PETROLEUM PRICING IN DEVELOPING COUNTRIES

by

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INTRODUCTION

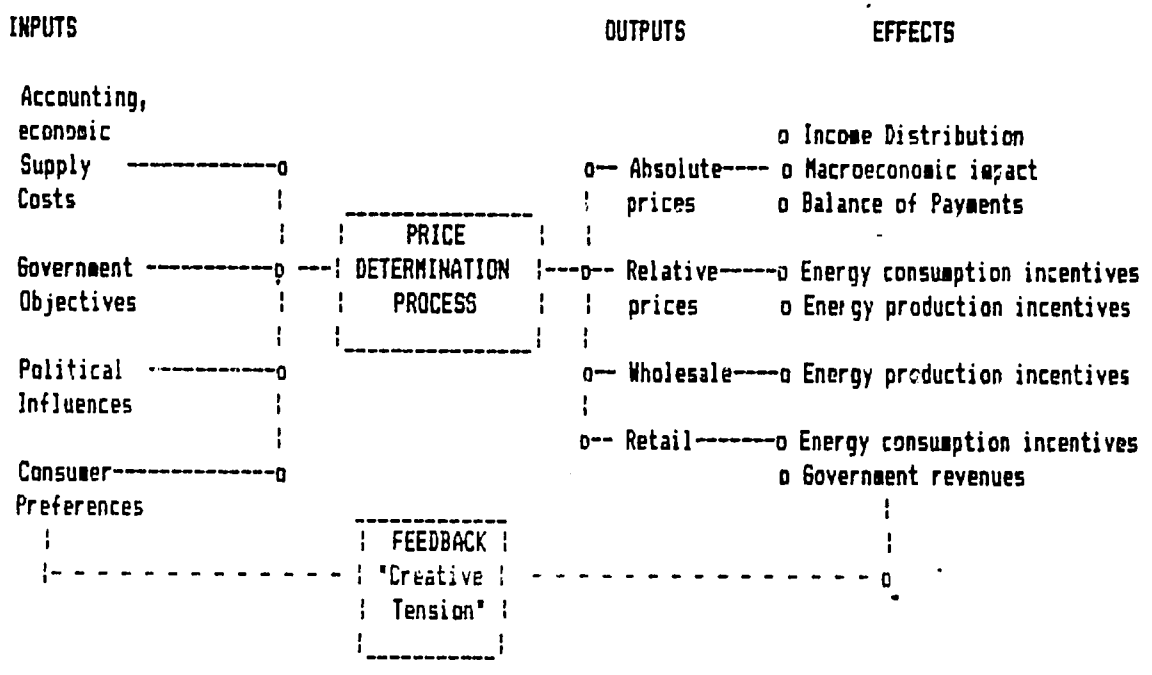
Oil prices are regulated in virtually every developing country.[1] Economists, oil businessmen, politicians, and government bureaucrats usually have diverging views on the "best price" for petroleum products. There should be consensus, however, on the following statements of priority:

> For governments of developing countries, it is far more important to get the **overall** oil price right than to get individual product prices right.
>
> For agencies disbursing development assistance, it is far more important to help governments implement a **program** of reform than a **one-shot** price change.
>
> For students of petroleum (and other) pricing policies in developing countries, **institutional** and **political** factors dominate the policy-making process, and these factors deserve far more systematic study than they have received. In the absence of "creative tension" between groups favoring lower and higher prices, it is unlikely that a sound pricing program can exist.

A complete oil pricing analysis should be a kind of Input/Output exercise, as illustrated in figure 1. Certain costs, objectives, and political influences are inputs to energy price determination. The outputs are sets of energy prices over time that influence the welfare of particular groups in society as well as, naturally, society as a whole. Some sets of prices may be more efficient than others, some may be regarded as more equitable.

FIGURE 1

ENERGY PRICING: INPUTS, OUTPUTS, EFFECTS



The diagram provides a framework for discussion of the principal findings of a study of petroleum product pricing in developing countries.[2] Research focused on Brazil, Argentina, Ecuador, the Sudan, South Korea, and Thailand. This article describes the evolution of overall and relative petroleum product prices, both retail and wholesale. It then reviews the price determination process and arrives at several propositions about countries' propensities to implement efficient pricing systems.

The project's principal purpose has been to review in considerable detail the state of petroleum prices in the subject countries, and to assess the institutional constraints on the implementation of efficient pricing systems. Hence this article deals more with the policy process than with measurement of economic efficiency, it is

more a study of the application of economic principles than of the principles themselves.

THE OVERALL PRICE OF OIL AND MACROECONOMIC POLICY

The absolute or overall price of oil[3] affects a nation's aggregate demand for goods and services, the balance of payments, public sector finance and the money supply. When domestic prices of oil change suddenly, demand for other goods and services is likely to change. If oil is an important import or export, the demand for foreign currency or the supply of foreign currency changes, causing the domestic currency to tend to appreciate or depreciate. When changes in the price of oil cause the changes mentioned above, the money supply may also be affected if the domestic monetary authorities choose to reflate or deflate in reaction to other changes in these macroeconomic variables.

The scale of the effect of oil prices on other macroeconomic variables, of course, is the real issue. In the set of developing countries studied here, the 1979 oil price increase was one economic shock, and the devaluation of national currencies was another shock that forced governments to reexamine their internal oil pricing policies. In both shocks -- the latter following very closely after the former -- governments had to decide whether to align overall oil prices gradually or suddenly or not at all with the international price structure.

With respect to the level of the overall price of oil, a government has four basic options:

1) Autarchic strategy: do not align the domestic overall oil price with the world price; base it instead on some other factor such as the cost of domestic oil production (Ecuador, Argentina)

2) "Managed market price" strategy: the domestic overall oil price is loosely based on international prices, but does not follow every twist and turn of international spot or even contract prices (Brazil, Sudan, Thailand)

3) "Industry security" strategy: set the overall price at levels that safeguard the financial

viability of the domestic oil industry. Typically, this approach creates an overall price higher than international spot prices, and calls as an auxilary policy for product import restrictions (South Korea).

4) Free market: very few countries, either developed or developing, allow oil prices to be determined without government interference. Among developed countries, the United States, West Germany, and the United Kingdom do not regulate prices. Among developing countries, Chile, Singapore, and Hong Kong are among the very few who refrain from regulating oil product prices.

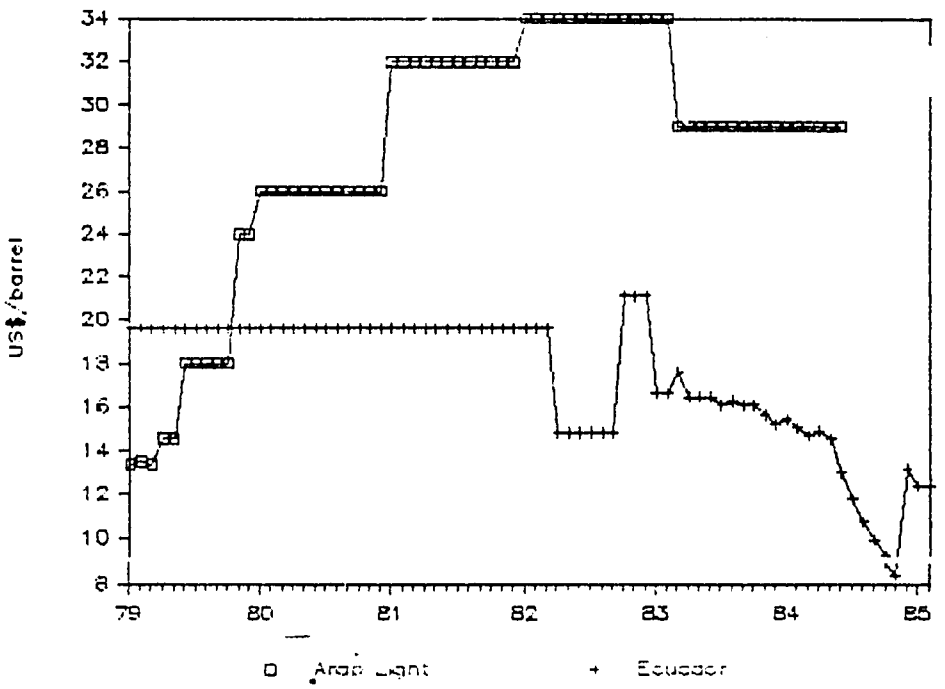
Ecuador and Argentina

Among the developing countries included in our study, we found that the governments of oil-sufficient and exporting countries (Ecuador, Argentina) had difficulty aligning domestic with international prices as they went up in 1979 and 1980. Ecuador ignored increases in international petroleum prices and depreciation of its currency against the dollar and continue to charge an extremely low overall price for oil to its own citizens. For example, in January 1978 the overall price of petroleum products was 10 sucres/gallon, which at the prevailing exchange rate was $0.33/gallon. Seven years later, the overall price was 34 sucres/gallon, still about $0.30 cents per gallon at the "high official" exchange rate ($0.38 at the "low official" exchange rate of 90 sucres per dollar). During this same period the "international" oil price (that of the benchmark Arab Light) increased from $14 to $28 and the sucre/dollar exchange rate had deteriorated from 30 to 120. In 1978, had Ecuador implemented a policy to keep its overall price at world levels, it would have risen to at least 60 sucres/gallon by 1985.

The government in Quito has the luxury of choice because the country produces over 250 thousand b/d of oil while consuming less than 100 thousand b/d. Oil consumers in Ecuador are merely paying the average cost of the oil products they use. Figure 2 shows the result of Ecuador's oil pricing policy.

