Reforming Fuel Pricing in an Age of $100 Oil

Masami Kojima

THE WORLD BANK

Reforming Fuel Pricing in an Age of $100 Oil

Masami Kojima

THE WORLD BANK

The International Bank for Reconstruction and Development / The World Bank
1818 H Street, NW
Washington, DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

Manufactured in the United States of America

Cover photo: Filling station in Zambia, courtesy Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Contents

Figures

Tables

Foreword

Increases in world oil prices since 2004 have challenged consumers and oil-importing countries across the world. Oil prices temporarily fell sharply in 2009, only to triple three years later. The oil import share of gross domestic product rose by nearly half among net oil importers in just two years between 2009 and 2011. Governments that control oil product prices have come under pressure to intervene by keeping domestic prices low and effectively subsidizing consumers.

This study, which is the most recent in a series that began with the 2006 publication, "Coping with High Oil Prices," examines how governments in developing countries have responded to market and political forces in handling pricing policy for oil products since 2009. Most governments have allowed the prices of some oil products to move with world prices, but many have also frozen prices, suspended automatic price adjustments, or stopped and even reversed price reforms for one or more fuels considered politically sensitive.

These price controls may have helped shield consumers, but all too often at a significant cost. Some markets have witnessed acute fuel shortages, fuel smuggling, flourishing black markets, downstream oil infrastructure in disrepair, and mushrooming fiscal outlays.

This publication suggests a menu of options for moving away from sectoral subsidies to market-based pricing, accompanied by an integrated social protection program and complementary policies to reduce consumption through efficiency improvement and fuel diversification. Sending the right price signals and reducing consumption can bring many benefits, ranging from greater supply security to less congestion and pollution from road transport. We hope this report can help policy makers conduct more informed national dialogues on managing fuel pricing and the political economy around it.

Vijay Iyer
Director
Sustainable Energy Department

Acknowledgments

This study is part of a broader work program on petroleum products in the Oil, Gas, and Mining Unit of the Sustainable Energy Department of the World Bank. This report benefited from helpful comments by Punam Chuhan Pole, Marianne Fay, Paolo Verme, Ruslan Yemtsov, and Ariel Yepez, all of the World Bank. Valerie Ziobro edited and Mary Anne Mulligan laid out the document.

The author is grateful to Osvaldo Victorino João of the International Monetary Fund; Saidamon Bodamaev, United Nations World Food Programme; and M. Khaliquzzaman, Veasna Bun, Salam Falah Almaroof, Keomanivone Phimmahasay, Bayartungalag Gursanjid, Olayinka Olufunke Babalola, Sylvie Nenonene, and Amir Mokhtar Althibah, all of the World Bank, for providing price information for Angola, Tajikistan, Bangladesh, Cambodia, Iraq, the Lao People's Democratic Republic, Mongolia, Nigeria, Togo, and the Republic of Yemen, respectively.

Abbreviations

bpd	barrels per day
CNG	compressed natural gas
CPI	consumer price index
EIA	U.S. Energy Information Administration
EITI	Extractive Industries Transparency Initiative
FOB	free on board
GDP	gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
LPG	liquefied petroleum gas
OECD	Organisation for Economic Co-operation and Development

All dollars in this report are U.S. dollars.

Executive Summary

Between 2003 and 2012 the average annual world prices of gasoline, diesel, and kerosene in 160 countries more than doubled, while the prices of liquefied petroleum gas (LPG) used for cooking and heating increased by two-thirds (with prices converted to local currency units and adjusted for domestic inflation). Rising world oil prices affect all countries by increasing either import costs or government revenues from oil exports. This has important policy implications for developing countries, which will soon have a greater oil demand than developed countries.

This study focuses on the evolving role of oil in national economies, particularly those of developing countries, and proposes a menu of options for drawing a roadmap for pricing policy reform for oil products. In light of events since 2009, it examines how recent price movements have affected countries' vulnerability to world oil price increases, how governments have adjusted domestic fuel prices in response, the consequences of the policy responses, other coping mechanisms to deal with high oil prices and price volatility, the roadblocks to reforming pricing policy, and how to deal with them.

Oil import costs and export revenues can be scaled with respect to gross domestic product (GDP) as a measure of a country's vulnerability to oil price volatility. The degree of vulnerability generally rises with rising oil prices, but net importers are adversely affected by price increases and exporters by price collapses. Between 2009 and 2011, the last year for which data are available, annual average world oil prices rose by two-thirds in nominal U.S. dollars. Among 133 net importers during the same period, median oil imports rose from 3.8 to 5.0 percent of GDP. In 2011, upper-middle-income countries had the highest median vulnerability (6.7 percent), followed by low-income, lower-middle-income, and high-income countries (3.4 percent). Among 40 net oil exporters, oil exports accounted for 16 percent of GDP in 2011, from 13 percent in 2009. Low-income countries had the smallest median export share (2 percent), and the share increased sharply with income to 32 percent for high-income countries.

The vulnerability of oil consumers can be reduced by decreasing the oil intensity (energy use per unit of GDP) of the economy, offsetting the increase in vulnerability from higher oil prices. Between 2009 and 2011, more than two-thirds of the countries in the sample reduced oil intensity. Had they not done so, their vulnerability would have increased even more.

Against the backdrop of high oil prices, many countries have not passed through the oil price increases to consumers, instead instituting government policies to keep domestic prices low. The retail prices of gasoline and diesel converted to U.S. dollars in more than 60 developing countries in January 2012, July 2012, and January 2013 showed large variations. The largest differences were found in January 2013: a factor of 190 between the lowest and highest prices for gasoline, and 250 for diesel, primarily because of exceptionally low oil product prices in República Bolivariana de Venezuela. Due to high fuel taxes, retail gasoline and diesel prices in high-income European countries were higher than in all developing countries in the sample for this study, except Turkey. Kerosene and LPG retail prices were available in fewer countries. The largest price differences across the countries again were found in January 2013, a factor of about 10 for kerosene (República Bolivariana de Venezuela was not in the sample) and 75 for LPG. As expected, net oil exporters had much lower median retail prices than net oil importers. By region, the Middle East and North Africa had the lowest median prices.

This study examined the degree of pass-through of world price increases to domestic consumers for gasoline, diesel, kerosene, and LPG between January 2009 as the starting month and January 2012 (first period), July 2012 (second period), and January 2013 (third period) as the end month. Fuel prices approximately doubled in the intervening months in nominal U.S. dollars. In all three periods and for all four fuels, the median pass-through was less than full.

In the four years between January 2009 and January 2013, the median pass-through for gasoline and diesel increased with income and was less than two-thirds in low-income countries. The study also examined high-income countries for gasoline and diesel price changes. High-income countries had larger median pass-through coefficients than any other income group for each of the three periods, and considerably higher ones in the third period. For kerosene, the median pass-through in the third period was full in upper-middle-income countries, but half in low and lower-middle-income countries. The median pass-through for LPG was highest in low-income countries in each of the three periods.

The relatively low median pass-through coefficients in developing countries indicate continued government influence on domestic fuel prices. Governments use a range of policies to keep domestic prices low, including setting prices or price ceilings, providing universal or targeted price subsidies, establishing a fund or mechanism for smoothing prices across time or freight cost equalization across the country, reducing taxes, requiring oil companies to bear some or all subsidy costs, and imposing export restrictions. Combinations of these measures have resulted in two-fifths of the countries in the sample freezing the retail prices of gasoline, diesel, or both, for months or even years during the past three years.

More generally, about two-thirds of the study countries have kept domestic prices below market-based levels for one or more fuels in the past three years, subsidizing consumers. In every case the government pays directly or indirectly—through budgetary transfers, tax expenditures, or lower corporate tax collection—due to financial losses suffered by oil companies. By compensating one or more consumer categories through price adjustments rather than cash transfers and other forms of assistance, these pricing policies also distort the downstream oil sector. Many countries have universal price subsidies, widely acknowledged to be regressive. Quite a few have subsidies targeting certain consumer categories, most notably kerosene and LPG for households. Price subsidies targeting the poor are rare. On paper, a price smoothing scheme can be self-financing: in times of low world prices, consumers pay more and the savings are put aside, and in times of high world prices, the savings are drawn down to reimburse the oil marketers to keep prices low. In practice, however, most price smoothing schemes build up deficits over time, eventually requiring budgetary transfers or large loans. These budgetary transfers can run into billions of dollars, as in Colombia and Peru.

Targeted subsidies for oil products have large leakages (such as diversion and smuggling) because, unlike electricity or natural gas, liquid fuels are easy to store and transport. Differentiating prices for the same oil product by user category creates powerful financial incentives to divert lower-priced fuels to users ineligible for the price discounts. Typical recipients of such targeted price subsidies are households (kerosene or LPG for cooking, lighting, and heating), transport operators, farmers, and fishermen. Although prices of kerosene and diesel are close on the world market, many governments price kerosene below diesel in the name of protecting non-electrified households that use kerosene for cooking, lighting, and heating. Kerosene, however, is well suited for adulterating diesel. The larger the price difference, the greater the financial incentive to divert kerosene to the automotive diesel sector. Chemical

marking, color dyes, and other detection measures can curb diversion to a degree, but these can be subverted. Also common is the diversion to commercial establishments—such as restaurants—of subsidized LPG sold in small cylinders for households. In most cases, the intended beneficiaries are not engaged in diversion on any meaningful scale. One possible exception is subsidized fuel for fishing boats: boat owners may be involved in diversion because boats can smuggle large quantities of fuel. These criminal activities worsen governance in the downstream oil sector, making sector reforms difficult.

Fuel shortages—and flourishing black markets with high prices—are common in markets with low official prices. Shortages occur because of diversion and smuggling and because of the government's inability or unwillingness to reimburse oil companies for subsidies. Cash-strapped oil companies may cut back on refining and imports, and even shut down filling stations if losses become unsustainably large. Subsidies may be channeled through state-owned oil companies, granting them monopoly or near-monopoly status. Not having to face competition, they become opaque and inefficient, raising costs.

Given the weight of the evidence, governments should pursue policies to make the downstream oil sector competitive and to deregulate it. Price controls are inefficient and unsustainable means of protecting the poor, curbing inflation, and achieving other objectives cited by governments that keep oil product prices low. To help the poor cope with high oil prices, the long-term goal should be to replace fuel price subsidies with effective social service delivery. The most efficient and least distorting approach is arguably to transfer cash as part of an integrated, comprehensive poverty alleviation program; government interventions using sectoral subsidies to keep prices low for each good and service are generally suboptimal. In parallel, to reduce vulnerability to oil price volatility, governments should promote energy conservation measures throughout the economy and facilitate fuel diversification to reduce overreliance on oil where it makes economic sense.

The path to market-based pricing depends on the starting conditions. Considerations include the size of the gap between current and market-based price levels, the level of public awareness about the extent of departure from market prices, the degree of market concentration and competition in downstream oil, the subsidy delivery mechanism where subsidies are provided, the robustness of social service delivery, and the perceived credibility of the government.

International experience makes clear that it is far more difficult to move to market-based pricing if the government has little credibility

because of a poor record of service delivery or worse, or if the legitimacy of the government is being challenged. If the oil sector is perceived to be corrupt—and this occurs particularly in countries with significant oil production—then the public may falsely come to believe that corruption is what makes subsidies unaffordable, and that subsidies can be made affordable by rooting out corruption and making subsidy delivery more efficient. If a national oil company dominates the sector, steps should be taken to introduce competition; options include breaking up the company, mandating third-party access to its infrastructure as a transition measure, and taking other steps to facilitate new entry. For healthy and fair competition, it is essential to establish clear and sound regulations and enforce them. All these steps should lower costs of supply over the long run. Strengthening social safety nets and making the oil sector transparent and accountable are essential for lasting price reforms.

In the immediate term, governments can develop a communication strategy to inform the public effectively about—

- the magnitude of the combined under-recoveries covered by the government and oil companies;
- captured subsidies broken down by income and sector, and the winners and losers of the price reform, including likely effects on different income groups, as well as opposition likely to be mounted by powerful groups benefiting from the subsidies legally and illegally;
- evidence on diversion and smuggling;
- nonfiscal costs of under-recoveries, such as acute fuel shortages and deteriorating infrastructure in the oil sector, leading to inefficient operations and rising costs;
- alternative ways of achieving the social and economic goals of current pricing policies; and
- a proposal or menu of options suited to the country circumstances to move away from a price-setting policy in the oil sector to market-based pricing complemented by broader social protection and compensation mechanisms outside the oil sector.

Consultation is an important element of communication. The variety of current media, including electronic media, makes a national conversation about price reform possible.

Government transparency is important regarding the agency in charge of pricing, the scope of its regulatory power, how prices are set, the criteria for price adjustments, the price breakdown, the magnitude of under- or over-recoveries, and the stakeholders being consulted. Informing the public frequently about cumulative under-recoveries is important because, even when fuels are subsidized, news headlines about falling

world oil prices can prompt the public to clamor for immediate price reductions in line with those declines.

If they are very low, current prices may need to be raised several-fold to reach market levels. In the case of universal price subsidies, bridging the price gap in one-off, very large price increases is likely to be too disruptive and invite a public backlash. The question for the government is how long it should take to raise prices and how large each price increase should be. In considering the reform strategy, it is important to look at the likely effects on consumers, which depend on the prices actually paid rather than the official prices. If fuel shortages are widespread and consumers are paying several times the official prices, making large adjustments to official prices and eliminating fuel shortages may have much smaller adverse effects than the theoretical impact of the large price adjustments.

Once prices are within a few tens of percent (such as 20 percent) of market levels, adopting automatic price adjustment rules linked to world oil prices and based on a formula should be a near-term goal. Doing so should largely depoliticize pricing. Adoption is easier in times of low international oil prices. Absent such an opportunity, prices should continue to be raised, with adoption of formula-based pricing in the last price increase. The timing of price deregulation—whereby the government ceases to be active in price-setting—depends on whether there is sufficient competition in the market. It is easier to gauge the degree of price competition if the government is setting price ceilings rather than price levels themselves; departure from price ceilings and measurable price variation across companies are signs of emerging competition. The evidence presented in this report suggests that pricing reform often does not have a clear end and should instead be viewed as a continuous process of adjustment and search for mechanisms that take into account the country's institutions and political system, and the oil sector's market structure, infrastructure, and history.

Chapter 1

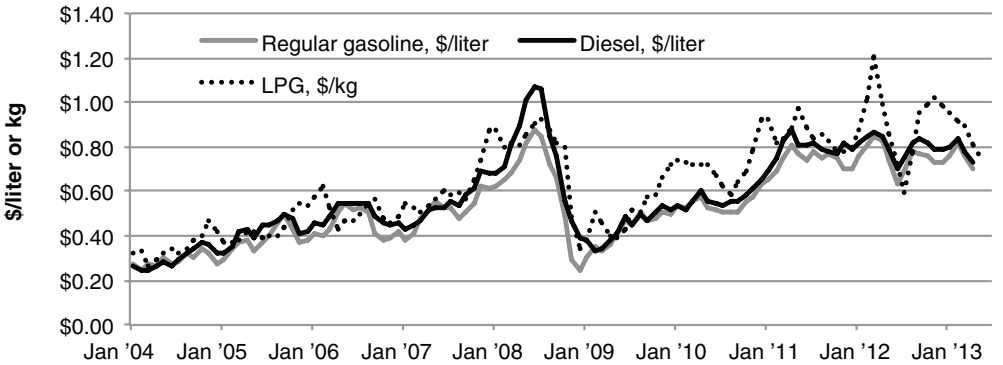
Context

After averaging $18 a barrel throughout the 1990s and rising to an average of $27 in the first four years of the last decade, the price of crude oil began to soar in 2004. The price of oil products followed similar trends, reaching historic highs in mid-2008, collapsing, then rising again. The price of liquefied petroleum gas (LPG) reached a new high in 2012 before halving in the following months. Figure 1 shows the history of free-on-board (FOB) prices of gasoline, diesel, and LPG since 2004.

Earlier in history, the annual average spot price of three benchmark crudes (Brent, West Texas Intermediate, and Dubai Fatah), expressed in 2012 U.S. dollars, reached a historic high of $89 a barrel in 1980. This record price was surpassed in 2008 when the annual average price soared to $103 a barrel. The prices in 2011 and 2012 were slightly higher, averaging $105 (Figure 2).

Government interventions in the oil industry and pricing were common around the world until three decades ago. World oil prices were opaque and were not uniform in the 1950s and 1960s. Vertically integrated companies dominated the oil sector, with opaque transfer pricing

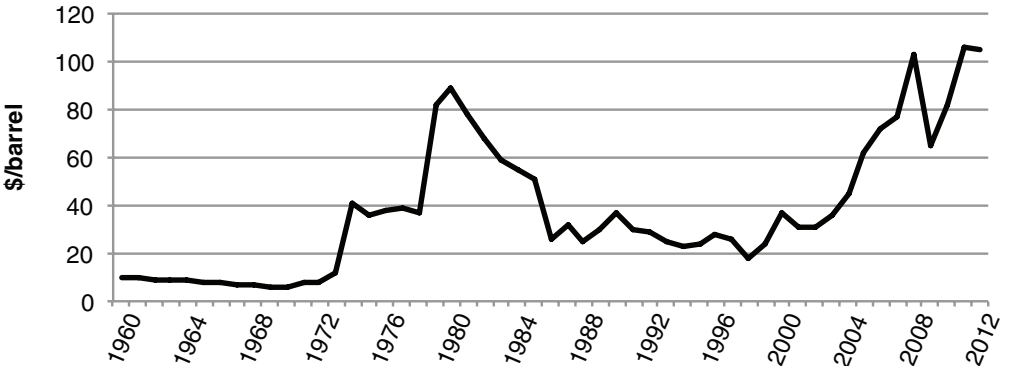
Figure 1 International Prices of Gasoline, Diesel, and LPG since 2004



Sources: Industry sources.

Note: Gasoline and diesel prices are from Singapore. LPG prices are average Saudi Aramco contract prices for propane and butane. Kerosene prices are not shown because they track diesel prices closely.

Figure 2 Annual Average Spot Prices of Three Benchmark Crudes (2012 US$)



Sources: World Bank 2013 for the prices of Brent, West Texas Intermediate, and Dubai Fatah; Federal Reserve Bank of St. Louis for the implicit price deflator for U.S. gross domestic product.

of crude oil to their own refineries. Transport costs were high, accounting for almost one-third of the landed cost of oil imported from Saudi Arabia to New York in the early 1970s. As a result, instead of one global market, there were many distinct regional markets each with its own prices (Stevens 2010).

The oil price shock of 1973 prompted governments to regulate prices and domestic oil supply even in developed countries. The Emergency Petroleum Allocation Act of 1973 authorized the U.S. government to exercise price and allocation controls in the oil industry until 1981. The Canadian government regulated crude oil prices between 1974 and 1985. The effects of these price controls were not always positive. A U.S. Federal Trade Commission report (Harvey and Roush 1981) concluded that the federal price controls in the United States had led to adoption of higher cost production methods as well as sporadic shortages that limited the days filling stations were open, restricted amounts and days in which consumers could purchase gas (alternate days by odd-even license plate numbers), resulting in long waits and travel from station to station for fuel. Analysis of these limitations in "The Welfare Costs of Rationing by Waiting" (Deacon and Sonstelie 1989) suggested that the queues cost some consumers—those who were fully employed—more than they saved as a result of price regulation. Efforts to hoard gasoline and an increased hazard of car fires from gasoline stored in containers in vehicles were among the secondary effects (Bradley 1995).

Although world oil prices doubled between 1978 and 1979 and remained twice the 1978 price level for the next three years, members of

the Organisation for Economic Co-operation and Development (OECD) began to dismantle price regulation in the 1980s. Several factors contributed to this policy change. The commercialization of very large crude carriers reduced transport costs beginning in the late 1960s, and after 1973 the share of transport in the landed cost of imported oil declined precipitously, helping to equalize prices across different regional markets. The globalization of oil markets in the 1970s was further assisted by the rise of paper markets. Heating oil in 1978 became the first widely traded oil financial contract sold through a regulated exchange. By 1990, there were 10 active oil futures contracts trading worldwide (Medlock and Jaffe 2009). Today crude oil and oil products are commodities bought and sold in one international market. The only exception among the oil products considered is LPG, which originates more from natural gas production than from oil refining and for which distinct regional markets still exist because it is difficult to store and transport (it is a gas at room temperature and atmospheric pressure).

Instead of regulating prices or allocation, governments in high-income OECD countries over the past three decades have focused on creating market conditions conducive to healthy competition, ensuring fair trading and acting on anti-competitive behavior. The UK Office of Fair Trading, for example, has acted twice in the last two years to boost the transparency of heating oil prices for end-users (OFT 2011, 2012). Even so, as recently as 2003, the government of Portugal was still setting price ceilings for gasoline and automotive diesel (IEA 2004), and the U.S. State of Hawaii, fearing a lack of adequate competition, imposed ceilings on wholesale gasoline prices from September 2005 to May 2006. Producer subsidies also continue, although at relatively low levels. For example, according to the OECD database on fossil fuel subsidies, between 2009 and 2011, the largest annual producer subsidies in the oil sector among its members were found in the United States, averaging $2.4 billion a year, followed by $1.4 billion in Canada (OECD 2013), although these particular producer subsidies have little effect on global or domestic oil prices.

In contrast to the oil sector deregulation in high-income OECD countries today, many developing country governments continue to be involved in price regulation, which has been made difficult by the steep world price increases in the last decade. The nature of price regulation has varied from setting price ceilings for one or more fuels based on a market-based formula at one end of the spectrum to pan-territorial pricing with frozen retail prices of all key oil products for more than a decade

at the other end. Price regulation in recent years has resulted in price subsidies in many countries.

In addition to subsidies for oil products, electricity and natural gas are two other large sources of subsidies in the energy sector. However, of the three, only oil is a commodity. Electricity cannot be traded globally, and natural gas (because it is much more expensive to store and transport than oil products) has regional markets with sharply different prices. For example, in the first quarter of 2013, natural gas prices in Europe were more than triple those in the United States, and the prices in Asia were even higher, about four-and-a-half times the U.S. prices. Because natural monopolies exist in some or all segments of the supply chain, electricity and natural gas are subject to economic regulation, whereas oil products in many markets are subject only to competition and not to economic regulation other than anti-trust. Connection charges for consumers can be high for electricity and natural gas, sometimes several tens of times (30, 40, or 50 times) the monthly use charge, whereas there is no equivalent of connection charge for oil products other than LPG, for which the connection charge may be a few multiples of the cost of monthly consumption rather than several tens of times more. Electricity and natural gas consumption by each user can be metered, but virtually no country has a system in place to meter all oil consumption by each consumer. These differences have significant implications for developing a pricing regime. Subsidized connection charges and subsidies based on monthly consumption (for which low consumption is a reasonable surrogate for low-income households) merit consideration in setting tariffs for electricity and natural gas, but they are far less applicable to subsidies for oil products (see "Targeted Price Subsidies for Liquid Fuels" in chapter 5).

