Oil, Development and Security: A Market-Based Approach

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The present paper will attempt to explore the argumentation frequently employed in the public discourse – but less in economic theory – by different categories of stakeholders that the exhaustion of world oil reserves will have a dramatic impact on global economic growth and development. Because of such an alleged impact, policy makers in different countries argue that a stable and cost-effective supply of oil is a matter of national security. Significant political events at a world scale are the result of such an approach. Starting by demystifying the concept of “economic security”, the present paper demonstrates that the best approach to such an alleged problem is to let the markets do their job. Any other solution won’t solve the problem but impose significant costs on society for the maintenance of a status quo which is not sustainable. The history of the myth of the “peak oil” is more a matter of political debate rather than of an economic one. It serves certain categories of stakeholders but not the consumers, the alleged targeted beneficiaries.

Key words: nonrenewable resources, petroleum industry, government policy

JEL classification codes: L71, Q31, Q38

Motto:
“We can have an effective and comprehensive energy policy only if the Federal government takes responsibility for it”.
(U.S. Federal Report)

The first lesson of economics: any resource is scarce

Economics has long ago agreed that there are two types of mineral resources in the natural environment: general conditions and economic resources (or goods). On the one hand, the first type of resources is not subject to the economizing action from the part of human individuals because it is perceived to be in an abundant supply. The air we breathe is the most used example. The general conditions of the environment are not subject to formulation of property rights because their use by human individuals does not generate conflict. On the other hand, an economic resource is subject to the economizing activity of human individuals as it is the input to the production of goods valued by final consumers. That means that economic agents use scarce production factors in order to bring that particular resource into the production process.

The issue of scarcity of resources is debatable because of different possible angles of analyzing it. From a broader perspective, all mineral resources of the environment are limited (as Earth itself has a limited volume in space and, at least for the moment, hu-
man beings still do not extract resources from other extraterrestrial sources). From a narrower perspective, the issue of scarcity (or of limited supply of certain resources) is raised only in the case of the minerals whose supply (both as a stock and as a flow) is considered to be insufficient in comparison to their consumption.

A mineral resource does not have *per se* an objective value but it has a value only if final consumers value certain consumer goods whose production process uses it as an input. Supply and demand – the market process – will always regulate the quantity and the value of all economic goods. From the perspective of exchange, the buyers of a resource will always argue (as they prefer) that the price is too high (and the quantity supplied too low) while the sellers of a resource will argue (because of their preference) that the price is too low (and the quantity too high). *Ceteris paribus*, any buyer of an economic good will prefer that its supply to be increased (both in quantity and as number of suppliers) or the competing demand be decreased (a smaller number of competitors) while any seller of a resource will prefer that its supply be decreased (both as quantity and as number of suppliers) or the demand be increased (a smaller number of competitors).

These competing interests in any exchange can be solved only through the institution of property rights and the freedom of exchange. Economics cannot objectively argue, in a theoretical proposition, that a mineral resource is too scarce or too abundant (or its price is too high or too low). Market prices will always reveal actual conditions of supply and demand, of the scarcity of and the interest for an economic good.

**The concept of security and its economic dimension: the yardstick of property rights**

“Security” is one of the most abused and misinterpreted concepts in social sciences. Because of its wide and vague psychological connotations, it has a highly subjective meaning. For two different individuals, the same situation may seem both secure and insecure. “Security” is not a physical situation or action (like “aggression”) but just a personal perception. It can be compared to risk-aversion. There may be individuals who feel secure but become victims in few seconds or individuals who live all of their life in a perceived insecurity but they won’t be harmed in any way. Insecurity is not, and we must stress that, aggression.

Scholars and politicians have always been involved in a quest to objectively define the concept of “security” but they failed because they didn’t have a proper yardstick (or because, more exactly, they lacked an ethical approach). For example, interests of individuals involved cannot be an objective yardstick. As individual interests are subjective, they may be competitive. Imagine two persons who participate in an auction to buy the same piece of land from a seller. As their interests are opposed, each one of them may regard the other one as a threat to his personal security as the other one attempts to buy the land and prevent him from doing so.
Legal scholars have demonstrated that the institution of property rights naturally emerged in human society in order to reduce conflict in the use of scarce resources. In the case of the above mentioned two persons, the one who will pay the higher price will get the piece of land. He didn’t aggress against his competitor and manifested his higher preference for the resource by paying a higher price. The losing bidder must accept the idea that his preference was not higher enough (he didn’t pay a higher price) or his welfare didn’t allow him to do so (he didn’t have the money to pay a higher price). Because of his welfare, he must accept to give up that particular piece of land (but he remains free to bid for other pieces of land till he is successful). If he doesn’t accept the outcome, he has “only” the solution of aggression: he may eliminate his competitor (and be the only buyer who bids the resource) or force the seller to transact with him. In this latter case, he not only does aggress against the property of one of the other two parties but also negatively affect the welfare of the other.

