Oil Price Risks and Pump Price Adjustments

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Abstract

Between 1999 and 2008, world oil prices more than quadrupled in real terms. For oil importers, vulnerability to oil price increases, defined as the share of gross domestic product spent on net oil imports, rose considerably. Considering medians, low-income countries had the highest vulnerability in 2008 and the highest increase in vulnerability between 1999 and 2008.

When changes in vulnerability were decomposed into several contributing factors, more than two-thirds of 170 countries studied were found to have offset the increase in the value of oil consumption by reducing the oil intensity of gross domestic product. Oil intensity fell in more than half the countries in every income group and in every region of the world, driven by falling energy intensity and, to a lesser extent, the oil share of energy.

This study also examines the degree of pass-through to

consumers of increases in world prices of gasoline, diesel, kerosene, and liquefied petroleum gas between January 2009 and January 2012, when oil prices in nominal U.S. dollars more than doubled. Retail fuel prices varied by two orders of magnitude in 2012, and oil-exporting countries were far less likely to pass on price increases. Gasoline had the highest pass-through, followed by diesel, liquefied petroleum gas, and kerosene. The median pass-through increased with income for gasoline, diesel, and kerosene, but was highest in low-income countries for liquefied petroleum gas. Despite divergent pricing policies, the pass-through coefficients of different fuels were strongly positively correlated, suggesting that the degrees to which domestic prices tracked world prices were comparable for the four fuels in many countries.

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1. Introduction

World oil prices began to rise significantly in 2004, and reached all-time historic highs in mid-2008. After falling sharply in the latter half of 2008, prices gradually rose to the first half of 2011 and have been fluctuating around the mid-2011 level since. In early 2012, Saudi Aramco contract prices for propane and butane—important benchmark prices for LPG—surpassed their peak in 2008 in nominal and real terms, and nominal gasoline prices in April 2012 also reached the levels seen in mid-2008 (figure 1), followed by a sharp decline. The surges—and wild fluctuations in the case of LPG—in world prices have posed significant challenges to governments in countries where governments control fuel prices and price-setting is highly politicized.

Figure 1: Monthly average world prices of gasoline, diesel, kerosene, and LPG since 2008

Sources: Platts Oilgram Price Report and Reuters, various issues.

Notes: Free-on-board cargo prices in Northwest Europe of regular gasoline with 92 research octane number, diesel with 0.1 percent sulfur, and jet kerosene; and the average of Saudi Aramco's monthly contract prices of propane and butane.

For consumers in many countries, the adverse impacts of steep rises in world oil prices on the world market since the end of 2003 have been exacerbated by currency depreciation against the U.S. dollar, in which world oil prices are denominated. Between 2003—before oil prices began to rise—and 2011, currency depreciated in two-fifths of developing countries, broadly evenly split across income categories. In nearly one-fifth of them, depreciation exceeded 20 percent.² In contrast, appreciation exceeding 40 percent was disproportionately concentrated in upper-middle-income countries (figure 2).

² It is worth pointing out, however, that depreciation against the U.S. dollar in the preceding eight years was much more serious: more than four-fifths of countries experienced depreciation, and depreciation exceeded 70 percent in one-fifth of them.

Figure 2: Currency appreciation in developing countries by income between 2003 and 2011

Sources: IMF 2012 and author's calculations.

Note: Calculations based on 29 low-income, 48 lower-middle-income, and 41 upper-middle-income countries.

* "0 to 20%" includes seven lower-middle- and five upper-middle-income countries in which the exchange rates did not change.

This paper is part of a larger study assessing the implications of high oil prices and oil price volatility on fuel use, the downstream petroleum sector, and household fuel consumption in developing countries, and follows two previous publications (Bacon and Kojima 2008; Kojima 2009a). The paper first examines one measure of vulnerability to oil price increases—net oil imports relative to income—in periods of high and low oil prices, and breaks down changes in vulnerability over time into several factors that contribute to determining the magnitude of vulnerability. This allows cross-country benchmarking and helps to show how changes in such factors as the oil intensity of energy and the energy intensity of the economy can make countries more vulnerable to oil price shocks or less so. Although the effects of high oil prices on net oil exporters are also analyzed, the main focus of this paper is on vulnerability arising from oil consumption, because the latter affects every country.

