Reform of the Fiscal and Subsidy Regime for the Petroleum Sector
(Based on a Report Commissioned by the Petroleum Federation of India)

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Abstract

Reform of the oil sector is long overdue. The problems in the sector emanate from the structure of central taxes and the system of subsidisation through prices. Solutions to the problems necessarily have to address both tax and subsidy simultaneously. The social losses include, misuse / wasteful use of scarce petroleum resources, diversion, adulteration, other avoidable negative externalities, improper substitution between products, tax arbitrage, distortion of consumer preferences and input choices of industries, and international cross hauling of petroleum. Nearly all these costs, and problems arise not because of subsidisation per se but due to the use of varying retail prices that are used to subsidise. Prices for the same product vary for different consumers besides. They also vary across products. These tax /subsidy variations are the root cause of nearly all problems in the sector. Autonomous price variations (i.e. those resulting from the actions of firms (under a regime of non-distortionary subsidies) would be small and not subject to 'arbitrage' i.e. to the realisation of rents through diversion and adulteration.

Tax reform – viz casting all taxes in the form of value added taxes has not taken place in the sector despite the passage of nearly 15 years since such reform was put in place in nearly all

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other sectors of manufacturing. Complete deregulation of the sector allowing oil producers, oil refiners, marketing companies, and integrated operators to price their products as they deem fit. Recast central indirect taxes (excise whether specific or ad valorem) into a value added tax, as for any other product., i.e., allowing input credit for all registered intermediate users of petroleum products is overdue. Central government revenues can be protected by working out a revenue neutral value added tax rate. This we have estimated approximately to be 110-120% of value added uniformly to all segments in the industry. Such a tax regime would also be neutral to the degree of vertical integration and remove the biases in the use of products. The Public Distribution System (PDS) is not necessary and ought to be dismantled. Kerosene would then be sold in the open market for all consumers. Kerosene could also be sold by retail outlets, kirana shops, other retail outlets, and by current PDS retailers on par with kirana shops/ ROs. Ditto for LPG. Subsidies are administered through endowments defined upfront, which allows the subsidised consumer to access his/her endowments, trade the same, convert the same into cash all without the causing any distortion. Only pipelines are subject to regulation by the Petroleum and Natural Gas Regulator.

The second best proposals involve the changes/recommendations as before but additionally creates a "Crude Price Stabilisation Fund" (CSF) that allows crude prices (both sharp rises and sudden falls) to be moderated, so that pass thru is influenced by the managers of the CSF. It is important that the CSF is set up as in independent body and insulated from the government and is governed by strict and automatic rules that make rapid price adjustment (to the market prices) necessary when the fund position is low, so that the probability of the fund going bankrupt is kept at nearly zero. A fund between $ 25 to 40 billion is envisaged. A fund of $40 billion (Rs. 200,000 crore) envisaged as a credit line would work in most situations. The fund would operate with strict limits on the quantum of the credit line used to pay out stabilization subsidies during the boom phase of the price cycle as also on the accumulated reserves built up from stabilization taxes during the bust phase of the price cycle. To ensure that such crude stabilisation measures do not affect the competitiveness of the industry exports of product (and crude) are taxed when crude is subsidised, and subsidised when crude is taxed. Appropriate conversion factors would apply. The conversion factor should be based on a refinery loss of between 10 and 7% say 8.5%.

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SECTION I

OIL IN THE INTERNATIONAL ECONOMY

Introduction

While there are global markets in crude and petroleum products these are not the perfectly competitive markets of the economists. Several factors have contributed to the imperfection in the markets. Firstly, oil being a natural resource with widely varying costs of production has necessarily involved the generation of vast rents. Since the variation in rates of extraction from wells is good enough to accommodate seasonal changes in demand, this in itself is not an important reason for the large price volatility, given the current stock of wells and their maximal yield. The yield variations though would be inadequate to respond to the speculative changes in demand.

The response to the rising demands, before the formation of the OPEC cartel was for the international oil companies to hold capacities of extraction with sufficient reserve capacity to meet the variability in oil demands. The pre-emption of oil reserves by these companies ensured very high profits for these companies. Profit maximization in this situation of high income elasticity and "competition" among these oligopolists, low price elasticity and rising world incomes, meant stable prices. Crude oil prices ranged between $ 2.50 and 3.00 from 1947 to the late sixties. When adjusted for price inflation and the prices are taken to 2007 dollars, then the crude prices could have varied between $14 and 18 per barrel over the same period. Indeed in real terms the price had declined to about $14 in the early 70s. The OPEC had been set up in 1960.

The OPEC which had not acted in any significant way until 1970, realized its power in 1973 with the Yom Kippur War. During the War the Arab states imposed an oil embargo cutting production by about 5m bpd. While about 1m bpd was compensated by increased production by other oil producers, the output fall and the speculation that followed was enough to drive current prices of oil to $12 a barrel. (Energy Economist Newsletter 2008). Since then oil price have been relatively volatile

responding to world events   but especially those in the middle east – Iranian Revolution, the Iran Iraq War, and the Iraq Wars. See Fig. 1.

Transition from Multinational Dominated Oil Production

As demands for national control and sharing of benefits from oil extraction emerged, governments responded in a variety of ways – forcing multinational oil companies to form JVs with state owned enterprises (SOEs) to share/ appropriate the profits. They also imposed taxes and large royalties on oil. Nationalisation and the setting up of state owned oil extraction companies were also the common during this period. As countries with large reserves and low domestic consumption seized control over their oil assets the ability to influence global oil prices through control and restraint over the amount of oil produced emerged.

While OPEC has been formed as early as 1960, it was only in 1972 that it was able to exercise its muscle, once its membership included all surplus producers outside the Communist Bloc, and governments were able to seize a degree of control over the oil MNCs. OPEC itself have had internal contradictions. Thus one set of OPEC countries would like to keep prices high even it that meant substitution in the long run. Such countries would typically have relatively low reserves (most of the OPEC players). Those with very large reserves (largely Saudi Arabia, and also possibly Iraq, Nigeria) that are expected to last many years at current rates of exploitation on the other hand would prefer to keep prices high but not high enough to bring about significant substitution. This has lead many commentators to question the OPECs capacity to operate as a cartel. It has no enforcement mechanism to ensure that production cuts are implemented.

More often than not it is only Saudi Arabia's capacity to implement cuts[3] as well as to increase production that has been influential. This was most evident during the period 1982-85 when OPEC's attempt at setting low production quotas did not work since most members violated the same.

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[3] With a very small return to its reserves and vast holdings of foreign investments in liquid form , Saudi Arabia can accommodate major variation in the dollar revenues it generates by selling oil. Out of current sales of oil much is saved in international banks and institutions besides securities of advanced country governments.

Saudi Arabia tried to cut back even more steeply than what it had agreed to but when others did not follow, Saudi Arabia abandoned and the policy. As a result the price of oil fell to under $10 per barrel in 1986.

Nevertheless after the two oil shocks the price of oil had not witnessed the sharp spikes that have been its characteristic over this century. Oil in terms of 2007 prices kept between $18 and $30 over the period from 1986 to 1999. The US influence over Saudi Arabia possibly kept oil prices lower than what they would have been even up to end 2000 given that the economic interest of the US lay in low international prices.

That changed dramatically after 2000 and especially after 9/11 in 2001. The lobby behind the Bush administration which had interests in oil pushed foreign policy of the US to result in higher prices of oil which while it may have been hurtful to the US economy allowed high profits for companies in the sector. The oil companies with upstream assets in oil wells (even if through JVs and production sharing arrangements) stood to gain from rise in crude prices. The strategy of high oil prices without a significant drop in world demand was sustained by the searing pace of growth of the Chinese economy, and since 2003 of the pick up in growth of the Indian. In both economies despite the fall in energy and oil elasticities the demand growth stemming from a trend growth in GDP of 10+% and 8+% respectively were large. The recent world wide recession has of course upset the strategy but in the long run since Chinese growth (and possibly the Indian) growth is sustainable the upward rise in growth can be exploited by the oil speculators in the form of higher oil prices. An added factor that sparked off the sharp rise was the Iraq war which knocked out a significant part of supplies.

The Recent Recession and Fall in Prices

The recent sharp fall in oil prices to under $36 (current prices) after it had rise to over $130 per barrel is the result of an abnormal situation of world wide recession which portends to be the deepest since the Great Depression. Since Asian countries are waiting to grow and have no fundamental problem keeping them from high growth, and Keynesian demand side policies are being actively pursued, it is quite unlikely that that the recession would last very long. At the first signs of revival oil prices would firm up and rise as China and the Asian countries pick up their growth.

$50 could be considered as a floor once the recovery is on, i.e. over the next decade. During the East Asian currency crisis crude prices had dipped to $10 in December 1998 sine the OPEC has not been able to estimate the import of the crisis and cut back production sufficiently.

Before the recent spike oil taxes had emerged as a significant component of government revenues not only in oil producing economies but also in many oil consuming economies – Europe, India, China etc. As prices rose very steeply the need to cut these taxes have been felt in many of these economies in order to moderate the spike.

Spot prices in oil have since 1974 been volatile since the spot markets have been thin relative to the total quantity of oil that is traded. A significant part of the oil is bought on medium term contracts. But as these contracts themselves look back on spot prices (being linked to them with weights less than unity), the role of market prices have no doubt increased. [In contrast, in the case of natural gas which is less tradable than oil the role of global market prices are smaller in the overall prices paid by consumers though even here the linkage with crude and with prices of gas in principal markets in long term contracts is increasing by the day].

The volatility in crude prices has been compounded by the long gestation in developing new oil wells. And the inevitable long term rise in oil (barring a sudden development of revolutionary technologies) would mean that the volatility in the prices is also going to be high as oil prices rise. Like any other commodity there is much speculation in oil. But unlike in many commodities the low storage capacities relative to annual demand has been a factor that have kept volatility high (despite the variability in production that existing wells are capable of which counteracts the impact the low storage.[OPEC behaviour has as mentioned before played a counteracting role, at least since the late nineties].

Rents in Oil

Economic costs of production (excluding all taxes and impositions such as royalties) range from as low as US$ 2 a barrel to as high as $30 or even more. Therefore besides the scarcity rent the differential rents are very high. Large rents in any industry create their own dynamics and state intervention including ownership /

control over oil is one result. When state systems have been weak (as in Nigeria or Columbia) and oil reserves are high there is compounding of the weakness of the state to result in state failure. Entrenched kleptocracies that do not go away even as governments change, with the oil companies being deeply involved in the politics and decision making in such societies are typical outcomes. Where governments are potentially weak, in not having the popular mandate (Brunei, Saudi Arabia, UAE) but are otherwise strong, the alliance of such governments with international powers often mediated by the giant oil companies is an important feature of their governance and of their system of exploitation of oil.

Retail oil product prices have varied greatly being lowest in some of the OPEC countries. Among the rich countries prices have varied depending almost entirely on the local taxes. Oil taxes have been an important source of revenue for many governments. Thus OPEC estimated that consumption taxes on oil accounted for an annual average of over $500 billion for the G-7 countries c. 2007/8.

Revenues from Oil

In many non-oil LDCs, oil taxes are important sources of revenue for the government. A World Bank estimate puts the taxes on gasoline and diesel to be 67% or 59% of the final price in OECD countries and 44% and 40% for a set of non-OECD countries. For kerosene in non-OECD countries the taxes amounted to as much as 23% of the final price. (Bacon, Robert, 2001). Oil resources are very unevenly distributed in relation to that of most other resources of wide use (iron and bauxite ores, coal or even gas for that matter). Despite this and the high price volatility, the preference for oil is high since it can be processed into easily storable liquids which have the ease of application and of being transported as well. The capital costs involved in applying oil, relative to gas, or coal, not only in mobile applications but also in small scale industries, is low which gives an added advantage to oil for developing countries which are typically capital (and coordination) short. India itself is no exception since its oil demand despite long years of very high user prices for oil has not quelled its demand in favour of derived fuels from say coal and gas, and gas itself. Part of the problem may well have been the poor institutional feature which has not brought about the requisite adjustment despite the high relative prices of oil.

Oil and Substitutes

Oil by nearly all counts would be the first fossil fuel to get exhausted. Shales and tar sands are currently expensive to exploit and are unlikely to be exploited since such oil would have to compete with, not the peak prices of oil, but the fall back prices of oil which can be low in a situation when demand is low. This is so since much of the costs in oil production are really rents or are capex to prove more oil. Similarly such oil would have to also compete with coal which in the advanced countries would only have to bear the operational costs since the fixed costs are already sunk (in the current situation when no further significant additions to capacity are contemplated).

In short the variations in the prices of oil despite the high average prices puts a disincentive on the development of alternative energies of not just shales and tar sands but also of potentially viable but as of now expensive (capital intensive) alternatives such as solar and wind. Such risks which are not being mitigated by suitable counteractive socially relevant policies in the more important countries has thus far kept the response of alternatives much below the potential. As such oil prices have continued to generally rise. Moreover as a resource nears exhaustion its prices could conceivable rise high enough to mop up all the savings from its intrinsic advantages over substitutes. The response of the gas industry has been quite large though, because inter alia of some degree of commonality of ownership of the two resources and because oil and gas are to an extent found together. This has been the main mitigating factor in the other wise even more rapid price of oil that would have happened. Counteracting this mitigation has been the increasing use of gas over coal. Environmental and emissions norms imposed on power producers especially in the US since such norms are difficult to meet with coal and this has resulted in gas being used not only to meet new demand but also replacement demand as coal gives way. This has further dampened the substitution of oil with gas. It has also limited and slowed considerably the exploitation of coal in countries like the US has lead to their exports instead of first best (local) use.

Optimal Tariff and Competition for Rents

Since for large net consuming economies (today, Japan, US, Europe, and now China and India) the "small country" assumption cannot be made, the developments including the fiscal developments in these economies can affect the global prices of

oil. Similarly, the net producing countries by controlling supply, and through fiscal measures can influence global prices. This creates a situation of large net buyers being in a situation, where from the requirements of "optimal tariff", high import taxes on petroleum products can be justified. Simultaneously, the large net suppliers (with low production costs) can justify large export taxes. In the play between such players who collectively would have the most influence on the international market for petroleum products, the taxes would only rise. This is one of the factors that underlie the stability of the current system of highly variable producer and consumer level taxes and levies on petroleum products.

As the bargaining power has slowly but surely shifted way from the buyers to the supplier countries (as demand growth has been maintained by high overall growth of the world economy) and the prices have risen, the scope for tax revenues being realized at the production level have heightened vis-à-vis at the consumption end. This is the most important change that has taken place over the late nineties and the first decade of this century. The large net buyers without much oil assets themselves - India, South Korea, Japan, Germany, France are potentially most affected by this inevitable force.

Strategic Responses to Oil Dependence

Countries have tried to respond to their dependence on oil in a variety of ways. South Korea and Japan have developed nuclear power. Brazil is endowed with hydro, and India and China have a large dependence on locally produced coal. Yet the dependence on oil is significant and in no country does it amount to less than 30%. Higher incomes increase this dependence upon oil since its suitability in transport applications is very high , and the elasticity of transportation requirements to GDP being typically greater than 1[4], oil needs grow rapidly as incomes rise. See table 1.

The case of China and US are somewhat different. Although both are heavily dependent upon imports, their substantial domestic production would allow them the

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[4] This is so during the phase of transformation i.e. in the low and middle income phases of a transforming economy. As incomes rise and a functional services sector takes root the energy elasticity comes down significantly with much of the continuing rise in demand being on account of in personal transportation, and electricity use in air-conditioning.

possibility of keeping oil prices low since they can cross subsidize high priced imported oil with the revenues (rents and taxes) from domestic oil. Their capacity to moderate prices, hold to lower prices and to mitigate against oil price hikes is large but steadily declining. As China's growth in demand is large, it would soon move to the category of oil import dependent economies similar to India. Unlike India in anticipation of such a dependence China has moved rapidly to create state owned oil assets in other countries through essentially direct investment in many countries. It has been the biggest buyer of oil fields in recent years[5]. Additionally its vast investments in hydro capacities would keep its energy imported at spot markets low in the long run as compared to India where there does not seem to be similar strategic initiatives.[6]

India among all the major importers is most vulnerable. The near certain scenario that in the next 15 years India would require to import significant amounts of energy in the form of oil and gas has not been used to the advantage that it could be by the government. Aggressively buying oil fields, or having long term deals with nearby oil and gas surplus countries could have been the way forward. India is open to price volatility and is also subject to much insecurity since the appropriate strategy given its position has not been the basis of its policy with regard to oil and gas. The political aspect in such potential deals have been overly heightened and there is little examination of counteracting measures or mitigation options that could have been brought to bear to seal such deals.

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[5] CNPC has production investments in 21 countries across 4 continents. Similarly SINOPEC and CNOOC have extensive foreign assets. While such oil from its overseas acquisitions constituted in 2006 only 8.5% of its total imports of oil, the fact that its fields in Angola now (2006) became the largest source of imports surpassing even Saudi Arabia, is indicative of its aggressive investments to build its own hedge in oil. Remarkably in 2006, 46% of its imports of oil came from Africa. (Country Brief. China, Dept of Energy, Energy Information Services).India whose strategic interests lie even more closely in African materials is only an insignificant player there. China of course dominates in the investments in the oil fields of ex-Soviet Central Asian countries like Kazakasthan. Similarly the share of oil imported through its own bottoms while low would grow very rapidly as China adds to its tanker fleet at a furious pace.

[6] There is no doubt that the first best strategic option for India is to buy up oil fields in other countries with higher probability of ensuring continuance of supply under various situations, or collaborate with the oil giants and others to buy up oil and gas assets. That India has could not decide to buy oil assets in the early nineties when prices were low, or that its 'negotiations' to procure gas from neighboring countries – Burma, Iran, and Bangladesh points to basic limitations in our approach on these strategic matters. India has also not been able to play its near certain demand for engery imports over the next 30 years at the very least to advantage.

Varieties of Oil Surplus Countries

Surplus oil producers can be broadly placed into several meaningful categories: (1) countries like Brunei, Saudi Arabia, Kuwait (and now Libya) where the writ of the state is strong – sometimes because of the military aid and presence of western foreign powers; (2) Russia, Iran, the ex-Soviet Central Asia where the state systems continue to be strong and (3) Nigeria, Columbia etc where the writ of the state is severely contested and oil extraction is embroiled in local near 'civil war" situation. In the latter category there is much wastage and in the extraction process and few investments to consolidate and marshal the resources. Thus Nigeria flares more gas than perhaps half the energy produced from North Sea fields! China in its search for oil has not stopped from considering the third category of countries, and incrementally the world oil sector would witness both high prices and contest for oil coming from China. Thus China has been active in Sudan, Angola, Nigeria, Niger, Kenya and Indonesia. China would also be the natural consumer for Russia's vast East Siberian oil and gas fields and is leaving no stone unturned to stake its long term interest in the world's energy resources.

SECTION 2

OIL DEVELOPMENT AND PRICING IN INDIA: AN OVERVIEW

Strategic Initiative in Oil

As an independent economy with much ambition to join the comity of nations, advancing India adopted planning of the intersectoral consistency variety with much role of the state in development of infrastructure and strategic industries. The Industrial Policy Resolution 1956, which laid out the ownership framework provided for oil in the public sector while allowing existing foreign owned firms to continue operations in India. The oil sector was seen as crucial to its economic transition. But the oil sector outside the Communist Bloc was controlled by the "seven sisters", and a quick nationalization would not have been possible without great cost to the economy since India was a net buyer of oil and was crucially dependent upon oil. Only the Soviet Union was truly independent. Other countries like Mexico, Venezuela and the Middle East countries with their own oil fields were nevertheless technologically dependent on the advanced countries. But the actions of several states – Mexico, Iran and India most notably in using Soviet technology and technology to lay its own refining capacity (India set up Koyali Refinery of Indianoil) created the basis later to nationalize the oil sector.

In India this was precipitated by the major multinational oil companies continuing the practice of transfer pricing the imports of crude from their operations elsewhere in the world, at prices higher than in India's immediate vicinity – Middle East. The government insisted on imports at prices that did not result in vast surplus outflow. And the possibility of being able to depend upon Soviet supplies in case of refusal to supply by the oil giants allowed it to take an aggressive stance.   It nationalized the oil industry when the oil companied refused to source crude from cheaper Soviet sources. That led to the oil sector development at a more rapid pace especially of refining. Indian nationalized oil companies made significant progress in terms of technology they developed but nevertheless continued to be dependent upon global companies for technology.

Globally many important pure technology providers had by the mid eighties emerged and this allowed the nationalized oil companies to operate without a large

technological handicap vis-à-vis the giants. However, the hold of large integrated oil companies continue to be significant owning to their ownership of oil fields, their access to the fields of important reserve countries like Saudi Arabia, Nigeria, Columbia, Iraq, Kuwait, Brunei etc. besides their access to the biggest oil markets – the US, Europe and some of the Latin American countries.