The same analysis is valid in the case not only of an event-transaction but of repeated transactions. If I daily buy bread from the neighboring baker, I may feel insecure (my welfare is threatened) in the case that, in one particular day, I cannot buy the product because the baker didn’t produce a sufficient quantity or other buyers offered a higher price than I was prepared to. I can claim that my security was threatened by the baker or by another buyer but, as long as anybody didn’t aggress against my property rights, I cannot have a substantiated claim. Imagine that, in a particular day, I decide not to buy bread because I prefer to consume another product (instead of bread). My decision will affect the welfare of the baker who will realize, at the end of the day, the he produced more than the quantity actually demanded (and actually bought by clients). From the perspective of property rights, nobody aggressed against him. From the perspective of his interests and welfare, he may claim that I threatened his security.

The concept of economic security refers usually to the stability of the welfare of an individual. Because of his highly subjective interpretation, it is just a metaphor (or a psychological consideration) and cannot justify violent action (like the baker forcing me to buy the bread every day). It is usually related to the past behavior of individuals on the market. Such a mundane economic analysis proved that the only objective yardstick in defining security (and aggression) is the institution of property rights. Any other yardstick is not ethical and cannot make people agree.

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1 If he eliminates the competitor, he will potentially bid a lower price for the resource so the seller will be affected as in the case of free exchange. If he forces the seller, the competitor will not be able to bid and will be adversely affected in his subjective welfare.

2 Suppose that another baker moves in town. If nobody buys from him, he can claim that every consumer of bread affects his prosperity by not buying from him. In such a situation, every buyer knows that he is in a lose-lose situation: if he buys from the new baker, the old baker will have his welfare negatively affected. If he keeps buying from the older one, the new one will be affected.
Exploring national economic security

While the issue of national security is a legitimate question for a nation, making appeal to it is one of the most frequent battle-cries of interventionism and expansion of government scope and regulations. As one commentator noticed, “nearly all individuals would feel that an action should be taken or a sacrifice borne if it clearly would contribute substantially to national defense” [Thorp, 1960]¹. It is the ultimate argument: “Every advocate of some public action tries to associate his proposal with the defense of the nation. No one can be against it …” [Fowke, 1952]².

For example, one of the real cases when the argument of national security was raised in United States was the imports of Swiss swatches. Swatches were considered “precision products requiring fine tolerances” and “this industrial ability was stated to be essential in the light of the rapidly developing field of bombs and missiles with its need for time fuses and other intricate and compact machinery” [Fowke 1952]³. A loose correlation with the production of defense equipment can be realized for any kind of industry (steel, auto, electronics, and so on)⁴.

One may wonder how does a state of perfect national security (economic or not) look like? It can be compared with perfect equilibrium models used by economics. Their fundamental traits are total absence of uncertainty as well as optimum allocation of resources. Unfortunately, the other characteristic is their virtual character: they will never look like a world fundamentally characterized by change.

The second lesson of economics: impossibility of socialist planning

³ Idem
⁴ One of the most spectacular logical inconsistencies of such arguments was revealed by the brilliant French economist Frederic Bastiat in his 1850 metaphor “La Pétition”: “nous [fabricants de chandelles, bougies, lampes, chandeliers, réverbères, mouchettes, étainnoirs, et des producteurs de suif, huile, résine, alcool, et également de tout ce qui concerne l’éclairage] subissons l’intolérable concurrence d’un rival étranger place, a ce qu’il parait, dans des conditions tellement supérieures aux nôtres, pour la production de la lumière, qu’il inonde notre marché national a un prix fabuleusement réduit ; car, aussitôt qu’il se montre, notre vente cesse, tous les consommateurs s’adressent a lui et une branche d’industrie française, ont les ramifications sont innombrables, est tout a coup frappe de la stagnation la plus complète. Ce rival, qui n’est autre que le soleil, nous fait une guerre si acharnée, que nous soupçonnons qu’il nous est suscite par la perfide Albion”.