The paper also investigates the changes in the retail prices of four fuels—gasoline, diesel, kerosene consumed by households, and liquefied petroleum gas (LPG) for household use—between January 2009, when crude oil prices were below US\$45 a barrel, and January 2012, when they rose above US\$100. By comparing the price changes at the retail level to those on the world market, the degree of passing through of fuel price increases on the world market can be estimated. Passing through less than fully might imply any combination of fuel tax reduction, greater subsidies, lower costs of supply, and lower profit margins for oil companies. Conversely, passing through more than fully might reflect higher fuel taxes, subsidy reduction, higher costs in the supply chain, or higher profit margins. Examination of the degree of pass-through helps understand how different markets have been reacting to rising oil prices in recent years.

The German development agency, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), surveys retail prices of super gasoline and diesel every other year in November, the last survey having been conducted in November 2010 (GIZ 2012). The

International Monetary Fund (IMF) has, for some time, been analyzing pass-through coefficients, primarily for gasoline and diesel but sometimes including kerosene. Coady et al. (2010) reported medians between end-2003 and mid-2008 for eight groups of countries, and Arze del Granado, Coady, and Gillingham (2010) reported pass-through coefficients for gasoline, diesel, and kerosene for 21 countries between end-2003 and varying end periods, with the last end period being mid-2008. A recent IMF publication reported pass-through coefficients for Pakistan and six countries in the Middle East and North Africa between the fourth quarter of 2010 and the second quarter of 2011 (IMF 2011). Pass-through coefficients between 2008 and 2011 have been presented in meetings (Parry 2011) but they have not yet been published. This paper complements the work carried out by the IMF by adding LPG, citing publicly available data sources for retail price information where it is available, and providing detailed information on fuel quality and reference prices.

2. Methodology

Throughout this paper, income category assignments are those of the World Bank as of July 2012. Regional assignments are also of the World Bank; country identification by region can be found under “Countries” on the World Bank’s Web site at worldbank.org.

2.1 Vulnerability levels and changes

A rise in oil prices both increases the value to the economy of any domestic oil production and decreases GDP according to the consumption of oil products. Different measures of vulnerability and the mechanisms by which higher oil prices affect GDP are discussed in Bacon and Kojima (2008). As in the 2008 publication, this paper defines vulnerability as the ratio of the value of the net volume of traded crude oil and oil products to GDP. This measure of vulnerability does not show the distributional or fiscal effects of a change in oil prices.

Vulnerability, so defined, can be related to a number of factors through an accounting identity. Such a decomposition analysis allows a study of how much changes in individual factors contribute to the overall changes in vulnerability. Following Bacon and Kojima (2008), this paper uses a refined Laspeyres index—rather than a log mean Divisia index—to enable the incorporation of both production and consumption effects, thereby allowing the inclusion of countries that are net oil exporters. The change in vulnerability (V) is decomposed into several factors between two dates. One advantage of this approach is that the decomposed factors are additive and their relative contributions to the overall change in vulnerability can be easily ascertained.

The identity is expressed as the sum of two terms that separate the production of oil and consumption of oil products, each of which is further decomposed into several individual factors:

$$\Delta V = \text{consumption terms} - \text{production terms} \equiv \Delta C - \Delta P =$$

$$\begin{aligned} & \Delta[\text{Oil price in current US\$} \times \frac{\text{Oil consumption}}{\text{Energy consumption}} \times \frac{\text{Energy consumption}}{\text{GDP in US\$ at 2005 PPP values}} \times \\ & \frac{\text{GDP in US\$ at 2005 PPP values}}{\text{GDP in constant local currency}} \times \frac{\text{GDP in constant local currency}}{\text{GDP in current local currency}} \times \frac{\text{GDP in current local currency}}{\text{GDP in current US\$}}] - \\ & \Delta[\text{Oil price in current US\$} \times \text{oil production} \div \text{GDP in current US\$}] \equiv \end{aligned}$$