FIGURE 2

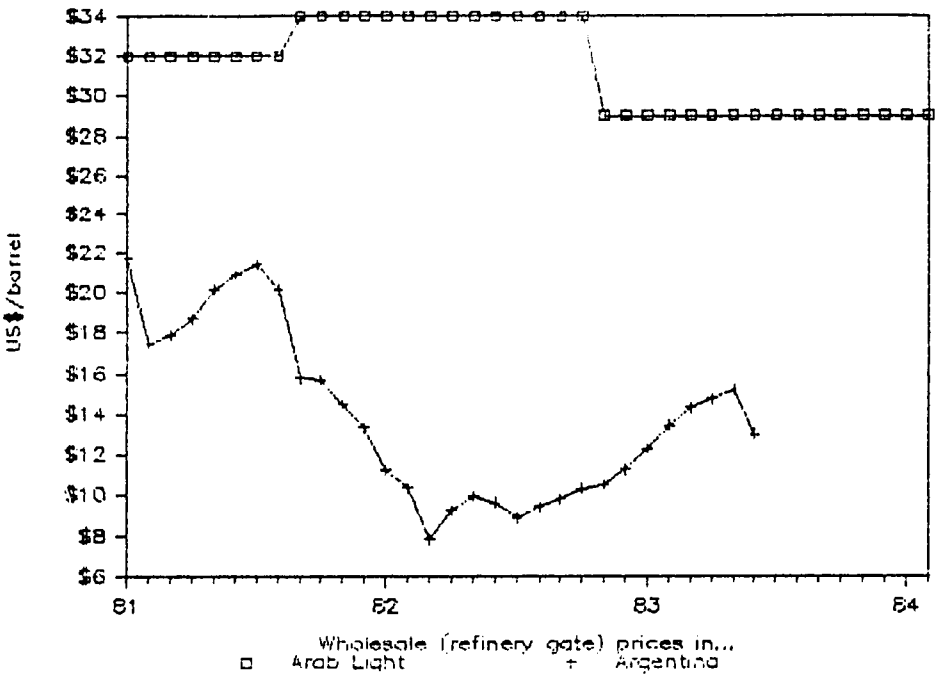
ADJUSTMENT OF ECUADORIAN OIL PRICES:
1978 TO 1985



Argentina presents a case in which overall petroleum price declined dramatatically in the 1981-1984 period, when it isolated itself from the world oil market. As is readily evident in figure 3, the Argentine domestic oil price was well below world levels in 1981. Because Argentina is self-sufficient in oil, this "subsidy" had no immediate, adverse effect on the demand for foreign exchange. In 1982, however, local oil prices in dollar terms plummeted as a result of the government's decision to freeze them during the Falklands crisis. In an economy where the rate of inflation exceeds 400 percent, a freeze in local prices is a very dramatic event.

FIGURE 3

ARGENTINE OVERALL OIL PRICES AND
THE PRICE OF ARAB LIGHT: 1981-1984



In Argentina, the factors that usually contribute to keeping overall oil prices at world levels were missing. First, YPF, the Argentine national oil company, was unable to prevent the oil price freeze from being implemented. Second, the central bank did not regard oil pricing as being of vital concern to its mission. The political elite, therefore, encountered little opposition to its decision to freeze oil prices.

In Argentina's circumstances, the oil price freeze had a particular short-term, macro-economic effect: a shift in revenues from the oil sector, YPF in particular, to oil consumers. In Argentina, unlike in oil-importing countries, pricing oil far below world levels had no immediate effect on the foreign exchange situation.

Thailand and South Korea[4]

Among the oil-importing developing countries, both Thailand and South Korea were able to adjust domestic

petroleum prices quite promptly in response to the 1979-80 world price increases. In both cases, the short-run inelasticity of oil demand to price, the conservative monetary and fiscal policies of the governments, and the relative sluggishness of the market for exports meant that the massive diversion of domestic expenditures to the oil sector had a strongly deflationary impact on the Thai and Korean economies. Moreover, in South Korea the domestic wholesale overall price rose so far above international levels that the domestic refining industry collected a substantial rent.

The Thai economy was not shielded by price controls from the sharp increases in world oil prices in 1979-80. The Thai authorities allowed the overall domestic oil price to rise with international posted (not spot) prices, with a lag of only a month or two. Because the increases in the price of oil were directly passed on to consumers, and because consumer demand for oil products was inelastic in the short run, national expenditures on oil imports rose sharply: from 16.5 billion baht in 1978 to 23.4 billion baht in 1979 to 39.3 billion baht in 1980.

The increased import cost of oil was recovered, however, by the domestic price increases. While there were subsidies on particular products, the overall price was increased sufficiently so that enough baht were collected to exchange for the dollars needed to buy the oil. There was no subsidy hidden by the exchange rate in the Thai pricing system.

As a result of the sharp domestic price increases and of the short-term inelasticity of oil demand to price, expenditures on goods and services other than petroleum were curtailed. Domestic oil expenditures (excluding excise taxes) rose from 5 to 8.5 percent of GDP during the period 1978 to 1980. In the same years, GDP growth fell from 10 percent in 1978 to 6 percent in 1979 to 5.8 percent in 1980. These superficial comparisons suggest that international oil price increases, passed on rather promptly to consumers, probably contributed to a 4 percent drop in GDP growth in Thailand.

The Thai government did not try to offset the recessionary effects of the oil price increase with a stimulative money supply policy. IMF data show that the rate

of growth of the money supply actually decreased from 20 percent in 1978 to 17 percent in 1979 and 12 percent in 1980.

Thus, the Thai government managed the oil price transition of 1979-80 in what can only be called a conservative fashion. International oil price increases were promptly passed on to consumers, and the recessionary impact was allowed to run its course without major offsetting fiscal or monetary policy responses. As a result of this conservative policy, the oil price increase did not materially affect domestic inflation. Wholesale prices rose by 8.4 percent in 1979, 16.7 percent in 1980, (probably reflecting a one-shot effect of oil price increase on price indicators), and by 9.5 percent in 1981.

Korean prices, like those in Thailand, were increased rather quickly in response to world oil price increases. IMF figures show that expenditures on crude petroleum imports increased from 1.06 trillion won in 1978 to 1.502 trillion won in 1979 to 3.425 trillion won in 1980. As a percentage of gross domestic product (GDP), these import expenditures were 4.4 percent in 1978, 4.8 percent in 1979, and 9.1 percent in 1980. These cost increases were recovered by increasing local prices. Indeed, the very sharp price increases of 1980 and the size of the difference between the overall wholesale price and world prices suggests that Korean oil enterprises collected substantial additional profits in the course of the transition from the pre-1979 to the post-1980 oil price situation.

The very large increase in domestic expenditures on oil also suggest that purchases of non-oil goods and services should have fallen in 1979 and 1980. Indeed, the rate of increase in Korean GDP does show a dramatic change: in 1978, GDP (measured in constant terms) increased by 11.6 percent; in 1979, GDP grew by 6.8 percent; and in 1980, GDP declined by 6.2 percent. The fall in real GDP had various causes, to be sure. A decline in exports might have been expected to be a factor. But exports, in dollar terms, increased by 16 percent in 1979 and by 17 percent in 1980. Thus, the recessionary impact of the increased expenditures on imports and the massive shift of domestic resources to the petroleum sector seems to have played a critical role in the Korean recession of 1980.

Brazil and The Sudan

In Brazil and the Sudan, we saw countries that seemed able to manage the initial effects of the oil price increases well: both managed to increase domestic prices substantially in 1979. In subsequent years, however, both countries had difficulty dealing with the exchange rate crisis. Both governments let the overall domestic oil price decline in real terms to the point where the petroleum sector was subsidized by the economy as a whole. The immediate culprit in both cases was a willingness on the part of the authorities to allow oil importers to exchange local currency for dollars at special exchange rates that did not reflect the market value of foreign currency.

Before 1978, the overall wholesale price of oil in Brazil was substantially above the official price of Arab Light. This suggests that before the price shock of 1979, the government wanted a pricing schedule that would give Petrobras a substantial surplus for reinvestment in Brazil's ambitious energy production program. With the exception of the first half of 1980, Brazilian pricing policy was able to make local wholesale prices remain, on average, comfortably above world levels. In essence, the Brazilian government succeeded in managing the oil price adjustment of 1979-80 in a manner similar to that employed by Thailand: the world price increases were relatively promptly passed through to consumers. In late 1982, however, the program ran into difficulty coping with the emerging exchange rate crisis.

Beginning in 1982, the value of the cruzeiro depreciated at a seemingly exponential rate. The managers of the quarterly oil price adjustment process did not anticipate the speed of the cruzeiro's fall in that year. As a result, the cruzeiro revenues Petrobras collected during this period fell below the levels required to purchase the quantity of dollars, at the market exchange rate, needed to obtain the required amount of oil. At this point, a political judgment was made to allow Petrobras to buy dollars at a subsidized "dolar petroleo" exchange rate. The result of this decision was to establish domestic oil prices at levels sufficient perhaps to balance the books of Petrobras, but not sufficient to cover the true costs of dollars. In effect, the Bank of Brazil subsidized the petroleum sector.

In the case of the Sudan, before 1979, the overall

retail price (wholesale price data were not available) was multiples larger than the international FOB price of Arab light. When the international price of oil began to rise sharply in early 1979, the Sudanese government responded relatively quickly with domestic price increases--from about $28 to $44 per barrel-- in the summer of that year. Unlike the quarterly price changes of Brazil, however, the Sudanese government changed prices and exchange rates only once a year. By 1981, instead of a retail price that was multiples of the international price, the retail price barely exceeded the international price, and hence barely covered the import cost. In effect, the full costs of refining and distributing oil were not being paid by the oil consumers, and the government was not collecting any real tax revenues on oil sales. The Sudanese oil sector was being subsidized by the rest of the economy.

The adverse effects of this subsidy might have been far worse had consumers been able to procure all the petroleum products they wanted. Reports of widespread and chronic fuel shortages suggest that if oil imports had not been under government control, consumers would have bought more and the size of the overall subsidy to the oil sector would have been larger. In this respect, the adverse effects of one economic distortion (price controls) were held in check by another distortion (import controls). In turn, the supply-side shortages probably created productivity losses: it is important to note the damage that price controls create if, for example, diesel oil shortages prevented farmers from irrigating their fields at the right time.

