

The Macrotheme Review

A multidisciplinary journal of global macro trends

TAXONOMY OF DOWNSTREAM OIL MARKET DEREGULATION AND SUBSIDISATION: THEORETICAL ISSUES

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Abstract

In this paper an analytical review of deregulation of the downstream sector of oil industry, its types, forms and the debate of scholars on its advantages and disadvantages are conducted. It also provides detailed analyses of the framework for considering subsidy introduction. In the study countries of the world are classified into four groups depending on their resources endowments and refining capacity. For each group comprehensive analyses is given on how deregulation of the oil market affects the economy. The result shows that deregulation has positive effect on the economy of some countries and negative effect on some others depending on whether the country is a net oil exporter or oil importer. It also depends on whether the country has refining capacity or not.

Keywords: DOWNSTREAM OIL MARKET DEREGULATION, SUBSIDISATION

1. INTRODUCTION

When talking about deregulation of the oil industry especially in the downstream sector the discussion is normally centered on subsidy removal pricing and importation (Birol et al 1995). Deregulation in the downstream oil sector in the case of net oil exporting developing countries involves total withdrawal of government from paying subsidy on refining, transportation, storage and pricing of petroleum products. In the net oil importing countries on the other hand deregulation involves the abolition of all laws that restrict importation of refined petroleum products. In either case the governments only assumes the role of a regulator of the industry. In light of the above, effect of deregulation within the context of this study is limited to subsidy withdrawal pricing and importation, and its effects on Macro economy.

The paper is structured into five sections; following this introduction related literature was reviewed. In section three the review of empirical literature on oil market deregulation in some selected countries was carried out. Section four presents the framework for considering subsidy introduction, while section five concludes the paper.

2. REVIEW OF RELATED LITERATURE

The literature reviewed covers both side of the divide; on one hand are the authors that write in support of deregulation and those that are against it.

Most of the writers that support deregulation hinge their arguments on improved efficiency in domestic demand by eliminating energy wastage, improved supply of fuel by attracting new investors into the sector who may want to take advantage of the deregulation policy and make profit since increased prices may result in increased profitability. Other factors are the increased revenue that will be available to governments as a result of saving the money that could have been spent on subsidy and the tax that could be imposed on the new investors. This is evident in the works of Birol, et al (1995), Lall and Chakravorty (2005), Akpoghomeh and Badejo (2006) and Bazilian and Onyeji (2012).

As mentioned above the proponents of deregulation strongly advocate for the privatization of refineries, pipelines, depots and the total withdrawal of government from all products refining, importation, transportation, storage and pricing. The governments should also abolished laws that restrict the importation of products to some specific companies, a situation that gives monopoly power to such companies that were granted the license to import. These actions will expose the domestic oil market to the prices obtained in the international market (PPPRA, 2004).

Proponents of deregulation further shows the advantage of exposing domestic oil price to the international market price in the sense that it helps minimize energy wastage, increase incentive to conserve energy efficiently and remove barrier to the entry of cleaner energy services. They also assert that energy subsidies create distortive price signal, in addition, it was argued that selling petroleum products below international market prices raises the tendencies for profitable smuggling, product hoarding and black marketeering.

The efficiency questions between private and state owned enterprises has also been advanced as one of the reasons for the need to deregulate, in their work Obaidan and Scully (1991) investigates the technical (managerial), scale and allocation efficiency difference between state owned and private for profit enterprises in the international petroleum industry. They posited that economic inefficiency is of three types; technical inefficiency, scale inefficiency and price or allocation inefficiency.

- i. Technical inefficiency is a situation where the actual inputs exceed the minimum required to produce the scale-efficient output with the cost minimizing input ratio.
- ii. Scale inefficiency can also arise when the actual output is less than the cost minimizing output.
- iii. Price or allocation inefficiency is a situation where the actual input ratio differs from the cost minimizing input ratio.

They observed that state-owned enterprises serves many masters and pursue multiple goals some of which are completely non-economic and sometimes political in nature, they are also controlled by ministries and the managers were appointed by political leaders, mostly based on political consideration rather than economic and technical expertise criterion, they are therefore sometimes influenced by political parties. Under this scenario therefore it is very likely that resources will be allocated based on political criteria instead of the economic principle of allocation to highest-valued use.

They (ibid p. 238) further opined that “government subsidy and protection, coupled with the pursuit of noneconomic objectives, may lead to resources misallocation. Government employment policies prevail over staffing. Protection and subsidy policies may presumably poster a relaxed operational environment. These policies may distort the allocation of capital and material, and lead to over capitalization and low productivity”.