(oil price effect through consumption + oil share in energy effect + energy intensity effect + real GDP converter effect + GDP price deflator effect + exchange rate effect) –
(oil price effect through output + oil production effect + inverse of current GDP in US\$ effect),

where PPP is purchasing power parity and ΔV is expressed in percentage points. Of the nine terms, the real GDP converter effect is always zero, because the ratio of GDP in constant dollars at PPP to GDP in constant local currency remains the same. For countries that do not produce crude oil, the production effects are zero, whereas consumption effects are non-zero for all countries.

With the possible exception of very large oil exporters or importers, governments have virtually no control over the world price of oil, but can influence the share of oil in energy use and the energy intensity of GDP through policy. The sum of these two effects is the oil intensity of the economy, and declining oil intensity can offset the price effect through consumption. This paper defines an offsetting coefficient as

$$\text{Offset} = - \frac{(\text{Oil share in energy effect} + \text{energy intensity effect})}{(\text{Oil price effect through consumption})}$$

This paper selects calendar 1999, 2008, and 2009 for decomposition analysis. 2009 is the last year for which all the data necessary for decomposition are available. For oil prices, this study uses the annual average of the prices of three marker crudes: Brent, West Texas Intermediate, and Dubai Fatah. In 2011 U.S. dollars, the prices were US\$23.59 a barrel in 1999, US\$101.25 in 2008, and US\$63.80 in 2009. The price in 1999 was within US\$2 a barrel of the decadal average in the 1990, both in 2011 U.S. dollars. The 2008 average price was the closest of all historical prices to the 2011 average of US\$104. Therefore, the level of vulnerability in 2008 is likely to be fairly representative of that in 2011, for which data are not yet available. Decomposition analysis is carried out for the change in vulnerability between 1999 and 2008 (first period) and between 1999 and 2009 (second period). During these two periods, oil prices increased by a factor of 4.3 and 2.7 in real terms, respectively; the price in 2009 was lower than that in 2008 by more than one-third.

Vulnerability calculations in this paper use two different data sources for oil production, consumption, and trade:

1. For vulnerability levels and changes without decomposition (figures 3–6), for all countries for which the International Energy Agency (IEA) has data, net imports are computed from the IEA's oil import and export statistics. For the remaining countries, net

imports are computed as the difference between the consumption and production statistics available from the Energy Information Administration (EIA) of the U.S. Department of Energy. Although the EIA also has import and export statistics, the data for 2009 are not yet available. Vulnerability is computed for a total of 180 countries, including 131 developing countries.

2. For decomposition analysis of changes in vulnerability, net imports are always based on the difference between consumption and production because both appear in the accounting identity used. Changes in inventories are omitted because the data are available primarily for high-income countries only and the contributions are expected to be small in most cases. For countries for which data from the IEA are available, they are used unless the net imports calculated using the EIA data more closely match the net imports computed using the IEA data in 1 above. For all countries in which the IEA does not collect data, the EIA data are used. Decomposition analysis covers a total of 170 countries.

The results of decomposition analysis necessarily exclude countries missing data for any one of the parameters in the accounting identity. In addition, the analysis excludes those countries for which there are serious discrepancies in the oil statistics, as explained in appendix 1.

Although full results for 1999, 2008, and 2009 are presented in appendix 1, the main text of this paper presents results for ΔV for only the period between 1999 and 2008. The differences between 1999–2008 and 1999–2009 are driven primarily by the difference in the price of oil. As expected, net oil importers were generally less vulnerable, and net oil exporters saw a smaller fraction of their GDP derived from oil export revenue, in 2009 than in 2008.