RELATIVE PRICES: INCENTIVES TO CONSUMERS

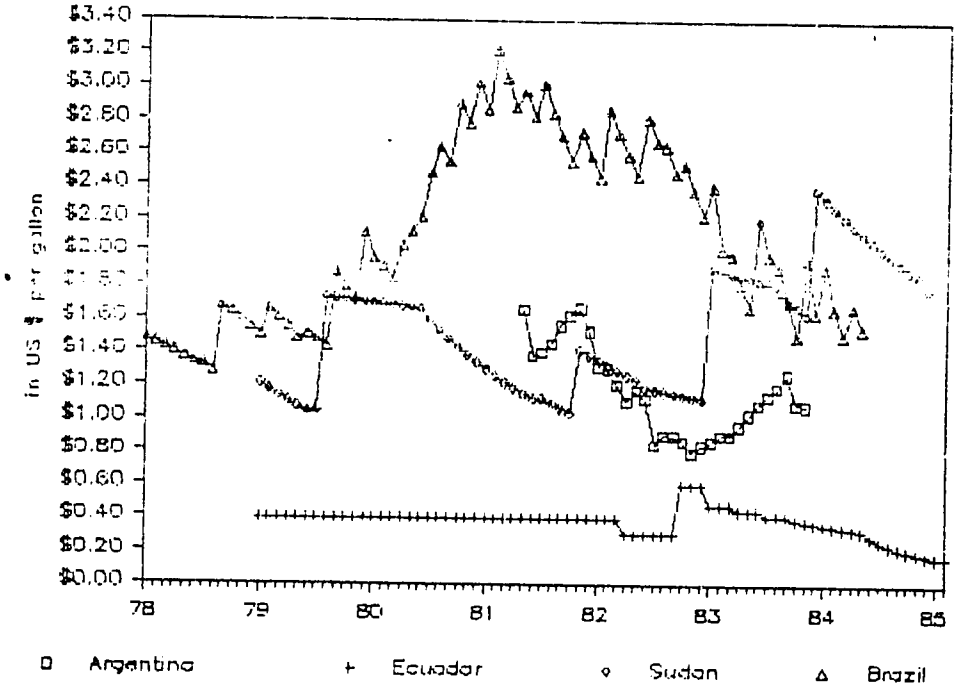
From the standpoint of overall economic analysis, the overall price of petroleum in an economy is a more important variable than the price of any particular product. From the standpoint of energy policy planning, however, governments of developing countries pay much more attention to particular product prices. In fact, there are few cases, at least among developing countries, where regulators establish first the overall price, and then derive a set of particular prices for the various products. This emphasis on the particular at the expense of the general is forced on them by political phenomena. At the extreme, regulators may have learned from past incidents of civil unrest that price

increases of some oil products require special treatment. At a minimum, some petroleum products have "constituencies" that lobby for special treatment.

In many developing countries, kerosine and diesel oil are regarded as "social products," in the sense that they are used by people in the country's lower income brackets, or they are intermediate goods strongly influencing the price of other social products, especially basic foodstuffs. Gasoline, on the other hand, tends to be the "cash cow" of the petroleum sector. Figure 4 provides a comparison of regular gasoline retail prices in four of the countries in this survey.

FIGURE 4

COMPARISON OF RETAIL PRICES OF REGULAR GASOLINE



The premium on gasoline can be in the ex-refinery price -- giving the oil company a bigger margin on gasoline makes it possible to ask them to do without a margin in a 'social' product like kerosine. The premium can also be in the form of a tax -- allowing the government to collect whatever overall level of revenues it can from this group of citizens.

In many countries, governments not only cross-subsidize one product with another, they also charge different prices to different consumers of the same product. Ecuador provides several examples. Since 1981, the fishing industry has paid 15 to 30 percent less for diesel oil than the regular consumer. Jet fuel purchased for flights within Ecuador by Equatoriana, the national airline, is priced at a fraction of the amount foreign airliners have to pay when they buy in Quito.

PATTERNS OF RETAIL PRICES

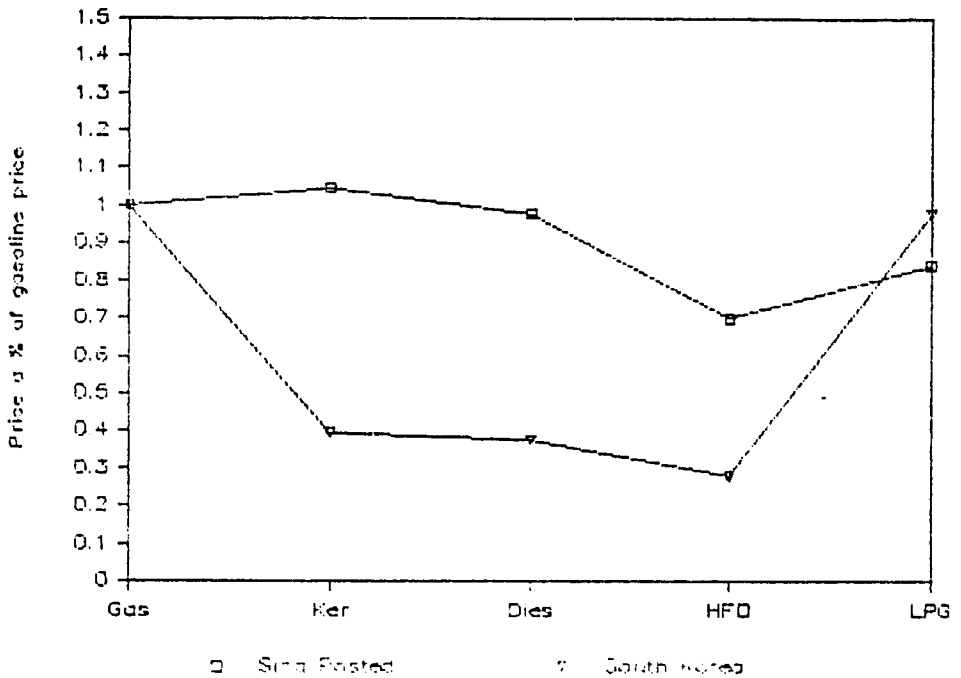
Terms such as "social products" and "cash cows" are used to designate some of the political forces behind petroleum pricing programs. There are others. For example, there are "international competition products," whose prices are controlled at relatively low levels as part of an industry development strategy. The prices of residual fuel oil and naphtha in Japan were kept well below world levels for years while the industrial base was being built.

More generally, in regulated economies the price of specific petroleum products is a function of the price-setters' political objectives. In some countries, the strongest political force, and hence the starting point of the price setting process, is aimed at subsidizing social products. Once that decision has been made, it generates a need to designate other products as sources of cash to pay the subsidy. In this manner, the pattern of relative petroleum prices in any countries is a kind of diagram of political sensitivity.

Figures 5 through 7 present three such diagrams. Each figure presents a snapshot of the retail price pattern in which prices of kerosine, diesel oil, fuel oil, and LPG are shown in relation to the price of regular gasoline. Figure 5 shows the singular case of South Korea, where, as has already been mentioned, the retail price of gasoline is extremely high in relation to the price of the other products. Figure 5 compares Korea's retail price pattern (in March 1982) with the pattern of prices posted by Singapore refiners.

FIGURE 5

SOUTH KOREA: RETAIL PRICING PATTERN

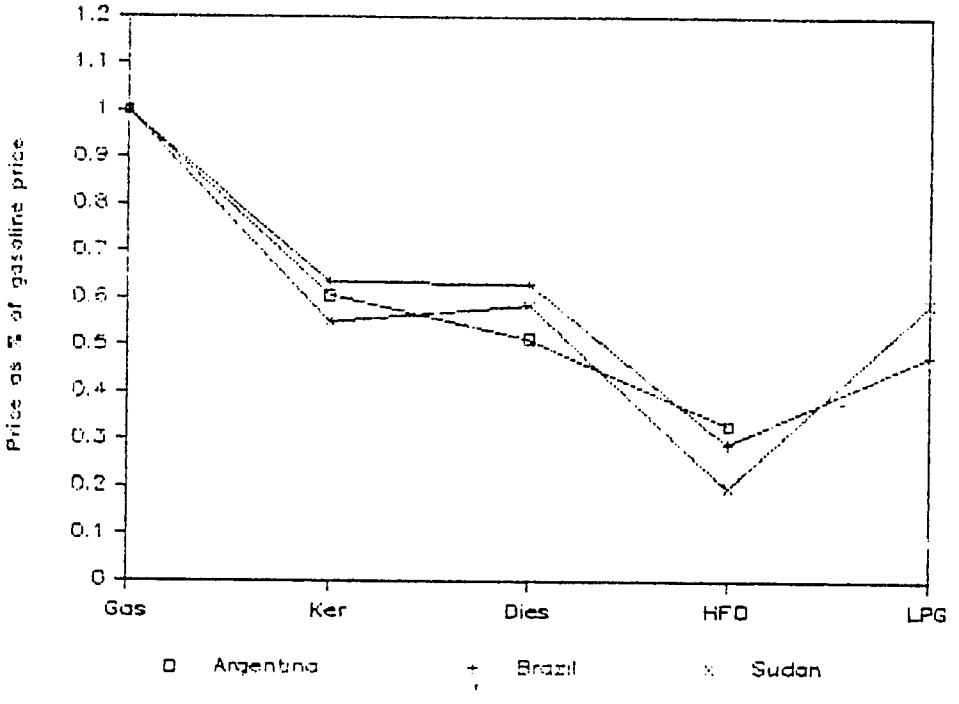


The Singapore pattern can be interpreted as reflecting the marginal cost of producing products in the Pacific market. Note that among posted prices, residual fuel oil (HFO on the X-axis of figure 5) is the lowest in proportion to gasoline, about 75 percent. Among Korean retail prices, residual fuel oil is only about 30 percent of the price of gasoline. What is distinctive about South Korean retail prices, however, is that all the products, except LPG, are low relative to gasoline.

Figure 6 presents a picture of the retail price patterns in June 1983 in Argentina, Brazil, and the Sudan, all grouped together as "fuel oil subsidizers." There are various similarities. Each country has three tiers of prices: gasoline, distillates (kerosine and diesel oil) at about 55 to 65 percent of regular gasoline prices, and fuel oil at about 25 to 35 percent of gasoline prices.

FIGURE 6

RESIDUAL FUEL OIL SUBSIDIZERS



In all cases, the diesel prices are relatively lower than the international price pattern. Figure 5 showed that in Singapore postings, diesel and gasoline prices were about the same. In Brazil, Argentina, and the Sudan, they are 35 to 45 percent lower than gasoline prices. This simply reflects the difference in excise taxes: as a motor fuel, diesel oil is taxed less stringently for the sake of keeping the cost of industrial transport and mass transit down. Similarly, kerosine, while not heavily subsidized in these countries, is not taxed because it is a social fuel.

Fuel oil prices, however, are not only not taxed in Argentina, Brazil, and the Sudan, they were absolutely subsidized in these countries when the snapshot presented in figure 6 was taken (June 1983). For example, in the Sudan, the retail price of "furnace oil" was only $16 per barrel, in comparison with a posted price in the Persian Gulf of about $26 per barrel. In the Sudan, the principal cause for such a subsidy on fuel oil was the perceived need to keep to a minimum the oil costs of the electric utility, whose financial condition was more tenuous than that of the oil

industry. In Brazil and Argentina, relatively low fuel oil prices were probably rooted in the government's intention to minimize the fuel costs of export-oriented industries.

