RICE
UNIVERSITY

The Future of Saudi Price Discrimination: The Effect of Russian Production Increases

Amy Myers Jaffe

Wallace Wilson Fellow for Energy Studies
James A. Baker III Institute for Public Policy

Ronald Soligo

Professor of Economics, Rice University

24th Annual Conference of the USAEE/IAEE
Washington, DC
July 2004

Extension of previous work:

"A Note on Saudi Arabian Price Discrimination,"
Energy Journal
Jan 2000.

Asian Price Premium

Table 1: Asia premium: Arab Light - 34		
Year	USD/barrel	As % of Europe
1988	0.94	7.10
1989	-0.40	-2.39
1990	-0.34	-1.56
1991	0.57	3.42
1992	0.65	3.78
1993	1.43	10.03
1994	0.75	5.15
1995	1.04	6.65
1996	-0.07	-0.37
1997	2.69	16.79
1998	2.21	22.18
1999	-0.56	-3.15
2000	1.75	6.96
2001	2.29	10.98
2002	0.58	2.44
Average 1988-2002	0.90	5.87
Average 1991-2002	1.11	7.07

Explaining the Asian Price Premium

- Saudi price discrimination
- Conditions for successful price discrimination:

  - must possess power to set price

  - must be able to identify separate markets in which the price elasticity of demand differ

  - must prevent arbitrage by third parties. That is, prevent others from buying in the low price market and reselling in the higher priced market.

Exports of Middle East Producers

Table 2. Middle East Producers' Crude And Condensate Exports To Asia-Pacific (thousands b/d) 2002			
Country	Production	Exports to Asia	Share
Iran	3,440	1,360	39.5%
Iraq	2,020	140	6.9%
Kuwait	1,890	1,070	56.6%
Oman	897	760	84.7%
Qatar	680	670	98.5%
Saudi Arabia	7,630	3,120	40.9%
UAE	2,080	1,810	87.0%
Source: Output data from EIA, Asia Export Data from MEES			

Exports of Middle East Producers

- Oman, Qatar and UAE export most of their oil to the Asian market.

- Kuwait exports over half of its production. The remainder is shipped to Europe, where Kuwait owns refineries, and to the US.

- Iraq has a pipeline to Ceyhan, Turkey as well as facilities in the South. (Until recent war, oil was primarily shipped to Ceyhan).

- Iran's exports to Asia are limited by US sanctions that prohibit US owned facilities to refine Iranian crude. Also, Iran may tacitly collude with Saudi Arabia

Controlling Asian Supply

- Saudi Arabia prevents resale of its exports with contracts baring resale without approval. Exporters must pay the formula price based on the destination of the crude.

- There are no other Middle East producers that could (or will) exploit higher Asian prices by significantly increasing their exports to Asia.

Controlling Asian Supply

- Price discrimination is constrained by the potential supply from West Africa

- West African crude that is disadvantaged in Asian market because:
  - transport costs
  - higher priced lighter, sweeter crude (Asian refineries have already invested in desulphurization capacity)
  - buyers must commit on volumes in advance
  - extra price risk

Determinants of the Demand Elasticity of Saudi Crude

- The elasticity of demand for Saudi oil in Europe is given by:

$$\varepsilon_{se} = \frac{Q_e}{Q_s} \cdot \varepsilon_e + \frac{Q_{oe}}{Q_s} \cdot \varepsilon_{oe}$$

where

ε_{se} is the elasticity of demand for Saudi oil in Europe;

ε_e is the elasticity of demand for oil in Europe,

Q_e is equal to the quantity of oil consumed in Europe

Q_s is the quantity of Saudi oil consumed in Europe

ε_{oe} is the elasticity of supply of oil, other than Saudi, to the European market

Profit Maximizing Conditions

$$MR = p\left(1 + \frac{1}{\varepsilon_d}\right)$$

$$\frac{p_{fe}}{p_e} = \frac{\left(1 + \dfrac{1}{\varepsilon_{se}}\right)}{\left(1 + \dfrac{1}{\varepsilon_{sfe}}\right)}$$

Profit Maximizing Price Differential

- Recent Saudi shares of European and Asian markets are 8% and 15% respectively.

- Assume that the elasticity of demand for oil in both markets is 1.0 and that the elasticity of non-Saudi supply is .5

