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Elementary Economics of the Energy Crisis

The energy crisis is not a matter of the earth running out of fossil fuels. Long before the physical exhaustion of oil or natural gas takes place the extraction costs will rise so that the price mechanism will restrict uses. The current crisis is due to the sudden accretion of power by the OPEC cartel and its ally the "trust" of major multinational oil firms, the expectations, induced the power of the Cartel and the multinationals, that the price of oil and other fuels will rise, and the national power and balance of payments implications of the United States, which has built an economy that is peculiarly dependent upon oil, becoming heavily dependent on foreign oil. Any policy that has a chance of being successful must confront the power of the cartel and the giant oil firms, modify the structure of the United States economy to decrease dependence upon oil, and increase the domestic supplies of United States oil and oil substitutes. Of these three dimensions to policy the confrontation with oil cartel and companies and the modification of the technology of the United States economy are of basic and long run significance, the increase of domestic supplies is both a short run problem and an instrument that can be used in confronting the interlocking OPEC oil companies cartel.

The administration's energy program is a significant improvement over the rhetoric and inaction of the Nixon-Ford years. However it does not confront the power of the cartel and the oil companies and it evades the issues of how the technology of American production and consumption can be modified so that the dependence upon energy is substantially decreased. Given the balance of payments implication of oil importation and the investment requirements of major supply expansions it seems clear that a continuation - let alone an increase - of the energy

dependent technology of the United States will lead to impoverishment. In the present case the path to continued improvement in United States living standards requires an abrupt break with past trends.

In order to understand how the oil cartel and the power of the oil companies affect output it is necessary to examine the effect of price expectations upon the rate of exploitation of a depletable resource and upon the pace of investment in finding and preparing for exploitation of a depletable resource. Even if the amount of oil, gas, and coal in the world is infinite, each particular proven and developed oil, gas, and coal field is a depletable resource. As such each operator of a field has to determine the rate at which oil will be extracted, for each operator has the option to leave the resource in its natural site for a later day.

The key determinant of the rate of extraction from a developed field is, in the case of oil, the expected path of the price per barrel minus the current operating costs per barrel - all this net of taxes: that is the expected path of net revenues per barrel determines the rate of exploitation of a depletable resource. If the expected rate of increase in net revenue per barrel exceeds the interest rate then it pays to leave oil in the ground. An expectation that the net revenues per barrel will rise will diminish the rate of extraction. Contrariwise an expectation that the net revenue per barrel will fall or remain constant will tend to increase the rate of extraction to a limit determined by short run extraction costs. Thus for currently proven and developed fields in the United States the demonstrated power of the oil cartel and their multinational allies to raise the price of oil has tended to cut the flow of oil from existing developed fields and proven reserves. The holder of proven reserves is in the position of a land developer or speculator who invests in holding

land on the basis of a future expected price that exceeds the purchase price by a goodly margin over the compound interest charges on the cost of the investment.

The limit to the "stockpiling" of oil, gas, and coal in proven reserves is the need for cash today in order to meet financial commitments. Although a particular "finite" holder of proven reserves can "sell off" a "hypothecate" reserves to acquire cash, the major oil companies and the owners of major fields don't have that option because of the magnitudes involved. Thus enough oil to fulfill the needs of oil producers for cash will be "pumped" each period. On the other hand if an oil field or the investment in developing a field are subject to possible increases in the tax rate on production or nationalization, then there is a strong incentive for the operator to extract as much as possible as quickly as possible. This is so because the possibility of higher taxes or nationalization tends to make the present net revenues greater than expected future net revenues even if a rise in the price per unit of output is expected.

The market value of a barrel of oil at any location can be derived from the cartel price. Inasmuch as the OPEC cartel and their giant firm allies have demonstrated an ability to raise and then sustain prices, the expected market value of oil at any location is expected to conform to what happens to the cartel price. If this link between an expected rise in price due to cartel policy and the "market" value of oil at any particular location can be broken, then the expectation that prices will rise may also be broken. If this occurs the incentive to extract will increase and the flow of oil would rise.