The price of oil is denominated in U.S. dollars; hence domestic prices are affected by currency fluctuations. Globally, the median increases from 2003 to 2012 in the nominal prices of gasoline, diesel, and LPG in local currency in 172 countries were 230, 250, and 170 percent, respectively. For gasoline and diesel, the median increases were lower than in the United States, because the U.S. dollar depreciated in slightly more than half the countries in the sample. International prices of gasoline, diesel, and kerosene were comparable in all major refining centers, but the LPG price movements depended strongly on the market, with North American prices much lower than those in the rest of the world in recent years (Kojima 2011). Therefore, price increases in the Americas tended to be smaller. (More details are provided in appendix A.)

Table 1 Increase in World Diesel Prices in Local Currency by Income, 2003–12 (nominal) and 2011 (real)

	All	Low	Lower middle	Upper middle	High		
					All	Non-OECD	OECD
Percent increase in nominal prices in local currency, 2003–12							
Minimum	110	230	110	110	140	180	140
Maximum	1,440	1,250	690	1,440	520	280	520
Median	240	330	260	280	230	240	230
No. of countries	172	32	48	47	45	14	31
Percent increase in real prices in local currency, 2003–11							
Minimum	-47	26	-47	19	66	89	66
Maximum	330	200	180	330	240	210	240
Median	130	130	110	130	150	140	150
No. of countries	160	31	44	43	42	11	31
Ratio with price increase in the United States in real terms, 2003–11							
Minimum	0.2	0.5	0.2	0.4	0.6	0.7	0.6
Maximum	1.6	1.1	1.0	1.6	1.2	1.1	1.2
Median	0.8	0.9	0.8	0.8	0.9	0.9	0.9

Source: Calculations based on data from industry sources and WDI 2013.

It is important to note that when expressed in real terms after accounting for changes in the consumer price index (CPI) in each country, the price increases between 2003 and 2011—the last year for which CPI data are available for most developing countries—were predictably much smaller. The median price increases for gasoline, diesel, and LPG were 110, 130, and 80 percent, respectively. Importantly, only a dozen countries saw their currencies depreciate against the U.S. dollar in real terms during the period. This meant that, for gasoline and diesel, most countries experienced smaller price increases in real terms than the United States.

Table 1 summarizes the results for diesel by income. High-income countries are further split by membership in the OECD. The results for individual countries and the summary statistics for gasoline and LPG are provided in appendix A. In nominal terms, high-income OECD countries had the lowest increases and low-income countries had the highest increases for all of the three oil products. In real terms, the highest price increases were found in high-income OECD countries for each of the three oil products. Despite the highest price increases in relative terms,

none of these countries has reintroduced price controls. Lower-middle-income countries had the lowest price increases in real terms compared to other income groups, followed by low-income and upper-middle-income countries, which had approximately the same average as well as median price increases.

The average oil price having more than doubled in real terms since 2003 has posed considerable political challenges to governments that administer oil product prices. In the period leading up to mid-2008, in the face of rapidly rising world oil prices, a number of the governments that had been keeping domestic prices artificially low seriously explored options for price reforms. The fiscal pressure to press on with reforms subsided briefly after the global price collapse in late 2008, but those governments that had done little were caught by rising prices again soon thereafter. Where governments have passed on some or all of world price increases to domestic markets, soaring prices have led to calls for governments to take action, ranging from providing greater safety nets for the poor and reducing fuel taxes, to ordering oil companies to lower prices and granting outright price subsidies, even if temporary.

Many interlinked developments have affected costs, availability, and prices paid by end-users with respect to oil products in developing countries in the last several years:

- High oil prices have exacerbated the poor financial states of the national oil companies in some countries with price subsidies, leading to their inability to procure oil products on time, acute fuel shortages, and high black market prices.
- Fuel price subsidies have increased incentives for diversion to black markets and smuggling to neighboring countries, pushing up domestic prices markedly above the official prices.
- Power shortages in a number of countries have increased demand for diesel for emergency power generation, causing diesel fuel shortages and higher diesel prices in some markets. Aside from chronic inefficiencies and financial trouble in a number of power markets, a growing cause of power shortage is declining rainfall that has reduced hydropower generation in East Africa and elsewhere. Diesel and fuel oil link the oil market to the power sector, with progress (or lack thereof) in power sector reforms affecting oil demand and domestic oil product prices.
- Piracy in the Gulf of Aden and Indian Ocean has increased insurance costs, led to shipping delays, and at times has caused fuel shortages in East Africa.

- The challenges to the authorities mounted by citizens across the Middle East and North Africa since 2010 have stalled and sometimes reversed oil price reforms in several countries, against the backdrop of perceived declining state legitimacy.

Against the backdrop of oil demand in non-OECD countries overtaking that in OECD countries (IEA 2013), this study examines developments related to oil prices since 2009 in developing countries. It looks at issues in the downstream oil sector and other sectors where oil is an important input from the point of view of consumers. The study does not consider macro-level policies (such as monetary or exchange rate policy) or the impact of oil price changes on the macroeconomic performance of countries, nor does it discuss management of windfall income by large oil exporters and the long-term economic consequences of revenue management. This report draws upon the findings from two background papers for the study (Kojima 2012, 2013)—hereafter referred to as the first and second background papers, respectively—and follows up on the earlier studies (Bacon and Kojima 2006, 2008a, 2008b; Kojima 2009a, 2009b). It covers developments since 2009 and looks at how recent oil price movements have affected countries' vulnerability to world oil price increases, how governments in 65 developing countries have adjusted domestic fuel prices in response, the consequences of the policy responses, and other coping mechanisms to deal with high oil prices and price volatility, and recommends a menu of options for a roadmap for reforming pricing policy. It complements recent publications and a Web-based database on this topic—such as IMF (2013a, 2013b); Vagliasindi (2013); Arze del Granado, Coady, and Gillingham (2012); numerous studies by the Global Subsidies Initiative (GSI); and the country factsheet section of the International Fuel Price page of *Energypedia*, recently set up by the German development agency, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)—by focusing particularly on the workings of the downstream oil sector.

Chapter 2 provides background on changes in the global oil market since the 1970s, how these changes have driven pricing policies in developed countries, and where many developing countries are in the evolution of pricing policies. Chapter 3 takes a brief look at vulnerability to changes in oil prices in recent years and summarizes the results from the first background paper. Chapter 4 compares domestic oil product prices in a sample of developing countries four years apart, in January of 2009 and 2013, to examine the degree of pass-through of world price increases to the domestic market. Chapter 5 provides an overview of pricing policy options and likely consequences. Chapter 6 touches on complementary

policies to help cope with high oil prices and price volatility. Chapter 7 concludes with observations and lessons.

All medians in this report are unweighted to avoid having large economies dominate the statistics. The report uses the numerical notation adopted in the United States and defines a billion as a thousand million (10^9), in contrast to other parts of the world where a billion is a million million (10^{12}).

Chapter 2

Drivers for Price Controls and Subsidies

With the globalization of oil markets, oil today is just like any other commodity, and government interventions in the pricing of oil products do not confer benefits if there is healthy and fair competition in the market. Importantly, nothing drives efficiency improvement as much as relentless competition, which also ensures that efficiency gains are passed on to consumers in the form of lower prices. The proper role of the government is to update regulations as needed; establish sound regulations and ensure their effective monitoring and enforcement; monitor for evidence of, and act upon, price collusion and other forms of anti-competitive behavior; provide market and other information—such as prices at different points along the supply chain; a breakdown of taxes and other charges imposed by different levels of the government; sales volumes; supply sources ; all regulations, ordinances, decrees, and any other decisions affecting the downstream sector; and instances of violation of regulations, including the names of the companies found guilty and the charges—so that suppliers and consumers can make informed decisions.

In an emergency situation, such as natural disasters disrupting fuel supplies, a government may intervene with supply allocation, pricing, or both, on a temporary basis. For example, oil product prices in the Philippines have been deregulated since 1998, but when a series of typhoons devastated Luzon in 2009, the government imposed price ceilings between October 23 and November 16.

In small markets vigorous competition may not be possible because of large economies of scale in fuel supply. If there is inadequate competition, governments may wish to set price ceilings to prevent marketers' profit margins from rising too high. Even in such markets, it is important to encourage price competition—the level of which can be gauged from the degree of divergence of the prices on the market from the price ceilings—through information dissemination and other means.

If the government deems price competition to be insufficient, it may set price ceilings, but such economic regulation need not involve subsidies. The objective of the pricing policy to address inadequate competition would be to establish price levels that would have prevailed in competitive markets. Depending on the trade status of a given fuel, the government may start with an import-parity or export-parity price equivalent, and add taxes, other government charges, costs, and reasonable profit margins. A point of departure from a competitive market is that profit margins tend to be static and always positive.

The government may wish to impose cross-subsidization—for example, to make the prices to households more affordable—without incurring net subsidies. However, such cross-subsidization schemes—in particular when individual subsidies are not intended—frequently result in large deficits. Cross-subsidization occurs particularly with LPG, used widely for cooking, for which some governments impose the same unit price independently of quantities sold. There are greater economies of scale with LPG than with other liquid fuels because it must be kept under pressure at all times—requiring metal containers throughout the supply chain—and it is typically sold in small cylinders to households. Absent government intervention, households would pay much higher unit prices than larger consumers because LPG in small cylinders is markedly more expensive (Kojima 2011). Forcing cross-subsidization, however, can distort market incentives, reduce competition, and compromise efficiency.

The frequent rises and falls of world oil prices since 2004 have intensified suspicions about "rockets and feathers"—when oil prices rise, retail prices rise quickly like a rocket, but when oil prices fall, retail prices fall slowly like a feather (Bacon and Kojima 2010). These and other such concerns have prompted some governments to tighten price control or launch investigations into price collusions. Kenya and Tanzania, having earlier deregulated domestic prices, began setting price ceilings by geographical location in 2010 and 2009, respectively.

The U.S. State of Hawaii illustrates the challenges of monitoring price collusion in small markets. The state has a total population of 1.4 million, of which about 1 million live on the island of Oahu. At about 100,000 barrels per day (bpd) of oil product consumption (EIA 2013c), the market is not small by developing country standards. The state has two refineries and about a dozen oil marketers. Concerned about high oil product prices from a lack of adequate competition in this small island economy, the State in the past decade has experimented with price

ceilings as well as a requirement for all marketers to report detailed information for transparency. In 2002, after the state had settled a price-fixing lawsuit with the two refiners for US$22 million, the legislature passed an act, which set ceilings on pre-tax wholesale and retail prices for regular gasoline. Before this act was enacted, it was replaced by Act 242, which set ceilings on wholesale prices of all grades of gasoline (the consumption of which was about 30,000 bpd at the time), linked to the average of the spot prices in New York, Los Angeles, and the U.S. Gulf Coast. Act 242 act was enacted in September 2005 and suspended eight months later in May 2006. Unfortunately, the timing of the start of the price ceilings coincided with high price volatility on the U.S. Gulf Coast from Hurricanes Katrina and Rita, and about the same time a major refinery in Los Angeles suffered a fire. Opponents objected to linking the state's prices so closely to the three markets and expressed frustration with high price volatility from week to week; proponents argued that the scheme should have been given more time (PUC 2006).

The price ceilings were replaced by the Petroleum Industry Monitoring, Analysis, and Reporting Program, intended to increase the transparency of pricing across the supply chain. The program required oil companies to submit weekly reports to the Public Utilities Commission on the volume, acquisition costs, margins, and sales prices at every stage in the supply chain—starting with crude oil acquisition by the refineries or oil product imports—by fuel type and consumer category on a confidential basis, and required the Commission to publish summary statistics within 14 days of receipt of these data. This program found that wholesale gasoline and diesel prices were higher than the price ceilings that would have been imposed under Act 242, and—perhaps reminiscent of rockets and feathers—retail margins for gasoline at filling stations rose during the sudden decline in global oil prices in 2008, while retail margins for diesel fuel were extremely high in several markets to mid-2009 (PUC 2010). For both price ceilings and price and margin monitoring, it was difficult to determine what would be a fair price, while the inability to analyze margins by company on account of confidentiality limited the usefulness of the information published under the Petroleum Industry Monitoring, Analysis, and Reporting Program. As one lawmaker put it, "We do have some information now on margins, but we don't know what profits are. Is there excessive profit or not? We need that information and we don't have it" (AP 2007). The program was repealed in 2010.

Many governments in developing countries keep retail prices of one or more oil products artificially low, thereby subsidizing them. Oil was

considered a strategic good and price controls were common worldwide decades ago. While many governments today treat oil no differently from other commodities, a large number of governments have not moved from the era of price controls to deregulation. In some countries, consumers have become accustomed to relatively low prices, and in the last decade a confluence of food crisis, oil price shock, financial crisis, and, in some countries, political crisis has made it politically difficult to press on with price reforms. Reasons cited by the opponents of price reforms include protecting the economy from high world oil prices, curbing inflation, promoting economic development by making relatively cheap energy available, and making modern energy affordable to them. In major oil producing countries, low oil product prices are regarded as windfall dividends from oil revenue to which many citizens consider themselves entitled.

Opponents of subsidy reduction often argue that higher oil prices hurt the poor more than the rich. This may be true when both the direct and indirect effects on household expenditures are considered. For example, a detailed study of households in Madagascar found that a 17-percent price rise would increase household expenditures by 2.1 percent for the bottom quintile, compared to 1.5 percent for the top. About three-fifths of the increase in expenditures was due to indirect effects, mostly through higher food prices. At the same time, because the poor spend far less on energy and food in absolute terms, the top quintile captured 40 percent of the total benefits of lower oil prices, whereas the bottom quintile captured only 9 percent (Andriamihaja and Vecchi 2008). Most poor do not own motorized vehicles or backup electricity generators; hence they may spend less than the rich on oil products not only in absolute terms but also as a percentage of total household expenditures. However, in countries where the poor rely on kerosene for lighting, they may be the largest spenders on oil products in terms of the percentage of total household expenditures, as shown by an analysis of household expenditure surveys in Bangladesh, Cambodia, and Uganda (Bacon, Bhattacharya, and Kojima 2010). What these observations suggest is that, even purely from the standpoint of equity, there is a cost associated with reforming oil price subsidies, and that cost should be weighed against the opportunity cost of maintaining the subsidies.

Some may argue that a fuel price subsidy is justified when the fuel is a merit good, such as a clean cooking fuel that causes much less pollution and has health benefits. Given cash instead of price subsidies, households may use the cash for other purchases while reverting to traditional

fuels that are cheaper or collected for free, with attendant air pollution and health problems. As chapter 5 shows, however, it is difficult to target price subsidies for oil products, and universal price subsidies have large leakages.

Price subsidies for oil products are provided today because they are easier to administer than social services or social protection and are visible and politically popular. Although they benefit the politically powerful disproportionately (both legally and illegally through diversion and smuggling), subsidies can be billed as a pro-poor policy if necessary. All too often, if the government in power is attempting to reform universal price subsidies on the grounds that the bulk of the total subsidy goes to the rich, the opposition would nevertheless argue that the government is intent on harming the poor who would starve (for lack of cooking fuel), freeze, or live in the dark (for lack of kerosene for lighting). Once introduced, subsidies tend to get locked in: the costs of organizing for subsidy reform are very high.

In short, price subsidies are provided because they are easy to introduce and politically expedient (Victor 2009). The ease of subsidy administration may be compared to the ease of downstream taxation of oil products. Regression analysis indicates that the share of tax revenue derived from oil products rises with decreasing GDP per capita (Bacon 2001). Fuel taxation is important, especially for low-income countries, because the points of tax collection are fewer than for income tax or sales tax for general goods, a situation comparable to administering fuel subsidies. What is good for fuel taxation, however, is bad for fuel subsidies in that consumption of fuels as a group is strongly income elastic and only weakly price elastic (see Dahl 2012 for price and income elasticities for gasoline and diesel in 124 countries), ensuring buoyant government revenue as income rises and fuel tax rates are increased, but leading to rapidly growing subsidies if the pace of domestic price increases lags behind that of world price increases.

The ease of administering price subsidies for oil products is all the more attractive in countries where the government has a poor track record of delivering social services. This is also the reason why high-income OECD countries, with well-developed administrative systems in place for delivering essential social services and social protection for the vulnerable, have done away with price subsidies for oil products.

Ironically, the presence of subsidies often entrenches the conditions that make it difficult to deregulate the downstream sector. In some countries such as India and Indonesia, subsidies are channeled exclusively

through state-owned oil companies or refineries. This subsidy delivery mechanism inhibits the entry of other players, thereby discouraging competition. And where price levels themselves are controlled, no price competition is possible by definition. Absent a competitive market, prices cannot be deregulated overnight; interim price regulation may be necessary as a transition measure, but continuing government involvement in price regulation politicizes price adjustments.

Ultimately, subsidies persist in large part because of weak institutional capacity. Establishing and enforcing sound regulations creating market conditions that promote healthy and fair competition in the downstream oil sector, delivering essential social services efficiently, protecting the poor and the vulnerable effectively, encouraging citizen participation in decision making, and responding to legitimate demands from citizens all require strong institutions, good governance, and capacity to deliver. Facing elections, political instability, or both, governments without such capacity use broad-spectrum subsidies—which are blunt instruments but are popular—especially when governments have few other administrative tools in their arsenal (Victor 2009).

The first background paper prepared for this study found that the greater the vulnerability of a country to changes in oil prices as consumers, the more likely the government would be to consider passing on price increases on the international market to domestic consumers rather than keeping domestic fuel prices artificially low. The next two chapters review the findings related to vulnerability and passing through of price increases.

Chapter 3

Oil Price Risks

This study takes one measure of vulnerability to changes in oil prices and defines it as the ratio of the value of the net volume of traded crude oil and oil products to GDP. This metric does not show the distributional or fiscal effects of a change in oil prices. By definition, vulnerability so defined is negative for net oil exporters and positive for net oil importers. For net importers, the larger the vulnerability index, the more vulnerable the country is to oil price increases. For net exporters, the higher the price of oil, the more negative the vulnerability index, everything else being equal. While a highly negative vulnerability index would signal large oil revenue flowing to the country, such an economy would suffer from an abrupt drop in the world oil price, as occurred in late 2008 and 2009. Therefore, any country with a large vulnerability index (with a positive sign for importers and negative sign for exporters) is highly vulnerable to oil price shocks, with net importers adversely affected by price increases and net exporters by price decreases.

Changes in vulnerability can be linked to several factors through an identity that forms the basis for a decomposition analysis that allocates the change in vulnerability to changes in the different factors in the identity. A refined Laspeyres index enables decomposing vulnerability to a sum of consumption terms and production terms, which in turn consist of products of several factors (Kojima 2012, 4–5):

$$\Delta V = \text{consumption terms} - \text{production terms} \equiv \Delta C - \Delta P =$$
$$\Delta \Big[\textit{Oil price in current US\$} \times \textit{(Oil consumption)/(Energy consumption)}$$
$$\times \textit{(Energy consumption)/(GDP in US\$ at 2005 PPP values)}$$
$$\times \textit{(GDP in US\$ at 2005 PPP values)/(GDP in constant local currency)}$$
$$\times \textit{(GDP in constant local currency)/(GDP in current local currency)}$$
$$\times \textit{(GDP in current local currency)/(GDP in current US\$)} \Big] -$$
$$\Delta \left[\textit{Oil price in current US\$} \times \textit{oil production} \div \textit{GDP in current US\$} \right] \equiv$$

(oil price effect through consumption + oil share in energy effect + energy intensity effect

oil intensity effect

} ΔC

+ real exchange rate effect) −

(oil price effect through output + oil production effect + effect of the inverse of the current GDP in U.S. dollars),

} ΔP

where PPP is purchasing power parity.

One advantage of this approach to decomposition is that the individual factors are additive. The sum of the effects of the oil share of energy and energy intensity of GDP is the effect of oil intensity of GDP. A comparison of the oil intensity effect with the oil price effect through consumption can indicate how much declining oil intensity has offset, or rising oil intensity has amplified, the adverse effects of increasing oil prices on consumers.

The first background paper for this study provided the results of decomposition analysis for changes in vulnerability between 1999, which was chosen as the base year, and 2008 and 2009 as years with high and low world oil prices, respectively. The limitations of the methodology and of the underlying data are discussed in Kojima (2012). Between 1999 and 2008, when oil prices in U.S. dollars quadrupled in real terms, more than half the countries in each income category (low, lower-middle, upper-middle, and high) and more than two-thirds of all countries combined reduced the oil intensity of GDP. This occurred more as a result of reducing energy intensity than reducing the oil share of energy, although half the countries with declining oil intensity reduced both.

Of the 172 countries in the sample, high-income countries had the largest proportion of countries with declining oil intensity. About two-fifths of low-income and lower-middle-income countries saw their oil intensity rise during the same period. As expected, net oil importers were somewhat more likely to reduce oil intensity than net exporters. Upper middle-income countries had the largest proportion of countries, one-third, in which declining oil intensity had offset one-fifth or more of the oil price effect through consumption. Among net oil exporters, nearly half had declining oil production between 1999 and 2008. Despite rising oil prices, oil exports as a share of GDP declined in one-fourth of the exporters—that is, the oil price effect through output had been offset by a fall in oil production combined with the effect of the inverse of GDP.

Although the full set of data to carry out decomposition analysis is not yet available, preliminary data are available from the U.S. Energy Information Administration (EIA) to compute vulnerability for 2011, when the average price of oil reached the highest level in history in real terms; the average price in 2012 was slightly lower. The data available as of March 2013 were used to calculate vulnerability in 2011 as well as the change in vulnerability between 2009 and 2011, during which period the world price of oil in U.S. dollars increased by more than 60 percent in real terms. The EIA database is periodically revised and further revisions are expected; hence these results should be viewed as preliminary.

Table 2 provides summary statistics by income, region, and oil trade status. The results by country can be found in appendix B. More than two-thirds of the countries in the sample reduced oil intensity between 2009 and 2011. The median vulnerability for net importers in 2011 was 5 percent of GDP, and that for net exporters was –16 percent. The median increase in vulnerability for net importers between 2009 and 2011 was 1.5 percent of GDP, and the median decrease in vulnerability for net exporters was 3.1 percent of GDP.

Among net importers, high-income countries had the lowest median vulnerability and the lowest median increase in vulnerability.