Figure 7 presents yet a different pattern of retail prices. Ecuador and South Korea are kerosine subsidizers. Kerosine, the most obvious social product amongst all the petroleum fuels, is only 40 percent of the gasoline price in these countries. In both cases, the relatively low price of kerosine is aimed at minimizing the fuel costs of lower-income oil users.

FIGURE 7

KEROSINE SUBSIDIZERS

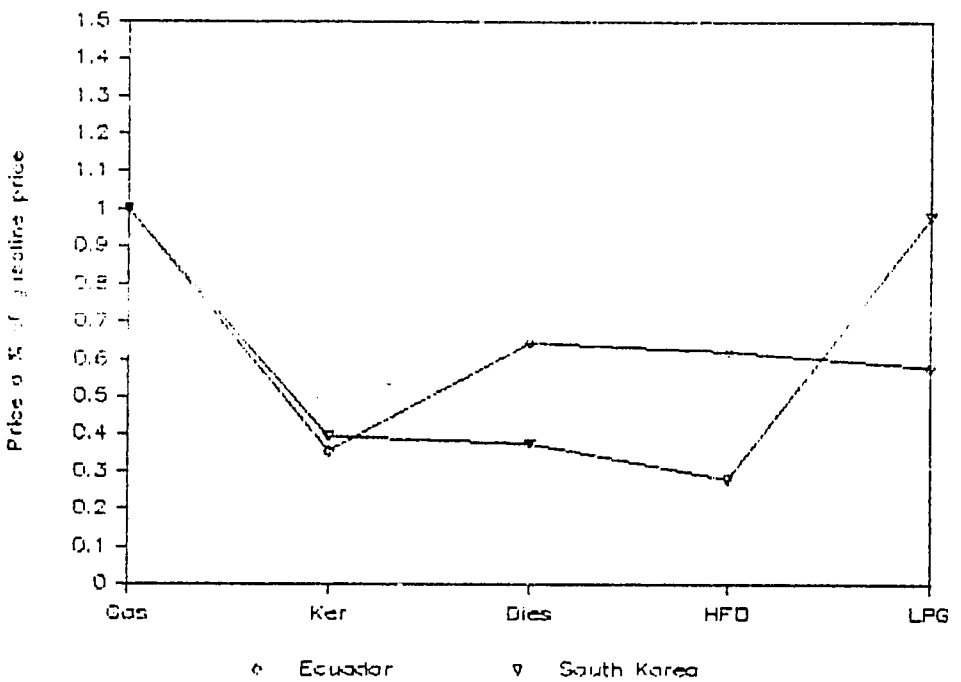


Figure 7 conceals, however, the enormous difference in the absolute prices of kerosine in Ecuador (about $0.15 per gallon) and South Korea ($1.50 per gallon).

RETAIL PRICES: PETROLEUM PRODUCT TAXES AS SOURCES OF GOVERNMENT REVENUE

Governments impose variable taxes on petroleum products. Social products are lightly taxed, as often are products that are inputs to export-oriented manufacturing industries. Because the choice of social products varies from country to country (kerosine in Korea, fuel oil in the Sudan), the simplest way to start this review is to compare the level of overall retail prices. In this manner, it is possible to get a picture of the overall incidence of taxes on petroleum products. That in turn sets the stage for looking at tax levels on specific products.

Although the subject has received much attention, there is no simple, a priori guideline on the appropriate level of taxation on particular products like gasoline in developing countries. If one examines tax opportunities, however, a very simple general principle--that in developing countries taxes ought to be imposed where they can be collected--emerges. The difficulty of collecting personal income taxes in countries with large subsistence sectors and low literacy rates is obvious. Import and export taxes and taxes on products coming out of refineries, on the other hand, are easier to collect because the number of points of collection is limited. Thus, for ease of administration, it makes sense to impose petroleum taxes.

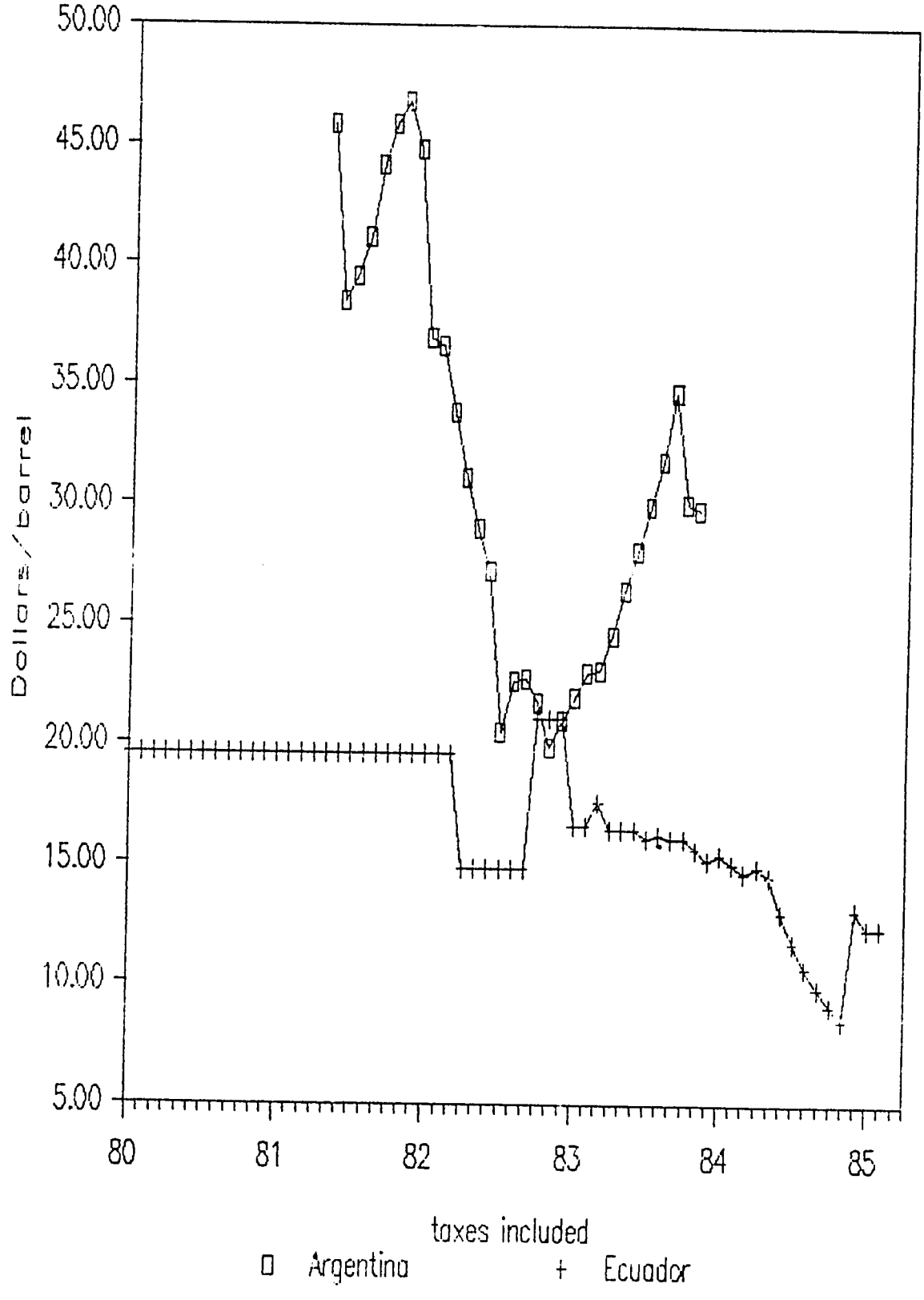
Governments of both developed and developing countries typically regard taxes on petroleum products as a convenient way of raising revenues. In most developing countries, gasoline prices carry the largest burden. This policy represents a political judgment: car owners deserve to be taxed. Excise tax levels are also part of a long-term oil demand management program. Very high taxes on, say, LPG can prevent demand for that convenient fuel to outstrip domestic refiners' ability to supply it. As in so many other respects, one can emphasize that the "overall" (weighted average for the representative barrel of petroleum products) price will affect overall demand for oil products, while relative excise taxes influence the pattern of product demand.

Our calculations of overall retail prices produce a not-too-surprising dichotomy. Overall retail prices, like overall wholesale prices, are substantially lower in Argentina and Ecuador than in the Sudan, Brazil, South Korea, and Thailand. Figure 8 provides a picture of the changes in overall retail prices in the self-sufficient countries.

Notice that Argentina's overall retail price, measured in dollars per barrel, fell sharply from around $45 per barrel in 1981 to as low as $20 per barrel in 1982. This drop was the result of the price freeze (discussed in previous sections) and the extremely rapid depreciation of the peso. One can surmise that when the retail price was $45 per barrel, the government was collecting substantial real revenues. When the price fell to $20 per barrel, the government was still collecting a lot of pesos from its excise taxes, but the real value of those pesos had declined sharply.[5]

FIGURE 8

OVERALL RETAIL PRICES IN SELF-SUFFICIENT DEVELOPING COUNTRIES



The overall retail prices of the oil-importing countries stand in vivid contrast to those of the self-sufficient countries. Figure 9 compares overall retail price levels in the Sudan, Thailand, and Brazil.

