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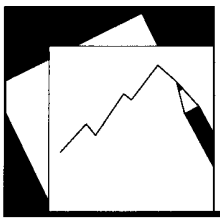

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Domestic Petroleum Product Prices and Subsidies: Recent Developments and Reform Strategies

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Domestic Petroleum Product Prices and Subsidies: Recent Developments and Reform Strategies

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Authorized for distribution by Mark Horton and John Thornton

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Abstract

The paper reviews recent developments in the pass-through of international to domestic petroleum product prices, in the different fuel pricing regimes, and in fuel subsidies in a range of emerging market and developing economies. The main finding of the paper is the limited price pass-through in many countries and the consequent increase in fuel subsidies. The paper proposes that key elements of a successful strategy to contain subsidies should comprise: making subsidies explicit; making pricing mechanisms more robust; combining reductions in subsidies with measures to protect the poorest; using the resulting savings well, and transparency and consultation.

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I. INTRODUCTION

The large increase in international fuel prices during 2003–06 (Table 1) proved to be particularly challenging for developing and emerging market economies, where governments have significant influence over domestic fuel prices and social safety nets tend to be poorly developed. This paper reviews how these countries have responded to the increase in international fuel prices in terms of the pass-through to domestic fuel prices, adjustments to fuel price and taxation regimes, and changes in fuel price subsidies.

Table 1. Change in International Fuel Prices, 2003-06[1]

	US$ per liter	Percent change
Crude oil prices	0.4	128.0
Gasoline	0.6	140.7
Kerosene	0.6	126.7
Diesel	0.6	142.1

1/Increase during end-2003 to June 2006. The crude oil price is the average spot prices for Dated Brent, WTI, and the Dubai Fateh. The prices for the other fuels are the average fob prices for Rotterdam, New York, Gulf Coast, Los Angeles and Singapore.

A key finding is that only half of the developing and emerging market countries in our sample appear to have fully passed-through the increase in international fuel prices over the past three years.[2] This has mainly reflected controls on retail prices and reductions in fuel taxes, and has resulted in increased explicit and implicit fuel price subsidies. In some cases, this has compounded fiscal difficulties. With respect to domestic fuel price reform, international experience has been mixed, but it suggests that a pragmatic approach of incorporating a phased increase in domestic prices to bring them to international levels is warranted. This would entail, at a minimum, ensuring that a robust retail fuel pricing mechanism is put in place, together with reforms aimed at protecting the poorest in the community.

II. ISSUES IN DOMESTIC FUEL PRICING

This section reports recent developments in the pass-through from international to domestic retail fuel prices (before and after domestic taxes), domestic pricing mechanisms for these fuels, and fuel price subsidies. The discussion is based mainly on the results of a survey of IMF economists assigned to work on 51 developing and emerging market economies. However, we also survey results on the pass-through in the G7 economies with calculations based on International Energy Agency (IEA) data.

[2] The countries included in the survey were: Afghanistan, Albania, Argentina, Armenia, Azerbaijan, Bangladesh, Bolivia, Bosnia and Herzegovina, Brazil, Cambodia, Cameroon, China, Colombia, Democratic Republic of the Congo, Republic of Congo, Dominica, Dominican Republic, Ecuador, Egypt, Ethiopia, Gabon, Georgia, Ghana, Honduras, Hungary, India, Indonesia, Jordan, Kenya, Kosovo, Kyrgyz Republic, Lao P.D.R., Lebanon, Malawi, Nigeria, Pakistan, Peru, Philippines, Russia, Senegal, Serbia, South Africa, Sri Lanka, Tanzania, Timor Leste, Turkey, Uganda, Ukraine, Uruguay, Yemen, and Zambia. The published source for the G7 economies is OECD/IEA *Energy Prices and Taxes*, various issues.

A. The Pass-Through of International Prices

In calculating the pass-through from international to domestic retail fuel prices, developments in net oil importing countries are distinguished from those in net oil exporting countries. In the case of oil importing countries, the pass-through was calculated with respect to the relevant regional fob price of gasoline, kerosene and diesel (i.e., Rotterdam, Singapore, U.S.) to reflect the extent to which domestic consumers pay the higher cost of imported petroleum products. For net oil exporting countries, the pass-through is calculated with respect to the world price of crude oil, which is proxied by the average of the spot prices for Dated Brent, West Texas Intermediate, and Dubai Fateh. This is to reflect the higher export parity price of domestically produced petroleum products (assuming that petroleum products are produced domestically). In both cases, the pass-through is defined as the ratio of absolute changes since December 2003 in the retail price of fuel and the local currency price of the relevant fuel import product. The calculations were made for the period end-December 2003 to the latest observation available in the first half of 2006, which was typically in the second quarter of the year. The following formula was applied:

$$\text{Pass - through} = \frac{(P_{Domestic,2006} - P_{Domestic,2003})}{(P_{world,2006} - P_{world,2003})}$$

where $P_{Domestic}$ and P_{World} are the domestic and world fuel prices, and 2003 and 2006 refer to the first and final month of the sample period, respectively; world prices are converted into local currency; and the pass-through ratios reflect both exchange rate and price changes.[3] On this basis, the pass-through appears to have been less than complete in half of the countries surveyed. In many countries in the sample, retail price setting for domestic fuels is not fully liberalized or determined by automatic price adjustment mechanisms (see below).
In addition, regulations were sometimes introduced that were aimed at reducing profit margins or transport costs to keep domestic prices from rising (e.g., the Republic of Congo). Finally, some countries sought to limit the impact of international price increases by reducing tax rates applied to retail sales.

The main developments with particular fuels were as follows:

- **Gasoline.** About 26 out of 44 countries fully or more than fully passed-on the increase in import prices for gasoline, with the average pass-through ratio for the sample being

[3] These pass-through calculations are subject to several important caveats. First, no allowance is made for transport, distribution and marketing costs, though these typically represent only a minor element (1–2 percent) of the total price. Second, it may be distorted by exchange rate changes; for example, an appreciation of a country's exchange rate against the U.S. dollar, if not reflected in a corresponding fall in the domestic price of imports, could overstate the price pass-through. Finally, in practice, most oil is traded under contract arrangements for which prices are less volatile than spot world prices, and which suggests that our calculation of the pass-through is somewhat overstated with respect to contract arrangements.

