DOMESTIC ENERGY PRICING: TRENDS AND IMPLICATIONS FOR THE ARAB WORLD

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Energy use everywhere is tied to population growth, industrialization, expansion of urban centers, and development of industrial and infrastructural facilities. The decade of the 1970s saw dramatic changes in the economic activity and performance of Arab economies. New economic targets were set in place, with new priorities and investment strategies. Energy policy was becoming an important priority for every country in the Arab world. A critical issue in energy policy is that of pricing, that is, determining the appropriate valuation for domestic uses of energy.

Issues of Domestic Energy Pricing

Arab countries have traditionally followed pricing policies in domestic energy that subsidize users, households, industry, manufacturing, services, agriculture, and government with respect to international energy prices. At least four reasons have contributed historically to low domestic energy prices in the region. First is the common concern for social equity (providing access to critical commodities at low prices—food, fuel, and the like). Second are the region's industrialization objectives (since energy is a critical input to industrial processes, maintaining low prices is an indirect form of subsidy to industry). A third reason is the problem

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of basic information (no one fully knows what the "true prices" of energy are to industrializing economies). Finally, almost every country in the region is reluctant to disturb established social arrangements by arbitrarily advocating a change in pricing policies without adequate assessments of potential impacts for implementation and preparations.

Pricing issues are among the most critical in all developing countries.[1] Pricing policies are also intensely political. Any changes in prevailing prices, for whatever underlying reasons, result in some costs and some benefits—to the economy, to component sectors, and to individual consumers. Given the central role of energy in development, what the "correct" pricing policy is and who will bear the burden of adjustment are particularly controversial with respect to energy.

The issues at hand are not straightforward. On the one hand, it is generally argued that low domestic prices relative to international prices have *negative* consequences of: (1) encouraging domestic consumption, including propensities for waste, which implies foreign-exchange earnings foregone for small oil exporters and additional foreign-exchange burdens for oil importers; (2) introducing energy inefficiencies and discouraging conservation; (3) providing wrong signals for resource allocations that might lead to distortions in investment allocations which cannot be afforded; (4) contributing to the depletion of energy resources through the combined effects of the three consequences previously noted; and (5) contributing to the deterioration of the balance of trade when low prices cut into oil export earnings of the oil-exporting countries and encourage energy imports in oil-importing nations.

On the other hand, some of the *positive* consequences of maintaining low energy prices relative to international prices that are always recognized include: (1) helping poorer segments of society, low-income consumers, obtain access to energy for household and productive uses; (2) helping to expand the broad industrial base by building its productive capacity; (3) protecting or safeguarding the development of critical industries (while these may also be energy intensive they may encourage import substitution); and (4) enhancing industrialization to promote self-sufficiency, through the combined effects of the second and third consequences just noted.

The real problem, of course, is that none of these contentions, taken in isolation, is entirely accurate. Pricing issues are complex and choosing the "right" pricing policy must depend on the economic objectives of the country in question, its factor and resource endowments, its socioeconomic framework, and its broad political objectives and development strategy. While some pricing rules are less relevant to the Arab world than others, the fact remains that the "correct" pricing policy depends upon the region's own distinctive developmental characteristics.

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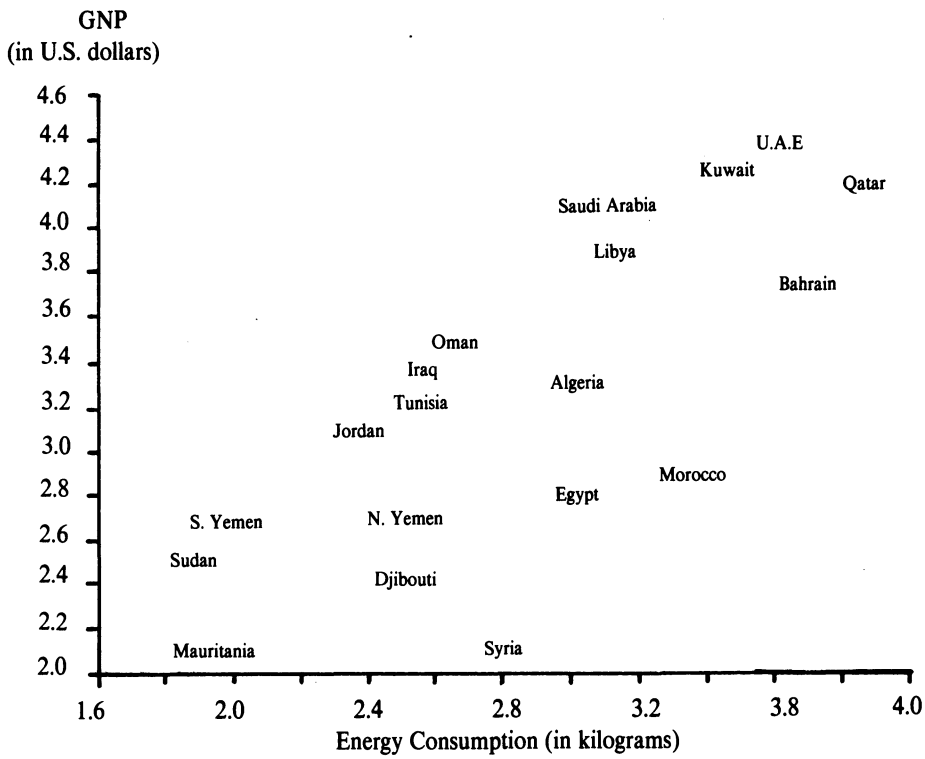
[1]For a survey of energy issues in developing countries, see Nazli Choucri, "Energy and Development: Fossil Fuels in Developing Countries," prepared for the Seminar on "Energy for Survival and Development," Pontifical Academy of Sciences, Rome, June 11-14, 1984.

Energy and Arab Development

The Arab states have considerable diversity in population size, level of economic activity, resource endowments, and energy profiles, yet every country has a modern sector that relies on commercial fuels.[2] The familiar relationship between per-capita energy consumption and per-capita gross national product (GNP), so well demonstrated in the industrial countries' relationship, emerges for Arab countries as well, as noted in Figure 1. Although the apparent regression line is not as pronounced as for industrial societies, the relationship is replicated in Arab economies.

Figure 1

PER-CAPITA ENERGY CONSUMPTION AND
PER-CAPITA GROSS NATIONAL PRODUCT (GNP) IN 1980
(logarithmic scale)



[2]I am grateful to Ivo H. Daalder, Ph.D. Candidate, Department of Political Science, Massachusetts Institute of Technology, for assistance in data compilation and analysis. A basic source of data analysis and interpretation is found in the *Proceedings of the Second Arab Energy Conference,* Doha, Qatar, March 6-11, 1982 (Kuwait: Organization of the Arab Petroleum Exporting Countries [OAPEC], 1983).

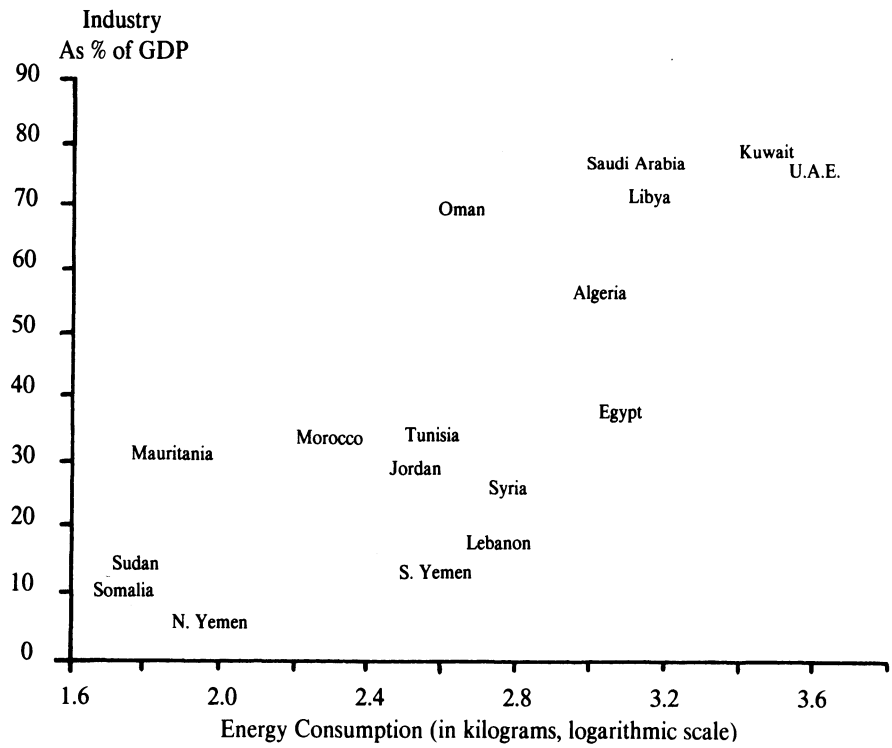
The relation between energy and industry (which includes the oil sector) on a *per-capita* basis is shown in Figure 2. This figure indicates the differences in Arab economies, both in terms of industrialization and energy use. In the Arab world the industry share of gross domestic product (GDP) expanded substantially between 1970 and 1980; with industrialization comes expanded energy use.

The economics of exhaustible resources come into focus as one observes the reserve/production ratio—the production which can be maintained at the present rate before resources are exhausted (assuming no additions to reserves). This ratio, of course, is highly dependent on production, and there is considerable variation among Arab states on this ratio, as evident in table 1 in the Appendix.

The size of the energy sector in selected Arab economies is shown in table 2 of the Appendix. The energy share of GDP in each Arab economy has expanded substantially between 1970 and 1980. A companion reality is even more

Figure 2

PER-CAPITA ENERGY CONSUMPTION AND INDUSTRY'S SHARE IN GROSS DOMESTIC PRODUCT (GDP), 1980



pervasive; production of crude petroleum has been extremely high as a percentage of total primary energy production. Many Arab economies have possibilities of diversification for their primary energy resources.

Energy balances in the Arab countries have been discussed extensively elsewhere. Less well known are trends in energy intensity (in terms of tons of oil equivalent per unit of GDP).[3] In general, we find an increase in energy intensity,[4] although there are some signals suggesting a possible reversal as indicated in table 3 of the Appendix.

Thus, the contemporary energy profiles of the Arab region raise some important questions for domestic energy-pricing policy.

1. Depletion of petroleum is an issue in some Arab economies. We must consider that current energy prices may encourage consumption and possible waste, thereby potentially accelerating depletion rates.

2. The size of the energy sector is expanding in the Arab economies, and there is a continued high degree of reliance on petroleum products. So we must consider that domestic pricing, which directly affects the energy sector, will inevitably reverberate throughout all economic activity. However, all users do not adjust in the same way to pricing changes.

3. Energy prices that were set historically low have been designed to encourage industrialization. Yet, they distort resource allocation by providing erroneous economic signals and unduly encourage energy-intensive industries. Since the size of the Arab economies' industrial base is expanding, the impacts of any distorting price signals will expand accordingly. National priorities, therefore, must determine which industries, if any, are to be protected through differential pricing or subsidies.