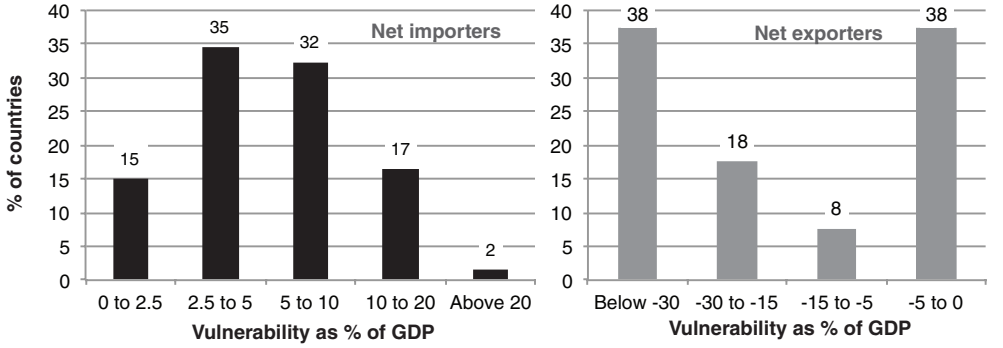
Table 2 Vulnerability in 2011 and Change in Vulnerability 2009–11 by Income, Region, and Oil Trade Status (% of GDP)

Classification	Oil trade status	No. of countries	Median V	Median ΔV
All income categories	Importers	132	5.0	1.5
	Exporters	40	-16	-3.1
Low income	Importers	30	5.7	1.9
	Exporters	3	-2.0	-3.3
Lower-middle income	Importers	35	5.2	1.5
	Exporters	12	-3.9	-2.5
Upper-middle income	Importers	33	6.7	2.2
	Exporters	14	-16	-2.8
High income	Importers	35	3.4	1.2
	Exporters	11	-32	-3.6
Developing countries only				
East Asia and Pacific	Importers	14	5.9	4.1
	Exporters	3	-3.0	0.9
Europe and Central Asia	Importers	17	5.0	1.8
	Exporters	5	-15	-2.7
Latin America and the Caribbean	Importers	23	8.0	5.9
	Exporters	7	-2.7	-3.4
Middle East and North Africa	Importers	9	5.4	6.4
	Exporters	3	-31	-1.2
South Asia	Importers	8	5.4	3.0
	Exporters	0	n.a.	n.a.
Sub-Saharan Africa	Importers	34	5.4	4.0
	Exporters	11	-19	-3.8

Source: Calculations based on data from EIA 2013a and WDI 2013.

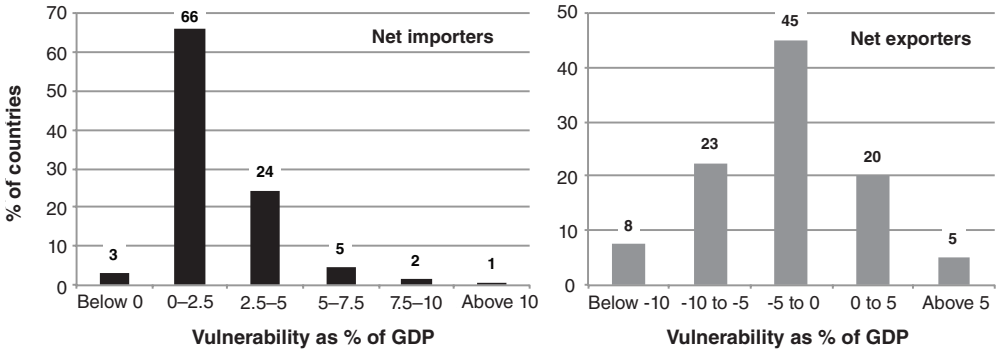
Note: Results by region exclude high-income countries. V = vulnerability; ΔV = change in vulnerability; n.a. = not applicable.

Figure 3 Countries' Vulnerability in 2011 by Oil Trade Status



Source: Calculations based on data from EIA 2013b.

Figure 4 Change in Vulnerability 2009–11 by Oil Trade Status



Source: Calculations based on data from EIA 2013b.

Upper-middle-income countries had the highest median vulnerability and increase in vulnerability. By region, Latin America and the Caribbean had the highest vulnerability and second highest increase in vulnerability. Among exporters, as expected, the Middle East and North Africa, with some of the major oil exporters, had the largest median vulnerability in magnitude. These countries also dominated the vulnerability index for high-income net oil exporters. Figure 3 illustrates the distribution of vulnerability in 2011 by oil trade status, and Figure 4 provides the distribution of the change in vulnerability between 2009 and 2011.

Chapter 4

Changes in End-User Oil Product Prices

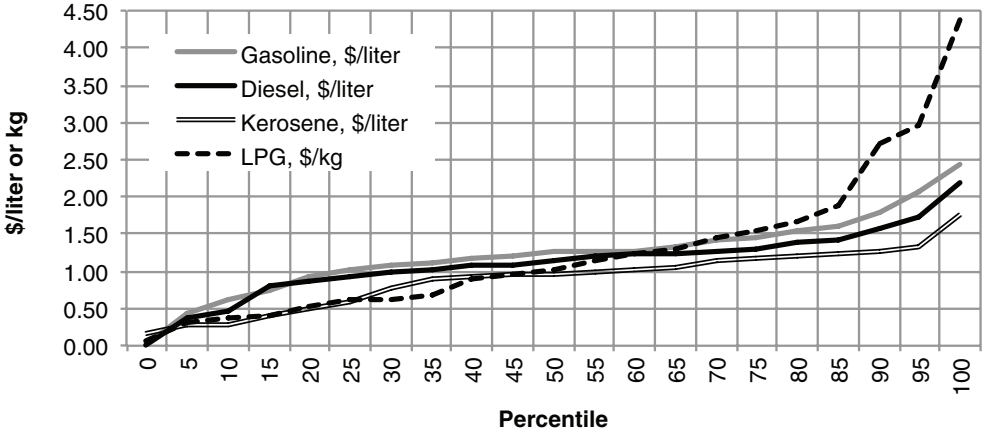
This study collected information on retail prices of gasoline, diesel, kerosene, and LPG in January 2012, July 2012, and January 2013, and calculated the degree of pass-through to consumers of world price increases since January 2009. Because prices at different stages in the supply chain are not available for most developing countries, a simplified methodology, described in the next paragraph, is used, yielding meaningful results only if the price difference between the two time periods is large. January 2009 was selected as the initial period for two reasons: first, the oil product prices in January 2009 were as low as in the latter half of 2004, and second, intervals of three to four years were deemed long enough to provide sufficient time to adjust to world price movements.

The pass-through coefficient for each fuel is based on the ratio of the difference in domestic retail prices to the difference in free-on-board (FOB) prices of the same fuel in one of the four major refining centers relevant to the domestic market. As in the second background paper, this report makes one adjustment to the methodology used in the first background paper: FOB prices in the denominator are taken from one month earlier to account for the findings in Meyler (2009). That detailed study of the transmission of world oil price increases in major 12 EU countries found that the increases were passed on to consumers within three to five weeks, or about a month. These countries can be safely assumed to be passing on the changes in world oil prices to their domestic markets in full. This report therefore takes FOB benchmark prices from the previous month. As an illustration, the coefficients between January 2009 and January 2013 are calculated by taking the following ratio:

$$\frac{(\text{Retail fuel price}_{Jan\ 2013} - \text{Retail fuel price}_{Jan\ 2009})}{(\text{Benchmark FOB fuel price}_{Dec\ 2012} - \text{Benchmark FOB fuel price}_{Dec\ 2008})}$$

It is important to recognize the limitations of this simplified approach, as discussed at some length in Kojima (2012, 7–8), and not to regard a pass-through coefficient of 1.0 as the threshold level below which a

Figure 5 Distribution of Fuel Retail Prices in January 2013 (US$)



Source: See table A1.2 in Kojima 2012.

market failed to pass through the increase in world oil prices; because of various factors, a fully deregulated and competitive market may pass through less than or more than 100 percent of the increase in the benchmark FOB prices. However, a pass-through coefficient smaller than 0.8 in times of rising prices is likely to suggest attempts to keep domestic prices artificially low, or else domestic prices were very high initially and price stability was maintained against volatile world prices (as seems to be the case with LPG in Japan).

The starting point for computing pass-through coefficients is collection of retail prices. Retail prices of gasoline, diesel, kerosene, and LPG were collected in January 2009, January 2012, July 2012, and January 2013. Table 3 shows the distribution of the prices in January 2013. The prices in U.S. dollars are given in Table B.2 in appendix B. The prices of gasoline across the countries varied by a factor of 190, diesel by a factor of 250, kerosene by a factor of 10, and LPG by a factor of 74. The large differences between the minimum and maximum prices are because of exceptionally low prices of gasoline and diesel in República Bolivariana de Venezuela, and because of very low LPG prices in the Arab Republic of Egypt and República Bolivariana de Venezuela. Without these countries, the price differences are reduced to a factor of about 10. Of the four months for which retail prices were collected, these variations were largest in January 2013. When distribution curves from the three months in 2012 and 2013 are overlaid, they match between the 20th and 95th percentiles for gasoline, 25th–95th for diesel, virtually the entire range for kerosene, and 0–45th for LPG. World prices in U.S. dollars were comparable in the three designated months for gasoline, diesel, and kerosene,

Table 3 Median Retail Prices in January 2013 (US$) and Sample Size

Category	Gasoline $ liter	Diesel $/liter	No. of countries	Kerosene $/liter	No. of countries	LPG $/kg	No. of countries
Income							
Low	1.34	1.22	15	0.98	12	1.77	10
Lower middle	1.12	1.02	24	0.84	17	0.80	22
Upper middle	1.21	1.08	24	1.15	12	1.04	18
High	1.97	1.52	8	a	1	a	2
Oil trade							
Net importers	1.28	1.22	51	0.99	32	1.24	35
Net exporters	0.87	0.93	20	0.56	9	0.61	15
Region (excluding high-income countries)							
East Asia and Pacific	1.25	1.03	9	1.11	4	1.20	8
Europe and Central Asia	1.16	1.23	4	a	1	a	1
Latin America and the Caribbean	1.24	1.14	16	1.18	8	1.01	14
Middle East and North Africa	0.67	0.44	8	0.41	4	0.40	7
South Asia	1.25	0.91	5	0.86	5	1.44	5
Sub-Saharan Africa	1.24	1.22	21	0.96	19	0.97	15

Source: See table A1.2 in Kojima 2012.

Note: Median prices are followed by the number of countries in each category. Gasoline and diesel have the same number of sample countries.
a. Too few countries in the sample for meaningful statistics.

but the price of LPG fell by one-third in the Americas between January 2012 and January 2013.

Table 3 provides median prices by income, oil trade status, and region. For gasoline and diesel, high-income OECD countries had the highest median prices on account of high fuel taxes and provision of no price subsidies. At the opposite end of the spectrum, lower-middle-income countries had the lowest median prices. As seen in all earlier

publications, net oil exporters had much lower prices than net oil importers. Median gasoline prices were comparable across the regions, with the exception of the Middle East and North Africa, a region dominated by net oil exporters. The median prices of other fuels showed greater variation across the regions.

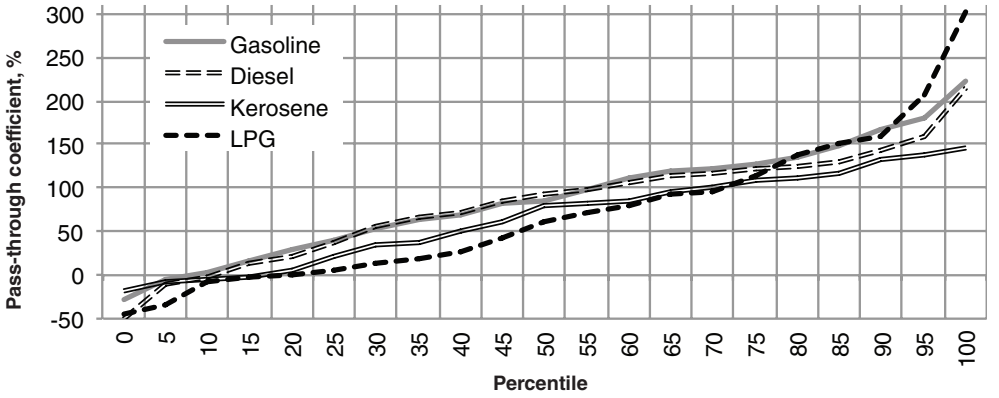
Price Movements between 2009 and 2013

Table B.3 in appendix B shows pass-through coefficients for January 2009–January 2012 (first time interval) and January 2009–January 2013 (last time interval). Although the results for the first time interval were previously published, the revised results take benchmark FOB prices from December 2008 and December 2011 to be consistent with the revised calculation methodology. Figure 6 shows the distribution of the coefficients for the four fuels for the last time interval, 2009–2013.

When the distribution curves for the earlier end points (January 2012 and July 2012) are overlaid, the plots overlap except at the lower and upper ends of the range for gasoline and diesel. The distribution plots for kerosene, and especially LPG, in the second time interval (January 2009–July 2012) show divergence from those for the other two time intervals. The 50th percentile (that is, the median) did not reach 100 percent for any fuel in any of the three time intervals. The lowest median pass-through coefficient was 60 percent for LPG in the last time interval, and the highest was 95 percent for gasoline in the first time interval.

The first background paper showed the medium to strong correlation between the pass-through coefficients—that is, the degree of

Figure 6 Distribution of Pass-through Coefficients, January 2009–January 2013



Source: Calculations using data from sources cited in table A1.2 in Kojima 2012.

Table 4 Median Pass-through Coefficients, January 2009–January 2013

Category	Gasoline	Diesel	No. of countries	Kerosene	No. of countries	LPG	No. of countries
Income							
Low	57	57	15	54	9	95	6
Lower middle	66	79	24	51	17	30	22
Upper middle	116	116	25	108	14	86	20
High	157	127	8	a	1	a	2
Oil trade							
Net importers	105	99	53	83	31	74	35
Low income	63	60	14	58	8	95	6
Lower-middle income	87	96	17	84	12	49	15
Upper-middle income	126	121	15	109	10	94	12
High income	169	130	7	a	1	a	2
Net exporters	57	42	19	17	10	21	15
Region (excluding high-income countries)							
East Asia and Pacific	99	99	9	59	4	57	8
Europe and Central Asia	111	145	4	a	1	a	1
Latin America and the Caribbean	117	113	17	111	10	117	16
Middle East and North Africa	22	4	8	22	4	3	7
South Asia	65	72	5	88	5	84	5
Sub-Saharan Africa	57	49	21	42	16	31	11

Source: Calculations based on data from sources cited in table A1.2 in Kojima 2012.

Note: Median coefficients are followed by the number of countries in each category. Gasoline and diesel have the same sample countries. Three figures are retained for coefficients exceeding 99% for formatting reasons only and are not intended to signify the number of significant figures.
a. Too few countries in the sample for meaningful statistics.

pass-through of world price increases tended to be comparable between gasoline and diesel, and so on. There was some correlation between pass-through coefficients and the country's oil import status as well as the vulnerability index. The correlations with other parameters examined—currency appreciation, current account balance, months of import cover, GDP per capita, and the logarithm of retail prices in the starting month (January 2009)—were weak or nonexistent.

Table 4 summarizes median pass-through coefficients by income, oil trade status, and region. Although there was no correlation between the pass-through and GDP per capita, when median coefficients were examined, they increased with income for gasoline and diesel. Among net importers, the median pass-through coefficients doubled going from low-income to upper-middle-income countries for gasoline, diesel, and kerosene. Sub-Saharan Africa had the second lowest coefficients after the Middle East and North Africa for all four fuels. Earlier, South Asia had the second lowest coefficients for gasoline and diesel during the first time interval and for gasoline and LPG during the second time interval.

The foregoing results suggest that domestic prices have been lagging the price movements on the world market for more than half of the countries studied. The next chapter looks at the pricing policies that have led to this outcome.

Chapter 5

Pricing Policy for Oil Products

The wide range of prices in chapter 4 mirrors the diversity of approaches to government pricing policy for oil products. Each has its own history and reflects the state of oil supply and consumption in the country, as well as the political economy of the downstream oil sector and the state of social service delivery by the government. This chapter reviews different pricing policies followed by governments in developing countries. Unless indicated otherwise, the materials are drawn from the second background paper, which contains case studies of 65 countries.

Range of pricing policies

Various options have been adopted by governments to help reduce price volatility, keep prices low for one or more user categories, or both. Measures include setting prices or price ceilings, providing targeted or universal price subsidies, setting up a fund for smoothing prices across time or freight cost equalization across the country for pan-territorial pricing, reducing taxes, requiring oil companies to bear some or all subsidy costs, and imposing high export tariffs or export bans to keep domestic prices low.

Combinations of these measures have enabled domestic prices to be frozen for months or even years at a time in dozens of countries. Countries that have frozen prices of gasoline, diesel, or both, for several months or longer in the past three years include Angola, Bangladesh, Bolivia, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, Ghana, India, Indonesia, Islamic Republic of Iran, Iraq, Jordan, Kazakhstan, Madagascar, Malawi, Malaysia, Morocco, Mozambique, Nepal, Niger, Nigeria, Russian Federation, Rwanda, Sri Lanka, Syria, República Bolivariana de Venezuela, and the Republic of Yemen. Malawi is rare in that it suspended automatic price adjustments in 2004 but resumed them in June 2012.

Jordan also resumed monthly price adjustments in December 2012 after suspending them at the end of 2010 except for LPG.

More generally, about two-thirds of the study countries have kept domestic prices below market-based levels for one or more fuels in the past three years, subsidizing consumers. The government pays in every case directly or indirectly—through budgetary transfers, tax expenditures, or lower corporate tax collection—on account of financial losses suffered by oil companies. Many countries have universal price subsidies and quite a few have subsidies targeting certain consumer categories, but price subsidies targeting the poor are quite rare.

Typology of pricing mechanisms

Table 5 provides a typology of different pricing mechanisms, examples of countries where these mechanisms have been operating in recent years, and their respective advantages and potential disadvantages. The mechanisms are not mutually exclusive and a single market may exhibit features of several of them. At one end of the spectrum are those countries where fuel prices are deregulated, subject to anti-trust legislation. The Philippines deregulated pricing in 1998 and Turkey did so in 1989, and both have maintained deregulated fuel prices. The Government of the Philippines, however, has been more active in influencing fuel prices: it has negotiated diesel price discounts with oil companies for transport operators and at times required oil companies to justify price increases in writing. At the opposite end of the spectrum are those where pricing is ad hoc for one or more fuels with no clear rules for when and how much to adjust prices. Many countries fall under this category. In countries where prices are frozen for years at a time, when they are finally adjusted, price increases can be very large. As a result, price adjustments in some markets have come to be synonymous with large price increases, giving price reform a bad name.

Oil product subsidies can grow to several percentage points of GDP, particularly in countries with ad hoc pricing. Two recent examples are subsidies of US$11.4 billion for gasoline and kerosene in Nigeria in 2011, amounting to 4.7 percent of GDP, and US$22.6 billion for gasoline, diesel, kerosene, and LPG subsidies in Indonesia in 2012, amounting to 2.6 percent of GDP. In particular, countries with ad hoc pricing need serious efforts to address subsidies: these countries tend to face greater political challenges in reforming subsidies, fiscal outlays

Table 5 Examples of Different Pricing Mechanisms

Mechanism	Advantages	Potential problems
Deregulate, subject to anti-trust regulations (Philippines, Turkey)	Minimizes market distortions, no subsidies, gives appropriate price signals to consumers, competition can drive down costs and prices by driving inefficient firms out of business.	Downstream oil sector needs to be competitive or else consumers may be charged high prices; world price volatility is immediately transmitted.
Adjust based on some link to world prices and domestic costs:		
(1) Frequent adjustments based on world prices averaged over 1–4 weeks (Dominican Republic, South Africa)	(1) Tracks world prices well while providing some measure of stability, limits scope for mounting subsidies	(1) World price volatility is quickly transmitted.
(2) Frequent adjustments, but based on world prices averaged over 1 month or longer to smooth prices	(2) Prices are more stable	(2) World and domestic prices can be moving in the opposite direction; potentially large scope for mounting subsidies.
(3) Adjustments made when world prices change by more than ± *X*% (Malawi, Togo)	3) Stability within the price band	(3) If *X* is relatively large, potentially large changes could occur when adjustments are made; there is a possibility of losses exceeding savings within the price band.
(4) Price flotation within a price band, changes smoothed outside (Chile for small and medium consumers, Peru)	(4) Large price changes avoided	(4) Can lead to large subsidies unless price bands are frequently adjusted.
Steadily increase price at regular time intervals until cost-recovery levels are reached: **(1) By a predetermined monetary amount (LPG for vehicles and industry in Thailand), or** **(2) By percentage (Mexico)**	Each price increase is small and predictable and is not affected by sudden price spikes and collapses.	Could lose political commitment over time, and invite resentment if world prices are falling; if the increases are regular but small compared to world price increases, subsidies could continue for years (Mexico).
Lowers domestic prices by imposing large export tariffs or export quantity restrictions such as export bans (Argentina, Bolivia, diesel in China, Kazakhstan, Russian Federation)	No setting of domestic prices by government, depoliticizes effective government price control for consumers	Friction with oil companies; if restrictions are sufficiently large, they create fuel shortages over the long run, because incentives to invest in oil production and refining decline and investors move to other markets
Stabilize prices through funds and other means as follows:	Prices are smoothed.	

(continued)

Mechanism	Advantages	Potential problems
(1) Based on the principle of over-recoveries offsetting under-recoveries (Ghana, India, Nepal, Nigeria, Vietnam): domestic prices are kept higher than market-based levels in times of low world prices, and over-recoveries are saved; prices are kept lower than market-based levels in times of high world prices, and the savings from over-recoveries are used to cover the under-recoveries.	(1) Can be self-financing in principle.	(1) Method is seldom, if ever, self-financing because of the arcsine law: even when prices move in a random fashion, a period of under-recoveries can last a very long time, creating a serious cash flow problem for a stabilization fund.
(2) Tax adjustments (based on clearly defined rules in Chile for small and medium consumers, temporary diesel tax reduction in Thailand, frequent adjustments of import tariffs in Vietnam)		(2) This method is a tax expenditure, which is less transparent than subsidies financed out of the budget because tax expenditures are not subject to annual budgetary scrutiny by the parliament.
(3) Establishing a temporary stabilization fund (Chile, Peru) with an initial transfer to cope with a sudden increase in world oil prices	(3) Helps deal with large price shocks while limiting the period of artificially low prices.	(3) This method faces political pressure to extend the phaseout date repeatedly (Chile, Peru, Thailand), potentially resulting in a growing budgetary outlay or loans taken out by the fund.
Cross-subsidize certain fuels (Ghana and Nepal using gasoline to cross-subsidize other fuels, Thailand using its oil fund to cross-subsidize ethanol-gasoline blends today and LPG in the past)	Possible to target net zero subsidy	Net subsidies often exceed the zero threshold under political pressure. Inter-fuel price differences are amplified, distorting incentives.
Deregulate prices for higher grade fuels (Egypt, India, Indonesia, Malaysia) or certain fuels (diesel in Nigeria)	End subsidies to the rich, who are the main consumers of higher-grade fuels, or end subsidies to less politically sensitive fuels	Various market distortions as a result of growing price differences for similar fuels, fuel switching by users from higher-grade to cheaper fuel, adulteration of higher-grade fuels with subsidized fuels.
Ration heavily subsidized fuels, charge higher prices outside the quota (kerosene and LPG in India, gasoline and diesel in Iran, Islamic Rep.)	Limit subsidies and protect vulnerable groups	Selling the same product at different prices invites corruption, starting with diversion to consumers who are not entitled to the subsidized fuel.
Shift subsidy from one product to another (kerosene-to-LPG conversion in Indonesia)	Subsidy for one product is eliminated.	Could lead to a growing subsidy on the product to which the subsidy is shifted (Indonesia).
Set different pricing rules depending on world oil price ($80 and $130 per barrel in China)	Limit subsidies to times of high world prices	Unless price bands are adjusted from time to time, if world prices remain high, subsidies could grow.