0.96 (Table 2, and Figure 1). The largest pass-through occurred in Turkey and the Dominican Republic, with increases in excise taxes explaining some of the increase for Turkey. In general, the pass-through was lower in net oil exporting countries (averaging 0.46) than in net oil importing countries (averaging 1.09); the smallest pass-through took place in Lebanon, Bangladesh, Argentina, Egypt and Azerbaijan, where retail fuel prices were either decreased or only slightly increased from 2003. Finally, in the case of the G7 countries, IEA data suggest that the average pass-through during 2003–06 was only slightly lower than the average for the G7 (1.05), but markedly higher than that for United States (0.89), suggesting that there may be lags even in countries where fuel pricing is fully liberalized.[4]

Table 2. The Average Price Pass-Through, 2003-06 [1]

	Gasoline	Kerosene	Diesel
Net oil importers	1.09	0.91	1.15
Net oil exporters	0.46	0.43	0.70
AFR	1.06	1.07	1.11
APD	1.05	0.37	0.83
EUR	1.25	...	1.54
MCD	0.56	0.78	0.78
WHD	1.00	0.92	1.30
G-7 countries	1.11		
of which : USA	0.89		
Average [2]	0.96	0.83	1.07
Countries in sample [2]	44	29	39

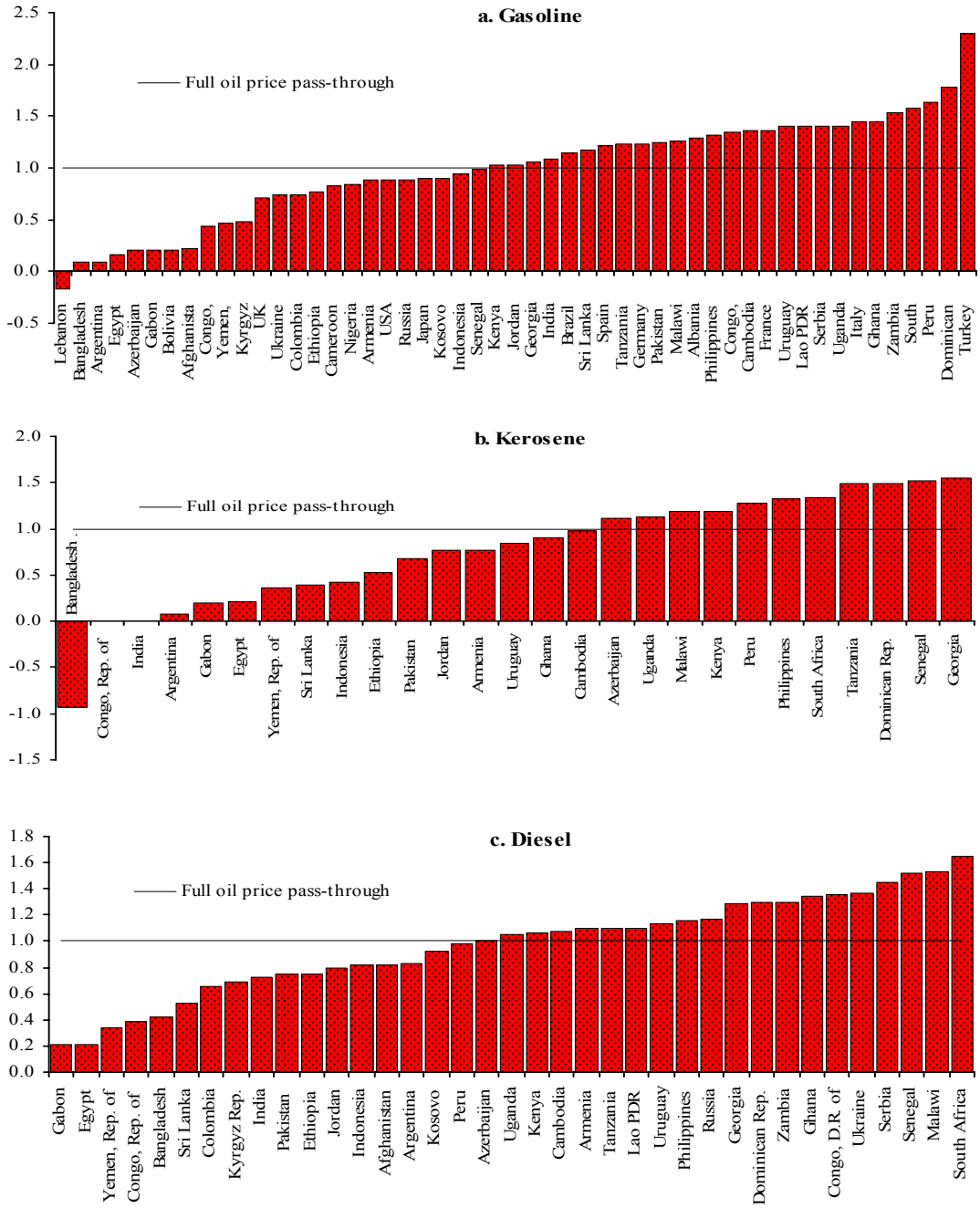
1/ Post-tax retail prices; latest observation for the first half of 2006.
A number lower than one indicates less than full pass-through.
2/ Excluding G7 countries.

- **Diesel and kerosene**. The survey for diesel and kerosene covered a smaller sample of countries, 39 in the case of diesel and 29 for kerosene. About half of the countries fully passed on the increase in diesel and kerosene prices. In these cases, the pass-through through mid-2006 appears to have been smaller for kerosene, with the ratio averaging 0.83. While this is relatively low, it represents a higher pass-through than what took place in 2005, when only three countries—Kenya, South Africa and the Democratic Republic of the Congo—fully adjusted to higher international kerosene prices. Still, as of mid-2006, India and the Republic of Congo had kept kerosene prices frozen since 2003. The limited price pass-through for these fuels probably reflects their relative importance

[4] The pass-through for the G7 countries was calculated using IEA data available for June 2006. Other data sources, however, indicate a somewhat higher pass-through in the United States. Data from the United States Energy Information Agency suggest a pass-through ratio closer to one for this period. The pass-through coefficient also varies with the time period studied.

in the consumption basket of poor households and a desire to limit increases in transport and industrial costs.

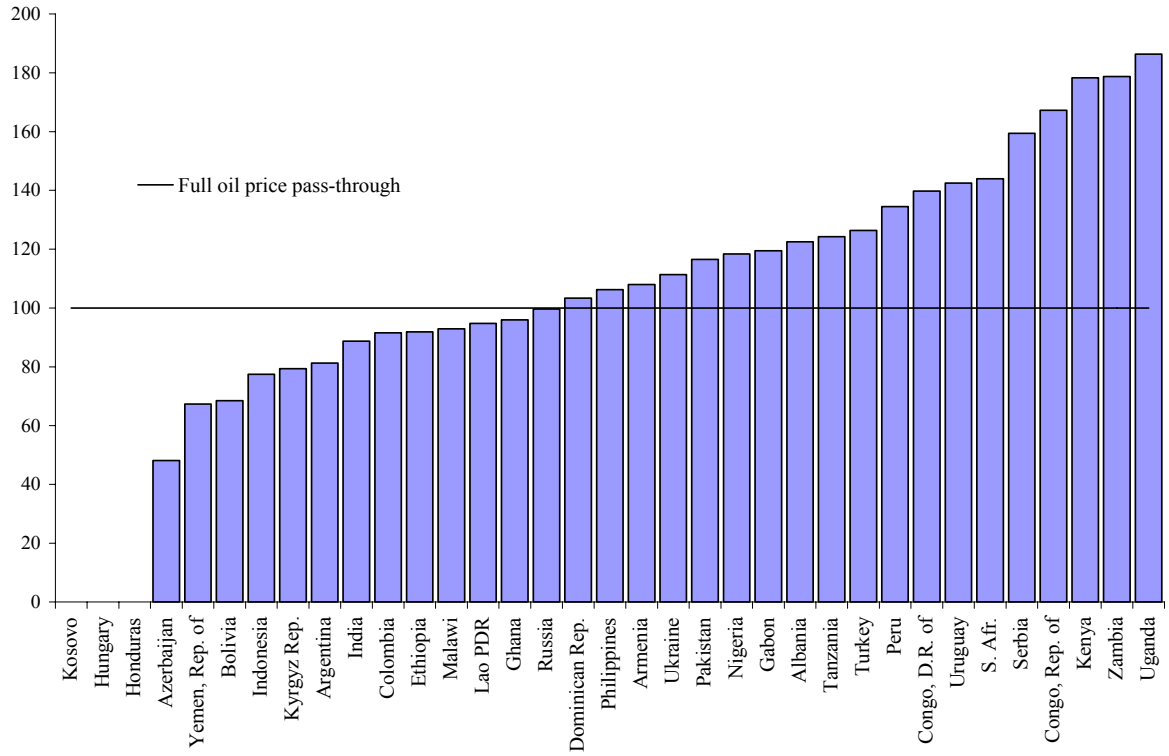
Figure 1. Oil Price Pass-Through For Domestic Fuels[1]



1/ Post-tax retail prices. The pass-through is calculated as the relative change in the retail price of domestic fuels and local currency price of oil imports since end-2003.

