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On: 28 January 2013, At: 10:36

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



American Foreign Policy Interests: The Journal of the National Committee on American Foreign Policy

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/uafp20>

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Version of record first published: 13 Jun 2012.

To cite this article: Jonathan Chanis (2012): Crude Oil Is Not Fungible, Where It Comes from Does Matter, and Global Markets Are More Fragmented Than Many Think, *American Foreign Policy Interests: The Journal of the National Committee on American Foreign Policy*, 34:3, 144-148

To link to this article: <http://dx.doi.org/10.1080/10803920.2012.686726>

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Crude Oil Is Not Fungible, Where It Comes from Does Matter, and Global Markets Are More Fragmented Than Many Think

Jonathan Chanis

ABSTRACT In studying petroleum issues, some analysts tend to overestimate the role of markets in promoting U.S. energy security. In particular, these analysts assume that crude oil moves internationally as if it were traded in a “free market.” They often repeat phrases such as “oil always moves to the highest bidder,” or “oil is fungible and where it comes from does not matter.” But global petroleum markets are not “free.” They are severely constrained by many factors, including logistical limitations, increasingly non-interchangeable types of crude oil, and limitations on where companies can produce oil and to whom they can sell it. Most important, the markets for petroleum are distorted by the practices of Saudi Arabia and the Organization for Petroleum Exporting Countries (OPEC). A misunderstanding of the above factors can lead to, among other misconceptions, an underestimation of the role of Canada in promoting U.S. energy security and an exaggeration of the ability of markets to protect consumer or U.S. national interests, both before and after supply disruptions. A more realistic understanding would recognize the imperfect hold markets have on global crude oil allocation and would stop confusing the theory of “free markets” with the reality of international politics and oligopoly.

KEYWORDS Canada; energy security; international trade; OPEC; petroleum; Saudi Arabia

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The continuing effort of the Obama administration to reduce Iran’s petroleum exports is an interesting example of politics and markets interacting to influence how crude oil is allocated. While U.S.-sponsored sanctions are an extreme example of politics affecting how buyers and sellers interact to price and trade crude oil, numerous other examples are available of politics affecting how petroleum is bought and sold. These would include restrictions on where companies can drill for oil or to whom they can sell their production, limitations on inter-company cooperation, and specification requirements for refined products. The interaction of global buyers and sellers also is seriously affected by the fact that a few states and their national oil companies routinely collude in an attempt to raise prices.

Given this high degree of political intervention and economic collusion, it would be accurate to say that the market for crude oil is not a “free market.” Yet it is common to hear or read such statements as “oil always moves to the highest bidder” or that in a “globally integrated market an oil supply disruption anywhere is a price increase everywhere.” Pundits are particularly fond of saying “oil is fungible and where it comes from does not matter.” A sophisticated declaration of these sentiments is found in a recent comment by Professor William Nordhaus:

Why is crude oil an integrated world market? The . . . costs of transporting oil are low, different crude oils are largely interchangeable, and . . . can be blended . . . [Crude] oil is fungible, like dollar bills . . . U.S. oil policies make no more sense than trying to lower the water level in one end of the bathtub by taking . . . water from that end.

He then goes on to say:

The implication of the bathtub view is profound. It means that virtually no important oil issue involves U.S. dependency on foreign oil . . . [Our] vulnerability depends upon the global market.¹

I suspect that crude oil is “fungible”—or mutually substitutable—primarily for those who have never traded or processed it, especially over the last decade. Nor can it be said that global oil market “integration” is either high or even increasing—if anything, crude oil markets are now substantially more regionalized than just five or seven years ago. Consequently, when economists, opinion leaders, and policymakers continue to repeat these oversimplifications, they undermine our ability to think clearly about petroleum security and encourage policy errors.

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Over the last 10–15 years, the world has seen a major increase in the number of crude oils produced and traded. Many of these new crude oils—which now make up an increasingly large part of the world’s deliverable supply—vary enormously by quality and processing characteristics. Back when crude production was more localized, and refineries and end-product markets were less sophisticated, quality differentials between crude oils were less important. Today, however, more and more crude oil comes from an increasingly larger number of diverse deposits. And, since these deposits are so different, they are not easily substitutable except at some of the world’s most sophisticated refineries. Even then, this

substitutability would occur with potentially undesirable changes in the type and value of refined products produced. To be sure, these crude oils can be blended with other crude oils to allow some refiners to “run” them, but even here the differences are so extreme that there are limits to what types of crude can be blended together and in what quantities. Consequently, crude oil is not really “fungible”—and to compare its substitutability to “dollar bills” is plain silly.²