4. The lower the price of energy, the higher will be the amounts consumed. It is thus essential to determine the demand elasticities for each Arab economy and for categories of users. One cannot ignore the social ramifications of policy interventions that have as their objective the improvement of economic performance.

5. At issue is whether broad energy price adjustments are necessary or whether "user-specific," sector-specific, or product-specific prices reflect more appropriate strategies.

As an introduction to this paper, we suggest that there is not one domestic energy-pricing issue in the Arab world, but a variety of price-related problems for

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[3]The issues related to appropriate indicators are reviewed and elucidated in M. A. Adelman, "Energy-Income Coefficients and Ratios: Their Use and Abuse," *Energy Economics,* January 1980, pp. 2-4.

[4]The data-related problems continue to be significant as different series show different trends. For example, as computed by the World Bank, we see that the trend from 1970 to 1980 is, with the exception of Iraq, towards higher, not lower, energy intensity. See The World Bank, *The Energy Transition in Developing Countries* (Washington, D.C.: World Bank, 1983), appendix I, table 2.

different nations of the region. Each country's energy balance and level of development provides the context for its appropriate pricing strategy. There is a need for a balanced view of domestic energy-pricing issues. The problem is to identify that set of pricing policies that best enhances the objectives of individual Arab economies and of the Arab world as a whole.

Trends in Domestic Energy Prices

The terms in which domestic energy prices are expressed reflect a variety of factors. There is a wide degree of variation in energy prices in the Arab world, variations across countries, and differences in pricing of energy products. Indeed, these differences are often obscured by the particular prices one chooses to analyze. There are several ways of viewing and calculating the level of domestic energy prices that demonstrate the various price dimensions along which Arab countries can be compared. Here we focus on five valuation types to reflect different perspectives in the analysis of domestic energy prices: (1) nominal terms (reflecting domestic inflation rates); (2) nominal prices in dollar equivalence (reflecting exchange-rate effects); (3) real terms in local currency (taking into account the effects of inflation); (4) real terms in dollar equivalence (taking into account domestic inflation and the value of the local currency relative to international currencies); and (5) in terms of index numbers (eliminating the effects of domestic inflation and exchange rates, thus facilitating assessments of real prices). This fivefold analysis of price trends will illustrate the complexity and diversity of prevailing energy prices in the Arab world.

Nominal Domestic Energy Prices: When expressed in local currency in nominal terms, we see the sheer invariance of domestic energy prices. With few exceptions, Arab countries have *not* used energy prices as a policy instrument in the past. Recently, many countries of the region have begun to change domestic energy prices.

For example, Qatar kept stable prices for all products except premium gasoline, which was priced upward in 1978. Algeria increased premium gasoline and fuel-oil prices initially around 1981, and again in 1983 gasoline premium prices were reset more sharply upward. Kuwait's domestic prices of refined products have remained completely invariant from 1970 up to 1982 when the first significant and major increases for all fuel products were set in place.

The United Arab Emirates (U.A.E.) slowly but systematically pushed domestic prices gradually upward since 1977. This is seen in all products for which we have data. Egypt maintained generally low prices, which rose marginally from 1970 onwards. By 1982, we see a doubling of nominal gasoline prices compared to 1970. A sharp increase in prices occurred in 1979, when the first major

upward adjustments were made. By contrast, domestic prices for fuel oil showed no increases in price whatever over this period.

While the price indices for Libya are incomplete, we do see a doubling of prices across the board for all products (except fuel oil where the increase is only by 50 percent). For gasoline prices (premium and regular) Bahrain is distinctive in having tripled domestic prices between 1976 and 1983. Kerosine prices (with many missing observations) show some upward adjustments in 1978, following a peculiar drop some years earlier. If the record is accurate, the drop in 1977 was astronomical, thus a slight recovery in 1978 may have been designed as a corrective measure.

Although nominal energy prices in Arab economies have remained largely unchanged throughout the 1970s, by the end of the decade it is apparent that all countries saw the need for energy-price adjustments. The changes occurring from 1980 to 1983 are still marginal by international standards. They are, however, more significant for consumers who are confronted with higher fuel costs.

Domestic Prices Expressed in Dollar Terms: Domestic nominal prices of energy, expressed in U.S. dollars, facilitate international comparisons and show the impact of exchange rates. Expressed thus, energy prices reflect the value of the local currency relative to a key international currency.[5] Tables 4, 5, 6, and 7 in the Appendix present these trends. By far the *lowest* nominal prices for petroleum products (premium gasoline, regular gasoline, kerosine, and fuel oil), taking into account the impact of the exchange rate, are in Saudi Arabia, Qatar, Bahrain, Egypt, and Kuwait. Despite some gaps in data, it is clear that these countries' prices for domestic consumers are a fraction of world prices. Fluctuation in exchange rates account largely for the price variation of Bahrain and Kuwait. For Egypt, the local price increases in the late 1970s and 1980 are disguised by the sharp devaluation of the Egyptian pound in 1979.

As seen in Appendix tables 4 through 7, the *highest* nominal domestic energy prices expressed in U.S. dollars are in Morocco, Algeria, and Tunisia, in that order. Morocco, a major importer of oil, has responded to its oil import burden by systematically raising the prices of all petroleum products. For example, in 1983 Morocco's gasoline prices for premium were 12 times higher than the Saudi prices and for regular gasoline, higher still. For fuel oil they were about 15 times above the Saudi level. Among the oil exporters, the U.A.E. and Libya specifically have trends in domestic energy prices that can be regarded as *middle to high,* relative to other Arab economies. In both cases we see some upward adjustments in domestic prices expressed in U.S. dollars over the past five years.

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[5]Assistance in resolving problems of data consistency in energy prices was provided by Ivo H. Daalder.

Nominal energy prices expressed in dollar terms reflect the impact of exchange rates and add a confounding element in assessing trends in domestic energy prices. Figures 3 and 4 present the trends for domestic prices of premium gasoline, expressed in dollar terms. Therefore, observing energy prices in real terms is the next logical step.

Domestic Energy Prices in Real Terms: Taking into account the impact of inflation, we note that throughout the Arab world, real energy prices have been declining. This is evident for two fuels for which detailed analysis has been undertaken—premium gasoline and kerosine. The reality of inflation translates into strong *downward* trends in domestic energy prices. These trends reflect the seriousness of the energy-pricing problems confronting all Arab economies (see tables 8 and 9 in the Appendix).

Real Energy Prices in Dollar Terms: Real prices expressed in U.S. dollars eliminate the impact of domestic inflation but not exchange-rate effects. For premium gasoline, the highest real prices of energy (expressed in U.S. dollars) are evident in Morocco and Tunisia. The lowest prices are in Kuwait and Saudi Arabia. For kerosine, Kuwait has undoubtedly the lowest prices among the Arab economies, followed by Saudi Arabia. Morocco and Tunisia have the highest kerosine prices while Egypt ranks third. Price declines continue to be evident throughout the Arab economies when real prices are expressed in dollar terms (figures 5 and 6 and Appendix tables 10 and 11).

Real Energy Prices in Index Terms: The real domestic price of energy, excluding the impact of inflation and exchange rates, is reflected in energy price indices. Figures 7 and 8 and tables 12 and 13 in the Appendix show the real domestic prices of energy in Arab economies for two products, premium gasoline and kerosine. In general, there is persistent evidence of declining real energy prices. The upward adjustments in nominal prices presented earlier are dampened considerably once inflationary pressures and exchange-rate effects are taken into account.

The basic conclusion, thus, is that in terms of price indices the real valuation of domestic energy in the Arab world has been declining. Prices have not kept pace with inflation, and they have not kept abreast of the fluctuation of domestic currency relative to the U.S. dollar.

Comparison with Domestic Energy Prices in Other Regions

Analysis of domestic energy prices in other regions of the world similarly entails an assessment in the same five alternative valuation terms: (1) nominal prices; (2) nominal prices in dollar terms, for comparison; (3) real prices; (4) real price expressed in dollar terms; and (5) real energy-price indices. Price trends in

Figure 3

DOMESTIC GASOLINE PRICES OF SELECTED "HIGH-PRICE" COUNTRIES, 1970-1983
(in U.S. cents per U.S. gallon)

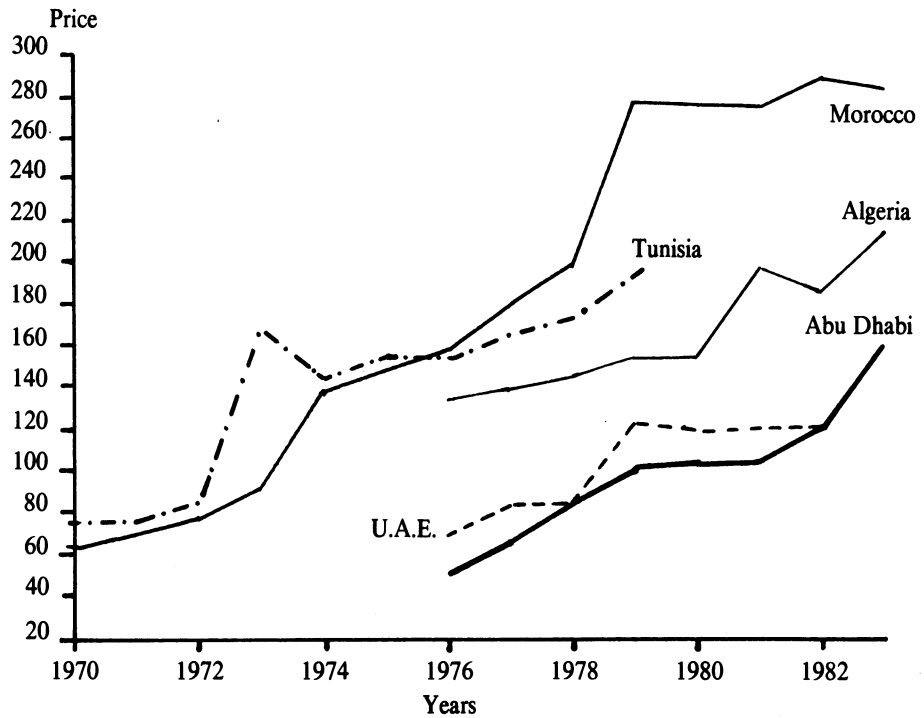


Figure 4

DOMESTIC GASOLINE PRICES OF SELECTED "LOW-PRICE" COUNTRIES, 1970-1983
(in U.S. cents per U.S. gallon)