Year X, no. 25   November 2007
Different scholars have argued that the problem with government intervention in the allocation of resources in a society resides not only in opportunism of public agents (and other stakeholders looking for appropriable rents) but, maybe more importantly, in the impossibility of rational planning. Free markets are the only mechanism that maximizes societal welfare and efficiency in the allocation of resources. Only the prices that emerge in free exchange are relevant for the demand for resources in that particular society. Any government intervention in such a natural process will distort the pricing process and ultimately cause misallocation of resources between industries.

Let’s take two brief examples which, as we will see, were used in the debate related to the oil sector. Import quotas on foreign products usually cause a reduction of foreign supply on the local market and determine prices to rise (as no government will introduce a quota which is higher than the real imports). As a direct consequence of such a rise, that particular sector will become more attractive for domestic investors due to its higher profitability. On the other hand, price controls (which are usually set at below-market levels) act in the direction of a reduction of the rate of return in a particular industry and the run of the factors of production from that particular sector.

As we can already notice, a government will always use different types of interventionist measures which sometimes have conflicting effects on a particular industry. The resulting complex mix of measures that affect an industry in different directions will be an increasingly difficult framework for the manifestation of entrepreneurship. As the logic of interventionism operates, “middle-of-the-road policy leads to socialism”. The government intervention is in a continuous process of expansion as desirable effects from the point of view of the government are usually paired with undesirable effects. As an interventionist scholar argued, “a defense policy for crude oil makes no sense all by itself. The problem also involves oil demand; it involves oil transportation; it involves oil refineries; it involves all the factors bearing on supply of and demand for coal and steel and so on down and across the input-output table. More generally, it involves proper allocation of capital investment and protection of the tax base” [Nelson, 1958].

Oil and society

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1 On a free market, the rate of return across all economic sectors will tend to be equalized (what Ludwig von Mises calls the natural rate of interest) by the migration of factors of production from the low return sectors to high return sectors. We exclude other preferences that may affect such a tendency. For example, if everybody wants to become an petro-preneur due to the success of TV serial “Dallas”, the rate of return in the petroleum sector will be lower than in the other economic sectors as individuals look for other gains that the monetary profit, which is the successful societal model of J.R. Ewing (hard drinker, Texan accent and womanizing).

Oil has been one of the most important mineral resources in the human society: “Oil is the largest internationally traded good, both in volume and value terms – creating what some analysts call a “hydrocarbon economy” [Considine, 2006]. In short, it can be stated that world economy runs on oil and there is no substitute in sight” [Gawdat, 1999]. Because of its historical critical role in providing energy to human society, several metaphors are used to describe its importance: “Oil is the lifeblood of America’s [and world] economy”.

Because of its importance, any factor that affects the conditions of supply and demand may be perceived by the already existing buyers and sellers as a threat to their economic security. *Ceteris paribus*, as Chinese producers start buying more oil on the international market, the existing buyers (America being the largest one) will feel threatened.

For almost half a century after the start of its industrial production (the discovery of petroleum by Edwin Drake in Titusville, Pennsylvania, in 1859), oil had not been a strategic resource. One of the key decisions that affected this industry was taken by Winston Churchill before the First World War as he decided to switch the British Royal Navy from coal to oil. As the experience of both World Wars seemed to prove that the military success is also determined by availability and continuity of fuels supply (the defeat of Germany and Japan was also justified by the lack of petroleum resources), U.S. Interior Secretary Harold Ickes firstly proposed in 1944 the stockpiling of crude oil for emergencies.

One of the most interesting relations between oil and security was the fact that, after the Second World War, U.S. policy makers considered that the imports of *cheap* oil were a threat to national security. As the classical protectionist argument goes, “the certified requirements of our national security […] makes it necessary that we preserve to the greatest extent possible a vigorous, healthy petroleum industry in the United States. Excessive quantities of low priced oils from off-shore sources threaten to impair the national security” [Thorp, 1960].