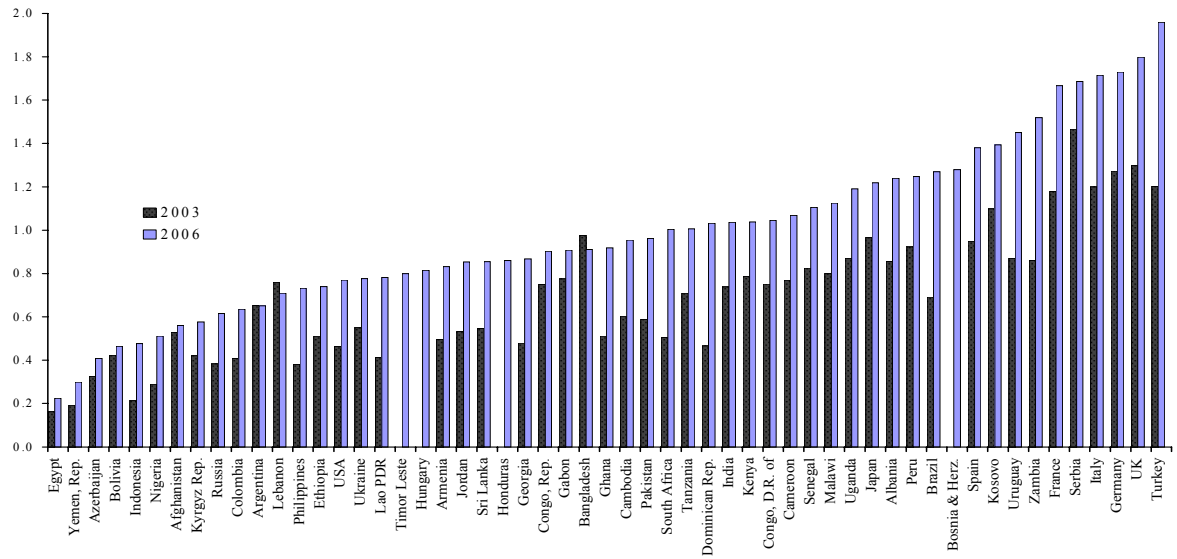
The price pass-through was generally lower for pre-tax fuel prices, implying that many countries changed fuel taxation (Figure 2). In the case of gasoline, for example, a full pass-through for pre-tax fuel prices occurred in 16 out of 35 countries for which data was available.

Figure 2. Pre-Tax Oil Price Pass-Through



Notwithstanding recent increases in domestic fuel prices in most countries, there are still large differences in retail fuel prices across countries (Figure 3). Thus, in the first half of 2006, retail gasoline prices ranged from US$0.22 a liter in Egypt to US$1.96 a liter in Turkey, and the dispersion of prices (measured by their standard deviation in a particular year) doubled over the period, from 0.26 to 0.5, reflecting different degrees of pass-through and tax regimes across countries. In addition, retail fuel prices in many countries remain well below international levels, notwithstanding large ad hoc increases (e.g., Yemen and Indonesia), reflecting the fact that the increases were from a very low base compared to international price levels. In general, retail prices of domestic fuels remain much lower in oil producing countries than in countries that are net oil importers.

Figure 3. Gasoline Prices, 2003 and 2006
(US$ a liter)



B. Setting Prices

Domestic petroleum product prices can be set by the market or by the government, on either an ad hoc basis or according to a formula. In the countries surveyed, there is evidence that ad hoc regimes, especially where automatic price formulas were suspended, are prone to prices that imply subsidization. Prices were found to be liberalized in 15 out of 44 countries for which information was available (Table 3). However, while there were no explicit regulations affecting prices in these countries, governments may, nonetheless, have been able to influence them through moral suasion, particularly in countries where there was a large state enterprise (e.g., Bolivia and the Republic of Congo).

Table 3. Gasoline Pricing Mechanisms Prices and Price Pass-Through

Pricing mechanism	Number of countries	Average price (US$ per liter)		Price pass-through
		2003	2006	
Ad hoc	21	0.61	0.98	0.83
Automatic	8	0.56	0.84	1.00
Liberalized	15	0.70	1.03	1.13

Means other than regulations were also used to limit increases in retail fuel prices in some countries. For example, in Argentina there are no direct price controls but fuel prices remained broadly unchanged reflecting informal price agreements with private companies, backed by taxes on fuel exports to divert supply to the domestic market. The pass-through could also be limited by lowering fuel taxes or cutting refinery margins.

A further eight countries have regulations establishing an automatic adjustment mechanism, and the remaining countries set prices on an ad hoc basis. Except for Asia, oil importers more typically had liberalized prices than oil producers and exporters. Of the nine Asian countries in the sample, all but one country was a net oil importer and only two of these, Cambodia and the Philippines, had liberalized price regimes. The sole net oil exporter, Timor Leste, also had a liberalized price regime.

Liberalized fuel pricing mechanisms were associated with the highest level of retail fuel prices and price pass-through. In 2006, average retail fuel prices in these countries were about 20 percent higher than in countries that adjusted prices with an automatic mechanism. By contrast, in several cases, ad hoc adjustments translated into prolonged price freezes, for example, Indonesia from end-2002 to March 2005, Egypt until April 2006, and Ecuador where retail fuel prices have been frozen since mid-2003. Automatic adjustment mechanisms were suspended in seven countries, mainly to limit increases in retail prices. In contrast, Ghana moved from ad hoc price adjustments to an automatic mechanism and Turkey adopted a fully liberalized pricing regime. There were no examples of countries suspending liberalized price regimes in favor of ad hoc adjustments, perhaps supporting the idea that these are the most sustainable regimes.

C. Domestic Petroleum Product Subsidies

Petroleum product price subsidies can entail significant fiscal and social costs that often are poorly understood. When oil-exporting countries do not adjust domestic petroleum product prices to reflect higher world prices, there is an implicit subsidy as the "windfall" from the higher oil prices is passed on directly to domestic consumers. The initial cost of implicit subsidies is typically assumed by the national oil company without explicit compensation through the budget. The size of these subsidies is often not well known, despite the fact that it is often large. For example, Gupta and others (2003) found that the average domestic fuel subsidy in major oil-exporting countries in 1999 (when international crude oil prices were around US$18 a barrel) was 3½ percent of GDP. When oil-importing countries do not adjust petroleum product prices, there is usually a direct fiscal cost, although subsidies may also be quasi-fiscal, for example, when refinery and distribution margins of national companies are squeezed.