- Then, for example, the Saudis would maximize revenues by charging Asian buyers 4.9% more than European buyers.
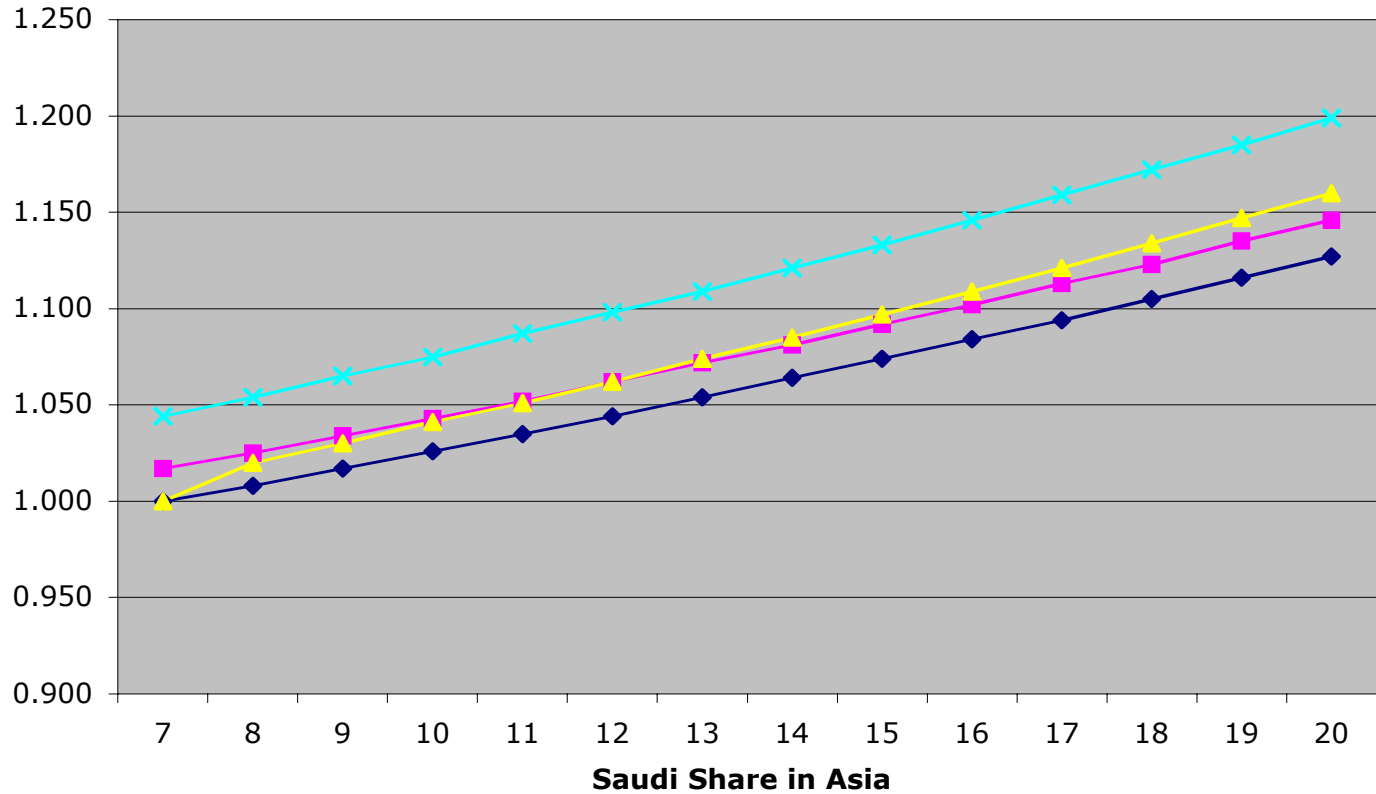
Table 3: Optimal Ratio of Far East to European Prices		
Elasticity of Demand for Crude	Elasticity of Supply of Non-Saudi Oil	P_{fe}/P_e
1	0.5	1.049
0.7	0.5	1.064
0.5	0.5	1.081
0.3	0.5	1.110
1	0.1	1.065
0.7	0.1	1.096
0.5	0.1	1.140
0.3	0.1	1.258

Figure 1: Asia Premium

Russian Pipelines

14

Significance of Increases in Russian Exports-Long Run Scenario

TABLE 3: Projections of Net Imports by Region (Millions b/d)				
	2000	2010	2020	2030
OECD Europe	7.4	10.1	12.5	13.9
OECD North America	8.6	10.8	15.4	20.9
Asia	12.5	19.5	26.6	34.0
Transition Economies	-3.5	-7.3	-7.6	-7.8
Middle East	-19.0	-23.1	-33.0	-44.6
Other	-7.3	-11.0	-15.1	-17.2

Source: IEA, World Energy Outlook 2002

Table 4:Changes in Net Imports and Exports (Millions		
	2000-2010	2010-2020
OECD Europe	2.7	2.4
OECD North America	2.2	4.6
Asia	7.0	7.1
Transition Economies	-3.8	-0.3
Middle East	-4.1	-9.9
Other	-3.7	-4.1

Source: IEA, World Energy Outlook 2002

Projected OPEC Capacity

| Country	2003	2005	2010 *
Saudi Arabia	10.15	10.50	11.0
Iran	3.80	4.10	5.0
Iraq	2.3	2.7	4.5
Kuwait	2.4	2.6	3.0
UAE	2.5	2.5	2.5
Qatar	0.75	0.80	0.80
Venezuela	2.4	2.6	3.5
Nigeria	2.3	2.7	3.0
Indonesia	1.00	1.00	0.5
Libya	1.45	1.3	2.0
Algeria	1.15	1.6	1.5
TOTAL	30.2	32.4	34.3

*optimistic scenario

RICE
UNIVERSITY

Significance of Increases in Russian Exports-Long Run Scenario

- Russian oil will primarily be exported westward through Europe, the Baltic Sea and the Mediterranean.