Moreover, U.S. government subsidized the expansion of the domestic oil industry through fiscal incentive in the field of exploration and consequent over-expanded production: “these tax policies have probably been the most important items of government interference in the petroleum industry. In the absence of these artificial stimulants the

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2 Gawdat, Bahgat – “Oil security at the dawn of the new millennium”, The Journal of Social, Political and Economic Studies, Fall 1999, 24, 3;
3 The American Congress did not vote for the plan. Both US Presidents Harry Truman and Dwight Eisenhower signed bills to set up a strategic oil reserve but they were not implemented but their attempts were failures.
market would have delayed production” [Mead, 1979]. In fact, the U.S. government used all the available tools of protectionism found in economics manuals: subsidies, import quotas, price controls and so on. The resulting structure and performance of the American oil industry is the direct outcome of all these powerful interventionist measures. The historically low prices that end-consumers benefited from were maybe an involuntary outcome of an over-expanded domestic oil sector: “in 1950, the United States provided 52% of the world’s crude oil production; by 1997, that figure dropped to 10%” [Gawdat, 1999].

One of the critical events that shocked the U.S. and international oil industry was not the energy crisis per se but the powerful wave of nationalization in the producing countries in the 1970s. That trend ended the period of the Seven Sisters and empowered the producing countries vis-à-vis international oil companies. Oil companies increasingly loose their political leverage and become “more of a mule than of a rider”. However, new actors emerge on the special-interest arena, at least in the capitals of the developed economies, environmentalists and consumerists: “One might assume that with the declining power of the oil industry in the last decade, future energy policy will be legislated in the national interest. However, the only change is that the power of one interest group has been displaced by others. The structure of public policy formation […] is unchanged” [Mead, 1979].

**Strategic Petroleum Reserve of United States**

After the first energy crisis of 1973, US President Gerald Ford signed the Energy Policy and Conservation Act that created the Strategic Petroleum Reserve [Considine, 2005]. The Act called for a Strategic Petroleum Reserve (SPR) of 1 billion barrels, equivalent of 62 days of consumption at mid 1970s levels. The US President George Bush decided

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2. Introduced by President Dwight Eisenhower in 1959;
3. Introduced in 1971: the fixed prices were artificially low which amounted to a subsidy of the refining sector;
4. The period of the Seven Sisters lasted from the end of the First World War to the beginning of the 1970s. The sisters were the biggest oil companies, the real players on the international market for petroleum. There were 5 American companies (Exxon, Mobil, Chevron, Gulf Oil, Texaco), 1 British (British Petroleum) and 1 Anglo-Dutch (Royal Dutch Shell). The governments of the producing countries did not have any power in controlling the behavior of these companies and the exploitation of the national resources. While this is not wrong in itself, it is wrong in the case that the regime was imposed by the Big Powers. See Podolny, Joel and John Roberts – “Global Oil Industry”, Graduate School of Business, Stanford University, November 30th, 1998 as well as Vietor, Richard and Rebecca Evans – “World Oil Markets”, Harvard Business School, November 11th, 2003;
in 2004 to fill the reserve to its maximum present-day capacity of 700 million barrels. At a present day price (September 2007) of $ 80 per barrel, SPR has a market value of $ 56 billion dollars.

The investment of U.S. public resources was of $ 22 billions ($ 5 billion for facilities and $ 17 billion for crude oil). While SPR seems to be a good bet for the US government (but who can argue that the job of the government is to bet taxpayers’ money?), it is a useless as well as debilitating public policy.

First of all, the new global security and military environment is increasingly far away from a classic war like the World War II. The today conflicts are asymmetric and resources are not the critical factor. For example, in the case of a war between superpowers, a mutual assured destruction (a nuclear holocaust between them) does not need significant energy resources. The crisis in Iraq is also a powerful example as guerilla warfare and mass crimes do not need energy resources.

Second of all, an embargo of the oil producing countries towards United States and Western World may deprive those countries from the revenues of oil in the short run but they are increasingly less dependent of oil. Saudi Arabia, Kuwait as well as United Arab Emirates are diversifying their sources of income and a political decision can be enforced without jeopardizing their chances to implement it.

Third of all, any kind of strategic reserve cannot solve the most pessimistic scenario of total depletion of oil resources. Such reserves can only prolong for several month a reality that will affect the entire world. The confidence that U.S.A. will still have oil while the rest of the world depleted it is not a device for making friends or money for America.