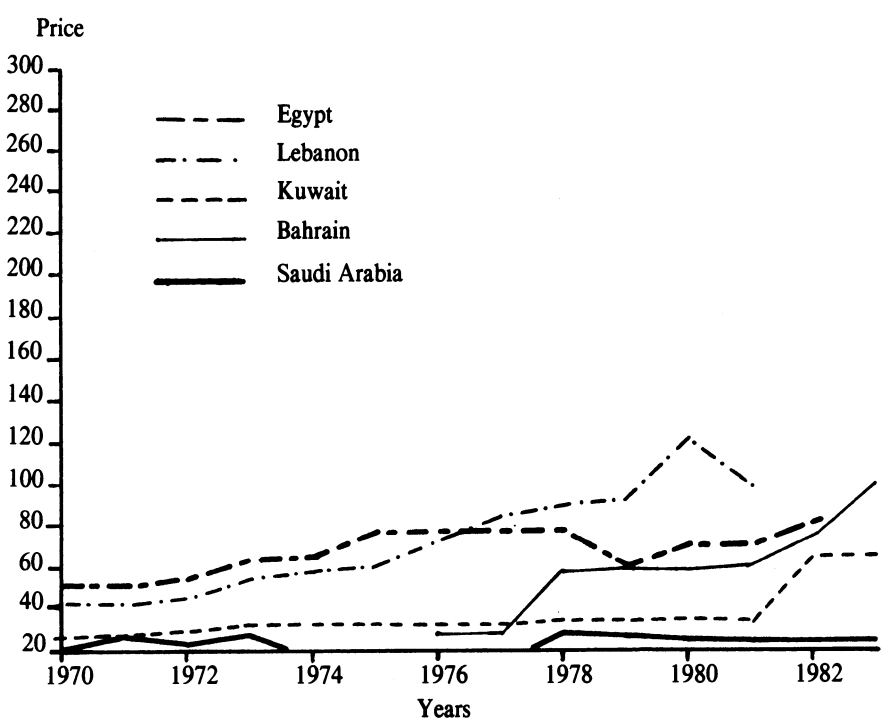


Figure 5

PREMIUM GASOLINE PRICES IN REAL TERMS, 1970-1980
(in U.S. cents per U.S. gallon in 1975 dollars)

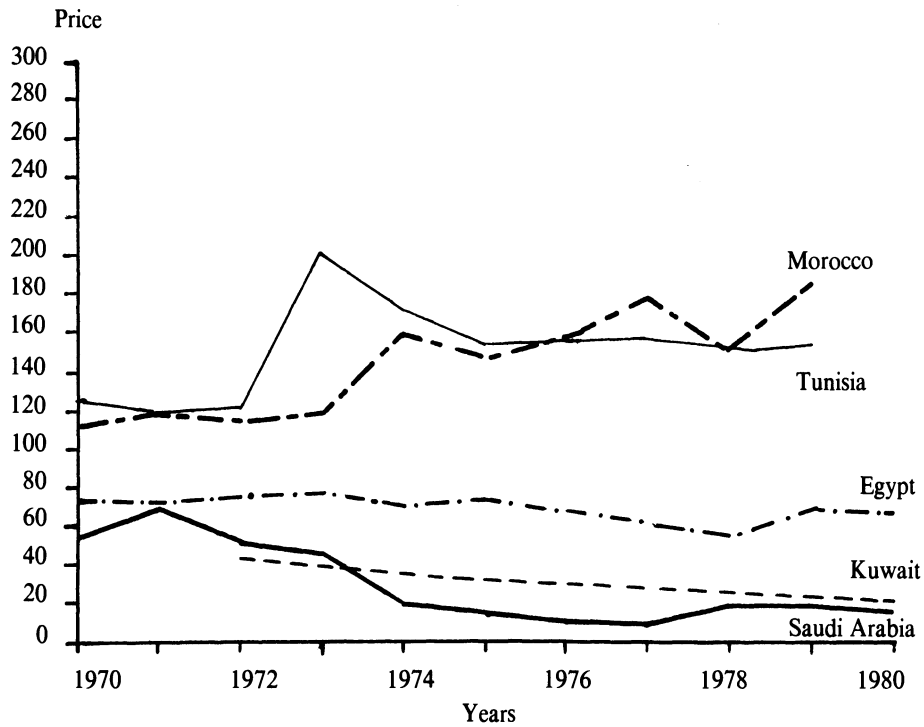


Figure 6

KEROSINE PRICES IN REAL TERMS, 1970-1980
(in U.S. cents per U.S. gallon in 1975 dollars)

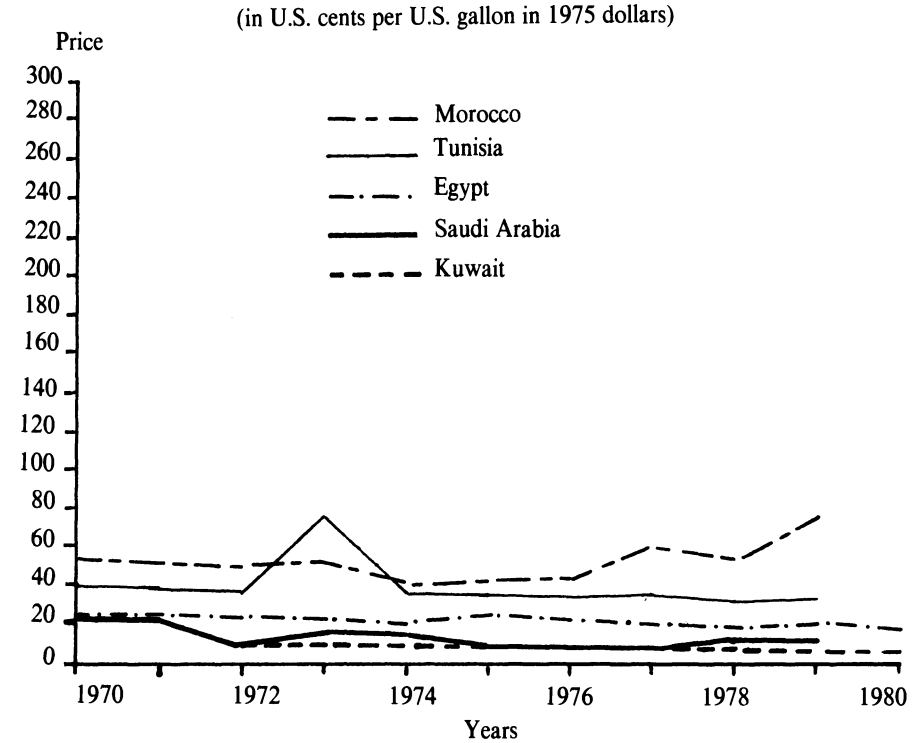


Figure 7

INDEX OF PREMIUM GASOLINE PRICES IN REAL TERMS, 1970-1980
(1975 = 100)

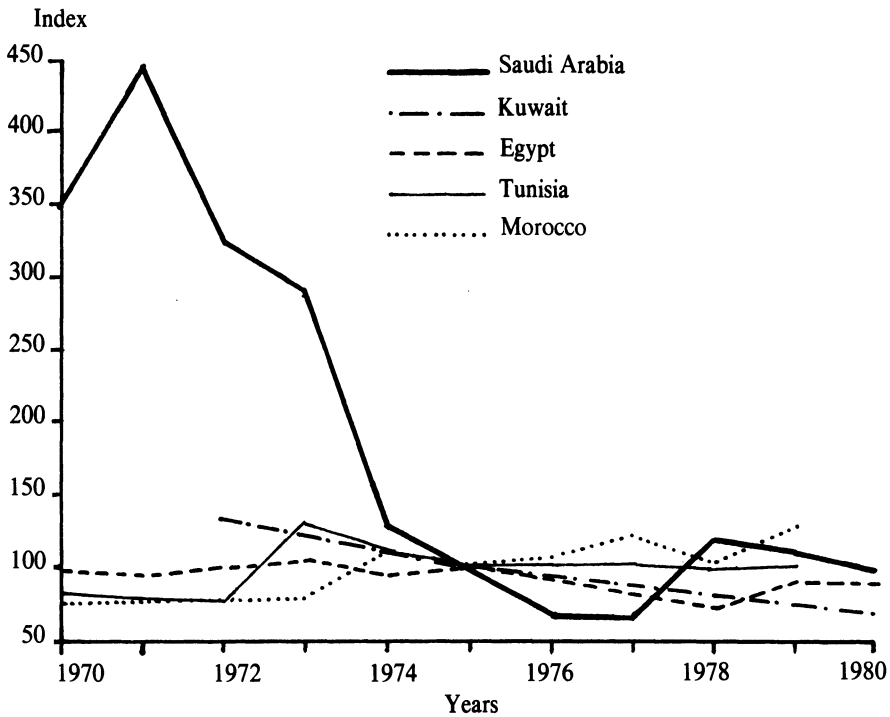
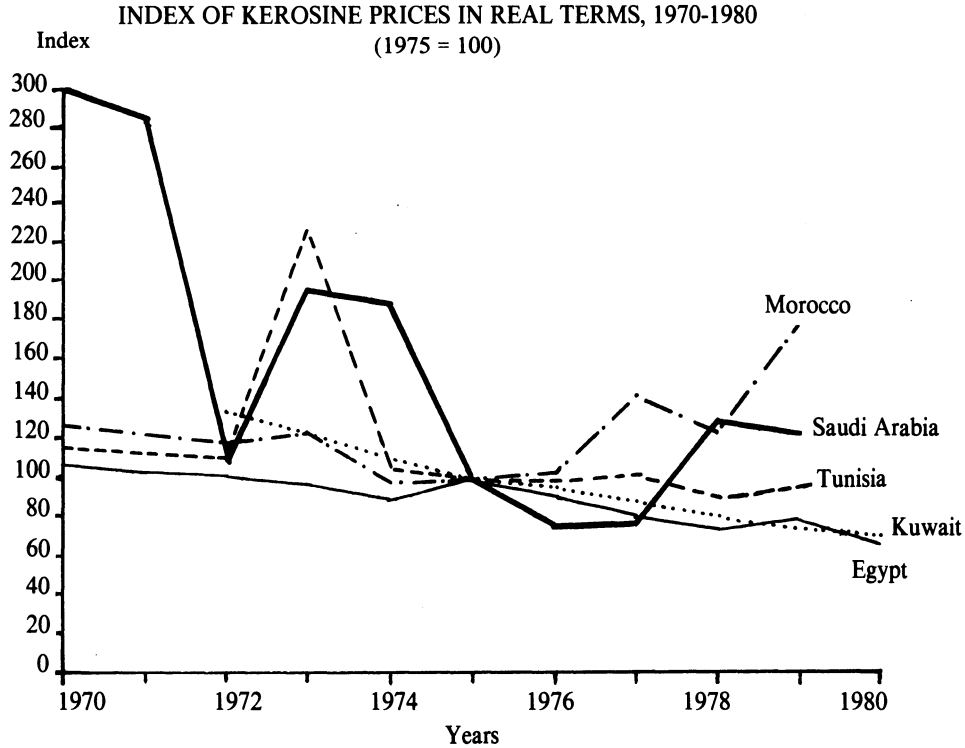


Figure 8

INDEX OF KEROSINE PRICES IN REAL TERMS, 1970-1980
(1975 = 100)



13 developing countries representing the economies of Africa, Asia, and Latin America are presented in tables 14 and 15 in the Appendix.