Response to the Oil Price Shock

The oil price rises of 1974 and 1979 were in India followed by deep price intervention in the market through the taxation route. This was in sharp contrast to the tendency then to intervene through rationing and price controls. During the period from 1964 almost right until the mid eighties the controls in the form of quotas, licenses, rationing had been the usual response to shortages and ensuring plan targets. The Oil Price Enquiry Committee suggested high taxes on discretionary oil consumption – essentially petrol, moderate taxes on diesel, fuel oil and naphtha – largely intermediate products then and low or negligible taxes on kerosene meant for final consumption by the poor (which alone was rationed). Kerosene in intermediate use was subject to moderate taxes. The response to the oil shock as a result of these measures is generally considered to be good since there was overall moderation in the oil consumption in the subsequent quinquennium   without hurting growth.

Indeed the growth during the eighties had increased to 5.5% on an average from the low "Hindu" growth of 3.5% which was all the economy had achieved over the previous 15 years. Nevertheless, now we do understand that the high growth of the eighties were caused by the spending multiplier effects of the Gulf remittances which grew rapidly as the rents based spending by the oil exporting states in the middle east accelerated. This created a vast demand for labour resulting in significant outflow of labour from India and other countries to the Gulf countries. Other factors were the rise in agricultural growth to an average of 3.2% from the earlier under 3.0 % during the first 15 years of the green revolution, and the fiscal profligacy which characterized government spending during this period. The fiscal deficit of the central government which even in the hey days of the Mahalanobis Plan was under control at less than 5% of GDP typically, during the eighties increased to reach an unsustainable level of over 8% of GDP which was one of the principal causal factors that led to the crisis of 1990-91. (Morris, Sebastian 1997)   More importantly the exchange rate which should have been steeply depreciated in response to the oil

price shock was not. The adjustment being largely on account of internal price of oil had a limited potential as the oil demand could not have but risen in response to the increased GDP since oil was relatively price inelastic (there being little other credible fuels especially for automotive and small industry application). Depreciation on the other hand by speeding up exports could have sustained high imports of oil in keeping with the increased growth which itself could have been higher and sustained had the depreciation been carried out early enough. The depreciation when it came in 1986, was little, and a little too late to prevent the balance of payments crisis of the nineties. (Joshi and Little, 1996). Nevertheless in response to this belated depreciation exports had begun to grow at 15% in US dollar terms since 1987.

Emergence of Administered Prices

Simultaneously, to address the question of volatility in prices of crude and oil and products the government set up the "Oil Pool Account" the purpose of which was to smooth the prices in the domestic economy. The idea was to hold prices low when international prices were high and to not let the retail local prices fall when the international prices were low, using the surpluses from the latter situation and an initial financial reserve to finance the former situation. The Oil Pool Account was not managed independently under a proper regulatory framework distanced from the government of the day. Thus beyond mitigating the effects of price spikes and sharp falls, the Oil Pool Account may have been used to moderate prices before elections, and for excessively long periods. The lack of regular adjustments in prices would only make the final adjustment when it had to be made all the more difficult.

Tax Reform Misses the Petroleum Sector

The stabilization and structural adjustment of the Indian economy was successful as can be inferred by both the vast efficiency gains and the high growth the economy achieved. One important element of the structural reform was the reform of indirect taxes. Central excise taxes – the principal indirect taxes were in most industries cast on value added basis. MODVAT with taxes on output and tax credit on input was brought about. The items for which tax credit was allowed was increased to include depreciation on machinery. And the central tax regime soon became known as CENVAT. The only exception was in the case of oil and petroleum products which were still taxed on the basis of excise duties with no credit allowed to users of oil as

intermediate goods. Oil was the only significant exception. Reform of oil taxes was to be done later and in 2002 the APM was to go. Then as much as 25% of both central and state taxes depended upon oil. In 2002 there was partial reform of the APM with all products other than kerosene, diesel, petrol and LPG being allowed to be set by the oil companies, while these four were continued to be "administered". The oil pool account as such was given up so the determination of these prices can at best be said to adhoc. Unlike in the case of all other products there was no commitment of the government that that the tax rates would converge to remove distortions in the use of various products.

Similarly the subsequent attempts at moving away from what may be characterized as an 'arbitrary pricing mechanism' , strangely did not include casting oil under a value added tax regime. This is surprising since there is no way to recompense exporters for very high energy taxes (and prices) in India without such a value added tax in place.

The response of the government to the recent oil price spike has been to pass on in an adhoc manner the costs of keeping the retail prices below costs including taxes, on to the companies, eroding their networth, and in part by adhoc write offs of the duties or reduction in the tax rates. The specious argument that the upstream companies, downstream companies and the government should take a third each of the burden of uncovered subsidies has been made in some of the pronouncements of the government on the issue. This completely violates the sanctity of the tax regime, introduces adhocism, and keeps the relationship between the oil companies and the government as far from arms length as can be imagined, and with the all the distortions that such non-arms length relationships bring. It also de-facto keeps the private sector out of the retailing business, since they do not have access to such offsets in taxes that are implicitly made or to hopes of receipt on account of uncovered subsidies in the future. The need for a clear policy and mechanism to handle oil price spikes (the need for which while it cannot be justified on economic grounds can have a political basis) that does not distort the playing field between private and public players is most urgent. That is also required if the public sector oil companies are not to move further away from commercial orientation and efficient working, as they would under the current adhoc regime.

Pricing Today

The Administered Pricing Mechanism (APM) was adopted in 1976 following the recommendations of the Oil Pricing Committee Report of 1975. The Oil Coordination Committee (OCC) was formed at the time to manage the procurement of crude, refining of crude, distribution of crude and operating the oil pool account. As said before the process came under increasing questioning after the economic liberalization picked up in earnest since the early nineties. It became clear that administered prices, based essentially on cost plus formula were making the oil industry inefficient and also discouraging much needed investments.

After considerable dithering the government finally moved to a new regime on pricing or petroleum products from April 2002. The pricing of all the products other than motor spirit, high speed diesel, kerosene and LPG were to be determined by the market. The government would continue to determine the price of these four products. The philosophy of pricing would be to cross subsidize the price of kerosene and LPG (at least partially) by charging higher prices for the other two products. The government also framed *'The Petroleum Regulatory Board Bill, 2002' with a view to creating an independent Board to regulate the refining process, storage, transportation, distribution, marketing and sale of petroleum and petroleum products excluding production of crude oil and natural gas so as to, protect the interests of consumers and entities engaged in specified activities relating to petroleum and petroleum products, ensure uninterrupted and adequate supply of markets and for matter connected therewith or incident thereto.'* The Bill however was not converted into an Act since the then government was in its last year in office and therefore was unwilling to pursue conversion of the Bill into an Act.

The relentless rise in the price of petroleum and petroleum products in the last few years has exposed the impracticality of government retaining its control over the pricing of petroleum products. The government's inability to revise the prices upwards, partly due to concern about its possible impact on inflation and partly due to the opposition from the coalition parties supporting the government, has led to a situation whereby the government has had to provide for large amounts of funds to support the losses being incurred by the Oil Marketing Companies (OMCs). As the prices rose, the government revenues also rose in sync, since duties were ad valorem.

Rangarajan Committee Report

The government set up a Committee on Pricing and Taxation of Petroleum Products, February, 2006, under Chairmanship of Dr. C. Rangarajan. The recommendations of the Committee were based on the following principles: a) taxation should be rationalised to improve efficiency, b) petroleum product prices should be aligned to international prices, c) subsidy should be targeted to help BPL (Below Poverty Line) families and it should be transparently accounted for in the Union Budget, d) customs duties should be rationalised to ensure that domestic refineries are not at a disadvantage, e) excise duties should be rationalised to shield consumers from price volatility.

- The specific recommendations of the Committee were as follows:
- The prices of motor spirit and diesel to refineries should be the weighted average of import parity and export parity prices in the ratio of 80:20. This was based on the data that about 20% of refinery products are exported.
- The customs duty on motor spirit and diesel should be reduced to 7.5%, thereby reducing the protection to refineries.
- The government should allow oil marketing companies to fix the retail prices of motor spirit and diesel, subject, if necessary to ceilings. This would encourage competition.
- The principle of freight equalisation should be discontinued. The government may consider some other manner of mitigating the impact of this measure on remote areas.
- The ad valorem levies should be replaced with specific levies at the rate of Rs. 5.00 per litre of diesel and Rs. 14.75 per litre of motor spirit.
- Subsidised kerosene should be available only to BPL families.
- The price of domestic LPG should be raised by Rs. 75 per cylinder (14.2 kg) and thereafter the price should be adjusted gradually to eliminate subsidy altogether.
- The subsidy sharing by upstream companies (ONGC, GAIL and OIL) should be discontinued and instead the OIDB cess collected from them should be increased to Rs. 4800 per tonne (from the present Rs. 1800 per tonne).
- The share of the subsidy to be borne by the government should be met through budget provision.

The thrust of the recommendations is clearly to bring in a regime where the prices of petroleum products are benchmarked to international prices, the taxes are rationalised to remove distortions, the industry is encouraged to become more efficient, the demand responds to changes in the international prices of products, the subsidies are capped and targeted properly and the burden of the subsidy is recognised today rather than being transferred to the future. The recommendations could not be accepted by the government for a variety of reasons.

Nevertheless, even the Rangarajan Committee did not suggest a complete and clean break from the past to cast taxes purely on value added basis, and subsidies as direct subsidies, which alone would have removed the core distortions on account of adulteration, diversion, distortionary effect on the value chain, competition and exports.

Chaturvedi Committee Report

The Prime Minister constituted in 2008 The High Powered Committee on Financial Position of Oil Companies under Chairmanship of Mr. B.K. Chaturvedi to assess the implications of the severe negative impact of the petroleum products pricing policies of the government on the financial position of the Oil Marketing Companies between 2004-5 and 2008 and recommend measures to deal with the situation. Acknowledging the need to take steps urgently to improve the cash flow situation of OMCs so that they are in a position to undertake the investments required to sustain long term growth and maintain efficiency of operations and product quality, the Committee recommended the following measures:

- The refinery gate price should be the fob export prices (to be revised every month on the basis of average prices for the month).
- The distribution and marketing expenses and the applicable Union taxes and duties should be added to the prices charged by the refineries to arrive at the retail selling prices.
- The refineries should be allowed to recover specific state taxes such as entry tax, octroi and CST from the OMCs and the OMCs in turn should be permitted to recover the same from the consumers of that state.
- The import duty on motor spirit and diesel should be eliminated (as in case of kerosene, LPG and crude). The excise duties on these products should be

simultaneously reduced and by March 2009, the domestic prices should reflect the prevailing international prices.

• Industrial consumers of diesel should be charged the full price of diesel with immediate effect.

• The subsidy on diesel to Railways and State Road Transport Corporations should also be rapidly done away with.

• A gradual monthly increase in price of motor spirit and diesel for retail consumers should be effected with immediate effect, till the market prices are reached. The proposed increase in price of MS should be Rs. 2 per litre and the increase in price of diesel should be Rs. 0.75 per litre.

• SKO should be made available at concessional rate only to BPL families. The subsidy should be delivered through smart cards or cash transfer and not through supply of kerosene at below fair market prices.

• The subsidy on domestic LPG should also be available only to BPL families in the long run. This subsidy too (as in case of kerosene) should be delivered through smart cards or cash transfer and not through supply at below fair market prices.

• Special Oil Tax should be levied on domestic producers of crude oil (on pre NELP leases). The tax will kick in if crude prices exceed $75 per barrel, at the rate of 100% for ONGC and OIL and 40% for private producers. The tax is seen as temporary measure till the product prices adjust fully to international prices.

It is quite evident that the Chaturvedi Committee too has in effect recommended that the process of arriving at the domestic prices of petroleum products should at the earliest possible start reflecting the prevailing international prices. This would ensure that the domestic industry becomes efficient and cost competitive and the economy responds to changes in the prices of products. The state should take care of the burden of high prices on BPL families through disbursement of subsidies directly to eligible families and not through distortionary controls on pricing of products.

The Chaturvedi Committee still operated under the framework of pricing on parity which is essentially a regulation of the sector. The point though is that true exit from any administration of prices and market determination would mean allowing the companies to freely price their product.

Trade and Import Parity Pricing

The four products that are under price control are Motor Spirit (MS), High Speed Diesel (HSD), Superior Kerosene Oil (SKO) and Liquid Petroleum Gas (LPG). These products account for about 70% of the output of refineries of the public sector Oil Marketing Companies (OMCs).

The prices are administered at two levels:

1.   At the refinery gate – this is the price at which products are sold to the marketing divisions of the OMCs.
2.   At the level of the consumer – this is the price that consumers are required to pay for the products.

The refinery gate prices for MS and HSD are what is called 'Trade Parity Prices (TPPs)'; while the refinery gate prices for SKO and LPG are what is called 'Import Parity Prices (IPPs)'

To arrive at these prices, it is necessary to understand other terms:

The C.I.F. (cost insurance and freight) price is first determined on the basis of F.O.B. (free on board) charges and other associated costs for imports as follows:

CIF = [FOB + Freight from the port of export to refinery port + Insurance] x (rupee/$)

    + LC charges + Landing charges + customs duty

The FOB rate is determined based on the rates prevailing in specified ports in the Gulf region. The freight rate is arrived at on the basis of the rates prevailing for MR (medium range, 45k tonne capacity) tankers (the rates are published by 'World Scale'). The Rupee/$ rate is the RBI reference rate. The rates are revised every fortnight.

The IPP is the same as the CIF arrived at as above and the EPP (export parity price) is nothing but the FOB. The TPP (trade parity price) is computed as follows:

    TPP = 0.80 x IPP + 0.20 x EPP

For a costal refinery, the refinery gate prices for SKO and LPG are the respective IPPs and the refinery gate prices for MS and HSD are the respective EPPs.

For an inland refinery, an element of freight is added.

The refinery gate prices for SKO and LPG are arrived at as follows:

Refinery gate price = IPP + 75% of the rail freight from the port to refinery

The refinery gate prices for MS and HSD are arrived at as follows:

Refinery gate price = TPP + 75% of the rail freight from the port to refinery

The port chosen is the one that is nearest to the refinery.

The price that OMCs are entitled to charge, which may be called the entitled price is computed as follows:

Entitled price = refinery gate price + 50% or rail freight from refinery to depot + marketing costs + marketing margin

The deficit or the under-recovery is the difference between the entitled price and the selling price:

Under-recovery = Entitled price – Selling price

Sharing of Under-recoveries

Last year the sharing was as follows:

OMCs	24.0%
Government	42.7% (essentially, the balance)

The proposed sharing this year is as follows:

Upstream companies	Rs. 45000 crore
OMCs	Rs. 20000 crore
Government	Rs. 95000 crore

The balance (if any) is as yet unmet and undecided. The government would make oil bonds available to the tune of its commitment to meet the under-recoveries.

RBI's Special Window for Oil Bonds

The OMCs have started facing stiff resistance from buyers of Oil Bonds. The supply of these bonds has outstripped the demand. As a result, these bonds have to be sold at heavy discount. The cash strapped OMCs need cash to purchase crude to keep their business going. The RBI, for some time, implemented an arrangement to provide liquidity to the oil bonds. It started giving US Dollars in exchange for the bonds (valued using a notional yield) directly to the OMCs. The amount of oil bonds that RBI agreed to purchase in one day was restricted to Rs. 1500 crore. However, the facility has now been withdrawn. This had resulted in renewed cash crunch for the OMCs as they were saddled with non-tradable oil bonds.

As oil prices fell and the government did not fully reduce the prices, the losses of the oil companies began to the covered. But the year 2008-09 closed with the oil companies showing significant uncovered subsidy. The Indianoil for the first time since its creation has shown losses in the year 2008-09.

SECTION III

ISSUES IN OIL PRICING TODAY

Politicization of Prices

Oil pricing today is one of the politically most sensitive aspects of public policy today. Whether in reality true or not, most political parties believe that higher oil product prices would hurt their electoral prospects and raising oil prices creates opportunities for the opposition to mobilize support, and agitate against policies of the government. Opposition parties typically would not let such opportunities go. What is worse is the belief that market determined prices would take away political support for the party in power. It is not merely kerosene and LPG (both of which are widely believed to be consumed by the common man) that are under such political scrutiny but also diesel and petrol. The inclusion of petrol in the radar of the political parties is interesting since it was hitherto considered as a luxury product and not a "common man's". The failure of public transport, and the resulting very large growth in private transport in the form of scooters and motorcycles among the lower middle classes creates the basis for populism with regards to petrol prices.

Low Prices as the Method of Subsidisation

The paradigm of using low prices rather than endowments to subsidise which is well entrenched among policy makers in India has meant that there is little awareness of possible other modes. And opportunities for re-casting the price based subsidies as direct subsidies, freeing pricing to be determined by markets was missed, many times, and especially when low international prices of petroleum products ruled, since the low prices allow a regime shift to be made with less difficulty. The opportunity to do so has again presented itself, since now global oil prices have started falling and the government must not miss the opportunity again. The recommendations that we make in this study have the potential to de-politicize the sector and actually create vast political goodwill if the measures especially for direct subsidization are put in place.

Distortions in the current regime[7]

The distortions in the current price based subsidisation are many and they stem from two root causes. One arises out of subsidisation being carried out through <u>retail price maintenance, with prices</u> that vary significantly both across products (eg. as between petrol and diesel or diesel and kerosene) and across consumers for the same product (kerosene through PDS and open sale). As argued below there are three levels of distortions. Second when differential taxes (positive and negative as in the case of products sold below import prices + transportation) are used so as not to leave regulatory rents with the oil company, then necessarily the value added in the industry has to be either assessed or assumed. This means unwarranted regulation and the distortions that such regulation brings.

The higher priced product's demand growth is slower than what it would otherwise have been. On the other hand the demand growth in the lower priced segment tends to much higher than what it would be otherwise be in an unrationed low price situation.

This reduces the net taxes collected from the sector from what they would otherwise have been, and so reduces the scope for cross subsidising through differential taxation. While energy as a whole is price inelastic over the short to medium period, it is only so to the extent that income effects are ignored. In the long term though there is weak price elasticity and strong income elasticity for overall energy consumption. For particular products such as oil products within energy, and most importantly for one fuel in relation to another there is strong price elasticity. The effects are often masked by the overall income elasticity, and the relative price effects have to be inferred through complex multivariate panel studies. These show significant substitution effects and slower growth of high priced fuels.

Inefficient use of fuels result as when there is an attempt by consumers to use the relatively low priced fuel to a greater extent than otherwise. Thus there is extensive diesel use in small engine applications –autorickshaws, cars and in electricity

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[7] For empirical evidence and detailed arguments for some of the contentions herein see Morris, Sebastian, Ajay Pandey and S.K. Barua (2006), and Pandey, Ajay , and Sebastian Morris (2006).

generating sets and of kerosene in mobile and power applications.[8] This is so especially when the socially wasteful higher capital cost of using the low priced fuel is taken into account. Additionally, the environmental effects, engine life loss effects could be significant as when inappropriate fuels are used.

To restrict the consumption of fuels which are very low priced –LPG and kerosene rationing arises naturally. The cost of rationing is socially wasteful and these rise as the degree of rationing increases in response to the dual pricing in the very fuel, and as the price difference between the same and substitutes increase. Thus rationing becomes necessary in the case of kerosene since for poor consumers the price is low (around Rs. 8-10) whereas for others (white kerosene) it is high (Rs. 36-40). This differential now creates problems: First is the already mentioned unnecessarily incurred social cost. The cost will be high since under rationing parallel distribution networks which with very low and occasional throughput would have to be created and maintained.

More importantly response to the divergent prices open arbitrage opportunities arise against which the only seeming option is increased vigilance and policing. Thus diversion of kerosene from the poor to other unintended consumers, and even worse the use of such kerosene for adulteration of diesel as a practice emerges. The fiscal losses are humongous. Equally importantly the social losses on account of reduced engine life, copying strategies and pollution are enormous.

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[8] Some policy makers attempt to justify the administered higher prices of diesel over petrol by presuming that diesel is used in public transport and petrol in more private and para-transport. While this may have been true at the start of the differential price regime, the fact is today the use of diesel in private cars and taxis is high. Indeed while the diesel to petrol cars numbers would be 1 to 3 in favour of petrol cars, since diesel cars are used more (the rule of thumb being buy and use diesel cars when the average annual usage is more than 10,000 km) than petrol cars the total vehicle-kms would be more evenly distributed between petrol and diesel. Trucks would anyway have chosen diesel given diesels superior performance in heavy engines, but having lower prices for them does in no way benefit the industry as such since being completely competitive, (efficient) input costs would be pass thru. Another aspect, that diesel typically has higher fuel efficiency while true, at smaller engine sizes this advantage has to work against higher cost and higher engine weights. Similarly both diesel engine weights (power to weight ratios) have been falling, while the fuel and emission efficiency of petrol engines rising with direct injection and multivalve /variable timing technology. The more important argument that taxes should not affect the technology and input choices of the economy supersedes other arguments, since technology characteristics change and governments should not be in the business of predicting or influencing these decisions. Only externalities need address through differential taxation. Thus in a non-distortionary fuel pricing scheme, small engine applications would have been petrol, cars a mix of both and trucks diesel, and trucks diesel.