Petroleum subsidies tend to be inefficient in part because they are poorly targeted. The higher the household income, the higher the subsidy, because higher-income households consume larger quantities of petroleum products and thus benefit relatively more from subsidies. A study by the World Bank (2006) estimated that in Venezuela in the early 1990s, the richest 20 percent of the population received six times more in fuel subsidy per person than the poorest third of the population. By distorting price signals, subsidies distort the allocation of resources and may lead to wasteful consumption and investment choices that do not reflect relative scarcities.

Subsidies may also encourage rent-seeking and smuggling. Smuggling is typically carried out by those with substantial financial means or political power, thus aggravating the pro-rich bias of fuel subsidies.

Several countries have responded to the increase in world oil prices by increasing *explicit* and *implicit* price subsidies on domestic fuels (Table 4). Explicit subsidies mainly reflect compensation to the national energy company for the increased difference between the wholesale domestic price and the world price of fuels. Estimates of such subsidies (at different levels of government) were available in sixteen cases, and they range from 0.1 percent (Lebanon) to 8.5 percent (Yemen) of GDP in 2006, and to average 1.5 percent of GDP (smaller than the 2 percent registered in 2005). Not surprisingly, explicit subsidies generally were larger in countries where the price pass-through was smallest or delayed. Examples include:

Table 4. Fuel Subsidies

(In percent of GDP)

	2003	Est. 2005	Proj. 2006
(a) Explicit subsidies			
Argentina	0.0	0.2	0.2
Azerbaijan	5.1	2.8	1.9
Bolivia	0.6	0.8	1.3
Cameroon	0.0	0.2	0.3
Congo, Republic of	0.8	1.0	1.0
Dominican Republic	...	0.5	0.4
Ghana	0.2	0.9	0.7
Honduras	...	...	0.6
Indonesia	1.5	4.2	2.0
Jordan	0.0	5.8	1.2
Lebanon	...	0.1	0.1
Nigeria	0.0	0.0	1.0
Pakistan	0.1	0.2	...
Senegal	...	0.6	0.8
Sri Lanka	...	0.8	...
Yemen, Republic of	5.0	9.2	8.5
(b) Implicit subsidies			
Armenia	0.0	0.0	1.0
Azerbaijan	10.0	13.9	10.4
Bangladesh	...	1.0	...
Bolivia	1.7	5.2	6.6
Cameroon	0.1	0.0	
Colombia	1.2	1.6	
Congo, Republic of	...	...	…
Dominican Republic	...	0.2	0.3
Ecuador	1.4	3.6	...
Egypt	3.9	4.1	6.2
Ethiopia	...	0.7	
Gabon	0.4	1.6	2.8
Nigeria	1.6	2.2	...
Sri Lanka	...	1.0	...

Source: IMF staff estimates using authorities' data.

- **Jordan**. Oil subsidies were twice as large as budgeted in 2005, despite the two retail price increases in 2005. Jordan previously received oil from Iraq at below world market prices but now has to import at the world price.

- **Yemen**. A reduction in fuel subsidies is part of the government's economic strategy, but price increases in 2005 were scaled back following violent public protests. The level of fuel subsidies projected for 2006 is greater than Yemen's budgeted health expenditures.

- **Indonesia**. The low initial level of retail fuel prices has meant that the share of government subsidies doubled from 2003 to 2005, despite a doubling of average fuel prices in 2005. The estimated subsidy of 3.4 percent of GDP in 2005 was higher than budgeted expenditures for health and education. For 2006, while fuel subsidies were

lowered to 2 percent of GDP, electricity subsidies doubled as tariffs were not adjusted in line with the fuel price increase.

Implicit subsidies are much harder to measure and often are not reported. They include costs borne by public entities such as oil producing companies that are not typically reported in the budget; tax expenditures, such as tax exemptions for oil products; and the difference between retail prices and import parity prices. Estimates were available for six countries for 2006 and range from 0.3 percent (the Dominican Republic) to 10.4 percent of GDP (Azerbaijan), and average 3.9 percent of GDP (higher than the 3 percent observed in 2005). The largest increase in implicit subsidies in the period took place in Bolivia, where the increase was threefold.

Some countries provide both explicit and implicit fuel subsidies. These include Azerbaijan, where combined subsidies were projected to reach 12.3 percent of GDP in 2006; and Bolivia, where combined subsidies were 7.9 percent of GDP. The low oil price pass-through for oil producers in our sample indicates that many of them also provide implicit price subsidies, though such data were not reported for all countries in the survey.

In spite of recent increases in domestic retail prices in many countries, there were no clear examples of explicit or implicit subsidies having been reduced between 2003–06. One exception is Azerbaijan, which is estimated to have shown lower budgeted subsidies in 2006, achieved by restricting budgeted transfers to the national oil company. As this action is being taken in the context of a freeze on retail fuel prices, the subsidies would simply be moved off-budget, to be borne by the national oil company.

III. Reducing Petroleum Product Subsidies[5]

In this section, we provide some practical options for reducing fiscal subsidies for petroleum product prices associated with the rise in international oil prices. A review of international experience suggests that a strategy to reduce domestic petroleum product price subsidies is most likely to succeed if it involves a combination of:

- Liberalizing domestic petroleum product prices, or instituting a robust automatic adjustment formula.
- Combining price increases with a well-publicized package of targeted measures to mitigate the impact on the poor, with at least some measures having immediate impact.
- Making transparent and publicizing the costs and beneficiaries of the present system of subsidies.

[5] This section draws on the more detailed and comprehensive work by Gupta and others (2000). Tax issues are not discussed.

- Identifying priority public expenditures that are better targeted to poor and middle class constituencies and could be financed with budgetary savings from reducing fuel subsidies.

- Getting the timing and size of price increases right.

A. Setting Prices

The most robust pricing mechanism to avoid a resurgence of subsidies is to keep prices liberalized or otherwise to make suppliers compete for the market in a context of supporting institutional arrangements. However, while the survey results reported in Section I suggest that no country that had a liberalized fuel pricing system subsequently abandoned it, moving to price liberalization requires substantial preparation. For example, in some countries, refineries have been established under concession conventions, which may make it difficult to liberalize the market before their expiration.

In countries where the market for petroleum products is dominated by the public sector, price liberalization would require privatization of suppliers or commercialization and liberalization of import and distribution activities. It is thus important to strengthen the regulatory framework, including the capacity to detect and discourage anti-competitive behavior. A case in point is Jordan, which has adopted a gradual strategy to liberalize petroleum products, comprising: (i) increasing administratively set fuel prices until they reach international parity (for social reasons, fuel oil, kerosene, and LPG will be the last products to reach parity); (ii) establishing an automatic mechanism for adjusting domestic fuel prices in line with developments in international market prices; and (iii) liberalizing the market for petroleum products, ending refinery concession, and liberalizing imports and domestic distribution.

In many countries, there are significant political difficulties associated with efforts to liberalize prices. In such cases, setting prices administratively might be the option to follow. The adjustment mechanism will be more robust if it uses an appropriate benchmark and degree of smoothing. For both petroleum product importing and exporting countries, domestic prices should generally be based on border (either import or export) parity. For importers, this would be the cost, insurance and freight import market price, to which local taxes, fees, and margins are added.[6] For exporters, this would be the market export price (i.e., the price at which domestic crude oil or petroleum products could be sold competitively to neighboring markets).

