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Taxation of Petroleum Products: Theory and Empirical Evidence

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Abstract

The domestic taxation of petroleum products is an important source of revenue in most countries. However, there is a wide variation of tax rates on petroleum products across countries, which cannot be explained by economic theory alone. This paper surveys different considerations advanced for taxing petroleum and presents petroleum tax rate data in 120 countries. It concludes that a significant reduction in the present extremely wide variation in petroleum prices and tax rates appears warranted.

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Summary

The taxation of the domestic consumption of petroleum products is an important source of revenue in most countries. It usually provides far more revenue than any other product, including tobacco or alcoholic beverages. However, the extremely wide variation in the retail prices and tax rates on petroleum products across countries is not found in other products whose consumption is also taxed. This paper discusses the reasons behind petroleum taxation policies, examines petroleum tax data for some 120 countries, and shows how tax rates for major petroleum products have changed between 1973 and 1991.

Because the level of petroleum taxes depends on a broad range of considerations, it is reasonable to expect some variation in petroleum tax rates among countries. Most countries do not seem to take explicit account of road usage, pollution or congestion costs in setting the tax rates on petroleum products. The overriding justification appears to be that these products can be taxed easily. However, the appropriateness of both extremely low petroleum prices and taxes and extremely high petroleum prices and taxes can be questioned on both economic efficiency and welfare grounds. A significant reduction in present extremely wide variation in petroleum prices and tax rates is therefore likely to improve economic efficiency and welfare in many countries.

## I. Introduction

The taxation of the domestic consumption of petroleum products is an important source of revenue in most countries. In developing countries it generally accounts for about 7 to 30 percent of total revenue and is equal to between 1 and 3.5 percent of GDP. Even in some industrial countries, petroleum revenue has amounted up to 2 percent of GDP. It usually provides far more revenue than any other product, including tobacco or alcoholic beverages. However, there is an extremely wide variation of the retail prices and tax rates on petroleum products across countries. 1/ No other product is subject to such divergent treatment. This paper discusses the reasons behind petroleum taxation policies, provides comparative data on the level of petroleum taxation, shows how tax rates for major petroleum products have changed between 1973 and 1991, and suggests some policy conclusions. 2/ Some attention will also be given to subsidies on petroleum products, which can be considered as essentially equivalent to negative taxes.

The main contribution of the paper is the presentation of petroleum tax rate data across 120 countries following a broadly uniform methodology. The observation that petroleum taxation is universal in non-petroleum exporting countries, although with rates of taxation that vary considerably across countries and over time, raises the question of what reasons may underlie these petroleum tax policies. This paper surveys these reasons and where possible evaluates their validity. Because the level of petroleum taxes depends on a broad range of considerations, some of which are inherently political, it is difficult to make a judgement in general about what is an appropriate level of petroleum taxation. However, the paper does question the appropriateness of both the extremely low domestic petroleum price policies in many oil exporting countries, as well as the extremely high petroleum tax rates in some oil importing countries.

The initial discussion is complemented by a look at the actual tax rates in a broad range of countries. While there are excellent sources of data on tax rates on petroleum products for OECD countries, there is no comparable data source for other countries. In order to make the data collection manageable and to enable comparability, this paper is concerned with the taxation of final petroleum products at the import, refining, and distribution, or "downstream" stages rather than taxes or royalties on the production of crude oil (the "upstream" activities that take place before the refining stages). The data exclude corporate income taxes on the petroleum sector and include only commodity taxes. Data on petroleum prices and taxes for mid-1990 and mid-1991 were collected for the five main petroleum products for all of the 23 OECD countries and 97 other countries. In addition to the OECD, the data are grouped into five major regions: Africa, Asia, Eastern Europe, Middle East, and Western Hemisphere. Data are

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1/ For instance, in 1991 the retail price of premium gasoline, excluding commodity taxes, ranged from 3 to 65 U.S. cents per liter, while taxes on premium gasoline ranged from 0 to 87 U.S. cents per liter.

2/ The word "petroleum" is used throughout the paper to refer to final petroleum products and not to crude oil. The paper focuses just on the main petroleum products--gasoline, diesel, fuel oil, and kerosene.

also presented for 1973 and 1974 to show the evolution of taxation and pricing policies since the first sharp increase in petroleum prices in late 1973.

The paper is organized as follows: Section II describes tax structure issues and the various reasons for petroleum taxation; Section III describes the data on petroleum pricing and taxation; and Section IV presents a summary of the major issues and policy conclusions.

## II. Tax Structure and Reasons for Petroleum Taxation

In this section, five broad conceptual reasons for taxing petroleum products are presented and discussed. Common to all of these reasons are the tax structure issues of establishing a tax base and determining the form of the tax to be implemented. This section begins with a discussion of the tax structure which includes a summary of the form that petroleum taxes can take, the factors which influence how petroleum prices are set, and whether tax rates should be specific or ad valorem. This section then surveys the five major reasons for levying taxes on petroleum: (1) to charge for benefits and costs; (2) to improve the distribution of income; (3) to raise revenue with low administrative costs; (4) to conserve foreign exchange or to achieve energy security; and (5) for oil exporters, to charge the export opportunity price for domestic sales of petroleum products in order to ensure a more efficient use of resources. Where possible, these reasons are evaluated as to whether they provide sound economic justification for taxing petroleum.

### 1. Tax structure issues

Petroleum products may be taxed in several ways. Imported petroleum may be subject to a customs duty, domestic refineries may be subject to an excise tax, wholesale or retail sales may be subject to a sales tax or a VAT, and the profits of state monopoly of petroleum product sales may be wholly or partially transferred to the government. In addition, there may be explicit levies which go into extra-budgetary funds. Many countries use only one of these tax forms, while some use a combination. A number of countries grant exemptions or lower tax rates to the use of gasoline or diesel in certain sectors, including the government, military, agriculture, and fishery. Such exemptions may result in significant evasion and loss of revenue, especially where tax rates are high and the ability to contain leakages is weak.

In many developing countries, the production and distribution of petroleum products is the monopoly of a state enterprise. In such cases there may be significant transfers from the state petroleum enterprise to the government, which are similar to taxes and which may be difficult to measure. These transfers can take many forms, including high profit levels or complete transfer of the difference between administratively set wholesale prices and agreed costs. In many cases the monopolistic or oligopolistic position of the domestic oil companies enables them to

appropriate rents that normally should accrue to the treasury in the form of taxes. This is reflected in the ex-refinery price of petroleum products exceeding 150 percent of the import price in some countries. 1/ The emergence of rents is symptomatic of inefficiencies in operations stemming from such factors as the small size of the operations, excessive employment and wage levels, and poor or corrupt management. Because these enterprises usually operate on a "cost-plus" basis, such inefficiencies are easily passed on to the consumers. In a few countries, prices are high because they are tied, for geographical reasons, to supplies from high-cost refineries in neighboring countries.

In a few countries, parafiscal levies are paid into special funds which are not considered part of general government revenue. The most important levies are for price stabilization or security stock purposes. Stabilization levies are intended to provide intertemporal cross-subsidization and greater price stability over time and to smooth the impact of sharp fluctuations in international prices. In practice, there has been a tendency for deficits to emerge in such funds, and in a few countries they have been sources of corruption and financial mismanagement. Levies for security stocks are intended to finance holdings of inventories to counter disruption in the supply of petroleum products.

An important consideration is establishing the appropriate base for applying petroleum taxes. Whenever final petroleum products are imported, the actual import cost (inclusive of insurance and freight) should serve as the base for domestic prices before taxes. In those cases where there is importation of crude oil and domestic refining of the final products, the base for domestic pricing and taxation should be the ex-refinery prices. Depending on the efficiency of the domestic refining, this price may be higher or lower than the import costs of the same product. Where there is a mix of importation and domestic production of final products, the base domestic price for taxation purposes should usually be a weighted average of the import price and the domestic producer price.

Another relevant issue in petroleum taxation is whether to use import taxes or domestic taxes. Under GATT principles, taxation should not favor domestic producers over foreign producers. 2/ This means that if there is some domestic production of petroleum and petroleum products, taxation should not take the form of import taxes but rather of domestic taxes (e.g., excises or VAT) that accord equal treatment to both domestic and foreign producers of petroleum and petroleum products.

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1/ If the domestic refinery is inefficient and only produces at prices significantly above import prices, it would appear appropriate to close it down eventually unless the processing costs can be lowered.

2/ As import duties on petroleum and petroleum products are covered by the GATT, they cannot be raised (or other charges imposed) without compensating affected trading partners. If domestically produced petroleum or petroleum products are favored through taxation of imports, the resulting shifts in consumption from imported to domestic sources will impinge on trading partners, and require compensation (or lead to retaliation).

It is also necessary to adjust the taxation of petroleum products in view of broader energy-related taxation. For example, in most countries electricity is subject to taxation and in almost all countries the energy input into electricity generation is exempt from taxation. There is generally no differentiation of the tax rate on electricity based on the input--oil, coal, natural gas, nuclear power, hydropower, and solar power--used to generate it. The tax rate on electricity use is usually in the 5-20 percent range, 1/ which is much less than the rate applied to gasoline and diesel in most countries.

There are two basic types of tax rates that can be imposed. Specific rates of duty are based on the quantity of the product sold, while ad valorem (percentage) rates are based on the value of the sale. 2/ In a large number of countries the tax rates on the major petroleum products are specific rather than ad valorem, although there has been a gradual shift towards ad valorem rates. Specific rates of duty have some advantages. First, specific rates may be administratively easier to apply because they avoid difficulties associated with determining what the appropriate value to tax is. Second, if the international price of the product is subject to wide variations, the quantities of petroleum products consumed may be more stable than the value of the petroleum product consumed. As a result, revenue from specific tax rates would be more predictable and stable, while revenue from ad valorem rates would be more elastic. Choosing to impose a specific or ad valorem tax rate depends on the particular reasons for the tax. As will be discussed in the sections to follow, to the extent the policy objective of taxing petroleum is to charge for benefits and costs, a specific tax is more appropriate. In contrast, to the extent the policy objective is to raise revenue, an ad valorem tax is more appropriate, especially when there are significant and ongoing international price increases and/or exchange rate adjustments. Thus there appears to be some justification for applying a mix of specific and ad valorem tax rates to the main petroleum products. This is presently done in a number of countries which levy both specific excise duties and percentage sales taxes or VAT.

## 2. Charging for benefits and costs

The economic literature provides a range of considerations for taxing petroleum. These, individually and/or collectively, explain why countries levy taxes on petroleum products differently from other products.

Petroleum taxation may be justified as a method of charging for costs or externalities that flow from petroleum consumption. An externality arises when an activity by one agent imposes costs on others that are not reflected in the prices facing that agent. Thus, there may be an incentive

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1/ Moreover, many of the developing countries (even those that have explicit taxes on electricity) set electricity prices at levels which do not provide an adequate return on investment in this sector.

2/ Throughout the paper, especially in the data section, the discussion is in terms of percentage tax rates (or the percentage equivalent of specific taxes) unless it is clearly indicated that specific tax rates are being discussed.

to use roads excessively--in relation to both their construction and maintenance costs as well as congestion costs--and to impinge on the natural environment to a degree that is excessive from a social perspective. Taxes reflecting the social cost of the resources that go uncharged can serve as prices for the use of resources and thereby eliminate the market failure. Petroleum taxation is often justified on market failure grounds when the administrative costs of taxing emissions or damage are prohibitive.

The most appropriate form of taxes used to take account of social costs will be specific rate taxes, which are based on the quantity of fuel consumed. Ad valorem rates are inappropriate because the value of the fuel does not necessarily bear any relationship to the amount of road use or to the environmental cost of emissions from the use of fuel, both of which depend on the quantities of fuel used.

a. Road use <sup>1/</sup>

The rationale for taxing petroleum that has received the most attention in the literature is that it serves as a charge for the use of public roads, thereby promoting their efficient use. This tax is seen as comparable to the charges levied by the government for the provision of other services, such as mail delivery or electric power. The user charge for roads is usually meant to cover at least the additional maintenance costs stemming from the incremental road use. If road users are not charged, resources are misallocated. The result is a tendency to make inappropriate location decisions that reflect the implicit subsidy for highway use or a diversion of traffic from railways to roads. Such taxes may also be considered an appropriate means of recovering part of highway construction costs. A number of OECD countries, including Belgium, Canada, Denmark, Japan, Sweden, and the United States, earmark for highway maintenance and construction all or part of their taxes on gasoline and automotive diesel. Very few developing countries, on the other hand, have any earmarking of their revenue from taxes on petroleum products. The evidence for selected developing countries indicates that expenditure on roads as a percentage of motor fuel taxes has varied between 327 percent in Colombia and Ghana and 270 percent in Sri Lanka (Bahl (1992)). In industrial countries, they have ranged between 637 percent and 434 percent (Newbery (1987)). On the other hand, it is argued that in some developing countries, taxation of petroleum could unreasonably inhibit development of more remote regions of the country.

Besides motor fuel taxes, there are a number of alternative ways of charging for motor vehicle use of roads, including: (1) road tolls; (2) purchase taxes on motor vehicles, vehicle parts and tires; and (3) annual license fees on motor vehicles. While road tolls tend to have high administrative costs and are generally not an efficient way of charging for road use in developing countries, it would appear that greater use of the other two means of charging for motor vehicle use would be appropriate

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<sup>1/</sup> The taxation of the use of diesel fuel in rail and marine transportation, and aviation fuel in air transportation raise additional issues which are beyond the scope of this paper.

in many countries. This is because fuel consumption may not vary with weight in a manner which adequately reflects the difference in highway wear and tear. The amount of damage done to roads by heavy trucks rises much more rapidly with their axle weight than does their fuel consumption per kilometer. Moreover, the maintenance costs generated by running a vehicle an additional kilometer depends on the type of road as well. While fuel consumption varies relatively little according to road type, the amount of damage inflicted by large trucks increases by up to 10 to 30 times as much as one moves from paved to gravel and then to earth roads. Thus, especially in countries where there are large volumes of traffic on unpaved roads, it is appropriate that somewhat greater emphasis be placed on excise or import duties on motor vehicles, spare parts and tires, as well as annual license fees on motor vehicles, compared with the emphasis placed on fuel taxes. Since most heavy vehicles use diesel rather than gasoline, as a road user charge it is appropriate to levy a higher tax rate on diesel. <sup>1/</sup>

b. Congestion

In addition to the maintenance of roads, users of petroleum may impose costs in the form of traffic congestion. It can be argued that internalization of the external cost of delays and traffic accidents to other users warrants some additional taxation of petroleum or vehicle use. While urban congestion costs are important, they are difficult to measure and charge for. Reliance on motor fuel taxes, separately or along with other levies on motor vehicles, as a means of dealing with and charging for road congestion may be inappropriate because they are nonselective, affecting congested and uncongested roads almost alike. High license taxes or surcharges (as in Singapore) for specific locations can be a more effective way of influencing the balance between private vehicle use and the demand for public transportation. Other alternatives are electronic road pricing, parking charges, and restrictions based on license plate numbers (such as alternative daily access to urban areas for license numbers ending in odd or even numbers--although this may lead to more two-car families).

c. The environment

Petroleum consumption results in externalities at both local and cross-border levels. Petroleum use associated with road transportation and industrial uses is, in many instances, the primary source of air pollutants in major cities. Most of the benefits from reducing air pollution (an important part of which derives from petroleum use) at the local level derive from health improvements. The balance of improvements come from reduced damage to buildings and machinery, forests, lakes, and other natural assets, and improved agricultural yields.

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<sup>1/</sup> The average tax rate on gasoline was about 70 percent higher in 1991 than the average tax rate on diesel in the data sample for this paper. Almost all countries levy much higher tax rates on gasoline than on diesel; however, there are some exceptions such as Australia, Barbados, Costa Rica, Guatemala, Switzerland, and the United States that each have higher tax rates on diesel than on gasoline.

Environmental damage associated with petroleum consumption may also be a rationale for the taxation of petroleum although it is usually justified on second-best grounds--because attempting to tax pollution damage directly is often administratively costly. This is because there is no fixed relationship between the combustion of petroleum and carbon dioxide emissions. Furthermore, there are geographic concentrations of environmental costs in urban areas, usually even in relation to time of day. Rural users of petroleum would, for example, be penalized by a national petroleum tax based on environmental considerations in urban areas. In the case of "global warming," a broad tax on petroleum, coal and natural gas levied in relation to the emissions of the various fuels could be justified, although there remains considerable scientific debate about its importance.