Comparing Arab pricing trends with those of four major Latin American countries—Venezuela and Mexico (oil exporters) and Argentina and Brazil (oil importers)—we observe the following trends in nominal prices. Venequela's prices have been extremely low and stable from 1970 to 1980 (at about 30 cents per gallon), then tripled in 1982 as the government announced a major policy change to 88 cents a gallon. The peak of Mexican gasoline prices in 1981, at $1.10 per gallon, was followed by a decline to 76 cents in 1983 from the base low of 33 cents in 1970. The most sustained increases in domestic prices are for Brazil, which increased its gasoline prices from 45 cents in 1970 to $2.04 in 1979.[6]

In the Arab world, only Morocco has adjusted domestic oil prices *higher and more sharply* than Brazil or the other three Latin American states examined. The Arab countries where energy (gasoline) prices are in the mid-range compare favorably with the Latin American states. Finally, those Arab economies with low gasoline prices are *much lower* than the Latin American cases. Thus, Venezuela, an OPEC member, had kept its domestic prices consistent with Saudi Arabia and Kuwait before its dramatic change of 1982. Of the small Latin American economies, the Dominican Republic's energy-pricing policies contrast with other countries of the region and with the Arab world, as the government systematically adjusted its pricing policies from 40 cents per gallon in 1970 to $1 in 1978, and then to $2.60 per gallon in 1982.

Comparing Arab pricing trends with select Asian countries—Indonesia, Pakistan, the Philippines, Burma, and India—we find that the Asian countries uniformly have been *more* responsive to pressure for changing domestic prices than the Arab states. Both India and the Philippines raised domestic gasoline prices in excess of $2.50 per gallon in 1981 from a low of 20 cents in 1970 (for the Philippines) and 58 cents (for India). Indonesia, an OPEC member, increased its domestic prices of gasoline from 40 cents in 1970 to 80 cents in 1976 and then to $2.20 in 1983. No Arab OPEC country has shown such a trend with the exception of Algeria, whose gasoline price in 1983 was $2.13 per gallon. Note that these prices are still lower than Morocco's prices, whose adjustments are greater than other countries examined so far.

In Africa we select two countries for comparison with Arab energy-price trends: Ethiopia and Kenya. Both countries have shown remarkable consistency in periodic price trends. Ethiopia's prices in 1981 had increased to $2.40 per gallon (from 70 cents in 1970). For Kenya, the 60-cent base was doubled in

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[6]For comparative purposes, a detailed analysis of energy issues in Latin America is provided by Nazli Choucri in *Energy and Development in Latin America: Perspectives for Public Policy* (Lexington, Massachusetts: D.C. Heath, 1982), revised for publication by Fondo de Cultura Economica, Mexico, forthcoming.

1975, and by 1981 Kenyan consumers paid $2.74 per gallon. All of these prices remain lower than Morocco's gasoline prices.

Finally, we consider the experience of Turkey, a Middle East country where economy and energy endowments have necessitated major energy-price adjustments. Turkey's gasoline prices in 1971 were about 50 cents per gallon, increasing to about 93 cents in 1974, then, following a decline, upward again to $1.60 in 1978, and to $2.30 in 1980, before settling at $2.10 in 1982. These prices are higher than those of most Arab countries.

Turning to comparisons between Arab and non-Arab economies in terms of index prices of energy, we conclude with the following.

1. The Arab economies with relatively higher energy prices (Morocco and, in part, Tunisia) are similar in pricing trends to the Philippines and Burma.

2. Arab economies with declining gasoline prices (Algeria, Egypt, and Kuwait) show the same price decline patterns as Brazil, Mexico, Venezuela, and Ethiopia.

3. Arab economies with low energy prices and relatively small price increases (for example, Saudi Arabia) are similar in pricing patterns to countries like Pakistan.

4. Certain non-Arab economies have recently undergone substantial price increases (notably, Turkey and the Dominican Republic), especially in 1980. Real and index energy prices for non-Arab countries are presented in figures 9 and 10.

Figure 9

PREMIUM GASOLINE PRICES IN SELECTED NON-ARAB COUNTRIES IN REAL TERMS, 1970-1980
(in U.S. cents per U.S. gallon in 1975 dollars)

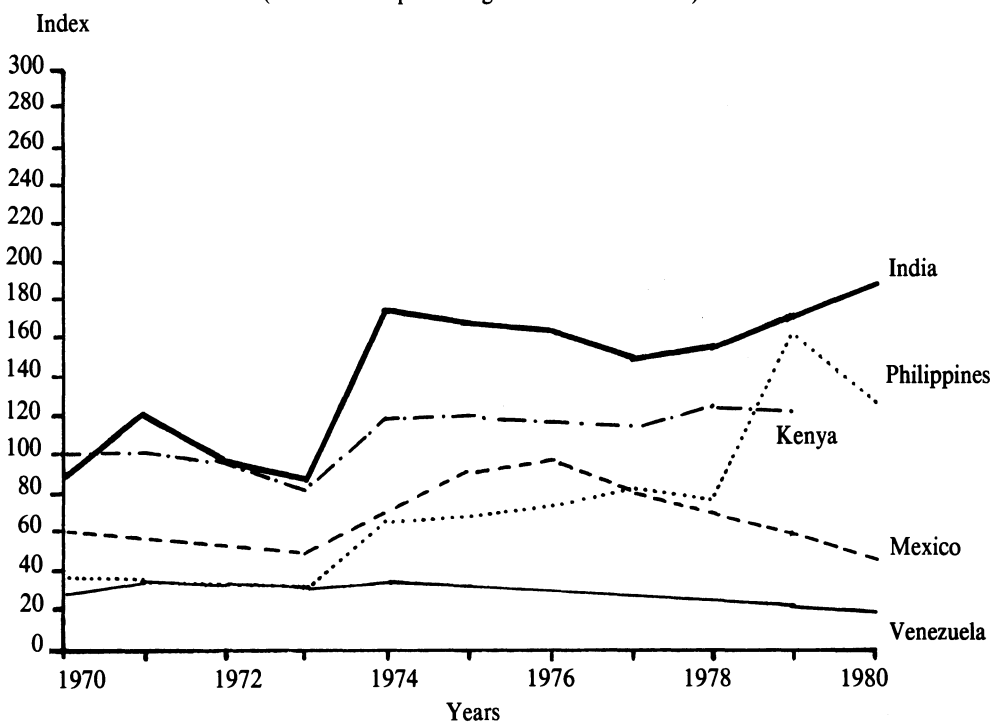
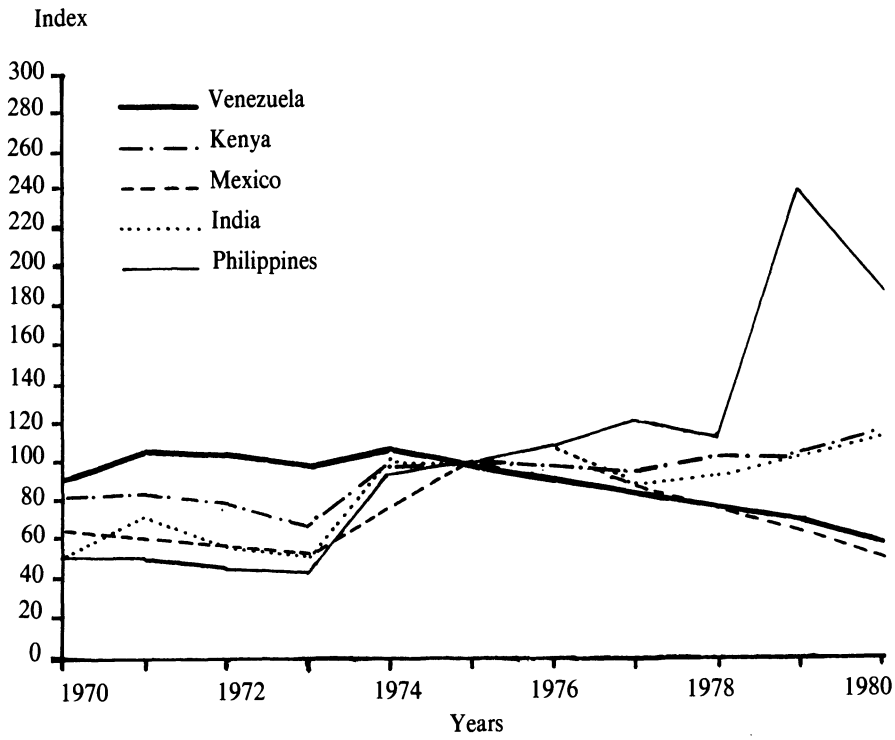


Figure 10

INDEX OF PREMIUM GASOLINE PRICES IN SELECTED NON-ARAB COUNTRIES IN REAL TERMS, 1970-1980
(1975 = 100)



Estimates of Demand Elasticity

Both the price and income-elasticity values are crucial in determining the level of future energy use and in examining the sensitivity of the system to energy prices. Erroneous assessments of sensitivity to prices might lead to wrong (poor) policy decisions, which can lead to substantial costs in terms of losses in output, income, and employment.

At this point we review the nature, conclusions, and coefficients obtained in existing studies of demand elasticities for Arab economies.[7] Allowing for incomplete data, we recognize that robust estimation for developing countries is

[7]I am grateful to Dr. Supriya Lahiri, Research Associate, Massachusetts Institute of Technology, who compiled table 1 and the comments therein. This section is based on her observations.

especially difficult. Table 1 compares the basic features of four studies on demand elasticities in Arab economies, including our assessment of their implications.[8]

Existing estimates of elasticities of energy demand vary widely among Arab states and there appears to be no "consensus" view of the responsiveness of demand to prices. Nonetheless, price-elasticity estimates in the Arab world are generally on the *low* side compared to estimates for other developing countries and particularly the developed members of the Organization for Economic Cooperation and Development. This conclusion is based on our review of studies on demand elasticities for Greece, Spain, Turkey, Brazil, and Mexico—all developing economies at about the same level of socio-economic development as the Arab world. The comparatively lower responsiveness in Arab economies is perhaps due to the prevailing low level of prices because of the existence of subsidies in those Arab states included in this review.

We find the typical international pattern evident in income elasticities, namely, that they are much higher than the price elasticities (in absolute terms). Particularly in the case of Egypt, we note that the estimated long-run elasticity measures are higher because they allow for adjustment in technology that would enhance the efficiency of fuel use.

The effect of energy pricing on curtailing energy consumption depends on the dominant users of energy: the household, industrial, and transportation sectors of the economy. As energy prices rise, there will be a downward adjustment in energy consumption. This adjustment might be possible if consumers purchase and use less energy-consuming appliances, and if energy-consuming appliances become more energy efficient. More important, the infrastructure for such adjustments must be set in place.

Since energy is an important intermediate input, an increase in the price of energy also will lead to an increase in costs, and hence to the general price level of the economy. However, if there are possibilities of substitution between energy and other nonenergy inputs, then an increase in the price of energy may not lead to a reduction in the productive capacity of the economy or constrain production.