For example if the "oil" in the ground were nationalized and the

"pumpers" of oil got a fixed sum per barrel the incentive to pump would be high. If the price of domestic oil were set far above the price of cartel oil by means of a tariff and the tariff were adjusted whenever the price of cartel oil rose so that no increase in the price of domestic oil takes place, then the incentives would point towards pumping the largest possible amount of oil.

If there exists "old oil" which requires considerable current expenditure so that the oil can be extracted, then the effect of a rise in world oil prices upon the extraction of this oil will be amplified. Thus if oil in the U.S. is \$12 a barrel and the current extraction costs from an old field is \$6 a barrel then the net revenues after taxes might be \$3.00. If the price of oil rises by 10% to \$13.20 the net revenue from oil will rise to \$3.60 per barrel - a 20% rise. The incentives are particularly strong to keep oil in the ground when higher prices are expected and current extraction costs are high.

It is rumored that the transit price for a barrel of oil through the Alaskan pipeline might be \$7 a barrel. With a \$12.00 price for oil at Valdez, the southern terminal of the pipeline, the net revenue to the extractors will be in the neighborhood of \$5 per barrel. Once again any particular oil field owner would find the impact of a rise in the price of OPEC oil amplified: a rise in the OPEC price to \$13.20 would increase the \$5 to \$6.20, a 24% rise in the pre tax pre-expense revenues to a North Slope extractor.

We note that there is a potential conflict of interest between the owners of the North Slope fields and the operators of the Alaska pipeline. The Alaskan pipeline needs oil to transport in order to acquire the cash required by its indebtedness whereas the North Slope field owners and developers might be better off allowing the oil to

remain in its site.

The price per barrel of oil set by the cartel and the international oil companies is significantly higher than the current costs of discovering, developing, and exploiting oil fields would justify; and apparently significantly higher than any reservation price based upon the present value of future expected prices would justify. Thus if the cartel is broken, or if it seems likely that the cartel would be broken, then there will be downward pressure on expected price and an inducement to pump oil now. The "cartel" is like a self fulfilling prophecy. If it is seen as strong and as being able to generate ever rising prices of oil then the amount of pumping from independent sources and potential break away oil producers will be minimized. If the cartel is seen as weak and as unable to generate ever rising prices, then there are strong incentives for independent and potential break away cartel members to pump as much as possible. Once a glut of pumped oil develops the cartels power will be broken. It is in the interests of the United States to break the power of the cartel.

Although rising expected prices of oil tends to diminish the production of oil from proven and developed fields, a rising expected price of oil is conducive to investment in finding and developing oil fields. In a world in which debts denominated in money are important and in which the prices of financial instruments reflect the money receipts of owners, a rising expected price of an output tends to be conducive to the debt financing of investment. In a world where fixed nominal financial commitments exist and are used to finance investment and positions in capital assets fully expected inflation that is not offset by financing costs will tend to induce investment. If prices and revenues attributable to capital assets that rise at the same rate as the general

price level is conducive to inflation, then prices and revenues that are expected to rise at a faster rate than inflation are particularly conducive to investment. Such is the ruling case for oil with the cartel's power undiminished.

It seems that rising prices of oil and natural gas are favorable for the finding and developing of new fields even as this price expectation tends to minimize the rate at which oil is pumped from developed fields. Thus there is a paradox expectations of rising oil prices induces investment in exploration and developing fields even as it diminishes the rate at which oil will be pumped from existing fields. But as exploration finds and proves the existence of oil while pumping is constrained by expectations that prices will rise, the ratio of proven reserves to current production will increase. An increase in this ratio tends to work against the expectation that prices will rise. In a free market situation the expectation that prices will increase can be undermined by an increase in proven reserves, in a market controlled by a cartel the expectation is not easily broken. [Incidentally it is in the cartel's interest to minimize the stated amount of proven reserves in order to induce independent operators to keep oil in the ground even as it is in the cartel's interest to maximize the stated amount of proven reserves in order to constrain investment by firms outside the cartel in finding new fields. Thus the cartel would tend to maximize the proven reserves in the cartel center - Saudi Arabia - even as it diminishes the proven reserves in the cartel's customers or in potential breakaway states.