FIGURE 9

OVERALL RETAIL PRICES IN OIL IMPORTING DEVELOPING COUNTRIES

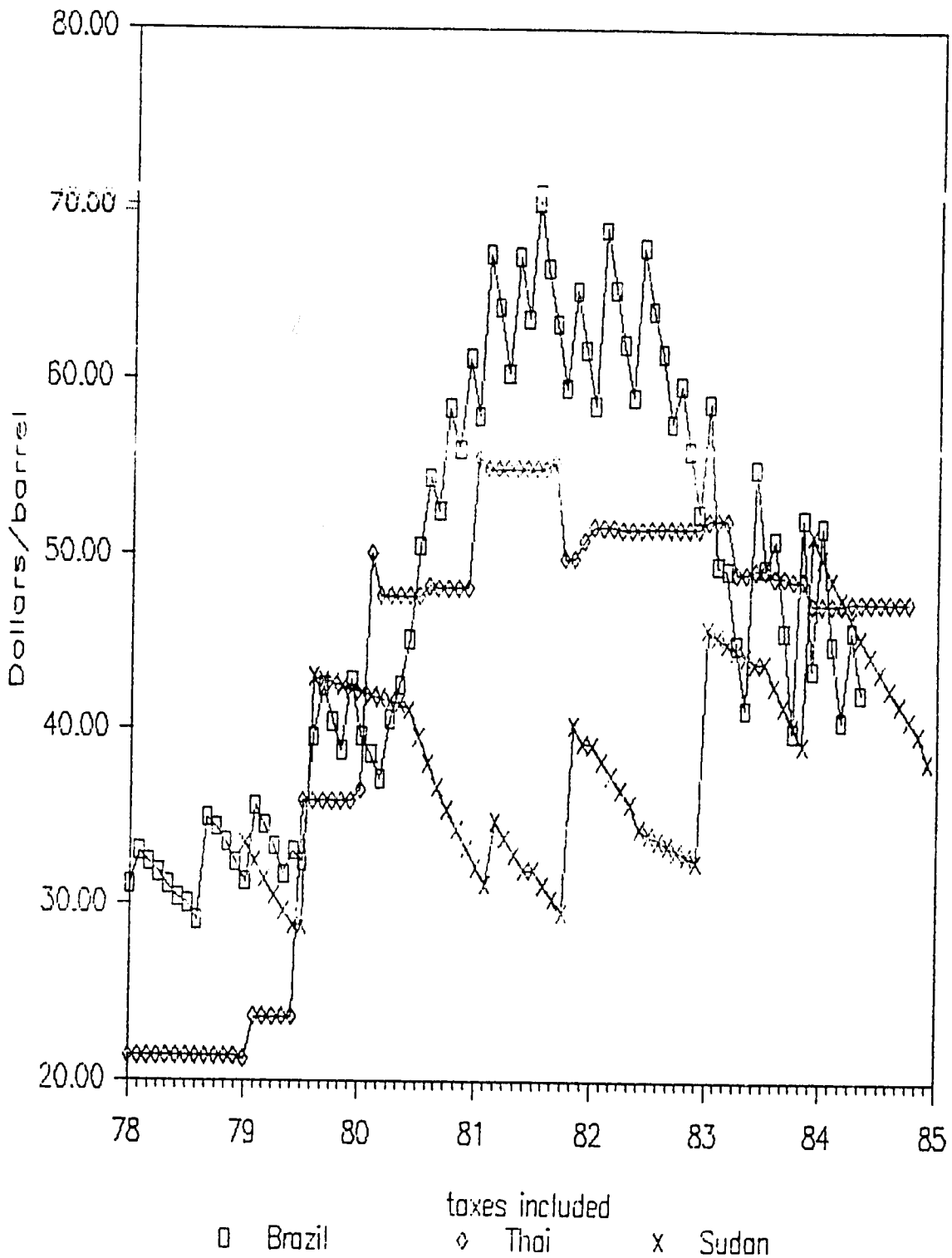


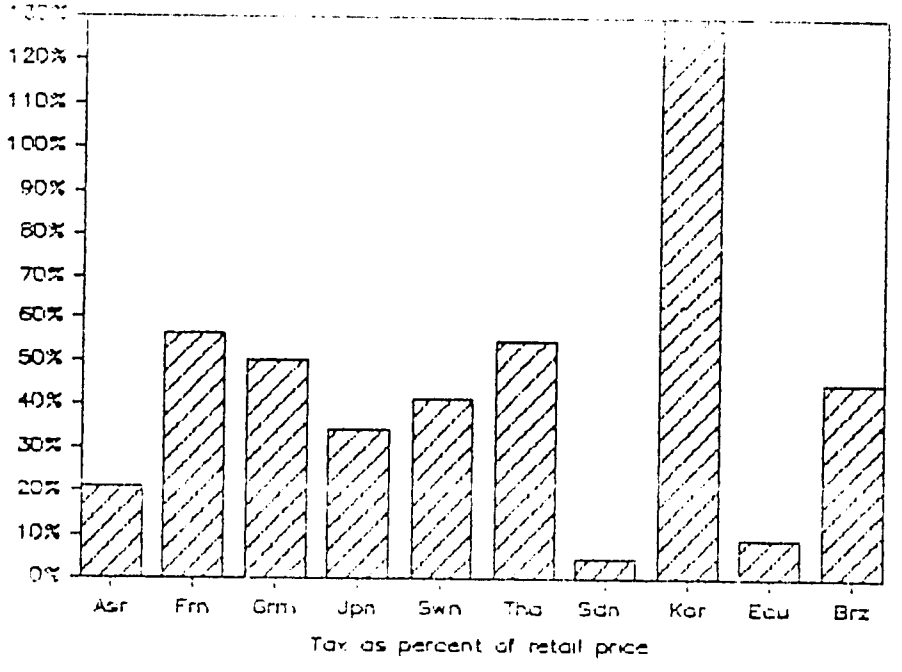
Figure 9 shows that in 1978, before the large international oil price increases, the overall retail prices of all three countries were between $20 and $30 per barrel. When the 1979 price explosion occurred, Thai prices increased in step with international prices, and then decreased in step with international prices. The Thai pattern does not exhibit the "sawtoothed" pattern evident in Brazilian and Sudanese prices because the baht/dollar exchange rate did not change significantly during this period.

PRODUCT BY PRODUCT TAXES

This section compares the excise taxes imposed by the developing countries included in this survey with excise taxes in selected developed countries. We begin with gasoline taxes. Figure 10 shows excise tax levels in 1983 on gasoline.

FIGURE 10

GASOLINE EXCISE TAX RATES IN SELECTED COUNTRIES

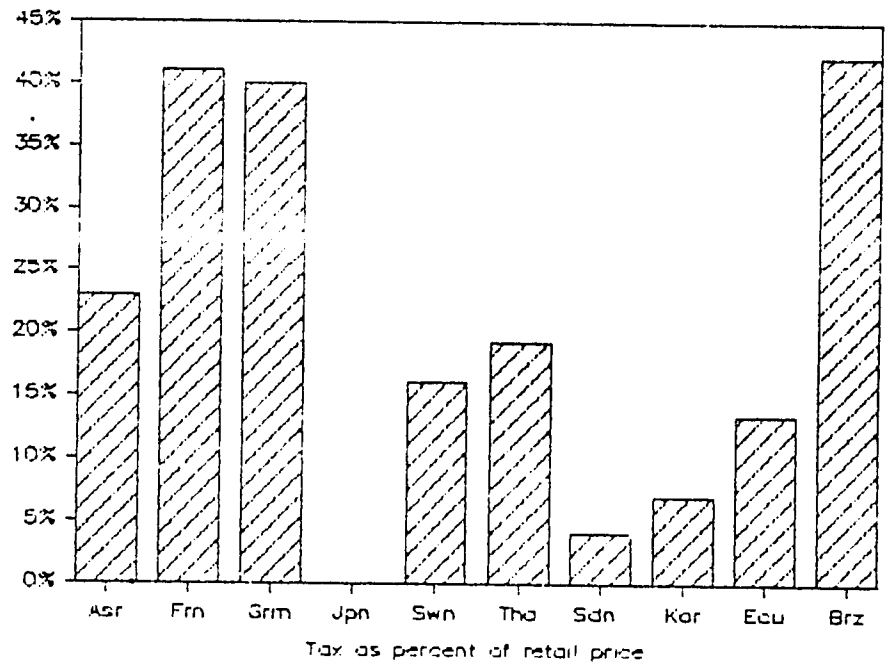


The comparison in figure 10 indicates that the selected developed countries had gasoline excise tax rates ranging from 20 percent to 50 percent of the retail price. South Korea, with a tax rate of 130 percent, was clearly in a league of its own. At the other extreme, the Sudan and Ecuador had a tax rate of under 10 percent. Brazil and Thailand's tax rates were in the range defined by the developed countries.

Figure 11 shows excise tax levels in 1983 on automotive diesel oil.

FIGURE 11

AUTOMOTIVE DIESEL OIL EXCISE TAX RATES IN SELECTED COUNTRIES



Among the developed countries, diesel oil taxes ranged from a low of 17 percent in Sweden to 40 percent in France and Germany. Among the developing countries, Brazil was alone in imposing a diesel tax comparable to that of France and Germany. In the Sudan, the diesel tax was very

small, a result of the government's concern about the effect of higher diesel prices on food prices and costs in the agricultural sector. In South Korea, diesel was lightly taxed as part of a deliberate cross-subsidy strategy that made gasoline bear the bulk of the tax-raising burden.

This brief survey of petroleum product taxes establishes several points relevant for pricing policies. While it is difficult to make a general prescription about what petroleum taxes "ought" to be that applies to all types of developing countries, general observations about importing and self sufficient countries can be hazarded.

From the standpoint of economic efficiency, oil-importing developing countries should have a relatively high overall petroleum product tax for the sake of restraining the growth in demand for oil imports. One basis for this proposition is the "disruption tariff" argument: oil import prices do not reflect the damage done by the occasional disruptions, hence a "disruption tariff" is appropriate. This view applies only problemmatically to developing countries, since it presumes that tax or tariff-induced decreases in oil import demand will affect the world oil price. The United States may have a measurable "monopsony power," but the Sudan clearly does not. Even in the Sudan, however, it is possible to argue that because the exchange rate chronically understates the value of foreign exchange, it is useful (at least in principle) to impose taxes that reflect this scarcity value (or the "shadow price" of foreign exchange).

The discussion of the ersosion in the effective tax take in Argentina and Brazil, due to the decline in constant oil prices, provides another general rule. Petroleum product taxes need to be indexed to the inflation rate to assure that the real revenue stream of the government does not erode. If this is not done, the fiscal purposes of these revenues will have to be met from other sources. At a minimum, of course, taxes on the oil sector ought to pay for subsidies granted within the oil sector. More broadly, oil tax revenues should be maintained to finance the social infrastructure, e.g. highways, that petroleum utilization demands.

For oil exporting countries like Ecuador, governments might be well-advised to look to petroleum product taxes to offset the decline in revenues caused by

reductions in the international price of oil. Projects that in the 1970s could be financed with export earnings may in the 1980s have to be financed at least partially by petroleum product taxes on local consumption.