The authors utilized the concept of frontier production function introduced by Farrel (1957) for their empirical measurement of efficiency. The study concludes that based on the test for efficiency carried out by estimating an Aigner-Chu deterministic frontier function, a maximum likelihood stochastic frontier function and a maximum likelihood Gamma frontier function to test the relative efficiency of state owned and private for profit petroleum enterprises, the result shows that the inefficiency of state-owned enterprises compared to private enterprises remains robust. The empirical findings reveal that state-owned oil firms can satisfy the demand for their output with less than half of their current resource input compared to their privately owned counterparts. The authors conclude thus; “whatever the policy goals are that justify state ownership of petroleum sector, the evidence suggests that the efficiency losses of pursuing these goals are enormous” (Obaidan and Scully, 1991, p. 246).

However, notwithstanding the above arguments the opponents of deregulation maintained that an oil price increase through subsidy withdrawal may have negative effect on major macroeconomic indices like consumption, industrial output, investment, inflation, employment and wages. According to IEA et al (2010 p. 8), “policy makers usually justify energy subsidies with the argument that they contribute to economic growth, poverty reduction and enhance security of energy supply”. Therefore oil subsidy withdrawal will raise the cost of production thereby adversely affecting productivity, real income and employment.

At this juncture it is relevant to analyse the deregulation of the oil market and higher oil prices and their effects on different economies in the world.

3. Review of Empirical Literature on Oil Market Deregulation in Some Selected Countries

Masih et al (2011) has studied the oil market price volatility on the macro economic variables in South Korea. The variables were assessed from economic and financial angle. The VAR model was used to capture the effect of crude oil prices on the South Korean economy covering the period of Asian economic crises of 1997 and the oil price hike of the early 1990s which happens as a result of Gulf war. Cointegration technique was employed to test the long run relationship between oil price movement and economic activity using time series monthly data from May 1988 to January 2005. The result shows that long run equilibrium relationship exists between oil price movement and macro economy in South Korea and the effect of high and volatile oil prices is felt in the entire sectors of the economy. The result also shows a negative indirect effect on industrial production because it leads to high cost of production and low profitability which makes investors to cut down investment.

Goto and McKenzie (2002) in their paper ‘Price collusion and deregulation in the Japanese retail gasoline market’ studied the effect of the deregulation of oil industry on the behavior of retail prices in Tokyo and Osaka. According to them (ibid), in 1994 the Japanese government made it clear that by the end of March 1996 the law relating to the importation of some specified petroleum products (gasoline, kerosene, light oil) which restricts their importation to some certain number of companies will be abolished, the paper estimates model for the domestic retail price of

gasoline based on game theory, focusing on forward looking behavior of oil firms in the two towns. Monthly data for the period 1990:11 to 1998:5 was used. The data was divided into two parts; the first half was the pre deregulation period 1990:11 to 1994:5 and the second half period was when the decision to deregulate was made effective from 1994:6 to 1998:5 and the findings were that; notwithstanding the deregulation total imports of the specified petroleum products relative to total production in the country remain very small, and total number of new importers of the said products also remain rather small, furthermore the wholesale price of the products has remained unchanged and yet at around the same time that the decision to deregulate the importation and abolish the law that restrict the importation to some certain companies was made and announced to the public the retail prices of the products began to fall. It was concluded therefore, that this is consistent with the said game theoretic model which suggests that future changes in the economic environment will affect current price settings by firms if the firms are faced with competition in a repetitive game context.

In essence this theory has shown that expected future changes in the economic environment that exposes firms to competition through market deregulation do have an impact on the current pricing of their products which in the case of this study apply to petroleum products pricing.

Similar findings were made by Clarke and Edwards (1998) using a simplified general equilibrium model on Japan. Their findings revealed that there was a 13.2% reduction in domestic oil price and a consequent rise in the consumption of oil products by 4.6% by final consumer and 17.8% by intermediate users like power stations. Furthermore, domestic oil refining increases by 8.4%. The findings also show that the real GDP rises by about 0.13% and a 0.70% rise in real wage.

Bello and Cavero (2008) conducted a study on the Spanish retail petroleum market which is the downstream sector of the Spain oil industry, and focus on the pattern of liberalization and competition since the deregulation of the market in 1992. According to them the Spain oil industry has been under strict government control from 1927 to 1984, the country's national oil company CAMPSA '*Compania Arrendataria del Monopolio de Petroleos S.A.*' held the concessionary right and conduct the exploration, production, refining and final distribution of petroleum products in the country. The period was characterised by low quality service, managerial, technical, scale and allocation inefficiencies this culminated into the decision to liberalize. However it was discovered that from the year 1992 when the liberalization policy brought about competition in the downstream sector there was significant rise in the number of service stations in the country from 4800 in 1992 to 8600 in 2005, furthermore this brought about structural changes in refining the products in the country.