The utility of energy pricing as an efficient demand-management tool depends on the crucial role that energy plays both in the consumption basket and as an

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[8]The studies on which this review is based are the following: Mervat Badawi, "Consumption Costs and Investment Needs in the Energy Sector in the Arab World," and Ibrahim B. Ibrahim, Hamki Saleh, and Abdel Rahim Iweis, "Energy Demand Forecasts for the Arab Countries," in *Proceedings of the Second Arab Energy Conference* (Doha, Qatar, March 6-11, 1982), vol. 2; and Gouda Abdel-Khalek, *Some Preliminary Estimates of Increase in Price Elasticities of Energy Consumption in Egypt,* Development Research and Technological Planning Center, Cairo University, Egypt, 1984.

Table 1

OVERVIEW OF DEMAND ELASTICITY ESTIMATES IN ARAB COUNTRIES

Level of Analysis/ Type of Data	Dependent Variables	Independent Variables	Functional Form/ Estimation Technique	Elasticities
1. Total energy consumption based on a cross-section sample of 17 Arab countries over 1977-1979[a]	Per-capita energy consumption	Income, energy price, share of economic sector in gross domestic product (GDP)	Log-linear: (1) OLS with dummy variable (2) Linkage models for intercountry comparison	Price: –.51 Income: .45 Linkage model Income elasticity 1.500 Jordan 1.203 United Arab Emirates (U.A.E) 0.836 Tunisia 0.766 Saudi Arabia 0.716 Syria 0.693 Iraq 0.996 Oman 0.655 Egypt 1.362 Libya

				Group	Price	Income	
2. Total demand for primary energy for each of the 24 Arab states (divided into 5 groups)[b]	Per-capita consumption of energy	Per-capita GDP, share of agriculture, share of mineral industry, share of manufacturing, share of electricity sector, share of transportation sector, energy price	Log-linear, OLS. A covariance model has been used for measuring income elasticities where each cross-section unit is characterized by its own special intercepts by introducing dummy variables for each country.			0.4677	Saudi Arabia
						0.4640	Oman
				First	–.11	0.6226	Qatar
						0.6040	Kuwait
						0.5529	U.A.E.
Data are based on combining chronological series and cross-sectional data for the period 1970-80 for each of the five groups.						0.8157	Algeria
				Second	–.20	0.7561	Libya
						0.8769	Iraq
			A two-stage model has also been used to measure income elasticities. A new variable has been formulated by excluding the effects of price and other structural variables. This new variable of energy consumption then has been treated as the dependent variable and as a function of income alone.			0.9432	Egypt
				Third	–.09	0.9366	Syria
						1.0370	Bahrain
						0.8589	Tunisia
						0.5392	Jordan
				Fourth	–.49	0.4630	Morocco
						0.5606	Lebanon
						–0.1822	Sudan
						–0.2557	Somalia
				Fifth	–.03	0.0905	South Yemen
						0.0117	Djibouti
						–0.0786	Mauritania
						–0.2381	North Yemen

Table 1

OVERVIEW OF DEMAND ELASTICITY ESTIMATES IN ARAB COUNTRIES (continued)

Level of Analysis/ Type of Data	Dependent Variables	Independent Variables	Functional Form/ Estimation Technique	Elasticities		
				Products Consumption	Energy Use	Country
3. Estimation of energy demand in OPEC states for consumption of refined products and total energy use.[c]	Income elasticities of refined products and energy use have been derived by taking the ratios between growth rates of refined petroleum products consumption or energy utilized and the growth rates of real GDP 1972-1976.			2.21	1.64	Algeria
				1.42	0.69	Ecuador
				----	----	Gabon
				2.35	1.65	Indonesia
				2.26	1.61	Iran
				2.04	1.96	Iraq
				----	----	Kuwait
				0.70	1.15	Libya
Growth rates, 1972-1976				3.31	1.31	Nigeria
				----	----	Qatar
				2.63	1.97	Saudia Arabia
				----	----	U.A.E.
				0.98	0.48	Venezuela

				Product	Price: Short-run	Price: Long-run[d]	Income: Short-run	Income: Long-run[d]
4. Empirical estimation of price and income elasticitie of energy consumption in Egypt.[e] Annual time series data 1960-81. Analysis conducted for aggregate energy as well as individual refined products.	Quantity of energy consumed	Retail price of energy, real GDP	Log Linear, OLS with 3 alternative specifications: (1) multiple regression; (2) with Koyck lag; (3) with dummy term		–0.151	–0.517	0.256	0.877
				Aggregate	–0.151	–0.517	0.256	0.88
				Butagas	–0.317	–0.70	0.422	0.94
				Gasoline	–0.043	–0.31	0.287	2.08
				Kerosine	–0.226	–0.41	0.260	0.47
				Gas oil	–0.257	–3.57	0.010	0.14
				Fuel oil	0.023	–0.065	0.313	0.88

[a]Ibrahim, Saleh, and Iweis refer to the –.51 price elasticity of demand as the long-term elasticity. Income elasticity from the generalized model appears much lower than those obtained from the linkage models. Linkage equations have been formulated by utilizing the estimation present in the cross-section model and the information of the time series data.

[b]The price elasticity estimates are low and vary over the countries from –.03 to –.49. Income elasticities appear to be larger than price elasticities. Substantial intergroup differences and minor intragroup differences exist in the value of income elasticities.

[c]Income elasticity of demand appears to be large. This method of estimation relates growth rates of consumption of refined products of energy use to growth rates of GDP.

[d]We calculated the long-run elasticity values by applying the formula $\frac{\beta}{1-\lambda}$, where β is the coefficient of the price or/income term in the log-linear model and λ the coefficient of the lagged term.

[e]Long-run elasticities of both price and income are larger than short-run elasticities. In the short run aggregate energy consumption seems relatively inelastic with respect to price and income variables.

Sources: Ibrahim B. Ibrahim, Hamdi Saleh, and Abdel Rahim Iweis, "Energy Demand Forecasts for the Arab Countries," *Proceedings of the Second Arab Energy Conference* (Kuwait: Organization of the Arab Petroleum Exporting Countries, 1983), vol. 2; Mervat Badawi, "Consumption Costs and Investment Needs in the Energy Sector in the Arab World," *Proceedings of the Second Arab Energy Conference*, vol. 2; Gouda Abdel-Khalek, *Some Preliminary Estimates of Increase in Price Elasticities of Energy Consumption in Egypt*, Development Research and Technological Planning Center, Cairo University, Egypt, 1984.

important factor of production in the industrial sector. Thus, determining the specific values of the relevant elasticities—for the short and for the long run—will be a critical step in designing realistic energy-related policies.

Two Case Studies

At this point we turn to a more detailed look at domestic energy pricing and its implications for two Arab economies, Sudan and Egypt.[9] Both are complex economies with large populations, whose energy-pricing policies have become a major aspect of economic policy more broadly defined. For purposes of analysis, however, two issues need to be resolved: (1) determining precisely how energy is used in the economy in different sectors and in which forms, and (2) determining the economywide effects as well as the sectoral effect of raising domestic energy prices as a key component of demand-management strategies. Persistent data problems make detailed analysis difficult.

The Case of Sudan: In Sudan, the domestic demand for petroleum products has grown from 815.9 thousand metric tons in 1973 to 1,008.4 thousand metric tons in 1980, only a modest growth. However, the import bill for petroleum products has been soaring, and the value of petroleum imports reached $257 million in 1979-1980. Oil-import payments amounted to 20 percent of all import expenditures and 43 percent of total export earnings. While the imports of crude oil have been relatively constant (in part constrained by the refinery capacity of Port Sudan), by contrast imports of petroleum products have increased rapidly over the past decade.

It is expected that Sudan's hydrocarbon resources will begin to be exploited in 1985/86, but the full impact of this will not be realized until 1990 when oil exports are expected to reach the level of at least 100,000 barrels a day. If these plans become operational, they would enable Sudan to meet its domestic consumption requirements (at present approximately 30,000 barrels per day), as well as become a net exporter of oil in the long run. In the immediate future, however, curtailing consumption to reduce waste is essential.

Domestic prices of petroleum products in Sudan were highly subsidized in the past. Prices charged to the consumers were fixed below the delivered cost of the product, and subsidies ranged from 14 to 4 percent of the delivered product cost. More recently, the government has eliminated the subsidies to a large extent, and petroleum prices were raised by an average of 40 percent in November 1981. The main policy objectives were (a) to reduce energy consumption and (b) to promote more efficient utilization of energy resources in productive activities. To consider

[9]Dr. Supriya Lahiri contributed to the research for this section.

the effects of pricing policy, we must look at the major users of energy in the economy.

The transport sector in Sudan is one of the largest consumers of petroleum products, accounting for approximately 55 percent of total consumption, followed by agriculture (18 percent), industry (16 percent), and electricity generation (6 percent). The bulk of the increase in consumption of petroleum products in the future will come mainly from the transportation and electric-power sectors. The rapid growth in the vehicle fleet has contributed to the increase in petroleum consumption. Currently, the electric-power sector is predominantly hydro-based (70 percent) and the remainder is thermal (30 percent). An increased dependence on thermal power will be required in the future to increase the reliability of the system.

At the present time, current electricity supply and transport services in Sudan are inadequate to meet the rapid growth in demand. This constraint is a major bottleneck to the country's economic recovery program. Thus, as petroleum prices increase, this will have an impact on the transportation and power sectors. A reduced performance in these two sectors might be counterproductive to the economy's growth process. Therefore, it might be important to consider a differential pricing system which would protect critical sectors (subsidizing the prices of petroleum products in these sectors) to help in developing the necessary infrastructure.

The Case of Egypt: In Egypt domestic demand for petroleum products has been growing in ranges between 12 and 15 percent annually. The government has followed a policy of insulating the majority of consumers from the pressures of world inflation. The cost of "implicit" energy subsidies for electricity and most petroleum products is estimated at Egyptian pounds (LE) 2.7 billion ($3.2 billion). Although the government has taken steps to curb energy consumption by increasing the price of certain petroleum products, energy prices average only about 20 percent of world market levels. The electricity-generation sector in Egypt claims the largest share of petroleum products (31.8 percent). The next major users are transport (19.7 percent) and industry (18.6 percent).

The petroleum sector in Egypt has shown marked increases in production and earnings since 1979, when Egyptian production increases coincided with the rapid rise in world oil prices. The share of the oil sector jumped from less than 5 percent of GDP in 1974 to nearly 20 percent of GDP in 1981. Crude-oil production averaged 673,000 barrels per day plus 50,000 barrels per day of natural-gas condensates. Commodity exports continue to be dominated by oil exports, which amounted to $2.76 billion in 1982 (nearly 70 percent of total commodity export earnings).

A major problem arises from the question of whether the increased earnings from the petroleum sector can be maintained in the face of two obstacles: a highly subsidized domestic price for oil, which is encouraging domestic consumption,

and a large degree of uncertainty that prevails in reserve generation and the future production possibilities of oil.[10]

In Egypt, as in many other developing countries, economic growth and structural changes have had major impacts on energy uses domestically. We explored the impacts of domestic energy-pricing policies through a ten-sector structural general equilibrium model that incorporates Egypt's particular economic features where price determination mechanisms differ from sector to sector. The model draws upon the well-known linear expenditure system of demand equations to arrive at the sectoral consumption level. This set of equations, derived for utility functions, is the basis for calculating demand, or the consumption levels related to price and income variables for each sector. Given the different behavioral assumptions and the different identities built around a social-accounting matrix, the solution is determined iteratively through a combination of several adjustment mechanisms which together more accurately represent the Egyptian economy: (a) output response in the quantity-clearing sectors; (b) a "forced saving" mechanism via the rise in the prices of output relative to wage; and (c) adjustments in the trade deficit and the surplus available in the government current account.