WHOLESALE PRICES: INCENTIVES TO PRODUCERS

The significance of a given wholesale pricing program can be evaluated with the same framework as retail prices. The overall wholesale price has its effect principally within the oil sector, the pattern of relative wholesale prices has its effect principally among energy sources. Put another way, there are intra-oil issues and intra-energy issues. The intra-oil issues influenced by the overall wholesale price level in a given country include such things as the incentives a refinery has to invest in upgrading its capacity. A refiner is more interested in its overall "realization" on all petroleum products (what has already been referred to as the overall price) than in the difference between the price of gasoline and diesel oil. Of course, the refiner is very interested in the pattern of relative wholesale prices, but his vital interest is in the overall price.

A coal company, on the other hand, is less concerned about the overall price than in the wholesale price of the oil products that compete with coal. The supply-side incentives created by wholesale pricing decisions of particular products are especially interesting when one company -- e.g. Petrobras in Brazil -- has a choice between putting its investment dollar in competing fuels. Because state enterprises in developing countries so often have monopoly positions, such intra-company "conflicts of interests" are not uncommon.

There are yet further layers of complication between normal wholesale price levels and the supply-side consequences. One is the role of subsidies. Regulating the wholesale price of, say, fuel oil in a country (for a particular reason like reducing the costs of production of companies manufacturing goods for exports) may require subsidizing the production of competing energy resources. For example, if fuel oil prices are kept down to help the steel industry, coal production may have to be subsidized as

a result.

A final variable is the reaction of international companies, if the government wants them to participate in the oil market, to wholesale product prices. One can argue that this "commercial" perspective is not terribly important in countries like Argentina, where the state owned company, YPF, presumably does what its shareholder tells it to do. As studies of publicly-owned enterprises have shown, however, in the course of time such firms do tend, in Paul Frankel's words, to put greater stress on the enterprise than on the public part of their name. In time, even state-owned companies will covet a level of wholesale prices that puts them in a situation similar to that of their private counterparts in other countries.

"TOP DOWN" VERSUS "BOTTOM UP" APPROACHES TO OIL PRICING

Wholesale pricing issues naturally receive most attention in countries where the petroleum sector is relatively independent from the government sector. Hence, wholesale pricing is important in Thailand, South Korea, and Brazil and less important in the Sudan and Ecuador (and in the early 1990s), Argentina.

To take a specific example, governments of developing countries with relatively a independent petroleum sector and refineries typically regulate the margin the refiner earns. This can be done from the "bottom up", literally monitoring, or trying to monitor, actual costs and determining product prices on the basis thereof; or it can be done from the "top down," using some reference market as a benchmark and making home refiners operate within that benchmark. Thailand's uses a "top down" approach, basing its domestic prices on prices in a reference market (Singapore postings) and South Korea uses a"bottom up" approach in which the government monitors costs and calculates allowable prices and margins.

The results of these different approaches, in terms of the overall wholesale price, is shown in figure 12.

FIGURE 12

COMPARISON OF OVERALL WHOLESALE PRICES:
THAILAND AND SOUTH KOREA

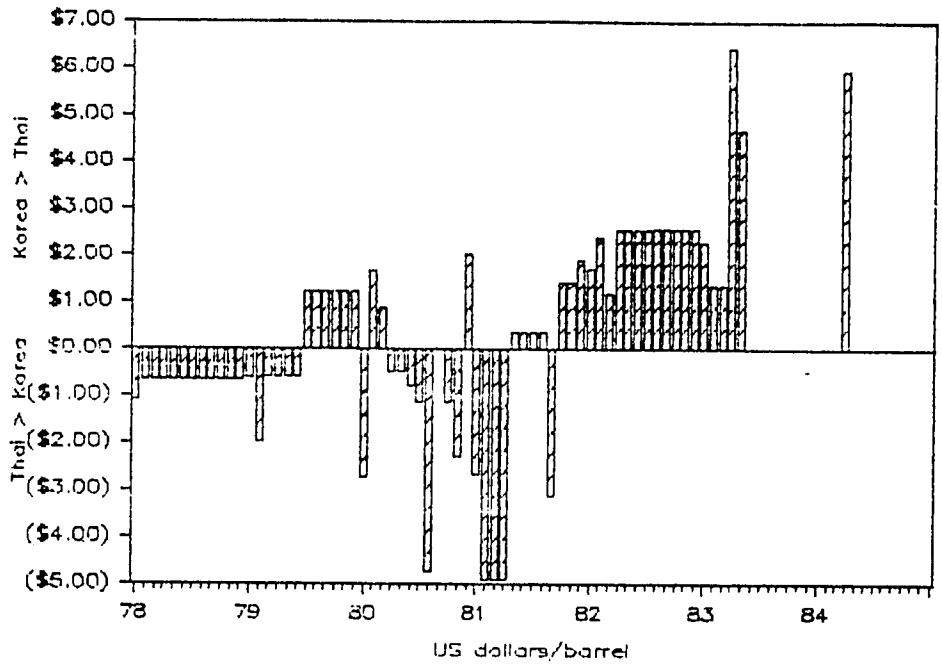


Figure 12 indicates that the Thai program has yielded a lower overall wholesale price than that of South Korea. Our study suggests that one prominent reason is that managers of the "bottom up" pricing approach have a tendency to grant additions to costs on a piecemeal basis that, over time, can add up to a considerable subsidy.

Price regulation in a market with a well-established refining industry, especially when foreign companies are present, requires attention to technical detail, to "pennies per gallon" distinctions that strongly influence the profitability of the enterprises. In these circumstances, price regulations also becomes inextricably enmeshed in broader trade and industrial policy issues. For example, in South Korea the levels of wholesale prices shown in the discussion could not be maintained if Korea allowed unrestricted imports of finished products.

Such issues are far less germane in countries where the state-owned oil company has a monopoly on oil

procurement. In Brazil, Argentina, the Sudan, and Ecuador the significance of wholesale pricing decisions is almost exclusively a function of the strength of the oil company. In Brazil, Petrobras has been able to obtain overall wholesale prices that (at the subsidized exchange rate in 1982 and 1983) allowed it to recover costs. But the wholesale pricing pattern, especially the prices of gasohol and fuel oil, have raised intra-energy complications. One of the consequences is a structure of incentives that may have discouraged Petrobras from developing natural gas with enthusiasm. In Argentina, YPF was unable in 1982 and 1983 to prevent the deterioration of the overall wholesale price from devastating its cash flow.

Thus, the propensity of a government to implement "efficient" wholesale pricing policies can be seen as a function of the political strength of the petroleum industry. This point figures prominently in the discussion in the next section.

CONSTRAINTS ON PETROLEUM PRICING POLICIES

To get beyond recitation of anecdotes about the "politics" that hinder "rational" decision-making, we now provide some principles that seem to be important in all the countries under review. They are:

- The propensity to adopt an efficient pricing system is a function of the relative political influence of supply-side and consumer-oriented political forces. In Argentina and Ecuador, the consumer-oriented view has preponderant influence. In South Korea, the supply-side influence dominates.

- The propensity to adopt an efficient pricing system is also a function of the extent to which government agencies play roles that promote "rational" economic planning. In Brazil and the Sudan, the central banks have failed to persuade the authorities that the foreign currency needed to purchase petroleum imports should <u>not</u> be made available at a subsidized exchange rate. In South Korea, the political leadership has not forcefully protected consumer interests. In Ecuador, the

Sudan and Argentina, the national oil company has failed to have a strong influence on oil price determination.

- The propensity to adopt an efficient pricing system is also a function of the degree to which the development assistance agencies are able to present the government with petroleum pricing advice that contributes to long-term reform. In some countries, too much emphasis has been given to individual product prices, rather than the overall price. In addition, the distinction between wholesale and retail prices, essential in the development of robust national oil companies, tends not to be made as forcefully as possible. This may be due to the strong emphasis given to economic analysis, rather than on the financial condition of the petroleum company, or to a bias against national companies.

- Finally, given a propensity to adopt an efficient pricing system, governments need tools to help them develop or reform pricing programs. Pricing formulas developed in other countries are useful at a minimum as frameworks for the construction of programs appropriate to local circumstances.

Analysts concerned about efficiency and economic growth prescribe certain economic criteria that should govern oil pricing. The World Bank, the International Monetary Fund, and other international and national agencies such as the U.S. Agency for International Development have developed a broad consensus on how energy prices should be determined. These institutions often make assistance contingent on certain changes in energy pricing. The changes are often accepted in principle by the aid- receiving governments, but when policies are reviewed to determine whether changes indeed occurred, frequently they did not.

There are various reasons why pricing policies are resistant to change, even when there is considerable pressure from important external agencies. Some are patently obvious: it is almost tautological to note that there must be strong internal pressures against changing oil prices.

POTENTIAL FOR EFFICIENT PRICING

While we are interested in whether a society has (or does not have) a potential for economically efficient pricing, we cannot assume that such efficiency is the optimal policy goal. Many governments believe they have to regulate the petroleum sector to enhance its contribution to overall economic efficiency because they believe the local market has "distortions" such as inadequate competition.

From the standpoint of economic efficiency, there are regulations that ignore economic principles and there are regulations designed with full cognizance that the fundamental principle underlying rational economic pricing policies "...is the well-know proposition that the costs of providing the last unit consumed should be just equal to the willingness of somebody to pay for it."[6] Neither discriminatory pricing by private companies nor discriminatory regulation by government agencies necessarily violates this principle: "While aggregate welfare, or economic efficiency, does not change as a result of well-designed discriminatory pricng practices, what changes profoundly is the distribution of income between different groups."[7]

The political implications of a given distribution of income is the driving issue in most regulated pricing systems. In general, the potential for political acceptance of an efficient pricing program is a function of several political factors. On the supply side, an important factor is the standing of the energy industry, the financial autonomy, and the place of energy executives within the politically relevant elite groups. On the demand side, a crucial factor is the degree of consumer organization and the ability of political dissidents to mobilize consumers to protest price increases. In the procedural context, the variable of note is the government's objectivity vis-a-vis energy interest groups. With respect to the society's external linkages, the key factor is the nature of the government's vulnerability to external influences, such as IMF conditions on foreign exchange assistance.