The main finding of the study was that in only a few years the Spanish oil industry has moved from being a state monopoly condition to the condition of free market competition, which brought about retail market growth, development and modernization. It also gives the national oil company a good platform to compete with the new comers in the industry. Another important finding was that different prices were charged for different quality of products, and deregulation of refineries and retail outlets eases price competition in the final market.

Birol et al, (1995), investigates the impact of oil subsidy removal on oil revenue and the energy sector in three countries, which are Algeria, Nigeria and Iran. The result shows that subsidising consumption of petroleum products leads to domestic excessive demand which results in lower product availability for export thereby decreasing foreign exchange revenues that are needed as investment to stimulate the development process. Secondly subsidising producers bring about

excessive supply which could lead to a fast depletion of resources which are the main source of foreign earnings of the countries in question. Thirdly, it was observed that switching to energy intensive production in these countries which are characterised by excess labour supply could worsen the unemployment situation in the countries and this could negatively affect growth. Fourthly, subsidies constitute a drain on governments' budgets because of lower export availability and revenue sacrificed for subsidy, this leads to fiscal deficit and in some cases debt accumulation.

The paper also posits that subsidies in most cases do not benefit the segment of the society they are targeted to help – the rural and urban poor- but rather it is the rich that benefit most from it. Therefore the income redistribution aim of the introduction of the subsidies in the first place is defeated.

Finally using standard econometric approach the findings of the paper suggests that the effects of deregulation on government revenue and energy use efficiency could lead to substantial revenue saving. However the authors were quick to add that “It is often believed that the removal of subsidies would lead to the suffering of the deprived segments of the population, while the extra output of oil (from reduced domestic consumption) would put down pressure on the world price, resulting in constant or even decreasing revenues”, (Biol, et al 1995 p.214).

Papapetrou, (2001) examines the oil price shock, stock market, economic activity and employment in Greece. She employed a multivariate vector-auto regression model to find the dynamic relationship between real oil price, interest rate, industrial production and employment rate. Two specifications were estimated, the industrial production specification and the employment specification. The result of the impulse response function shows the responses of the four variables to oil price shock which indicated that an oil price shock has an immediate negative effect on industrial production and employment. Therefore the paper concludes that oil prices play an important role in affecting economic activity and employment in Greece as oil price shocks explain a considerable proportion of the fluctuation in output growth and employment growth.

Vladimir (2012) in his article titled ‘Does oil price matter? A case of Czech Republic’ investigates the effect of oil price movements on the main economic indicators of Czech Republic. More specifically the study dwells on the influence of oil price on GDP, Inflation and money supply (M1). Bayesian VAR model was employed to analyse the relationship. The study used three specifications for the oil prices to find out whether the change in oil price significantly affects the above mentioned variables either in linear, linear asymmetric or nonlinear asymmetric way. The finding shows that there is no significant impact of oil prices movements on the dependent variables. Therefore it was concluded that oil price changes are not found to contribute significantly to the changes in GDP, Inflation and money supply in the Czech Republic.

In the United States of America (U.S.) the price of oil has tremendous influence on the economy; this is evident from the vast literature on the issue of oil price and the U.S. macro economy. Hickman et al (1987) had examined fourteen studies on the impact of oil prices on the U.S. economy that were conducted using econometric models alone, this is apart from the ones that were conducted based on empirical analysis. Foote, and Sneddon-Little, (2011 p. 49) while analysing conference proceedings organised by Federal Reserve Bank of Boston titled ‘Oil and the macro economy in a changing world’ concludes that “economists concur that oil prices continue to have sizeable effects on the U.S. economy”. In fact Hamilton (1983) has shown that

all the post war U.S. economic recessions were always preceded with oil price shock except one recession which took place in 1960-61. He further stressed in his article titled Nonlinearities and the Macroeconomic effect of Oil Prices (2011) while referring to the 2007-2008 doubling of oil price in the international market and the recession that followed that 10 out of 11 U.S. economic recessions were preceded by sharp increase in oil prices. The Hamilton stand was concurred by the observation of the Boston conference participants who according to Foote, and Sneddon-Little, (2011pg. 51) “had no trouble agreeing on the empirical regularity that large oil supply and price shocks generally precede U.S. recessions and tend to have a larger and more extended negative impact on the economy than the importance of oil in consumption or production would suggest”.