Engendering Poor Governance

There are even third order effects as when in response to these distortions, the governance structure in oil distribution and retailing is badly affected and corruption is entrenched. Fighting the same only compounds the problem since the additional cost of fighting which itself is socially unnecessary and therefore wasteful are also large. Control is lost in distribution as an activity, and the oil distribution business instead of generating profits, generate rents which attracts politicians to intervene embedding rent seeking in society. Thus oil retailing and gas distribution as businesses have to be administratively allocated and managed and the social waste as a result are very large. This is exemplified by the existence and working of the Dealer Selection Board and the vast pressures they bring on the oil companies to award retail businesses to particular groups and individuals. Valuable managerial and administrative energies are lost in fighting corruption and adulteration, even if the same are overcome. It is more likely that barring a few points of high visibility and consumption by the elite, adulteration and short filling in a managed sort of way continues elsewhere and is the best possible result under this overarching distortion of price based subsidisation.

Since adulteration and short filling allows oil retailers with small turnovers to coexist with others with large turnover who may not be adulterating, the very data on retail sales in making the locational choices is problematic. Also the average throughput per RO is very low in India, and that means that socially wasteful expenditure is being incurred in oil retailing.

Opportunities also emerge to develop socially wasteful technologies such as special additives to use LDO /kerosene –diesel mixture in diesel engines, naphtha in petrol engines etc. The latter means use of benzenes as an additive whose carcinogenic values in contact with humans in many times higher than that of linear hydrocarbons. It is likely that this use of benzenes to stabilise the use of naphtha as an adulterant in petrol is one of the most important avoidable reasons for cancers in urban India.

Vast Directly Unproductive Activities Supported

Similarly since liquid fuels can always be adulterated, environmentalists, to fight pollution resulting from adulteration, force upon the system gaseous fuels, since these are believed to be beyond adulteration. The very high social cost of using gaseous fuels in relation to liquid fuels – LSHSD and Euro –III /IV norms for engines, then becomes necessary as has happened in the case of Delhi.

The fight against adulteration in this situation of differential prices (in the case of kerosene for instance) has reached "heightened levels" of using markers in PDS kerosene so that PDS kerosene if used in adulteration of other fuels and white kerosene (non subsidised kerosene) can be detected. Such an approach to manage even while arbitrage price differences continue necessarily means that large numbers of samples would have to be regularly collected and tested. They would involve entirely avoidable and very large monitoring costs.   They also involve the costs of trucks dedicated to kerosene transport, a parallel distribution system which is engaged only once in 15 days. Theoretically such socially wasteful activities – or directly unproductive activities (DUPs) as they have been called by Jagdish Bhagwati, would amount to a substantial part of the rent in adulteration, to be able to overcome the problem of adulteration. This presumes that the markers cannot be neutralised. That markers could be neutralised was easy to have been visualised. The recent evidence of the same proves that markers have not worked since all that the adulterating industry had to do was to find methods to remove the marker from kerosene![9]

Thus the complex responses when price based subsidisation is in place for, long result in very large social costs being borne and rents being generated and governance being adversely affected.

It is very difficult to estimate the impact on consumption including consumption distortions that result from administered pricing.

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[9] Cf. Amitava Ranjan, "Tamper Proof Kerosene – There's proof that it can be tampered", *Indian Express.Com*, Sunday , Oct 05, 2008, (http://www.indianexpress.com/news/tamperproof-kerosene-theres-proof-it-can-be-tampered/369550/)

Trade Patterns

Table 2 brings out the gross and net trade in petroleum products in relation to consumption. Observe that for naphtha, fuel oil, and other products the gross trade is very high in relation to the net trade and this is arising on account of the cross hauling across the country's borders due to both the older refineries in being able to handle domestic crude and also because of the distortions that have not allowed private players the space in distribution (since they would then have to be subsidised under retail price maintenance) forcing them to export more of their product than what they would have desired, while others import product to serve the domestic market under the current pricing regime. Also there is a very large export of naphtha and MS from India since the demand is relatively higher for diesel and not for MS, necessitates the use of naphtha in thermal applications or its export. (Naphtha can be considered as stock requiring further processing to make into MS). Also observe that the export realisation prices of MS, naphtha, ATF, and diesel are not too dissimilar.

The need to export and import naphtha arises both on account of surplus of this lighter distillate (due to higher overall demand for diesel –due in turn to the lower prices of diesel vis-à-vis petrol) as also due to the fact that local industries' requirement of naphtha is largely of a kind that is not produced in India. The export of petrol is also on account of surplus engendered by retail price distortion. Similarly, due to surplus refining capacity HSD which earlier was imported to meet the higher relative demand is now exported in significant amounts. Petroleum products have had the highest growth rate in exports since 2001, and there are no obvious reasons (other than distortions) for this seeming revealed "comparative advantage".

Revealed Distortions in Consumption

Figure 2 brings out the implicit deflator in a number of items of private final consumption expenditure including all of private final consumption expenditure. These are based on NAS Private Final Consumption Expenditure data at current and constant prices and dividing one by the other. These are items of PFCE available at the most detailed level of disaggregation in the NAS. Observe that PFCE deflator has been very close to the food beverage and tobacco deflator. More importantly the

large swings in the deflator for LPG, kerosene and electricity induced by essentially administrative pricing may be seen. See also the sudden rises that the administrative prices impose upon society. Since the early 80s the prices of the subsidised products have behaved as expected. Being the log of the implict delfators the slopes indicate the inflation. Thus inflation was high following the oil price shock.

Figure 3 brings out the "Theil Measure" for consumption across a the variety of fuels. The "Theil Measure" is a measure of entropy and higher values indicate periods when there is rapid substitution across the components in this case fuels and energy[10]. Thus the measure has been high since the oil crisis and the differential pricing of fuels and the since the institution of price based subsidisation in the sector. Thus there is a degree of unwarranted uncertainty in terms of consumption of fuels, even though the entire rise in the "Theil Measure" cannot be attributed to pricing alone. Per capita income rise which was rapid from 1980 and the poor performance of public transport brought about the two wheeler revolution which would have had some impact. But since the "Theil Measure" for overall consumption has increased less proportionately (See figure 4) the role of administered pricing is likely to be quite significant. This is also shown by figure 5 wherein on notices that the growth rates in the private final consumption expenditures of kerosene and LPG have varied much more than PFCE and especially so since the administered price mechanism was put in place.

Commercial Orientation of Industry is Problematic

Price based subsidisation also means that if there are truly profit maximising commercial entities – such as private sector firms – then a moral hazard situation is created for them. Consider for instance, the possible case of a private sector in refining and oil distribution. Without detailed examination of every consignment from a refinery it is not possible to accurately measure the amount of diesel, petrol, naphtha, kerosene etc. that is produced. Since taxes on some fuels are lower than on others it creates a situation on moral hazard in that the enterprise can gain

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[10] The "Theil Measure" can be defined as : $T = \sum_i -(\ln(S(t-1)_i)) \cdot S(t)_i$; where S_i is the share of the ith fuel in total expenditure, and t is the time period. It measures the structural change taking place in terms of the share of consumption. Thus when the shares change the theil measure would show an increase in the value. When they are unchanging the theil measure would be small indicating stasis.

substantially by under reporting the higher taxed fuel and over reporting the production of under taxed fuel. There is no way retail sales data across the very large number of retail outlets can be collected to verify the quantum of fuels export since an over statement of imports would allow the private company to realise rents on taxes collected at the retail level but not paid to the government, if the company can overstate its exports. Thus there is an open opportunity for tax 'arbitrage' which is a situation of moral hazard. In the case of the public sector firms since one could possibly argue that they are not motivated by profits alone, a certain situation of arbitrage could be left unexploited.[11] Therefore price based subsidisation acts to prevent liberalisation of the sector and a commercial orientation from emerging.

Administrative Roles Get Reinforced

Differential excise means that the prices in India for product have to be administratively determined since the taxes are not on value added basis and the distribution of products over the total output of the refinery is necessary to assess the taxes due from each of the commercial entities in the sector. This leads to administrated prices with all the difficulties that it brings as a necessary feature. As said before, it also means that the government has to have firm records of the details of the products sold/ produced to be able to asses the taxes. There is a very large moral hazard problem that private refining and marketing firms would face since they could gain much by underreporting the throughput /sales of the product with higher taxes, as said before. Additionally it brings with it the need for regulation of the petroleum sector when none is justified on first principles.

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[11] It is exploited by the retail outlets.

SECTION IV
THE REGULATORY FRAMEWORK FOR OIL

The Subsectors

The petroleum sector may be considered as having the distinct segments - oil extraction, oil refinery, oil distribution, and oil transport through ships, trucks, oil tankers and other vessels and through use of pipelines. Natural monopoly obtains only in the transport of oil through pipelines and by rail tankers. Movement by rail tankers are to be regulated as part of the regulation of railways. It is only the pipeline business which is the part of the sector that needs regulation. The business of transportation by other means is quite competitive and is never to be regulated. Oil extraction because of the role of access to natural resources, results in some firms with large market power and as such oligopoly is the norm in this business. Nevertheless this aspect cannot be considered as resulting in a natural monopoly needing to be corrected by price regulation. Herein for countries without such access, strategic initiative to create firms with countervailing power, buying oil assets abroad, developing and procuring other sources such as gas would be the examples of the correct initiatives.

Forced Regulation of Distribution

But when import parity/trade parity prices constitute the mechanism of pricing rather than markets, then there is defacto price regulation of both refining and distribution business. Thus under import parity the refinery gate prices is the imported cost (CIF) + inland transport cost indexed to 75% of the rail freight from port to refinery. The administered price of rail freight therefore enters into the picture. Since this is an area of natural monopoly, there is little distortion in such pricing. Ostensibly at 75% of rail freight the provided cost for transportation of bulk material covers the cost of transportation via pipelines, leaving the mode risk, scale decision etc. to the business. The ill features in this pricing are as :

1)   The railways being not independently regulated there is perverse incentive on the part of the Railway Ministry to raise tariffs in oil transport keeping it just so high as to remove the incentives to go in for road except for very short distances. Bulk of the difference in cost between rail thus priced and road would be mopped up by the

railways. Additionally the Railways with such rent opportunity would try to pressure the oil companies from investing in pipelines.

2)   More importantly the prices in India for all petroleum products are necessarily linked to prices in the reference market (Middle East). Product markets are known to be thinner than crude markets and fragmented locally, depending upon local refinery capacities, taxes[12], demand patterns, besides local support. Thus in having import parity prices, there is an artificial movement away from what the market prices in India would have been. In other words, there is an imposed 100% linkage of the Indian market to the reference market. As the Indian consumption and market becomes significant in the region east of the Suez (and excluding East Asia) the Indian market's influence on global prices would be attenuated and instead the influence would be exclusively in one direction. It could in the near future amount to linking a larger market to prices in a smaller or thinner market. Some product prices are expected to be lower in India, relative to South East Asia since India has significant refining capacity. In other words it forcibly links the prices in India to the prices as obtained in the reference country, whereas prices in a competitive situation are market determined with significant variations across regions even when all movement is free and there are no taxes.

3)   Perhaps most damaging is the feature that to move from "refining prices" to retail prices, the administrator has to regulate the cost of distribution. While the tax and levies cost of distribution are determined very simply, in determining the cost of distribution, the administrator is regulating an important component of the sector. Today the cost of distribution (called marketing cost and marketing margin) as determined is a norm. To the extend that it is a norm and not based on actuals, there is some incentive to reduce costs. However since these norms are themselves backward looking, being based on past data there is a tendency to not compete to reduce the cost and margin. Most importantly, this is an area where the play of markets and competition must reign but today, under the import /trade parity regime is being muted by the created need to regulate. This arises out of the need for retail price maintenance via differential taxes which in turn arises out of the paradigm of price based subsidies.

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[12] Taxes because they change the final retail prices affect the price elasticity and therefore the demand patterns.

Weak Incentive Effects

Seemingly the movement to import parity prices and now trade parity prices has been an improvement. It is so only to the extent that it brings about a limited contestability since conceivably the large users at least could import the product and pay the taxes in case the oil companies overcharge them. While this is possible for large importers with their own large transportation and bulk distribution assets – pipelines, tankers, storage etc – in reality even for them the contestability in the sector is limited since these assets are specific and therefore the barriers to entry are considerable. More than contestability from outside industry players, the competition within the industry is the key to ensuring the right prices. While import parity pricing is better than the one based on costs as incurred by Indian oil players (entirely cost plus) it is important to realise as argued earlier that import parity is actually cost plus on value added in the distribution and retailing, while being pass thru on inputs (or notional inputs for distribution and retailing). The add on to import prices based on standard margins (which are driven by industry averages and past costs) provides only weak incentives to lower costs of distribution and retailing. They are no significant incentives to use new technologies to lower costs. Trade parity is merely the average of import and export parity as explained before and does not really bring the competitive pressure of the market on the distribution value added while weakly bringing in some pressure on refining.

Competition and Competitiveness are Badly Affected

More importantly the pricing regime does not result in free pricing between the products since the final retail prices are determined by the taxes and the subsidies and as such companies cannot derive their prices from overall profit maximisation in a situation of joint cost. As such the prices are non-responsive to the varying price elasticities across fuels, and competition is muted.

The movement from import parity to trade parity is an "improvement" only in the sense that it recognises the possibility that refining firms could export their product and as such under this pricing the refinery gate are adjusted downwards by the "assumption" of an overall export of 20% of petroleum products produced in India is exported. Thus the formula itself being based on an outcome is backward looking

and would have to be changed then the export proportions change. It is not fair to refiners who do not export at all.

One of the results of the current pricing regime is that it has resulted in large unnecessary and socially wasteful exports (and imports) from the country. The industry exports product and imports product and crude not merely to optimise the different crude processing flexibilities of refineries but also because of the distortions in the pricing regime which makes it profitable for the industry as a whole to do so. Indeed if the public sector refining industry had been purely commercially oriented they too would have preferred to export product rather than sell at a loss in India when retail prices through ad-hoc administrative action were held below cost including taxes.

The fact that the pricing regime in creating a very large demand for LPG and HSD in relation to MS creates also the problem of surplus of MS, naphtha which then has to be exported out or used in lower value applications. Similarly, the import of LPG and HSD is necessary since there are limits to how much the thruput of refineries can be tweaked to increase the output of LPG and HSD.

Besides subsidisation through relative prices, the government has been virtually determining the prices of product on a day to day basis and thereby violating its own trade parity prices. Its response to the oil price hike has been to hold retail prices at low levels (from what the trade parity prices would imply) and to force upon the oil companies some part of the uncovered subsidies. While the state owned enterprises bear these losses, it is a major loss to the minority share holders of these companies, and government should not be doing the same without a formal policy or agreement which the capital markets can correctly factor in. In this case the SOEs can perhaps have no option but to continue with these adhoc pricing. Being state owned they could hope for higher than import parity prices in situations when the international oil prices fall, or when government chooses to award them higher than import parity prices. This is worse than the what was the case under the administered price regime earlier. With such behaviour the pricing regime is adhoc.

Not Level Playing Field

On private refining and distribution such adhoc retail price determination can be disastrous. Thus when retail prices were held below costs and taxes as in the recent period when oil prices rose globally the private players Reliance and Essar had to shut their retailing business with vast national assets in retailing that had been built up going waste, and forcing upon the companies socially wasteful exports.

Perhaps the most important ill resulting out of price based subsidisation are the distortions resulting in adulteration and the governance failure all of which together makes the cost of petroleum operations far higher than what they need be and take way consumer value in a very large way.

Another major distortion, that is hardly ever recognised, is that in having higher energy prices that are not offset through tax (excise) credit, manufacturing industry in India faces a significant handicap in competing with East Asian firms not only in the international market but in the home market. Besides relatively overvalued exchange rates (Morris, S. 1997,2001) , this is one of the important reasons for the hollowing out of Indian manufacturing.

Specific duties have emerged as a vehicle to tax products like MS under the consideration that this unlike advalorem excise duties would not make the tax collections highly sensitive to global petroleum prices. Advalorem taxes though would amplify the the fall and rise in prices for consumers. The very large anti competitive effects of specific duties are ignored in this position.   Thus the competitive advantage of a player with merely half the refinery and distribution cost (excluding fuel costs) is whittled down by the specific duties which would not allow him to sell petrol at a low enough price, since the value added in the refining business is low no more than 10%. With value added taxes, since value added is only weakly dependent upon input prices, value added taxes give the benefit of being competitive, non-distortionary in other respects and at the same time not amplifying tax collections by government, when crude prices rise.

SECTION V

ESTIMATING THE REVENUE NEUTRAL VALUE ADDED TAX RATE IN THE PETROLEUM SECTOR

In what follows we estimate the indirect taxes per unit of output or litre of product consumed in the country and what is of relevance to government and the policy makers in relation to the value added in the sector.

Table 3 brings out the central indirect taxes (excise and customs duty) per tonne of crude and crude equivalent of product worked as Product/(1-crude loss factor). It shows that the taxes realised on account of excise duty was about Rs. 3700 per tonne of crude; i.e. roughly about Rs. 3.0 per litre of crude or its equivalent (assuming an average specific gravity of crude at 0.8). So a revenue neutral excise tax rate (given these figures) would have to generate a net excise collection of Rs. 3.0 per litre of products sold or Rs. 3.7 per kg of product sold. The figures of tax revenues have been taken from the company data as reported by the Chaturvedi Committee and the relevant output figures from the PNG Statistics.

Table 4 is based on company accounts as reported in the Prowess Data Base of the CMIE. Individual company data was downloaded to construct the value added and indirect taxes and components and then added across the sets of companies described in the notes to the table. Two measures of value added can be arrived at based on adding economic incomes generated and on subtracting from output value the purchased input values. Both are gross value added measures. It is likely that the second measure of value added is more reliable since this would be affected only by the impact of non-operations but the first measure while not affected by non-operating items would be affected by the details of classification of expenditure. Being not based on a clear economic and functional classification it is not possible to classify each item of cost whether it arises on account of purchased inputs or otherwise. Note that the indirect taxes amount to as much as 137% of value added for the public sector oil refining and distribution companies. For the oil production companies in the public sector and for the private sector (most of which are in oil production) the taxes are smaller in relation to value added. Using the second measure of value added for the public sector oil refining and marketing companies they are as high as 254%.

Table 5 is based on aggregation across all mfg and petroleum sector companies carried through CMIEs Economic Information Services. Indirect business taxes (IBT) herein includes essentially excise and net sales taxes. They are in the range of 150% for the oil sector firms as a whole. And for all mfg in the range of 58 to 70%. Thus the petroleum taxes are quite severe on the sector in relation to the mfg sector as a whole (which includes the sector). Removing the effect of petroleum sector it is in the range of 30 to 56%. Thus in the rest of mfg despite the IBT having gone on the value added basis the taxes remain onerous since there are many sectors like cigarette, liquor and other sectors which are heavily taxed. It is presumed that the tax credit had been removed in the data and routines of the EIS.

Table 6 attempts again to compute the indirect taxes in relation to value added but now using the Annual Survey of Industries for output and value added (items 17 to 21) and but for taxes using the Company Data on taxes paid as reported in Infraline Database (Oil and Natural Gas) by the oil companies. It gives an indirect taxes /value added of around 160% for the central taxes (excluding customs duty) and 150% for state taxes (presumably net) for the year 2005-06. Since then the same would have come down marginally to about 130-140% on value added.

The same data as in table 5 is plotted for an extended period in Figure 6. Even if there can be doubts on the accuracy of the value added rate of taxes, this is not likely to affect the relative movements. It shows that the value added rates of taxes for manufacturing as a whole have varied some what and to quite an extent propelled by the taxes in the petroleum sector. The period of recession in India which had started a little before the East Asian currency crisis, also corresponds to high taxes in relation to value added on petroleum products. The onset of high growth is also marked by a fall in the taxes since 2003 for at least two years before it grew. Growth fluctuations and the business cycles are better explained by demand variations brought about by variations in public spending, world demand and exchange rates driving exports, and agricultural demand driven exogenously by rainfall. The supply side is of little importance. But the supply side (petroleum prices in the local market and other primary goods prices especially of agriculture and other imported commodities) have been important in explaining inflation in the country. (Cf. Morris, Sebastian 1997; Morris, 2005). Therefore the distortions brought about by unvatted advalorem excise duties are quite significant in amplifying the price

movements in the economy as a whole and that is another reason why taxes need to go on a value added advalorem basis. Figure 7 also brings out the well known fact of the hollowing out of manufacturing in India (as indicated by the increasingly (negative) ratio of net forex by the value added. The oil sector of course as is well known has a very high import dependency reflected in the net forex on account of trade being as much as 4 to 6 times the total value added in the sector.