2.2 Passing through of world fuel price increases

The pass-through coefficient for each fuel is calculated between January 2009 and January 2012 as

$$\frac{(Retail\ fuel\ price_{Jan\ 2012} - retail\ fuel\ price_{Jan\ 2009})}{(Benchmark\ fuel\ price_{Jan\ 2012} - benchmark\ fuel\ price_{Jan\ 2009})},$$

where all fuel prices are expressed in current U.S. dollars and the reference world prices are the free-on-board (FOB) prices of the fuel in the relevant international market: Northwest Europe, the Persian Gulf, Singapore, and the U.S. Gulf Coast. Two criteria were used to select the two dates:

- The time gap between the two dates is sufficient to allow governments to adjust prices. This would not be an issue if all countries have deregulated downstream markets and market-clearing prices are prevailing, but prices in many are regulated.
- The price difference between the two periods should be sufficiently large to reduce the noise in the data relative to other factors.

Where governments conduct frequent retail price surveys and post them on the Web, the study uses monthly average prices for the country or, if country-wide average data are not available, average prices in the capital city. For countries with price control, *official* prices averaged over the month (if prices were adjusted once or more in January) are used, even if black market prices were markedly higher, because the focus of this study for countries with price control is not on the actual prices paid by consumers but government pricing policies. In a handful of cases where one or more grades of a given fuel are subsidized but not others, the subsidized prices are used to highlight policy consequences. Details about fuel characteristics and sources of price information can be found in table A2.1 in appendix 2 and reference FOB prices in table A2.3. The inter-regional differences in the reference FOB prices varied by 7 percent or less for gasoline, diesel, and kerosene. LPG prices in contrast varied by as much as 60 percent by region—propane prices were much lower in the United States than elsewhere in January 2012, and the lowest and highest butane prices in January 2009 differed by almost 50 percent.

The pass-through coefficients as defined in this study need to be interpreted with caution. Retail prices depend not only on the reference world prices, taxes, and subsidies, but also on a number of other factors:

- *Timing of fuel purchase.* Particularly in small markets, there may be a considerable time lag between fuel purchase and fuel sale, and world fuel prices may change markedly during that period. The smaller the market, the longer is the time interval between purchase on the world market and final retail sale. This is arguably the largest source of uncertainty in this analysis. The monthly average benchmark price of regular gasoline in Singapore was about the same in November 2008 and January 2009, but 20 percent lower in December 2008, resulting in an under-estimation of pass-through for gasoline purchased in December 2008. In Europe, the benchmark price of regular gasoline was 14 percent lower in December 2008 and 11 percent higher in November 2008 than in January 2012, leading to under-estimation and over-estimation, respectively. Diesel and kerosene prices were about the same in December 2008 and January 2009 in both Singapore and Europe, but 20 percent higher in Singapore and 30 percent higher in November 2008. The variations were smaller for January 2012. In Europe, kerosene and diesel prices were within 3 percent of the January 2012 prices in the preceding two months, while the benchmark price of regular gasoline was about 5 percent lower. In Singapore, diesel and kerosene prices were the same in January 2012 and November 2012 and 3–4 percent lower in December 2011, while the price of regular gasoline was 8 percent lower in November and December 2011 than in January 2012. Correcting for this factor, however, would entail a detailed analysis of each individual market including the status of the refined product inventory in the relevant periods. Such a large undertaking is beyond the scope of this study.
- *Fuel quality.* The octane grade of gasoline and the sulfur content of diesel are two of the most important fuel characteristics that affect the price. As an illustration, diesel prices

from the U.S. Gulf Coast are for ultralow-sulfur diesel, while some markets in Latin America continue to sell high-sulfur diesel. In a handful of countries, a grade of a given fuel with inferior quality was withdrawn between 2009 and 2012, changing the fuel quality. Because differences rather than price levels are being compared, this effect may be the smallest of all the factors listed here.