Each of these factors is in turn a function of other, more concrete societal, economic, and external factors. The standing of energy industry in a society is a

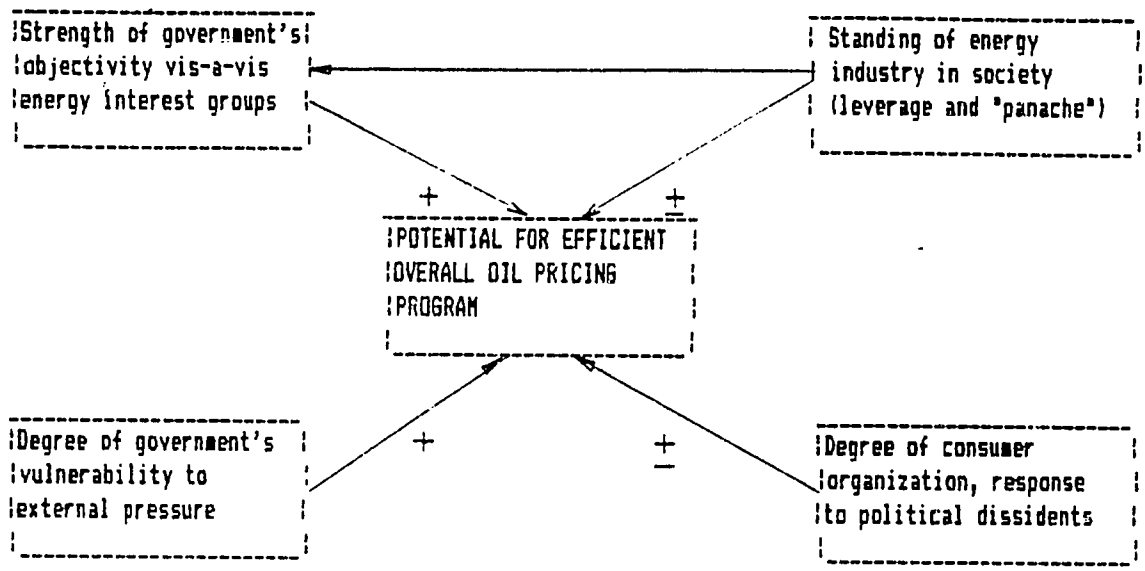
function of historical developments, (e.g. has the national oil company been in existence for a long time? Is it highly regarded by elite groups?), national resource endowment (is there much oil production, is the oil industry a major national employer of scientists?), and the frequency of elite "turnover" (whether a revolution has displaced the established energy elite).

The degree of consumer organization and mobilization is a function of the extent to which dissent can be publicly displayed, the organizational skills of dissidents, and the ratio of individual's average energy costs to total disposable income. The government's objectivity vis-a-vis energy interest groups is a function of the degree of professionalism in the civil service, and the nature of the government's hold on power. The degree of the government's vulnerability to external pressure is a function of its need for external assistance, which in turn is a function of the cumulative effect of preceding economic policies.

Because these are social phenomena, it would be foolish to attempt to construct a rigidly deterministic hypothesis of the conditions promoting or reinforcing the potential for efficient pricing. It is possible, however, to construct a looser set of causal propositions based on the discussions in the preceding sections. The diagram below summarizes a set of propositions:

FIGURE 13

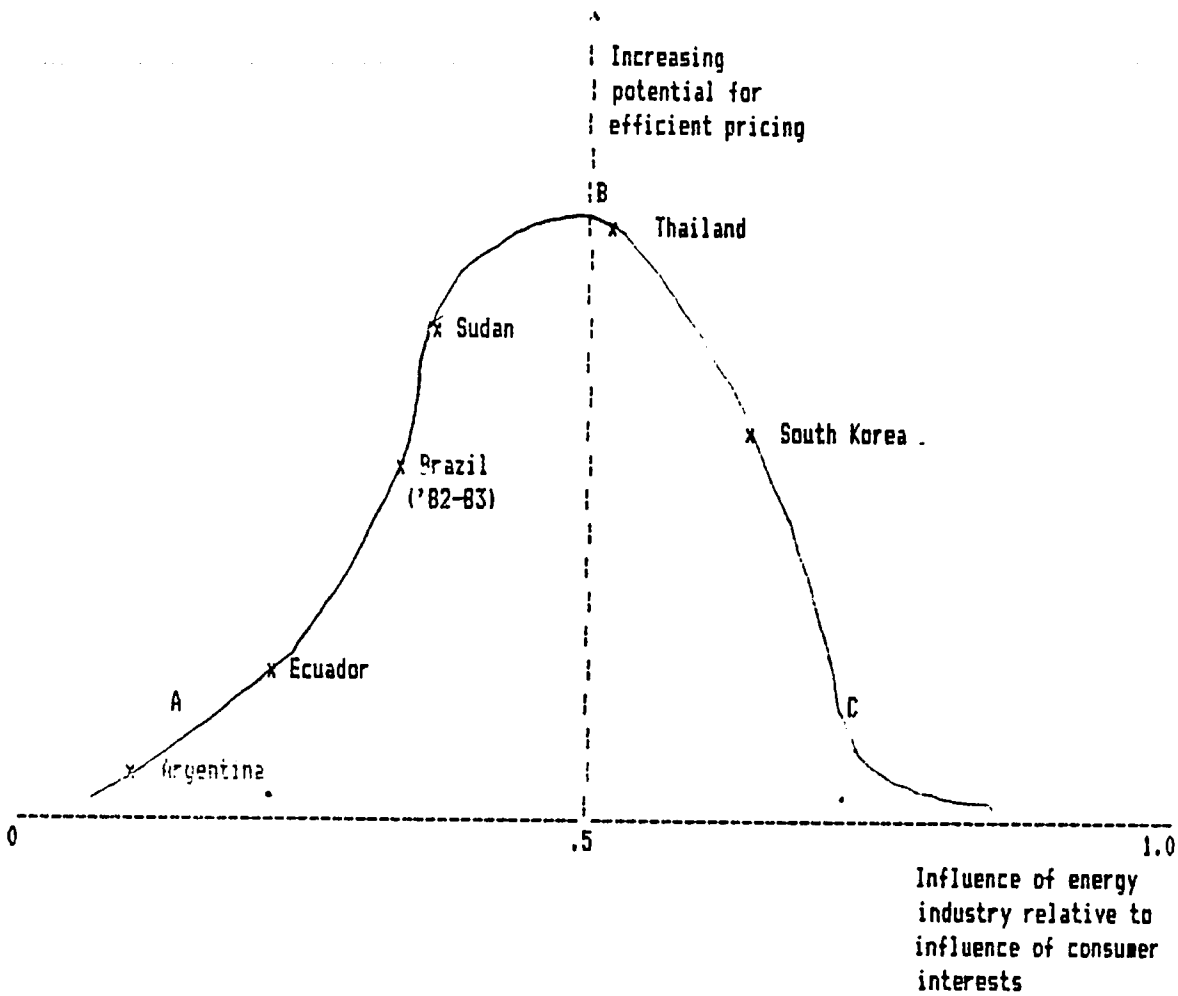
FACTORS INFLUENCING POTENTIAL FOR EFFICIENT PRICING



Each of the causal relations between the various institutions noted in figure 13 above is treated further in the set of propositions below. The first deals with the standing of the energy industry.

Proposition 1

The relationships between the standing of the energy industry, the degree of consumer organization, and the potential for efficient pricing can be described as being in the shape of the bell curve shown below. At point A, the energy industry's influence relative to that of consumer interests is very low, and there is a high probability that energy prices will be too low, i.e. that energy consumers will capture rents at the expense of the citizenry as a whole. From the discussion in the preceding sections, Ecuador and Argentina can be said to be close to position A.


Increasing
potential for
efficient pricing
B
Thailand
Sudan
South Korea
Brazil
('82-83)
Ecuador
A
C
Argentina
0
.5
1.0
Influence of energy
industry relative to
influence of consumer
interests

At point C, the influence of the energy industry relative to consumer interests is very high, and there is a strong probability that wholesale oil prices will be very high. South Korea provides the best example of this situation.

Interest groups bring pressure to bear on pricing policy, but some pressure is for higher and some for lower or steady prices. Thus, one must consider how this political pressure is handled by the price-setters in the government. This is a question of bureaucratic behavior, an enormous area of study in its own right. One way to begin to peel the layers of government in a systematic way is to assign different pricing roles to different parts of the whole government. Most governments have departments corresponding to the various interest groups. The energy industry is typically regulated by an industry or energy ministry. Prices, however, are typically the province of finance ministry, and exchange rates are often the policy responsibility of the central bank. Consumer interests are seldom safeguarded by a particular ministry (e.g. there are few ministries of consumer affairs), but are watched over by the chief executive's office and by the legislature. The extent to which these parties get involved in oil pricing decisions differs substantially in the countries surveyed in this report.

The lesson we can draw from our survey is that how the government "processes" political inputs from the energy industry and consumers interests is an important factor in its own right. To put it more explicity:

Proposition 2

a) The finance ministry and the central bank bear primary responsibility for advocating an efficient <u>overall</u> pricing policy;

b) The more the central bank accedes to multi-tier exchange rates, the higher the probability that oil purchases will be transacted at the low (subsidized) exchange rate, and the more likely that overall energy pricing policy will be inefficient.

The implications of this proposition are evident in the oil pricing process in the Sudan. In 1984, the Bank of Sudan made dollars available to the General Petroleum Corporation (GPC) at the lowest "official" exchange rate. As a result, GPC's true costs of oil imports were understated. It could balance its accounts, in which its true costs were understated due to the exchange rate subsidy, with lower oil prices. In these circumstances, GPC dropped its role as advocate of efficient pricing. It assessed its interests according to the criteria of financial, not economic, analysis: it was satisfied with price levels that covered the costs of the firm, even though they did not cover the costs of oil to the economy as a whole. In addition, the finance ministry, with its eye on the government budget, could refrain from active advocacy of oil price increases because it was collecting its customary level of tax receipts from oil. Thus, charging the lowest official exchange rate robbed the Sudanese price-setting system of the "creative tension" that tends to encourage rational oil pricing.

In countries self-sufficient in petroleum, but which are not major exporters, external influences, in particular the International Monetary Fund and the World Bank, may be the only advocates of efficient energy pricing. In countries where the U.S. Agency for International Development (AID) has substantial missions, (e.g., the Sudan), it can also exert a strong influence. These external voices are unquestionably important. All perceive of their roles in terms well beyond providing financial assistance. Clearly, the more a government needs external assistance, the greater the potential constructive influence towards efficient pricing the external agencies can have.

The potential, however, must be realized, and to do so, the advise must be carefully constructed. How is such advice to have the best effect?