We also look up the price build up data as in table 7 for petrol and diesel to arrive at the tax as it exists on value added in distribution alone. The data is from the collations of the Infraline as indicated. Observe that the total indirect tax (vatted sales tax and excise) when worked as on the distribution value added (assumed to be the marketing cost, marketing margin, return on capital and dealer commission) is as high as 740% in the case of petrol and 320% in the case of diesel c.2008 in the Delhi area. This means that for petrol the advantage that a competitive distributor could have by lowering his distribution costs would be smothered by very high taxes. The value added tax basis has the advantage that the tax on refining, production, and distribution would be uniform (on a value added basis) and therefore neutral to competition and the degree of vertical integration.

SECTION VI

THE FIRST BEST OPTION

The first best option would be to opt for complete price deregulation of the sector with subsidies being delivered as direct subsidies and therefore market determined prices.

The elements of deregulation are as follows:

All central taxes except import duties – excise duties, specific excise duties, special taxes – are put on a value added tax bases. Given the analyses earlier in Section V., this value added revenue neutral rate would be 110-120 % on value added for the sector as a whole. Revenue neutrality has been ensured by working out a value added rate which is revenue neutral.   And subsidies are recast as direct endowments.

Value Added Taxes

The value added tax rate can be linked out rather easily as

V=CurrentTaxesRealised / ValueAddedInSector

All of the oil sectors - refining, oil extraction, oil distribution, lubricants manufacture, oil transportation, bottling of LPG, storage and pipelines, trading in crude and petroleum products - ought to be included but not the petrochemicals sectors. For the current taxes realised the taxes paid by the very same sectors plus the possible claims of on account of tax credit due to the use of petroleum products by other sectors should be included. Based on our analysis a rate of 100-120% is believed to be revenue neutral. However this rate can be worked out more accurately with finer data from the players in the industry although for policy making it is not important. The approximate value of 110-120% is quite good enough to be near neutral.

This value added rate would work on all petroleum products irrespective of the nature and use of the product. Thus the rate would be independent of the product

mix, and the depth of value added, would be neutral as between upstream and downstream operations, the degree of outsourcing etc.[13]

The value added tax can be operationalised as a tax on output at v and a tax credit on input at v the way the CENVAT operates for all other products where v is the value added tax rate.

The trucking, taxi and transport industry practices as well as the accounting and reporting by small businesses is not good enough for value added principles to be applied to the industrial /service use of oil products. There are two kinds problems:

If all service tax/excise registered entities are allowed tax credit on fuel input use tax compliance and the value added principle can be strengthened. But the converse issue is that since there are many small truck, bus and taxi operators, final consumption demand can also perversely be reported as intermediate use as when entrepreneurs and employees of companies could use their company registration to get tax credit on their purchase of fuel for personal use of their automobiles. Similarly small taxi operators would have to maintain accounts and receipts to claim tax credit and that would impose much cost on both the operators and on the tax department. In other words to give tax credit to all intermediate users of petroleum products would not be feasible since it would involve high transaction costs.

Hence it is better to keep petrol and diesel out of tax credit for all including in intermediate applications. LPG and kerosene used in industrial applications can be

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[13] It can be contented that governments must retain the right to use taxes to influence consumption. That right can never be questioned but a liberal wiser regime of taxation would exercise this right minimally. To influence consumption in a very distortionary and unintended way (as is the case with petroleum taxes) would go against the spirit of a liberal economy. The tenets of good taxation demand that the tax system does not distort consumption, production, input use and technology choice, not to speak of not bringing about governance problems and corruption. This was the guiding principle of the tax reform ever since excise taxes, following the Tax Reform Committee's recommendations, a process that has been going on and continues with the agenda of the GST (Goods and Services Tax). Most countries have moved away from using tax to influence consumption except at the margin, strategically and against the so called sin products –alcohol, tobacco etc. Even if the logic of higher taxes on petroleum products vis-à-vis gas and coal (given that the domestic availability of these is higher) is granted , there can be no reason other than the status quo to justify the vastly different taxes on products within the petroleum sector that results in humongous fiscal losses, social costs, diversion and adulteration, and corruption and governance problems that take away a large part of the energies of the oil distribution companies. That one need to subsidise some users of kerosene or LPG is no argument to continue with this highly distortionary system since there are cleaner ways of giving subsidy.

allowed for tax credit by registered users of both products within the licensed limits which may be reviewed every two years by the excise department at one or two levels higher than the operational office. Although naphtha is not a final use good by consumers, in order to prevent any misuse of naphtha (to adulterate petrol) it is also recommended that naphtha like LPG be made non-vatable except for registered users.

All oil industry users of petrol and diesel (as when they buy from refineries or import the same) to sell/resell would have automatic tax credit on inputs of petrol and diesel (in addition to naphtha, kerosene and other oil products)

Treatment of Trucking and Small Productive Users

Thus except for all intermediate users of all oil products oil product purchases are not vatable. Registered users would be:

- Oil industry – for all products
- Registered excise paying industry (who would also be paying sales tax)– all products except diesel, lubricants and petrol.

For consumers, taxi operators, truckers and bus companies, farmers using LDO or diesel – no tax credit on use of any fuel including of petrol, lubricants and diesel.

Import duties petroleum products and on crude would not be vatable; but excise duties (countervailing duties) paid on crude and petroleum products imports would be on the same basis as for excise duties on produced goods.

Excise rates on all products are uniform at v.

Import duties on all petroleum products and on crude are at the same uniform rate of no more than 8%. 8% is good enough to provide protection to the refining industry. At 8% duty on products and on crude the effective and nominal protection rate would be close to each other and at nearly 8% (assuming that the average protection rate today is close to 8%)[14]. In general since no discrimination is desirable

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[14] Effective protection is defined as the ratio of value added at domestic prices by the value added at international prices. Assuming that prices in the country equal the international prices plus the customs duty rate, and there are no non-tradable inputs (which in the case of oil industry is not a major limiting assumption) the *EPR* can be defined as:

either in favour of petroleum or against it the average rate of tariff on imports (of manufactures and non-agricultural products) should be the upper bound on petroleum products and crude. 8% is additionally justified on the basis of an optimal tariff argument since we cannot make the "small country assumption" with regard to India in its aspect as an importer of petroleum and products.

Oil companies – upstream and downstream would have the complete freedom to set their prices. Both competition within the industry among the oil retailers and import competition would set automatic limits to the prices, and price discovery would take place in a non-distortionary manner. [15]

Expected Retail Prices Under Competition

The expected retail prices for oil products would be close to each other and would be governed by costs and taxes as follows:

Average Price of Product = (1 + insurance and freight)(1+ import duty) International price of crude(Rs./Litre) * (1 - refinery loss) (1 + value added in refinery)(1 + value added in distribution and retailing) for an RO located close to the coast, and being served by refinery located nearby and using imported crude.

The retail prices of individual product would of course vary around the average depending upon the substitution possibilities, the price elasticities of demand and

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EPR_i = \frac{ValueAddedAtDomestic\,\mathrm{Pr}ices}{ValueAddedAtInternational\,\mathrm{Pr}ices} = \frac{Q_i P_i^I (1+t_i) - \sum_j w_{ji} Q_j P_j^I (1+t_j)}{Q_i P_i^I - \sum_j w_{ji} Q_j P_j^I}
$$

Where $t_{i,j}$ is the ad-valorem customs duty on the ith output or j^{th} input, and $P_{i,j}^I$ is the international price of the ith output or j^{th} input. w_{ij} is the input output coefficient in production. If therefore $t_i = t_j = t$ for all inputs and outputs, then the effective protection rate is the nominal protection rate, i.e., $EPR = (1+t) = NPR$.

[15] Currently the customs duty on crude is nil, while on petroleum products (other than kerosene) it is around 3% giving approximately an effective protection of around 15-30% if the value added can be assumed to be no higher than 20%. Moving to 8% customs duty need not raise the final price of petroleum products on an average to the customer if the proposed value added taxes at 110 to 120% can be adjusted. Indeed the revenue neutral rate would also be approximately neutral to the average customer prices if the second order effects (arising on account of demand being affected) can be ignored. This assumption is usual in making revenue neutral estimates.

such other factors. There is no reason why the relative prices should not mirror those internationally with FO/LSHS being low per tonne, and the core products being in a narrow band. In India, (as in countries without distortionary taxes /administered prices) based on our estimates (Pandey, Ajay and Sebastian Morris, 2006) of price elasticity of petrol (being greater than 1) and of diesel (slightly lower than 1), petrol would then reach marginally lower prices than diesel and kerosene.

The value added in refining and value added in distribution and retailing are competitively determined. Similarly, the refinery loss would be driven down as far as possible through both better operations and technology choice, once competition in the market emerges and is allowed to be determined by, and determine, competition for the market.

In what follows we work out the refinery loss factor (or the product yield factor= 1-refinery loss factor) and the value added in refining (or the refinery margin).

Table 8 works out the revealed crude conversion ratio in India given the total crude inflow and the product produced. This has ranged from nearly 0.90 to 0.93. This calculation does not include the stock changes. Ideally the crude absorbed – Change in stocks has to be used. Since stock figures for crude was not readily available, the approximate measure is arrived at. For regulation this means a crude loss factor of around 10-7% say 8%. There has been a marginal improvement (fall in this loss factor) with technical improvements on the average refining capacity.

Table 9 brings out the average price realisation in exports of products and of crude imports by Indian refiners. It works out the implicit refinery margin based on the weighted average dollar price realisation of Indian products given Indian mixes of product. This can be used to compute approximately the refinery margin in India as revealed implicitly. The implicit margin as revealed is the value of the output of refineries at international prices divided by the cost of the same amount of crude required to produce a tonne of product (calculated using the refinery loss factor of table 8). The refinery loss factor is assumed at 10%. Thus the refinery margin has ranged from -2.9% to 15.2%. The crack spread too though more crudely is an index that tracks refinery margins which is in Dollars per barrel. The crack spread over the same period ranged from $ 3 to 27 per barrel as crude prices rose to $ 130 per barrel. See Figure 3. In $ per barrel the implicit spread for Indian refining was as

given in the table was from -70 cents to $ 17 per barrel measured at international prices of product and crude and excluding all taxes as table 9 does. With a refinery loss factor of 7% rather than 10% this refinery margin in $ per barrel for Indian refining would range from $ 1 to $22. The crack spread (3:2:1) Nymex is the difference between (price of 2 barrels of gasoline + one barrel of fuel oil) and 3 barrels of crude divided by 3. It is measure that can be used to monitor the spread between crude and product prices. Since the middle and light distillate prices move in sync globally (unlike in India where there are differential taxes and large distortions) the 3:2:1 spread is a shortcut and easily understood indicator of the profitability of refinery operations.

Competition through yield increases and reduction in distribution costs would drive the prices of retailed products lower down from the initial market prices discovered. Since there is no administered element, oil companies would truly compete instead of indulging in pseudo competition as is the case today.

Efficiency by way of use and sourcing of lower priced crude, improvement in refinery yield, cost cutting in distribution, use of scale economies and innovations in distribution and transportation would all thereby be incentivized. Also incentivised would be the competitive pricing of multiple products of a refinery and the output mix would tend towards optimality given the demand that can be effectively accessed.

At equilibrium, i.e. within a few years as the price discovery process is allowed to work itself the price of the principal petroleum products would vary within narrow bands , as outlined above, and the variation would depend upon the price elasticity of demand, degree of processing, substitution, besides the international prices and transportation costs.

It is expected that the prices would settle down as indicated below in inverse order of their price elasticity of demand: Naphtha, Lube oil, Diesel, LDO, kerosene, LPG, petrol, naphtha, FO/LSHS, petcoke and conditioned by international prices.

The conditioning by international prices would be such as to remove arbitrage option between prices in India and globally say in the middle east. Thus no price would be higher in India than the *Plat (Middle East) prices + logistic costs of imports*

and no price would be lower than the **Dubai (or Singapore price) – logistic costs of export from India**.

Note here that the logistic cost includes the cost of freight, of capital blocked up, insurance and risk associated with movement.

Between petrol diesel and kerosene, petrol would have the lowest price since the price elasticity of its final demand is higher. Essentially the refineries would end up setting their prices to maximise their profit in a joint cost situation where price elasticity of demand would play its role. The same would again be conditioned by transport costs with reference to a feasible territory of reach.

The existence of cheap transport routes in the form of oil (and crude pipelines too) would set limits to the local monopolistic advantage of particular producers. In other words the price of a product in no place would be higher than the **minimum of (refinery sale price of any other competitor + logistic cost of transporting from the competitors refinery)**, the minimum being over all competitors, assuming that all players compete.

Since refineries are well spread through the country and the access from important port refineries into the interior is good, there is little territory in India where any particular company would be able to exercise significant monopoly power.

In what follows we argue that the expected competition in refining and in oil retailing is adequate to make the industry competitive and the continued high growth would allow for entry. With independent retail outlets and open access to the infrastructure part of the business – (oil pipelines) which can be ensured through appropriate regulation, competition is likely to be quite good.

Competition Would be Adequate

Table 10 brings out the Herfindhal Index[16] a measure of concentration in an industry and widely used. When considered over the capacity since this provides the potential

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[16] The Herfindhal Index can be defined as the sum of the squares of the market share of competing firms. Thus $H = \sum_i S_i^2$ where S_i is the share of the ith firm. The inverse of the H-index can be interpreted as the number of firms in the market adjusted for concentration. It is the most justified measure of concentration.

for competition in refining then the index is about 0.18 when considered over firms and 0.09 when considered over refineries. In reality given the geographical aspect of transport costs the effective concentration is likely to be more. The measure is somewhat higher than in the US where it has been of the order of 0.09 increasing to about 0.12 in the 90s. It is of the same magnitude as in many other advanced countries. In share of plants rather than firms are used it is somewhat lower and comparable to that in the US regionally. In Indian regions the concentration is likely to be higher though the smaller geographical size of the Indian landmass should result in higher effective competition at the regional level for the same concentration.

In oil retailing (marketing) the concentration would be even lower since there are independent retailers, and the shares in terms of the number of retail outlets   Most importantly the current consumption of petroleum products can only grow to reduce the H-index if policies that ensure competition are in place. Most important of these would be the freedom to source bulk fuel by ROs on own account, i.e. to have brands of their own. Then the last mile can become highly competitive. If the policy of independent retailing results in about a third of the ROs being impendent, then the oil refining and distributing companies have to compete in sales to bring the price down to its competitive level. Historically though since OMCs developed their product and marketing and there is value in a brand right across the country and in near uniform pricing, the mode of development has been on the basis of exclusive dealerships tied to particular OMCs, though this is changing rapidly[17]. In India many of the cities are ripe for independent dealerships both local and chains so the motorists can have their own preferences.

Independent Retail Outlets and Internal Markets in Product

The potential for competition at the retail level is quite high[18]. Currently the average thru put of ROs is very low since adulteration, short selling, and administered prices allow even small thru put ROs to co-exist with larger ROs who may be either

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[17] Thus the California Independent Oil Marketers Association reports that it is able to innovatively address small markets and seasonal markets, provide fuel in national emergencies besides having its main markets in institutions and firms. (http://www.cioma.com/index.html , 26th April 2009).

[18] Independent retailers as also franchisees of companies and company ROs would have to be 'licensed' by the safety authorities.

avoiding these malpractices or marginally indulging in the same. With the "price arbitrage" option vanishing (once prices are set by the markets under uniform and value added taxes as we recommend in this report), these malpractices would collapse and competition in the true sense would emerge across ROs. The process can be enhanced by allowing merchant ROs who are not agents of OMCs to emerge, and who can source fuel from the wholesale market i.e. from any refining /trading company, which can develop if the 'last mile access' is opened up as we propose.

The entire business of rent seeking (administrative allocation of ROs and rationing of shortages) would collapse, and overcoming adulteration and short selling would be simple, and not the major governance problem that it is with perhaps a large part of the time and effort of sales personnel in oil companies being absorbed in a socially wasteful activity of preventing corruption and adulteration.

Similarly, wholesale markets for the principal fuels would emerge centred around important distribution territories, which could negate the marginal monopolistic power that OMCs have in retailing through close control over, their affiliated ROs. The co-existence of independent ROs, agencies of OMCs, and OMC run ROs would be healthy for competition and high quality of the product.

There is really no need for any special measure to support oil marketing companies to open and maintain retail outlets in far flung and remote areas. Through a process of spatial price adjustment, the supplies in all but the most remotest areas (in fact wherever there is sufficient demand) would be maintained by the market, and since there is competition the price difference would be reflective of the logistic cost from the nearest reference location.

Thus freedom to price oil products differently at different locations with no more than a oversight by the Competition Commission is called for.[19] This oversight is merely as a precautionary measure (without any direction to influence). Today when the ROs of the OMCs hold prices lower than cost of serving at a particular location they are indirectly cross subsidise. And merchant ROs would find it difficult to

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[19] Thus in a place like say Uttarkashi or Gangotri at an additional cost of no more than the competitive logistic cost of reaching a road tanker from Haridwar, retail outlets should come up. Today it is the very regulation and policy of holding prices uniform at all locations in a certain region, that makes few formal retail outlets come up.

compete with them. Thus retail price maintenance is anti-competitive. As a result none or few ROs operating independently can come up today. It is interesting that only small sellers who sell from oil drums operate further into the interior from Uttarkashi for instance, who carry out a business, that is under scaled and therefore more expensive than what would have happened had merchant ROs been allowed and encouraged.

Endowment Based Direct Subsidies are Crucial

All subsidies have to be directly delivered to the intended consumer as an endowment. All current BPL card holders who are entitled to say *K* litres of kerosene per year per person can be issued chip (smart cards) with assignment of *K*(family size)* litres (which currently would be *2*5*12=120* litres per year of kerosene which can be made completely tradable.

The details of such a scheme which should not cost more than 5 paise to transfer subsidy of Re.1 have already been brought out in (Morris S, Pandey Ajay & SK Barua, 2006). The scheme as described in an earlier report ought to be put in place. See "Box 1: Eliminating Distortions and Directing Kerosene Subsidies to the Poor" for a summary presentation of the proposals to ensure low cost administration of direct subsidy in the case of kerosene based the same study.

In the case of LPG subsidy similar smart cards can be issued to all consumers including to those below BPL entitling per family to a cylinder of LPG (14.2Kgs) at Rs, 360 (i.e for a subsidy = current market price for 14.2 kgs – 360) per family, which again can be made completely tradable. The details of this scheme have been brought in Pandey, Ajay and Sebastian Morris (2006). Politically it would be unwise to limit the endowment to only BPL families. All new connections can be freely given at the market price and all consumption in excess of one cylinder would be at the market price.

Box 1:
Eliminating Distortions and Directing Kerosene Subsidies to the Poor

"*OBSERVATIONS ON THE EXISTING SYSTEM:*

- *There is clear evidence that a significant percentage (about 40) of kerosene is diverted out of the PDS and sold at higher prices.*
- *The manual information and control system to keep diversions and leakages in check is completely ineffective.*
- *The commission paid to the distribution channel, in particular to the retailers of kerosene does not make the business financially viable.*
- *The rents being earned by those associated with the distribution channel for kerosene are very large.*
- *The rent extractors have become so well entrenched over time that it is plausible that other agencies in the system and even the regulatory process itself may be hostage today to their influences.*
- *The indirect losses from use of sub-optimal fuel mix, product mix and investment decisions are very large and may harm the economy significantly in the long term.*
- *The subsidy through uniform low pricing of kerosene, though intended for the poor, is in fact not reaching them as they are in no position to buy much of the kerosene allotted to them even at the low issue prices being charged by the fair price shops.*
- *In sum, kerosene subsidy has become the ever-growing white elephant of the Indian economy.*

ALTERNATIVE TO EXISTING SYSTEM:

- *It is imperative to bring into play information and communication technologies so as to break the stranglehold of the distribution channel by capturing information at the point of sale and thereby creating a permanent audit trail of all relevant transactions.*
- *It is imperative to empower the target segment, the BPL families, by providing them with the freedom to choose the manner in which they would like to consume the subsidy intended for them.*
- *The well-documented failure of TPDS (Targeted Public Distribution System), implemented on an experimental basis, clearly demonstrates that tinkering with the existing system would not achieve the twin goal of benefiting the really poor and not-benefiting the non-poor.*
- ***The direct subsidy scheme, which is based on free market pricing of kerosene, and therefore a radical departure from the current method of uniform low pricing is the answer for achieving effectiveness of subsidization****.*
- *The subsidy is to be disbursed to the poor through smart cards and the accounting of disbursal is to be done using systems similar to those used by credit card companies.*
- *The purchasing power put in the hands of the beneficiaries would allow them to use it for spending on their choice of commodities and services and thereby not only enhance the use of subsidy to the full but would also add greatly to their welfare.*

- *The proposed system would almost completely eliminate the indirect losses arising from distorted choices since the price of kerosene would be market determined and therefore not relatively cheap compared to alternate fuels.*

IMPLEMENTATION OF PROPOSED SYSTEM:

- *A task force (TF) must be set-up for implementation, with wide-ranging powers and full financial backing of the government of India so as to be able to function autonomously.*
- *The task force should consist of eminently qualified individuals with diverse skills and known for their integrity and appreciation for the significance of the task to be performed.*
- *The critical task of identifying the beneficiaries at micro-level should be done using all possible sources of data and information (outlined in the report) so as to minimize both, Type I and Type II errors, that is, chance of exclusion of genuine beneficiary and chance of inclusion of spurious beneficiary in the list of target beneficiaries.*
- *The disbursement of subsidy should be such that the disbursement is recorded at the point of transaction and get immediately captured in a large centralized database, thereby creating a permanent audit trail, akin to operation of credit cards (details outlined in the report).*
- *The activities associated with initial identification of beneficiaries, disbursement of subsidies and updating the list of beneficiaries is to be done by well-qualified private agencies.*
- *The operations of the system should be monitored by an SPV to be specially created for the purpose and working under the broad supervision and direction of the task force.*
- *The SPV and the TF should ensure full transparency of operation of the private vendor and the scheme by making public all relevant information on the operation of the system and opting for periodic audit of operations.*

GAINS FROM THE PROPOSED SYSTEM:

- *The immediate gain to the exchequer from the proposed system, due to market based pricing of kerosene would be an estimated inflow of Rs. 14000 crore per year by way of additional taxes.*
- *This gain from additional taxes, based on certain assumptions, is expected to rise to over Rs. 37000 crore in 2010-11.*
- *The gain to the economy and society at large from elimination of indirect losses due to sub-optimal choices of fuel-mix, product-mix, and asset mix would be immense as they would be completely eliminated in the new system.*
- *The most important gain however is that the beneficiaries would be in a position to fully utilize their entitlements and spend the same on products and services of their choice, significantly enhancing thereby the utility of their consumption."*

From, Summary and Conclusions in Morris, Sebastian, Ajay Pandey and Samir K. Barua (2006), "A Scheme for Efficient Subsidisation of Kerosene in India (Based on a Report Commissioned by the Petroleum Federation of India)", WP No. 2006-07-06, July 2006, pp. 47-4

The endowment card for kerosene and LPG can be bundled to ensure that the benefit on both together does not exceed a certain limit which is in units of fuel on a LPG equivalent of kerosene which a family of 5 can be expected to use in cooking and lighting. Already smart card systems when carefully designed and implemented as in the case of the National Medical Insurance Scheme in India have overcome many otherwise governance problem which as argued before are rife in the case of the PDS, PDS kerosene, LPG etc. wherein subsidisation is based on lowering the prices. See "Box 2: Recasting LPG Subsidies in a Way that is Non-Distortionary" for a brief presentation of the proposals to remove the distortions in subsidisation of LPG by recasting the same as direct subsidies.