Our purpose was to examine how the economy adjusts to changes in domestic petroleum prices and also to determine which sectors of the economy will be most affected, and to what extent. The model analyzes the short-run adjustment mechanisms in the Egyptian economy to oil price changes and helps in identifying appropriate policy measures that could contribute to smoother adjustments.

Our conclusions are as follows. An increase in the domestic price of petroleum will encourage the curtailment of petroleum use to some extent (in the immediate short run) which may be redirected to exports or conserved for future use. The effectiveness of the petroleum pricing policy for the curtailment of energy demand will depend on the flexibility of energy use in the production processes and the supply conditions in the natural-gas sector. However, the reduction in petroleum use will impose adjustment problems for the economy in the short run in terms of an increase in inflation, a fall in the share of wage income, and sharp output losses (particularly in those sectors where energy is used as an important intermediate input). An expansionary government expenditure policy will be required to offset the negative macroeconomic impacts which would make the transition smoother.

Although oil price increases slow down economic activity in the short run, these effects may be small and temporary from a long-run perspective as the dynamics of the system are taken into account. For instance, the expansion of government revenue, resulting from oil price increases and increases in exports,

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[10]For additional analysis of immediate economywide and sectoral impacts of increasing domestic energy prices for the case of Egypt, see Nazli Choucri and Supriya Lahiri, "Short-Run Energy-Economy Interactions in Egypt," *World Development,* vol. 12 (1984), pp. 799-820.

can be highly beneficial from a long-term perspective if they are directed towards increasing the productive capacity of the economy. So, too, raising energy prices will curtail consumption and perhaps even reduce the erosion of the country's reserves (unless exports are expanded, of course).

On balance, for the price of energy to provide the right signal for resource allocation in the economy an overall energy/economy strategy is required in which adjusting domestic prices toward international prices is only one element. Effective energy-demand management policies will have to be directed mainly towards the industrial sector. The demand effects will have to operate through interfuel substitution in the industrial sector because household consumption forms a very small portion of total petroleum demand in Egypt. Our analysis suggests that a high elasticity of substitution between petroleum and natural gas will be able to bring about the desirable changes in the economy only if efforts are made to increase the short-run supply of natural gas as well.[11] Substitution from petroleum uses to natural gas takes place if bottlenecks in the gas system are removed. But, alternatively, if the domestic supply of national gas remains fixed, then the contractionary effects on the economy, indeed, can be more severe.[12]

The above leads to one conclusion relevant for *all* demand management strategies for *all* developing countries: that energy-demand management will bring about desirable impacts on the economy if efforts are made to prevent cost increases and if bottlenecks to substitution are removed. Putting infrastructure facilities in place for substitution purposes is an essential aspect of demand-management policies.

The macroeconomic implications of domestic petroleum-pricing strategies for Egypt, as for all Arab economies, are extremely important and should be considered carefully. Simply suggesting lifting of domestic subsidies or increasing domestic energy prices to world prices will not have the intended effects unless other measures are adopted as well. Treating the energy sector in isolation from the rest of the economy will be counterproductive and lead to adoption of measures that may even have detrimental effects. An overall energy/economy strategy is required in which adjusting domestic prices toward higher, worldwide prices is only one element.

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[11]See Nazli Choucri and M. Zaki Shafei, *Energy Policy Project: Petroleum and Natural Gas in Egypt,* Massachusetts Institute of Technology, Technological Planning Program, June 1983.

[12]See Chapter 3 of Nazli Choucri and M. Zaki Shafei, *Energy Policy Project: Petroleum and Natural Gas in Egypt,* and David Woodruff, *Linear Programming Analysis of the Use of Natural Gas in Egypt (Energy Project: Petroleum and Natural Gas in Egypt),* Technology and Development Program report no. 83-5, November 1982.

Toward Effective Domestic Energy Pricing

The basic objectives of national policy toward economic growth and social development constitute the underlying criteria to determine the most appropriate policy in any particular case. While the search for appropriate domestic pricing policies must proceed from some basic economic principles, it must also be based on national objectives and take into account political strategy for developmental and social impacts. Ultimately, it is the structure of national objectives that will serve as the guide to "best" policy formulation.

Pricing Strategies: What are the correct pricing criteria to use in devising and implementing a pricing policy? Economists, still divided on this issue, revert to elementary principles for elucidating debates on pricing policies based on the conventional pricing rules.[13] The criteria used as a guide are alternatively defined in terms of economic efficiency and for the meeting of the national objectives.

The criterion of economic efficiency, or Pareto optimality, is defined in terms of the outcome of one or more activities. It demonstrates that any reallocation away from "optimality" results in the reduction of welfare for at least one individual.

Competitive pricing, determined by market forces or the interplay of supply and demand, is commonly advocated by those who believe that economics operates along the lines of perfect competition. Marginal-cost pricing, the addition to total cost by producing one more unit, is considered the most consistently "correct" price guide for most economic activities. The marginal-cost-pricing rule is perfectly valid under the conditions of perfect competition and economic efficiency, but only under these conditions. This belief is not consistent with the realities of the Arab world.

Markup pricing (the cost plus, namely, the added increment to cost specified to determine the selling price) is common in the energy sector for many producing countries and relevant here to the extent that the markup is correctly specified. Usually it is an arbitrary value that reflects an intuitive understanding of the profit structure.

When the pricing criteria include a variety of national objectives, then the appropriate pricing rule is that of shadow pricing, reflecting the true opportunity cost, where opportunity cost is defined as the cost of foregone benefits (generally in terms of national welfare); the opportunity cost encompasses the "true" costs.

It should come as no surprise that each of these pricing rules yields fundamentally different directives, in terms of prices charged to consumers. Each, further, implies a different matrix for burden of adjustments borne by consumers—government, industry, transport, construction, agriculture, house-

[13]The assistance of Dr. Supriya Lahiri is acknowledged in this review.

holds, etc. Each differs with respect to its manipulability by policy makers. Thus, as policy instruments, these alternative pricing "rules" or devices yield different outcomes and vary in their use for implementation purposes.

Arab economies have traditionally, for social equity reasons, avoided strict competitive pricing and considerations of pure economic efficiency. Marginal-cost pricing, so advocated in other contexts, is seldom a useful independent device for converging on the "correct" price based on one explicit economic criterion for either oil-rich economies or oil-poor economies.

In the last analysis, the search for a viable pricing strategy for domestic energy in Arab economies might well begin with the price that reflects the true costs to the economy as a whole in terms of benefits foregone. In the Arab world, that price has seldom been effectively considered nor are there computations of the price levels consistent with shadow-pricing algorithms. Since developmental criteria are diverse, accommodating national priorities within one accounting device is important; ultimately, costs and benefits must be defined by national objectives and conceptions of national welfare.

Selection of Appropriate Strategy: To reason about energy prices in Arab economies with the assumption of the perfectly competitive nature of factor and product markets simply is not valid for these economies, owing to structural and institutional features. Hence, the market prices of commodities prevalent in developing economies do not reflect their true scarcity values (or appropriate "shadow prices"). This is particularly evident in the case of energy prices.

The shadow price of a unit of energy may be defined as the contribution that one unit of energy would make to the nation's economic welfare. The criteria for economic welfare would depend on national priorities, for example, an increase in the level of aggregate consumption (or standard of living), a reduction in the level of inequality of incomes, a fall in the level of unemployment, commercialization of scarce resources, and the like. A weighted sum of these objectives may be expressed in an appropriate measurement unit.

To be useful, shadow-price computation must be based on an internally consistent accounting framework for the entire economy. This would necessitate assessing the role of energy (e.g., petroleum) as a critical factor of production (which helps in building the productive capacity of the economy), a valuable natural resource in terms of foreign-exchange earnings, or as a valuable source of proven reserves under the ground. Furthermore, one cannot ignore the social and human elements in the Arab world as the burdens on the society of any economic adjustments are seldom easy.

Some studies have suggested that for small countries where export-import prices are exogenously given, the shadow prices of petroleum products would be determined by the appropriate world price of the commodity. However, the world price is the shadow price only under restrictive assumptions: the world price may or may not be the "right" price, given national objectives. If the

objective is only to earn foreign exchange in the short run, then the world price may approach the shadow price. But governments seldom have that as their sole, or even primary, objective.

The issue is not a matter of economic theology, but a direct function of national objectives. From a practical policy perspective, therefore, governments need to take a comprehensive view of the potential impacts of policy pricing changes. Viewed thusly, the "correct" pricing rule is that which enhances economic performance while minimizing (or at least distributing) the burden of adjustment. There will always be such burdens. An evaluation of these burdens must be arrived at so that the entire social and economic fabric is considered as alternative energy-related (or other) policies are evaluated. Deciding who or which sectors bear the burden is itself an essential element in the search for a viable pricing policy.

The role of energy as an intermediate good in the many stages of production makes the policy problem more complex. For improved efficiency in resource allocation all prices will have to be moved in the right direction towards their appropriate shadow prices. In other words, changing the relative rather than the absolute price of energy in the right direction will help in removing any prevailing distortions in resource allocation in the economy. These issues are best explored in a rigorous way. Economists would say that one would need a comprehensive model for the economy as a whole, with a multi-objective function, to arrive at the appropriate price for energy. However, in the absence of such an effort, these observations serve as an initial guide for improving energy pricing.

Collaboration Among Arab States in Pricing Policies: There is considerable scope for collaboration among Arab economies in the search for and implementation of appropriate energy-pricing strategies for domestic uses. Given the diversity in Arab economies, improved dialogue would encourage clarification of the costs and benefits of alternative pricing policies.

Among the actions that would enhance the utility of such collaboration are the following: (a) discussion among oil-importing countries regarding their respective experience along the frontiers of energy prices, consumption, imports, and measures taken or considered to save foreign-exchange earnings (or at least reduce the burden of added energy imports); (b) discussion among exporters regarding the impacts of prevailing prices and implications for industrialization; (c) since Arab economies with "high" energy prices and those with "low" energy prices include oil exporters and oil importers in each of these two categories, the experience is already diverse and exchange of information concerning the economywide impacts and their social ramifications can entail a wealth of shared knowledge; (d) monitoring the economywide effects of prevailing energy prices on a systematic basis would provide important inputs to these discussions, and the results would improve policy-making in this area; and (e) explorations of differentials in pricing policies, for exporting countries in terms of prices charged

to different buyers, and for all Arab economies in terms of prices charged for individual products or individual users might lead to broadening of the price discourse.

To conclude, while some energy price adjustments are taking place in the Arab world, there is considerable scope for further adjustments. Toward this end, a careful delineation of objectives served by different pricing rules would greatly improve existing discussions of energy pricing.