But the use of SPR in United States is a proof of the same expansion of the scope of public bureaucracy. The Energy Policy and Conservation Act, which regulates the operation of SPR, define three types of draw-downs:

1. Full drawdown: The President can order a full drawdown of the Reserve to counter a "severe energy supply interruption." EPCA defines this as "a national energy supply shortage which the President determines - (A) is, or is likely to be, of significant scope and duration, and of an emergency nature (B) may cause major adverse impact on national safety or the national economy; and (C) results, or is likely to result, from (i) an interruption in the supply of imported petroleum products, (ii) an interruption in the supply of domestic petroleum products, or (iii) sabotage or an act of God.

EPCA also states that a severe energy supply interruption "shall be deemed to exist if the President determines that -

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1 Website of US Department of Energy, http://www.fe.doe.gov/programs/reserves/spr/index.html (September 2007);  
2 Not to speak that, in such a case, China or India will in fact be ready customers for the Arab oil.
(A) an emergency situation exists and there is a significant reduction in supply which is of significant scope and duration; 
(B) a severe increase in the price of petroleum products has resulted from such emergency situation; and 
(C) such price increase is likely to cause a major adverse impact on the national economy.

2. Limited drawdown: If the President finds that -
(A) a circumstance, other than those described [above] exists that constitutes, or is likely to become, a domestic or international energy supply shortages of significant scope or duration; and 
(B) action taken....would assist directly and significantly in preventing or reducing the adverse impact of such shortage” then the Secretary may draw down and distribute the Strategic Petroleum Reserve, although in no case:
(A) in excess of an aggregate of 30,000,000 barrels....
(B) for more than 60 days....
(C) if there are fewer than 500,000,000 barrels....stored in the Reserve”.

A large number of analysts noticed the ambiguity of the concepts used in the Act. Such an ambiguity will always allow a free (re)interpretation from the part of public bureaucracy. While the operation of the SPR during First Gulf War was a matter of “too-little-too-late”, is was timely employed in September 2000 when U.S. President Bill Clinton released 30 million barrels of crude oil at the request of … the U.S. Vice-President Al Gore, in the middle of a presidential race [Considine, 2005]1. The perversion of the SPR come “in the spring of 1996, Congress authorized the selling of $ 227.6 million worth of oil in order to reduce the federal deficit. This marked a dramatic shift in the purpose of the SPR: instead of a strategic asset, the reserve was used as a piggy bank that could be tapped during fiscal hard times” [Considine, 2005]2.

In fact, the idea of buffer stocks in order to prevent the rapid adjustment to market conditions is not very novel. Different international commodity agreements (cartels of producers) attempted such a policy but they failed miserably (PANCAFE - the international coffee cartel orchestrated by Brazil, international tin agreement, and so on). And the fundamental observation was that “once played, the SPR card had modest impacts on world prices and could be easily trumped by actions of other players, including output adjustments by world oil producers” [Considine, 2006]3. And one of the significant

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1 Because of a spike of heating oil prices in North-Eastern United States, the presidential candidate Al Gore made an appeal to the President to a limited drawback of oil from the strategic reserve. It seems that the real motive was the poor results in surveys of Al Gore as compared to the Republican candidate George Bush. See Considine, Timothy and Kevin Dowd – [2005]. Unfortunately for mankind, Al Gore noticed that the warming of the Planet Earth occur only under Republican presidents.

2 Considine, Timothy and Kevin Dowd – [2005];

3 Considine, Timothy – “Is the Strategic Petroleum Reserve our Ace in the Hole?”; The Energy Journal, 2006, 27, 3, page 91;
effects was on private companies. Due to the availability of oil drawbacks in cases of “emergency”, such companies gave up their own buffer stock as these were immediately available from public authorities.\footnote{Stanislaw, Joseph and Yergin, Daniel – “Oil: Reopening the Door”, Foreign Affairs, September / October 1993, 72, 4;}

According to mainstream economists, the maximum security a society can reach regarding oil supply is to give up foreign trade in that commodity and produce everything internally; that is, complete autarky. From this point of view, SPR can also be perceived as a central bank for petroleum companies which can use it in cases of emergencies. Such availability (on taxpayers’ money) creates wrong incentives for private operators as in the case of fractional-reserve banking.