[6] Pakistan and South Africa publish the price structure of petroleum products on government websites. In Lebanon, to keep retail prices fixed, excises are adjusted on a weekly basis. In Bangladesh, to keep retail prices at low levels, the tax base for petroleum products is set at about half of the market price for imported crude and refined petroleum products. In China, part of the impact of increases in international prices for crude oil is borne by refineries, though they offset these losses with profits on upstream and export activities, and the government has recently announced compensation.

Bingham, Daniel and Federico (2001), simulating fiscal costs based on historical price variations, concluded that the most effective smoothing rules—and those that strike an appropriate balance between retail price smoothing and fiscal risk—are short moving-average rules (three-month, or possibly six), and/or a max-min rule with automatic updating of the max-min price band (Box 1).

Box 1: Country Experience in Setting Regulated Prices

Price adjustments under automatic adjustment formulae have generally taken the following forms:

- **Moving average.** In Dominica, the retail price is reviewed every month on the basis of a four-week moving average of import market prices.
- **Caps**. In Sri Lanka, the pricing adjustment formula was adopted in 2003. This mechanism was suspended in early 2004, capping price increases and decreases at SLRS2 (about 2 U.S. cents) per month.
- **Triggers**. Under Gabon's (suspended) price adjustment mechanism, the ex-refinery price (and therefore the retail price) was to be changed whenever the administered import price deviated from the import market price by more than 4 percent. Bolivia used to maintain an asymmetric trigger of 5 percent for upward adjustments and 20 percent for downward adjustments.
- **Price bands**. Under a max-min rule, a ceiling and floor are placed on the level of the import price or ex-refinery price. Chile and Peru have a price stabilization scheme under which ex-refinery prices are updated on a regular basis. If the ex-refinery price is above the ceiling, the government pays the difference to refineries by withdrawing from a stabilization fund. If the price falls below the floor, refineries pay to the fund. During 1998–2004, Turkey had an automatic mechanism involving a small band, frequent price adjustments, and a smoothing mechanism, by which the ex-refinery price was adjusted if the average market price (using a mix of five-day and seven-day averaging) was beyond a 3 percent band (1.5 percent above or below the existing price).

B. Protecting the Poor

One of the main reasons why governments are reluctant to pass on higher petroleum prices is the adverse effect such price increases will have on the real incomes of poor households. Petroleum subsidy reform programs should thus identify the impact on poor households and, if necessary, take mitigating measures.

Identifying real income effects

Higher domestic prices for petroleum products will affect household real incomes through two channels. First, there is a direct effect from an increase in the prices paid by households for consumption of petroleum products (e.g., kerosene for lighting or gasoline for private transport), and second, there is an indirect effect from increases in prices of other goods and services (e.g., higher prices for food, transportation and electricity consumption) consumed by households as producers pass on the higher costs of fuel inputs.

The IMF's Poverty and Social Impact Analysis (PSIA) unit has analyzed the distributional impact of planned fuel price increases for a number of countries (see Coady and others 2006). The main results are:

- The total (direct plus indirect) impact of increasing prices to levels implied by automatic formulae on household real incomes was large, ranging from 1–9 percent for average price increases of 31–68 percent. On average, a 50 percent increase in domestic prices resulted in a 5 percent decrease in household real incomes. The pricing formulae considered included a substantial degree of taxation, especially in the case of gasoline. In most of the countries, actual gasoline prices were already 28–60 percent above international parity, whereas diesel and kerosene prices were only 60–87 percent and 53-88 percent of international parity, respectively.

- The indirect effect is typically larger than the direct, as a substantial portion of gasoline, diesel and other fuel oils are used in the production and distribution of goods and services. Most of the indirect effect arises from the pass-through of higher fuel prices to food and transportation costs for households.

- The distribution of the overall effect tends to be slightly regressive (the percentage decrease in real income is higher for lower income households). The direct effect tends to be neutral or regressive, typically reflecting the increase in the price of kerosene, which tends to account for a higher share of total consumption among lower income households. The distribution of the indirect effect tends to vary from being slightly regressive to slightly progressive.

- Much of the fuel subsidies go to higher-income households. The top 20 percent of households received, on average, about 42 percent of the total subsidy, whereas the bottom 20 percent received less than 10 percent. Fuel subsidies are a costly approach to protecting the real incomes of poor households.

- Even kerosene subsidies, which are typically seen as being pro-poor, are not well targeted. The percentage of kerosene subsidies received by the top 60 percent of households always exceeded 57 percent. However, kerosene subsidies are likely to be more progressive in low-income countries and where the poor's access to electricity is limited.

Identifying mitigating measures

As most fuel subsidies accrue to higher income households, it should be possible to eliminate or substantially reduce subsidies, use some of the budgetary savings to finance better targeted-programs to compensate the poorest households, and still have funds left over (Box 2). For example, simple geographic targeting, which concentrates extra social expenditures on households living in the poorest areas, can result in a much higher proportion of the expenditures reaching poor households. But this may exclude poor households living in other areas. Since poverty rates in these excluded areas are lower, reducing undercoverage without leakage requires finer targeting methods, such as means

Box 2. Mitigating Measures—Country Experience

Ghana, Indonesia and Jordan all recently raised petroleum product price. The key mitigating measures they took to protect the poor were:

Ghana

- Fees for attending primary and junior-secondary school were eliminated.
- Extra funds were made available for primary health care programs concentrated in the poorest areas through the existing Community Health Compound Scheme.
- Investment in the provision of mass urban transport was expanded and expedited.
- Extra funds were made available to expand a rural electrification scheme.

Indonesia

- An unprecedented cash transfer program to 16 million poor families was implemented. Under the program, each family receives Rp.300,000 (about US$30) every three months. The full annual cost of the program is estimated at nearly 0.7 percent of GDP. The identification of poor households is based on an existing approach used by the Central Statistics Bureau, which calculates a "proxy-means score" for potentially poor households based on observable household socio-economic characteristics. Beneficiary cards and receipt coupons are printed and delivered by the post office. Eligible households with access to a post office collect their cash quarterly on designated days. Those in remote areas without such access receive cash in their village.
- Some budgetary savings from reducing subsidies were reallocated to existing education, health and infrastructure programs that disproportionately benefit low- and middle-income households.
- Initially, the subsidy on kerosene was not substantially reduced, and its price remained at two-thirds of the world price. However, subsequent to the implementation of the transfer program, the kerosene subsidy has been substantially reduced.

Jordan

- The minimum wage was increased, as were the salaries of low-paid government employees.
- A one-time bonus was given to low-income government employees and pensioners.
- An electricity lifeline tariff was maintained at current low levels—electricity access is almost universal.
- Cash transfers were provided to other low income households.
- The government announced a plan to increase funding to the National Aid Fund as part of a program to improve the design and implementation of this national safety net program with World Bank assistance.

testing (eligibility based on income or on a predicted income based on household socio-economic characteristics) or community targeting (eligibility determined by community actors, such as teachers or community leaders, who have knowledge of households' economic welfare).

Where a social safety net already exists, some of the budgetary savings can be used to expand programs, (e.g., expanding eligibility for cash or ration card transfers as well as increasing their value). Although cash transfers give households more flexibility over their consumption patterns, governments often prefer to use in-kind fuel transfers. The choice between these may be driven by political more than economic considerations, but the administrative costs of in-kind transfers is probably relatively high, due to additional logistical requirements.