Constraints on the global system of crude oil delivery are another factor limiting substitutability. Generally speaking, global pipeline infrastructure and the logistics of crude delivery adjust very slowly to the more rapidly changing patterns of petroleum production and consumption. At any one time, especially after protracted periods of significant exploration and development as seen in the late 1970s and after 2004, producers and traders often encounter significant physical limitations to their ability to move large amounts of crude oil from one region to another. This is one reason why West Texas Intermediate (WTI) crude has become significantly cheaper than Brent crude oil since the spring of 2011.³

In the 1980s and 1990s, WTI generally traded at a dollar or two above Brent crude oil. However, since that time, WTI has often traded below Brent because the midcontinent of the United States began receiving ever-greater supplies of Canadian crude oil. This Canadian crude oil was and is still largely trapped in the midcontinent—it has virtually no pipeline export capacity to other markets.

The recent WTI–Brent experience illustrates how crude oil markets can become more regionalized. Supply logistics limit the range of customers a producer has for its oil, which affects the price realized when sold. This does not mean that a region totally disconnects from the global marketplace, only that over intermediate time periods, significantly different price dynamics can be experienced in each market, and these price differentials are hard to arbitrage away. Consequently, some purchasers pay less for crude oil than other purchasers and price increases (or decreases) often are unequally distributed as markets work to adjust to supply disruptions or other changes.⁴

While the U.S.–Canada example of crude oil market “regionalization” is extreme, there are other important

examples. Thus, until the Russians construct a hugely expensive pipeline to the Pacific Ocean and their terminal at Kozmino, they are severely limited in the amount of East Siberian “ESPO” production they can move to the global markets irrespective of price. To a large extent and for the indefinite future, this production is captive to China, just as most Canadian production is captive to the United States. Eventually, “the market” will find a way for Canadian and East Siberia crudes to gain better “global” access and receive higher prices, but many years and a great deal of money will be needed to construct and reconfigure pipeline systems.

Another factor promoting regionalization of crude oil markets has been Saudi Arabian sales policy. The Saudis were, and still are, at the apex of the waterborne trade in crude oil. Generally, their sales policy is the largest single variable determining price differentials between regions. Their objective is not to keep regional prices aligned, however, but to extract the highest price from each customer consistent with the kingdom’s longer-term interests. Accordingly, the Saudis often use their market power to demand a higher price from some customers. This is especially true for customers in the Far East, where indigenous oil production relative to consumption is lower. Moreover, Saudi Arabia imposes destination and resale restrictions on their crude oil sales, and purchasers (both refiners and traders) are not free to sell this oil to higher bidders.

Besides these marketing and logistical rigidities, “globally integrated market” enthusiasts often note how inexpensive it is to transport crude oil. In one sense this is true. Crude oil can be moved from the Persian Gulf to the United States or the Far East for as little as \$1.75–\$2.25 per barrel. But focusing on this figure leaves out other important facts.

First, only about half of all produced crude oil is moved by tanker. Second, much of the waterborne crude moves through expensive pipeline systems before being loaded on tankers. The best illustration of this would be Russia, the world’s second-largest petroleum exporter. Approximately 60 percent of its crude oil moves by very expensive pipelines to markets in Europe and Asia. The remainder moves by this very same expensive pipeline system to ports where it is then loaded onto tankers. Consequently, a second transport fee is incurred—often adding approximately \$6–\$9 per barrel transported. The

waterborne delivery of crude oil is burdened with much higher delivery costs than usually assumed.

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If oil transportation costs are not really low, if crude oils are increasingly less interchangeable and limited in how they can be blended, and if global crude oil markets are increasingly regionalized, what is left of our “bathtub” analogy? Not much.

If the market for crude oil is a “bathtub,” it is a very funny bathtub. For one, as even Professor Nordhaus notes, it does not have a single spigot or drain. Besides multiple spigots and drains, the bathtub is also divided into scores of compartments, or localized demand centers. Each compartment has its own drain and more than one-third of these compartments have their own spigots. And, not only does the size of the drains and spigots vary considerably between each compartment, but so does the height of the walls between each compartment. So, while U.S. compartmental barriers may be low, Canada’s barrier to the United States is low, but high for all other countries. Russia has a low barrier to Europe, but a higher barrier to China. While the barriers on the Saudi Arabian compartment, which run down the middle of the bathtub, tend to be lower, they manipulate the height of their barriers in order to maximize revenue by attempting to keep the bathtub undersupplied and to make it nearly impossible for buyers to resell or change the destination of oil sourced from their compartment.