Appendix

Table 1

ARAB WORLD PETROLEUM RESERVE AND PRODUCTION RATIO, 1970, 1980, 1983

Year/ Country	Reserves (billion barrels)	Production (thousand barrels)	Ratio[a] (years)	Ratio in 1983
1980				
Algeria	8.2	400,405	20.5	27.4
Egypt	2.9	217,175	13.4	12.4
Iraq	33.0	955,570	34.5	100+
Libya	23.0	655,905	35.1	54.4
Kuwait	61.5	493,115	124.7	100+
Oman	2.9	102,930	28.2	20.1
Qatar	3.6	171,915	20.9	29.3
Saudi Arabia	167.5	3,513,490	47.7	86.9
Syria	1.9	59,495	31.9	25.6
Tunisia	1.7	43,070	39.5	44.0
United Arab Emirates (U.A.E.)	30.3	621,595	48.7	100+
1970				
Algeria	7.0	375,585	18.6	
Egypt	4.5	118,990	37.8	
Iraq	29.0	565,385	51.3	
Libya	25.0	1,211,070	20.6	
Kuwait	64.0	998,275	64.1	
Oman	2.0	121,545	16.5	
Qatar	4.3	132,130	32.5	
Saudi Arabia	128.5	1,295,385	99.2	
Syria	1.2	29,565	40.6	
Tunisia	0.6	31,755	18.9	
United Arab Emirates (U.A.E.)	12.8	253,675	50.5	

[a]Ratio expresses the year that production can be maintained at the present rate before reserves are exhausted.

Sources: Energy Economics Research Ltd., *The "Oil and Energy Trends" Statistical Review* (London: Energy Economics Research Ltd., 1981), tables 1 and 3.

Table 2

ENERGY SECTOR AS PERCENTAGE OF TOTAL GROSS DOMESTIC PRODUCT (GDP) IN CURRENT PRICES, 1970, 1979[a]

Category/Country	1970	1979
High		
Kuwait	61	66
Libya[b]	62	55
Oman	67	62
Qatar	68	63
United Arab Emirates (U.A.E.)	68	61
Medium		
Bahrain[c]	34	17
Iraq	31	57
Saudi Arabia[d]	56	63
Low		
Algeria[e]	15	29
Egypt	3	16
Jordan	3	5
Lebanon	16	18
Morocco	10	8
Sudan	2	2
Syria	2	13
Tunisia	7	11
Yemen Arab Republic (North Yemen)	1	2
People's Democratic Republic of Yemen	2	2

[a]The energy sector is defined as the value added by the mining and quarrying and the gas, electricity and water sectors to the GDP. Data for Qatar, Bahrain, and United Arab Emirates in the 1970 column are for 1975; data for Iraq, both Sudan and Lebanon, and for Libya in the 1979 column are for 1975, 1977, and 1978, respectively.

[b]Note that Libya belonged to the medium category in 1979.

[c]Note that Bahrain belonged to the low category in 1979.

[d]Note that Saudi Arabia moved to the high category in 1979.

[e]Note that Algeria moved to the medium category in 1979.

Source: United Nations, *Yearbook of National Accounts, 1981* (New York: United Nations, 1983).

Table 3

ENERGY INTENSITY IN THE ARAB WORLD, 1970-1980[a]
(in tons of oil equivalent per $1 million GDP)

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria	245	307	377	380	329	423	451	358	391	368	799
Bahrain	---	---	---	---	---	1,961	1,591	1,595	1,499	1,581	---
Egypt	608	638	680	592	655	735	747	720	717	1,257	1,211
Iraq	545	515	583	453	414	384	375	308	290	---	---
Jordan	---	564	575	657	678	708	771	728	763	677	740
Kuwait	377	350	471	503	386	335	341	404	353	296	258
Lebanon	---	---	---	---	---	---	---	---	---	---	---
Libya	68	62	75	94	126	136	180	176	245	230	259
Morocco	421	347	364	361	346	348	378	356	326	309	402
Oman	59	61	55	63	89	113	153	156	212	216	194
Qatar	---	---	---	---	---	---	---	---	---	---	---
Saudi Arabia	152	140	139	134	146	178	212	216	203	200	266
Sudan	394	359	403	531	467	375	312	268	290	---	---
Syria	582	652	544	555	582	594	655	834	786	810	729
Tunisia	472	449	440	434	411	407	421	442	455	445	502
United Arab Emirates	---	---	---	149	162	175	198	194	223	163	144

[a]Energy consumption was taken from the United Nations source cited; gross domestic product (GDP) in current dollars was computed from the International Monetary Fund source. Conversion to constant dollars (1975 base year) was done using the implicit GDP deflator index as recorded in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984).

Sources: United Nations, *Yearbook of World Energy Statistics* (New York: United Nations, 1979 and 1982) and International Monetary Fund (IMF), *International Financial Statistics Yearbook* (Washington, D.C.: IMF, 1983).

Table 4

PREMIUM GASOLINE PRICES IN ARAB COUNTRIES, 1970-1983
(in U.S. cents per U.S. gallon)[a]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Algeria	---	---	---	---	---	---	134	---	145	154	155	197	186	213
Bahrain	---	---	---	---	---	---	29	29	59	60	60	60	76	101
Egypt	51	51	55	65	66	77	77	77	77	69	70	70	81	---
Kuwait	27	27	29	32	32	33	32	33	35	34	35	34	66	65
Lebanon	42	42	45	54	59	61	---	85	90	94	122	99	---	---
Libya	---	---	---	---	---	---	---	48	48	48	96	---	---	---
Morocco	64	71	78	93	138	148	158	180	198	277	---	275	288	284
Qatar	---	---	---	---	---	---	32	32	40	41	---	---	---	---
Saudi Arabia	21	28	23	27	15	16	14	15	28	27	25	24	24	24
Syria	---	---	---	---	---	---	81	---	87	135	---	---	---	---
Tunisia	76	76	85	168	144	155	155	165	173	193	---	---	186	194
United Arab Emirates	---	---	---	---	---	---	71	85	85	124	120	121	121	160
Abu Dhabi	---	---	---	---	---	---	52	66	85	101	104	105	121	160

[a]Data for Algeria, Egypt, Kuwait, Libya, Qatar, Syria, United Arab Emirates, and Abu Dhabi were converted to U.S. dollars using annual average exchange rates as recorded by the International Monetary Fund.

Sources: United States, Department of the Interior, *International Petroleum Annual, 1970-1977*; United States, Department of Energy, *International Energy Annual, 1978-1982*; *Middle East Economic Survey*, various years; Organization of the Arab Petroleum Exporting Countries, *Annual Statistical Bulletin, 1975-1979*; International Monetary Fund, *International Financial Statistics Yearbook, 1983.*

Table 5

REGULAR GASOLINE PRICES IN ARAB COUNTRIES, 1970-1983
(in U.S. cents per U.S. gallon)[a]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Algeria	---	---	---	---	---	---	126	---	136	145	---	---	---	---
Bahrain	---	---	---	---	---	---	29	29	39	40	40	40	60	81
Egypt	45	50	50	59	60	60	60	60	60	34	59	59	59	---
Kuwait	16	16	18	20	20	20	20	20	21	21	21	21	52	52
Lebanon	36	36	39	47	51	53	---	73	78	---	---	---	---	---
Libya	---	---	---	---	---	---	---	42	42	42	83	---	---	---
Morocco	60	67	74	89	129	139	146	160	180	257	---	261	276	272
Qatar	---	---	---	---	---	---	25	25	26	---	---	---	---	---
Saudi Arabia	17	24	20	22	12	11	12	11	25	19	23	18	18	18
Syria	---	---	---	---	---	---	76	---	75	124	---	---	---	---
Tunisia	73	73	81	161	139	147	147	156	164	182	---	---	167	182
United Arab Emirates	---	---	---	---	---	---	67	78	79	112	107	108	108	147
Abu Dhabi	---	---	---	---	---	---	52	58	70	88	91	92	124	147

[a]Data for Algeria, Egypt, Kuwait, Libya, Qatar, Syria, United Arab Emirates, and Abu Dhabi were converted to U.S. dollars using annual average exchange rates as recorded by the International Monetary Fund.

Sources: United States, Department of the Interior, *International Petroleum Annual, 1970-1977*; United States, Department of Energy, *International Energy Annual, 1978-1982*; *Middle East Economic Survey*, various years; Organization of the Arab Petroleum Exporting Countries, *Annual Statistical Bulletin, 1975-1979*; International Monetary Fund, *International Financial Statistics Yearbook, 1983*.

Table 6

KEROSINE PRICES IN ARAB COUNTRIES, 1970-1983
(in U.S. cents per U.S. gallon)[a]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Algeria	---	---	---	---	---	---	28	---	30	30	---	---	---	---
Bahrain	---	---	---	---	---	---	15	4	28	20	---	---	---	---
Egypt	17	17	17	19	19	24	24	24	24	16	16	16	16	---
Kuwait	6	7	7	8	8	8	8	8	8	8	9	8	26	26
Lebanon	23	23	24	29	32	33	---	55	58	54	67	55	---	---
Libya	---	---	---	---	---	---	---	19	19	19	39	---	---	---
Morocco	33	33	36	44	38	---	46	65	73	121	---	146	138	136
Qatar	---	---	---	---	---	---	13	13	13	13	---	---	---	---
Saudi Arabia	9	9	4	9	11	8	8	9	15	15	---	15	15	15
Syria	---	---	---	---	---	---	20	---	24	24	---	---	---	---
Tunisia	24	25	27	66	31	34	34	37	36	42	---	---	44	61
United Arab Emirates	---	---	---	---	---	---	61	75	108	110	100	101	101	134
Abu Dhabi	---	---	---	---	---	---	52	60	60	82	84	85	101	134

[a]Data for Algeria, Egypt, Kuwait, Libya, Qatar, Syria, United Arab Emirates, and Abu Dhabi were converted to U.S. dollars using annual average exchange rates as recorded by the International Monetary Fund.

Sources: United States, Department of the Interior, *International Petroleum Annual, 1970-1977*; United States, Department of Energy, *International Energy Annual, 1978-1982*; *Middle East Economic Survey*, various years; Organization of the Arab Petroleum Exporting Countries, *Annual Statistical Bulletin, 1975-1979*; International Monetary Fund, *International Financial Statistics Yearbook, 1983*.

Table 7

FUEL-OIL PRICES IN ARAB COUNTRIES, 1970-1983
(in U.S. cents per U.S. gallon)[a]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Algeria	---	---	---	---	---	---	18	---	19	20	---	---	---	---
Bahrain	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Egypt	7	6	6	6	6	6	6	6	6	3	3	3	3	3
Kuwait	---	---	---	---	---	---	3	---	---	---	---	---	---	---
Lebanon	5	5	---	---	---	17	---	37	40	41	---	---	---	---
Libya	---	---	---	---	---	---	---	---	10	15	15	---	---	---
Morocco	11	11	12	14	12	29	17	24	28	49	---	67	78	77
Qatar	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Saudi Arabia	8	10	13	6	21	21	6	6	4	---	---	67	5	5
Syria	---	---	---	---	---	---	---	15	---	---	---	---	---	---
Tunisia	5	5	5	10	30	---	---	54	13	---	---	---	37	44
United Arab Emirates	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Abu Dhabi	---	---	---	---	---	---	---	---	---	---	---	---	---	---

[a]Data for Algeria, Egypt, Kuwait, Libya, Qatar, Syria, United Arab Emirates, and Abu Dhabi were converted to U.S. dollars using annual average exchange rates as recorded by the International Monetary Fund.