(continued)

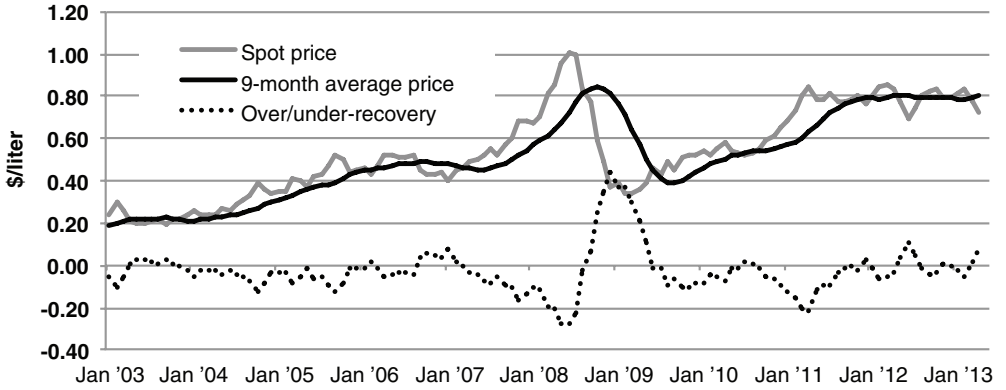
Mechanism	Advantages	Potential problems
Establish the total subsidy envelope for the fiscal year and adjust prices, volume, or both, accordingly	Limit the total subsidy bill	Politically difficult to raise prices when money runs out
Ad hoc: No clear rules; prices may be frozen for months or years at a time for one or more fuels (Angola, Bangladesh, Bolivia, Côte d'Ivoire, Egypt, Gabon, India, Indonesia, Iran, Islamic Rep., Iraq, Jordan, Malaysia, Morocco, Mozambique, Nepal, Niger, Nigeria, Syrian Arab Republic, Tunisia, Venezuela, RB)	Stable prices between changes	Price changes can be large when adjustments are finally made, and adjustments become synonymous with (large) price increases; tendency to delay price increases; lack of predictability; likelihood of mounting subsidies; politicization of price adjustments; hoarding in response to rumors of imminent price increases and fuel shortages.

Source: Table A1.1 in Kojima 2013.

Table 6 Decision Parameters for Government-Controlled Prices

Mechanism	Advantages	Potential problems
Price ceilings	Provide some scope for price competition; divergence from ceilings suggests emerging competition, with less need to get the prices "exactly right" than controlling price levels	If price ceilings are too high, there is little incentive to improve efficiency. If they are too low, some or all segments of downstream oil may cease to be financially viable.
Price levels	Greater control	There is no scope for price competition. If price levels are set too high, there is little incentive to improve efficiency, and if set too low, some or all segments of downstream oil may cease to be financially viable.
Control at retail	Easy for consumers to check compliance	More assumptions are needed to calculate prices than controlling prices upstream of retail. Compliance is more difficult to monitor because the number of points to be checked is the largest at retail. In the extreme, wholesale could be higher than retail (Kazakhstan).
Control at wholesale or elsewhere upstream of retail	More transparent because of greater correlation with benchmark international prices, easier to monitor compliance because there are fewer points of sale. There is no need to try to estimate transport costs and retail margins throughout the country.	If competition is inadequate, margins could grow and retail prices could be markedly higher than otherwise. If upstream prices are set too low, oil companies may try to recover losses by increasing retail prices to compensate.
Uniform prices	Sense of national unity: one country, one price. Easy for consumers to check compliance.	Freight equalization introduces additional scope for inefficiency as well as corruption. Cross-subsidization could increase to the point of making the cost of compliance unacceptably high.
Pricing by location	Costs are better reflected.	Consumers in remote areas may compare themselves to those in major cities and feel a sense of injustice. If the cost of serving remote areas is too high, some may not be served.

Figure 7 U.S. Heating Oil: Monthly Average Spot Prices vs. Nine-Month Average Prices



Source: Calculations based on EIA 2013b.

supporting subsidies are generally larger, and there tend to be greater market distortions, less transparency, and more commercial malpractice.

Government control of fuel prices requires several decisions before criteria for setting prices can be selected. The first is whether to set price ceilings or price levels. The second is where along the supply chain prices or price ceilings will be set. The third is whether prices or ceilings will be uniform throughout the country or vary by location. The pros and cons of different options are outlined in Table 6. The inability to promote price competition is one of the disadvantages of controlling price levels.

Cost of smoothing prices

A common objective for government control of prices is to smooth the international oil price volatility on the domestic market. There is an economic cost to price volatility, and a vast literature exists on whether it would make sense to intervene to try to reduce price volatility, particularly in agriculture. Keynes (1942) argued, "One of the greatest evils in international trade … [is] the wide and rapid fluctuations in the world prices of primary products. It must be the primary purpose of control to prevent these wide fluctuations."

One systematic approach to smoothing oil price volatility on the domestic market is to set the domestic price by averaging past, and possibly futures prices over a fixed period of time. Figure 7 shows a hypothetical smoothing scheme that uses moving averages of spot prices from the previous nine months as the starting point for constructing domestic

Table 7 Heating Oil: Comparison of Returns and Cumulative Losses Using Different Averaging Periods, January 2003–April 2013

Parameter	No averaging	1-0	3-0	6-0	9-0	1-1	3-3	6-3	9-3
Minimum return	-0.11	-0.27	-0.24	-0.16	-0.13	-0.23	-0.21	-0.16	-0.09
Maximum return	0.11	0.22	0.15	0.09	0.07	0.14	0.12	0.10	0.08
Coefficient of variation	53	7.5	5.1	3.8	2.9	6.1	5.0	3.7	2.8
Cumulative loss, $ million for 10,000 bpd	n.a.	25	54	98	144	3	10	54	99

Source: Calculations based on EIA 2013b.

Note: Except for the column labeled "no averaging," for which daily spot prices are used, all other prices are monthly average prices of spot and future prices for no. 2 heating oil in the New York Harbor. The first number, "n," in "n-m" stands for the number of past months for averaging prices, and the second number, "m," for months in the futures contracts. For example, "6-3" is the average of the past six months and the average of the next three months, taking the futures contract prices for one, two, and three months ahead. Returns = differences in logarithms of successive prices; coefficient of variation = ratio of standard deviation to average; n.a. = not applicable.

prices. The plot uses heating oil (a type of diesel) in the New York Harbor, for which both spot prices and futures contract prices (which are used in the next illustration) are available publicly. Smoothed prices significantly reduce price volatility, although world oil prices and domestic prices move in opposite directions half the time—that is, domestic prices (black solid line in the figure) are rising when world prices (gray solid line) are falling, and vice versa. The plot also shows over- and under-recoveries in each month (dotted line).

Table 7 summarizes the results of analyzing for different averaging periods—ranging from taking the average price from the previous month (third column) to averaging prices from the previous nine months and the next three months (last column)—using the historical spot and futures contract prices of U.S. heating oil since January 2003. The analysis is based on returns, which are differences in successive data entries. When logarithms of prices are taken, as in the table, returns approximate fractional changes in prices from month to month, so that multiplying returns by 100 approximates percentage changes; a return of 0.05, for example, represents a price change of about 5 percent. The hypothetical smoothing schemes maintain the same price for a month at a time and make monthly adjustments. Cumulative losses between January 2003 and April 2013 for smoothing prices for 10,000 bpd are also shown.

The results show that, as expected, increasing the averaging period reduces price volatility: the coefficient of variation, one measure of volatility, is largest when daily prices are taken with no averaging, and it is smallest when the prices from 12 months—the previous nine months and the next three months—are averaged. Cumulative losses increase with decreasing volatility. Inclusion of futures prices, however, reduces cumulative losses markedly without sacrificing the benefit of volatility reduction. The number of months when world and domestic prices move oppositely—which could be politically awkward—is also reduced substantially when futures contract prices are included. For example, adding the futures prices for the next three months to the past nine months in the averaging basket reduces the percentage of time when world and domestic prices move in the opposite direction from 50 to 30 percent. Although not shown, adjusting prices daily rather than monthly increases volatility and decreases the cumulative loss for the same averaging period.

When there is no strong trend in the underlying international prices, smoothing schemes can operate without incurring an excessive fiscal burden for the government in the long run. Even in that case, however, the pattern of oil price changes can result in the scheme running a deficit for a lengthy period. The choice of moving average is important. The longer the moving average, the lower the volatility of the regulated price, but the more vulnerable the scheme will be to periods of sustained price increases. There tends to be a trade-off between cumulative losses and the extent of smoothing. The incorporation of several futures prices into the moving average may help reduce volatility without incurring an additional fiscal burden. However, futures contract prices are available largely for crude oil, and much less for oil products.

On the basis of the belief that the economic cost of volatility could be reduced with price stabilization and other price control mechanisms, many governments tried to dampen price volatility after the first oil shock of 1973. As the U.S. experience demonstrates, however, government interventions to smooth price volatility on the world market proved costly and were soon abandoned in a number of countries. The economic cost of oil price volatility is little researched and difficult to quantify. Recent experience suggests that no smoothing scheme in the past decade has managed to achieve substantial smoothing without a corresponding fiscal burden or necessitating large loans (Kojima 2013, table A1.1). As such, there are large opportunity costs associated with government interventions targeting significant price smoothing; thus the costs and the

perceived benefits of such smoothing schemes should be weighed against those of other alternative uses of the same financial resources. Further, as chapter 6 shows, if the objective is reducing periods of high oil prices and price hikes on the domestic market, there are non-fiscal means of doing so. In a detailed assessment of commodity price stabilization, Newbery and Stiglitz (1981) concluded, "The major result of our analysis is to question seriously the desirability of price stabilization schemes, both from the point of view of the producer and of the consumer."

Targeted price subsidies for liquid fuels

Universal price subsidies for liquid fuels are widely recognized as generally captured disproportionately by the rich and businesses (Coady et al. 2010; Bacon, Bhattacharya, and Kojima 2010, 75–79; Kojima 2011, 28–30; Arze del Granado, Coady, and Gillingham 2012). Large universal price subsidies lead to large fiscal burdens, losses for suppliers, or both; they can decapitalize the downstream oil sector; and weaken governance by providing strong incentives for smuggling and other forms of commercial malpractice. These observations underscore the importance of moving away from universal price subsidies as rapidly as possible.
As Table 5 shows, many governments have attempted to target price subsidies to limit the size of the subsidy bill and help primarily those who are vulnerable. Examples include subsidizing or offering larger subsidies for, and sometimes rationing, kerosene for household use in Angola, India, Indonesia, Malawi, Nigeria, and Tunisia; subsidizing LPG for the poor in Argentina and Panama and for household use in India, Indonesia, Morocco, Thailand, and Tunisia; offering price discounts or larger price subsidies for gasoline, diesel, or both, for certain user categories in Ghana (fishing), Islamic Republic of Iran (certain vehicle categories for gasoline and diesel), Kazakhstan (farmers), Malaysia (certain vehicle categories and fishing boats), the Philippines (price discounts negotiated with oil companies for transport operators), and the Russian Federation (farmers). With the exception of premix in Ghana, which is gasoline pre-mixed with a small quantity of lubricant for two-stroke engines, the identical fuel is sold at different prices depending on the user in all other cases.

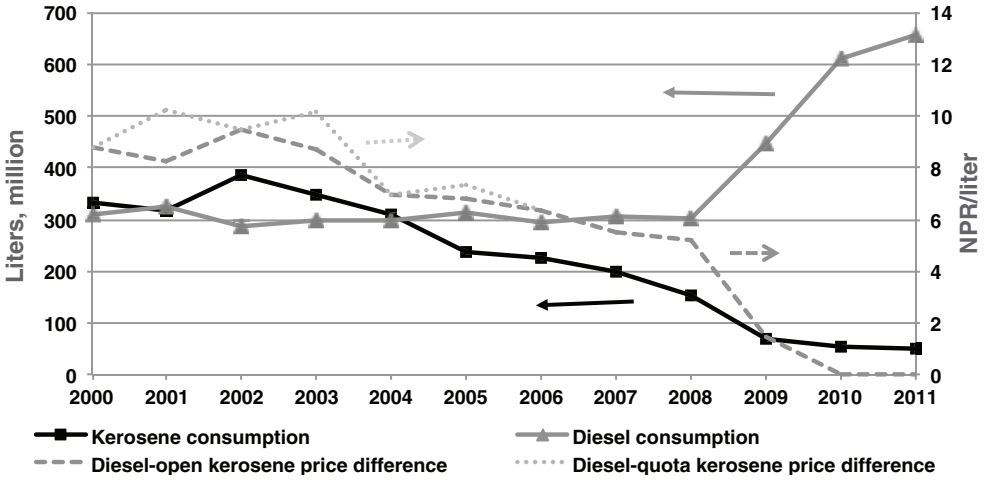
In some segments of the energy sector it is possible to design and implement targeted subsidies effectively. Electricity and natural gas are suited for this purpose because consumption by each consumer can be metered precisely, consumption is typically correlated with the user's

income level so that the poor can be relatively easily targeted, and a properly designed tariff structure can limit the amount of subsidized energy sold to the poor and achieve cost recovery through cross-subsidization. Importantly, it is difficult to divert electricity or natural gas delivered to the poor on a large scale to businesses. The difficulties associated with diversion help maintain the integrity of multi-tier pricing.

In contrast, liquid fuels are very easy to store and transport, making it virtually impossible to prevent diversion. An attractive destination for diversion is arguably the automotive sector, most commonly kerosene for household use diverted to the automotive diesel sector. Kerosene is not produced to diesel specifications but can be added in large quantities to diesel without immediate detection by the driver. As a result, the level of diversion tends to increase with increasing price difference between kerosene and diesel. Apparent kerosene and diesel consumption in Nepal illustrates this point. Two types of kerosene were sold in Nepal until 2006, so-called quota kerosene, which was rationed, and open kerosene. Both were priced much lower than diesel. By 2006, the quota kerosene had been withdrawn from the market, but kerosene continued to enjoy a significant price advantage over diesel. The government eliminated the price difference in November 2008, at which point apparent consumption of diesel rose sharply (Figure 8). Similarly, when Vietnam in March 2005 lowered the price of kerosene by D 600 ($0.038) a liter below that of diesel—against the historical difference of D 50 ($0.003)—the demand for kerosene immediately rose by 30–40 percent (Asia Pulse 2005). In response, the government equalized the prices of these two fuels in July 2005.

Multi-tier pricing of gasoline and diesel targeted to specific businesses is equally problematic. One example is premix in Ghana, which is sold at less than one-third the price of gasoline to help the fishing industry. Although premix is not an ideal diluent for gasoline, it is diverted on a large scale to adulterate gasoline, leading to frequent complaints of premix shortages (2012). Eliminating subsidies for high-octane gasoline (used in high-performance cars typically owned by the rich) and widening the price difference between gasoline grades similarly risks diversion of cheap gasoline to adulterate high-octane gasoline, or fuel switching from high-octane to lower octane gasoline. Subsidized diesel set aside for farmers and fishing boats can also be diverted, either by suppliers before the fuel reaches the intended beneficiaries, or, especially in the case of gasoline and diesel used in boats, by the beneficiaries themselves. Fishing boats are particularly suited for transporting large quantities of fuel and hence for diversion. It is for this reason that the government of

Figure 8 Kerosene and Diesel Pricing and Consumption in Nepal (Rupees)



Source: Sales statistics from the Nepal Oil Corporation.

Note: The years are fiscal years in Nepal, starting on July 16, and each is the end-year of the fiscal year. For example, fiscal 2000 is July 16, 1999, to July 15, 2000. The price differences are averaged over each fiscal year.

Malaysia in August 2012 announced a new requirement for fishing boats whereby each catch would be verified by a government representative to ensure that the subsidized fuel is used for fishing and not other purposes (2012).

LPG is more difficult to store and transport because it is a gas at room temperature and atmospheric pressure and needs to be kept under pressure. Nevertheless, selling LPG in small cylinders for household use at lower unit prices than large cylinders invites diversion from households to businesses and industries, as in Indonesia and Thailand, or to the automotive sector, as in Ghana, if the price difference between gasoline and LPG is large enough. Even without taking diversion into account, LPG price subsidies for households benefit the rich disproportionately (Kojima 2011).

In all cases, diversion makes less subsidized fuel available for the intended beneficiaries, enables black markets to flourish, and all too often forces the poor—especially in rural areas—to pay more. In the extreme, the prices paid can be markedly higher than what would have prevailed in a deregulated market. An example is kerosene in Nigeria, for which the official price has been 50 naira (US$0.32) a liter for years but which has been known to cost as much as six-times the official price in some regions (All Africa2011).

Large enough financial incentives may attract criminal elements, who may use physical force and violence to silence investigators and whistleblowers (2011). To stem diversion, smuggling (into or out of the country, depending on price levels in neighboring countries), and tax evasion, some countries require the use of chemical markers or dyes (Kenya, Senegal, South Africa, Thailand, Togo, Tanzania, Turkey, Uganda), tagging of vehicles (República Bolivariana de Venezuela), and even electronic tracking of delivery vans (Tanzania). But when the financial gains are high, those engaged in commercial malpractice find ways to get around these restrictions over time.

A clean-burning fuel for cooking and heating may be a merit good with health benefits users do not fully recognize. One way of ensuring continuing consumption is to earmark cash transfers for the purchase of that specific fuel. In this way, market prices are not affected, and the poor can use the cash only to buy the clean fuel. This is the principle behind bonogas cards for LPG in the Dominican Republic. Newly developed biometric databases could be useful to ensure that fuel cards are used only by those whose personal data are embedded in the card.

The Government of India is proceeding with what it calls end-to-end computerization of the targeted public distribution system, which distributes subsidized food and kerosene. Some states are now piloting distribution of subsidized food and fuel using smart cards containing biometric information about beneficiary families (India Ministry 2013). Egypt is planning to introduce a nationwide smart card system for rationing subsidized gasoline starting in July 2013, and eventually subsidized diesel except for agriculture and food industries (Reuters 2013). While it is always possible to sell the fuel purchased in this way for cash, the transaction cost would presumably discourage resale on a large-scale.

Unintended consequences of keeping domestic prices low

Rising claims on the budget or growing tax expenditures, the public being shielded from sharp price rises, and weak price signals reducing incentives for fuel conservation are among the predictable consequences of keeping domestic prices artificially low. Less expected are growing fuel shortages, protection of inefficient fuel suppliers, and rising demand with rising prices once subsidies are reduced or removed.

Fuel shortages are common in a number of markets with low prices. In Egypt, LPG shortages in recent years have been so serious that several consumers have been killed in scuffles over LPG cylinders, and the army

and the police have provided armed guards for LPG transport. Shortages occur because of commercial malpractice, implicit rationing, and adverse effects of subsidies on the operational and financial performance of oil companies. Subsidized fuels are diverted to black markets or smuggled out of the country, reducing fuel availability in the formal sector. Even when there is no commercial malpractice, as in the United States in the 1970s, price controls have led to sporadic fuel shortages and long queues, with costs to many consumers of queuing and other inconveniences outweighing the benefits of low prices, as described in chapter 2.

Many governments cannot cover the full costs of subsidies for apparent demand, leading to implicit rationing of subsidized fuel. Where oil companies must partially or fully shoulder the costs of subsidies, they may decide to cut back on refining or else export oil products (as in China and Russia), reduce imports, or both. They may also choose to shut down filling stations—some 3,500 filling stations in Argentina closed between 2005 and 2010 because of poor profitability, and in India two private oil companies have closed thousands of filling stations, Essar Oil in 2005 and Reliance Petroleum in 2008 (Essar has since reopened its stations). In extreme cases, financially cash-strapped oil companies cannot purchase crude oil for refining or import oil products because banks are reluctant to issue letters of credit. Egypt, Senegal, and the Republic of Yemen have been in that situation in recent years. Years of subsidies can also decapitalize the downstream oil industry, leaving refineries and other infrastructure in disrepair and creating fuel shortages.

It is common to channel all subsidies through state-owned oil companies in countries that have them. As a result, these companies can end up attaining a monopoly or near-monopoly status. But years or even decades of not having to face any competition make these operators opaque and inefficient, raising costs. Higher costs in turn raise the cost of subsidies to the government.

If there are frequent acute or widespread fuel shortages, it is even possible that removing subsidies and raising prices will free up supply constraints—such as by operating refineries at higher utilization rates and importing more oil products—to meet suppressed demand. In such circumstances, the elasticity of demand with respect to price may be positive rather than negative initially while consumption rises to match supply.

Shift to market-based pricing

The foregoing suggests that price subsidies for liquid fuels, however "targeted," are not efficient means of achieving the stated objectives—controlling inflation, helping the poor, making modern energy services affordable, and assisting agriculture, transport, or fisheries—because of various adverse consequences stemming from poor targeting, diversion, and market distortions. Even smart cards to restrict fuel purchase to the intended beneficiaries have been known to be abused; the targeted subsidy for fishing boats in Malaysia discussed above is administered through smart cards. Upward price trends on the world oil market in recent years mean that keeping domestic prices artificially low or smoothing volatility significantly has been costly to the government, oil companies, or both.

Given the weight of the evidence, governments should pursue policies to make the downstream oil sector competitive and deregulate it, so as to achieve social protection and other objectives of price controls through means other than exercising control over pricing and fuel allocation. To help the poor cope with high oil prices, the long-term goal should be to replace fuel price subsidies with effective social service delivery. The most efficient and least distorting approach is arguably to transfer cash as part of an integrated, comprehensive poverty alleviation program; government interventions to keep prices low for each good and service through sectoral subsidies are generally suboptimal.

The path to price deregulation (or market-based pricing in small markets with inadequate competition) depends on the starting conditions. Several aspects of the starting conditions influence the design and timing of price reform, including: (1) the gap between the current and market-based price levels, (2) the market structure, (3) the subsidy delivery mechanism where there is a price subsidy, and (4) the mechanism for delivering social protection. The rest of this section discusses these four aspects briefly followed by comments on the potential impact of price reform on the quality of service, the role of communication, and the transparency of the pricing policy. Restructuring of the downstream oil sector is beyond the scope of this report.

Bridging the price gap

If current prices are very low, they may need to be raised several-fold. Examples include all subsidized fuels in República Bolivariana de

Venezuela, Egypt, Indonesia, Islamic Republic of Iran, and Iraq; pre-mix in Ghana; kerosene in Angola, Bolivia, Ghana, India (for household use), and Nigeria; and LPG in Angola, Bolivia, Argentina (LPG for the poor), Morocco, Tunisia, and Panama (LPG for the poor). Implementing very large, one-off price increases is likely to be too disruptive and unlikely to find political acceptance. Large price increases also invite backlashes. A recent example is the price reform in the Islamic Republic of Iran in December 2010, in which fuel prices were at least doubled (for super gasoline) and increased by as much as 21-fold for diesel. That reform was remarkable in that such large price increases were not rolled back. Nevertheless, despite very large handouts to virtually the entire population for compensation at a cost that far exceeded the savings from the price increases, the parliament in 2012 amended the law reforming subsidies, turning future price floors in the law—intended to eliminate subsidies in five years—to price ceilings, thereby effectively entrenching subsidies (albeit smaller ones than at present).