Leaving aside the awkwardness of the bathtub analogy, the mantra of the “integrated global market with fungible crude oil always moving to the highest bidder” encourages confused thinking about petroleum security. One area where this is particularly evident is in the minimization of the value of crude oil sourced from Canada. While a barrel of Canadian oil is not as secure as a domestically produced U.S. barrel, it is pretty close. Besides being a physically captive supplier to the U.S. market, Canada also has a treaty obligation to maintain the same “proportion of export to supply” as averaged over the previous 36 months. Thus, the United States can count on this supply under all but the most extreme circumstances. How can Asian purchasers “bid this supply away” from the United States if they cannot transport it to their country?

To be sure, in the event of a major supply disruption the price of all crude oil, including Canadian, would increase substantially. The price of Canadian

crude, however, should go up less than the price of waterborne crude oils. For example, if the world supply of Persian Gulf crude oil were reduced by 10 million barrels per day and “marker” crude prices such as Brent or WTI increased by \$100, Canadian crude, which is trapped in North America, would most likely go up less, say by \$80 or \$85. While this price difference may not seem significant to some, in economic terms it is enormous. This is especially important when one considers that the value of other waterborne crudes such as those from Venezuela or Nigeria would probably increase substantially more than Brent or WTI. Consequently, though one may argue against development of the Canadian oil sands from an environmental point of view, from a narrow petroleum security perspective encouraging the Canadians to build a crude oil pipeline to the Pacific Ocean is one of the most unintelligent things U.S. policy can do.

This is a good illustration of how a country with a high reliance on a continental pipeline market can have greater petroleum security than a country with a high reliance on global waterborne markets. In general, over the short term, continental pipeline markets lack adequate access to waterborne terminals. Without such access, radically altering the geographical distribution of a producer’s sales would be difficult. Accordingly, the buyer–seller relationship becomes less asymmetrical and the buyers less vulnerable. Where crude oil comes from and how it gets to its destination matters.

A second area where the fungibility and integration oversimplifications contribute to confused thinking is the degree to which markets actually promote petroleum security. Obviously, markets are critical in the global allocation of crude oil, but wishful thinking or ideological fervor should not be allowed to exaggerate the ability of markets to protect consumer (or U.S. national) interests when supply disruptions occur.⁵ Yes, supply disruption solutions, such as price controls, which work against market mechanisms are unlikely to promote consumer welfare in the long term, but we need to recognize that we already operate in a highly distorted market environment. There is no “free market” in crude oil—consumer welfare and arguably U.S. national security already are damaged by major distortions in the crude oil markets. But we can promote a more rational approach to markets and crude oil security by at least

recognizing some of these distortions and discouraging simplistic thinking.

First, recognize that the crude oil markets are highly oligopolized. Even if the Organization for Petroleum Exporting Countries (OPEC) is not a cartel (and many still think it is), it is made up of a few dominant producers with disproportionate power over supply and prices. This clearly reduces consumer welfare and transfers a large amount of economic rent to a few of producers. Hence, to rely uncritically on the self-interests of producers to resolve a supply disruption (big or small) or simplistically think that “they need us more than we need them” is naïve.⁶

Second, in policy discussions the tendency is to conflate crude oil markets with refined products markets. But these markets are substantially different—refined products markets are more competitive. They have significantly more buyers and sellers, the barriers to entry are lower, and it is more difficult for producers to collude, especially since U.S. and Organisation for Economic Co-operation and Development (OECD) antitrust rules are better enforced.⁷

Third, the ubiquity of the business media has encouraged people, including more than a few academics, to think that transparency in the crude oil market is far greater than actually exists. In the age of CNBC and Bloomberg, people want to believe that there is “one crude oil price.” The reality is that there are numerous prices for crude oil, and market participants often have to expend a great deal of effort and money figuring out what they are.

The problems with transparency arise from a number of sources. At the most elementary level is the fact that many powerful buyers and sellers do not want transparency (at least in regard to their own transactions). Additionally, approximately one-fifth of all petroleum produced in the world is not allocated through markets and has no market price.⁸ The exclusion of such a large volume from global trade is a major distortion.