Box 2:
Recasting LPG Subsidies in a Way that is Non-Distortionary

" 1. LPG subsidy has grown historically and has become quite high because of aggressive growth in connections and increase in per connection consumption in addition to rising input costs.

2. Given that there is evidence that LPG subsidy has been ineffective in increasing penetration in rural and poorer households, there is a case for capping and targeting LPG subsidy. Otherwise it can explode over time unless new connection growth is curbed, which is indefensible.

3. The best option to curtail LPG subsidy would be to eliminate it straight away. However, there are at least two factors which are likely to make it difficult. Firstly, the input costs are high (from a historical point of view). Secondly, the high input prices coupled with lack of preparatory ground work may result in political mobilization against the move.

4. Even if difficult to implement, the option to eliminate LPG subsidy need to be debated and be at the focal point as more information indicating the flow of LPG subsidy would help in softening and preparing the ground. It is also important to keep this option in play as all other next best options are prone to misuse and may become ineffective over a long enough period through systematic abuse. These possibilities are curbed as long as there would be uncertainty about continuation of subsidy.

5. The next best option which sharply focuses on the deserving segment is direct subsidy to below poverty line families. These households may be given up to 8 coupons every year. Each coupon can be used for subsidy for a cylinder. A separation of the identification and issuance of coupon is critical to the success of this scheme. As clarified elsewhere in the study, by coupon we mean any technology which allows the target group to get a well-defined and secured entitlement. It could be paper coupons with security features or smart cards, using IT for identification and entitlements.

6. Direct subsidy to BPL family through coupon would allow them to pay cash equal to retail price less the subsidy per coupon. This amount and a coupon would entitle them to get a cylinder. The coupon surrendered to the dealer would be in turn be surrendered by him to the Oil companies, who would pay equivalent cash to the dealer. In fact, dealer may get an additional compensation for the cost of accounting and administration.

7. The BPL coupon holders may be allowed to trade the coupons as this would convert the LPG subsidy to income subsidy. Even if the transfer or trade is not allowed, it is bound to take place and the net effect of that would be sharing of subsidy between intended beneficiary and some intermediary.

8. Targeting LPG subsidy to BPL consumers may encounter problems in improper identification about which Oil companies need to work closely with district/ local administration so as to proactively eliminate inappropriately classified consumers.

9. Targeting BPL consumers for LPG subsidy also leaves open the possibility of non-BPL consumers taking connections in the name of BPL consumer and that of BPL consumers opting for multiple connections. Both problems are to some extent self limiting (due to conflict and due to connection charges) but warrant closer examination of new connections under BPL category.

10. Coupon based direct subsidies require efficient administrative support associated with coupon distribution, appropriate documentation, coupon accounting, collection and cash reconciliation. Coupons have to be difficult to copy and print to prevent frauds etc. This can be ensured by printing of coupons at a security press.

11. As the extent of penetration of LPG in BPL families might be too low and because of political difficulties, the next best option would be to limit the number of cylinders for which the subsidy would be allowed for all the customers. To start with, each consumer may be given 6 coupons per year which allows him to get 6 cylinders at subsidized rate.

12. Even though this option does not attempt to direct the subsidy to more deserving segments, yet this option cuts down the overall subsidy by about 25% in one stroke (or about Rs.40/50 per cylinder). Coupons could be given to all consumers without the need to worry about misclassifications.

13. Like in case of targeting BPL consumers, this option also suffers from the possible misuse through multiple connections. The Oil companies would have to have data base of all of their consumers to prevent such a possibility. In addition, a sound coupon disbursement, collection and accounting system needs to be developed by them. Outsourcing of such administrative tasks is feasible and might be more efficient as well, in case eventually subsidies are withdrawn.

14. Under this option, a phased subsidy elimination program can be laid out. After 6 coupons per year, the number of coupons may be brought down to 4 and then to 2. Phasing down of subsidy by reducing number of coupons may be linked to input costs with faster phasing down if the input prices are lower and vice versa. This would allow the expectations of consumers to be modified gradually.

15. Irrespective of any method of LPG subsidy reduction, there is a need to examine the taxes built in currently estimated gross subsidy. The net subsidy to the consumers should be the basis of elimination otherwise the target is self-defeating (by being higher) and not justifiable (elimination of gross subsidy means moving from net subsidy to net tax regime).

16. Even if the state governments continue to collect sales tax, the central government which also collects taxes and simultaneously bears subsidy should neutralize the subsidy estimate from central taxes. The state governments need to be persuaded to retain the current amount of sales tax (but at a lower rate) otherwise states get higher revenue and the price target goes up.

17. In case the state governments were to pay truant on this issue, there is a need to explore whether differential issue prices can be used as a deterrent.

18. Another issue which warrants closer examination is the impact of volatility of input costs on retail prices. Had the industry been competitive, this would not have been a major issue. Clearly, some oversight or regulation is required so that prices are changed at appropriate intervals and are still neither excessive nor too low. It would be appropriate to set up a regulator to review periodically review the input costs and allow changes. He may allow prices on the basis of average cost with a lag or may prescribe a band linked to input costs and may monitor the prices to prevent any abuse.

19. The rationalisation of prices and of tax reform in this sector is long overdue. These need to be simultaneously pursued. It is possible for the entire sector to move towards a revenue neutral cenvat based tax regime. That in itself and the direct subsidization of kerosene and LPG through coupons is necessary to remove all the distortions. The ill effects of the distortions that result in misuse, diversion, revenue loss, and added environmental and governance problems can only be feasibility addressed by the movement away from price based subsidies to direct subsidies. Similarly kerosene subsidises if correctly targeted and administered can have large spillovers in the management of subsidies in LPG."

From **Section 6: Brief Findings and Recommendations,** Pandey, Ajay and Sebastian Morris, "Subsidisation of LPG: A Study of Possible Options in India Today (Based on a Report Commissioned by the Petroleum Federation of India)", W.P. No. 2006-04-07, April 2006, pp. 36-38.

With direct subsidies in kerosene the role of the PDS retailers exclusively for kerosene is no longer there and as such the PDS kerosene shops and the associated system can be wound up or expected to evolve into viable retailers of kirana, kerosene, gas and other products.

Kerosene wholesalers whose investments are largely in trucks to carry kerosene (they have a little investments in storage tanks) can easily transform themselves into product carriers in general.

Retail outlets of other products (petrol, LPG and diesel) could also sell kerosene. But kerosene sales being in small quantities and also in rural areas the current small PDS retailers could and would continue to operate selling kerosene freely for all users including those with endowments (subsidy entitlements). Many of them are likely to combine kirana operations with kerosene retailing. Oil marketing companies would then find it worth their while to innovate to reduce the total cost of retailing including of kerosene delivery.   Indeed several innovations like thick plastic pouched kerosene in one litre kerosene packs, in pet bottles, dispensation through pumps besides the usual retail dispensation from small drums by gravity feed would all be able to work together in different retailing contexts to be a part of the retail business as such.

Similarly LPG applications other than for cooking-lighting[20], air conditioning, electricity generating, heating of water, automobile – can all co exist without necessarily separate channels and there could be no arbitrage since the market price for LPG adjusted for logistic, packaging and delivery cost would be the same. Use of LPG in lighting where electricity is a problem, when small cylinders are widely available could do much to improve the quality of lighting in areas prone to power cuts.

Such entirely market based solution of use and distribution with endowments based direct subsidy is first best and removes all the perversities (adulteration , diversion etc and the governance failure in oil marketing, the third order distortions that affect investments, and entry into oil retailing), and removes the need to set cost and prices.

Role of Regulation of Pipelines

The pipeline transport business is a natural monopoly[21] and therefore has to be subject to price regulation if open access and competition across territories is accepted as the basis for the organisation of oil retailing. The Petroleum and Natural

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[20] It is interesting that under the current regime a first best application of LPG at the household level is for lighting especially when there is no electricity. But since this would demand small cylinders, and only cooking cylinders are subsidized, here we have a case where the first best use is discriminated against.

[21] Pipelines having network economies exhibit subadditivity of costs, resulting in market failure of the natural monopoly variety. Other segments do not have this any other significant

Gas Regulatory Act Board Act 2006 provides the framework for the regulation of the pipeline sector of gas, oil (crude) and product pipelines. While the direction of change indicated in the Act is towards complete open access, the proposals with regard to product and crude pipelines are far from being open access. Thus as per the Act open access is possible only on such pipelines as where the regulator licenses as open access. And only up to 30% of the capacity of existing pipelines (provided the incumbent is not using the same) can be declared as open access. Given the provisions of the law it is debatable if on open access basis pure pipeline companies would come forth without a plan, and unless invited by the regulator with take or pay contracts. Incumbent users with their own pipelines and other incumbents adding capacities would be able to set up dedicated capacities, and there are few incentives for them to go open access. Incentives to access each others networks at this stage of development is not likely to be a major force, but the regulator could insist on a certain portion of the fresh capacities to be necessarily in open access mode. Nevertheless since vast capacities especially in crude pipelines and product pipelines are likely there would be the dynamic contestability of growth which can be a competitive force, even if it means redundancy and higher social costs for a while. This dynamic aspect of natural monopolies considerable reduces the usual argument that all natural monopolies have to be regulated. The worlds networks of pipelines, electricity lines, railways, etc. were build when demand was gripping rapidly. Then the profit maximizing behaviour of the players is functional since in greatly expanding the network even when by reinvesting rents earned out of high tariffs, user values go up rapidly since these are determined by the shift from the earlier service to the new service.   As such little of these expanding networks had been regulated.   It is only as saturation was reached that the dysfunctionalities of monopoly pricing become severe, and the need for regulation arises. See Morris, S, (2001) and Varma J.R.(2002) for arguments to this effect. In other words if the dynamic aspect of growing natural monopolies is considered, the usual argument that they ought to be regulated, based on static economic analysis, may be mistaken.

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market failure, other than features arising out of scarcity of resources and their monopolization, and vertical integration economies. While these warrant competitive oversight and strategic response in the context of the interests of a country, they do not create the need for price regulation as such.

Pipelines can be subject to a variety of pricing methods but most efficient would be price cap, indexed to a relevant price index that captures the broad cost components of the pipeline business.   This can be easily done if the relevant business segment wise information can be obtained from the oil companies. Alternatively the same can be worked out from a set of projects in pipelines taken up by the oil companies.

Since the "Petroleum and Gas Regulatory Act" has been notified for pipelines and storage facilities of both crude and product, access to pipe lines as this is likely to be made open access, there would further increase in the competitive pressure to reduce transport costs and more generally logistic costs. Players would be able to access each others marketing territories.

The Petroleum and Gas Regulatory Authority could monitor (without having the power to determine) by checking whether product prices exceed the ***minimum(retail prices at a reference location + logistic cost from reference to the location in question, reference price at a location where there are wholesale prices + logistic cost of reaching the location in question + cost of retailing).*** The factors such as the logistic cost can be once estimated by the regulator or a consultant on his behalf and indexed to appropriate prices, to monitor the prices at remote locations.

In the case of prices being higher, the Competition Commission / Petroleum Gas Regulatory Authority would have to examine the situation in greater detail to remove the source of the higher price – such as non-competition or agreement to fix prices- but the regulator should not fix prices ever (other than for pipeline access and use), since that would violate competition, the process of price discovery and the role of prices in allocating scarce resources. This is because oil refining and marketing including retailing are competitive activities.

Handling Wind Fall Gains in Crude Production

Producers of crude oil under the proposed regime could hope for "windfalls" when the crude oil price rise beyond its cost of production. In India this is significant only in the case of ONGC which produces about a third or less of the oil that is consumed in India.

The solution to the same at the first best level <u>would be to leave ONGC with the rents, while granting it all the autonomy to use these rents in aggressive oil exploration in India as well as abroad</u>. The government in this case can gain through market upswing on the share price once the announcement of clarity on the ownership of the oil fields is made. The residual problem, that this will leave current private shareholders of ONGC with windfall gains, cannot be avoided unless the government can first buy all the stock (at a backward looking prior determined stock price) and then make the announcement that assigns to ONGC its current operative fields with no restriction of the price it can obtain for its crude.. This would amount to a "nationalisation" before privatisation / commercialisation since the dilution of ONGC's stock thus far has been without clarity with regard to the property right on the oil fields. Only then can a windfall to the current non-government share holders be avoided.

Windfall "Charge/Subsidy"

The alternative solution to the same (at a level significantly below the first best) would be for the government to evoke a charge that is akin to royalty which may be called the "windfall charge" and which can be applied on oil price bands in the following manner.

Imagine the cost of production (including a normal return at 20%) of ONGC today to be $C_{ONGC,0}$ which for the future may be indexed to the retail price index or to a relevant price index (P_t) suitably constructed that is reflective of the non-rent and non-tax cost components of ONGC per tonne of crude.

$C_{ONGC,t} = C_{ONGC,0} P_t$ where P_t is the relevant price index. The weights for the relevant price index can be derived from ONGCs costs in the base period (today). Then if international price of crude is 20 % above the all inclusive cost of crude the *additional "windfall charge" = current price of crude – 1.2*$C_{ONGC,0}$ P_t* can be levied for every barrel of crude that ONGC produces. Concomitantly government would have to subsidise ONGC when crude prices fall below *1.2*$C_{ONGC,0}$ P_t* . The probability of such an eventuality while very small is not zero and hence this upfront understanding is necessary. The factor of 1.2 is necessary to leave some "rents" (which are more correctly viewed as return to uncertainty not factored by markets) with ONGC to enable it to be aggressive in EP activities.

This solution would have the problem of denying the current non-government shareholders the upside. But since the risk of the government doing so was in existence ever since the first shares of ONGC were sold in the market, it would not amount to a gross violation of fairness on the part of the government.

This option of a windfall tax/subsidy should be applied only on the "historic" oil fields though earlier covered under APM, not the oil discovered under the various NELPs. The latter oil whether produced by ONGC or the private sector are governed by the contracts implicit (and explicit) in the policies that were part of the announcement. And change therein would amount to contract violation on the part of the government.

State Taxes

All state taxes that are not currently vatable (entry, purchase and turnover taxes and octroi) should be abolished. Where the centre does not have the jurisdiction, through fiscal inducements and suasion of fiscal reform, it must persuade the states to give up such adhoc and highly distortionary taxes.

Sales taxes which are currently vatable and are under VAT should continue as such with far greater uniformity across states. The centre should try for outright uniformity thorough a standard VAT rate. Then the same may be collected along with the excise (CENVAT) on value added basis though on a separate account to be disbursed to the state government , with an equal weight for production and consumption. This is eminently feasible and would not penalise producing (refining and extraction states as is the case today).

While convergence of state taxes to a common rate is important, even more important is the abolition of any specific duties or rates and the need to not deviate from the value added principle.

A Temporary Deviation from the First Best

Until a direct subsidy scheme is put in place the oil companies have to be directly compensated for the kerosene and LPG they deliver through the following formula.

SubsidyPaidToOilCompanies =

TonnesOfKeroseneGivenToStateGovernmentforPDS* (LandedCrude

PricePerTonneOverPast Month * (1/RefineryYield)*(1+StandardMargin) –

PDSPricetoStateGovtPerTonne + taxes on OneTonneOfKerosene)

The ***StandardMargin*** can be determined as the current cost (other than input and tax) of refining one tonne of product + moving one tonne of product over a distance of 800 Kms the average lead for kerosene from refinery or import point. There is only a need to get this approximately correct. Once arrived at it can be indexed to a relevant price index as follows:

0.6*CrudePriceIndex + 0.4WPI, since about 60% of the total cost (exclusive of input and taxes) of refining and transport can be related to the price of crude and the rest being more general – on account of labour, local transportation etc be indexed to the WPI. This would amount to the subsidy being given in a way that does not require cost plus regulation with all attendant evils of cost plus.

Thus for

StandardMargin(t+1) =

StandardMargin(t)*(0.6CrudePriceIndex(t+1)+0.4*WPI(t+1))

Where WPI and ***CrudePriceIndex*** in the base year are =1.

Similarly for LPG the

SubsidyforLPGPaidtoOMCs = TonnesOfLPGSoldUnderOneCylinderScheme*

(LandedCrudePricePerTonneOverPastMonth * (1/Refinery

Yield)*(1+StandardMargin) – IssuePricePertonneOfLPGBeforePackaging

+ ExcisetaxesOnOneTonneOfLPG

The ***StandardMargin*** even in this case should be suitably indexed.

The ***StandardMargin*** can be determined as the ***current cost (other than input and tax) of refining one tonne of product + moving one tonne of product over a distance of 300 Kms the average lead for moving a tonne of LPG to a bottling plant + the cost of bottling (excluding input and taxes).*** The bottles are assumed to be picked up by the ROs and distributed at a cost they incur

with a maximum margin fixed on the same as certain trade margin which oil companies can fix. There is only a need to get this approximately correct. Once arrived at it can be indexed to a relevant price index as follows:

0.4*CrudePriceIndex + 0.6WPI, since about 40% of the total cost (exclusive of input and taxes) of refining and transport can be related to the price of crude and the rest being more general – on account of labour, capital cost of bottling, local transportation etc be indexed to the WPI. This would amount to the subsidy being given in a way that does not require cost plus regulation with all attendant evils of cost plus.

Thus for

StandardMargin(t+1) =
StandardMargin(t)*(0.4CrudePriceIndex(t+1)+0.6*WPI(t+1))

Where WPI and ***CrudePriceIndex*** in the base year are =1.

In a later section we propose that in case the first best is not pursued but a retail price control mechanism is sought then rather than use the standard refining costs as defined above it would be better to use the Crack Spread on the NYMEX, since this being determined in a large market with depth would be fair to all producers and would not discriminate (or unduly reward) local operations over foreign refinery operations.

When the subsidy is given this way the incentives to compete and reduce the costs of distribution are not affected and so there is minimal distortion on the producer side. The oil companies in having to maintain delivery prices of kerosene to the civil supplies departments and of LPG to the LPG ROs would nevertheless continue to keep the distortions on the user side on, since the retail price of the subsidised product is now affected. There is little justification for such a regime except to provide the time to work out a detailed direct subsidisation scheme on the lines already described and covered in an reports. (Morris, Sebastian and Pandey Ajay, 2006; Morris Sebastian, Pandey Ajay and S.K.Barua, 2006).