In these situations, the government needs to decide how long it should take to raise prices to market levels, and how large each price increase should be. This task is obviously made easier if price adjustments are started in times of low world oil prices, as the Government of China did in January 2009 when it switched to a new regime requiring more frequent price adjustments based on a 22-day running average price of a basket of crudes. Several countries mentioned above that now require large price increases had retail prices close to market-based price levels in January 2009. Having missed that opportunity, and given that oil prices are unlikely to collapse as spectacularly as they did in 2008 and 2009, governments may consider raising prices in small increments regularly until market levels are reached, as the Government of Thailand has begun to do with LPG prices. However, if the starting prices are very low—a cup of coffee in República Bolivariana de Venezuela is a hundred times more expensive than a liter of premium gasoline—large initial price increases may be warranted and find political acceptance.

Although rare, there are circumstances when overnight subsidy elimination may be feasible. One such case is a limited price subsidy program targeting only the poor, as with the LPG programs in Argentina and Panama. The Dominican Republic in September 2008 eliminated the LPG price subsidy and replaced it with bonagas cards issued to the poor; cash earmarked for LPG purchase is transferred to bonagas cards as part of social protection. Another scenario where overnight subsidy elimination may make sense is where black market prices have become the de facto end-user prices and are close to what would have been market prices,

as with subsidized kerosene in Nigeria. In these situations, it would be informative to conduct price and quantity surveys to identify how much consumers actually purchase and at what price, because the quantities purchased and prices paid determine the impact of higher official prices.

Market structure

If a national oil company dominates the downstream oil sector, competition is more difficult to introduce, cost reduction from efficiency gains presents a greater challenge than otherwise, and price deregulation would be problematic. Mimicking market conditions using an import- or export-parity pricing formula for ex-refinery prices and estimating costs and reasonable returns downstream of refining or importing would be an alternative until the sector is restructured and adequate competition is fostered. Even in a country with several oil companies, regional monopolies in different parts of the country could still exist. It is difficult to estimate what would be efficient costs in an uncompetitive market for the purpose of establishing a pricing formula, because the only readily available benchmark costs are FOB prices. Inefficiencies in importation, storage, transport, and retailing, and excess profits are difficult to estimate; doing so requires data collection from other markets that are competitive and similar in size and fuel consumption makeup.

In large markets, where vigorous competition is possible in principle, domination by national oil companies may continue if subsidies are delivered through them—subsidies isolate the national oil companies from competition and entrench the monopoly structure. It is clear that prices cannot be deregulated in a highly concentrated market. Removal of subsidies and sector restructuring may need to proceed in parallel.

Small markets pose special challenges, especially if they are isolated, as the experience in Hawaii in the last decade demonstrates. Even if there are several suppliers with no single company dominating, it may not be easy to gauge whether there is adequate price competition. As described earlier in this chapter, price ceilings may be used as a transition measure to avoid high prices from price collusion while giving some indication of the degree of competition in the market.

Subsidy delivery

How subsidies are delivered affects the sequence of steps for price reform. In some cases, crude oil (typically from domestic production) is provided at a heavy discount to domestic refineries, almost always

state-owned. The crude oil price discounts also isolate the refineries from competition. It would not make sense to raise retail prices without adjusting crude oil prices, but that may mean that the budgetary outlay for subsidies increases for a while—because the government must now pay the entire subsidy bill where previously oil producers covered part of it out of the upstream rent—before subsidies are eliminated completely. In other cases, price subsidies are channeled through state-owned oil companies. In both cases, subsidy delivery is closely linked to the market structure.

Oil companies often end up bearing some of the costs of subsidies. Subsidies are seldom reimbursed on time, creating cash-flow problems, even if fully reimbursed eventually. The government may freeze margins for a long time, effectively eroding their values. In countries such as Argentina, Brazil, and India, oil companies are being asked to bear some or all the costs directly. In such cases, oil companies would welcome elimination of subsidies.

If there is much profiteering from subsidies—notably through diversion and smuggling but also from fraudulent claims on reimbursements, as in Nigeria in 2011—there is likely to be considerable political opposition to subsidy elimination, orchestrated through other stakeholders to disguise those who are benefiting through illegal means. Communication (see next section) becomes all the more important.

Delivery of social protection

One of the arguments for keeping prices artificially low is that, however large the leakage, such a policy does protect the poor. This argument is not invoked in high-income OECD countries where integrated social protection mechanisms already exist and there is no need to use price controls with attendant market distortions as social safety nets.

There is nothing special about oil as a commodity for which a single global market exists. Prices of commodities rise and fall all the time. It is inefficient to intervene in the market to protect the poor each time the price of something they buy increases. The government's goal should be to develop a comprehensive and integrated social protection mechanism to help the vulnerable cope with rising prices of the basket of goods and services they purchase. In this respect, the highest priority for the government should be to work on two aspects of social protection: accurate identification of beneficiaries, updated from time to time, and a mechanism for efficient and timely delivery of cash and services to help pay for such essential needs as food, energy, health, education, transport, safe

water, and sanitation. For the poor, the largest impact of higher prices of oil products may very well be through higher food prices, which is all the more reason to focus on the basket of goods they consume rather than on the prices of individual fuels.

Developing a comprehensive social protection program takes time. But problems with fuel price controls and subsidies have also persisted for a long time, long enough to have developed a good social protection program by now. Governments accelerating efforts in this area today have a wealth of experience from other countries to draw from on suitable safety programs how to develop them for maximum effectiveness (Grosh et al. 2008; Fiszbein et al. 2009).

Countries with large subsidies could experience a vicious cycle, whereby subsidies take up virtually the entire social spending by the government, which leaves it with few resources to begin an effective social protection program. Breaking the logjam requires taking steps in parallel to chip away at reducing subsidies and shifting spending from subsidies to social safety nets.

Higher oil prices may lower demand for labor, wages, or both in the short run, especially for unskilled workers (for example, see Keane and Prasad 1996). Such labor market adjustments could be painful for the poor and near-poor. Unemployment benefits are essential to smooth labor market transitions, yet they are underdeveloped or virtually nonexistent in rapidly urbanizing low-income countries. This highlights the importance of channeling more resources to strengthen unemployment policies in these countries.

Good safety net programs require efficient and cost-effective systems for enrolling beneficiaries, making payments, and monitoring. Setting up a sound safety net program from scratch takes at least four to six months, with a longer period for refinement. In the immediate term, the question is which existing programs can be scaled up while avoiding actions that will work against the medium- to long-run development of a sound social protection system. For example, if medium- or long-term plans envisage consolidating or closing specific programs, scaling these up as part of a short-run response will work against long-term reforms.

In the near term, countries with sound and comprehensive safety nets already in place can increase the value of the benefits, coverage, or both. Examples include unconditional or conditional cash transfer programs. Targeted cash transfers of adequate coverage, generosity, and quality are the best option. Increasing the benefits of social insurance programs not linked to earnings—such as social pensions, survivorship pensions, disability pensions, and unemployment benefits—can be helpful if they

cover the poor. Near-cash instruments such as food stamps or vouchers for transport have slightly higher administrative costs than cash but can be politically popular. Fee waivers or vouchers for health and education help households maintain access to services even if households become poorer (World Bank 2008).

Service quality

Governments' attempts to keep domestic prices artificially low can reduce the quality of service substantially in the downstream oil sector. Examples include long queues, flourishing black markets with much higher prices, adulterated fuels, and sometimes outright fuel outages with no fuels available at any price. Conversely, moving to market-based pricing could reduce or eliminate the financial incentives and causes of the low quality of service and transform the market. Some changes are instant; others take longer.

Adulteration of automotive diesel with kerosene can be stopped instantly if the price of kerosene is raised to equal the price of diesel. Black markets may disappear if official prices are raised sufficiently; the size of a black market is inversely correlated with the price difference between the official fuel prices and prices on alternative markets, capped by import-parity prices. Fuel shortages may also disappear altogether if prices are raised to market levels. Short-selling is common in many markets, and is another way by which consumers pay more than the official prices. Raising official prices but clamping down on short-selling can reduce the adverse effects of price increases. Shortages may persist for a while in exceptional circumstances: if the supply infrastructure is in disrepair and needs significant refurbishment for normal operation, or if suppliers are in financial distress after years of subsidies and need to be recapitalized.

Normalization of fuel supply is readily observable and can be effected immediately—hence a quick win for the government in price reforms. The more people are affected, the greater are the perceived benefits. Adroit handling of supply deficiencies therefore merits special attention.

Consultation and communication

Consultation and communication are essential to the transition to market-based pricing. Nearly all governments communicate about the regressive nature of fuel subsidies, often comparing the total subsidy bill with total spending on education or health. Governments usually go on

to explain how the savings from subsidy reduction will be used more equitably.

The content, timing, and manner of communication are all important. Resources should be devoted to developing an appropriate communication strategy. Analysis of winners and losers, effects on different segments of the economy as well as households, and how the savings from price reform might help offset the adverse effects of the reform should be undertaken ahead of time and communicated appropriately.

There should be adequate time for the messages to be delivered and feedback to be received. Today there is a variety of media for having a national conversation about price reform. Electronic media, in particular, are interactive, giving people an opportunity to have their say and the government an opportunity to acknowledge their concerns. Both the internet and now mobile phones enable citizens to voice their opinions. Although not related to fuel pricing, one such example is "Mali speaks" in a country where less than 3 percent of the population has access to the internet but two-thirds have mobile phones (2013). The government could also take advantage of how mainstream news stories are shared and commented on in the social media by tracking and monitoring the quantity and quality of the conversation to gauge where public opinions lie. Yet another option is to leverage existing organizations by formulating a questionnaire and asking civil society organizations located in remote areas to survey people in their areas. All these can complement more traditional forms of communication—TV, radio, newspapers, press releases, and stakeholder meetings.

It is important to recognize that communication is only as effective as the credibility of the communicator. If the government has a poor track record of delivery, if there is a perception of widespread corruption, or if the subsidy delivery mechanism has large illegal leakages, the public rightly may question whether the savings from subsidy reduction will be used for their benefits, or whether the subsidies need to be reduced in the first place. As a former Nigerian trade union leader put it, the government can afford to continue giving a price subsidy, if only it can do so far more efficiently and without corruption (2011). That is, however cleverly designed a communication strategy, it cannot compensate fully for perceived lack of credibility of the government in society at large.

Finally, working with the transport sector is important because higher transport costs are among the immediate consequences of higher fuel prices, readily noticed by the public. The timing of adjustments of controlled transport fares and tariffs often coincides with fuel price increases, giving the public the impression that the fare and tariff increases are

solely due to the fuel price adjustments. When fuel prices are raised by 20 percent and transport tariffs increase by 30 percent, fuel price reforms are blamed, whereas the fuel price increases alone would account for only a fraction of the 30-percent increase. Communicating these aspects, and possibly reassessing the way transport fares and tariffs are set, are also important.

Transparency

One step in fostering public acceptance of price reforms is to make fuel pricing policy transparent. Where there is a measure of price control, however limited, the government should establish, through regulations or laws, the agency in charge of determining prices and the principles governing price control. This should be by an independent regulatory authority—not a unit within the national oil company, for example—and the government should make public information about the process by which pricing principles and formulas are established, including all the parties involved. Costa Rica's price-setting mechanism formally includes citizen participation, whereby objections can be lodged and considered by the regulatory authority.

Careful consideration should be given to the degree of discretion embedded in the pricing policy. The greater the degree of discretion allowed, the more politicized fuel price setting is likely to be. Triggers for adjusting prices, the formula for the price buildup, and the frequency and rules for adjusting domestic costs—including profit margins, transport and storage, refining, and bottling of LPG—all determine the level of discretion accorded to the agency in charge of setting prices. Wide discretion may invite significant interference, but leaving virtually no flexibility may harm the downstream oil sector if certain cost estimates turn out to be too generous or too low. And, as the review of country experience in this study has shown, political pressure and "extraordinary" world oil price movements can lead to suspension of automatic price adjustment mechanisms on a "temporary" basis with no clear timeline.

The criteria for price adjustments, historical and current price calculations, and associated costs—for example, benchmark FOB prices in the relevant markets, exchange rates, and various taxes and charges—should be available on the government Web site and through other media. It is important to disclose price controls at different points along the supply chain and the magnitude of under- and over-recoveries. Brazil, Ghana, and Thailand regularly report price structures, but the subsidies at the refinery gate are not explicitly shown, giving a false impression to

consumers. Where there is a price stabilization fund, flows in and out of the fund and the fund balance should be regularly reported; such reporting is rare.

Equally important, information should be easily accessible, easy to follow, and timely. The pricing information should be consolidated in one place so that consumers are not forced to hunt for information scattered on different Web sites or buried in hundreds of pages of government gazettes. In countries with price control, it should not be difficult to post information as soon as new prices are set. If prices are frozen, it is important to keep on reporting world oil prices in local currency units on a regular basis and the current as well as cumulative subsidies.

Chapter 6

Complementary Policies to Cope with High Oil Prices

Reducing consumption and reducing costs of supply are two means of responding to high oil prices.

Reducing consumption

There are two means of reducing consumption: (1) fuel conservation and efficiency improvement and (2) fuel diversification.

Fuel conservation

Making oil-fueled cars, stoves, and heaters more efficient; eliminating nonessential trips and tasks; and generally reducing the level of fuel-consuming activities reduce spending. Where electricity is generated in part from diesel or fuel oil, efficient lighting and other efficiency improvement measures for electricity can also conserve fuel. An important driver of fuel conservation is sending correct price signals to consumers. Keeping fuel prices and electricity tariffs artificially low militates against fuel conservation efforts.

In addition to sending the right price signals, governments can set efficiency standards or encourage voluntary ones. Making information about efficiency performance widely available, such as through labeling, and verifying efficiency standards are also important. Fuel economy standards are still relatively rare in developing countries, in part because many import rather than manufacture vehicles. China has the longest history, having first introduced fuel economy standards in 2004.

Power shortages can increase oil consumption as consumers turn to emergency diesel generation, an expensive and inefficient way of generating electricity. Significant diesel power generation often signals a sector in need of fundamental reform and plagued by chronic inefficiencies and financial trouble. In such cases, power sector performance is closely linked to the downstream oil sector.

Some energy waste comes from lack of information or bad habits. Two classic examples are driving cars with improperly inflated tires and aggressive driving involving sudden acceleration and deceleration. Awareness-raising campaigns can help change behavior; some oil companies have actively promoted eco-friendly driving habits, such as Total Jordan (2011) and Shell's FuelSave campaign (Shell 2013). Because transport fuel consumption is expected to grow rapidly in developing countries in the coming decades, it is particularly important to focus on curbing the growth of gasoline and diesel consumption.

Fuel diversification

In high-income countries with a well-functioning, market-based power sector, use of oil for generating power has been rapidly declining against the backdrop of widening gaps in cost between oil and alternatives. Markets such as small island economies have little choice but to continue using oil power generation for the most part, and energy conservation remains the primary means of reducing consumption. In many other markets, optimizing investments in the power sector through long-term planning and improving the financial and operational performance of the power utilities through sector reforms can help substantially reduce reliance on power generation from oil.

Gasoline and diesel account for about one-half of oil consumption in developing countries; substitution with natural gas or liquid biofuels can help with fuel diversification. Some countries have promoted compressed natural gas (CNG) as a substitute for automotive fuels, mainly gasoline and to a much lesser extent diesel. If abundant domestic gas supplies and an adequate gas distribution network are in place, CNG may be an attractive option. The top five CNG markets in the world as of the end of 2011 were the Islamic Republic of Iran, Pakistan, Argentina, Brazil, and India (IANGV 2012). Relative availability of oil and gas can change over time—Pakistan and Argentina have been suffering from serious natural gas shortages in recent years and Argentina has even mounted a national program to shift away from CNG back to gasoline and diesel.

Substitution of gasoline and diesel with bioethanol and biodiesel, respectively, is another way of reducing oil consumption. The cited objectives include substitution of oil with renewable energy, energy independence, and support for agriculture and rural development. Bioethanol is manufactured from sugarcane and starch crops (maize, wheat, cassava) by fermenting sugar; there are large economies of scale associated with bioethanol production. Biodiesel, made from reacting methanol with

plant oils (soy, palm, rapeseed,), is easy to make on a small scale; there are economies of scale in making biodiesel that meets tight automotive diesel specifications.

Argentina, Brazil, China, Colombia, Ethiopia, India, Jamaica, Malawi, Malaysia, Pakistan, Peru, the Philippines, Thailand, and Uruguay are among the study countries that have been blending biofuels for some time, and Mozambique began mandating blending in 2012. Brazil has the longest history, having authorized blending of 5 percent ethanol in gasoline in 1931 and mandating blending in 1938. In percentage terms, Brazil also has the highest share of ethanol displacing gasoline in the world. Factors contributing to the success of the ethanol program in Brazil have been described elsewhere (Kojima and Johnson 2005; Kojima, Mitchell, and Ward 2007).

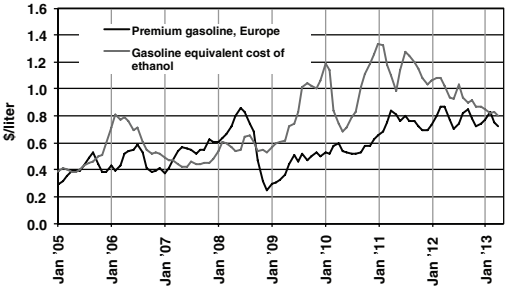
The economics of biofuels are specific to location and feedstock. The economics are more favorable where the costs of importing oil products are high and domestic production costs of biofuel feedstocks are low, such as a landlocked country. For example, landlocked Malawi produces ethanol from molasses, a byproduct of sugar production, and substitutes for some imported gasoline.

The economics of biofuels are not determined solely by the price of oil, but also by the price of the feedstock in the alternative agricultural crop market. The economics of ethanol from sugarcane—technically the most efficient pathway to bioethanol production—are shown in figure 9a. Ethanol is economic when the black line is above the gray line. Despite high world oil prices, with the exception of February 2013, ethanol from sugarcane has not been economic since October 2008 because world sugar prices have soared, and since January 2000 has only been economic to produce one-sixth of the time. Similarly, the economics of biodiesel have been challenging. As figure 9b shows, the opportunity costs of one of the two principal feedstocks (plant oil, the other feedstock being methanol) have been higher than diesel prices before adding the capital, operating, and maintenance costs for the biodiesel manufacturing plant.

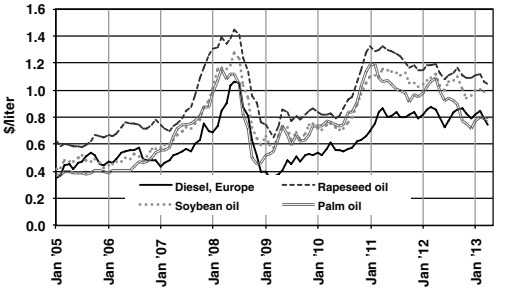
As a result of weak economics in many parts of the world, most liquid biofuel programs have required subsidies, mandates, or both. The subsidies can be substantial. In Thailand, the total reduction in taxes and charges on E10 (10 percent bioethanol) for gasoline with 91 research octane number was more than $2 per liter of ethanol blended in 2012 (EPPO 2013), or triple the FOB price of gasoline with 92 research octane number in Singapore. If the goal is mitigating high oil prices, a fuel diversification strategy that requires large subsidies raises questions

Figure 9 Economics of Ethanol and Biodiesel as Oil Substitutes

a. Prices of ethanol from sugarcane



b. Prices of different biodiesel feedstocks vs. diesel



Source: Calculations based on data from World Bank 2013, USDA 2013, and industry sources.

Note: Opportunity costs of ethanol are calculated based on the following parameters used to compute the equivalencies between sugar and ethanol in Brazil: 1.0495 kg of sucrose equivalent to 1 kg of sugar, and 1.8169 kg sucrose equivalent to 1 liter of anhydrous ethanol. Sugar cane is assumed to yield 83 percent sugar and 17 percent molasses. Prices of molasses are assumed to be equal to 25 percent of sugar prices on a weight basis, and the sucrose content of molasses is 55 percent that of sugar. A fuel economy penalty of 20 percent is assumed for ethanol. Sugar prices are raw, FOB, and stowed at greater Caribbean ports. Soybean oil prices are in Decatur, Illinois; rapeseed oil prices are Dutch, FOB, ex-mill; and palm oil prices are for palm oil from Malaysia delivered in Northwest Europe.

about efficacy. Another concern is the competition for fertile land and water, which could contribute to food price increases. Concerns about food security have prompted China to ban grains for ethanol production, India to restrict ethanol production to molasses, and South Africa to exclude maize and (which is not edible but may nevertheless compete for water and land) from its national biofuel policy (South Africa 2007).

Reducing costs of supply

Hedging, bulk procurement, infrastructure modernization and expansion, reducing regulatory barriers, and price disclosure to promote price competition are among the means employed to reduce costs of supply.

Hedging

Hedging is a strategy intended to reduce the risk of adverse price movements—future oil prices rising for an oil purchaser, declining for an oil seller. Industries in which fuel is a significant part of total cost, such as aviation, have turned to hedging for years to mitigate fuel price volatility. Hedging risks were manageable until the last quarter of 2008, when world oil prices collapsed suddenly. Many airlines faced large losses from hedging in late 2008 and 2009, amounting to as much as $1 billion for

Air China. These losses have led to government interventions and investigations in some countries (China, Pakistan, and Vietnam), and even imprisonment of airline executives in Vietnam.

The cost of hedging in a way that protects the purchaser against an oil price collapse is high, but not paying that extra price could lead to a situation similar to the one in Sri Lanka. The national oil company's large hedging losses in 2008 led to protracted litigation, the supreme court ordering the treasury to handle fuel imports between December 2008 and November 2009, and temporary suspension of the chairman of the national oil company. China restricted hedging in 2009 after large losses suffered by 68 state-owned companies. Pakistan's central bank in August 2009 rejected the finance ministry's proposal to hedge oil prices for a year. Chile explicitly regulates hedging in its new price smoothing scheme for small and medium consumers.

Ghana began to implement a government-led hedging strategy after the price volatility of 2008–09, thereby avoiding the high risks associated with hedging in those years. Ghana's cabinet in March 2010 approved a Commodity Price Risk Management Policy, paving the way for hedging oil products and crude oil. Ghana hedged half of its crude oil requirements in 2010–11. The International Monetary Fund reported that sizable hedging gains in the first half of 2011 had allowed fuel subsidies to be covered through July (IMF 2012).

Private companies engage in hedging at their own risk. In contrast, when state-owned companies engage in hedging and suffer large losses, the losses could become government liabilities. The costs and benefits of hedging are influenced by world oil price movements, which are extremely difficult to forecast. Rather than explore hedging of oil product prices to reduce subsidies, governments would seem better off focusing on reforming the oil sector, its pricing policy, and social protection programs.