### 3. Income distribution considerations

Petroleum taxes can have considerable implications for the distribution of income in developing countries, where petroleum products are often used for heating, cooking, lighting, and transportation, and constitute a significant share of the consumption basket of the poor. Unless the consumption by the poor of these products (typically diesel and kerosene) is explicitly considered, petroleum taxes can be regressive and adversely affect this segment of the population. In contrast, the consumption of motor cars and, thus, motor gasoline, has been found to rise rapidly with family incomes in developing countries, and its taxation can be considered to be a form of excise on luxury consumption which improves the distribution of income. 1/ 2/

Petroleum products, such as kerosene, are widely used by the poorer sections of the society. In view of their significance in the poor population's consumption basket, it is argued that such products should be taxed lightly or even subsidized. This argument is sometimes supported by environmental considerations because in many countries kerosene and fuelwood are near substitutes. Higher prices for kerosene can encourage the poorer groups to increase fuelwood usage, thereby leading to excessive cutting of forests. In some countries, diesel fuel, too, may be an important item from the perspective of the poor groups, particularly in urban areas. It is often argued that lower tax rates on diesel are desirable to keep the costs of public transportation low, and that it promotes economic development.

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1/ Furthermore, in many developing countries it is difficult to bring higher-income groups fully into the taxation net, leaving consumption taxation as the major taxation avenue.

2/ The long-standing view for industrial countries is that commodity taxes on gasoline are regressive, imposing a relatively heavier burden on low-income households vis-a-vis high-income ones. This conclusion is based on the studies using annual surveys of consumer income which show that expenditure on gasoline constitutes a larger proportion of household income at lower income levels than for middle- and high-income households. However, a recent study for the U.S. (Poterba, (1990)), argues that relative to household expenditure, low-expenditure households devote a smaller share of their budget to purchases of gasoline than higher-expenditure households.

The former may be true in some countries in which most public transportation is provided by diesel-powered buses. However, in many developing countries, a significant share of public transportation is provided by gasoline-powered mini-buses. Thus, this issue needs to be looked at separately for each country.

Detailed empirical studies indicate that taxation of kerosene can indeed be regressive, as was found in Indonesia, Thailand, and Tunisia between the mid-1970s and early 1980s (Hughes, (1986, 1987)). This is because kerosene is consumed mainly by the relatively poor, and predominantly in rural areas. On the other hand, the tax on gasoline was found to be progressive and to have contributed to improving economic efficiency. However, practical considerations limit the extent to which kerosene should be subject to low tax rates or subsidies, as evidenced by experience in India and Thailand, where benefits of a kerosene subsidy policy were undermined (through adulteration of kerosene with diesel) and the subsidy became untargeted as there was substitution away from other fuels in favor of kerosene.

The question of the appropriate relative tax rates between gasoline and diesel is highly complex. In most countries, both gasoline and kerosene are seen as mainly used for consumption by individuals, while diesel fuel is seen as an intermediate good used for the transportation of goods and passengers and for agricultural and industrial production. <sup>1/</sup> A very high level of taxation of an important intermediate can also affect international competitiveness. To the extent that taxation of gasoline and diesel is based on the road user charge principle, diesel ought to be taxed more heavily than gasoline, because of the greater fuel economy of diesel engines. It is estimated that to place the same burden per ton-mile, <sup>2/</sup> the tax on diesel fuel must be higher than that on gasoline by between 33 percent and 50 percent. While there is some non-highway use of gasoline in agriculture, fishing and timber production, there is more significant non-highway use of diesel and its close substitutes, kerosene and light fuel oil. Diesel is used in the railways and in industry as well as for electricity generation, and for residential heating. If diesel fuel for non-road use can be differentially taxed (as in the United Kingdom, Germany, and some other industrial countries), and its illegal use in road vehicles effectively prevented, this need not be a problem. However, in most developing countries, it has not been feasible to separate road use of diesel or gasoline effectively from other uses which are not appropriately taxed at high rates. The data show that aforementioned considerations have indeed influenced the average percentage tax rates in the country sample

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<sup>1/</sup> Many other petroleum products (heavy fuel oil, bitumen, and aviation fuel) are also intermediates into production, and for this reason, warrant lower tax rates than those applied to gasoline. Taxes on aviation fuel are further constrained by taxes levied by other countries. If tax rates on aviation fuel are set relatively high, commercial airlines may decide to carry more fuel from another country or not to service the high-tax country at all. The latter could hurt the country's exports, particularly of perishables.

<sup>2/</sup> Transport of goods weighing one ton, a distance of one mile.

studied; against an average tax of around 82 percent for gasoline, kerosene had a percentage tax rate of 31 percent and automotive diesel of 48 percent in 1991.

In addition to the benefit-based levy on all fuel used on highways, fuel used for private cars can justifiably be subject to an additional tax on equity grounds. The appropriate level of relative taxation between diesel and gasoline will depend mainly on the relative weights given to the tax as a road user charge and as a mechanism for redistributing income. However, if gasoline is taxed at a significantly higher tax rate, it provides an incentive for use of diesel-powered cars. This problem can be largely solved by levying a much higher import or excise duty on the purchase of diesel private cars and a higher annual license fee on such vehicles (as has been done in a number of countries). Since kerosene can be mixed with diesel for many uses, it is important to ensure that the relative tax rates on these products are such that the relative retail prices are kept close enough so that there is no significant incentive for the adulteration of diesel with kerosene. 1/

Related to the concern of the impact on income distribution, a large number of developing countries seek to have uniform petroleum product prices throughout the country in order to favor people living in the more remote regions. This is achieved by some mechanism for cross-subsidizing of the transportation costs interregionally, so that consumers distanced from import or production points are subsidized by those living closer to these points. Unless there are serious problems of excessive urbanization, such a policy appears to have little merit in terms of economic efficiency.

Many countries have been found to be reluctant to adjust petroleum product prices in the wake of international price changes on the grounds that this would contribute to inflation, thereby hurting the poorer groups of population. The direct inflation impact of higher petroleum prices, however, has to be weighed against the inflationary consequences of the larger fiscal deficit that would otherwise emerge.

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1/ Although gasoline and diesel are the main fuels used for transportation, some countries, for environmental and other reasons, have tried to encourage the use of methanol, ethanol, gasohol, liquefied petroleum gas (LPG), and compressed natural gas (CNG). In some instances, explicit subsidies have been provided for their use. If these fuels have no non-highway uses, they should be taxed in the same manner as gasoline or diesel to recover the user costs of roads. This would be true for methanol, ethanol, and gasohol. The difficulties arise, however, with LPG, which has uses outside the transport sector. It is used for cooking and water-heating purposes as well as for motor fuel (e.g., in Thailand). To some extent, kerosene and LPG are substitutes, and their relative tax rates will influence relative consumption. The ideal solution will be to levy taxes on the basis of use, but this is difficult. In a way, therefore, LPG is like diesel and may have to be treated in a similar way, with relatively low tax rates on its use combined with high license fees on LPG-powered private cars.

#### 4. Revenue generation

In addition to the above justifications relating to charging for benefits and costs and improving income distribution, petroleum products may be taxed purely to raise revenue. In a number of countries this is probably the main justification. In most countries some petroleum products, particularly motor gasoline, are considered suitable for levying taxes. Ad valorem tax rates bring about an automatic increase in tax revenue stemming from increases in petroleum product prices. <sup>1/</sup> Furthermore, particularly in developing countries, the revenue base of petroleum taxes is likely to be buoyant over time as the income elasticity of gasoline is high and its price elasticity relatively low. It is sometimes argued that it is desirable to place relatively high tax rates on relative price-inelastic products because it gives rise to less "excess-burden," meaning less change in consumption behavior. From an administrative point of view, petroleum taxes are usually easy and cheap to collect, particularly when there are few refineries or importers or when they happen to be government-owned. Also, there may be less resistance to paying these taxes as they are collected in small amounts over the fiscal year. However, it is not clear that the low price elasticity of demand and the ease of administration of taxes on petroleum products justify taxing them on revenue grounds, at rates far above the general sales tax rates applied to most consumer goods. Excessive reliance on petroleum taxes can be discriminatory and can distort resource allocation.

Although petroleum taxes in general have proven to be a reliable source of raising revenue, this is not always the case. Countries that border nations which levy low petroleum taxes or which deliberately set prices of petroleum products below world market levels will have difficulty in enforcing sizeable petroleum taxes because of the possibility of smuggling. In some countries, extensive informal markets for petroleum products exist parallel to the official markets, and the price paid by most consumers is determined in the parallel market. In some cases, importing through parallel channels not only avoids official petroleum taxes in the home country but also secures the subsidy provided to domestic consumers in the country which prices the domestic sale of petroleum products below world market prices. In cases where such opportunities for smuggling are difficult to contain, there is little chance that high tax rates on petroleum products will yield much revenue to the government; hence, such governments may have to accept parallel market imports as providing a net resource transfer (in the form of subsidized prices) from their neighbors. However, such a policy has important costs. Not only does the government lose tax revenue, the distribution of the implicit subsidy and tax exemption elements among middlemen and consumers is highly distortive, and puts those sectors which do not have access to the smuggled products (e.g., public

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<sup>1/</sup> Ad valorem tax rates on petroleum products for the purpose of raising revenue are considered superior to specific rates for two main reasons. In a number of countries, the failure to adjust specific rates to maintain their ad valorem equivalence has resulted in revenue losses from this source. In addition, the process for adjusting specific rates has been unpredictable and has been frequently politicized.

enterprises, some segments of the formal sector) at a competitive disadvantage.

While it was not possible to obtain comprehensive data on the importance of petroleum tax revenue across all countries, some data on revenue from commodity taxes on petroleum products both as a percentage of GDP and total revenue for a sample of countries are shown in Table 1. For most countries, the explicit taxation of the domestic consumption of petroleum products is equal to 1-3.5 percent of GDP. Since developing countries generally have lower levels of revenue-to-GDP ratios than the OECD countries, petroleum taxes generally provide a higher proportion of total revenue than in the OECD countries.

5. Conserve foreign exchange and strategic considerations

A country that is a net importer of petroleum products and is faced with a foreign exchange shortage may resort to petroleum taxation in order to restrain its consumption and conserve foreign exchange. However, it does not appear appropriate to seek to address the problems of external balance by singling out petroleum products for increased taxation. Any resort to increased taxation of imported products to address these problems should normally apply to all taxable imports, not just petroleum products. Moreover, restoration of external balance should primarily be pursued through tighter financial policies and exchange rate adjustment.

Some countries may seek to achieve enhanced energy security through conservation by raising the cost of petroleum products in relation to other domestic energy sources. The motivation for energy security can stem from the observed volatility of petroleum prices and volumes in world markets. To meet this objective, the government can charge a premium on petroleum consumption in the form of an excise duty. <sup>1/</sup> The resulting increase in prices discourages petroleum consumption, and encourages both more efficient use of energy and the development of alternative technologies over time. Major petroleum importing countries may also raise taxes on petroleum products in an effort to constrain the ability of oil producers to influence international crude oil prices.

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<sup>1/</sup> To meet the objectives of increasing energy security, it would appear appropriate to tax all petroleum products at the same ad valorem tax rate, rather than singling out the transport use of gasoline and diesel, or to simply tax the crude oil input if there were domestic refineries.

Table 1. Tax Revenue from Domestic Consumption of Petroleum Products 1/

Country	Fiscal Year	As Percentage of	
		GDP	Total Revenue
Argentina	1991	1.9	13.4
Bangladesh	1991/92	0.8	9.0
Belgium 2/	1990	1.2	4.4
Cote d'Ivoire	1991	3.5	18.2
Denmark 2/	1990	0.7	1.8
France 2/	1990	1.8	5.5
Germany 2/	1990	1.5	5.3
Ghana 3/	1991	3.3	22.2
Haiti	1990/91	2.6	25.2
Hungary	1991	5.0	9.5 4/
India	1990/91	1.5	10.2
Italy 2/	1990	2.4	6.1
Japan 2/	1988/89	0.6	4.7
Kenya	1991/92	2.5	9.9
Mexico	1991	1.5	6.8
Netherlands 2/	1990	0.8	1.6
New Zealand 2/	1989/90	1.2	3.0
Norway 2/	1990	2.4	5.2
Paraguay	1991	0.9	7.6
Philippines	1991	1.2	6.7
Poland 3/	1992	1.7	6.5
Senegal	1991/92	3.6	22.7
Singapore	1991/92	0.7	2.2
Sri Lanka	1991	2.1	11.2
Sweden 2/	1990	1.4	3.1
Uganda	1991/92	2.2	29.5
United Kingdom 2/	1990	1.8	4.4 4/
United States 2/	1989/90	0.4	1.8
Uruguay	1991	1.9	10.1
Zambia	1991	1.3	7.9

Sources: Revenue Statistics of OECD Member Countries 1965-1991, OECD 1992; Government Finance Statistics, 1991; and staff calculations.

1/ In addition to excise duties of petroleum products, Belgium, Denmark, France, Germany, Italy, New Zealand, Netherlands, Norway, Sweden and United Kingdom have VAT or turnover taxes ranging between 12.5 percent (New Zealand) and 25 percent (Sweden). Since these are not accounted for in the estimates in the Table an adjustment of at least 5 to 10 percent, depending on the level of tax, would be required to get a closer approximation to revenues from petroleum taxes. The exact computation of petroleum revenue from such taxes is complicated by the fact that commercial and industrial use of the petroleum products is not subject to that tax.

2/ Excises only.

3/ Estimated.

4/ General government revenue.

6. Domestic taxation of petroleum products in oil exporting countries

In many petroleum producing countries, the marginal production cost is significantly below world market prices. In some of these countries, the domestic prices of petroleum products are set well below world market levels (at around 5 cents a liter for gasoline), thereby providing an implicit

subsidy to domestic petroleum consumers. This is apparently done on the grounds that it is appropriate to pass on to consumers the benefit of the low production costs. However, low petroleum prices tend to distort the relative attractiveness of alternative production activities and do not appear to have much merit even on income distribution grounds.

The Fund has generally encouraged oil exporting countries with programs to levy a tax on petroleum products to close the wedge between world prices and the domestic cost of production if the marginal cost of production is significantly below world market prices. It has argued that a tax should be set so that the ex-refinery price is at least equal to the opportunity cost, the price that could be obtained if the product was exported on the world market (this price would equal the export price, excluding the cost of transportation and insurance). Such a policy is deemed appropriate to maximize gains in economic efficiency and to assist in mobilizing revenue resources. The rent extracted by the government through such taxation can then be redistributed and targeted to promote socially desirable objectives. This is far more efficient than distributing the rent to the domestic oil consumers by underpricing petroleum. By curbing domestic consumption and, hence, production of petroleum, it would also prevent a rapid depletion of existing reserves of crude oil. Another advantage of maintaining opportunity cost petroleum prices in oil producing countries is that incentives to smuggle petroleum products to neighboring countries that have higher tax-inclusive prices would be reduced.

For a few major oil producing countries which have abundant supplies of very low-cost oil and little problem with respect to government revenue, there may be a less pressing need to reduce or close the wedge between domestic petroleum product prices and export prices. However, even in these countries there would appear to be a possibility for efficiency and welfare gains, as long as the enhanced revenue derived from reducing the wedge between domestic and import petroleum prices is efficiently used to increase appropriate forms of government expenditure or investment. In addition to levying taxes to raise prices to the export opportunity level, some of the other justifications for petroleum taxation given earlier would also apply to these countries.

7. Determining the tax rate on petroleum products

In practice, it is difficult to design a tax structure that covers all costs of road use from a social point of view, especially when such a structure would have to encompass taxes on fuel and vehicles, license fees, tolls, parking charges, etc. Notwithstanding these difficulties, a rough notion of the level of petroleum taxes which might be considered appropriate as a road use charge can be obtained by examining country specific studies. In a detailed study of petroleum and road taxes in Jamaica, Smith (1984)

proposed, inter alia, a 100 percent ad valorem tax rate on the tax-exclusive retail price of gasoline, and initially a 50 percent ad valorem tax rate on the tax-exclusive retail price of diesel fuel. 1/ 2/ In arriving at these estimates, Smith took into consideration most of the justifications for petroleum taxation indicated above. However, if fuels for transport cannot be differentially taxed (because they are intermediates, and therefore have a significant non-highway use), the automotive diesel tax relating to road use may have to be kept relatively low. In another study, U.S. Highway Cost Allocation Study (1982), pollution costs were estimated to be small compared to road user costs in urban and suburban areas. Some estimates of the marginal congestion cost (in terms of marginal cost of time) are also available for Bangkok, Hong Kong, and Toronto, although they are sensitive to the underlying methodology. Nonetheless, discussion in the preceding section does provide a broad guidance on petroleum tax policies: that petroleum tax rates in a country should be set by taking into consideration rates prevailing in neighboring countries, that a relatively high tax rate on some items (for example, diesel) can be distortionary, and a relatively low tax rate on kerosene can result in adulteration.