Thus the economics of oil (and of other extractable, depletable resources) is full of paradoxes: price expectations that leads to exploration tends to minimize production from proven and developed reserves

and the oil cartel is interested in both maximizing and minimizing the proven reserves upon which non-cartel operators base their decisions.

However, even as we recognize that there is an influence from the path that oil prices are expected to follow upon the rate of exploration, investment and development it is important to recognize that exploration, investment and development have taken place in the face of expectations of constant and even falling prices. This is so because a high enough near term price of oil relative to the costs of exploration, development, and extraction will draw forth investment. Thus even though we cannot have oil prices go up and down at the same time we can have high and stable oil prices: high prices to induce investment and stable to induce extraction. This can be achieved by imposing a substantial tariff on imported oil and allow all domestic production to rise to the price set by the tariff and the OPEC price - if domestic demand and supply sustains that price. Furthermore, the tariff will be such that price increases by OPEC will be offset by reductions in the tariff. Thus the high price induces exploration and the stable price of pumped oil induces extraction.

The first step in a strategy for oil and other fuels is to free domestic oil and gas from all controls and then impose a tariff upon oil that makes the domestic price substantially above the OPEC price. Let us say the tariff is 50% of the OPEC price - some \$5.00 a barrel. Furthermore the tariff will decrease whenever the OPEC price increases, so that the domestic price remains constant. The impact of such a tariff will be to guarantee that the price of old oil will not rise over the next several years; in fact the price of old oil may well fall as the combination of the high price and the expectation that price will not rise both restricts demand and induces supply.

As things now stand the possibility that the OPEC cartel might collapse is a barrier to domestic exploration and investment in oil. Let us examine the Alaskan pipe line - oil field again. The technical capacity of the pipe line sets the maximum that can be extracted and shipped. However if the cartel breaks so that the world price of oil becomes \$6.00 a barrel then the revenues from the pipe line cannot be sufficient to fulfill the presumably \$7 a barrel interest, dividend and operating costs of the pipeline. Furthermore if a large transit fee is charged, the value of the North Slope deposits is nil. The viability of the project, its ability to fulfill the commitments and validate the investments, depends upon the maintenance of a high price. A substantial tariff that will modify the impact of the cartel's power upon the domestic suppliers is needed. Thus even as the tariff will be lowered to offset cartel price increases the tariff will have to guarantee that there is some minimum price below which foreign oil will not be available in the United States market. If the initial tariff is set so that the United States price of oil is \$18 a barrel then the tariff might well guarantee that the landed price of foreign oil will never be allowed to fall below \$9 a barrel. Thus if the OPEC price breaks the tariff will not increase beyond the \$6 a barrel initially set in our example until the landed price of foreign oil falls below \$3 a barrel. At that point the tariff will be adjusted to stabilize the domestic price at \$9 a barrel.

A program in which tariffs are used to induce an apt price level for exploration and apt price expectations for exploitation of proven reserves can be effective only if the interests of the domestic producers are clearly separated from the interests of the international or multinational producers. Thus all giant oil companies must be separated into independent

parts; domestic extraction, domestic refining, and domestic marketing must be separated from and become fully independent of offshore extraction, refining, and marketing. As a minimum each of the multinational oil companies must be divided into separate extraction, refining and marketing organizations even as the foreign operations are independent. Only a much more competitive set up in oil and the other fossil fuels will lead to the development of an apt current extraction plus new exploration program.