Another distortion arises from the large-scale use of aid, grants, and loans by China. If a buyer goes into a country and purchases its crude oil at “market prices” but provides the seller with billions of dollars of other payments, then that buyer clearly is paying more than the “world market price.” By some estimates, just over the last three years, China has provided more than \$100 billion of such deals to numerous countries from Angola and Russia, to Sudan to

Venezuela. Crude is flowing, but it is very unclear if it is flowing to the highest bidder since it is essentially trading outside global markets.

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The virtue of a competitive market is that supply disruptions and price shocks can be contained through the uncoordinated actions and ingenuity of thousands of independent actors. But a competitive market depends, among other things, on a large number of sellers who are able to enter and exit the market without barriers. It also depends on perfect price information. Neither of these conditions obtain in today's crude oil markets. In fact, the opposite is true. The producer side of the market is dominated by a few powerful sellers that maintain insurmountable barriers to entry for U.S. and other oil companies, with real price information often being opaque. And, interestingly, while many in the United States talk about crude oil and markets, few are trying to promote them. If one looks at the top importing and exporting states, what is clear is that only one other state, Germany, has even a moderate commitment to markets. The other large consumers—China, Japan, and India—as well as all five top exporters—Saudi Arabia, Russia, Iran, United Arab Emirates, and Nigeria—all have a strong commitment to neo-mercantilism, not to markets. That is, they all want the state, not markets, to have the dominant role in managing trade and investment in their crude oil sectors.

If the United States really wanted to encourage the use of markets internationally, it would pursue very different policies—policies aimed at reducing the dominant power of the Persian Gulf producers and the role of national oil companies. It would insist on an end to collusion, on fairer private corporate sector access to OPEC's resource base, and on more equal treatment between national and international oil companies. But to do so would seriously destabilize a number of important states, particularly Nigeria, Mexico, Russia, and most important, Saudi Arabia. In addition, such insistence would not be welcomed in many other states, including Brazil, India, Japan, Korea, and Norway. Consequently, U.S. policy on crude oil and markets is to talk about the importance of markets for assuring U.S. energy security but to do little to promote their greater use.

The United States did not create the international petroleum regime in the post-1973 world. And, there are, in fact, many parts of this regime that the United States arguably would like to see changed. But the cost of trying to reform or aggressively alter this regime would be high and fraught with risk. Consequently, the United States remains, in fact, the regime's top supporter. Given this situation, prudence would indicate that more pundits and policy-makers should at least recognize the imperfect hold markets have on global crude oil allocation and stop confusing the theory of "free markets" with the reality of international politics and oligopoly.

Notes

1. William D. Nordhaus, "Energy: Friend or Enemy?," *The New York Review of Books*, October 27, 2011.
2. Dollar bills are not exchanged at varying discounts or premiums of 10, 20, or 30 percent. If this is the standard we want to use for fungibility, then automobiles and dogs also are fungible. At some very basic level it is true, but it is not helpful as a behavioral guide.
3. A second important reason was a relatively protracted interruption of "light, sweet crude oil" sales from Angola, Azerbaijan, Libya, and Nigeria.
4. For example, during the first 10 months of 2011, U.S. average refiner acquisition costs for crude oil were a staggering \$10 under Brent crude oil. For the previous nine years, this figure was closer to \$3. Clearly, European refiners paid substantially more for crude oil than their U.S. counterparts. Note, however, that this is not the same as saying that U.S. consumers paid less for gasoline. In fact, they did not. The margins were captured by others in the supply chain, especially companies with refineries in the U.S. midcontinent.
5. An entire segment of the petroleum security literature, especially among some academic economists and libertarian think tank analysts, does this.
6. There is a deep asymmetry between how long the United States could function with a severely reduced supply of petroleum and how long several producers could function without the revenue.
7. While Saudi Arabia and other OPEC countries continually engage in collusive behavior internationally, they are much more restrained when dealing directly with the United States. It would be hard to imagine Motiva, the large Saudi Refining–Shell Oil joint venture, telling purchasers of its gasoline at Port Arthur, Texas, that they can only sell this product in Texas or to certain customers. The U.S. Department of Justice (DOJ) would not tolerate such anticompetitive actions domestically, whereas DOJ does not resist them internationally. This is not an issue of jurisdiction; it is an issue of policy.
8. This would include, among other places, most crude consumed in the Middle East, all locally produced crude in India, and probably most of China's domestic production.