The extraordinarily high tax rates on gasoline in a few countries appear to be related to giving an unusually high weight to pollution or revenue considerations. An examination of percentage tax rates in excess of 200 percent on gasoline in 9 countries in the data sample shows that 6 of them are OECD countries (Denmark, France, Italy, Norway, Portugal, and Sweden) where containment of pollution may have been a major objective. The remaining three are in Africa: in The Gambia and Senegal revenue considerations appear to have been dominant, while in Angola the high percentage rate results mainly from the very low tax-exclusive prices. 3/ Nevertheless, a question does arise of whether tax rates as high as 200 percent on gasoline are appropriate.

### III. Data on Petroleum Pricing and Taxation

The data presented in the tables and charts in this section show the wide diversity of the level and structures of tax rates on petroleum products both among countries and within particular countries over time. The data indicate that most countries have made significant adjustments in

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1/ Caution needs to be exercised in applying these estimates to other countries, as the conditions prevailing there may be different. The percentage rate suggested for Jamaica is for a given tax base. As shown in the next section, the tax-exclusive petroleum prices differ widely among countries.

2/ It is interesting to note that these rates are fairly close to the average tax rates for the sample of countries shown in the next section in Table 4.

3/ The tax rates in The Gambia may also have been influenced by relatively open borders with Senegal. In Angola, which is an oil exporting country, the tax rate is high in percentage terms, but low in specific terms because the tax-exclusive price is very low.

their percentage of tax rates on petroleum products in response to changes in petroleum prices. Frequently, the tax rates changed significantly in percentage terms merely as a result of countries maintaining unchanged specific tax rates on petroleum products in the face of large changes in international petroleum product prices.

Mid-year data on prices and explicit taxation of various petroleum products have been compiled for 1990 and 1991 for 23 OECD countries, 37 African countries, 15 Middle Eastern countries, 15 Asian countries, 5 countries in Eastern Europe, and 25 countries in the Western Hemisphere. Mid-year data for about half of these countries are also provided for 1973 and 1974. The data have been collected for two types of gasoline as well as for diesel, kerosene, heavy fuel oil, and light fuel oil. For some country groupings data are not available for all products or for all years. In some countries only regular or premium gasoline is sold, while in others, there are different varieties of regular or premium that are marketed. In the latter case, the two most widely sold types of gasoline have been used. For each of the four years, mid-point data were sought, or the closest available to end-June. For 1990 and 1991, about one half of the developing country data were obtained from the country-desk economists in the IMF; the remaining were obtained from Energy Détente. <sup>1/</sup> For OECD countries, the data are from various issues of Energy Prices and Taxes, published by the International Energy Agency of the OECD. The data for 1973 and 1974 are from a World Bank publication. <sup>2/</sup>

The paper does not provide any data on the countries of the former Soviet Union or any discussion of the current issues with regard to the pricing and taxation of petroleum products in these countries. This is partly because petroleum prices have been changed so sharply in the past year that data regarding the prices of petroleum products in 1990 and 1991 is not very relevant to discussion of the issues at present. Moreover, the considerations relevant to deciding how quickly retail petroleum prices in these countries should be raised to tax-exclusive international levels are largely beyond the scope of this paper. The arguments presented in this paper would appear to justify eventually levying some domestic tax on petroleum products in both the net oil exporting and net oil importing states of the former Soviet Union.

Because there are differences in the country composition of the two data sets, the paper only provides a rough indication of the average changes in the levels between 1973 and 1991. In addition, by presenting data for 1973 and 1974, and 1990 and 1991, it is possible to get a picture of the changes in taxation and pricing policies of different countries and country groups following the large exogenous permanent increases in international oil prices in 1973 and the temporary increases in 1990.

It is important to note that this paper has sought to measure only those taxes that are explicitly levied on petroleum products, expressed as a percentage of before-tax petroleum prices. Comparisons of tax rates between

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<sup>1/</sup> Lundberg Inc.

<sup>2/</sup> Saito (1975).

countries are distorted by the fact that some countries have significant implicit taxes or subsidies on petroleum products. This affects the base price against which the explicit taxes are measured and thereby reduces (increases) the explicit tax rate measured in percentage terms. In a few countries, the cost of producing petroleum products is very low so that even a modest tax in absolute terms can amount to a high percentage tax. Some countries have cross-subsidies in the basic prices of various petroleum products (usually gasoline prices are kept high in order to keep kerosene prices low). In other countries, some of the levies (e.g., for the stabilization fund) may not have been captured in explicit taxes. To the extent it was not possible to adjust the data for these factors, the percentage tax rates among various petroleum products are distorted--an aspect that has to be kept in mind while describing and assessing the petroleum tax policy of specific countries.

The data spread over 19 years are from four different points of time. Thus, for the observation points, the absolute dollar prices may be distorted because of the over- or under-valuation of exchange rates used in converting domestic prices into dollar prices. However, the computed average tax rates are unaffected by the exchange rate. For this reason, cross-country comparisons of the tax rates are made in both percentage terms and specific terms (U.S. cents a liter). It should also be borne in mind that percentage tax rates and dollar prices of different petroleum products may have changed significantly in some countries since mid-1991. In order to facilitate cross-country comparisons for a broadly similar time period, no attempt was made to update the data.

The data presented in Tables 2-4 illustrate the diversity in averages of retail prices, before-tax retail prices, and percentage tax rates among six country groupings. Both OECD and Africa had prices in 1991 that were higher than the average of all countries for almost all petroleum products. This picture changes somewhat when before-tax prices are examined; the OECD average of before-tax prices is below, and that of Africa is above, that of the all-country average. The variation in the average before-tax price is evident from the fact that premium gasoline price in 1991 was 27 to 29 cents a liter in the Middle East, OECD, and Western Hemisphere, and 42 cents a liter in Africa. The lowest before-tax gasoline prices were in Angola (3 cents a liter), and the highest in Sri Lanka (65 cents a liter). The dollar before-tax price dispersion among regions was even more substantial for other petroleum products. With the exception of kerosene and heavy fuel oil, OECD, Eastern Europe, and Africa had average percentage tax rates that were higher than the all-country average. The average tax rates for premium gasoline range between 175 percent (OECD followed by Eastern Europe and Africa), and 23 percent (in Middle East); for diesel, between 90 percent (OECD, followed by Eastern Europe and Africa) and 6 percent (Middle East). A similar pattern emerges for kerosene.

In response to the sharp increase in crude oil prices in late 1973 and early 1974, there was a reduction in the average percentage tax rate on all petroleum products in all regions, except for a modest increase in the average tax rate on heavy fuel oil in the African region from a low initial level (Table 4). This was mainly because most countries rely on specific duties that were left unadjusted in the wake of oil price increases.

Table 2. Petroleum Products: Average Retail Prices Including Taxes,  
1973, 1974, 1990, and 1991

(U.S. dollars per liter)

Country group	Premium gasoline				Regular gasoline				Kerosene				Automotive diesel				Heavy fuel oil			
	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991
Africa	0.22	0.30	0.70	0.70	0.21	0.29	0.69	0.69	0.14	0.16	0.40	0.41	0.15	0.21	0.48	0.49	0.04	0.05	0.29	0.30
Asia	0.16	0.30	0.41	0.52	0.15	0.27	0.38	0.52	0.06	0.13	0.25	0.29	0.07	0.11	0.28	0.33	0.03	0.07	0.16	0.22
Eastern Europe	...	...	0.44	0.52	...	...	0.42	0.46	...	...	...	...	...	...	0.34	0.35	...	...	...	...
Middle East	0.14	0.21	0.32	0.34	0.12	0.19	0.29	0.29	0.06	0.09	0.17	0.16	0.06	0.12	0.18	0.16	0.02	0.04	0.09	0.06
OECD <sup>1/</sup>	0.24	0.33	0.78	0.79	0.22	0.30	0.71	0.71	0.11	0.15	0.35	0.37	0.17	0.22	0.49	0.49	0.03	0.08	0.15	0.14
Western Hemisphere	0.13	0.23	0.41	0.46	0.10	0.19	0.39	0.42	0.06	0.09	0.26	0.28	0.06	0.10	0.30	0.31	0.03	0.07	0.18	0.16
All countries	0.19	0.29	0.56	0.59	0.17	0.26	0.51	0.54	0.09	0.13	0.31	0.33	0.10	0.15	0.38	0.39	0.03	0.07	0.18	0.17

Sources: Katrine Saito, (1975); OECD, Energy Prices and Taxes, 1990 and 1991; Energy Detente, and staff estimates.

<sup>1/</sup> The 1990 and 1991 data for regular gasoline pertain to unleaded regular.

However, between 1974 and 1991, there was considerable variation in changes in average tax rates on petroleum products for different regions. While average tax rates continued to decline in the Asian and Middle East regions during this period, tax rates increased in the OECD and Western Hemisphere countries, the former from a relatively high initial level and the latter from a relatively low initial level. For most petroleum products there was a modest increase in average tax rates in Africa during this period. For the total period from 1973 to 1991, the most noteworthy changes were the sharp decline in average tax rates on petroleum products in the Asian and Middle East regions. A more detailed discussion of the developments in each region is given below.

#### 1. OECD countries

When crude oil prices quadrupled in late 1973 to early 1974, the OECD countries responded by keeping the average tax component of prices broadly unchanged in absolute terms while adjusting before-tax prices of petroleum products upward by between 50 to 100 percent (Table 3). As a result, by mid-1974, the average tax rate on the two major types of gasoline had declined by between 53 and 67 percentage points, and that on diesel by 47 percentage points. However, by 1990 and 1991, the average OECD tax rate on each petroleum product increased significantly compared with 1974. Comparing 1973 with 1991, the average tax rate of OECD countries was increased from 31 percent to 64 percent for kerosene and from 11 percent to 36 percent for heavy fuel oil, while the rate for diesel was reduced from 123 percent to 90 percent. During this period, the average tax rate for premium gasoline increased from 151 percent to 175 percent, while that on regular gasoline declined from 170 percent to 141 percent. This difference was the result of a shift between the two periods in the type of regular gasoline prices being measured, from leaded to unleaded, and the policy of shifting the tax structure in favor of unleaded gasoline in a number of countries. On balance, it is fair to say that the average percentage tax rates on gasoline in 1991 were about the same as in 1973.

OECD countries may have increased their average percentage tax rates after 1974 to reduce their dependence on imported oil. This essentially strategic objective emerged in response to the effort of the OPEC countries to assert increased market power. It was argued that high tax rates on petroleum products reduce the economic costs associated with vulnerability to price or output decisions of the major oil exporting countries. This may explain why the previously relatively low tax rates on kerosene and heavy fuel oil were increased significantly above their 1973 levels by 1991. However, it should be noted that in percentage terms the average tax rates on gasoline and diesel were already high in 1973 before the increase in crude oil prices. The relatively high petroleum tax rates in the OECD region may reflect a relatively greater desire to charge for benefits and costs and/or a greater concern with the strategic considerations regarding the international supply and price of crude oil.

Table 3. Petroleum Products: Average Retail Prices Excluding Explicit Taxes, 1973, 1974, 1990, and 1991

(U.S. dollars per liter)

Country group	Premium gasoline				Regular gasoline				Kerosene				Automotive diesel				Heavy fuel oil			
	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991
Africa	0.12	0.19	0.42	0.42	0.11	0.18	0.41	0.39	0.10	0.14	0.31	0.32	0.08	0.15	0.34	0.33	0.04	0.05	0.21	0.20
Asia	0.08	0.17	0.29	0.38	0.07	0.15	0.26	0.34	0.05	0.11	0.22	0.26	0.05	0.09	0.23	0.27	0.03	0.07	0.15	0.21
Eastern Europe	...	...	0.17	0.24	...	...	0.15	0.20	...	...	...	...	...	...	0.13	0.19	...	...	...	...
Middle East	0.06	0.10	0.28	0.29	0.05	0.10	0.25	0.24	0.04	0.07	0.16	0.14	0.04	0.10	0.17	0.15	0.02	0.03	0.09	0.06
OECD 1/	0.10	0.17	0.29	0.29	0.08	0.15	0.28	0.30	0.09	0.13	0.22	0.23	0.08	0.12	0.26	0.26	0.03	0.07	0.11	0.10
Western Hemisphere	0.08	0.16	0.26	0.27	0.06	0.13	0.24	0.26	0.05	0.08	0.22	0.22	0.05	0.08	0.22	0.23	0.03	0.06	0.15	0.13
All countries	0.09	0.17	0.31	0.33	0.07	0.15	0.29	0.30	0.07	0.11	0.24	0.25	0.06	0.10	0.26	0.26	0.03	0.06	0.14	0.13

Sources: Katrine Saito, (1975); OECD, *Energy Prices and Taxes*, 1990 and 1991; *Energy Detente*, and staff estimates.

1/ The 1990 and 1991 data for regular gasoline pertains to unleaded regular.

Table 4. Petroleum Products: Average Tax Rates, 1973, 1974, 1990, and 1991

(As percent of tax exclusive retail price)

Country group	Premium gasoline				Regular gasoline				Kerosene				Automotive diesel				Heavy fuel oil			
	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991	1973	1974	1990	1991
Africa 1/	83	76	90	79	95	81	85	86	43	26	27	27	94	46	44	53	5	8	35	48
Asia	116	85	45	37	132	91	48	53	28	19	15	13	38	29	21	21	13	9	5	4
Eastern Europe	...	...	190	115	...	...	197	125	...	...	...	...	...	...	177	82	...	...	...	...
Middle East	137	87	18	23	142	86	18	23	35	23	6	8	53	22	4	6	17	20	2	1
OECD 2/	151	98	176	175	170	103	153	141	31	16	62	64	123	76	93	90	11	9	32	36
Western Hemisphere	55	50	58	70	57	46	61	62	16	10	19	26	24	19	39	36	13	8	24	25
All countries	109	79	92	87	121	82	81	79	29	17	29	30	66	41	51	49	12	9	24	28

Source: Staff calculations.

1/ Excluding Algeria, Angola, Senegal, and Zimbabwe, there is no difference between average tax rate for premium gasoline in 1990 and 1991.

2/ The 1990 and 1991 data for regular gasoline pertains to unleaded regular.

A disaggregated picture of prices and taxes of different petroleum products within the OECD countries can be obtained by focusing on the 1991 data--the latest available year (Charts 1-6). 1/ The charts reveal a significant difference in the before-tax prices of each of the major petroleum products consumed in the OECD countries, with Australia, France, Greece, and the United States being low price countries and Japan, Finland, Norway, and Sweden being high price countries. In absolute terms, the highest tax rates were levied in Italy on leaded premium (87 cents a liter), automotive diesel (46 cents a liter), and light fuel oil (59 cents a liter); in Portugal, on unleaded regular (60 cents a liter) and in Sweden on heavy fuel oil (US\$221 per metric ton). 2/ On the other hand, there are countries that exempt certain petroleum products from taxation, for example, Denmark (automotive diesel); Belgium, Canada, Denmark, and the U.S. (heavy fuel oil); and Canada (light fuel oil). There are six countries that collect very small amounts of taxes on light fuel oil, ranging between 1 to 3 cents a liter.

The percentage rates of taxation are also the highest in Italy on leaded premium (330 percent), automotive diesel (201 percent), and light fuel oil (275 percent), while France tops the list for unleaded regular (240 percent) and Sweden for heavy fuel oil (201 percent). With respect to gasoline, there are 7 countries where tax rates are 200 percent or more and only 4 countries that have rates that are less than 100 percent. The tax rates on automotive diesel are substantially lower, with more than half of the countries having rates that are below 100 percent. There are only three countries (Australia, Switzerland and U.S.) that have higher tax rate on automotive diesel than on gasoline; over three fourths of the countries levy taxes on diesel that are less than 60 percent of those on leaded premium gasoline. The taxation of light fuel is somewhat lower, with over two thirds of the countries having tax rates that are less than 70 percent. Heavy fuel oil, an intermediate input in production, has still lower rates; about two thirds of the countries levy taxes that are less than 25 percent.