In many cases, it may take time to develop an effective safety net program. However, it should be possible to undertake immediate expenditure measures to protect the poorest households from the adverse effects of price hikes. For example, user charges for education and health services can be reduced or eliminated in the poorest rural and urban areas.

Public works programs can also be temporarily expanded. Such programs not only protect household real incomes, but can contribute to expanding the social and physical asset base of poor households. Extra funds (in cash or kind) may be provided for informal social assistance programs delivered through an existing network of community, religious, or NGO bodies. The particular approach used will depend on the specific characteristics of each country, especially the nature of social institutions. The approach to mitigation should also depend on the size of the income loss. For example, if this is small, it would not be desirable to incur significant fixed costs of setting up new programs.

Given that electricity is an important source of energy for some poor households and its cost is closely correlated with fuel prices when generated using oil, reforming the level and structure of electricity prices can help mitigate the effect of higher average tariffs on poorer households with access to electricity. For example, many countries charge or mandate a lower residential "lifeline tariff" for electricity consumption below a certain "lifeline limit." Although the potential for such reforms to benefit the poor is limited when the poor lack access to electricity, the middle class can benefit substantially from these reforms.

Without better targeted expenditures, the best strategy may be to eliminate subsidies gradually, while simultaneously enhancing the government's capacity to target expenditures. However, there is an obvious trade-off in terms of lower budgetary savings. This trade-off can be reduced by decreasing the subsidies on some products more gradually than others. For example, one might maintain kerosene subsidies for a year or two while reducing other subsidies. This could give time to develop better targeted expenditure programs, but such price differentials between petroleum products should not be maintained over the medium term as the products are substitutes and even kerosene is mainly consumed by the better off.[7] Removing subsidies on kerosene could also help end rationing and supply shortages.

Budgetary savings can also be used to expand access to and quality of social and infrastructure services. Savings could be used to expand access to education and health services, the rural road network and mass urban transport, or access to electricity in rural areas.

[7] In particular, kerosene is a close substitute for diesel. The World Bank (2006) estimates that half of the subsidized kerosene in India is used in the automotive sector. Switching from gasoline to diesel takes more time, but as the experience of South Asia indicates, subsidizing diesel relative to gasoline leads to heavy consumption of diesel by all forms of transport (which also worsens pollution).

Those households that already have access to these services can benefit from investments that improve quality. These expenditures can be expected to benefit middle class as well as poor households, which can help generate crucial political support for energy pricing reforms. In addition, investments in transport and energy sectors can contribute to improving energy efficiency and thus reduce the vulnerability to oil price shocks.

C. Building the Political Support

Raising petroleum prices tends to be politically costly, with a number of countries suffering civil disorder, protests, and strikes in recent months. In Yemen, the July 2005 price increase sparked widespread protests, leaving 22 people dead and hundreds injured. With the current high international oil prices, even seemingly robust pricing mechanisms have come under pressure and were suspended or cancelled. In other countries, taxes were greatly reduced. Pakistan's well-functioning fortnightly price adjustment mechanism, in place for several years, was suspended in May 2004 in the face of rising oil prices, first by a reduction in petroleum levies and then by outright budgetary subsidies.

Experience suggests that if the public trusts the government to use the savings from reducing fuel subsidies responsibly, they are less likely to oppose the price increases (see Esfahani, 2002). Thus, fuel subsidy reforms should be viewed in the context of strengthening governance, institutions, and transparency.

Building up trust and institutions however takes time. What can a government do more immediately to garner political support to reduce petroleum price subsidies? In addition to protecting the poor, the answer seems to lie in a comprehensive package that includes:

- Transparency;
- Educating and consulting the public (especially the often vocal middle class);
- Using the savings well;
- Depoliticizing petroleum prices;
- Getting the timing right; and
- Obtaining regional buy-in, when revenues are shared.

Transparency

Sound public financial management practices that help identify the explicit and implicit subsidies are a vital component of strategies to increase transparency. Removal of subsidies may have a better chance of success if expenditure management systems are in place to carry out targeted compensation schemes. Moreover, unless the costs and beneficiaries can be clearly seen, political support for reform will likely be weak. Depending on the institutional

structure, subsidies and taxes—both implicit and explicit—often coexist. This calls for bringing the subsidy on budget and making it complete for funding, like other government expenditures.

Transparency is especially important for oil exporters where the subsidy is typically implicit, in that the cost is the revenue forgone by not charging international prices domestically. While oil-importing countries have to pay for the difference between domestic and international prices, this cost may be off-budget. For example, with prices well below cost recovery, the Bangladesh Petroleum Corporation is forced by the government to incur losses and borrow from state banks to continue its refining operations. In Pakistan, by contrast, when prices are below cost recovery, the corresponding transfers to oil marketing companies are transparently reported in the budget reports. In fact, such figures were used by the policy makers in justifying the large price increases in 2005.

Public awareness

The public should be made aware of the costs and implications of the current system and the benefits of reform. Countries preparing or updating a PRSP can usefully engage the public in such discussions. Generally, governments could also highlight that subsidized prices promote smuggling, shortages, black market activity, and corruption.

It will also be important to convince the public that the compensation programs will remain in place for an extended period, regardless of the government in power. Some governments have aimed at allaying public discontent by linking price increases with other reform initiatives, for example, the government of Pakistan announced a series of energy conservation measures (including restrictions on government travel) during the latest round of price increases.

Use of savings

Assuring the public that the savings will be used well and embedding the subsidy reform within a broad reform package should help the reform's success. While raising petrol prices by itself will make all consumers worse off, explaining how the savings will be used may reduce political fallout. For example, the Indonesian government ran a campaign during the summer of 2005, which directly linked the savings from petroleum price increases to a cash compensation program for the poor.

Depoliticizing petroleum prices

In regulated environments, consumers tend to see domestic prices as under the government's control and so blame the government for every increase in spite of international price developments. Depoliticizing is most cleanly and robustly achieved by liberalizing the system, but transparent and automatic price setting mechanisms can also substantially depoliticize domestic price setting.

In South Africa, the product pricing formula and the time series of prices and quantities sold are available online on a public website. Petroleum taxes have amounted to about 1-2 percent of GDP in recent years, and public debate of fiscal policy has been virtually divorced from tinkering with this significant source of budgetary resource. In Ghana, the government established the National Petroleum Authority in May 2005 to monitor the implementation of the pricing mechanism and limit a perception of government interference with petroleum pricing. Given that suspending such mechanisms can be costly both economically and politically, relevant institutions should be strengthened to minimize the likelihood of a policy reversal.

Timing

Abrupt large price increases may not be feasible, or desirable. A gradual, pre-determined, approach to phasing out subsidies could allow time to build up political support, design the new system and protective measures, and get the public used to the idea of petrol prices changing frequently. Such a gradual reform does, however, imply higher fiscal costs, could be reversed at any stage, and needs to be weighed within the overall macro-fiscal context.

The post-election period often offers a useful window for governments to push through tough policy measures, as do periods of economic strength. For example, the newly-elected government in Ghana in early 2005 felt emboldened to implement a new pricing regime, after two years of frozen prices. The new government strengthened its credibility by hosting extensive public discussions on the pricing issue. As a result, the large price increase, implemented within three months after the government came to power, caused little surprise or protest.

Regional buy-in

In oil-exporting countries, petroleum revenue is often shared regionally. This means that the (implicit) subsidy of low domestic prices is borne by different levels of government, depending on the country's fiscal federalism structure. In countries with revenue-sharing, in the absence of special arrangements, removing implicit subsidies could increase the resources transferred to some regions, which may help the political economy of reform.

