 8.8% increase in China, the world’s largest supplier. Global coal consumption increased by 5.4%, with the Asia Pacific region accounting for all of the net growth. Elsewhere, large declines in North American consumption were offset by growth in all other regions.
Summary

• Geology creates large barriers to entry in energy production.
  – Barriers to entry limit cross-border “leakage” of reserves—not production.
  – To deter leakage, impose emissions tax on production, not consumption, of energy.
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  – Barriers to entry limit cross-border “leakage” of reserves—not production.
  – To deter leakage, impose emissions tax on production, not consumption, of energy.

• Geology also creates market power in energy production.
  – Market power alters the basis of multilateral emissions policy.
  – Should that influence unilateral border measures?
The Role of Competition in Energy Markets...

• With competitive markets:

\[ MB^{private} = P = MC^{private} < MC^{total} \]
...and the Fog of Market Power

• With competitive markets:

\[ MB^{private} = P = MC^{private} < MC^{total} \]

• But, with market power:

\[ MB^{private} = P > MR = MC^{private} < MC^{total} \]

• So, how should unilateral measures regard cross border market power? (OPEC)
Thank You!

jsmith@smu.edu  smith@rff.org