## 2. Africa

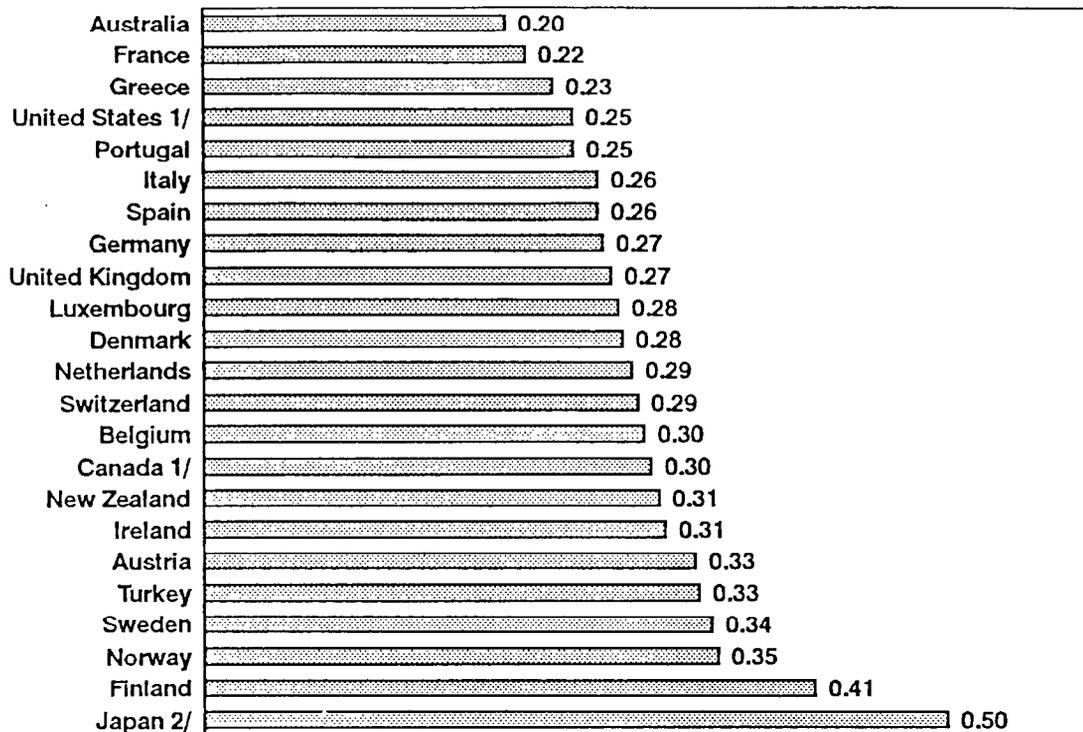
The African countries reacted to the 1973-74 oil price increase by differentiating sharply the magnitude of tax rate changes for different petroleum products. While there was some increase in the average specific U.S. dollar tax rates on premium and regular gasoline, in percentage terms the average tax rate declined by 7 and 14 percentage points. The average tax, expressed in U.S. dollars, on both kerosene and automotive diesel was

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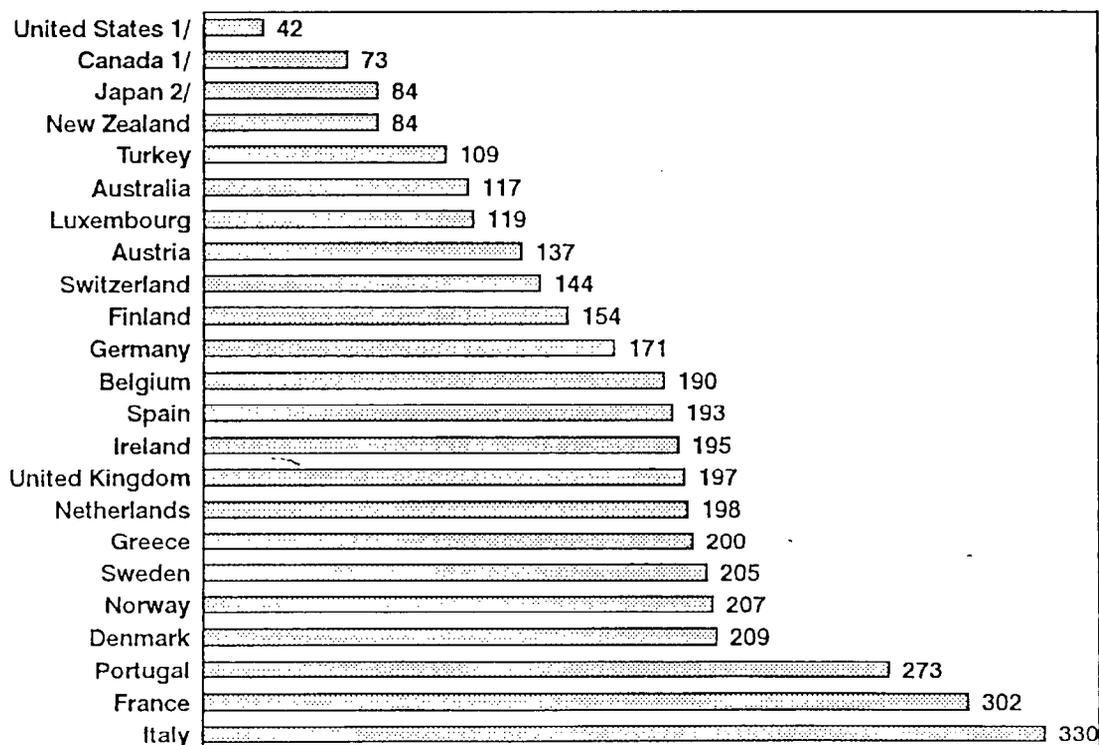
1/ Charts are given only for the most important petroleum products in each region.

2/ Since 70 to 80 percent of total automobile diesel fuel oil in the EC countries is used in industry and commerce and the VAT on such use is refunded, dollar prices and percentage tax rates exclude VAT. To the extent automobile diesel is used by motorists, tax and tax inclusive price is understated for these countries.

**Chart 1 OECD Countries:  
Leaded Premium Gasoline Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



**Chart 2 OECD Countries:  
Taxes on Premium Gasoline, 1991  
(As a percentage of tax exclusive price)**



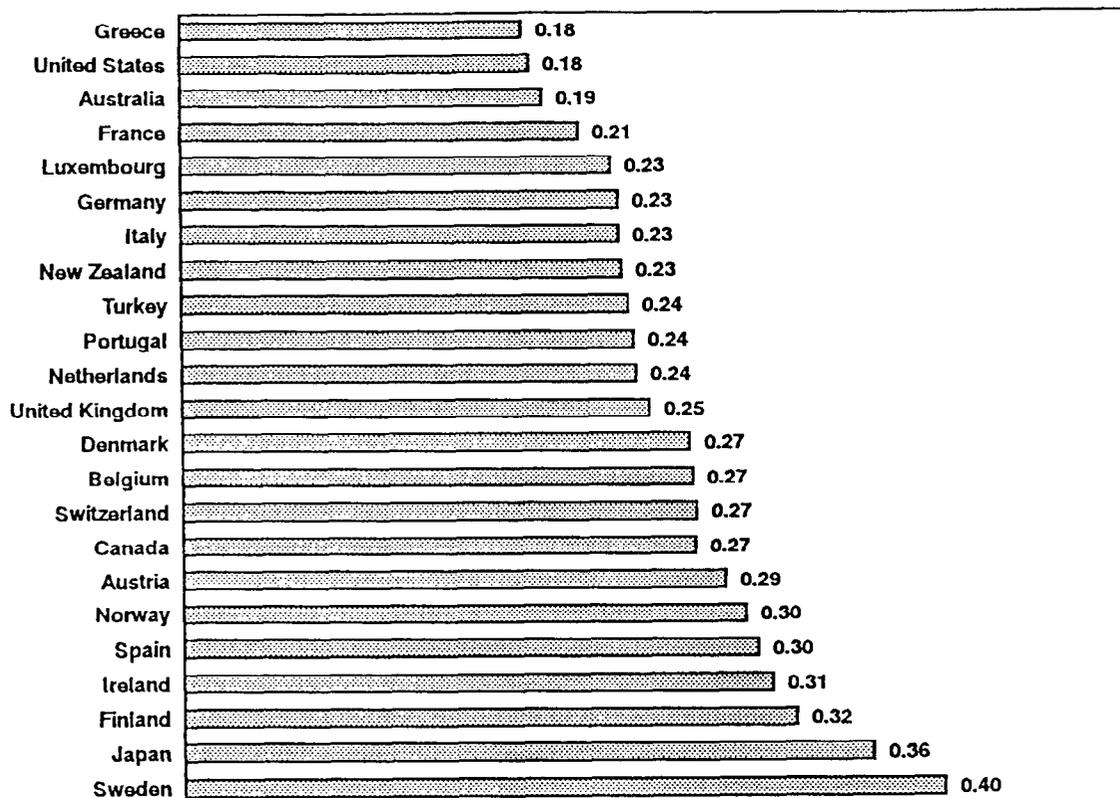
Source: Energy Prices and Taxes, International Energy Agency, OECD, 1991.

1/ Unleaded premium.

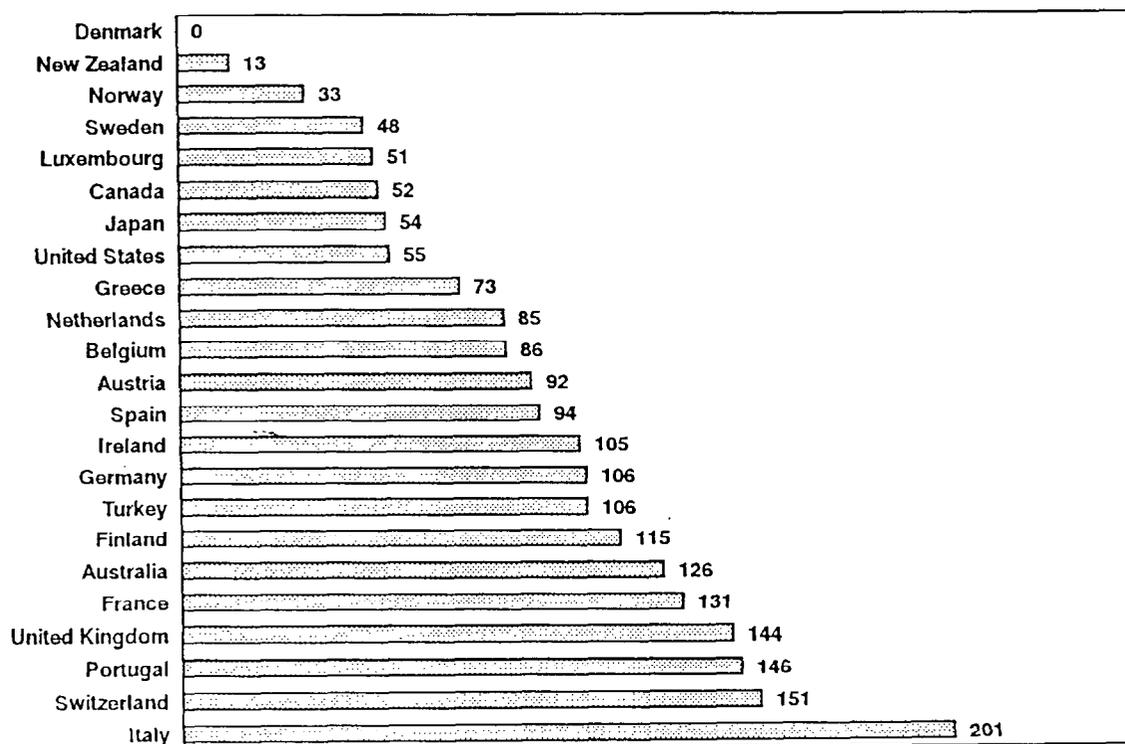
2/ Unleaded regular gasoline prices.



**Chart 3 OECD Countries:  
Automotive Diesel Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**

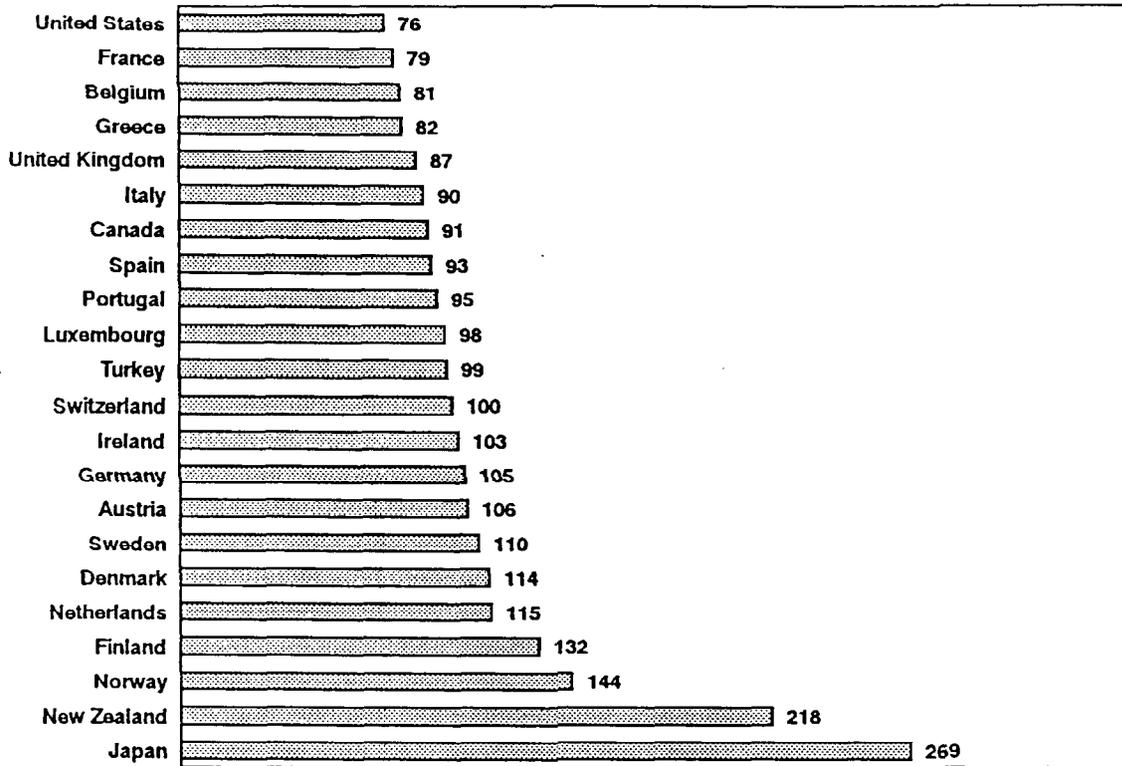


**Chart 4 OECD Countries:  
Taxes on Automotive Diesel, 1991  
(As a percentage of tax exclusive price)**

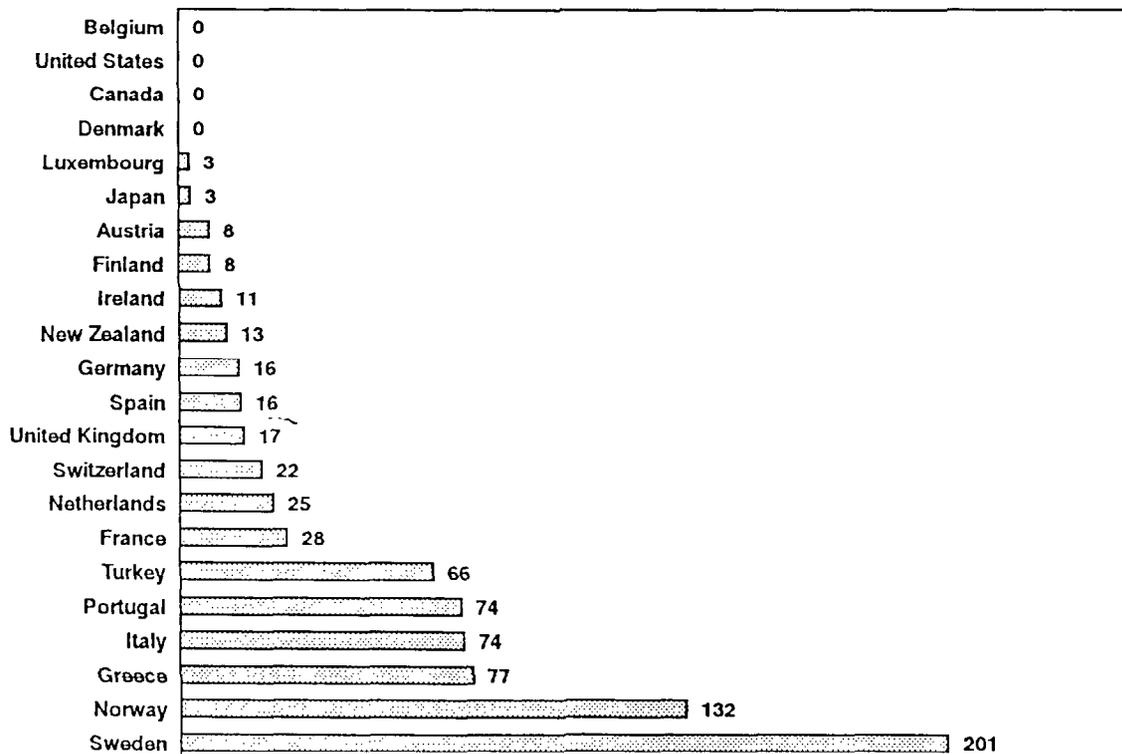




**Chart 5 OECD Countries:**  
**Heavy Fuel Oil - Industry Prices, Excluding Explicit Taxes, 1991**  
 (US dollars per metric ton)



**Chart 6 OECD Countries:**  
**Taxes on Heavy Fuel Oil, 1991**  
 (As a percentage of tax exclusive price)





actually reduced between mid-1973 and mid-1974, which led to a fall in the average tax rate from 43 percent to 26 percent for kerosene and from 94 percent to 46 percent for automotive diesel. One plausible reason for adopting this policy could have been to minimize the impact of higher international oil prices on domestic prices, especially of products that are heavily used by the poorer population groups. On the other hand, the tax rate on heavy fuel oil almost doubled to 8 percent.