- *Oil trade status.* Depending on the location of the market, there may be a large difference between import-parity and export-parity price levels, which would correspond to market-clearing price levels in the absence of price control, and these in turn depend on the cost of transport, and therefore world prices of petroleum fuels used in transportation. Landed costs may also be markedly higher in countries with poor port facilities or slow customs clearance and correspondingly large demurrage charges. There are also economies of scale in importing refined products, such as the import parcel size in marine transport—the smaller the size, the higher the unit cost. Because price differences are used, this effect is unlikely to be large.
- *Domestic distribution costs and supply-demand balance.* Domestic distribution costs include costs and profit margins associated with transport, storage, distribution, marketing, and retail sale. Transport costs are influenced not only by distance but the means of transport—for example, pipeline transport is much cheaper than trucking—and scale economy, which is what makes rural markets much more expensive to supply. Margins are influenced by the local supply-demand balance—a product pipeline or refinery outage would push up prices—and the level of price competition in the market. These effects could be significant, as illustrated by the case of fuel shortages in Uganda below.

As a result, even in a completely deregulated market with only specific taxes and fees and no change in tax policy, pass-through coefficients typically differ from 1.0, and everything else being equal, imposition of sufficiently large ad valorem tax would make pass-through coefficients larger than 1.0. Nor does a coefficient much larger than 1 necessarily imply the absence of a subsidy: if a country used to subsidize a fuel heavily in January 2009 and subsidized it less in January 2012, the pass-through coefficient may exceed 1 markedly, but the fuel may still be subsidized in January 2012. At the opposite end of the spectrum is a situation in which serious fuel shortages pushed up prices in January 2009 but not three years later. Prices are deregulated in Uganda, and its pass-through coefficients should be broadly comparable to those in Kenya, because Uganda imports most of its refined products from Kenya, but serious fuel shortages in January 2009 appeared to have given rise to much lower pass-through coefficients.

Pass-through coefficients must be seen in the context of absolute fuel price levels and other factors in individual countries. These qualifications notwithstanding, completely deregulated oil markets, such as those in Europe, have pass-through coefficients of 1 or higher, while countries with large fuel subsidies may even have negative pass-through coefficients, often exacerbated by currency depreciation. In periods of large price increases, such as the one

selected in this paper, pass-through coefficients smaller than about 0.8 are likely to signal a subsidy increase or fuel tax reduction.

3. Findings

3.1 Vulnerability

Vulnerability is by definition negative for net oil exporters and positive for net oil importers. For the latter group of countries, vulnerability tends to rise with increasing oil price. For large net oil exporters, barring a large reduction in oil production, vulnerability decreases with price. It would not be correct to conclude, however, that a large negative value for vulnerability means that the country is not vulnerable to oil price shocks. On the contrary, a large negative vulnerability means that the country is heavily dependent on oil export revenue, making it particularly vulnerable to price shocks. In fact, if an economy were to consist entirely of the oil sector, vulnerability would be -100 percent and changes in vulnerability would be 0 percent irrespective of the price of oil (while the country's GDP itself may be fluctuating wildly). The vulnerability of large oil exporters to oil price shocks increases with increasing magnitude of vulnerability, which has a negative sign. Because interpretations are distinctly different between net oil importers and exporters, they are treated separately when vulnerability is discussed. Because every country consumes oil, all countries are considered together in discussing some of the consumption terms.

Figures 3 and 4 show vulnerability for net oil importers and exporters, respectively. Among net oil importers, the trend points to the large impact of the price of oil on vulnerability: the median vulnerability was 1.9 percent in 1999 (lowest price), 3.8 percent in 2009, and 5.7 percent in 2008 (highest price). World oil prices in real terms more than doubled between 1999 and 2009, and the vulnerability of oil importers similarly doubled. Among net oil exporters, the median vulnerability was -14 percent in 2009, -16 percent in 1999, and -21 percent in 2008 (that is, oil exports constituted the largest share of GDP in 2008, when oil prices were highest). While the median vulnerability was comparable between 1999 and 2009, significantly more exporters had vulnerability below -30 percent in 2009, signifying higher vulnerability in that year. Detailed results on vulnerability and decomposition analysis, including results by country, can be found in appendix 1.