SECTION VII

CRUDE PRICE STABILIZATION FUND

Introduction

In this section, we present a proposal for a crude price stabilization fund that could be used to smooth out short run fluctuations in the global price of crude. The fund would have an effect similar to that of having a strategic reserve of crude that is drawn down during periods of higher prices and replenished during periods of lower prices. However, there are substantial differences as the proposed fund does not involve any actual stocks of crude. It is more like a "financial" virtual buffer stock that could provide some relief from a price shock, but not from a physical supply interruption. In our view, the strategic crude reserve serves completely different goals and should be taken up completely independently of our proposal for a stabilization fund. Energy security can be best ensured by tying up long term crude sources. A strategic reserve crude reserve on the other hand provides insurance in times of war against blockades and other possible supply interruptions.

The argument in favour of a crude price stabilization fund is only a limited one viz that the global crude market is distorted by producer cartels that could move prices away from long run fundamentals in the short term. Moreover, the relatively low non operational stocks of crude globally mean that speculative forces could also cause short run movements in global crude prices that are not justified by fundamentals. The fund could moderate these short term spikes and insulate the economy from the ill effects of these transient shocks.

This is not our preferred recommendation. Nevertheless, we present the same as the second best. This is because the historical experience in attempting stabilization of this kind has been dismal. More than a decade ago, Gilbert wrote an obituary[22] of such attempts to stabilize prices of globally traded commodities documenting the failure of international agreements in such diverse commodities as coffee, cocoa, rubber, sugar and tin. The bankruptcy of the buffer stock manager of the International Tin Council (ITC) almost a quarter century ago is a warning of how well intentioned schemes to smooth out price fluctuations can end up in disaster. The

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[22]   Gilbert, C. L. (1996) "International Commodity Agreements: An Obituary Notice", *World Development,* 24(1), 1-19.

principal problem is that what appears to be a temporary aberration in prices may well turn out to be a semi-permanent change in price levels. Attempts to resist this change can lead to large losses which end up discrediting the entire scheme.

If at all such a price stabilization is attempted, it should be subjected to strict discipline on floor and ceiling prices through mechanical formulas that do not leave any discretion to the managers of the fund. Historical experience suggests that discretionary changes in floor and ceiling prices never work in the desired manner as it becomes politically impossible to do the right thing at the right time.

The leeway available to the fund in maintaining prices away (lower) than market price would be very little for countries like India that are significantly import dependent. For countries that are marginally dependent on imports the leeway on the lower side is a lot more, provided that the government has the ability and the framework in place to tax the domestic producers of crude through an appropriate windfall tax as outlined in the section "Windfall gains in Crude Production"[23]. In other words, the tax/subsidy to the local producers of crude flow into/out of the stabilisation fund when allowed crude prices are significantly above cost/ when below cost. This is discussed in Section "Domestically Produced Crude" later in this report.

We visualize the stabilization fund as a counter cyclical tax/subsidy on crude that is revenue neutral over the entire price cycle. When crude prices are low, a tax (windfall tax) is levied on crude to moderate the fall in the price of petroleum products. This revenue remains ring fenced in the stabilization fund to be used when prices rise to abnormally low levels. At this point, the price of crude is subsidized from out of the resources of the fund to moderate the rise in the price of petroleum products. The fund must be designed so that over the entire cycle, the tax collected and the subsidy provided offset each and the operations of the fund are fiscally neutral. The stabilization would achieve two purposes. First, it would moderate the fluctuations in energy prices for Indian consumers and industry. Second, it would provide greater comfort to investors in energy conservation and alternative energy. These investments might not otherwise be made because of a fear that a sharp fall in crude prices might make these investments unviable.

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[23] This presumes that the cost of production of domestic crude is significantly lower than the international price of crude at most times.

Stabilization Rules

Though the fund would be revenue neutral over the price cycle, it would be in surplus or deficit at different points of time. The deficit would be met from a credit line from the government while the surplus would be invested in government securities. The line of credit is needed because the fund may encounter a period of high prices before it encounters a period of low prices and might therefore have to pay out large stabilization subsidies before it has earned any stabilization taxes. This borrowing would be repaid out of surpluses earned at a different point in the price cycle. After all borrowings have been repaid, further surpluses would be invested to meet future deficits.

The fund would operate with strict limits on the quantum of the credit line used to pay out stabilization subsidies during the boom phase of the price cycle as also on the accumulated reserves built up from stabilization taxes during the bust phase of the price cycle. These limits are required to ensure that the fund remains revenue neutral over the cycle and does not become a hidden taxation device or an implicit subsidy mechanism. To enforce these limits, the stabilization rules would require that as the fund uses up the credit line, it automatically reduces the stabilization subsidy (raises the stabilized price of crude) rapidly enough to ensure that the credit line would never be exhausted. Similarly, as it accumulates reserves, the fund would have to reduce the stabilization tax (reduce the stabilized price of crude) rapidly enough to ensure that the accumulated reserves would never cross the upper limit.

Our specific stabilization proposal is as follows. We propose that the crude price be stabilized towards a target price that is equal to the 12 month moving average of crude prices. If the stabilization fund is well within the limits on the maximum permissible surplus or deficit, the stabilized price would be equal to this target price. But as the fund moves closer to these limits, the stabilization would be reduced by moving the stabilized price away from the target price towards the actual price prevailing. The specific formula that we propose is that the subsidy is always limited to a level low enough to ensure that the subsidy can continue at the current rate for a specified period (say 3 months or 6 months) without crossing the limit on the fund deficit. Similarly the stabilization tax is limited to a level low enough to ensure that the tax can continue at the current rate for a specified period (say 3 months or 6 months) without crossing the limit on the fund surplus.

In Figure 8, we simulate the functioning of a stabilization fund of $ 25 billion[24] using the Nymex crude futures prices[25] for the period from 1983 to 2008. We find that a $25 billion fund is inadequate to deal with the price spike beginning late 2007. For almost a year, from October 2007 to September 2008, stabilization is incomplete and during March-August 2008, stabilization has to be virtually abandoned as the stabilization fund does not have enough money.

The stabilization fund does much better if the limit is raised to $40 billion[26] as shown in Figure 9. In this case, the problem is only for a few months during May-August 2008. For about half of even this period, there is a high degree of stabilization, but in late June and early July 2008, less than half of the price spike is eliminated through stabilization.

We believe that a stabilization fund somewhere between $25 billion and $40 billion would be appropriate for India. The price spike of mid 2008 was far too high to be managed by any reasonable stabilization fund and therefore it is quite acceptable to set the fund limit at a level that handles all spikes except this.

Stabilization of Prices of Petroleum Products

The purpose of the crude price stabilization fund is to stabilize the prices of petroleum products within India. Competition between refiners and marketing

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[24]   Actually, the size of the fund must grow as India's oil consumption grows. In our simulation we assume that the fund is $25/bbl times the annual crude consumption in barrels. In other words, the fund is large enough to provide a subsidy of $25/bbl for a whole year. Since the 2007 crude consumption in India is about a billion barrels, this translates into about $25 billion.

[25]   We use daily prices of the near month Nymex contract. In practice, Brent crude futures or other benchmarks closer to the Indian crude basket could be used. The fund might also operate on a weekly or even monthly basis rather than on a daily basis. There might be merit in averaging prices of several futures contracts (near month, mid month and far month) and in averaging prices over a week or so. This would eliminate issues like the abnormal one day spike in the expiring near month contract on September 22, 2008. Since our simulation is only illustrative in nature, we do not carry out these refinements and suggest that the one day spike of September 22, 2008 be simply ignored.

[26]   As explained in footnote above, the fund is actually $40/bbl times the annual crude consumption in barrels. In other words, the fund is large enough to provide a subsidy of $40/bbl for a whole year. Since the 2007 crude consumption in India is about a billion barrels, this translates into about $40 billion.

companies would ensure that the stabilization of crude prices passes through to petroleum products though the pricing of these products is left to market forces.

However, it is important to ensure that the crude stabilization taxes and subsidies are applied only to the crude content of all petroleum products consumed in India. Conceptually, what we would like is a scheme under which whenever a litre of petrol or more generally of a litre of any petroleum product is consumed within India, the stabilization tax/subsidy on the crude required to produce this petrol has been collected/disbursed by the fund. To implement this, the fund would lay down standard conversion factors that specify the crude content of every major class of petroleum product consumed in India. This can be based on the actual refining yields in the previous year in India.

Treatment of Exports and Imports

For administrative convenience, it is easier to keep track of exports and imports than to keep track of consumption. The customs records provide fairly reliable data about exports and imports that are less vulnerable to under and over statement than consumption data. For this reason, we propose that the stabilization fund base the collection/disbursement of the stabilization tax/subsidy entirely on exports/imports of crude[27] and petroleum products.

For example, suppose a refiner imports and refines 100,000 barrels of crude, and then exports petrol equivalent to 25,000 barrels of crude input and sells the remaining refined products in India. If there is a stabilization tax of $10 per barrel of crude, the refiner will pay a stabilization tax of $1 million while importing the crude ($10 x 100,000). When it exports the petrol, it receives a refund of stabilization tax equal to $250,000 ($10 x 25,000). Therefore, the net tax that it pays is equal to $750,000. This is equal to $10 tax on the 75,000 barrels equivalent of crude that was sold in India. Conceptually, there is no difference between

1. Levying a tax/subsidy on the domestically consumed products, and
2. Levying a tax/subsidy on all imports and refunding the tax/subsidy on all exports.

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[27]   In this section, we are ignoring domestically producing crude which is discussed in the next section.

The advantage of the latter is that the data is easy to collect from customs records while the former would require an elaborate system of data collection.

Domestically produced crude

We have three options for domestically produced crude. The first option is to expose the domestic crude producer completely to global market forces. The producer is free to export the crude or to sell in the domestic market at market determined prices. The buyer of crude from the domestic producer pays/receives a stabilization tax/subsidy just as if the crude had been imported. Thus the stabilization tax/subsidy applies only to domestically consumed petroleum products and the crude production industry is left alone. This is part of the first best option already discussed.

The second option is to use domestic crude as a strategic asset to provide energy price cushion and to lower energy costs for Indian industry. Under this scheme, domestic crude is guaranteed a floor price of crude to induce investment in exploration and production of crude. In return, there is also a ceiling price on crude price for domestically produced crude. The government in effect sells a put option to and buys a call option on crude from the producer[28]. The floor and ceiling prices (the strike prices of the call and the put) can be set so as to equalize the prices of the call and the put.[29]

The third option is to set the floor and ceiling prices low enough to make the collar valuable to the government and thereby levy an implicit tax on domestically produced crude. This tax could be paid into the stabilization fund to allow it to moderate the prices of petroleum products in India to a greater extent than is otherwise possible.

Under the second and third options, we would propose that the floor price of domestically produced crude be set just high enough to provide a minimum rate of return on oil exploration and production. The ceiling price under the second option is

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[28]   This combination is sometimes known as a collar.

[29]   This makes it a zero cost collar.

then determined so as to make the collar zero cost to the government and to the producer[30].

Under the third option, the ceiling price is set lower than that of a zero cost collar in order to levy an implicit tax. In other words, this option would use domestically produced crude to subsidize energy consumption in India.

The Section on Windfall Gains discusses the same issue and outlines the method to set lower and upper collars and thereby determine the windfall tax /subsidy. It is possible to treat state owned crude producers differently from privately owned crude producers. The state owned producers could be under option two or option three while leaving the private producers under option one. Alternatively, the state owned producers could be under option three while leaving the private producers under option two.

Linkage with other strategic oil initiatives

The Crude Stabilization Fund is very different in nature from other strategic initiatives that the government might consider like a strategic crude reserve or strategic acquisition of oil assets abroad. The stabilization fund is a set of mechanical rules that do not require any discretion or judgement. As stated earlier, global experience over the last half a century teaches us that strict adherence to mechanical rules is the only viable way to run a stabilization fund.

The strategic crude reserve is designed to deal with physical supply disruption (for example) a disruption caused by war or internal disturbances. Its purpose is not to smooth oil price, but to ensure physical supply to strategic national needs under times of stress. It would be a mistake to run down the reserves merely to subsidize oil prices for the economy. Managing the strategic reserves would require operational

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[30] It is important to set the floor rate high enough, to make exploration and production risk worth taking by the upstream companies. An additional reason is that if alternatives such as domestic gas, hydropower, nuclear and in the future solar and bio-fuels have to emerge, the floor should be high enough and credibly communicated as such to potential investors in these alternative sources. India to almost all accounts would be deficit in energy. Therefore it is important that India has in place policies that engender the development of alternative sources of energy faster than what the market would have brought about. A crucial element in this policy is that the price of oil is not artificially held low even for short periods since that would create uncertainty with regard to the viability of other options. Thereby the rents paid through high oil prices to other (surplus) countries would be replaced by costs (and hence value added) incurred locally, as these investments take place and alternatives are brought on line. This for India would be optimal even if for the world in the short run it is not.

capabilities of storing crude efficiently for extended periods of time and protecting it against enemy forces. As such, the agency managing the strategic reserve needs significant specialized managerial and operational expertise.

Acquisition of oil assets outside India is an investment activity that is conceptually close to a sovereign wealth fund. This is an activity that requires investment appraisal and management capabilities of a high order. This activity is different from that of either the stabilization fund or the strategic reserve. The stabilization fund does not require any judgement or discretion and the strategic reserve needs operational and technical skills rather than investment judgement. Also the protection against supply disruption provided by secure reserves within the country is of a different nature from that provided by oil assets outside India.

As such, there are three different initiatives which are all conceptually different and are in some sense independent of each other:

- Stabilization fund

- Strategic crude reserve

- Strategic global oil asset acquisition

For the purposes of this report on petroleum pricing, the stabilization fund is the only one that is relevant as it is the only one that impacts pricing. The others are potentially important and valuable initiatives, but they are in some sense beyond the scope of this report. Both from a strategic and from an organizational or managerial perspective, the stabilization fund is independent from the other initiatives.

The only linkage that might make sense is that just as the stabilization fund could if desired sell a costless collar to domestic oil producers[31], it could if desired sell a costless collar to oilfields outside India owned and controlled by Indian entities.

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[31] See the section on "Domestically produced crude" above.

SECTION VI

IMPROVED ADMINISTERED PRICING MECHANISM

Introduction

In this section, we present our least preferred alternative for petroleum pricing in India which is as close as possible to the current Administered Pricing Mechanism (APM). We strongly believe that this solution is far inferior to the two methods that we have proposed in earlier chapters. We propose this only as a short term interim measure while moving towards our preferred solution very quickly.

Our reasons for not favouring the administration of prices are the standard ones. It distorts product prices and encourages unhealthy substitution of subsidized products for other products which are more efficient. It dampens price signals and discourages energy conservation. It creates vast distortions and makes good governance almost impossible as mentioned before. It also threatens India's international competitiveness in the long run. Our improvements in the APM do not address any of these issues and that is why we do not favour it ourselves.

Our improvements only address the issue of providing reasonable price signals to the oil refining and marketing companies so that investments in refining and distribution are not distorted and efficiencies are rewarded.

Our proposal is that the current APM or some variant thereof be used to set prices of petroleum products for the end consumer. Refiners and marketers would under the proposed scheme be unaffected by these prices because they would be paid a standard refining margin and a standard distribution margin. They would therefore be rewarded for operational and cost efficiencies without being burdened with the pricing subsidies.

Standard Refining Margin

Refineries are very long lived assets and it is absolutely critical to avoid misallocation of investment in refineries that are not globally competitive. We therefore propose that refineries be paid a standard gross refining margin in line with global trends. To

avoid reliance on accounting data that is prone to manipulation, we propose to rely on simple but transparent pricing benchmarks.

Specifically, we suggest use of the widely tracked crack spread based on futures prices. The most widely used crack spread is the 3:2:1 crack spread which assumes that three barrels of crude are cracked to produce two barrels of gasoline and one barrel of fuel oil[32]. This is of course a very simplified assumption as it ignores the wide range of other petroleum products and also abstracts away from refining yields. Yet, it has the advantage of relying on very liquid futures prices that are completely transparent. Unlike more detailed prices from agencies like Platts, these prices are accessible to any citizen of India with an internet connection.

In Figure 10, we plot the one month and twelve month moving averages of the crack spread since the mid 1980s. It is seen that during the 1980s and 1990s, the crack spread was relatively stable at around $5/bbl, but in this decade, the spread has become more volatile and has averaged around $10/bbl. In recent months, the spread has moved down from the historic highs achieved in 2007.

We propose that the twelve month moving average of the crack spread could be used to provide a standard refining margin to be paid to the refineries for every barrel of crude processed by them. This would insulate the refineries from the price of crude as well as the end user prices of petroleum products.

Standard Refining Yields

If the refineries were paid a simple crack spread based on barrels of crude processed, they would have no incentive to optimize refining yields. Therefore the crack spread margin must be supplemented by rewards and penalties for refining yields.

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[32] This Crack Spread would be suitable for India. Price distortion in India (differential pricing) creates a larger share for HSD than MS. Since international prices for MS and HSD are highly correlated using this crack spread would be alright. In any case since individual prices of crude, MS, HSD, FO are available it is always possible to construct a seemingly more suitable 'crack spread for India'. However since the Nymex spread is traded, hedging options would be available in a global setting and that would be useful, Being international in character over a period refineries would align themselves to the same.

In the chapter on the crude price stabilization fund, we proposed that the government lay down standard crude input required for producing each of the petroleum products. Based on these standards, it would be easy to determine the standard quantity of crude required to produce the actual outputs of any refinery. This quantity can be compared with the actual quantity of crude consumed to determine the quantity of crude saved or over consumed in the refining. This saving or excess consumption would be rewarded or penalized on the basis of the price of crude.

Suppose for example that a refinery processes 100,000 barrels of crude and produces an output which based on standard yields should have required only 99,100 barrels of crude. The refinery has used 900 barrels of crude in excess of the standard. It would therefore be penalized by an amount equal to 900 times the price of a barrel of crude. If another refinery processes 100,000 barrels of crude and produces an output which based on standard yields should have required 100,700 barrels of crude, then it has saved 700 barrels of crude. It would therefore be rewarded by an amount equal to 700 times the price of a barrel of crude.

As a further fine tuning, we propose that refineries be classified by scale and vintage into three or four categories and standard yield be laid down for each category. This categorization may be necessary because older refineries might use inferior technologies and therefore might achieve poorer yields. This must however be done with care to ensure that there is sufficient incentive to shut down old refineries and build new more efficient ones.

Standard Distribution Margin

We now turn to a similar mechanism to insulate the oil marketing companies from the distortions caused by the APM. Unlike the crack spread, there is no transparent and liquid benchmark for the distribution margin. This will have to be estimated on the basis of an analysis of cost components.

There are broadly three components of the standard distribution margin as we visualize it:

3.   Some costs like transportation are related to physical weight or volume. A standard distribution cost per litre could be used to cover these costs.

4.   Some costs like insurance, storage and evaporation losses are related to the value of the product and a standard distribution margin as a percentage of product value could be used to cover these costs.

5.   A reasonable rate of return as a percentage of standard capital investment in distribution would be the third component of the standard distribution margin. The rate of return could be specified as a standard risk premium over the yield on government securities or some other measure of the risk free interest rate.

It is important to ensure that all components of the standard distribution margin are based on standards (standard cost per litre, standard percentage markup and standard capital investment) and not on actual costs. This is essential to allow new entry into distribution of petroleum products and to foster competition between existing players.

In our earlier discussion of a "temporary deviation from the first best free pricing" with direct subsidies, we had indicated how the distribution costs could be indexed and awarded to the companies for those products, whose retail prices are controlled. Here we additionally relate the standard margin to the crack spread on the Nymex and lay out the framework for regulating the refining operations, making the companies immune to the retail price of the final product in India; rather than develop an index to carry forward refining costs.

Similarly here we retain the price cap regulation for distribution cost developed earlier under the topic of "temporary deviation from the first best".

Conclusions

1. Reform of the oil sector is long overdue. The problems in the sector emanate from the structure of central taxes and the system of subsidisation through prices. Solutions to the problems necessarily have to address both tax and subsidy simultaneously.

2. The social and fiscal costs arising out of the current method of subsidisation, and taxation are very severe. Additionally the sector generates vast rents, and much directly unproductive activities[33] take place both within and

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[33] The term "directly unproductive activities was originally used by Jagdish Bhagwati to describe socially wasteful activities arising out of rent opportunities created by policies such as licensing, quotas, artificial barriers to entry.

outside the sector. Governance problems arise as a result. In attempting to overcome these through administrative action further distortions arise, and there is further addition to directly unproductive activities.

3. The recent attempt to use markers in rationed kerosene to prevent its use in diesel (for adulteration) and in open sale kerosene, which has failed, is just one example of the vast unproductive activities generated by the price distortion.

4. The social losses include, misuse / wasteful use of scarce petroleum resources, diversion, adulteration, other avoidable negative externalities, improper substitution between products, tax arbitrage, distortion of consumer preferences and input choices of industries, and international cross hauling of petroleum. While an accurate quantification of these costs is difficult, it is almost certain that these losses are humongous and possibly many times the value of the consumer surplus arising out the subsidies delivered.