The average tax rates on all petroleum products in Africa declined between 1973 and 1991, with the exception of heavy oil. Between 1973 and 1991, the average percentage tax rate on premium gasoline declined (from 83 percent to 79 percent), as did for regular gasoline (95 percent to 86 percent), automotive diesel (94 percent to 53 percent), and kerosene (43 percent to 27 percent). In the early 1970s, there was little taxation of heavy oil in these countries (two-tenths of a cent). This changed by mid-1991, when the average tax rose to 10 cents a liter, causing the average tax rate to increase from 5 percent in 1973 to 48 percent in 1991.

According to the mid-1991 data, the highest before-tax prices of premium gasoline, automated diesel, and heavy fuel oil were in Burundi (68, 63 and 40 cents a liter, respectively), and of kerosene in Rwanda (65 cents a liter) (see Charts 7-12). The lowest before-tax prices prevail in three oil producing countries: Algeria, Angola, and Nigeria. The maximum tax, expressed in U.S. dollars, is collected in Senegal for premium gasoline (81 cents a liter), regular gasoline (79 cents a liter), and kerosene (33 cents a liter); Côte d'Ivoire for automotive diesel (47 cents a liter); and The Gambia for heavy fuel oil (33 cents a liter). The lowest levels of petroleum taxation (including subsidization) are in Angola and Nigeria--the two countries that produce oil--together with Sierra Leone and Ethiopia (which do not levy any tax on kerosene and heavy oil) and Cameroon (which subsidizes kerosene by 7 cents a liter).

Senegal has the highest percentage tax rates on almost all items--regular gasoline attracts a rate of 272 percent, while Ghana has the maximum rate of 162 percent on heavy fuel oil. The tax rates on gasoline are below 75 percent in more than half of the countries whereas for automotive diesel the bulk of the countries are below this level. Most of the countries have a tax rate of less than 50 percent for kerosene. The lowest tax rates are in Nigeria (premium gasoline and automotive diesel), Tanzania and Zambia (regular gasoline), Cameroon (kerosene), and Ethiopia, Mozambique and Namibia (heavy fuel oil).

### 3. Asia

The average percentage tax rates on petroleum products in the Asian region declined sharply between 1973 and 1974 and declined sharply further by 1990 and then remained at roughly the same level in 1991. In a couple of countries reductions in petroleum tax rates were introduced in an effort to contain inflation as measured by the consumer price index in the hope that this would contain wage increase pressures. Between 1973 and 1991, the average tax rates declined by 79 percentage points for both premium and

regular gasoline, 17 percentage points for automotive diesel and 15 percentage points for kerosene. Heavy fuel oil data for 1991 is not available for most of the countries in this group, therefore, no meaningful comparison can be made between 1973 and 1991. The reduction of taxes on gasoline by 1991 was steep enough to narrow the dispersion in tax rates on different products that existed in 1973. For instance, the tax on automotive diesel as a proportion of tax on premium gasoline rose from around 15 percent to 44 percent.

In the available sample (see Charts 13-18), the highest before-tax prices in 1991 for premium and regular gasoline were in Sri Lanka (65 cents and 60 cents a liter, respectively); and for kerosene and automotive diesel in Tonga (48 cents and 42 cents a liter, respectively). The lowest tax exclusive price for premium gasoline was in Malaysia and Solomon Islands (26 cents a liter); for regular gasoline in Malaysia, Thailand, and Vietnam (24 cents a liter); for kerosene in Bhutan and Indonesia (11 cents a liter); and for automotive diesel in Indonesia (15 cents a liter). The maximum specific tax rate was in Hong Kong on three products: premium gasoline (54 cents a liter), regular gasoline (48 cents a liter), and automotive diesel (24 cents a liter). Western Samoa collected the highest tax on kerosene (10 cents a liter). The lowest tax on premium gasoline was in Bhutan (1 cent a liter), and that on regular gasoline was in Viet Nam (5 cents a liter). Hong Kong does not levy any tax on kerosene consumption, and Bhutan exempts both kerosene and automotive diesel from explicit taxes. The majority of the Asian countries have tax rates on gasoline below 60 percent, tax rates on kerosene below 10 percent, and tax rates on automotive diesel 40 percent.

#### 4. Eastern Europe

Data for the Eastern Europe region were not available for 1973 and 1974, so this section will only provide a brief description of the tax rates in mid-1991. The tax-exclusive average price of oil products in U.S. dollar terms was still 20 to 30 percent below the average for OECD countries, despite a sharp adjustment in petroleum prices during the previous two years, with the disappearance of access to highly subsidized oil from the Soviet Union. The sharp decline in the average percentage tax rates on petroleum products in Eastern Europe between mid-1990 and mid-1991 was mainly due to the large increases in the tax-exclusive prices of the petroleum products during this period. By mid-1991 the percentage tax rates in the region were still significantly higher than in any of the other developing country regions, but considerably below the average OECD tax rate.

#### 5. Middle East

With the exception of five countries (Egypt, Israel, Jordan, Pakistan, and Yemen), the other Middle East countries in the sample do not levy any

Chart 7 Selected African Countries:  
Premium Gasoline Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)

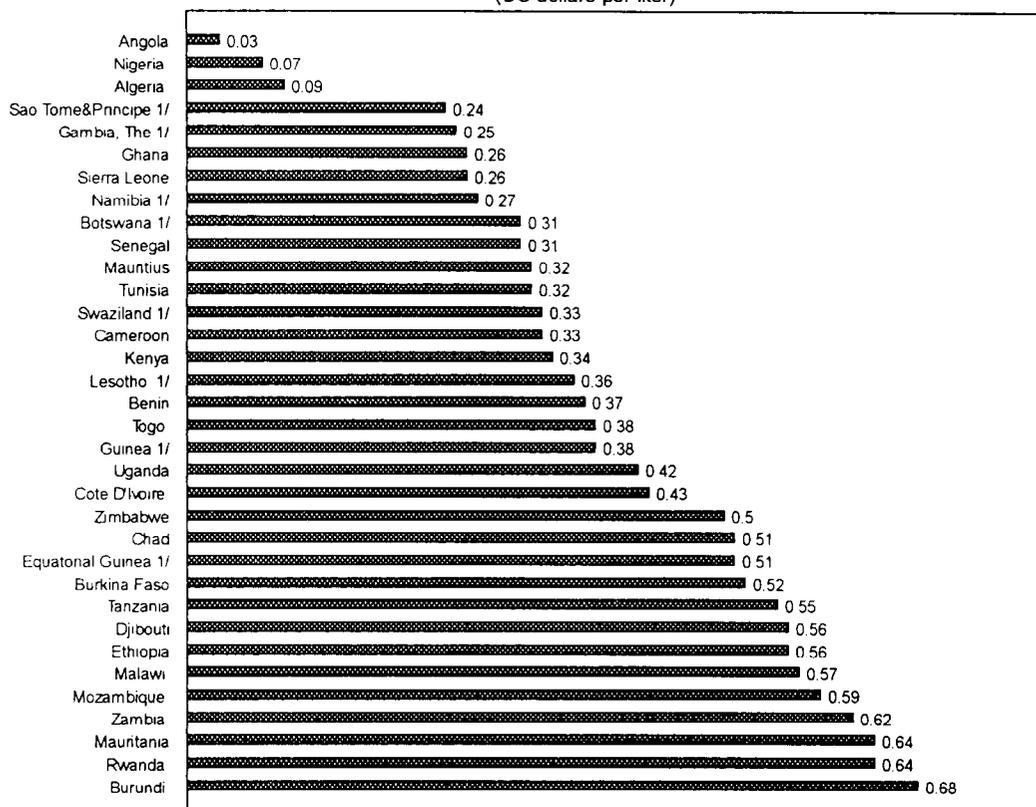
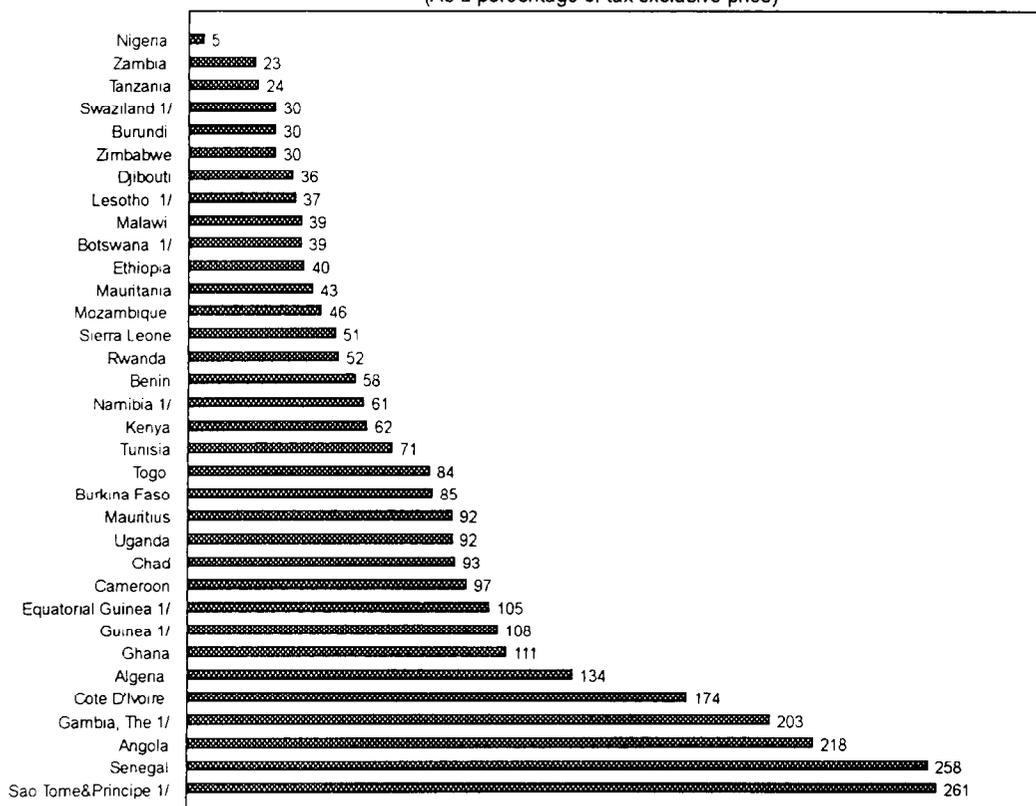


Chart 8 Selected African Countries:  
Taxes on Premium Gasoline, 1991  
(As a percentage of tax exclusive price)

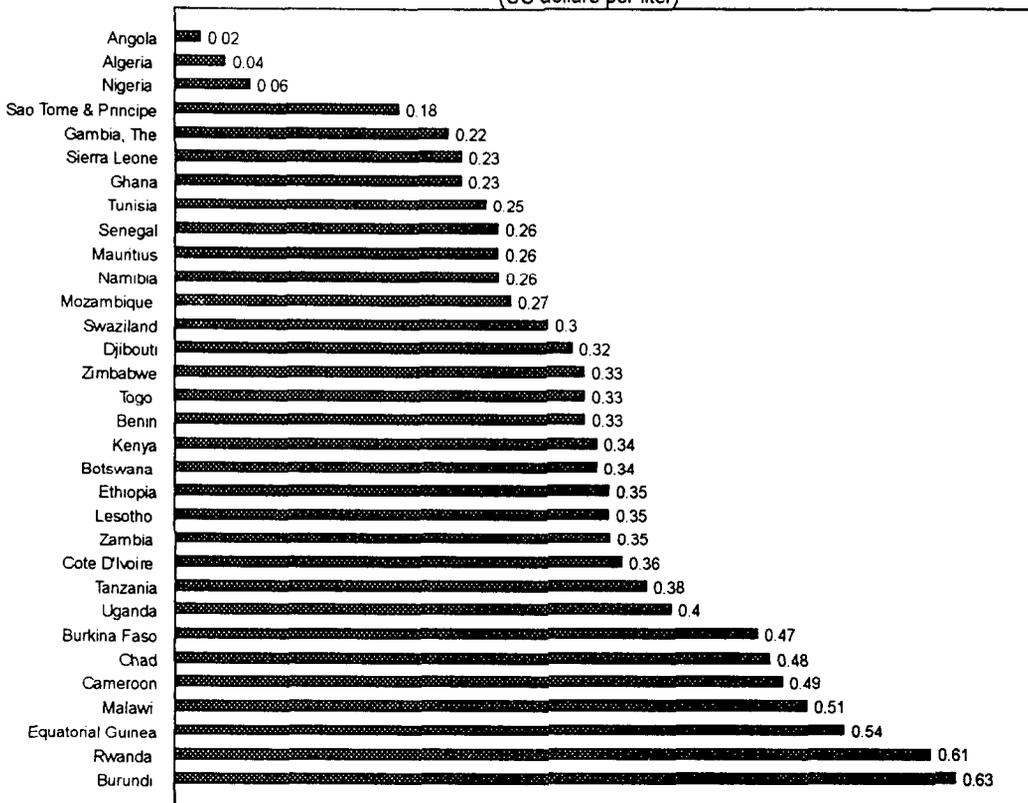


Source: Staff estimates.

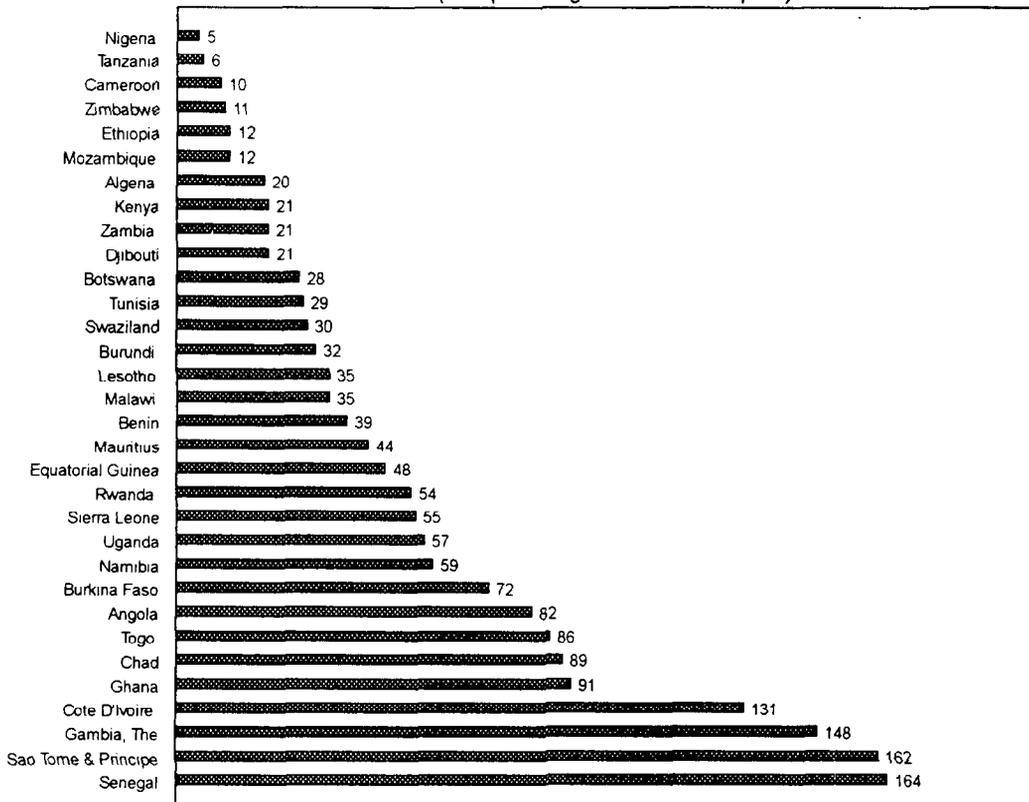
1/ Unleaded regular gasoline.