Hamilton (2012), views higher oil prices as tax which the U.S. citizens pay abroad which in turn negatively affects their consumption of domestic goods and services. Edelstein and Kilian (2009) in their article titled ‘How sensitive are consumer expenditures to retail energy prices?’ indicated that the personal consumption expenditure (PCE) price index for energy goods by U.S. households increased by 68% in real terms between 2002q1 and 2006q3. The increase in expenditure on energy goods according to Hamilton means decrease in domestic consumption, which in turn results into low aggregate demand and therefore slows the growth rate of G.D.P. Hamilton explained further that about 5 per cent consumer spending in U.S. is on energy products. Therefore if oil prices rise by 20 per cent and the consumers continue to consume the same amount of energy goods and services as before, then a pure income channel would imply that the U.S. consumer’s consumption of other goods would fall by 1 per cent. However the method of calculation of Edelstein and Kilian (2009) reveals that the consumption decline is much larger than the 1 per cent predicted by the pure income channel and the decline was spread out over many months. In fact the consumption decline in response to higher oil prices according to them is both larger and more protracted than the pure income effect would predict.

Another important effect of higher oil prices on the U.S. economy according to Hamilton (2012) is that higher oil prices tend to constrain firms to minimise as much as possible in the use of oil inputs which leads to a reduction in the amount of output that they produce; this in turn has a general negative effect on output and aggregate supply in the economy.

4. FRAMEWORK FOR CONSIDERING SUBSIDY INTRODUCTION

Having seen the different types of oil subsidy scheme, it is imperative at this juncture to show the framework under which the introduction of oil subsidy could be considered.

Bacon and Kojima (ibid) have provided three frameworks under which oil subsidy can be introduced. According to them countries can be classified into three: (i) nations that do not possess refining facilities; and these can be further classified into two, oil producing and non-oil producing (ii) a non-oil producing country with refining capacity and (iii) an oil producing country with refining capacity.

Under the first scenario that is a country without refining capacity, the domestic oil prices are arrived at by adding the import cost of products, wholesalers margin, retailers margin and taxes (this include both specific tax and value added tax).

This could be expressed as

$$PR = (P_i + M + T) \times (1 + \tau) \quad \text{(Equation 1)}$$

Where

PR = retail price per unit of a product

P_i = per unit price of an imported product

M = Domestic marketers margin (wholesale, retail, storage and internal transport)

T = specific tax on one unit of product sold

τ = tax rate on one unit value of final sale

If the government desires to bring down the price at retail level it can achieve that in four different ways.

- Pay subsidy to importers in order to reduce the effective cost of imported product (P_i)
- Pay subsidy to wholesalers or retailers in order to reduce the internal marketers margin (M)
- Reduce the specific (T) or value added (τ) tax rates
- Reduce the final pump price (PR) by paying a subsidy to retailers

Closely related to the above scenario is the case of oil producing country with no refining capacity therefore it exports all its crude oil, so the price received is determined by the international price of crude oil less transport cost of exporting the crude to the international market (selling point). This can be expressed as

$$\pi D = \pi W - F \quad \text{(Equation 2)}$$

Where

πD = per unit price of crude received domestically

πW = per unit price of equivalent crude on international markets

F = per unit cost of transporting crude to the world markets

In the scenario above the export price of crude has no influence on the mechanism for introducing subsidy on domestic petroleum products.

The second situation is that of a non-oil producing country with domestic refining capacity. The country has a choice of either importing refined petroleum product at international market price or importing crude oil at international market price and makes use of its domestic refineries to refine it domestically. Whichever can guarantee lower prices after middlemen margins and taxes would be the one that will be prepared by the consumers. The cost of imported refined products is same as the price of crude oil at international market plus international refining costs plus the cost of import freight. This may be expressed as:

$$P_i = \pi W + RW + F \quad \text{(Equation 3)}$$

Where:

RW = is the international refining cost per unit of product.

Under the above scenario three simplifying assumptions were made. First, the costs of freight in importing one unit of refined product and the equivalent amount of crude, and of exporting crude

oil to the international market are all assumed to be equal. But in reality the cost of transporting refined product is always higher than that of crude. Second the cost of domestically refined products to the market and that of imported products are also assumed to be equal. Third, it is also assumed that there is only one type of crude oil in the international market and there is only one single price of crude oil in the international market.

Going by the above assumptions the cost of products refined domestically at the refinery gate may be expressed as:

$$PD = \pi_w + F + RD \quad \text{(Equation 4)}$$

Where

PD = per unit price of a domestically refined product

RD = domestic cost of refining the equivalent unit of crude oil

In a situation where the price per unit of domestically refined product (PD) is higher than the import price of product (P_i) the government would need to take some measures in order to keep the domestic refineries in operation. These measures include; providing a subsidy which should be equal to the difference between the two prices, restrict the import of refined products or impose an import tax on the refined products. If a subsidy is provided, the retail domestic price of product reflects the import parity price as in Equation 1. Therefore reducing pump prices could be done through the same mechanisms as those of a country that has no refining capability.