5. The fiscal costs are very large and much larger than that reported in the budget since they do not include the costs of diversion and tax avoidance that result from differential pricing. Thus in the case of kerosene the cost of delivering Rs. 2000 crore to the BPL consumers was in excess of Rs. 24, 000 crore. (Based on Morris et al 2006).

6. Nearly all these costs, and problems arise not because of subsidisation per se but due to the use of varying retail prices that are used to subsidise. Prices for the same product vary for different consumers besides. They also vary across products. These tax /subsidy variations are the root cause of nearly all problems in the sector. Autonomous price variations (i.e. those resulting from the actions of firms (under a regime of non-distortionary subsidies) would be small and not subject to 'arbitrage' i.e. to the realisation of rents through diversion and adulteration.

7. Tax reform – viz casting all taxes in the form of value added taxes has not taken place in the sector despite the passage of nearly 15 years since such reform was put in place in nearly all other sectors of manufacturing. Now that the a general goods and services tax on value added basis is on the cards, the insistence on price based subsidies, and varying prices through differences in the tax rates which are not vattable is an anathema.

8. Such unvattable taxes and "cross subsidisation" has imposed a very large cost on Indian industry making it difficult for it to compete with industries based in China and the Asian Tigers.

9. The response to the oil price rise has been to, in an adhoc manner, delay or not allow pass-through of the higher crude and oil prices. Thus the uncovered losses on account of incomplete pass thru has been "shared" by the government through excise tax "subvention", losses carried to the balance sheet of oil marketing and oil producing companies. It opens the door to arbitrariness in economic governance, and imposes very large policy risks on industry and the consumer.

10. Since commercially oriented entities cannot carry such uncovered losses (even if there are "indications" that price falls would also be delayed in pass thru) the risks they face are large. Unlike state owned enterprise private firms would value such indications differently, discounting the same steeply. This is especially so since they do not arise out a policy, law or an institutionalised process. A non-level playing field results therefore. The result has been the waste /underutilisation of vast distribution assets created by the private sector. The private sector had earlier created these assets on the promise of the reforms in the sector. It has resulted in unnecessary export of petroleum product even as imports of the very same products take place.

11. Not surprisingly therefore private investment has not generally gone into distribution. Since public sector firms have to bear the burden of adhocism they face a non-level playing field.

12. The two discriminations due not cancel but multiply the risks in the industry both with regard to entry and operations.

13. State owned companies can be forced to carry losses on account of uncovered subsidies. Even when these losses are made up subsequently when domestic prices are higher than that warranted by international prices, high risks are imposed since such compensation arises out of executive action of the state and not through policy or a well laid out framework . As such the markets would high risk. Therefore public sector oil companies are valued very poorly in terms of their P/E ratio. Additionally the current mode of ad-hoc administrative determination of allocation of subsidy cost is ofcourse unfair to minority shareholders in these companies.

14. The argument that little other than change at the margin in "reform" is possible is not quite convincing. The approach of "reform" thus far has been avoiding the recognising the root of the problem. While the trade and import parity prices for oil products (the extant regime) create some competition in refining, it is no solution since they do not remove the distortions outlined above, And such parity pricing makes distribution illegitimately into a regulated business defacto, when intrinsically it is a competitive business. Even the use of norms (based on past data) in this unwarranted regulation does not recognise the fact that the industry is intrinsically (had it not been for this unwarranted regulation) fully competitive except for the pipeline business.

15. Similarly, the political difficulties in carrying out tariff reform have been exaggerated. Earlier expert committees have ignored the use of direct endowment subsidies which potentially could remove the distortions outlined above, by liberating subsidies from prices. Such an approach by preserving and enhancing consumer benefits to the subsidised sector can only be politically rewarding.

16. We summarise the reform proposals:

17. Complete deregulation of the sector allowing oil producers, oil refiners, marketing companies, and integrated operators to price their products as they deem fit[34].

18. Recast central indirect taxes (excise whether specific or ad valorem) into a value added tax, as for any other product., i.e., allowing input credit for all registered intermediate users of petroleum products including of course the oil companies themselves, leaving out only truckers, taxi operators and other small intermediate users.

19. Central government revenues can be protected by working out a revenue neutral value added tax rate. This we have estimated approximately to be 110-120% of value added uniformly to all segments in the industry. Such a tax regime would also be neutral to the degree of vertical integration and remove the biases in the use of products.

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[34] It is important to recognize that free pricing does not mean either import or trade parity pricing, both of which are a form of administered prices, but with reference to international prices.

20. Prices of all major products would settle down to around today's diesel prices with very little difference between petrol, diesel and kerosene closing the large price arbitrage options (diversion and adulteration) that exist today.

21. The Public Distribution System (PDS) is not necessary and ought to be dismantled. Kerosene would then be sold in the open market for all consumers. Kerosene could also be sold by retail outlets, kirana shops, other retail outlets, and by current PDS retailers on par with kirana shops/ ROs. Ditto for LPG.

22. Companies are then free to price their product. There is sufficient degree of competition in refining, marketing and retailing to ensure that prices across locations do not vary by more that the difference in logistic costs of delivery to the locations from the cheapest sources.

23. Subsidies are administered through endowments defined upfront, which allows the subsidised consumer to access his/her endowments, trade the same, convert the same into cash all without the causing any distortion. Consumer welfare would be enhanced in a considerable way.

24. Such subsidisation framework has to be developed in a programme mode on the lines outlined in earlier reports submitted by the IIMA to the Petrofed.[35]

25. Imports and exports are completely free and all residual restrictions are removed. Only pipelines are subject to regulation by the Petroleum and Natural Gas Regulator.

26. Independent retailing on a substantial scale can further enhance the competitiveness of the sector not only in retailing but also in refining.

27. Crude, and product prices being not set/regulated in any way would result in pass thru in accordance with the structure, logistics and costs, and demands in the market. This is as it should be.

28. The difference between the cost of production of crude (under the ex-APM (Administered Price Mechanism) not the NELPs (New Exploration and Licensing Policy, various rounds) and the international price of crude is in part mopped up by the state.

29. The above proposals constitute the recommendations and are first best and are to be preferred over the second best proposals below:

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[35] Morris, Sebastian, Ajay Pandey and SK Barua (2006), and Pandey, Ajay and Sebastian Morris (2006)

30. The second best proposals involve the changes/recommendations as before but additionally creates a "Crude Price Stabilisation Fund" (CSF) that allows crude prices (both sharp rises and sudden falls) to be moderated, so that pass thru is influenced by the managers of the CSF.

31. It is important that the CSF is set up as in independent body and insulated from the government and is governed by strict and automatic rules that make rapid price adjustment (to the market prices) necessary when the fund position is low, so that the probability of the fund going bankrupt is kept at nearly zero.

32. A fund between $ 25 to 40 billion is envisaged. A fund of $40 billion (Rs. 200,000 crore) envisaged as a credit line would work in most situations.

33. The stabilisation is based on a counter cyclical tax/subsidy on crude that is revenue neutral over the entire price cycle. The fund must be designed so that over the entire cycle, the tax collected and the subsidy provided offset each other and the operations of the fund are fiscally neutral.

34. Though the fund would be revenue neutral over the price cycle, it would be in surplus or deficit at different points of time. The deficit would be met from a credit line from the government while the surplus would be invested in government securities. The line of credit is needed because the fund may encounter a period of high prices before it encounters a period of low prices and might therefore have to pay out large stabilization subsidies before it has earned any stabilization taxes. This borrowing would be repaid out of surpluses earned at a different point in the price cycle. After all borrowings have been repaid, further surpluses would be invested to meet future deficits.

35. The fund would operate with strict limits on the quantum of the credit line used to pay out stabilization subsidies during the boom phase of the price cycle as also on the accumulated reserves built up from stabilization taxes during the bust phase of the price cycle.

36. To enforce these limits, the stabilization rules would require that as the fund uses up the credit line, it automatically reduces the stabilization subsidy (raises the stabilized price of crude) rapidly enough to ensure that the credit line would never be exhausted.

37. We propose that the crude price be stabilized towards a target price that is equal to the 12 month moving average of crude prices. If the stabilization fund is well within the limits on the maximum permissible surplus or deficit,

the stabilized price would be equal to this target price. But as the fund moves closer to these limits, the stabilization would be reduced by moving the stabilized price away from the target price towards the actual price prevailing.

38. It is important to ensure that the crude stabilization taxes / subsidies are applied only to the crude content of all petroleum products consumed in India. Whenever a litre of petrol (or more generally of a litre of any petroleum product) is consumed within India, the stabilization tax/subsidy on the crude required to produce this petrol has been collected/disbursed by the fund. To implement this, the fund would lay down standard conversion factors that specify the crude content of every major class of petroleum product consumed in India. This can be based on the actual refining yields in the previous year in India. It goes without saying that the fund taxes /subsidies would have to be applied on / be made available to all players in the sector (traders, refineries, marketing companies) whether they are privately or state owned.

39. To ensure that such crude stabilisation measures do not affect the competitiveness of the industry exports of product (and crude) are taxed when crude is subsidised, and subsidised when crude is taxed. Appropriate conversion factors would apply. The conversion factor should be based on a refinery loss of between 10 and 7% say 8.5%.

40. As a third "best" option which is not really an option in our view (is no reform at all since all the distortions of controlled and varying retail prices would continue) we suggest a "better APM" which involves regulating refineries by awarding them an internationally referenced standard refining margin. Such a margin would not be administered and is independent of the final administered retail prices. It is based on the Crack Spread on the NYMEX. Similarly, the distribution and marketing business is regulated through a price cap based on a price index relevant for distribution. This should not be considered as an option really, since it replaces the current norms of cost plus regulation with marginally slightly improved one, while retaining all the other ill effects of the current mode of pricing, taxation and subsidisation.

41. Above all we would emphasise that on political expediency or the social dimension our first and second best proposals cannot be rejected since on both these counts they are actually value enhancing. They would create

much political good will for the government initiating reform, benefit the poor and the consumer. It would also result in vast fiscal savings.

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Table 1: Share of Primary Energy in Total Energy Consumed						
	India	South Korea	Brazil	Japan	Mexico	Taiwan
Coal	53	24	5	20	5	36
Hydro	6	< 1%	36	3	4	2
Nuclear	1	14	1	13	1	0
Other Renewable	1	< 1%	2	1	2	8
Oil	31	50	48	49	55	45
Natural Gas	8	12	7	14	32	9
Source: US Dept. of Energy, Country Analytical Briefs						

Table 2: Some Aspects of the Taxation of Oil and Oil Products in India							
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Excise and cess on crude oil (Rs. cr.)	2731	4501	5134	5248	5007	7034	6866
Excise and cess on product (Rs.cr.)	26606	31460	35017	37897	46742	50850	53365
Customs duties on crude (Rs.cr.)	4818	6820	7491	9761	7158	7583	9101
Customs duties on product (Rs.cr.)	1949	2346	3091	3489	4236	6426	9041
Excise Paid on all Petroleum products and crude per tonne of crude absorbed by economy (Rs./MT)	2550.4	2904.8	3092.3	3278.5	3556.9	3715.6	
Customs Duty paid on all imports of petroleum products and crude per MT of crude and crude equivalent imported (Rs/MT)	752.1	925.4	1002.8	1180.5	873.1	958.9	

Table 3: Oil Products: Production, Imports and Exports (2006-07)									
	Import ('000 MT)	Production ('000 MT)	Exports ('000 MT)	Exports (Rs. crore)	Consumption ('000 MT)	Price /MT realised exports (Rs)	Value of exports per litre(Rs.)***	Trade Ratio (E+I)/C	Net Import Ratio (I-E)/C
LPG	2278	8454	112	342	10849	30535.71	16.79	22.03%	19.96%
Naphtha	5307	18176	8411	21431	13886	25479.73	18.60	98.79%	-22.35%
Petrol (MS)	421	12536	3615	10191	9286	28190.87	21.99	43.46%	-34.40%
ATF	0	7850	3652	10254	3983	28077.77	22.46	91.69%	-91.69%
Kerosene	1424	8621	150	541	9505	36066.67	28.85	16.56%	13.40%
Diesel (HSD)	968	53676	11369	29198	42896	25682.12	21.57	28.76%	-24.25%
Fuel Oil	2983	12259	3759	4988	12618*	13269.49	11.94	53.43%	-6.15%
Others **	4279	18498	2556	4149	17726	16232.39		38.56%	9.72%
All products	17660	140070	33624	81094	120749	24117.89		42.47%	-13.22%
**Others are LDO, lube oil, LSHS, Bitumen, and other products *Including LSHS ***At density at 15 deg. C.									

	Table 4: Certain Aspects of Taxation in Relation to Value Added in the Petroleum Sector in India				
		A	B	C	D
1	Value Added (Output-Input-Indirect Taxes) (Rs. crore)	22809	27883	44537	95228
2	Value Added (PBIT+deprn.+ Wages and Salaries)(Rs. crore)	42278	34628	51988	128894
3	Indirect taxes (Rs. crore)	57908	8072	9814	75794
3(a)	of which excise duties	55175	6885	6110	68171
3(b)	.. sales taxes	476	619	320	1415
3(c)	...other indirect taxes	2257	568	3384	6208
4	Royalties/knowhow paid (Rs. crore)	133	0	7223	7356
5	Wages and Salaries (Rs. crore)	5658	2255	6708	14622
6	Interest paid (Rs. crore)	3459	2279	5046	10784
7	Returns to the company (Rs. crore)	7095	19545	22632	49272
8	Direct taxes (Rs. crore)	6596	3804	10151	20550
9	Sales including all taxes ((Rs. crore)	621307	173137	70630	865074
Ratios Using Measure of Value Added as in (2) above					
10	Value added / Sales (%)	6.80%	20.00%	73.61%	14.90%
11	Indirect taxes / Sales (%)	9.32%	4.66%	13.90%	8.76%
12	Royalties /Value added (%)	0.31%	0.00%	13.89%	5.71%
13	Indirect taxes / Value added (%)	136.97%	23.31%	18.88%	58.80%
13(a)	of which excise duties (%)	130.50%	19.88%	11.75%	52.89%
13(b)	.. sales taxes (%)	1.13%	1.79%	0.62%	1.10%
13(c)	...other indirect taxes (%)	5.34%	1.64%	6.51%	4.82%
14	Returns to Company / Value added (%)	16.78%	56.44%	43.53%	38.23%
15	Direct taxes / value added (%)	15.60%	10.98%	19.52%	15.94%
16	Interest /value added (%)	8.18%	6.58%	9.71%	8.37%
17	Wages and salaries / value added (%)	13.38%	6.51%	12.90%	11.34%
Ratios Using Measure of Value Added as in (1) above					
18	Value added / Sales (%)	3.67%	16.10%	63.06%	11.01%
19	Royalties /Value added (%)	0.58%	0.00%	16.22%	7.72%
20	Indirect taxes / Value added (%)	253.88%	28.95%	22.04%	79.59%
20(a)	of which excise duties (%)	241.90%	24.69%	13.72%	71.59%
20(b)	.. sales taxes (%)	2.09%	2.22%	0.72%	1.49%
20(c)	...other indirect taxes (%)	9.89%	2.04%	7.60%	6.52%
21	Returns to Company / Value added (%)	31.11%	70.10%	50.82%	51.74%
22	Direct taxes / value added (%)	28.92%	13.64%	22.79%	21.58%
23	Interest /value added (%)	15.16%	8.17%	11.33%	11.32%
24	Wages and salaries / value added (%)	24.81%	8.09%	15.06%	15.35%
A-Public Sector Oil Refining and Distribution Companies; B- Pvt Sector Oil Refining, Distribution and Production Companies; C-Public Sector Oil Production Companies; D-All Companies. Annual Accounts information taken from Prowess Data Base of the Centre for Monitoring the Indian Economy. Sales taxes may be correctly captured. Data pertain to the year ending 2008, as in the original annul report. (*1) BPCL, Bongaigon Refineries and Petrochemcials, Chennai Petroleum, HPCL, IOCL, Kochi Refineries (Merged), Mangalore Refineries and Petrochemicals, and Numaligarh Refineries (*2) Cairn Energy, Essar Oil, Gujarat State Petroleum Corporation, Hindustan Oil Exploration Corporation, Reliance Industries, Reliance Petroleum (merged). (*3) ONGC Videsh, ONGC, Oil India.					

Table 5: Select Aspects of Sales, Foreign Exchange, Value Added and Taxes from the Aggregate Annual Reports (Rs. crore or %)						
	Dec-02	Dec-03	Dec-04	Dec-05	Dec-06	Dec-07
All Manufacturing Companies						
Value Added 1 (PBDITA+Compensation - Income from Financial Services)	133488	152609	184809	214610	227665	290559
Value Added 2 (Sales - Income from Financial Services - RM - Power Fuel etc- IBT - Selling and Distribution)	323658	349934	410441	474270	519566	614619
Indirect Business Taxes (IBT)	96005	102325	116693	130255	157514	169383
Sales	871322	961327	1110825	1338385	1552763	1822509
PBDITA	91076	108927	139348	167645	180932	244862
Gross Fixed Assets + Current Assets	988277	1038876	1135663	1287788	1488503	1670410
Forex Earnings	81670	99414	127241	170707	204505	277447
Forex Spending	157044	186443	220911	317959	438807	502748
No of firms included	4660	4595	4741	4595	4281	3722
IBT / Value Added 1	71.9%	67.1%	63.1%	60.7%	69.2%	58.3%
IBT / Value Added 2	29.7%	29.2%	28.4%	27.5%	30.3%	27.6%
IBT / Sales	11.0%	10.6%	10.5%	9.7%	10.1%	9.3%
PBDITA /Total Assets	9.2%	10.5%	12.3%	13.0%	12.2%	14.7%
Net Forex / Value Added 1	-56.5%	-57.0%	-50.7%	-68.6%	-102.9%	-77.5%
Petroleum Product Companies						
Value Added 1 (PBDITA+Compensation - Income from Financial Services)	20955	27296	32061	31779	30922	41487
Value Added 2 (Sales - Income from Financial Services - RM - Power Fuel etc- IBT - Selling and Distribution)	133613	141988	160508	183394	202533	245432
Indirect Business Taxes (IBT)	33835	36023	40869	43879	59548	61257
Sales	273926	313916	349012	426853	538459	656757
PBDITA	22685	29425	34624	34229	32954	47471
Gross Fixed Assets + Current Assets	174566	198437	215307	247195	302931	332630
Forex Earnings	12079	15508	20272	35994	54773	88180
Forex Spending	78156	101160	109644	164096	246277	279343
No of firms included	36	37	42	41	36	29
IBT / Value Added 1	161.5%	132.0%	127.5%	138.1%	192.6%	147.7%
IBT / Value Added 2	25.3%	25.4%	25.5%	23.9%	29.4%	25.0%
IBT / Sales	12.4%	11.5%	11.7%	10.3%	11.1%	9.3%
PBDITA /Total Assets	13.0%	14.8%	16.1%	13.8%	10.9%	14.3%
Net Forex / Value Added 1	-315.3%	-313.8%	-278.8%	-403.1%	-619.3%	-460.8%
NB: No of companies included are given. The collation has been over annual reports ending at any time up till Dec of the year. Source: Originally from the EIS, of the CMIE.						