**Chart 9 Selected African Countries:  
Automotive Diesel Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



**Chart 10 Selected African Countries:  
Taxes on Automotive Diesel, 1991  
(As a percentage of tax exclusive price)**



Source: Staff estimates



Chart 11 Selected African Countries  
Kerosene Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)

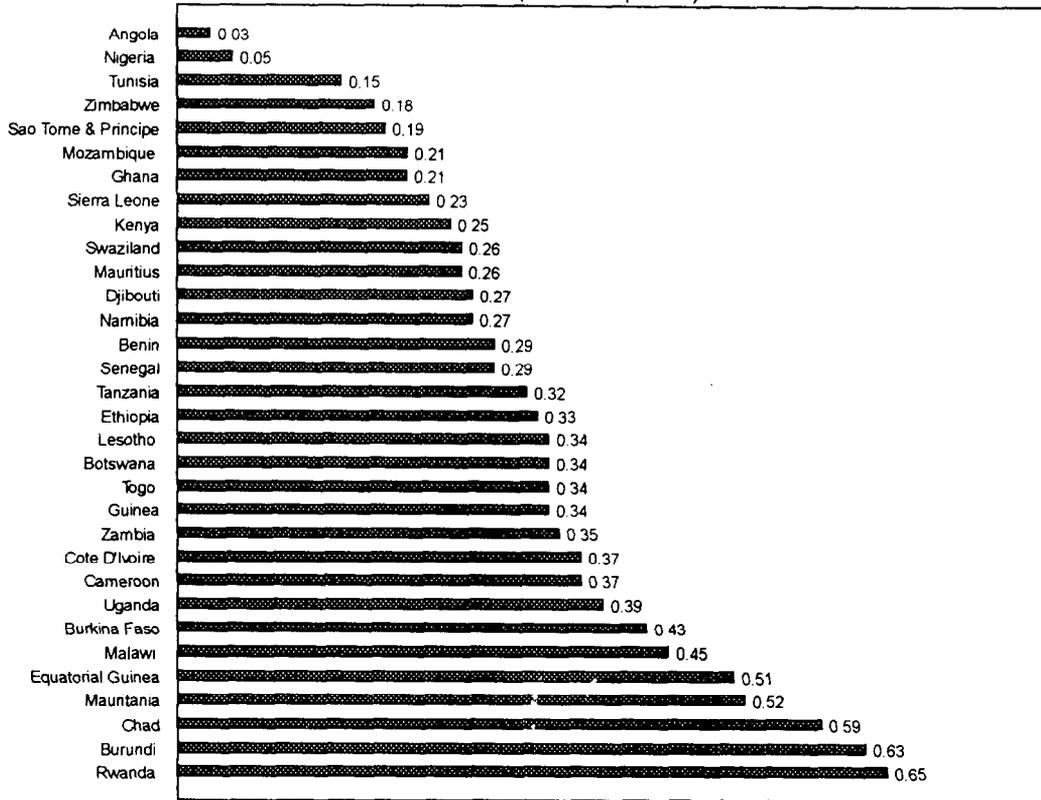
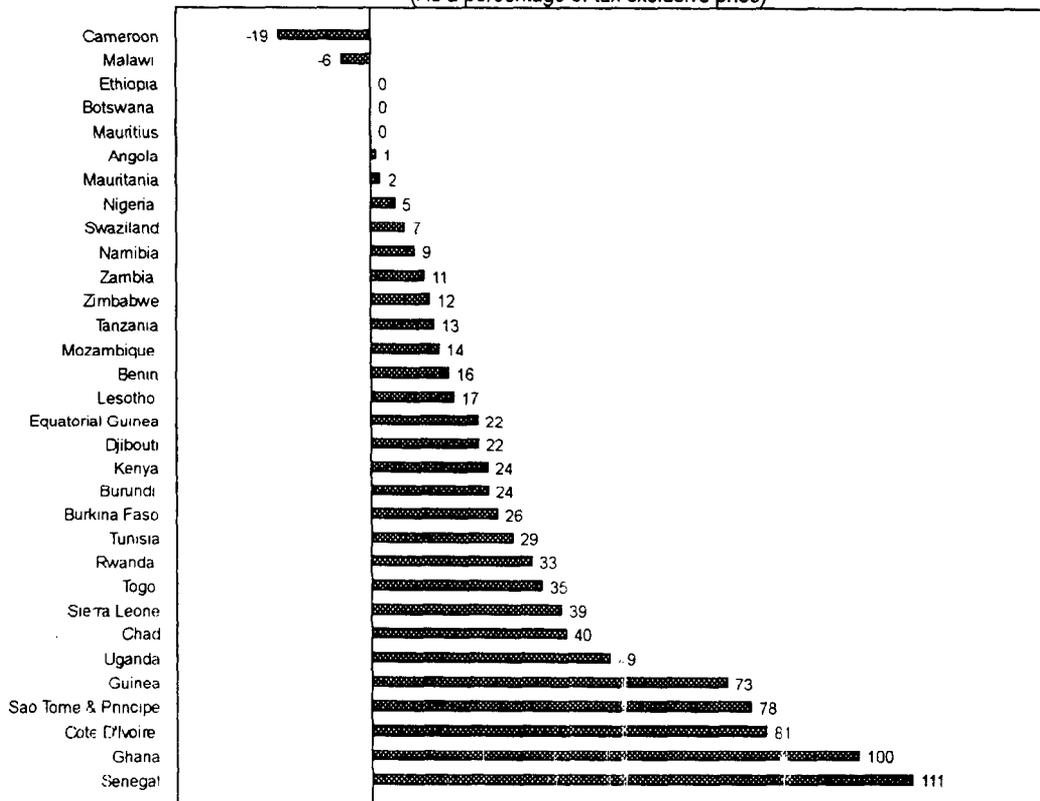


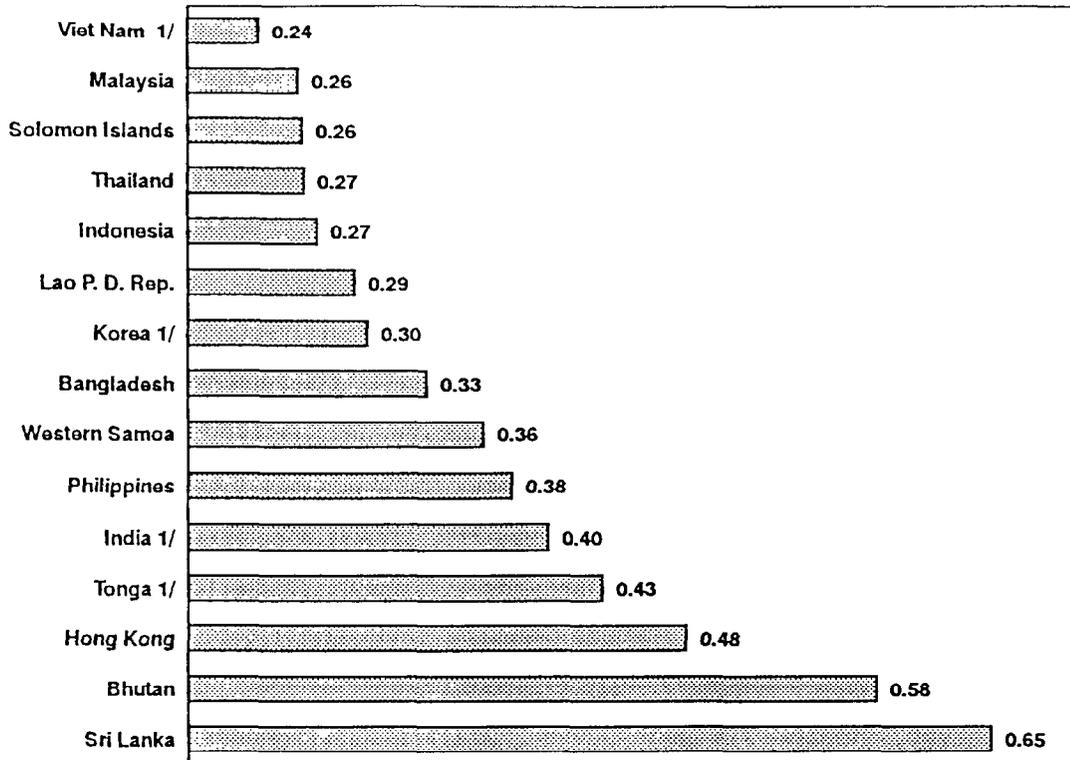
Chart 12 Selected African Countries:  
Taxes on Kerosene, 1991  
(As a percentage of tax exclusive price)



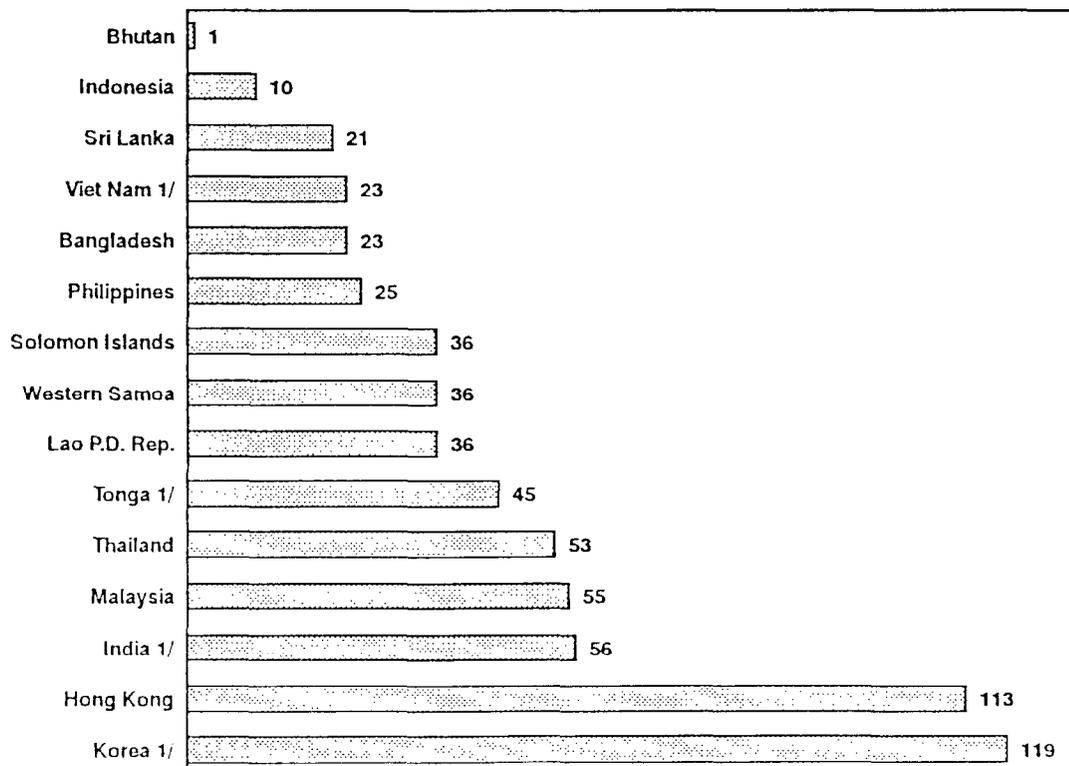
Source: Staff estimates.



**Chart 13 Selected Asian Countries:  
Premium Gasoline Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



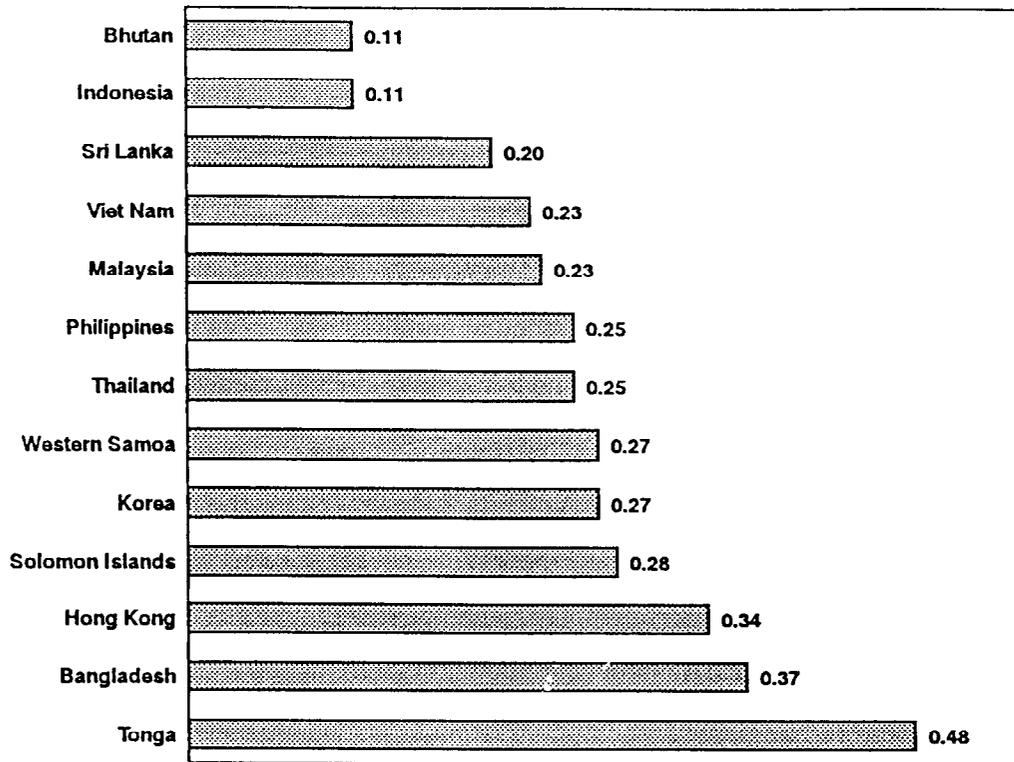
**Chart 14 Selected Asian Countries:  
Taxes on Premium Gasoline, 1991  
(As a percentage of tax exclusive price)**



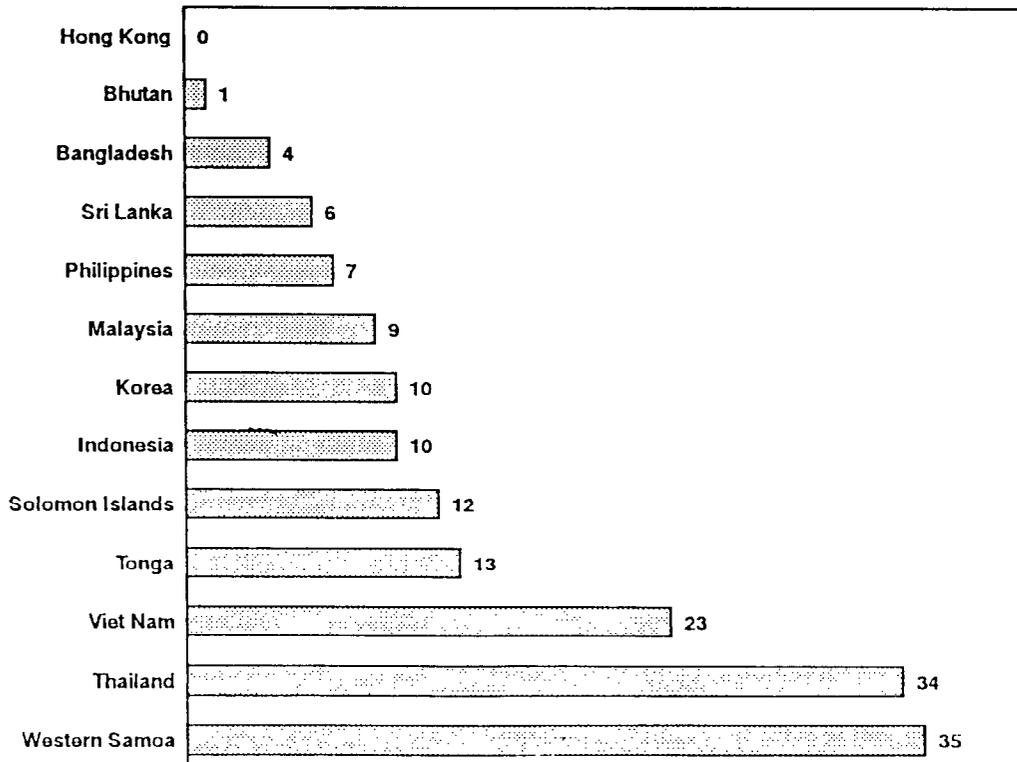
Sources: Energy Detente, 1991 and staff estimates.  
1/ Regular gasoline prices.