In Nigeria, for example, the domestic pricing scheme entails an implicit subsidy, and the government is considering incorporating estimates of the subsidy in its budget reports. Given that half of the implicit subsidy is effectively paid by the states, more transparent reporting of the subsidy could result in the state and local governments pushing for higher revenue transfers rather than across-the-board subsidies.

IV. CONCLUSION

This paper examines a large dataset to shed light on petroleum pricing and subsidy practices around the world. With world oil prices at high levels, this issue remains a major source of

fiscal and overall policy concern for most countries. The data show that only half the sample countries managed to implement a full domestic pass-through of international price changes through the middle of 2006, underscoring the associated difficulties.

The paper suggests a pragmatic approach to dealing with petroleum product pricing. In times of increases of international prices, a package that includes liberalizing the setting of domestic petroleum product prices, or institutes a robust automatic adjustment formula, and combines price increases with a well-publicized package of targeted measures to mitigate the impact on the poor, of which at least some have immediate impact, would increase the likelihood of policy success. Additionally, the experiences and examples discussed in the paper indicate that implementing a transparent pricing framework, publicizing the costs and beneficiaries of the present system, using the savings well, and explaining their use to the public, are crucial ingredients in such an approach.

There is also a broader issue of whether the degree of pass-through depends on the level of international prices and their speed of increase. As world prices declined in late 2006 and early 2007, countries were faced with a situation where fuel-related taxes and levies (if kept unchanged) led a revenue windfall or substantially reduced subsidies. As such, governments that did not adjust downward the administered prices could be seen as somehow smoothing the fluctuations in world prices. From the point of view of fiscal stance, this could be seen as acting counter-cyclically relative to the oil price cycle. This issue and associated policy implications deserve further attention in future research.

REFERENCES

Bingham, Benedict, James Daniel, and Giulio Federico, 2001, "Domestic Petroleum Price Smoothing in Developing and Transition Countries," IMF Working Paper 01/75 (Washington: International Monetary Fund).

Coady, David, Moataz El-Said, Robert Gillingham, Kangni Kpodar, Paulo Medas, and David Newhouse, 2006, "The Magnitude and Distribution of Fuel Subsidies: Evidence from Bolivia, Ghana, Jordan, Mali, and Sri Lanka," IMF Working Paper 06/247 (Washington: International Monetary Fund).

____, Margaret Grosh, and John Hoddinott, 2004, *Targeting of Transfers in Developing Countries: Review of Lessons and Experience*, The World Bank and the International Food Policy Research Institute.

Esfahani, Hadi, 2002, "A Political Economy Model of Resource Pricing with Evidence from the Fuel Market," Department of Economics, University of Illinois at Urbana-Champaign, *Mimeograph*.

Gupta, Sanjeev, Benedict Clements, Kevin Fletcher and Gabriela Inchauste, 2003, "Issues in Domestic Petroleum Pricing in Oil-Producing Countries," in *Fiscal Policy Formulation and Implementation in Oil-Producing Countries*, editors Jeffrey M. Davis, Rolando Ossowski, and Annalisa Fedelino (Washington: International Monetary Fund).

____, Marijn Verhoeven, Robert Gillingham, Christian Schiller, Ali Mansoor, Juan Pablo Cordoba, 2000, "Equity and Efficiency in the Reform of Price Subsidies: A Guide for Policymakers," *IMF Pamphlet*.

Published: August 21, 2003 *IMF Working Paper 02/140*.

World Bank, 2006, *Coping with Higher Fuel Prices,* Energy Sector Management Assistance Program Report No. 323/06 (Washington).

Attachment 1: Key Data

	Country	Net oil exporter (X)/ importer (M)	Retail fuel price mechanism	Post-tax retail fuel price (US$ per liter) 2006 1/			Price pass-through 2003 - mid2006			Tax as a percent of gasoline retail prices (2006)
				Gasoline	Kerosene	Diesel	Gasoline	Kerosene	Diesel	
1	Cameroon	M	Ad hoc	1.07	0.68	1.00	0.83	...	...	...
2	Congo, D.R. of	X	Ad hoc	1.05	1.04	1.04	1.34	1.57	1.35	14.9
3	Congo, Republic o	X	Ad hoc	0.90	0.50	0.64	0.43	0.00	0.39	20.4
4	Ethiopia	M	Ad hoc	0.74	0.39	0.54	0.77	0.53	0.75	35.0
5	Gabon	X	Ad hoc	0.91	0.48	0.71	0.21	0.20	0.21	43.2
6	Ghana	M	Automatic	0.92	0.69	0.83	1.45	0.90	1.35	47.5
7	Kenya	M	Liberalized	1.04	0.74	0.90	1.03	1.20	1.06	26.6
8	Malawi	M	Ad hoc	1.13	0.92	1.14	1.26	1.19	1.53	56.8
9	Nigeria	X	Ad hoc	0.51	...	...	0.84	...	...	0.0
10	Senegal	M	Automatic	1.10	0.75	1.00	0.98	1.53	1.53	...
11	South Africa	M	Automatic	1.00	0.71	0.94	1.58	1.34	1.65	28.0
12	Tanzania	M	Liberalized	1.01	0.88	0.96	1.23	1.49	1.10	38.0
13	Uganda	M	Liberalized	1.19	0.92	1.03	1.41	1.13	1.05	33.1
14	Zambia	M	Ad hoc	1.52	1.12	1.31	1.53	1.79	1.30	41.0
15	Bangladesh	M	Ad hoc	0.91	0.65	0.65	0.09	-0.93	0.43	...
16	Cambodia	M	Liberalized	0.96	0.68	0.75	1.36	0.98	1.08	24.9
17	China	M	Ad hoc	...	...	...	...	...	...	...
18	India	M	Ad hoc	1.04	0.20	0.71	1.08	0.00	0.72	55.1
19	Indonesia	M	Ad hoc	0.48	0.21	0.46	0.95	0.42	0.82	15.0
20	Lao PDR	M	Automatic	0.78	...	0.68	1.41	...	1.10	33.3
21	Philippines	M	Liberalized	0.73	0.70	0.66	1.32	1.33	1.16	25.9
22	Sri Lanka	M	Ad hoc	0.85	0.37	0.49	1.17	0.39	0.52	...
23	Timor Leste	X	Liberalized	0.80	...	...	...	...	...	...
24	Albania	M	Liberalized	1.24	...	...	1.28	...	...	50.4
25	Bosnia & Herz.	M	Liberalized	1.28	...	1.29	...	...	...	...
26	Hungary	M	Liberalized	0.82	...	0.78	...	...	...	
27	Kosovo	M	Liberalized	1.39	...	1.39	0.90	...	0.93	
28	Russia	X	Liberalized	0.62	...	0.60	0.89	...	1.17	30.8
29	Serbia	M	Ad hoc	1.69	...	1.44	1.41	...	1.45	50.5
30	Turkey	M	Liberalized	1.96	...	1.55	2.30	...	2.78	67.6
31	Ukraine	M	Ad hoc	0.78	...	0.72	0.74	...	1.37	31.3
32	Afghanistan	M	Ad hoc	0.56	...	0.54	0.23	...	0.82	...
33	Armenia	M	Liberalized	0.83	0.83	0.70	0.88	0.77	1.09	34.8
34	Azerbaijan	X	Ad hoc	0.41	0.41	0.41	0.20	1.11	1.01	49.6
35	Egypt	M	Ad hoc	0.22	0.13	0.13	0.17	0.21	0.21	...
36	Georgia	M	Liberalized	0.87	0.93	0.83	1.05	1.54	1.28	...
37	Jordan	M	Ad hoc	0.85	0.44	0.44	1.03	0.76	0.79	...
38	Kyrgyz Republic	M	Liberalized	0.58	...	0.48	0.48	...	0.69	30.8
39	Lebanon	M	Automatic	0.71	...	0.36	-0.17	...	...	...
40	Pakistan	M	Ad hoc	0.96	0.59	0.54	1.24	0.69	0.75	36.6
41	Yemen, Republic o	X	Ad hoc	0.30	0.17	0.17	0.47	0.36	0.34	3.6
42	Argentina	X	Liberalized	0.65	0.47	0.64	0.09	0.08	0.83	46.4
43	Bolivia	X	Ad hoc	0.46	0.34	...	0.21	...	...	36.4
44	Brazil	M	Liberalized	1.27	...	0.92	1.14	...	2.92	...
45	Colombia	X	Automatic	0.64	...	0.47	0.74	...	0.65	38.4
46	Dominica	M	Automatic	...	...	...	...	...	...	...
47	Dominican Republ	M	Liberalized	1.03	0.83	0.79	1.78	1.49	1.29	33.4
48	Ecuador	X	Ad hoc	...	...	...	...	...	...	...
49	Honduras	M	Ad hoc	3.33	2.27	...	...	...	...	...
50	Peru	M	Liberalized	1.25	0.91	0.85	1.64	1.28	0.99	42.0
51	Uruguay	M	Ad hoc	1.45	0.89	0.95	1.40	0.84	1.14	43.9