- Asian import growth will increase Asian reliance on Middle East exports.

- Effect of growing Asia imports from Middle East on Saudi share likely to depend more on output increases in Iran and Iraq and not on Russian exports which will be limited.

- The Saudi share in Asia unlikely to diminish.

The Middle East strengthens its position as the world's largest oil exporter

19
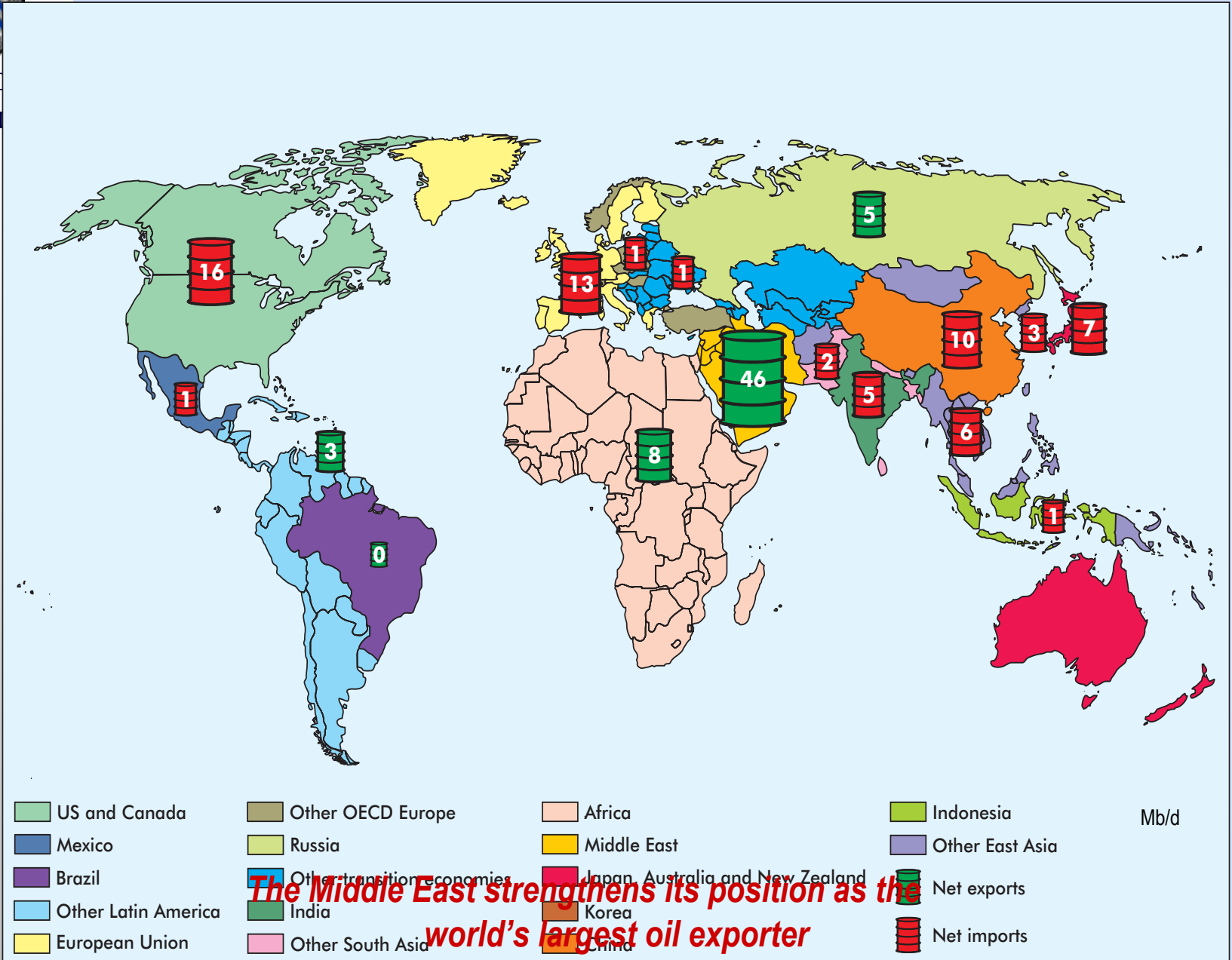
Conclusions

Ways to eliminate the Asian premium:

- end destination based pricing
  - challenge right of international oil companies to accept Saudi destination pricing
  - form buyer's cartel
- reduce Saudi share of Asian market
  - import more oil from countries other than Saudi Arabia
  - import more products produced from non-Saudi crude promote inter-fuel competition
    - de-link LNG and coal prices from crude
    - develop clean coal and other technologies that reduce the demand for oil
  - promote conservation and energy efficiency (gas-electric hybrid cars - especially in China and other developing economies)