**Chart 15 Selected Asian Countries:  
Kerosene Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



**Chart 16 Selected Asian Countries:  
Taxes on Kerosene, 1991  
(As a percentage of tax exclusive price)**

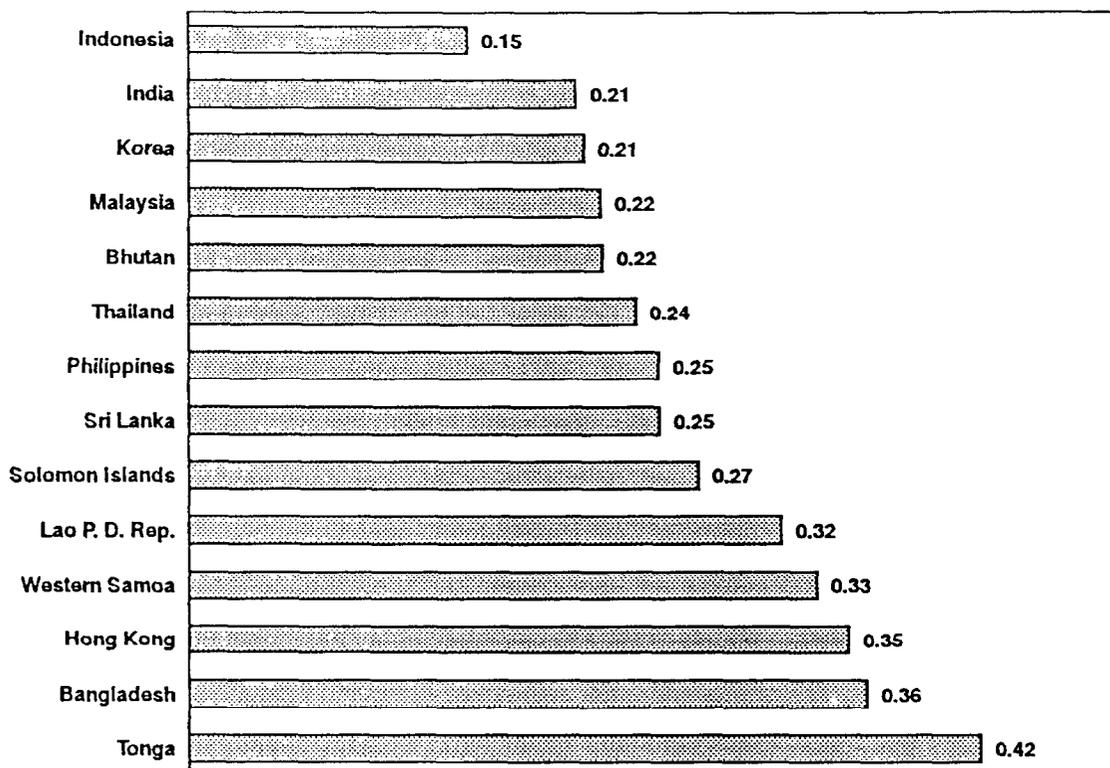


Sources: Energy Detente, 1991 and staff estimates.



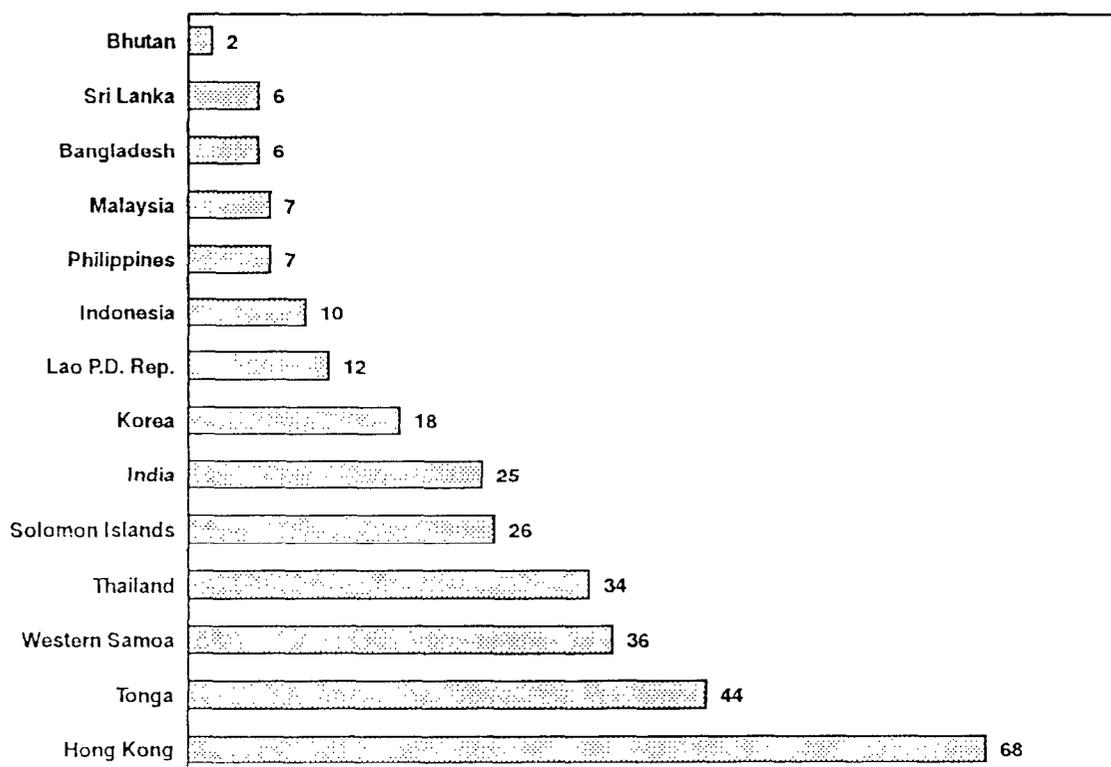
### Chart 17 Selected Asian Countries:

Automotive Diesel Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)



### Chart 18 Selected Asian Countries:

Taxes on Automotive Diesel, 1991  
(As a percentage of tax exclusive price)



Sources: Energy Detente, 1991 and staff estimates.



tax on petroleum products. <sup>1/</sup> The wide variation in retail prices in mid-1991 in this group (Charts 19-21) is a reflection of differences in the cost of production and distribution margins of the oil companies. The lowest retail prices (5 cents a liter for premium gasoline, 1 cent a liter for automotive diesel, and 1/10 of a cent a liter for both kerosene and heavy fuel oil) are in Iran. Both Egypt and Syria sell kerosene at a relatively low price (6 cents a liter) in an effort to cater to the needs of the poorer part of the population. In this country-group, Pakistan has the highest tax rates on gasoline (178 percent on premium gasoline) and Israel on kerosene (60 percent) and automotive diesel (55 percent).

#### 6. Western Hemisphere

The data show that the average percentage tax rates on gasoline increased marginally during the 1973-91 period, while the increase in tax rates on automotive diesel and kerosene and heavy fuel oil was somewhat larger (Charts 22-27). The average percentage tax rates on each petroleum product declined between 1973 and 1974 (ranging between 5 to 11 percentage points), but more than recovered by 1990 and increased further in 1991.

As of mid-1991, Honduras and Haiti had the highest tax-exclusive prices of premium and regular gasoline (43 cents and 41 cents a liter, respectively). Jamaica had the highest automotive diesel price, net of taxes (35 cents a liter), while Guatemala's price before taxes for kerosene was the highest (37 cents a liter). As would be expected, the lowest prices for various petroleum products were in the oil producing countries. Venezuela's price, before taxes, for premium gasoline, regular gasoline and automotive diesel was an average of 5 cents a liter. Ecuador, another oil producer, had a tax-exclusive price of kerosene of 1 cent a liter. The highest tax were being collected by Argentina (premium gasoline, 43 cents a liter); Uruguay (regular gasoline, 35 cents a liter); Dominican Republic (kerosene, 17 cents a liter); Barbados (automotive diesel, 27 cents a liter); and Peru (heavy fuel oil, 15 cents a liter). Low or no taxes are mostly found among oil producing countries, Ecuador and Venezuela. For the majority of the countries for which data are available, the tax rates are less than 70 percent on the two types of gasoline, less than 30 percent on kerosene, and less than 40 percent on automotive diesel.

#### IV. Conclusions

The domestic taxation of petroleum products is an important source of revenue in most countries. There are a complex variety of reasons for petroleum taxation, including charging for benefits and costs, improving income distribution, raising revenue, and strategic considerations; and, for oil exporters, charging the export opportunity price for domestic sales of petroleum products in order to ensure a more efficient use of resources.

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<sup>1/</sup> Hence charts for this region are only given for prices excluding taxes, and not for tax rates.

Since it is difficult to assign a weight to each of the different reasons to derive, from theory, the appropriate petroleum tax rate for each country, the paper also examined the actual petroleum tax rates in 120 countries. The comparative data show an extremely wide range of petroleum tax rate levels and structures among countries and significant changes in tax rate levels, over time.

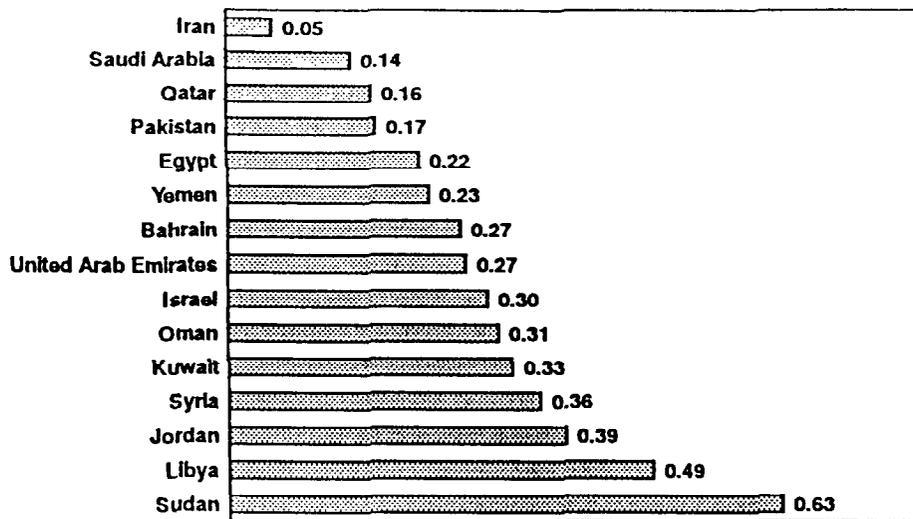
Because the level of petroleum taxes depends on a broad range of considerations, it is reasonable for there to be some variation in petroleum tax rates among countries. However, the appropriateness of both extremely low petroleum prices and taxes and extremely high petroleum prices and taxes can be questioned. In addition to providing a significant amount of revenue, both economic efficiency and the welfare of the population can be improved if oil exporting countries levy a tax on domestic use of petroleum products to close the wedge between low long-run marginal costs of production and the world market price. Another advantage of raising petroleum prices to at least the export opportunity price is that it lessens the incentive to smuggle petroleum to neighboring countries and completely removes the implicit subsidy being given to the smugglers and users of smuggled petroleum in neighboring countries. On the other hand, the extremely high tax rates on the consumption of petroleum products in a number of countries do not appear to be appropriate in light of the sum of the justifications identified in this paper. In brief, a significant reduction in the present extremely wide variation in petroleum prices and tax rates appears warranted. In some countries, there should be an effort to broaden tax bases so as to reduce high petroleum tax rates.

Most countries do not appear to take explicit account of road usage or pollution and congestion costs in setting their tax rates on petroleum products. The overriding justification in most cases appears to be the fact that it is an easily taxed, important product which yields a considerable amount of revenue.

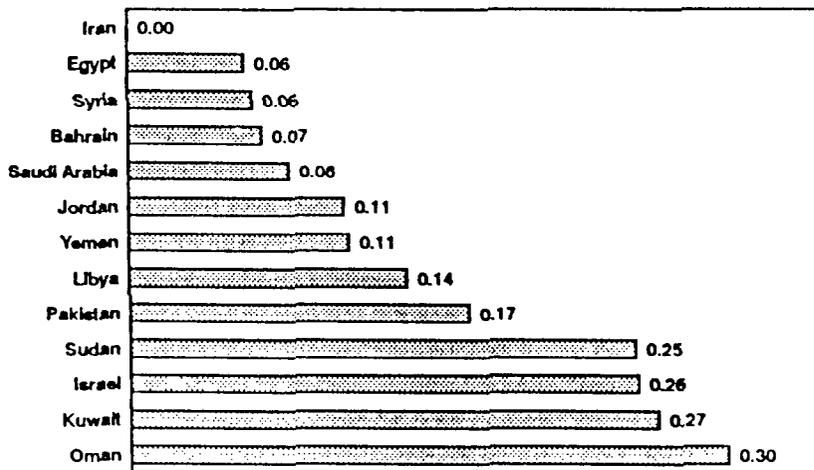
There is justification for applying a mix of specific and ad valorem tax rates to the main petroleum products. It is more appropriate to levy a specific tax to charge for benefits and costs, such as road usage or pollution, because these benefits or costs are not significantly related to the price of the petroleum products. However, it is more appropriate to levy an ad valorem tax rate to raise revenue, especially when there are significant ongoing increases in the local currency prices of petroleum products, emanating from either exchange rate or international petroleum price developments. Generally, it is probably also easier to achieve desired income distribution objectives by use of ad valorem taxes.