Bulk procurement

There are large economies of scale in importing crude oil and oil products. As mentioned in chapter 2, the introduction of very large crude carriers capable of carrying 2 million barrels slashed the shipping costs in the 1970s, and similarly importing products in large parcels reduce unit costs.

Kenya, Mozambique, and Tanzania have instituted bulk procurement to take advantage of scale economy, but that strategy has had mixed results. In Kenya, questions have been raised on and off about whether its bulk procurement system actually results in cost savings. In May 2011 the

Table 8 Infrastructure Investments and Related Measures to Reduce Costs of Supply

Objective	Options
Exploit economies of scale	Hospitality arrangements, nondiscriminatory third-party access
	Adequate receiving and storage capacity for large vessels
	Closure of small refineries together with efficient import infrastructure
	Large refineries
Minimize demurrage charges	Rapid customs clearance
	Round-the-clock staffing by port authorities
	Adequate port receiving capacity
	Other means of reducing port congestion
Improve transport infrastructure	Build or rehabilitate pipelines
	Improve performance of freight rail
	Improve road conditions
Minimize shortages	Require minimum commercial and/or strategic stockholding in regulations
	Encourage hospitality and third-party access for pipelines and depots
	Ensure reasonable returns (e.g., by removing universal price subsidies) to efficient operators to save enough earnings for construction of storage facility

Ministry of Energy reportedly blamed high fuel costs on the refiner's needing to go through a third party to procure crude oil and manipulation of the crude oil price by traders who alter the date when crude oil enters the country (BMI 2011). In Tanzania, questions have been raised about the same company winning the first three tenders in succession and importing gasoline failing to meet fuel specifications, which reportedly damaged vehicles (2012). A similar incident involving imports of contaminated gasoline prompted the government of Mozambique to give the state oil company a 51-percent stake in Imopetro in 2011 (All Africa 2012). While cost savings should be possible in principle, experience in East and Southern Africa suggests that reaping the benefits of scale economy through bulk procurement through government involvement is difficult.

Infrastructure modernization and expansion

Expanding the port capacity to enable large carriers to dock, increasing unloading speeds, increasing fuel storage capacity, and using cheaper transport means (by pipeline or rail rather than road) are some of the ways to lower costs and fuel prices. Shortening unloading times for imported

fuels will slash demurrage charges and relieve port congestion, with positive economywide effects. Some countries, especially those in Sub-Saharan Africa, have inadequate fuel storage capacity, leading to fuel shortages and higher prices. Rail and pipelines tend to be underutilized due to the rundown state of the infrastructure, increasing transport costs. Both exacerbate the adverse effects of high world oil prices.

Table 8 shows examples of investments in infrastructure and related measures that can help reduce costs of supply. Hospitality arrangements and terminals that guarantee nondiscriminatory third-party access help minimize duplication of infrastructure, enable small players to take advantage of scale economy, and lower the barrier to entry, potentially enhancing competition. Port demurrage charges can add substantially to the supply costs; there are non-investment measures that can reduce demurrage charges significantly. Having sufficient storage capacity is important for avoiding fuel shortages.

The operation of strategic reserves—as opposed to operational stocks—should be carefully considered. High-income OECD countries hold strategic reserves as insurance against sudden supply shortages; these reserves have rarely been used. The costs of filling and running the rarely used strategic stocks may not be as affordable for developing countries. Countries now building strategic reserves may be considering their use for domestic price stabilization at times of unusually high prices without serious supply disruptions. Such a stabilization strategy is more likely to be cost-effective in a period of rising prices. Oil price movements are unpredictable, and correspondingly, the likely costs and benefits of such a stabilization scheme are also very difficult to predict (Bacon and Kojima 2008a, chapter 6).

Reducing regulatory barriers

Regulations within and outside the oil sector may be raising costs. As an example, the U.S. Federal Trade Commission testified before the State Government of Hawaii that several State regulatory features are likely to be deterring competition and pushing up prices: Hawaii's unusual landownership regime, which makes fee-simple land ownership difficult; rent control legislation, which limits the rent wholesalers can charge for leasing filling stations and could reduce the number and quality of dealer-operated stations; and a law prohibiting encroachment, which limits the establishment of new filling stations (FTC 2003). Consideration should be given to modifying regulations if there is a reasonable chance that their costs outweigh benefits.

Price disclosure

In markets with price competition, including those with price ceilings, price disclosure could aid price competition. The government can play an important role by collecting price data and making price information easily accessible. Among the most detailed, timely, and accessible systems is the online price database in Chile—mandated in January 2012—also available on iPhone, BlackBerry, and Android. The database gives viewers the choice of displaying data in order of increasing or decreasing price and the address of each filling station, prices, and the date and time of the last price change (CNE 2013).

The Government of Guatemala highlights on its Web site lowest-price filling stations in the Guatemala City Metropolitan Area with their addresses and street maps every week (Guatemala MEM 2013). The Nicaraguan Institute of Energy surveys about 75 filling stations in Managua every week and provides details on the three highest-priced and three lowest-priced filling stations (INE 2013). The Authority for Consumer Protection and Competition in Panama, proclaiming "an informed consumer has power," collects and posts gasoline and diesel prices at filling stations every four weeks, highlighting those with low prices (Panama ACPC 2013).

If only city-average or country-average prices are disclosed, if prices by filling station are published but one month later, or if prices are averaged by company across the country, the scope for promoting price competition is reduced. In addition to disclosing current prices by company and location, it is important to require and enforce prices posted on display boards at readable heights, clearly visible to drivers. For price competition to benefit consumers, there needs to be effective monitoring and enforcement of technical standards, or else a competitive fuel market could lead to partial or total product degradation, with a low-quality product (adulterated, mislabeled, or short-weighted) driving out a high-quality product.

Chapter 7

Conclusions

In competitive markets in which sound regulations are enforced, costs of price controls are likely to outweigh benefits. Enforcement of sound technical, environmental, health, and safety regulations is a goal in every market, whether or not there is adequate competition or price control. When enforcement is combined with competition, deregulation of the downstream oil sector including prices should be the goal. Absent adequate competition, economic regulation would be necessary, but the goal should be an automatic pricing mechanism that is market-based and does not introduce market distortions, such as large price differences for similar fuels through inter-fuel tax differentials or subsidies.

Significant government interventions in pricing and large departures from international prices are likely to signal other deep underlying problems: poor budget planning and execution, weak capacity to deliver essential social services, weak capacity to protect the poor and vulnerable others, rampant corruption in the oil sector and its opaqueness, a general lack of sense of security and fairness, or even challenges to the legitimacy of the government. These problems are interlinked, making it difficult to isolate and address the pricing policy for oil products alone. That does not mean that distortions in pricing policy cannot be addressed before all underlying problems are resolved. Some problems, however, affect the likely success of reforming pricing policy more than others. International experience seems to point in particular to corruption in the oil sector and a lack of an adequate system for social protection.

If corruption in the oil sector is legendary, widely perceived to reach the highest levels of the government and the national oil company, the public would not be sympathetic to the view that subsidies are hurting the government and oil companies. An opaque sector is rarely, if ever, efficient, and costs are generally higher. While this report focuses on the downstream oil sector, very high rents in upstream oil (oil field development and production) are particularly susceptible to capture by powerful

interest groups, and that colors the way the public perceives price subsidies for oil products in oil-producing countries.

Corruption and opaqueness go hand in hand. Transparency throughout the supply chain greatly strengthens the government's ability to carry through with price reform. In an oil-producing country, one way of making the sector more transparent is to join the Extractive Industries Transparency Initiative (EITI), which requires public disclosure of the revenues received by the government from oil producers, payments made by the oil companies to the government, and reconciliation of any material differences between the two (see eiti.org for more information). Refining dominated by one national oil company can also lead to inefficiencies and rent capture. It is important to take steps to break up its monopoly status, for example, by breaking up the company; subjecting the company to competition from imports; facilitating new entry through third-party access and other means; and making information about costs, operations (such as refinery utilization rates), and prices public, and comparing them to international benchmarks.

Although not necessarily related to corruption, the news of vertically integrated oil companies making record profits on the back of soaring oil prices, while consumers are being asked to pay more and more for oil products, also creates resentment and increases political pressure on governments to intervene. Such pressure has arisen worldwide in recent years, including in high-income OECD countries. Even in such cases, an appropriate policy response is not to start controlling fuel prices but to promote a tax system that is progressive, increasing government revenue markedly in times of high profits and using the extra revenue perhaps in areas that enjoy broad public support, such as delivery of essential social services, building human capital, and building infrastructure that will have economy-wide benefits.

Different segments of society have vested interests in maintaining subsidies, as shown in the following:

- While no government welcomes the fiscal costs of subsidies, universal price subsidies benefit everyone and help buy political capital. Governments in competitive democracies may fear losing elections by acting decisively to reform subsidies; governments in other systems may fear challenges to their legitimacy. In hard economic times, when governments can least afford subsidies, demands for subsidies grow in many developing countries, especially where generous subsidies have been provided in the past.
- Oil companies that are protected by subsidies—such as national oil companies through which all subsidies are channeled—may lose their

market power if subsidies are eliminated. Many businesses, especially energy-intensive industries, benefit from low oil product prices, unless the costs of fuel shortages or low fuel quality outweigh the benefits of low official prices. These firms are most unlikely to be compensated fully for subsidy reform, and hence will oppose price increases.

- If oil products are important in electricity generation, reducing subsidies for these oil products will immediately affect the financial viability of the power sector. Unless electricity tariffs allow for the immediate pass-through of the oil product price increases (which is not common), power utilities will have to bear financial losses until the next round of tariff adjustments. Many power utilities in developing countries are already bearing the financial costs of underpricing and power tariff reforms are as challenging as oil pricing reforms. Oil pricing reforms add to the challenges in power sector reforms.
- Poor and rich alike benefit from universal price subsidies. Gasoline and LPG price subsidies are particularly popular among the rich, because the consumption of both increases with income (except among those connected to natural gas). The rich are politically powerful and their opposition to price increases can be influential.
- Those benefiting illegally from subsidies through smuggling and diversion may come from powerful groups, ranging from criminal elements to even high-ranking government officials and oil company executives. The greater the illegal gains, the more fiercely they will oppose attempts to reform subsidies, in the extreme even by resorting to violence.

Designing and implementing effective economic safety nets is imperative. Fuel price increases due to price reforms may call for compensating the poor not only for higher fuel prices, but even more so for higher food and transport prices, and anything else that is oil-intensive to deliver. All countries fund safety net programs, but not all are well designed and demonstratively effective. Having a functional mechanism in place greatly strengthens the government hand in implementing price reforms, and helps exploit economies of scale by addressing a host of related and unrelated problems occurring in parallel, such as food crisis, financial crisis, and high unemployment. Importantly, a good social protection mechanism enables the government to move away from sectoral subsidies, which are inefficient, costly, and suboptimal.

While the above steps are being taken in parallel, pricing mechanisms should be made more transparent and automatic based on a formula, accompanied by an inclusive process of consultation and

communication. It would be worth devoting resources to developing a communication strategy that uses a variety of means, including Web-based conversations. It is important to highlight the costs of keeping domestic prices artificially low, not just in fiscal terms but in the form of commercial malpractice, acute fuel shortages, flourishing black markets, and deteriorating infrastructure. Comparing spending on fuel subsidies with that on health and education would be less effective if any one of the sectors involved is known to be plagued by corruption—for example in the procurement of textbooks or builders for construction of schools and clinics—which points back to the importance of addressing poor governance in the government.

Communication that is opened up to everyone may very well elicit requests for price discounts from a range of stakeholders. Even if businesses can pass through all of the price increases to consumers, demand for their goods and services will decline in response to higher prices. Requests for such targeted subsidies need to be managed, and it is easier to do so if there are strong institutions to handle erosion of the spending power of the vulnerable.

For any significant price reform, the government would benefit by having at least one compensatory measure that is immediate and readily noticeable and publicized widely. Such benefits can signal to the public that the government is making honest efforts to use its budget expenditures to better the welfare of its citizens. An example that does not even add to the government's budget is rapid disappearance of acute fuel shortages—shortages caused by diversion and smuggling can be eased immediately if the price reform substantially reduces the financial incentives for commercial malpractice. Examples that involve redirection of the government budget include cash given to the poor for LPG purchase through bonagas cards in the Dominican Republic and LPG vouchers through Bolsa Familiar (government social welfare program) in Brazil, both after elimination of LPG price subsidies; a doubling of the monthly allowance in Sri Lanka for kerosene to households without electricity from SL Rs 100 ($0.85) to SL Rs 200 ($1.71) in February 2012 after the kerosene price was increased by 49 percent; and temporary unconditional cash transfers in Indonesia in 2005–06 and 2008–09; and unconditional, essentially universal, cash transfers in the Islamic Republic of Iran beginning in 2011, in both countries following very large price increases (Kojima 2013). In all examples except the last, a small portion of the savings from the price increases was used to implement the safety nets. The cash transfer schemes in Indonesia and the Islamic Republic of Iran have been widely credited for minimizing incentives

for mounting opposition to price reforms and for avoiding reversals of price adjustments. Although there were implementation problems, as one would expect, the first of the two transfer schemes in Indonesia was also remarkable in that the whole scheme was designed and deployed in just five months (World Bank 2012).

Fuel price increases matter because so much of the economy depends on oil products. Reducing consumption and increasing income, both reducing the share of income spent on oil products, make oil less important and the government's pricing policy less politically sensitive. The low share of total spending on oil due to high income is one of the reasons oil product pricing is not nearly as politically sensitive in high-income OECD countries. Globally, about half of oil consumption in 2010 was for road transport, and transport as a whole (road, air, and sea) accounted for about 70 percent of oil consumption, followed by industry (8 percent), power generation (7 percent), and households (6 percent) (IEA 2012). Significant scope exists for reducing oil consumption in every country.

There are barriers to fuel conservation, starting with fuel prices that are kept artificially low. Achieving fuel conservation requires changes, both short term—such as behavioral change—and long term. Behavioral changes can reduce fuel consumption for road transport immediately, including fuel-efficient driving habits and vehicle maintenance practice, taking public transport or walking more, combining trips to reduce kilometers traveled, and minimizing nonessential trips. Public education and information campaigns can help where drivers and even transport operators are unaware of fuel-efficient driving habits or fuel-conserving vehicle maintenance practice. Government policies that promote fuel conservation include parking policies to discourage private car use, traffic management to smooth traffic flows, and restricting speed limits on highways to about 80 kilometers per hour. Over the long run, urban planning that promotes public transport and minimizes distances traveled to work, schools, and shops, and improving the infrastructure for public transport that is convenient, affordable, and attractive can reduce oil consumption (GIZ 2012).

Power-sector reforms can slash oil use in many markets by providing adequate and reliable electricity, thereby eliminating the need for captive or emergency diesel power generation. Where oil is used in power generation, increasing the efficiency of generation, minimizing technical losses in transmission and distribution, and increasing energy efficiency of power use can all contribute to lower oil consumption. Efficient lighting

is a proven way of reducing power consumption markedly; some countries have actively pursued, and even legislated, efficient lighting.

This study shows that fuel pricing is interlinked with an array of issues, starting in the oil sector and extending to power sector performance, port infrastructure, transport sector, social service delivery, safety nets, and governance in budget planning and execution. Price reforms are difficult to maintain because there is a self-reinforcing mechanism whereby subsidies reduce the fiscal resources available to strengthen safety nets and deter the development of a competitive, efficient market—by giving no scope for price competition if prices themselves are controlled, channeling subsidies through state-owned companies and inhibiting new entry, and protecting inefficient refineries and oil marketers, to mention a few examples.

As with any other reform, no model is universally applicable; appropriate solutions are highly context-specific, necessitating varying solutions over time even within a given country. Events in the country outside of the oil sector—such as food crisis or a publicized scandal in the government—have significant effects on the public's willingness to go along with price reform for oil products. It is important to analyze the starting conditions to develop a sequence of steps that are specific to country circumstances, accompanied by an inclusive process of consultation and communication. Table 9 provides a list of issues for consideration in the process of developing a roadmap for price reform.

Table 9 Considerations for Drawing a Roadmap for Price Reform

Consideration	Specific issues
Starting Conditions in the Oil Sector	
Gap between current price and market-based price levels	Is the gap becoming an important fiscal concern? If the gap is large, what time period for bridging the gap is likely to find public acceptance, and how large a price increase could be taken at a time? If the gap is relatively small, how soon could a formula-based market pricing mechanism be adopted or resumed?
How prices are set and who sets them	Price levels or price ceilings? At retail or elsewhere? Pan-territorial pricing or geographical variation? Is there a formula for setting prices? Is the formula being followed, or has it been suspended in practice? Is there an agency in charge of setting prices, or is the decision to change prices made by different political groups depending on the state of politics at the time?
Who determines under-recoveries, who pays for them, and how	Is the size of under-recoveries based on self-reporting of costs by oil companies, or some international benchmarks? Does the government reimburse oil companies fully or partially, and in a timely manner or often with long delays? Is the downstream oil infrastructure languishing for lack of investment because of price controls? Are reimbursements for under-recoveries channeled through state-owned oil companies? Is the government's share of subsidies clearly shown in the budget, or are there off-budget transfers of funds, obscuring the magnitude of the subsidies? Are tax expenditures used to cover under-recoveries? Subsidies should be made transparent and easy to track.
Competition in the market	How concentrated is the market at refining/import, wholesale, and retail levels? Does a national oil company dominate the market? Are inefficient refineries or state-owned oil companies protected by tariffs, subsidy delivery mechanisms, or other means? Is hospitality or third-party access encouraged to facilitate new entry and avoid duplication of infrastructure?
Subsidies in place	Are these universal or targeted subsidies? Who is targeted and how? Are subsidized fuels rationed, and if so, how?
Who uses which fuel and for what purpose	Is there widespread use of gasoline or diesel for standby power generation? If so, higher fuel prices could threaten access to power. Is gasoline used primarily by the better-off, or is there widespread use of gasoline in motorbikes by small businesses and lower-middle class families so that gasoline is not fuel only of the rich? Is kerosene or LPG widely used for cooking? There is more resistance to raising cooking fuel prices that affect a majority of households. Is there widespread use of kerosene for lighting? If so, pro-poor arguments could be used to argue against raising kerosene prices without compensation.

(continued)

Consideration	Specific issues
Commercial malpractice	Are there flourishing black markets? Are actual prices paid by consumers markedly higher than official prices? If so, raising official prices would have much less adverse impact. Is short-selling routine? If so, enforcing rules against short-selling would lower the effective price increases when official prices are raised. Is there smuggling? Is there diversion of subsidized fuels to consumers who are not eligible? Is there adulteration of higher-priced fuels with subsidized fuels?
Perception of the oil sector	Is it considered opaque, corrupt, politically well-connected, or a state within a state? Are there scandals to do with large leakages in subsidy delivery? If so, raising prices could be difficult if the public is angry about corruption; on the other hand, it might be possible to persuade the public that higher prices get to the source of the corruption and help stamp it out. If the state is a large oil producer, is the country an EITI member?
Social Protection	
Safety nets	Is there an up-to-date database of beneficiaries? Is there an administrative system in place to deliver benefits? Does the government have a national identity and smart card system for cash transfer to the needy? Does the government have safety nets that can be scaled up in terms of benefits, coverage, or both, to compensate the vulnerable for higher oil prices in a way that would be consistent with medium- and long-term goals for social protection? Or will deployment of sound social safety nets require considerable preparatory work and development?
Delivery of essential social services	What is the state of primary education, primary health, access to safe water, access to sanitation? Is the track record of delivery such that the public would consider credible the government's promises of putting the savings from subsidy reduction to better uses?
Reform Steps	
Sector structure and regulation	Is the market sufficiently large to become competitive over time, making price deregulation a realistic goal? If there is market concentration, what are the physical assets that protect the market power of the incumbents—import terminals, refineries, depot terminals, pipelines? How can their market power be broken? Are there laws or regulations on supply that need to be amended? Do regulations and standards reflect current international good practice, or do they need to be updated? Is there monitoring and enforcement, and, if so, how can they be strengthened? How is commercial malpractice tackled and is there a plan to reduce it further?
Who will set prices and how	Will there be an independent regulatory agency in charge of setting prices? Are there laws or regulations on pricing that need to be amended? If there are large price subsidies, what transition steps are needed before an automatic, formula-based pricing mechanism can be adopted or prices deregulated?

(continued)

Consideration	Specific issues
Timing	Are there events outside the oil sector that could affect timing—national elections, natural disasters, food crisis, large-scale agricultural crop failure, domestic or international financial crisis, soaring unemployment, or collapsing prices of other commodities, such as coffee or minerals, that the economy depends on? Most of these would call for greater social protection measures in response to price reforms. Is there a time when fuel consumption is higher—major national holidays, winter in cold-climate areas, summer travel period—that should be avoided for raising official fuel prices?
Analysis of winners and losers	Is there a reasonable understanding of effects of price reforms on different segments of society and income groups, including likely effects on inflation and which sectors would be particularly affected? What are the relative effects of higher food prices, higher transport fares, and higher energy prices on the poor? If food prices are more important because of the expenditure patterns of the poor, that would argue even more for moving away from sectoral approaches and combining safety nets for all risks under one umbrella. Does the financial viability of some businesses depend on oil price subsidies? If so, they will lobby to oppose subsidy reforms through industry associations, trade unions, and other groups. Is there a need for managed closure of these businesses and retraining of staff? Would it be possible to make small, regular, incremental price increases that minimize adverse effects? Would it make sense to provide support for fuel switching or fuel efficiency improvement? Does the power sector rely on diesel, fuel oil, or both? Can power utilities pass on oil price increases to consumers, or will they have to bear financial losses until the next round of tariff adjustments? Is underpricing a problem in the power sector? If oil product price increases will significantly increase power tariffs, affect the financial viability of power utilities, or do both, careful consideration needs to be given to coordination between the oil and power sectors, and to the political economy of power tariff reforms. Are there powerful groups that benefit from subsidies and can they exercise their influence to block price reforms? Are some benefiting illegally from subsidies by engaging in smuggling, black marketing, diversion, and fuel adulteration? Do they include high-level government officials and high-level oil-company officers? If so, building a broad-based coalition of supporters for price reforms would be all the more important.