Conclusions

Unfortunately for the modern day society, policy makers (but also the majority of consumers) define security in terms of welfare and not property rights. Any factor that affects their welfare (and interestingly, not only the already existing welfare but also its projected growing one) may be perceived as a threat to security. Such a perspective on economic security is problematic as it sooner or later will generate conflicts which cannot be solved as there is no consideration of objective yardstick. “Interests” per se may always be mutually exclusive and they cannot offer a peaceful and sustainable solution.

The perceived problems of the security of oil supply are even more problematic as they are also the result of conflicting objectives of public policy. On the one hand, the alleged protection of environment determined a series of public policy decisions which have a deep impact on the role of oil in the energy policy of the majority of developed states. The bans on the expansion of nuclear industry as well as on the exploration and drill in certain “natural wildlife reservations” are some of the examples.

Another significant example is the taxation of oil (and oil derivatives). While taxation is considered, from this point of view, a measure to reduce oil consumption (see the European and Japanese examples), in case of emergency (like high oil prices), national governments should lower the taxation of these products (in order to maintain a supply of “cheap” oil). This is not however the case because the governments would reduce their own resources extracted from the taxation of oil products. According to certain estimates, European countries “earned [in 1992] about $200 billion in taxes on the 11.8 million barrels per day of oil products they consumed. This is nearly three times the $74 billion that the oil exporters earned selling a similar amount. The Italian treasury alone earns as much as its tax take on 2 million barrels a day of consumption as Saudi Arabia earns in producing more than 4 times as much oil”\footnote{Stanislaw, Joseph and Yergin, Daniel – “Oil: Reopening the Door”, Foreign Affairs, September / October 1993, 72, 4;}.

As a direct conclusion, taking into account the acclaimed inelasticity of oil consumption, national governments would, ceteris paribus, prefer higher oil prices than lower ones. And there is, for sure, a logical inconsis-
tency between the declared goal of abundant and cheap oil and the goal of maximizing tax revenue.

The claim of an apocalyptic end of the oil availability is oversold because policy makers will have a strong argument for the expansion of interventionism and planning both in this industry as well as foreign policy. As International Energy Agency declares, “in the absence of new government policies, the world’s energy needs will rise inexorably”\(^1\). Such a statement which raises the prospect of a negative phenomenon is a declaration of distrust in every type of markets. A better statement will be: “In the absence of free energy markets, the world’s energy needs will surely not be satisfied (and will cause wars)”\(^1\). Such claims are the outcome of a wrong perspective on world politics were the situation is a zero-sum game.

The idea that there are particular goods or services which are more important than others (defined as “strategic”) is based on an implicit consumption model advanced (or implied) by the analyst. Is the bankruptcy of a bakery a problem of security in a small community? Or the bankruptcy of Coca-Cola in today globalized world?

What it is often forgotten in the debate about the future of oil availability is the fact that present-day technologies and production activities use oil in a large degree because it was the cheapest energy commodity. Production processes and technologies which are today qualified as “expensive” and “non-efficient” will become cheap and efficient when they will be adopted by a large number of entrepreneurs and businesses. They are not attractive today because using oil is more efficient.

The inclusion of oil on the political agenda is a wrong development. It is a brutal over-simplification of a complex economic reality. Oil is a “star” commodity (ab)used in the political discourse maybe also because it is easier for policy-makers to claim success (or for competing policy-makers to claim failure) or the demand further powers to intervene in the economic sphere from political constituencies. As one political actor commented, “Given our habits, change is very difficult. Conservation faces popular resistance, Given those circumstances, we need to have that supply of oil not only for national security, not only to keep the economy running, but to keep the transportation system running and the automobile owner happy. That automobile owner is the voter. For the average American, his car is his temple, not his castle. When politicians begin to muck around with that temple, they put their own reelection at risk”\(^2\).

However, any public policy that may attempt to block or oppose such a natural reality can be easily qualified as expensive and futile. The natural reality cannot be changed by a public policy. The fact that some mineral resources are perceived to be scarce is a fact of the natural environment. We may argue that absent the scarcity, they wouldn’t have been

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qualified as economic goods. In the case of any economic planning and forced allocation of resources by public authorities, any factor that may jeopardize this allocation can be defined as a threat to national economic security.

As an analyst of the oil industry concluded, “assertions about the future in general, and about energy developments in particular, may occasionally turn to be accurate, but mostly will not”1.

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