The question of the appropriate relative tax rates among gasoline, diesel, and kerosene is also highly complex. It depends primarily on the relative weights given to charging for road use and seeking to improve income distribution through luxury taxation as well as the potential for adulteration with the lower-priced product. If gasoline is subject to significantly higher tax rates than diesel, it is important to discourage use of diesel-powered cars by levying much higher taxes on the purchase of

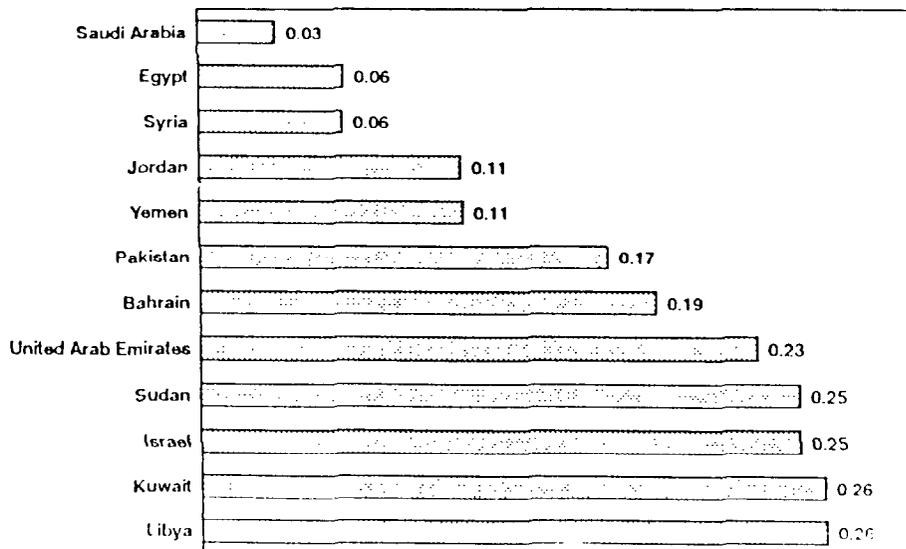
**Chart 19 Selected Middle Eastern Countries:  
Premium Gasoline Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



**Chart 20 Selected Middle Eastern Countries:  
Kerosene Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



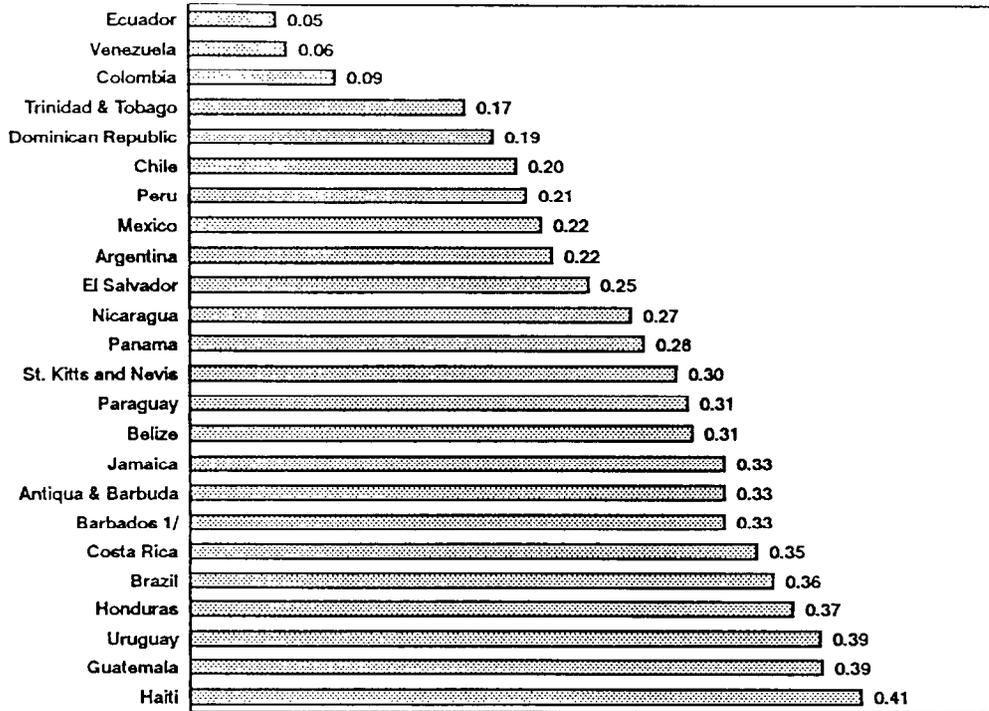
**Chart 21 Selected Middle Eastern Countries:  
Automotive Diesel Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



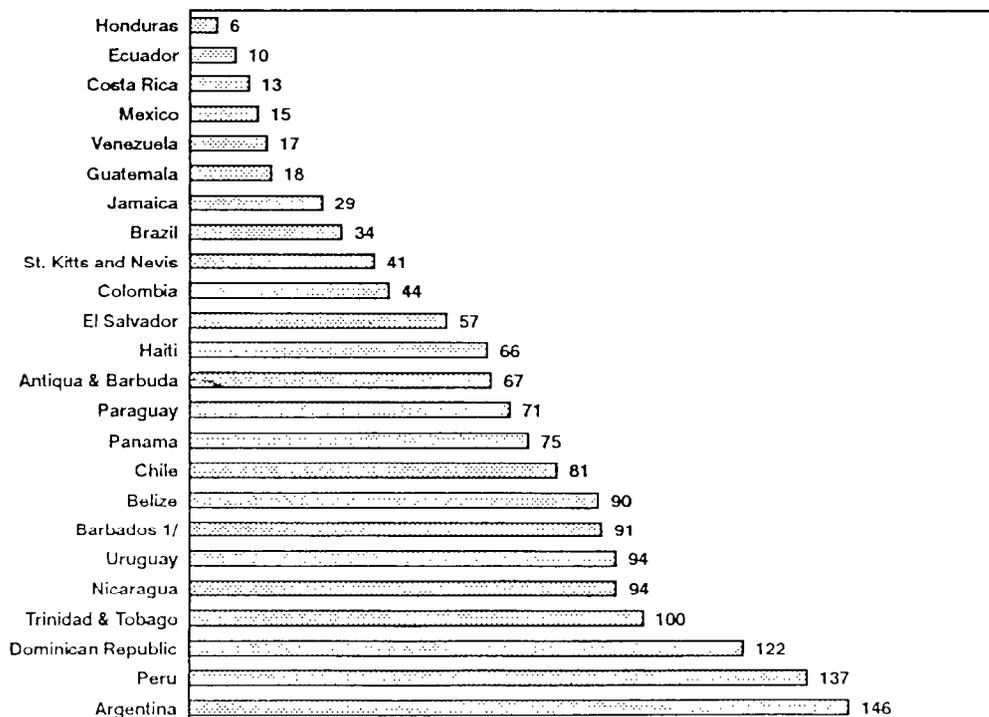
Sources: Energy Detente, 1991 and staff estimates.



**Chart 22 Selected Western Hemisphere Countries:  
Regular Gasoline Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



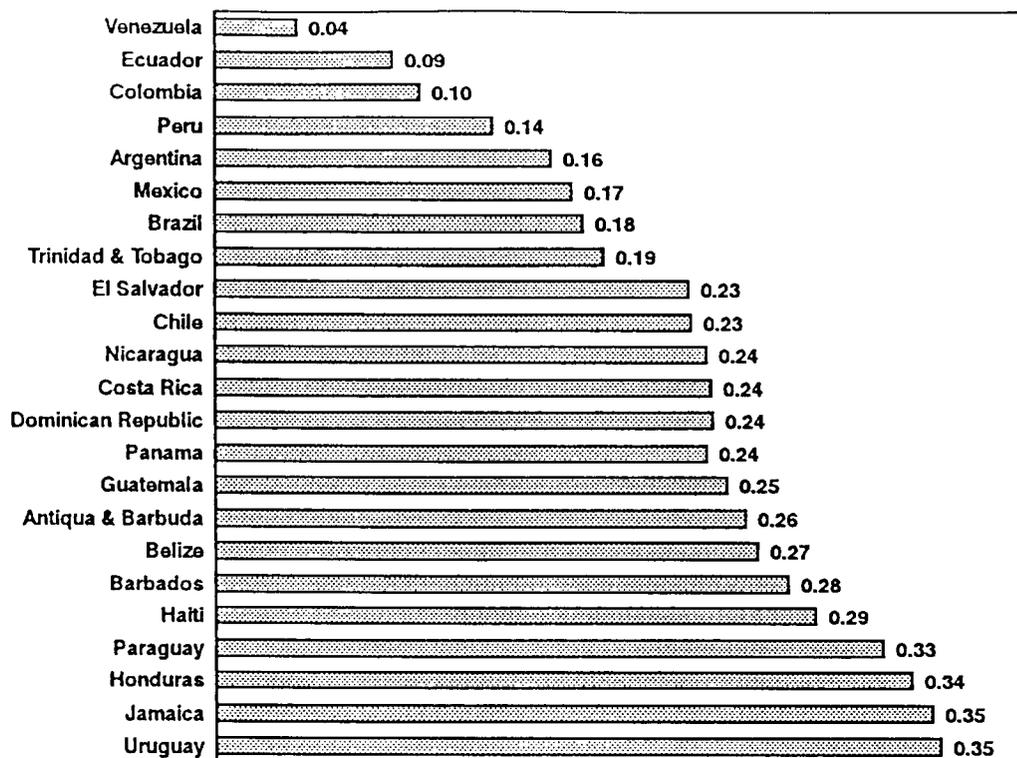
**Chart 23 Selected Western Hemisphere Countries:  
Taxes on Regular Gasoline, 1991  
(As a percentage of tax exclusive price)**



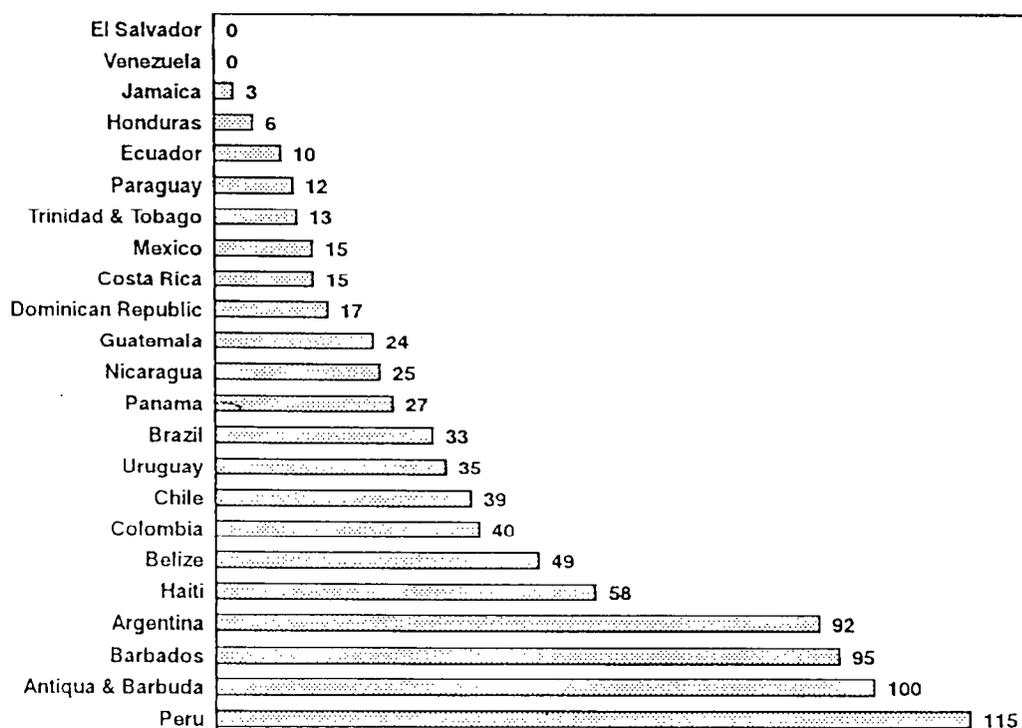
Sources: Energy Detente, 1991 and staff estimates.  
1/ Premium gasoline prices.



**Chart 24 Selected Western Hemisphere Countries:  
Automotive Diesel Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**

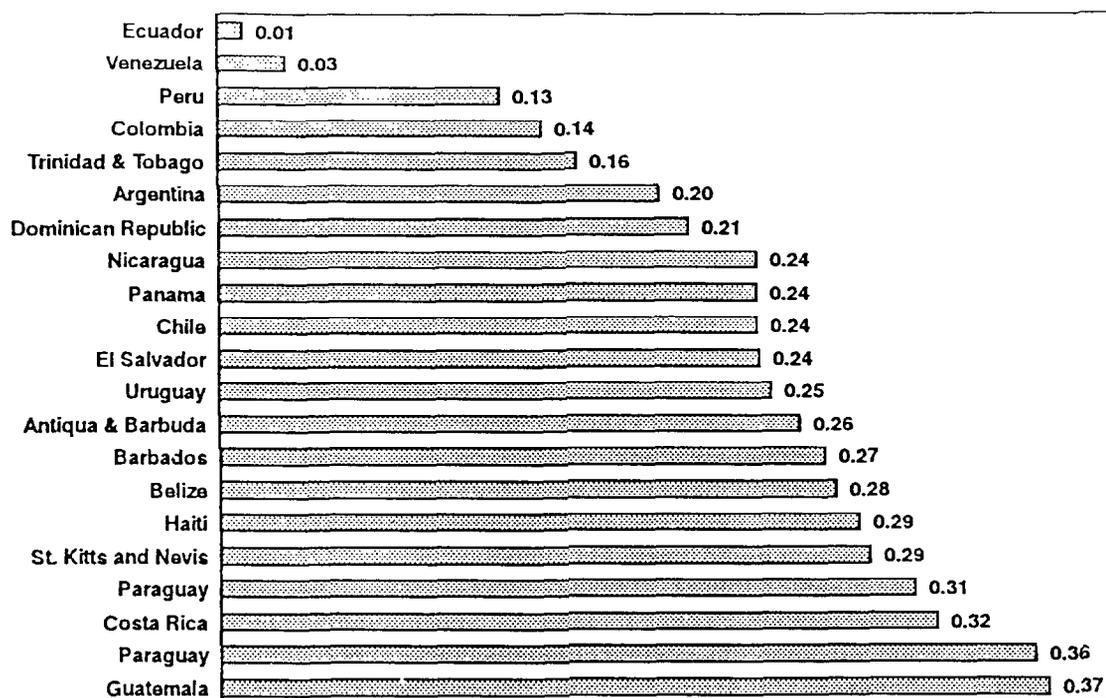


**Chart 25 Selected Western Hemisphere Countries:  
Taxes on Automotive Diesel, 1991  
(As a percentage of tax exclusive price)**

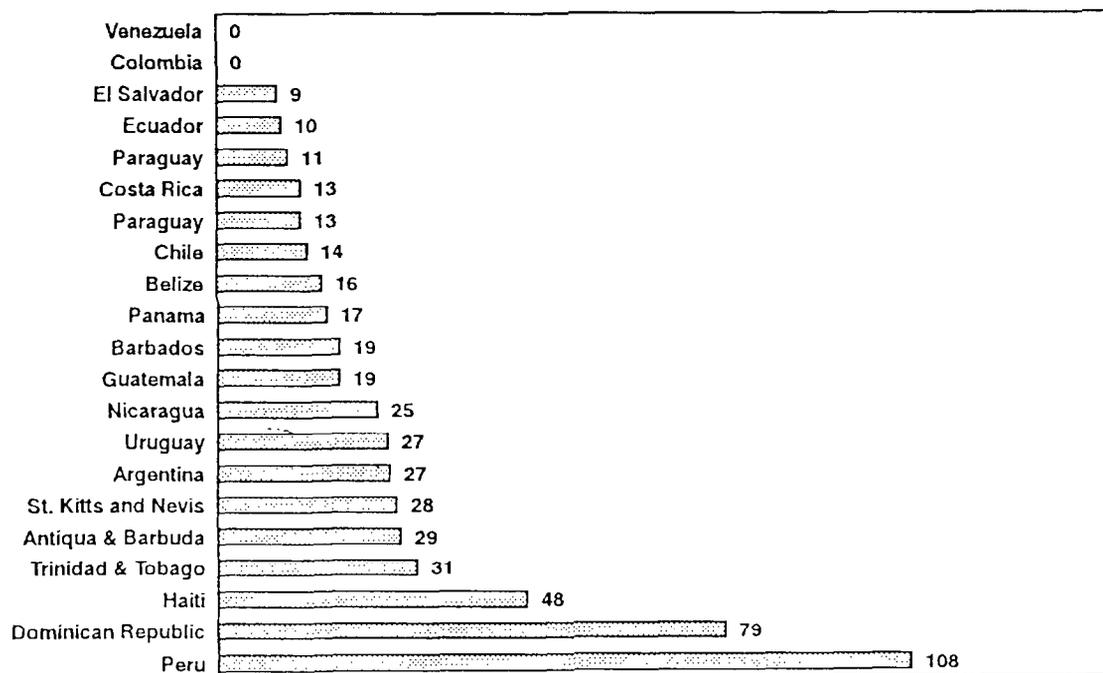




**Chart 26 Selected Western Hemisphere Countries:  
Kerosene Prices, Excluding Explicit Taxes, 1991  
(US dollars per liter)**



**Chart 27 Selected Western Hemisphere Countries:  
Taxes on Kerosene, 1991  
(As a percentage of tax exclusive price)**



Sources: Energy Detente, 1991 and staff estimates.



diesel private cars and a higher annual license fee for such vehicles. It would appear that the large tax rate differential between gasoline and diesel should be reduced in some countries. Since kerosene can be mixed with diesel, the relative tax rates on these products should be set so that there is no significant incentive for adulteration.

The analysis in this paper raises the question of the appropriateness of cross-subsidies in the pricing of petroleum products, such as by raising prices of gasoline to lower prices for kerosene, and of pricing petroleum products uniformly throughout a country by some mechanism that applies average transport costs rather than actual transport costs. If a subsidy given to a particular kind of petroleum product or to consumers in a particular region is deemed necessary, it should be financed directly through the budget in order to make the cost of the subsidy transparent. Given that petroleum subsidies result in distortions in usage of petroleum products, in most cases assistance to the poor can usually be better targeted by other means.

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