(continued)

Consideration	Specific issues
Immediate, tangible benefits	Would it be possible to deliver immediate benefits of the price reform? In the oil sector, these could be no more queues, much less fuel adulteration, much lower black market prices, and a crackdown on short-selling. Outside the oil sector, are there existing administrative systems in place that can deliver compensation immediately and is visible to the public? If not, is there something that could be set up quickly, and could the start of any large price adjustments be postponed until that setup is nearly, if not fully, operational?
Longer-term assistance	Aside from initial compensation to help adjust to higher prices, is there a need for longer-term compensation or assistance, such as energy efficiency fund or tax expenditures for acquisition of more efficient equipment and appliances to reduce oil consumption, increases in food assistance, and long-term cash compensation to the poor for higher fuel prices?
Communication	
About the current state	Is the public aware of the size of under-recoveries, who is benefiting, the distortions caused by keeping prices low, and the opportunity costs of the under-recoveries? Can the public easily find out past and present price gaps? Is there a national dialogue on the pros and cons of the current pricing policy?
About future options or plan	Are options or a proposal for price reform being communicated effectively and accurately? Or are rumors causing panic buying and hoarding? Is there a mechanism to consult different stakeholders and include them in deliberation and decision-making to the extent possible? Is communication about compensation plans undertaken far in advance of the implementation of the price reform, so that the public is well prepared?
Means of communication	Are all forms of communication being exploited? Is consideration being given to a Web-based national conversation, giving many people an opportunity to be heard? Are all segments of society being reached, including those without access to the internet or TV? Is electronic communication being complemented by face-to-face stakeholder meetings?
Communication about the oil sector	Is there a plan to make price, production, and consumption information available regularly and in a timely manner so that consumers and potential investors can take informed decisions? As competition begins to emerge, could the government make price information readily available to further promote price competition? Is there a mechanism for registering complaints? Are companies found in violation of rules named with specific charges outlined? Are all regulations and rules, announcements about pricing policy, calculations of controlled prices, the magnitude of the remaining subsidies and how they are channeled, and any other information related to prices consolidated in one place so that they can be easily found? Is information provided in plain language and comprehensible to many, if not most, people in the country?

Appendix A

This appendix presents the results of converting world prices of gasoline, diesel, and LPG in local currency units and computing changes between 2003 and 2012 in nominal terms and between 2003 and 2011 in real terms. The real prices are computed using consumer price index in each country. The calculations are based on annual averages. Kerosene is not shown because kerosene world prices closely track diesel prices. For gasoline and diesel, U.S. Gulf Coast prices are used for the Americas, prices in Singapore for East Asia and the Pacific, and Northwest European prices for the rest of the world. For LPG, propane spot prices in Mont Belvieu, Texas, are used for the Americas and the Saudi Aramco contract

Table A.1 Increase in World Gasoline Price in Local Currency by Income, 2003–12 (Nominal) and 2003–11 (Real)

	All	Low	Lower middle	Upper middle	High		
					All	Non-OECD	OECD
Percent increase in nominal prices in local currency, 2003–2012							
Minimum	96	220	96	100	120	160	120
Maximum	1,360	1,180	640	1,360	480	260	480
Median	220	300	240	260	220	230	220
No. of countries	172	32	48	47	14	14	31
Percent increase in real prices in local currency, 2003–2011							
Minimum	-51	14	-51	12	53	78	53
Maximum	300	180	170	300	210	190	210
Median	110	110	100	110	140	120	140
No. of countries	160	31	44	43	42	11	31
Ratio with price increase in the United States in real terms, 2003–2011							
Minimum	0.2	0.4	0.2	0.4	0.6	0.7	0.6
Maximum	1.5	1.1	1.0	1.5	1.2	1.1	1.2
Median	0.8	0.8	0.8	0.8	0.9	0.8	0.9

Source: Calculations based on industry sources and WDI 2013.

Table A.2 Increase in World Price of LPG by Income, 2003–12 (Nominal) and 2003–11 (Real)

	All	Low	Lower middle	Upper middle	High		
					All	Non-OECD	OECD
Percent increase in nominal prices in local currency, 2003–2012							
Minimum	9	72	19	9	24	74	24
Maximum	1,170	1,020	550	1,170	410	210	410
Median	170	250	180	170	170	170	170
No. of countries	172	32	48	47	45	14	31
Percent increase in real prices in local currency, 2003–2011							
Minimum	-59	-5	-59	-10	29	43	29
Maximum	230	130	120	230	160	140	160
Median	80	80	70	80	100	80	100
No of countries	160	31	44	43	42	11	31
Ratio with price increase in the United States in real terms, 2003–2011							
Minimum	0.2	0.5	0.2	0.4	0.6	0.7	0.6
Maximum	1.6	1.1	1.0	1.6	1.3	1.2	1.3
Median	0.9	0.9	0.8	0.9	1.0	0.9	1.0

Sources: Saudi Aramco propane and butane contract prices from Reuters, various issues; Mont Belvieu propane spot prices from EIA; consumer price index from WDI; and calculations based on these sources.

prices for propane and butane, assuming a 50/50 mixture, for the rest of the world.

Table A.1 and A.2 show the summary statistics for gasoline and LPG, respectively, by income. Table A.3 shows percentage increases in nominal and real prices in local currency units for individual countries.

Table A.3 Percent Increases in World Prices of Gasoline, Diesel, and LPG in Local Currency Units

Country	Nominal price increase, 2003–12			Real price increase, 2003–11		
	Gasoline	Diesel	LPG	Gasoline	Diesel	LPG
Afghanistan	270	310	230	74	91	45
Albania	220	240	180	130	150	92
Algeria	260	280	210	140	160	100
Angola	360	380	300	16	26	-2
Antigua and Barbuda	220	240	74	160	180	110
Argentina	410	430	170	130	140	86
Armenia	150	160	120	46	58	23
Australia	120	140	96	74	91	45
Austria	220	230	170	140	160	99
Azerbaijan	190	200	150	34	45	13
Bahrain	260	280	210	190	210	140
Bangladesh	400	450	340	140	160	100
Barbados	220	240	74	100	110	63
Belarus	1,360	1,440	1,170	160	180	120
Belgium	220	230	170	130	150	96
Belize	220	240	74	170	180	120
Benin	220	230	170	120	130	82
Bermuda	220	240	74	—	—	—
Bhutan	310	350	260	110	130	73
Bolivia	190	210	57	73	83	39
Bosnia and Herzegovina	220	230	170	—	—	—
Botswana	450	480	380	140	160	100
Brazil	110	120	11	12	19	-10
Bulgaria	220	230	170	74	89	47
Burkina Faso	220	230	170	120	140	88
Burundi	380	410	320	83	98	54
Cambodia	260	290	220	110	130	72
Cameroon	220	230	170	130	150	92
Canada	130	140	24	91	100	54
Cape Verde	220	230	180	120	140	89
Central African Republic	220	230	170	120	140	87
Chad	220	230	170	150	170	110

Country	Nominal price increase, 2003–12			Real price increase, 2003–11		
	Gasoline	Diesel	LPG	Gasoline	Diesel	LPG
Chile	130	140	23	72	82	38
China	170	200	140	110	130	76
Colombia	100	110	9	40	49	13
Comoros	220	230	170	120	130	83
Congo, Dem. Rep.	710	760	610	110	130	80
Congo, Rep.	220	230	170	100	120	70
Costa Rica	310	330	120	89	100	53
Côte d'Ivoire	220	230	170	120	140	87
Croatia	210	230	170	120	140	84
Czech Republic	150	160	120	76	90	48
Denmark	220	230	170	140	160	100
Djibouti	260	280	210	140	160	100
Dominica	220	240	74	150	170	100
Dominican Republic	310	330	120	68	78	35
Ecuador	220	240	74	130	140	86
Egypt, Arab Rep.	270	290	220	57	70	32
El Salvador	220	240	74	130	140	86
Equatorial Guinea	220	230	170	84	99	55
Eritrea	300	320	250	—	—	—
Estonia	220	230	170	96	110	66
Ethiopia	640	680	540	97	110	66
Fiji	240	270	200	130	150	90
Finland	220	230	170	140	160	110
France	220	230	170	140	160	110
Gabon	220	230	170	130	150	98
Gambia, The	300	320	250	130	150	93
Georgia	180	190	140	52	65	28
Germany	220	230	170	140	160	110
Ghana	640	690	550	130	140	90
Greece	220	230	170	120	130	82
Greenland	220	230	170	—	—	—
Grenada	220	240	74	140	150	93
Guatemala	220	240	72	85	96	49

(continued)

Country	Nominal price increase, 2003–12			Real price increase, 2003–11		
	Gasoline	Diesel	LPG	Gasoline	Diesel	LPG
Guinea	1,180	1,250	1,020			
Guinea-Bissau	220	230	170	110	130	81
Guyana	240	260	84	110	120	67
Haiti	220	240	72	31	38	5
Honduras	250	270	90	97	110	59
Hungary	260	280	210	110	120	74
Iceland	480	520	410	210	240	160
India	310	350	260	95	110	62
Indonesia	290	320	240	98	120	65
Iran, Islamic Rep.	430	460	360	38	49	16
Iraq	96	110	71	-51	-47	-59
Ireland	220	230	170	140	160	100
Israel	200	220	160	130	150	92
Italy	220	230	170	140	160	100
Jamaica	400	420	170	86	97	50
Japan	150	170	120	140	170	100
Jordan	260	280	210	130	150	94
Kazakhstan	260	280	210	67	81	41
Kenya	300	320	250	59	72	34
Kiribati	120	140	96	—	—	—
Korea, Rep.	240	270	200	150	180	110
Kuwait	240	260	190	120	140	87
Kyrgyz Republic	290	310	240	72	86	45
Lao PDR	170	190	140	63	79	36
Latvia	240	260	200	84	99	55
Lebanon	260	280	210	200	220	150
Lesotho	290	310	240	110	120	73
Liberia	340	370	290	99	120	68
Libya	250	270	210	—	—	—
Lithuania	210	230	170	100	120	69
Luxembourg	220	230	170	130	150	95
Macedonia, FYR	220	230	180	130	150	95
Madagascar	540	570	450	140	160	100
Malawi	820	870	700	160	180	120

(continued)

Country	Nominal price increase, 2003–12			Real price increase, 2003–11		
	Gasoline	Diesel	LPG	Gasoline	Diesel	LPG
Malaysia	190	220	150	130	150	90
Maldives	330	370	280	—	—	—
Mali	220	230	170	130	150	91
Mauritania	300	330	250	110	130	78
Mauritius	290	310	240	120	140	86
Mexico	290	320	110	160	180	110
Micronesia, Fed. Sts.	260	290	210	—	—	—
Moldova	210	230	170	39	51	17
Mongolia	320	360	270	71	88	43
Morocco	220	240	180	150	170	110
Mozambique	330	350	270	100	120	69
Myanmar	—	—	—	14	26	-5
Namibia	290	310	240	110	130	77
Nepal	300	330	250	81	99	51
Netherlands	220	230	170	150	170	110
New Zealand	160	180	120	100	120	69
Nicaragua	400	430	170	130	140	85
Niger	220	230	170	110	130	81
Nigeria	340	360	280	70	84	43
Norway	190	210	160	140	150	99
Oman	260	280	210	140	170	110
Pakistan	480	530	410	120	140	83
Panama	220	240	74	140	150	89
Papua New Guinea	110	130	83	58	74	32
Paraguay	120	130	19	21	28	-2
Peru	140	160	32	100	110	61
Philippines	180	200	140	87	110	56
Poland	200	220	160	110	120	74
Portugal	220	230	170	140	160	99
Qatar	260	280	210	110	130	80
Romania	270	300	230	81	96	53
Russian Federation	260	280	210	49	62	26
Rwanda	310	330	260	92	110	62
Samoa	180	200	140	66	83	39

(continued)

Country	Nominal price increase, 2003–12			Real price increase, 2003–11		
	Gasoline	Diesel	LPG	Gasoline	Diesel	LPG
Saudi Arabia	260	280	210	150	170	110
Senegal	220	230	170	130	150	94
Seychelles	810	860	690	300	330	230
Sierra Leone	560	600	480	130	150	95
Singapore	160	180	120	110	130	71
Slovak Republic	130	140	100	53	66	29
Slovenia	220	240	180	130	150	94
Solomon Islands	250	280	210	95	110	62
South Africa	290	310	240	110	130	81
Spain	220	230	170	130	140	91
Sri Lanka	370	410	310	81	99	51
St. Kitts and Nevis	220	240	74	130	140	85
St. Lucia	220	240	74	150	170	100
St. Vincent and the Grenadines	220	240	74	130	140	85
Sudan	390	420	330	—	—	—
Suriname	310	330	120	92	100	55
Swaziland	290	310	240	99	120	68
Sweden	200	220	160	150	170	110
Switzerland	150	160	120	110	130	79
Syrian Arab Republic	390	410	320	110	130	80
Tajikistan	460	490	380	140	160	99
Tanzania	450	480	380	180	200	130
Thailand	170	190	130	99	120	65
Togo	220	230	170	120	130	82
Tonga	190	210	150	68	84	40
Trinidad and Tobago	230	250	78	78	89	43
Tunisia	330	360	280	180	200	140
Turkey	330	350	270	93	110	63
Uganda	360	380	300	120	140	86
Ukraine	440	470	370	97	110	66
United Arab Emirates	260	280	210	—	—	—
United Kingdom	270	290	220	180	210	140

(continued)

Country	Nominal price increase, 2003–12			Real price increase, 2003–11		
	Gasoline	Diesel	LPG	Gasoline	Diesel	LPG
United States	220	240	74	160	170	110
Uruguay	130	140	25	23	31	-1
Uzbekistan	600	640	510	—	—	—
Vanuatu	170	190	140	110	130	72
Venezuela, RB	760	810	370	—	—	—
Vietnam	380	420	320	99	120	66
Yemen, Rep.	320	340	270	64	78	38
Zambia	290	310	240	42	54	20

Sources: Reuters, various issues, for Saudi Aramco contract prices of propane and butane; EIA for gasoline and diesel prices on the U.S. Gulf Coast and for spot propane prices in Mont Belvieu; industry sources for other markets; WDI for CPI.

Note: — = not available.

Appendix B

Vulnerability in Table B.1 is based on the data from the U.S. Energy Information Administration posted in March 2013. The retail prices in Table B.2 are averaged over the 31 days in January 2013 if prices as a function of time are available for the month. Where one grade of fuel is subsidized by the government, the official price for the subsidized fuel is shown. In particular, the LPG prices in Argentina and Panama are those for the poor subsidized by the government. The reference markets and fuel quality to compute pass-through coefficients in Table B.3 are detailed in table A2.3 in Kojima (2012). For both tables B.2 and B.3, types of fuel and prices and sources of data are outlined in table A2.1 of Kojima (2012). For Uganda, the prices for both 2009 and 2013 are now taken from the price surveys in Kampala reported by the Uganda Bureau of Statistics. As mentioned in both background papers, the pass-through coefficients in Uganda are low in part because the country experienced acute fuel shortages in January 2009, pushing up prices.

Table B.1 Vulnerability in 2011 and Vulnerability Change 2009–11 (% of GDP)

Country	2011	Δ'09-11
Afghanistan	7.1	0.5
Albania	3.6	1.3
Algeria	-31.0	-4.8
Angola	-64.0	1.1
Antigua and Barbuda	14.0	5.1
Argentina	-0.7	0.8
Armenia	18.0	5.8
Australia	1.4	0.3
Austria	2.1	0.7
Azerbaijan	-54	-6.8
Bahamas, The	11	4.5
Bangladesh	3.5	1.1
Barbados	8.2	2.9
Belarus	11.0	3.9
Belgium	4.7	1.7
Belize	-1.3	-6.3
Benin	19.0	8.1
Bhutan	4.4	0.8
Bolivia	1.1	0.4
Bosnia and Herzegovina	5.9	2.2
Botswana	4.4	0.8
Brazil	-0.1	0.0
Brunei Darussalam	-32.0	-2.4
Bulgaria	7.2	2.5
Burkina Faso	4.5	1.3
Burundi	2.3	0.5
Cambodia	9.8	2.8
Cameroon	-4.1	0.4
Canada	-2.9	-1.0
Cape Verde	5.4	1.7
Central African Republic	4.0	1.3
Chad	-45	-9.3
Chile	4.8	0.1
China	2.8	0.7
Colombia	-7.5	-3.4
Comoros	6.2	2.0
Congo, Dem. Rep.	-2.0	0.1
Congo, Rep.	-75	-13.3

Country	2011	Δ'09-11
Costa Rica	4.4	0.8
Cote d'Ivoire	-2.0	1.0
Croatia	4.3	1.8
Cyprus	8.9	3.4
Czech Republic	3.3	1.0
Denmark	-0.8	-0.1
Dominica	7.8	3.6
Dominican Republic	8.2	2.8
Ecuador	-16	-4.2
Egypt, Arab Rep.	1.1	1.2
El Salvador	7.5	2.8
Equatorial Guinea	-56	7.0
Eritrea	4.4	0.3
Estonia	2.6	0.6
Ethiopia	5.9	2.3
Fiji	8.9	1.5
Finland	2.8	0.8
France	2.3	0.8
Gabon	-51	-4.4
Gambia, The	13.0	4.9
Georgia	5.0	1.1
Germany	2.4	0.7
Ghana	-1.3	-5.4
Greece	4.4	1.6
Grenada	9.3	3.5
Guatemala	5.3	1.5
Guinea	6.7	1.8
Guinea–Bissau	11.0	3.3
Guyana	16.0	4.2
Haiti	7.2	1.9
Honduras	10.0	3.5
Hungary	3.1	0.8
Iceland	5.6	1.5
India	5.0	1.1
Indonesia	1.5	0.4
Iraq	-63	-1.2
Ireland	2.5	0.9
Israel	4.0	1.4
Italy	2.3	0.7

(continued)

Country	2011	Δ'09-11
Jamaica	15.0	4.2
Japan	2.8	0.8
Jordan	15.0	5.6
Kazakhstan	-29	-2.8
Kenya	9.2	3.6
Kiribati	9.1	1.2
Korea, Rep.	7.4	1.5
Kuwait	-49.0	-3.6
Kyrgyz Republic	21.0	5.3
Lao PDR	1.4	0.2
Latvia	4.6	1.7
Lebanon	13.0	4.3
Lesotho	4.7	2.6
Liberia	9.8	2.5
Lithuania	4.7	1.3
Luxembourg	3.9	1.4
Macedonia, FYR	7.1	2.5
Madagascar	4.6	1.4
Malawi	3.9	1.2
Malaysia	-0.2	0.9
Maldives	13.0	4.9
Mali	1.8	0.6
Malta	19.0	8.1
Mauritania	4.0	2.8
Mauritius	7.4	2.2
Mexico	-2.7	-0.4
Moldova	9.2	3.2
Mongolia	5.2	-0.4
Montenegro	3.4	1.3
Morocco	8.9	3.2
Mozambique	5.0	1.5
Namibia	6.8	1.2
Nepal	4.0	0.5
Netherlands	4.3	1.6
New Zealand	2.3	0.5
Nicaragua	12.0	4.4
Niger	-1.1	-3.3
Nigeria	-36	-9.7
Norway	-14	-0.9
Oman	-41.0	-6.4

Country	2011	Δ'09-11
Pakistan	6.4	1.8
Panama	15.0	5.9
Papua New Guinea	-3.0	1.3
Paraguay	4.1	-0.4
Peru	0.5	-0.2
Philippines	4.8	1.2
Poland	4.0	1.4
Portugal	4.1	1.4
Qatar	-32.0	-7.7
Romania	2.3	0.9
Russian Federation	-15.0	-1.7
Rwanda	3.3	1.0
Samoa	6.5	1.6
Sao Tome and Principe	14.0	3.6
Saudi Arabia	-56	-11
Senegal	10.0	3.7
Serbia	4.9	1.3
Seychelles	30.0	10
Sierra Leone	17.0	5.5
Singapore	20.0	4.6
Slovak Republic	2.9	0.9
Slovenia	4.2	1.6
Solomon Islands	6.8	1.8
South Africa	3.8	0.9
Spain	3.5	1.2
Sri Lanka	5.8	1.2
St. Kitts and Nevis	9.8	4.0
St. Lucia	9.0	3.5
St. Vincent and the Grenadines	8.3	3.3
Sudan	-19.0	-3.8
Swaziland	4.6	0.9
Sweden	2.1	0.4
Switzerland	1.5	0.3
Tajikistan	8.0	3.4
Tanzania	5.6	1.9
Thailand	6.7	1.7
Timor–Leste	-300.0	-25.0
Togo	10.0	3.9
Tonga	10.0	2.0

(continued)

Country	2011	Δ'09-11
Trinidad and Tobago	-16.0	-3.6
Tunisia	1.9	2.1
Turkey	3.2	0.8
Turkmenistan	-15.0	-2.7
Uganda	5.2	2.0
Ukraine	5.0	1.0
United Arab Emirates	-26.0	-7.4
United Kingdom	0.7	0.5
United States	2.2	0.5

Country	2011	Δ'09-11
Uruguay	4.4	0.0
Uzbekistan	-0.6	0.2
Vanuatu	5.0	1.8
Venezuela, RB	-21.0	-8.4
Vietnam	1.4	2.4
Yemen, Rep.	-3.8	10.0
Zambia	3.3	1.0
Zimbabwe	5.5	0.9

Source: Calculations based on data from EIA 2013a and WDI 2012.

Note: 2011 = vulnerability in 2011; Δ'09-11 = change in vulnerability between 2009 and 2011.

Table B.2 Retail Prices in January 2013 (US$) and Ratio of Kerosene Prices to Diesel Prices

Country	Gasoline ($/liter)	Diesel ($/liter)	Kerosene ($/liter)	LPG ($/kg)	Kerosene/diesel
Angola	0.63	0.42	0.27	0.39	0.65
Argentina	1.30	1.40	1.20	0.32	0.86
Bangladesh	1.25	0.86	0.86	1.72	1.00
Bolivia	0.69	0.54	0.39	0.33	0.73
Brazil	1.40	1.09		1.57	
Cambodia	1.34	1.29		1.47	
Cameroon	1.15	1.05	0.71	0.97	0.67
Chile	1.58	1.27	1.32		1.04
China	1.25	1.25		1.24	
Colombia	1.53	1.19			
Costa Rica	1.28	1.26	1.11	1.38	0.88
Cote d'Ivoire	1.61	1.25	1.26	0.68	1.00
Dominican Republic	1.42	1.38	1.25	1.16	0.91
Egypt, Arab Rep.	0.26	0.16	0.16	0.06	1.00
El Salvador	1.05	1.10		1.01	
Ethiopia	1.02	0.92	0.75		0.82
Gabon	1.08	0.95	0.56	0.88	0.59
Ghana	0.90	0.90	0.48	0.68	0.53
Guatemala	1.09	1.07		1.01	
Honduras	1.14	1.11	0.94	1.02	0.85
India	1.25	0.88	0.28	0.54	0.32
Indonesia	0.46	0.46	0.26	0.44	0.56
Iran, Islamic Rep.	0.33	0.29			
Iraq	0.39	0.30	0.29	0.32	0.97
Jordan	1.10	0.94	0.94	1.13	1.00
Kazakhstan	0.73	0.77			
Kenya	1.28	1.20	0.97	2.82	0.81
Lao PDR	1.32	1.16		1.17	
Liberia	1.15	1.21	1.21		1.00
Madagascar	1.51	1.23	0.95	2.82	0.77
Malawi	1.66	1.63	0.47	4.38	0.29
Malaysia	0.61	0.58		0.61	
Mexico	0.85	0.87		0.94	
Mongolia	1.20	1.29			
Morocco	1.46	0.97		0.40	
Mozambique	1.56	1.21	0.94	1.83	0.78

(continued)

Country	Gasoline ($/liter)	Diesel ($/liter)	Kerosene ($/liter)	LPG ($/kg)	Kerosene/diesel
Namibia	1.16	1.24			
Nepal	1.43	1.15	1.15	1.20	1.00
Nicaragua	1.22	1.17	1.16	0.92	0.99
Niger	1.09	1.09	1.00	0.61	0.92
Nigeria	0.62	0.98	0.32	2.03	0.32
Pakistan	1.04	1.12	1.01	1.44	0.90
Panama	1.01	1.01		0.39	
Peru	1.27	1.30		1.25	
Philippines	1.25	1.01	1.27	1.59	1.26
Russian Federation	0.94	1.07			
Rwanda	1.58	1.58			
Senegal	1.80	1.60	1.28	0.62	0.80
South Africa	1.31	1.25	0.96	2.51	0.76
Sri Lanka	1.25	0.91	0.84	1.51	0.92
Syrian Arab Republic	0.75	0.42		0.61	
Tajikistan	1.38	1.39			
Tanzania	1.24	1.22	1.21		0.99
Thailand	1.48	1.00	1.19	0.61	1.19
Togo	1.20	1.27	0.99	0.89	0.78
Tunisia	0.94	0.83	0.52	0.37	0.62
Turkey	2.43	2.20	1.76	3.16	0.80
Uganda	1.41	1.30	1.06	2.75	0.82
Uruguay	1.95	1.86	1.41	1.53	0.76
Venezuela, RB	0.01	0.01		0.07	
Vietnam	1.11	1.03	1.04	1.69	1.00
Yemen, Rep.	0.58	0.47		0.56	
Zambia	1.55	1.43	0.98		0.68
Canada	1.19	1.25			
France	2.07	1.53			
Germany	2.14	1.64			
Italy	2.34	1.87			
Japan	1.62	1.40	1.03	3.88	0.74
Spain	1.89	1.51			
United Kingdom	2.05	1.81			
United States	1.19	1.03		1.27	

Source: Calculations using data from the sources cited in table A1.2 in Kojima 2012.