	Table 6: Taxes in Relation to Value Added and Profits in the Sector				
		2003-04	2004-05	2005-06	2006-07
1	Customs duty	9552	11697	9157	10043
2	Cess	4766	4891	4884	6899
3	Excise duty	35364	38150	47180	51922
4	Royalty	1620	2181	2306	2794
5	Corporate tax	10038	11180	10896	12153
6	Dividend	6320	7641	7229	7963
7	Tax on dividend	1110	1513	1315	1362
8	Others (incl. service tax)	425	439	347	666
9	Subtotal	69195	77692	83314	93802
10	Sales tax	32080	38935	46667	53650
11	Royalties	1643	2251	3199	3568
12	Dividend to state governments	18	21	19	22
13	Octroi, duties incl. electricity duty	1032	1313	2211	1891
14	Others	408	734	157	525
15	Subtotal	35181	43254	52253	59656
16	Total contribution	104376	120946	135567	153458
17	Net value added	17335	23659	28459	n.a
18	Gross value added (GVA)	21210	27740	32691	n.a
19	Gross output	142989	172778	228439	n.a
20	Gross profits	14703	21289	25920	n.a
21	Wages	1448	1542	1695	n.a
22	Indirect central taxes / GVA	191.2%	156.7%	160.3%	n.a
23	Indirect state taxes /GVA	158.0%	147.7%	150.0%	n.a
24	Royalties /GVA	15.4%	16.0%	16.8%	n.a
25	Customs duty /GVA	45.0%	42.2%	28.0%	n.a
26	Direct taxes /profits	52.6%	45.8%	37.4%	n.a
NB: Values in Rs. crore, ratios as %. (1) to (16) - from Company Data as reported in Infraline (17)-(21) from the Annual Survey of Industries (3 digit industry 314) as in CMIE Business Beacon					

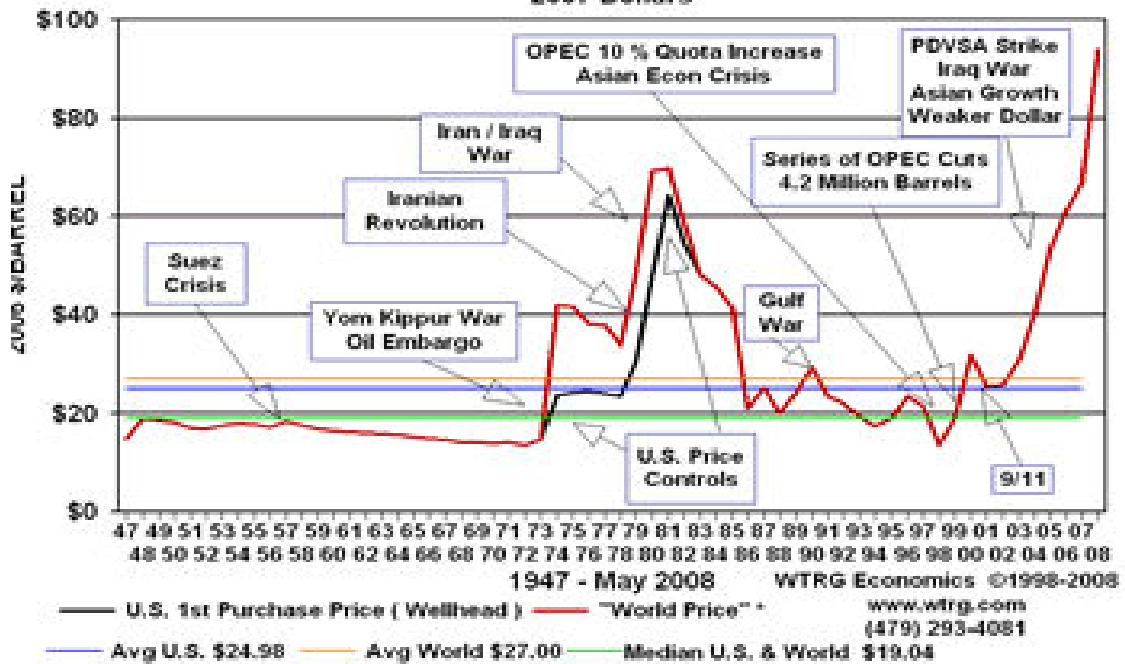|	Table 7: Price Build up on Diesel and Petrol and Computation of Taxes as a Proportion of Value Added. C. 2008		
		MS	Diesel
1	Price paid to refinery (Rs.)	29.95	36.24
2	Inland Freight (Rs.)	0.68	0.76
3	Marketing cost (Rs.)	0.59	0.59
4	Return on capital (Rs.)	0.73	0.71
5	Dealer commission (Rs.)	1.02	0.6
6	Excise Duty (Rs.)	14.78	4.74
7	VAT (Rs.)	7.59	3.78
8	Total (Rs.)	55.34	47.42
9	Retail selling price (Rs.)	45.52	31.76
10	Under recovery to oil marketing companies (OMCs) (Rs.)	-9.82	-15.66
11	Under recovery to OMCs for the month (Rs. crore)	1250	7860
12	VA by oil companies in distribution and by dealers and product transportation (Rs.)	3.02	2.66
13	Indirect Taxes paid (Rs.)	22.37	8.52
14	Total tax on value added (13)/(12)	740.73%	320.30%
15	Implicit quantities sold (in Kilolitres)	1272912	5019157
16	Tax per rupee of retail selling price (13)/(9)	49.14%	26.83%
17	Total taxes collected (Rs. crore)	2847.51	4276.32
	Source (1) to (11) Infraline 7164 Second Fortnight of April, New Delhi		

Table 8: Some Structural Features of the Oil Economy in India, and the Revealed Conversion Ratio							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Crude imports (MT)	74.1	81.99	90.43	95.86	99.41	111.5	121.67
Crude production (MT)	32.43	33.04	33.37	33.98	32.19	33.988	34.117
Crude exports (MT)	0	0	0	0	0	0	0
Domestic absorption of crude (MT)	106.53	115.03	123.8	129.84	131.6	145.488	155.787
Product imports (MT)	9.27	7.23	7.9	8.83	11.68	17.66	22.72
Product production (MT)	95.81	104.14	113.46	118.58	119.75	135.26	144.93
Product exports (MT)	8.37	10.29	14.62	18.21	21.51	33.62	39.33
Domestic absorption of product (MT)	96.71	101.08	106.74	109.2	109.92	119.3	128.32
Product/Crude conversion ratio as revealed	0.899371	0.905329	0.916478	0.913278	0.909954	0.929699	0.930309

Table 9: Prices of Crude and Petroleum Products, and Implicit Refinery Margins in India															
	Prices in $ per MT					Price Ratio to Crude				Consumption Products in India				Weighted Avg Product Price	*Implicit Refinery Margin (%) of input*	*Implicit Refinery Margin ($ per barrel)*
	Crude	Petrol	Diesel	Kero-sene	LPG	Petrol	Diesel	Kero-sene	LPG	Petrol	Diesel	SKO	LPG			
2-Mar	170.9	225.4	173.6	186.8	194.0	1.319	1.016	1.093	1.135	7011	36546	12688	7728	184	-0.029	-0.7
2002-03	195.3	256.2	215.3	231.0	279.7	1.312	1.102	1.183	1.432	7570	36644	12674	8351	231	0.066	1.8
2003-04	205.0	298.6	226.7	245.8	277.0	1.457	1.106	1.199	1.351	7897	37074	12714	9305	245	0.079	2.2
2004-05	287.4	417.7	349.9	391.1	368.6	1.453	1.218	1.361	1.282	8251	39650	12208	10245	367	0.152	5.9
2005-06	408.4	550.3	482.7	548.5	481.0	1.347	1.182	1.343	1.178	8647	40191	12837	10456	502	0.107	6.0
2006-07	457.8	619.4	552.9	608.5	499.7	1.353	1.208	1.329	1.091	9286	42896	13488	10849	563	0.107	6.7
2007-08	580.9	774.2	693.1	745.2	683.5	1.333	1.193	1.283	1.177	10327	42847	13908	11324	711	0.103	8.1
2008-09 (upto October)	792.0	979.2	981.4	1059.3	847.3	1.236	1.239	1.338	1.070	10327	42847	13908	11324	975	0.109	11.7
Apr'08	775.3	998.8	1012.4	1075.2	811.0	1.288	1.306	1.387	1.046	10327	42847	13908	11324	992	0.152	16.1
May'08	886.3	1109.4	1160.9	1238.3	854.0	1.252	1.310	1.397	0.964	10327	42847	13908	11324	1123	0.141	17.0
June'08	950.8	1183.8	1206.7	1267.6	910.0	1.245	1.269	1.333	0.957	10327	42847	13908	11324	1171	0.109	14.1
July'08	971.0	1149.0	1204.4	1287.9	932.0	1.183	1.240	1.326	0.960	10327	42847	13908	11324	1172	0.087	11.5
Aug'08	828.7	972.2	945.6	1047.1	878.0	1.173	1.141	1.264	1.060	10327	42847	13908	11324	957	0.040	4.5
Sep'08	709.6	894.1	848.1	920.7	824.0	1.260	1.195	1.298	1.161	10327	42847	13908	11324	863	0.095	9.2
Oct'08	506.6	657.9	589.9	675.1	802.0	1.299	1.164	1.333	1.583	10327	42847	13908	11324	644	0.145	10.0

Table 10: Herfindahl Index of Refining Based on Capacity and Output (000 tonnes)									
	Capacity	Refinery Output							
	c. 2006-07	1999-00	2000-01	20001-02	2002-03	2003-04	2004-05	2005-06	2006-07
(A) Public Sector	105468	51772	77411	82015	89495	93107	96946	108172	112541
IOC, Guwahati,	1000	783	707	458	891	1002	864	839	920
IOC, Barauni, Assam	6000	2416	3122	2994	4304	5082	5553	5469	5634
IOC, Koyali, Bihar	13700	9334	12006	12434	12758	11698	11543	12953	13714
IOC, Haldia, Gujarat Bengal	6000	2835	3873	4513	4518	5418	5502	5836	5715
IOC, Mathura, West Pradesh	8000	7808	7133	8207	8248	6387	7938	8883	8033
IOC, Digboi, Uttar	650	566	678	581	602	651	615	586	564
IOC, Panipat, Assam	12000	0	5707	6101	6338	6390	6507	9435	12821
Total IOC Haryana	47350	23742	33226	35288	37659	36628	38522	44001	47401
BPCL, Mumbai,	12000	6957	8683	8711	8757	9138	10298	12030	12746
HPCL, Mumbai, Maharashtra	5500	5766	5575	6078	6108	6118	6249	7419	7409
HPCL, Visakh, Maharashtra Pradesh	7500	3464	6405	6851	7591	8121	7980	9377	9409
Total HPCL Andhra	13000	9230	11980	12929	13699	14239	14229	16796	16818
KRL, Kochi, (BPCL)	7500	5006	7520	7580	7854	7924	6939	7742	8134
CPCL, Manali, Kerala Nadu	9500	5698	6046	6176	6387	8181	9680	9784	9802
CPCL, Narimanam, Tamil Nadu	1000	0	579	643	653	742	682	618	464
Total CPCL Tamil	10500	5698	6625	6819	7040	8923	10362	10402	10266
BRPL, Bongaigaon,	2350	1139	1488	1463	2126	2311	2356	2067	2020
NRL, Numaligarh, Assam	3000	0	1451	1879	2200	2042	2133	2504	2568
ONGC, Tatipaka, Assam Pradesh	78	0	0	93	91	93	93	94	63
MRPL, Mangalore, Andhra	9690	0	6438	7253	10069	11809	12014	12536	12525
(B) Private Sector PRIVATE Karnataka	43500	0	26033	30544	32345	34309	33163	38379	43562
RPL, Jamnagar,	33000	0	26033	30544	32345	34309	33163	36616	36931
ESSAR Oil Gujarat Vadinar**	10500	0	0	0	0	0	0	1763	6631
Total (a+b) Ltd.	148968	51772	103444	112559	121840	127416	130109	146551	156103
Hindex of firms	0.182	0.282	0.201	0.204	0.199	0.191	0.189	0.188	0.182
Hindex of units	0.097	0.118	0.114	0.121	0.117	0.118	0.113	0.110	0.104

Figure 1:
World Prices of Crude and Events That Have Influenced Crude Prices

Source: History and Analysis – Crude Oil Prices (http://www.wtrg.com/prices.htm)

Figure 2

Figure 3

Theil Measure of Instability for Consumption Shares of Various Items of Fuels

Figure 4:

Theil Measure of Instability for Consumption

Figure 5

Growth Rates in PFCE

Private final consumption expenditure (PFCE) (at constant 99-00 prices (new series))

PFCE: Liquified petroleum gas (at constant 99-00 prices (new series))

PFCE: Kerosene oil (at constant 99-00 prices (new series))

PFCE: Other fuel (at constant 99-00 prices (new series))

Figure 6

Indirect Taxes / Value Added (1) in All Mfg and in the Petroleum Products Sector

All Mfg.   Petroleum products

Figure 7

**Indirect Taxes / Value Added (1) and
Net Forex/ VA in All Mfg and in the
Petroleum Products Sector**

Legend:
— All Mfg.   — Petroleum products
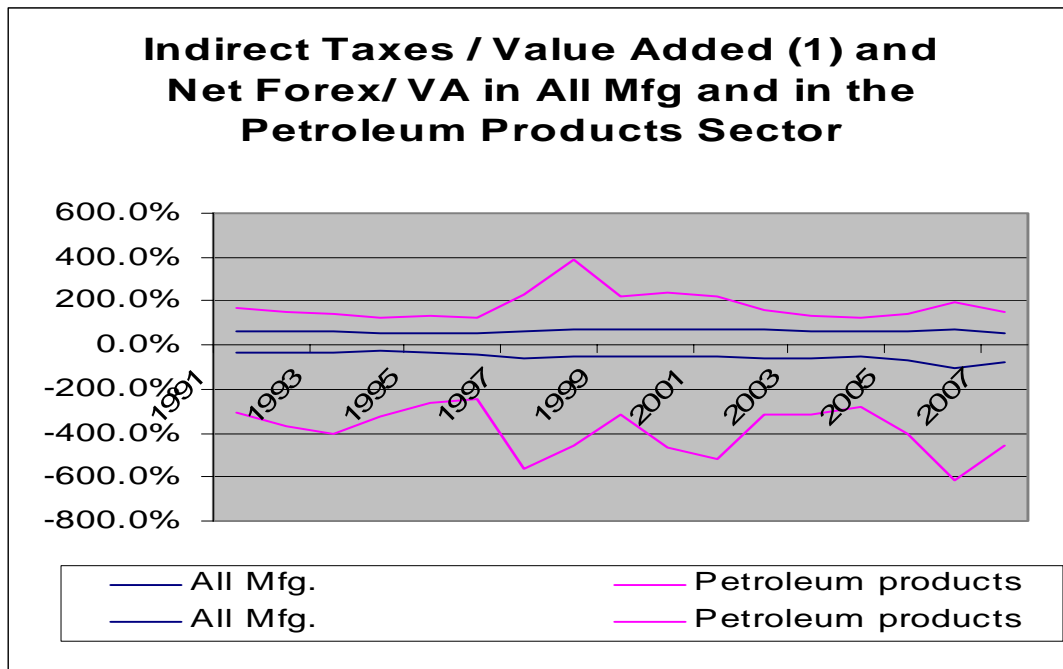— All Mfg.   — Petroleum products

Figure 8:

Stabilization with fund of $25 b and 3 months target cover

Legend:
— Stabilization Tax (Subsidy) $/bbl   — Fund Surplus (Deficit) $ billion
— Crude Futures 12M MA (right axis)   — Stabilized Price (right axis)
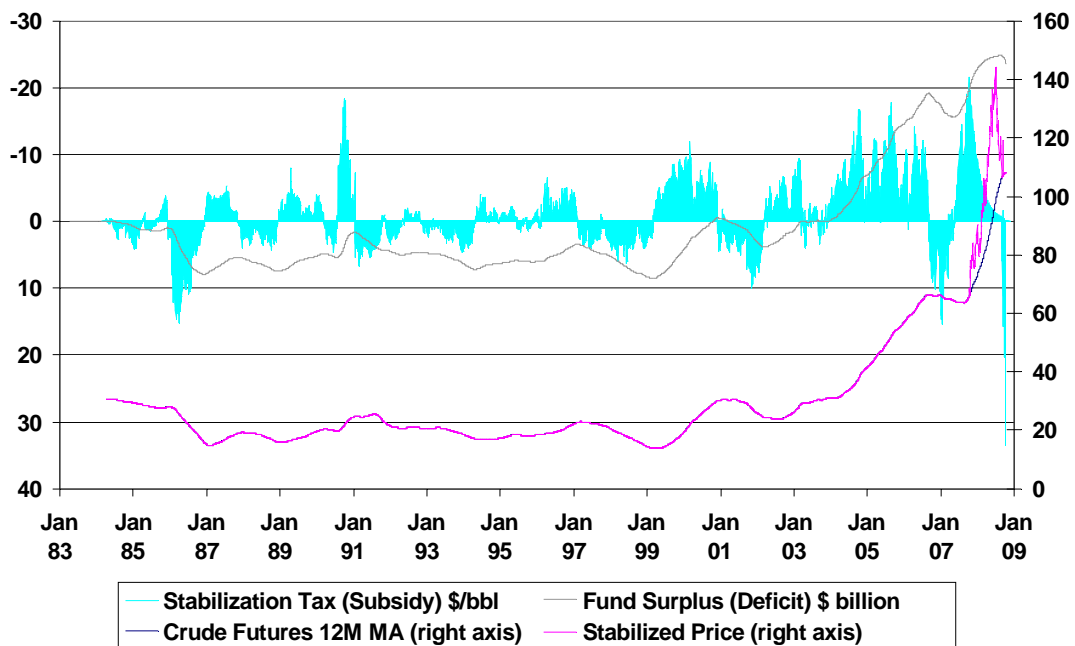
Performance of stabilization with fund of $25 b and 3 months target cover. For almost a year, from October 2007 to September 2008, stabilization is incomplete and during March-August 2008, stabilization has to be virtually abandoned as the stabilization fund does not have enough money.
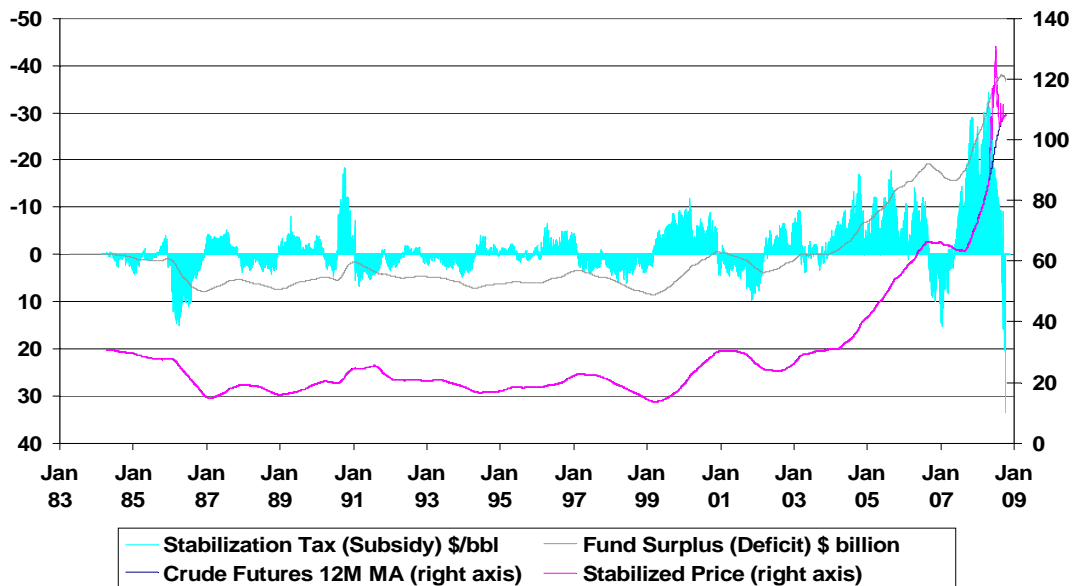
Figure 9:

Stabilization with fund of $40 b and 3 months target cover

Performance of stabilization with fund of $40 b and 3 months target cover. During May-August 2008, stabilization is partial as the stabilization fund does not have enough money. In late June and early July 2008, less than half of the price spike is eliminated through stabilization.

Figure 10:

Crack Spread (3:2:1) on Nymex
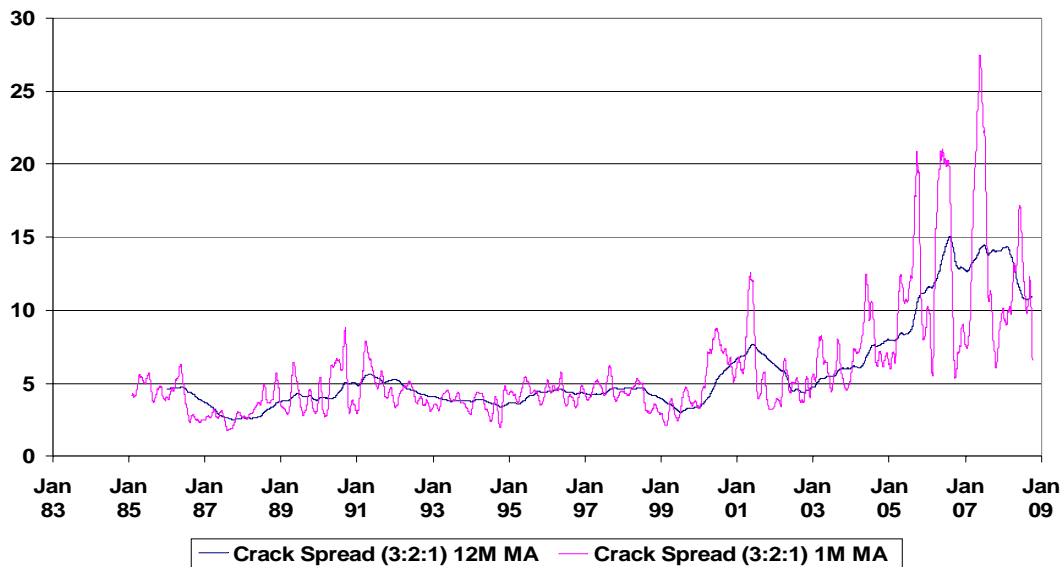
This chart shows one month and twelve month moving averages of the 3:2:1 crack spread at Nymex. This is computed by adding the price of two barrels of gasoline to the price of one barrel of fuel oil, subtracting the price of three barrels of crude oil and dividing the result by three. It measures the approximate refining margin from refining one barrel of crude. Since the gasoline and fuel contracts are quoted in cents per gallon, and a barrel is 42 gallons, these prices are multiplied by 0.42 to obtain the price in dollars per barrel.