Source: FAD economists and India desk.

1/ Latest information available in Quarter 2 of 2006.

Attachment II. Domestic Petroleum Pricing Practices, 2005- May 2006

Country	Fuel pricing mechanism	Frequency of adjustment	Changes in the price mechanism during the last year If ad hoc, any recent price increases.
Cameroon	Ad hoc		Automatic mechanism suspended. Formula not used systematically.
Congo, D.R. of	Ad hoc		Formula not used systematically. Adjusted by 10 percent in 8 increments in 2005.
Congo, Republic of	Ad hoc		A June 2005 decree increased jet fuel prices
Ethiopia	Ad hoc		After suspending the automatic pricing mechanism in December 2004, prices were adjusted in May 2006, with further adjustments expected to bring domestic prices in line with international prices.
Gabon	Ad hoc		Automatic adjustment mechanism suspended since 2002.
Ghana	Automatic		February 2005: Introduction of a petroleum price adjustment mechanism, resulting in price increases in February, August and October.
Kenya	Liberalized		No changes in pricing mechanism
Malawi	Ad hoc		No, with price increases in June and August 2005.
Nigeria	Ad hoc		August 2005: increased retail prices by 25 percent.
Senegal	Automatic	Every thirty days	The automatic price adjustment mechanism was suspended for fuel oil used by the main public electricity company in during July-October 2005.
South Africa	Automatic	Monthly	No changes in pricing mechanism
Tanzania	Liberalized		No changes in pricing mechanism
Uganda	Liberalized		No changes in pricing mechanism
Zambia	Ad hoc		No changes in pricing mechanism
Bangladesh	Ad hoc		No changes in pricing mechanism
Cambodia	Liberalized		No changes in pricing mechanism
China	Ad hoc		Prices set by NDRC with a lag based on average spot prices (NY, Rotterdam and Singapore) reluctant to adjust prices. This squeezes margins for refiners.
India	Ad hoc		Gasoline and diesel prices have increased by a cumulative 16 percent in 2005.
Indonesia	Ad hoc		Retail fuel prices were increased by over 100 percent during 2005. There has been no change in domestic retail prices for subsidized petroleum products in 2006.
Lao People's Dem. Rep.	Automatic	Monthly	No changes in pricing mechanism
Philippines	Liberalized		No changes in pricing mechanism
Sri Lanka	Ad hoc		A monthly pricing formula, with a cap of Rs 2 per month for each product, was suspended in early 2004.
Timor Leste	Liberalized		No changes in pricing mechanism
Albania	Liberalized		No changes in pricing mechanism
Bosnia & Herzegovina	Liberalized		No changes in pricing mechanism
Hungary	Liberalized		No changes in pricing mechanism
Kosovo	Liberalized		No changes in pricing mechanism
Russia	Liberalized		No changes in the price mechanism, although pressures for establishing a mechanism to control prices has been reported in the press
Serbia	Ad hoc		Prices increased in July and September 2005
Turkey	Liberalized		The price mechanism was changed from automatic price adjustment mechanism to liberalized price mechanism in 2005 – The new legislation liberalizes the oil market by allowing licensed refineries and retailers to determine their ceiling prices that are based on the actual costs and profit margins under the liberated market conditions. The pump prices, then are reached by inclusion of Special Consumption Tax, freight, profit margins of retailers and Value Added Tax
Ukraine	Ad hoc		No changes in pricing mechanism

Attachment II. Domestic Petroleum Pricing Practices, 2005- May 2006 (contd.)

Country	Fuel pricing mechanism	Frequency of adjustment	Changes in the price mechanism during the last year If ad hoc, any recent price increases.
Afghanistan	Automatic	Monthly	Mechanism varies according to geographical area
Armenia	Liberalized		No changes in pricing mechanism
Azerbaijan	Ad hoc		No changes since November 2004.
Egypt	Ad hoc		No changes in pricing mechanism
Georgia	Liberalized		No changes in pricing mechanism
Jordan	Ad hoc		Increases in July 2005; September 2005 and April 2006.
Kyrgyz Republic	Liberalized		No changes in pricing mechanism
Lebanon	Ad hoc		No changes in pricing mechanism
Pakistan	Ad hoc		Automatic formula frozen in May 2004. Ad-hoc changes since then include an increase in gasoline prices by 24 percent, and diesel and kerosene increased by 17 percent since May 2005.
Yemen, Republic of	Ad hoc		Diesel, gasoline, and kerosene prices were raised by an average 144 percent in July 2005. Increase rolled back to 99 percent follwing civil unrest.
Argentina 1/	Liberalized		No changes in pricing mechanism
Bolivia	Ad hoc		Automatic formula tried and abandoned during 2004. Main domestic fuel prices frozen since end-2004 after 10 percent increase for gasoline and diesel. Prices of crude oil frozen at US$ 27 a barrel in late 2004.
Brazil	Liberalized		No changes in pricing mechanism
Colombia	Automatic	Monthly	Medium term reference oil price for formula was increased.
Dominica	Automatic	Every two months	Social pressures are building for increasing targeting subsidies. No Change.
Dominican Republic	Automatic	Weekly	No changes in pricing mechanism
Ecuador	Ad hoc		No changes since 2004.
Honduras	Ad hoc		Formula suspended and reintroduced several times during 2006.
Peru	Liberalized		No changes in pricing mechanism
Uruguay	Ad hoc		Adjustment twice a year if inflation higher than 10 percent, once otherwise.

1/ The government pursues price agreements with private companies, imposes export taxes to divert supplies to the domestic market and has threatened to increase export taxes if domestic prices are raised.