Proposition 3

a) In oil-importing countries, the highest priority should be placed on advising the government to align the <u>overall wholesale</u> price with international prices.

b) Advice dealing with the prices of individual products must be given with full consideration of the political and technical context of the country in question. In the political sphere, cross-subsidies may be a highly effective means of income redistribution. In the technical sphere, there is no a priori reason for cross-subsidies to be inefficient. They often balance other distortions, and aligning an individual product price with international prices, without taking other distortions into account, may decrease overall economic efficiency.

c) In self-sufficient countries where the overall petroleum product price is far below international levels, emphasis should be placed on a long-term program of reform which may take years to implement, and not on "one-shot" increases in prices in return for assistance on a particular development project.

d) In all cases, high priority should continue to be placed on the development of institutions that contribute to the emergence of the "creative tension" between supply-side and consumer advocates. In many developing countries, the national oil company can play a vital role in this respect. Conditions on development assistance that denigrate the role of such national institutions are likely to be counterproductive.

The first part of this proposition deals with the question of the limits to which the external agencies become involved in social and political life in their client countries. If pricing of individual petroleum products is a political process, affecting national income allocation to various groups in society, it seems most useful to provide advice on oil pricing that accomplishes the most essential purpose.

The implication of this principle in oil-importing countries is that development assistance should encourage the government to align overall wholesale prices with

international prices, and refrain from insisting that each and every product be so aligned. This principle accomplishes the most important objectives. First, it ensures that wholesale prices recover import costs, at a realistic exchange rate (see proposition 2). Second, by focusing on wholesale prices, it contributes to maintaining a distinction between the revenues needed for cost recovery and the intended level of tax revenues.

Any recommendation on the price of individual products has to be assessed in the context of other price distortions in the country. For example, in Brazil, diesel prices are substantially lower than gasoline prices. Because the government prohibits importing diesel vehicles, another "distortion," this price difference is of less consequence than the unintended reduction in overall prices resulting from the exchange rate crisis. Thus, while aligning every product price with international prices is in principle the best policy from an economic standpoint, aligning the overall wholesale price may be a useful "second best" policy. In the Sudan, fuel oil prices are low because the government wants to subsidize the electric utility. Tying development assistance to the "rationalization" of fuel oil prices may be useful only if assistance to the utility is studied as well.

In arguing in favor of price reform, officials from development agencies can help demonstrate the long-held presumptions of the existing program. For example, many programs presume that regulating petroleum prices is the most efficient way to protect certain groups from the impact of higher prices. In many least developed countries, this presumption has never been subjected to detailed scrutiny. Thus, analytical projects can be designed to examine the subject country's petroleum consumption by user group to help determine with as much specificity as is practical 1) which groups the government wants to protect from price increases and 2) how such protection can be most efficiently rendered. This includes consideration of technical and financial instruments for granting "discriminating" relief.

In oil-exporting countries where the overall level of wholesale prices is far below international levels, the key need is likely to be a blueprint for <u>long-term</u> price reform. Again, focusing on individual products avoids the main issue. Implictly or explicitly, the government must 1) evaluate the economic and social effects of the existing

program, 2) evaluate the economic effects of changes in prices on the various social groups whose welfare is of primary concern, and 3) consider various candidate reform programs based on experiences of other countries. In addition, the government can be encouraged to launch a campaign aimed at influencing elite perceptions of the benefits of a more efficient pricing program. The public, legislators, the press, and some in government have become so accustomed to the status quo, that change, especially any increase in prices, is regarded as not being in the public interest. In many countries, the debate over oil prices has yet to focus on the cost of petroleum subsidies to the country as a whole. The concept that all citizens may be better off if petroleum prices more closely reflected the world value of oil is seldom put forth.

One of the obstacles to change is that petroleum pricing reform in any country typically requires that attention be given at various levels. First, on the technical level, existing regulations often invite abuse by those who have access to information. In some countries, it may be necessary to review the conduct of petroleum sales, and to reform the importer-refiner-distributor-marketer relationship, as part of a process pricing reform.

At the "program" level, it may be useful to encourage the government to specify in detail what criteria will be employed to determine petroleum prices. Various programmatic options exist. Which ones should be employed is in part a function of the choices made at the third, the policy level.

At the policy level, the first major decision that must be made is whether to base domestic petroleum product prices on costs or on value. This presumes, of course, that the government is not prepared to let market forces determine prices. In the cost-based system, the government monitors cost and adjusts prices when predetermined variance thresholds are crossed. In the value-based system, the government monitor oil prices (and also elements of total costs such as interest and exchange rates) and adjusts local prices whenever conditions in either the home or reference markets warrant. Development agencies can help this process along by disseminating information about the experience of other countries and by sponsoring assessments of how various types of systematic pricing programs would affect the

economy.

While the dissemination of information and careful evaluation of the benefits and costs of the current program and of alternatives are useful steps, their essential purpose must not be overlooked. We have argued that a country's propensity to implement an efficient pricing system is strongly influenced by the degree of "creative tension" between advocates of supply-side and consumer-oriented pricing programs. In countries where the supply-side is underrepresented (the Sudan, Ecuador, Argentina), one of the most useful roles external development agencies can play is to strengthen these institutions.

In this respect, a policy to withhold assistance to national oil companies for the sake of promoting a more market-oriented energy policy, or to persuade governments to open up their oil markets to multinational firms, may be counterproductive. If the principal objective of development assistance is to improve the overall efficiency of the economies, surely a reform of the pricing system is an important initial step. Multinational companies will not be interested in participating in national markets where product prices are ill-regulated (although they may be very interested if bad regulations lead to high wholesale prices, but that is not a recipe for efficiency). In countries like the Sudan, reform is more likely to occur if the General Petroleum Corporation becomes a forceful advocate of rational pricing than if it remains a mere appendage, with no autonomous financial accounts, of the energy ministry. In addition, many countries like Argentina are so committed to state ownership of the long-established oil company that pressure to privatize that sector will little or no effect. This is not an argument for the superiority of nationalized oil companies, rather it is an argument for recognizing political realities and setting priorities: first, provide assistance to "get the price right." That lays the basis for opening the market to greater competition.

When governments have made the decision in principle to deal with the petroleum pricing problem on a systematic basis, whether or not as a result of the persuasion of development agencies, the regulators must turn to the technical task of establishing or changing the pricing program. At this time, they will begin to look for technical models of pricing programs. That leads to the next

proposition.

Proposition 4

a) Given the development of a propensity to embrace the principles of efficient petroleum pricing, regulators' ability to maintain efficient prices in the face of market fluctuations is a function of their ability to develop a technical pricing program that satisfies critical social and political objectives .

b) The principal elements of successful pricing programs are 1) pricing formulas that clearly spell out the variables that set the thresholds for price changes, 2) a commitment to change petroleum prices, at a minimum on a quarterly basis, and preferably on a monthly basis, and 3) automatic implementation of these changes.

After reviewing petroleum pricing programs in our sample of developping countries, and considering the findings of our previous study of pricing programs in industrial countries, we offer one general programmatic conclusion: "formula-based" pricing programs based on prices in external reference markets have several important advantages over ad hoc pricing schemes. First, they can help make progress towards depoliticizing domestic oil pricing. An integrated pricing formula for can "automate" price adjustments from the refinery to the pump.

Government desiring to move from an ad hoc to a formula-based program based in whole or in part on "reference markets" have to accept a dimunition of their day-to-day influence over prices. The offsetting advantag : in time, the pricing process become less politicized, ar the expectations of the public and the oil industry change towards acceptance of the fact that when international prices change, domestic prices will also change, gradually and systematically.

Such a program can be difficult to design in countries where readily available benchmarks, such as the value of crude and products, have not gained acceptance, as

in South Korea. One of the great advantages in Thailand's case is that one central benchmark--Singapore postings--is already well-established, obviating the need for complex cost-based formulas on crude and crude freight.

Brazil, Argentina, the Sudan, and Ecuador all have cost-based pricing systems. The social and political objectives of their pricing programs could still be achieved in an automatic price-formula program because those objectives relate principally to the prices of individual petroleum products, whereas the initial focus of a price formula is the overall price. Argentina and Ecuador, where the overall wholesale price has been far below world levels, could creat a pricing formula that continues to subsidize critical products, but gradually raises the prices of others so that in time (say, five years) the overall wholesale price reaches near-parity with international levels. Once that is accomplished, the prices of the subsidizied products could also gradually be brought in line.

In Brazil and the Sudan, the difference between the overall wholesale price and international prices has not been as egregious. In these countries, the pricing formula (quite explicit and sophisticated in Brazil, implicit in the Sudan) can be modified by assuring that the exchange rate used in determining the overall price be the highest, rather than the lowest rate.

NOTES:

1. They are also regulated in the majority of industrialized countries, even if one considers only those within the Organization for Economic Cooperation and Development (OECD). For a survey, see E.N. Krapels, Pricing Petroleum Products: Strategies of Eleven Industrial Nations (New York: McGraw-Hill Publiching Company, 1982).

2. The full report is titled "Fuel for the Engine of Growth," and includes detailed wholesale and retail price data for the surveyed countries for the period 1978 to 1984.

3. By "absolute" price level we mean the weighted average price of a representative barrel of oil products consumed in the market. From an analytical standpoint, the absolute price of oil in a given market is important because it provides a way to "net out" the effects of subsidies. For example, kerosine prices in Thailand are subsidized, gasoline prices are negatively subsidized. An issue of great concern is whether the negative subsidy on gasoline "pays for" the subsidy on kerosine.

To illustrate, consider a simple case in which a country imports crude oil at $30 per barrel CIF. Domestic demand requires that one-third of the crude be refined into gasoline, one-third into kerosine, and one-third into heavy fuel oil. The price regulations of the country are such that gasoline is "negatively subsidized", selling at $40 per barrel; kerosine is heavily subsidized, selling at $15 per barrel, and residual fuel oil is sold at world prices, assumed to be $27 per barrel. The "absolute price" of oil is

.33	x $46 =	$13.20
.33	x $15 =	5.00
.33	x $27 =	9.00
		$27.20

The cost of oil is $30, and assuming the cost of refining is $2 per barrel , it is clear that the cost exceeds the absolute price by $4.80 per barrel. This difference does not account for any distribution or marketing cost; it obtains simply at the oil-refinery level.

4. The macroeconomic statistics used in the following paragraphs were taken from the International Monetary Fund's

Monthly Financial Statistics.

5. The value of the peso fell from 328 to the dollar in May 1981 to 1,400 in May 1982 to 8,110 in May 1983.

6. M. Munasinghe and G. Schramm, Energy Economics, Demand Management, and Conservation Policy (New York: Van Nostrand Reinhold Company, 1983), p. 102.

7. Ibid.