Finally a scenario with an oil producing country that has refining capacity is considered. Under this condition the country could either supply its refineries with domestically produced crude oil or the imported crude from the world market. The cost at the refinery level of products refined from imported crude oil could be expressed as

$$PDW = \pi_w + F + RD \quad \text{(Equation 5)}$$

Where

PDW = cost of locally refined product acquired from imported crude.

On the other hand the cost at factory gate of refined products from domestically sourced crude oil may be similarly expressed as below:

$$PDD = \pi_D + RD \quad \text{(Equation 6)}$$

Where

PDD = cost of locally refined product using domestically sourced crude oil

Given that the price of domestic crude oil should be related to the international market price by the export parity equation 2, equation 6 may also be expressed as

$$PDD = \pi_w - F + RD \quad \text{(Equation 7)}$$

At this juncture the consumer choice would be that of the minimum of either imported products (equation 3) or locally refined products using imported crude (equation 5) or locally refined product using domestically sourced crude (equation 7).

It is worthy to note that it is difficult to make the cost of refining imported crude in domestic refineries lower than the cost of imported refined products. However refining domestic crude oil locally will be advantageous in the sense that the cost of crude produced locally will be lower

than the cost of imported one by twice the transportation cost. Therefore even if the domestic refining cost is higher than that of international market ($RD - RW > 0$) the transport cost advantage will offset it especially if the following condition is satisfied;

$$RD - RW < 2F \quad (\text{Equation 8})$$

Under the above scenario it will be more economical to use domestic crude in the domestic refinery, the zero transport cost advantage makes domestically refined products using domestic crude to be cheaper at refinery gate and that can allow for their price to be raised towards the product import parity level. This therefore makes it possible for another type of subsidy to be introduced, because prices of products do not necessarily have to be increased by import parity therefore the margin that could have been captured by domestic refining is transferred to consumers. Another option is to sell crude oil to domestic refineries at a price below export parity, thus foregoing part of the revenue that could have been available to the government if the crude were sold at world market.

5. CONCLUSIONS AND RECOMMENDATIONS

The aim of this paper is to make an analytical review of theories on deregulation and subsidy provision in the downstream sector of oil industry with a view to show the circumstances under which the market can be deregulated or require the provision of subsidy for optimum results. To achieve this literature was reviewed on the countries that practice one form of deregulation or the other and those that provide subsidies and the frame work under which subsidy can be introduced was also analysed.

From the fore going it is concluded that for a country to embark on deregulation of its downstream oil sector or introduce subsidy, certain factors must be considered. These factors are whether the country is an oil producing country with refining capacity or not and whether it is non-oil producing country with refining capacity or not.

For non-oil producing countries with refining capacity the decision to deregulate and or introduce subsidy depends on the choice made that is either to import refined petroleum products or consume the one refined locally.

This choice however, depends on which of the two options guarantees lower prices after removing middle men margins and tax. If refining products locally would guarantee lower prices that is desirable and it gives the country competitive advantage. Under this scenario the country should be better off by deregulating the downstream sector to allow for competition which will lead to efficiency and increased production. If on the other hand the price per unit of domestically refined product is higher than the import price of products, the country would have to take some measures in order to keep the domestic industries in operation and prevent job lost. These measures include provision of subsidy equal to the difference between the two prices, restrict import of refined products, impose an import tax on refined product or put a total embargo on the importation of refined products.

The case of non-oil producing countries without refining capacity is almost similar with that of oil producing countries without refining capacity. The best option for such countries is to deregulate the downstream oil sector and allow the forces of demand and supply under perfect

competition to determine the price of products. Any attempt in providing subsidy could result into a heavy burden on government earnings, and excessive demand products due to the low prices.

Finally, the case of an oil producing country with refining capacity was considered. In the case of countries within this category, providing subsidy at the downstream sector could bring improved economic activities by lowering cost of energy which could result into lower cost of inputs for the local industries. This could give competitive advantage to local industries against their foreign counter parts, leads to expansion in their operations and provide jobs to the citizens. The total effect will be increased in productivity and economic growth.

The paper recommends that for a country to embark on either deregulation of its downstream oil sector or introduce subsidy payment therein it is imperative to consider its position against the criterion discussed in section four of this paper for it to make an informed decision that will guarantee sustainability, minimize waste and bring about growth and development.

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