Note: The prices in Uruguay are ceilings on wholesale prices set by the government; they appear to be close to retail prices, and hence are shown as retail.

Table B.3 Pass-through Coefficients, January 2009–January 2012 and January 2009–January 2013

Country	Gasoline		Diesel		Kerosene		LPG	
	Jan 2012	Jan 2013	Jan 2012	Jan 2013	Jan 2012	Jan 2013	Jan 2012	Jan 2013
Angola	22	20	9	8	-18	-18	-22	-16
Argentina	91	116	108	117	84	109	-18	-46
Bangladesh	2	28	23	55	23	54	113	136
Bolivia	3	3	2	2	2	1	1	2
Brazil	104	77	54	42	—	—	110	154
Cambodia	126	128	126	140	128	—	99	92
Cameroon	-7	-2	-7	-3	-4	-2	-5	-1
Chile	199	222	132	132	90	100	153	
China	94	98	107	121	—	—	78	79
Colombia	88	127	103	125	142	145	240	301
Costa Rica	103	118	89	94	67	80	112	142
Côte d'Ivoire	39	66	0	21	72	86	-3	14
Dominican Republic	138	151	139	140	132	134	114	112
Egypt, Arab Rep.	-6	-12	-4	-9	-4	-8	-1	-1
El Salvador	122	117	129	118	—	—	182	220
Ethiopia	102	76	94	70	74	61	145	—
Gabon	-9	-5	4	8	-4	-1	-10	-6
Ghana	100	65	97	64	0	-8	1	31
Guatemala	96	102	99	104	66	—	95	-32
Guinea-Bissau	65	—	83	—	—	—	—	—
Honduras	118	122	115	113	113	113	124	188
India	78	70	32	55	26	23	24	16
Indonesia	20	17	23	21	13	11	19	12
Iran, Islamic Rep.	56	47	72	66	—	—	—	—
Iraq	9	5	-10	-15	40	38	8	3
Jamaica	128	130	130	127	144	138	133	273
Jordan	83	126	55	108	56	107	6	67
Kazakhstan	34	57	28	74	—	—	—	—
Kenya	93	68	89	75	—	—	—	—
Lao PDR	125	125	127	126	—	—	155	49
Liberia	95	106	81	86	80	81	—	—
Madagascar	8	36	2	26	-2	28	128	150
Malawi	115	-28	129	-9	-26	—	—	—
Malaysia	28	29	25	28	—	—	26	21

(continued)

Country	Gasoline		Diesel		Kerosene		LPG	
	Jan 2012	Jan 2013	Jan 2012	Jan 2013	Jan 2012	Jan 2013	Jan 2012	Jan 2013
Mexico	45	85	57	92	—	—	33	123
Mongolia	99	87	71	86	—	—	—	—
Morocco	-35	32	-96	-50			-2	2
Mozambique	179	136	64	37	67	49	95	43
Namibia	126	122	112	125	—	—	—	—
Nepal	65	84	52	100	51	97	34	27
Nicaragua	105	115	116	111	84	83	86	71
Niger	28	14	6	-9	33	36		
Nigeria	70	39	122	117	-7	-5	202	150
Pakistan	58	65	91	99	83	88	99	92
Panama	104	120	103	112	—	—	0	0
Peru	99	104	111	116	—	—	48	93
Philippines	120	123	98	96	99	117	142	114
Russian Federation	52	85	65	122	—	—	—	—
Rwanda	52	51	58	60	—	—	—	—
Senegal	129	161	148	145	116	113	79	-34
South Africa	161	155	157	151	120	111	132	94
Sri Lanka	32	42	30	72	46	96	96	84
Syrian Arab Rep.	8	-22	-65	-30	—	—	1	28
Tajikistan	158	136	154	167	—	—	—	—
Tanzania	60	63	38	38	139	133	—	—

(continued)

Country	Gasoline		Diesel		Kerosene		LPG	
	Jan 2012	Jan 2013	Jan 2012	Jan 2013	Jan 2012	Jan 2013	Jan 2012	Jan 2013
Thailand	122	176	108	119	22	34	12	15
Togo	37	40	60	66	—	—	—	—
Tunisia	-4	12	-2	17	5	6	-6	-4
Turkey	127	184	125	215	95	134	146	157
Uganda	24	-4	64	17	40	-8	62	99
Uruguay	166	204	169	183	128	145	91	172
Venezuela, RB	-4	-5	-3	-3			-17	-35
Vietnam	77	99	81	99	65	84	50	64
Yemen, Rep.	114	58	14	71	15		87	56
Zambia	97	82	97	87	60	51	—	—
Canada	130	133	133	124	—	—	—	—
France	125	143	111	123	—	—	—	—
Germany	124	146	109	130	—	—	—	—
Italy	165	192	160	187	—	—	—	—
Japan	148	98	122	75	99	69	151	18
Spain	143	169	124	144	—	—	—	—
United Kingdom	186	169	154	145	—	—	—	—
United States	100	176	102	101	—	—	71	74

Source: Calculations based on data cited in table A2.1 in Kojima 2012.

Note: Three figures are retained for coefficients exceeding 99% for formatting reasons only and are not intended to signify the number of significant figures. For kerosene and LPG in Colombia, for all fuels in Jamaica and Uruguay, and for LPG in South Africa, wholesale or ex-refinery prices are used for pass-through computation because retail prices were not available for at least one of the two years. The pass-through coefficient for LPG in Egypt is based on the official depot price. — = not available.

References

Andriamihaja, Noro, and Giovanni Vecchi. 2008. "An Evaluation of the Welfare Impact of Higher Energy Prices in Madagascar." Africa Region Working Paper Series 106, World Bank, Washington, DC. www.worldbank.org/afr/wps/wp106.pdf.

Al Jazeera. 2013. "Mali speaks." 21 January 2013. www.aljazeera.com/indepth/interactive/2013/01/201312113451635182.html.

All Africa. 2011. "Marketer Takes Delivery under Questionable Circumstance." By Hector Igbikiowubo, July 11.

———. 2012. "Mozambique: Government Restructures Imopetro." November 14.

AP (Associated Press). 2007. "Report: Gas Costs up to 10 Cents More without Price Cap." December 27.

Arze del Granado, Francisco Javier, David Coady, and Robert Gillingham. 2012. "The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries." *World Development* 40(11): 2234–2248. www.sciencedirect.com/science/article/pii/S0305750X12001155#.

Asia Pulse. 2005. "Kerosene Sales Surge Raises Suspicions in Vietnam." May 10.

Bacon, Robert. 2001. "Petroleum Taxes." *Viewpoint* 240.Washington, DC: World Bank.

Bacon, Robert, Soma Bhattacharya, and Masami Kojima. 2010. "Expenditures of Low-Income Households on Energy: Evidence from Africa and Asia." *Extractive Industries for Development Series* 16. Washington, DC: World Bank. http://siteresources.worldbank.org/EXTOGMC/Resources/336929-1266963339030/eifd16_expenditure.pdf.

Bacon, Robert, and Masami Kojima. 2006. "Coping with Higher Oil Prices." ESMAP Report 323/06. Washington, DC: World Bank. http://www.esmap.org/esmap/sites/esmap.org/files/FR323-06_GBL_Coping_with_Higher_Oil_Prices.pdf.

———. 2008a. "Coping with Oil Price Volatility." ESMAP Special Report 005/08. Washington, DC: World Bank. http://esmap.org/esmap/sites/esmap.org/files/8142008101202_coping_oil_price.pdf.

———. 2008b. "Vulnerability to Oil Price Increases: A Decomposition Analysis of 161 Countries." *Extractive Industries for Development Series* 1.Washington, DC: World Bank. http://siteresources.worldbank.org/INTOGMC/Resources/eid1_oil_price_vulnerability.pdf.

———. 2010. "Rockets and Feathers: Asymmetric Petroleum Product Pricing in Developing Countries." *Extractive Industries for Development Series* 18. Washington, DC: World Bank. http://siteresources.worldbank.org/EXTOGMC/Resources/336929-1266963339030/eifd18_rockets_feathers.pdf.

BMI (Business Monitor International). 2011. "Fuel Supply Crisis Forces Further Reforms at Mombasa Refinery." May 11.

Borneo Post. 2012. "New Rule for Local Fishermen to Reduce Catch Leakages." August 8.

Bradley, Robert L., Jr. 1995. *Oil, Gas & Government: The U.S. Experience*. Lanham, Maryland: Rowman and Littlefield Publishers.

CNE (Comisión Nacional de Energía). 2013. "Sistema de Información en Línea de Precios de Combustibles en Estaciones de Servicio." www.bencinaenlinea.cl/web2/.

Coady, David, Robert Gillingham, Rolando Ossowski, John Piotrowski, Shamsuddin Tareq, and Justin Tyson. 2010. "Petroleum Product Subsidies: Costly, Inequitable, and Rising." IMF Staff Position Note 10/05, IMF, Washington, DC. www.imf.org/external/pubs/ft/spn/2010/spn1005.pdf.

Dahl, Carol A. 2012. "Measuring Global Gasoline and Diesel Price and Income Elasticities." *Energy Policy* 41: 2–13. www.lantm.lth.se/fileadmin/fastighetsvetenskap/Nationalekonomi/Elasticities.pdf.

Deacon, Robert T., and Jon Sonstelie. 1989. "The Welfare Costs of Rationing by Waiting." *Economic Inquiry* 27 (2): 179–96. http://onlinelibrary.wiley.com/doi/10.1111/j.1465-7295.1989.tb00777.x/pdf.

EIA (Energy Information Administration). 2013a. "International Energy Statistics." www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm#.

———. 2013b. "Petroleum and Other Liquids – Data – Prices." www.eia.gov/petroleum/data.cfm#prices.

———. 2013c. "Prices, Sales Volumes & Stocks by State." www.eia.gov/dnav/pet/pet_sum_mkt_dcu_SHI_m.htm

EITI (Extractive Industries Transparency Initiative). http://eiti.org/.

Energypedia. "International Fuel Prices." https://energypedia.info/wiki/International_Fuel_Prices.

EPPO (Energy Policy and Planning Office). 2013. "Price Structure of Petroleum Products in Bangkok." www.eppo.go.th/petro/price/index.html.

Fiszbein, Ariel, Norbert Schady, Francisco Ferreira, Margaret Grosh, Nial Kelleher, Pedro Olinto, and Emmanuel Skoufias. 2009. *Conditional Cash Transfers: Reducing Present and Future Poverty*. Washington, DC: World Bank. http://siteresources.worldbank.org/INTCCT/Resources/5757608-1234228266004/PRR-CCT_web_noembargo.pdf.

FTC (U.S. Federal Trade Commission). 2003. "Competition and the Effects of Price Controls in Hawaii's Gasoline Market." www.ftc.gov/be/v030005.shtm.

GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). 2012. "Urban Transport and Energy Efficiency. Moduel 5h. Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities." Bonn. www2.gtz.de/wbf/4tDx9kw63gma/SUT_module5h.pdf.

Grosh, Margaret, Carlo del Ninno, Emil Tesliuc, and Azedine Ouerghi. 2008. *For Protection & Promotion: The Design and Implementation of Effective Safety Nets*. Washington, DC: World Bank. http://siteresources.worldbank.org/SPLP/Resources/461653-1207162275268/For_Protection_and_Promotion908.pdf.

GSI (Global Subsidies Initiative). "Fossil-Fuel Subsidies." www.iisd.org/gsi/fossil-fuel-subsidies.

Guardian. 2011. "Nigeria to Set Up Special Body to Manage Funds Accruing after Oil Subsidy Removal." October 26.

Guatemala MEM (Ministry of Energy and Mining). 2013. "Rutas de Precios Bajos—Estaciones de Servicio Área Metropolitana." www.mem.gob.gt/viceministerio-de-mineria-e-hidrocarburos-2/direccion-general-de-hidrocarburos/precios/rutas-de-precios-bajos-estaciones-de-servicio-area-metropolitana/.

Harvey, Scott, and Calvin T. Roush, Jr. 1981. "Petroleum Product Price Regulations: Output, Efficiency, and Competitive Effects." Staff Report of the Bureau of Economics to the Federal Trade Commission, Washington, DC.

Hindu. 2011. "Brazen Criminality." January 31.

IANGV (International Association for Natural Gas Vehicles). 2012. "Current Natural Gas Vehicle Statistics." July 2012. www.iangv.org/current-ngv-stats/.

IEA (International Energy Agency). 2004. *Energy Policies of OECD Countries: Portugal 2004 Review*. Paris.

———. 2012. "World Energy Statistics." IEA World Energy Statistics and Balances (database). doi: 10.1787/data-00510-en.

———. 2013. "Medium-Term Oil Market Report: Market Trends and Projections to 2018." Paris.

IMF (International Monetary Fund). 2012. "Ghana: Fifth Review Under the Three-Year Arrangement Under the Extended Credit Facility and Request for Modification of Performance Criteria—Staff Report; Staff Supplements; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Ghana." IMF Country Report 12/36. Washington, DC. www.imf.org/external/pubs/ft/scr/2012/cr1236.pdf.

———. 2013a. "Energy Subsidy Reform: Lessons and Implications." Washington, DC. www.imf.org/external/np/pp/eng/2013/012813.pdf.

———. 2013b. "Case Studies on Energy Subsidy Reform: Lessons and Implications." Washington, DC. www.imf.org/external/np/pp/eng/2013/012813a.pdf.

India Ministry (India Ministry of Consumer Affairs, Food, and Public Distribution). 2013. "Smart Cards for PDS." February 27. http://pib.nic.in/newsite/erelease.aspx?relid=92612.

INE (Instituto Nicaragüense de Energía). 2013. "Monitoreo de precios de los combustibles 2013." INE, Managua, Nicaragua. www.ine.gob.ni/dgh.html.

Keane, Michael P., and Eswar S. Prasad. 1996. "The Employment and Wage Effects of Oil Price Changes: A Sectoral Analysis." *The Review of Economics and Statistics* 78(3): 389–400.

Keynes, John Maynard. 1942. "The International Regulation of Primary Products." In *Collected Writings of John Maynard Keynes*, ed. D. Moggridge. London: Macmillan and Cambridge University Press, 1980.

Kojima, Masami. 2009a. "Changes in End-User Petroleum Product Prices: A Comparison of 48 Countries." *Extractive Industries and Development Series* 2. Washington, DC: World Bank. http://siteresources.worldbank.org/INTOGMC/Resources/ei_for_development_2.pdf.

———. 2009b. "Government Response to Oil Price Volatility: Experience of 49 Developing Countries." *Extractive Industries and Development Series* 10. Washington, DC: World Bank. http://siteresources.worldbank.org/INTOGMC/Resources/10-govt_response-hyperlinked.pdf.

———. 2011. "The Role of Liquefied Petroleum Gas in Reducing Energy Poverty." *Extractive Industries and Development Series* 25. Washington, DC: World Bank. http://siteresources.worldbank.org/INTOGMC/Resources/LPGReportWeb-Masami1.pdf.

———. 2012. "Oil Price Risks and Pump Price Adjustments." World Bank Policy Research Working Paper No. 6227, World Bank, Washington, DC. http://go.worldbank.org/SIM8QA2VI0.

———. 2013. "Petroleum product pricing and complementary policies: Experience of 65 developing countries since 2009." World Bank Policy Research Working Paper No. 6396, World Bank, Washington, DC. http://go.worldbank.org/6A2XVLPTY0.

Kojima, Masami, and Todd Johnson. 2005. "Potential for Biofuels for Transport in Developing Countries." ESMAP Report 312/05. Washington, DC: World Bank. http://www.esmap.org/esmap/sites/esmap.org/files/312-05%20Biofuels%20for_Web_0.pdf.

Kojima, Masami, Donald Mitchell, and William Ward. 2007. "Considering Trade Policies for Liquid Biofuels." ESMAP Special Report 004/07. Washington, DC: World Bank. http://siteresources.worldbank.org/INTOGMC/Resources/Considering_trade_policies_for_liquid_biofuels.pdf.

Medlock, Kenneth B., and Amy Meyers Jaffe. 2009. "Who Is in the Oil Futures Market and How Has It Changed?" James A. Baker III Institute for Public Policy, Rice University. www.bakerinstitute.org/publications/EF-pub-MedlockJaffeOilFuturesMarket-082609.pdf.

Meyler, Aidan. 2009. "The Pass Through of Oil Prices into Euro Area Consumer Liquid Fuel Prices in an Environment of High and Volatile Oil Prices." *Energy Economics* 31: 867–81. doi:0.1016/j.eneco.2009.07.002.

Modern Ghana. "Premix Shortage Again as Fuel Mafias Hijack Supply Process." August 28.

Newbery, David M. G., and Joseph E. Stiglitz. 1981. *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*. Oxford: Oxford University Press.

OECD (Organisation for Economic Co-operation and Development). 2013. "Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013." www.oecd.org/site/tadffss/.

OFT (Office of Fair Trading). 2011. "OFT Takes Action Against Heating Oil Companies and Price Comparison Websites." Press release 96/11, OFT, London, UK. www.oft.gov.uk/news-and-updates/press/2011/96-11/.

———. 2012. "OFT boosts transparency on heating oil prices." Press release 64/12, OFT, London, UK. http://www.oft.gov.uk/news-and-updates/press/2012/64-12.

Panama. Authority for Consumer Protection and Competition. 2013. "Combustibles." ACPC, Panama City, Panama. http://www.autoridaddelconsumidor.gob.pa/estadisticas.asp?area=3.

PUC (Public Utilities Commission). 2006. "Annual Report: Fiscal Year 2006–2006." PUC, Honolulu, Hawaii, USA. http://lrbhawaii.info/reports/legrpts/bf/puc/269_5hrs_07.pdf.

———. 2010. "Petroleum Industry Monitoring, Analysis and Reporting (PIMAR)." PUC, Honolulu, Hawaii, USA. http://puc.hawaii.gov/industries/petroleum.

Reuters. 2013. "UPDATE 1-Egypt Sees 3.8 Pct Growth in Fiscal Year from July." April 23.

Shell. 2013. "Target One Million: Learn How to Save Fuel and Become One in a Million." www.shell.com/global/products-services/on-the-road/fuels/fuel-save-challenge.html.

South Africa. Department of Minerals and Energy. 2007. "Biofuels Industrial Strategy of the Republic of South Africa." www.info.gov.za/view/DownloadFileAction?id=77830.

Stevens, Paul. 2010. "The 'Shale Gas Revolution': Hype and Reality." London: Chatham House Report. www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/r_0910stevens.pdf.

Tanzania Daily News. 2012. "Oil sector hails Muhongo over BPS reports." August 22.

Trade Arabia. 2011. "Total Jordan Launches Move to Cut Fuel Use." June 26.

USDA (U.S. Department of Agriculture). 2013. "Oil Crops Outlook." Economics Research Service, USDA, Washington, DC. www.ers.usda.gov/publications/ocs-oil-crops-outlook.aspx.

Vagliasindi, Maria. 2012. "Implementing Energy Subsidy Reforms: An Overview of the Key Issues." Policy Research Working Paper 6122, World Bank, Washington, DC. http://elibrary.worldbank.org/content/workingpaper/10.1596/1813-9450-6122

Victor, David. 2009. "The Politics of Fossil Fuel Subsidies." GSI series, "Untold Billions: Fossil-Fuel Subsidies, Their Impacts and the Path to Reform." Geneva: Global Subsidies Initiative, International Institute for Sustainable Development. www.iisd.org/publications/pub.aspx?id=1254.

WDI (World Development Indicators). 2013. World Bank, Washington, DC. http://databank.worldbank.org/data/home.aspx.

World Bank. 2008. "Guidance for Responses from the Human Development Sector to Rising Food and Fuel Prices." World Bank, Washington, DC. http://siteresources.worldbank.org/SAFETYNETSANDTRANSFERS/Resources/HDNFoodandFuel_Final.pdf.

———. 2012. "BLT Temporary Unconditional Cash Transfer: Social Assistance Program and Public Expenditure Review 2." Jakarta: World Bank. http://documents.worldbank.org/curated/en/2012/02/15893823/bantuan-langsung-tunai-blt-temporary-unconditional-cash-transfer.

———. 2013. "Commodity Market." Price data series. World Bank, Washington, DC. Series at http://go.worldbank.org/QNYZRM5540.

Rising oil prices in the last decade have prompted an array of policy responses from governments in developing countries. High oil prices have spurred efforts to intensify energy conservation and diversify away from oil. As households and businesses spend more and more of their income on fuels and other goods and services that use oil as an input, governments have come under pressure to step in and keep domestic prices low. Many consumers have benefited from the low prices, although all too often the rich have gained far more than the poor.

These low prices have had unintended consequences, ranging from fuel smuggling and adulteration to acute shortages and high prices on black markets, harming the economy. In a handful of countries, the pricing policies have cost several percentage points of gross domestic product, cutting expenditures on government programs including delivery of essential social services.

Based on case studies, this report reviews the evolution of pricing policy for oil products in developing countries, complemented by measures to reduce oil consumption. It suggests a number of considerations for drawing up a road map for pricing reform, tailored to the specific starting conditions in individual markets. The report considers the interests of a wide range of stakeholders and suggests a menu of options for moving to market-based pricing. The findings of this report will be of interest to governments, industry, and civil society.

THE WORLD BANK