Sources: United States, Department of the Interior, *International Petroleum Annual, 1970-1977*; United States, Department of Energy, *International Energy Annual, 1978-1982*; *Middle East Economic Survey*, various years; Organization of the Arab Petroleum Exporting Countries, *Annual Statistical Bulletin, 1975-1979*; International Monetary Fund, *International Financial Statistics Yearbook, 1983*.

Table 8

GASOLINE PRICES IN REAL TERMS IN ARAB COUNTRIES, 1970-1980[a]
(price per U.S. gallon in 1975 local currency)[b]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria (dinar)	---	---	---	---	---	5.56	5.11	---	4.02	3.73	3.41
Bahrain (fils)	---	---	---	---	---	114	93	79	136	133	130
Egypt (millieme) ...	294	285	302	313	282	303	275	244	219	274	269
Kuwait (fils)	---	---	127	117	103	95	90	83	76	71	66
Libya (dirham)	---	---	---	---	---	142	135	127	98	---	---
Morocco (dirham)	4.54	4.82	4.67	4.78	6.51	6.00	6.43	7.22	6.16	7.43	---
Saudi Arabia (riyal)	1.96	2.49	1.82	1.63	0.72	0.56	0.38	0.36	0.66	0.62	0.55
Syria (pound)	---	---	---	---	---	3.12	2.81	---	2.60	3.87	---
Tunisia (dinar)	0.54	0.51	0.52	0.86	0.73	0.66	0.67	0.63	0.65	0.65	---

[a]The 1975 price for Algeria, Bahrain, Libya, and Syria is assumed to equal the 1976 nominal price for reasons of conversion.

[b]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Sources: Appendix tables 4 and 5.

Table 9

KEROSINE PRICES IN REAL TERMS IN ARAB COUNTRIES, 1970-1980[a]
(price per U.S. gallon in 1975 local currency)[b]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria (dinar)	---	---	---	---	---	1.17	1.07	---	0.82	0.73	---
Bahrain (fils)	---	---	---	---	---	60.00	48.94	11.09	45.51	44.50	---
Egypt (millieme) ...	101.47	98.45	96.45	92.46	83.42	95.00	86.13	76.43	68.79	75.10	62.26
Kuwait (fils)	---	---	30.75	28.36	25.05	23.00	21.80	20.14	18.30	17.09	15.98
Libya (dirham)	---	---	---	---	---	57.00	---	50.85	39.31	---	---
Morocco (dirham)	3.87	3.70	3.56	3.74	2.96	3.04	3.09	4.31	3.75	5.36	---
Saudi Arabia (riyal)	0.84	0.80	0.32	0.54	0.53	0.28	0.21	0.22	0.35	0.34	---
Syria (pound)	---	---	---	---	---	0.76	0.68	---	0.73	0.69	---
Tunisia (dinar)	0.54	0.16	0.15	0.32	0.15	0.14	0.14	0.14	0.13	0.13	---

[a]The 1975 price for Algeria, Bahrain, Libya, and Syria is assumed to equal the 1976 nominal price for reasons of conversion.

[b]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Source: Appendix table 6.

Table 10

GASOLINE PRICES IN REAL TERMS IN ARAB COUNTRIES, 1970-1980[a]
(price per U.S. gallon in 1975 U.S. cents)[b]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria	---	---	---	---	---	134	123	---	97	90	82
Bahrain	---	---	---	---	---	29	24	20	35	34	33
Egypt	75	72	77	79	72	77	70	62	56	70	68
Kuwait	---	---	44	41	36	33	31	29	26	25	23
Libya	---	---	---	---	---	48	46	43	33	---	---
Morocco	112	119	115	118	161	148	159	178	152	183	---
Saudi Arabia	56	71	52	47	20	16	11	10	19	18	16
Syria	---	---	---	---	---	81	73	---	68	100	---
Tunisia	127	119	121	201	172	155	158	158	152	154	---

[a]The 1975 price for Algeria, Bahrain, Libya, and Syria is assumed to equal the 1976 nominal price for reasons of conversion.

[b]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Sources: Appendix tables 4 and 5.

Table 11

KEROSINE PRICES IN REAL TERMS IN ARAB COUNTRIES, 1970-1980[a]
(price per U.S. gallon in 1975 U.S. cents)[b]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria	---	---	---	---	---	28	26	---	20	18	---
Bahrain	---	---	---	---	---	15	12	3	11	11	---
Egypt	26	25	24	23	21	24	22	19	17	19	16
Kuwait	---	---	11	10	9	8	8	7	6	6	6
Libya	---	---	---	---	---	19	---	17	13	---	---
Morocco	53	51	49	52	41	42	43	60	52	74	---
Saudi Arabia	24	23	9	16	15	8	6	6	10	10	---
Syria	---	---	---	---	---	20	18	---	19	18	---
Tunisia	39	38	37	77	36	34	34	34	31	32	---

[a]The 1975 price for Algeria, Bahrain, Libya, and Syria is assumed to equal the 1976 nominal price for reasons of conversion.

[b]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Source: Appendix table 6.

Table 12

INDEX OF GASOLINE PRICES IN REAL TERMS IN ARAB COUNTRIES, 1970-1980[a]
(1975 = 100)[b]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria	---	---	---	---	---	100.0	91.8	---	72.3	67.1	61.4
Bahrain	---	---	---	---	---	100.0	81.6	69.3	119.2	116.6	114.0
Egypt	96.9	94.1	99.7	103.2	93.1	100.0	90.7	80.5	72.4	90.4	88.7
Kuwait	---	---	133.7	123.3	108.9	100.0	94.8	87.6	79.6	74.3	69.5
Libya	---	---	---	---	---	100.0	---	89.2	69.0	---	---
Morocco	75.7	80.3	77.8	79.7	108.5	100.0	107.2	120.4	102.6	123.9	---
Saudi Arabia	350.1	444.4	324.7	290.7	128.0	100.0	67.1	64.5	117.9	110.2	97.4
Syria	---	---	---	---	---	100.0	90.1	---	83.4	124.0	---
Tunisia	82.1	77.1	78.1	129.8	111.0	100.0	101.7	101.9	98.1	99.2	---

[a]The 1975 price for Algeria, Bahrain, Libya, and Syria is assumed to equal the 1976 nominal price for reasons of conversion.

[b]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Sources: Appendix tables 4 and 5.

Table 13

INDEX OF KEROSINE PRICES IN REAL TERMS IN ARAB COUNTRIES, 1970-1980[a]
(1975 = 100)[b]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Algeria	---	---	---	---	---	100.0	91.8	---	69.9	62.8	---
Bahrain	---	---	---	---	---	100.0	81.6	18.5	75.8	72.4	---
Egypt	106.8	103.6	101.5	97.3	87.8	100.0	90.7	80.5	72.4	79.1	65.5
Kuwait	---	---	133.7	123.3	108.9	100.0	94.8	87.6	79.6	74.3	69.5
Libya	---	---	---	---	---	100.0	---	89.2	69.0	---	---
Morocco	127.2	121.7	117.1	122.9	97.5	100.0	101.7	141.8	123.4	176.5	---
Saudi Arabia	300.1	285.7	112.9	193.8	187.7	100.0	76.0	77.3	126.3	122.5	---
Syria	---	---	---	---	---	100.0	90.1	---	95.4	91.2	---
Tunisia	114.9	112.2	109.8	225.8	105.9	100.0	98.8	100.9	90.4	95.6	---

[a]The 1975 price for Algeria, Bahrain, Libya, and Syria is assumed to equal the 1976 nominal price for reasons of conversion.

[b]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Source: Appendix table 6.

Table 14

PREMIUM GASOLINE PRICES IN REAL TERMS FOR SELECTED COUNTRIES, 1970-1980
(in 1975 U.S. cents)[a]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Argentina	33	31	20	36	58	160	25	44	32	27	26
Brazil	66	72	57	47	89	145	174	158	142	157	---
Dominican Republic	69	87	83	79	89	84	78	81	79	135	149
Mexico	59	56	53	47	70	91	98	80	70	59	46
Venezuela	29	34	33	31	34	32	30	27	25	22	18
Burma	85	84	78	61	87	86	95	162	166	167	---
India	88	121	96	86	175	168	166	150	156	172	188
Indonesia	85	75	84	69	60	61	68	62	61	74	97
Pakistan	74	92	81	91	114	99	100	95	95	---	128
Philippines	36	35	32	30	65	68	73	83	77	163	128
Ethiopia	100	117	147	157	214	138	107	95	83	83	79
Kenya	99	101	95	81	118	120	118	114	124	122	---
Turkey	116	106	92	81	109	89	74	61	112	85	234

[a]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Source: United States, Department of Energy, *International Energy Annual*, various years.

Table 15

INDEX OF PREMIUM GASOLINE PRICES IN REAL TERMS FOR SELECTED COUNTRIES, 1970-1980
(1975 = 100)[a]

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Argentina	20.7	19.6	12.6	22.6	36.4	100.0	15.7	27.5	20.3	16.8	16.1
Brazil	45.5	49.4	39.2	32.5	61.6	100.0	119.9	108.9	98.1	108.0	---
Dominican Republic	81.9	103.4	99.4	94.1	106.2	100.0	92.8	96.8	93.5	160.2	177.2
Mexico	64.4	61.0	58.2	51.9	77.2	100.0	107.7	87.6	76.4	64.7	50.8
Venezuela	91.0	104.9	103.7	97.5	106.8	100.0	93.0	83.7	78.1	69.6	57.2
Burma	99.2	97.6	90.3	71.1	101.7	100.0	110.1	187.9	193.4	194.1	---
India	52.5	72.3	57.2	51.0	104.0	100.0	98.6	89.4	93.0	102.2	111.9
Indonesia	139.8	123.0	136.9	112.8	97.6	100.0	112.2	101.0	100.1	120.7	159.2
Pakistan	74.4	92.9	81.6	92.4	115.2	100.0	101.3	96.1	96.1	---	128.9
Philippines	52.4	52.0	46.7	43.5	95.3	100.0	108.0	121.9	112.7	239.0	188.9
Ethiopia	72.8	84.9	106.7	114.1	155.4	100.0	77.7	68.6	60.0	60.1	57.5
Kenya	82.9	83.9	79.3	67.8	98.5	100.0	98.0	95.4	103.2	101.9	---
Turkey	130.7	118.9	103.7	90.9	122.2	100.0	82.9	68.1	125.4	95.7	177.3

[a]Conversions were made using the consumer price index (1975=100), as reported in the World Bank, *World Tables*, 3rd edition (Baltimore: The Johns Hopkins University Press, 1984), vol. 1, series 1.

Source: United States, Department of Energy, *International Energy Annual*, various years.