Figure 3: Distribution of vulnerability in 1999, 2008, and 2009 among net oil importers

Sources: Table A1.1 and author's calculations.

Figure 4: Distribution of vulnerability in 1999, 2008, and 2009 among net oil exporters

Sources: Table A1.1 and author's calculations.

Summary statistics by income and region are available in appendix 1, tables A1.2 and A1.3, respectively. The average vulnerability was the highest for low-income countries for all three years—in part because they had the highest concentration of non-oil producers—and the median was also the highest for low-income countries in 1999 and 2008. High-income countries had the lowest median vulnerability for all three years—reflecting the low oil intensity of their economies—and the lowest average vulnerability in 2008 and 2009. Upper-middle-income countries had the highest share of countries with falling vulnerability. The regional breakdown in this paper excludes high-income countries and focuses only on developing countries. The Middle East and North Africa, with some major oil exporters, was the only region with negative average and median vulnerability indices for all three years; Europe and Central Asia and Sub-Saharan Africa also had negative average vulnerability indices in every year. At the opposite end of the spectrum was South Asia, with no net oil exporters, which had the highest average vulnerability

for each year. Latin America and the Caribbean had the highest median vulnerability in 2008 and 2009, and South Asia in 1999.

The change in vulnerability between 1999 and 2008 is shown in figure 5 (importers) and figure 6 (exporters). Nearly one-third of net importers spent at least 5 percentage points more of GDP on oil imports in 2008 than in 2009. Brazil was the only country that managed to decrease vulnerability, and it did so by increasing domestic oil production. Among exporters, one-quarter derived less of GDP from oil revenue, mostly as a result of falling production. Equatorial Guinea, Nigeria, and Vietnam all increased oil production but, unlike other exporters in a similar situation, diversification of the economy led to a lower share of GDP derived from oil revenue, signifying lower vulnerability to oil price shocks.

Figure 5: Distribution of changes in vulnerability among net oil importers, 1999–2008

Sources: Table A1.1 and author's calculations.

Note: The import status is that in 2008.

Figure 6: Distribution of changes in vulnerability among net oil exporters, 1999–2008

Sources: Table A1.1 and author's calculations.

Note: The export status is that in 2008.

Tables 1 and 2 summarize ΔC and ΔV in decomposition analysis for 1999–2008 for net importers and exporters, respectively. The results are shown for the production and consumption terms, which in turn sum three and six factors, respectively. For the two-thirds of net oil importers that did not produce oil, ΔC and ΔV are the same and ΔP is equal to zero. Only six countries, all net oil exporters and of which four are in Europe and Central Asia, managed to

decrease vulnerability due to consumption, despite a quadrupling of prices in real terms between 1999 and 2008. This, however, is in part due to historically low energy efficiency and high oil intensity of these countries at the beginning of the study period, providing large scope for improving efficiency.

Table 1: Distribution of production and consumption effects by income and region among net oil importers, 1999–2008 (percentage of countries in each category except for the median)

Category (number of countries)	ΔP					ΔC					
	Med	< -5%	-5 to 0%	0%	0–1%	Med	0– 2.5%	2.5– 5%	5– 7.5%	7.5– 10%	>10 %
Income											
Low (29)	0.0	3	3	90	3	4.6	21	34	17	14	14
LM (34)	0.0	3	24	68	6	4.4	15	47	18	6	15
UM (33)	0.0	0	36	61	3	5.3	21	24	33	15	6
High (35)	0.0	0	60	40	0	2.3	57	26	9	0	9
Region (excluding high-income countries)											
EAP (13)	0.0	0	31	62	8	5.6	8	38	23	23	8
ECA (16)	0.0	0	44	38	19	1.9	63	31	0	0	6
LAC (21)	0.0	5	19	76	0	5.7	0	29	33	19	19
MENA (5)	0.0	0	20	80	0	6.8	0	20	40	20	20
SAR (7)	0.0	0	43	57	0	4.6	0	71	14	14	0
SSA (34)	0.0	3	6	91	0	4.6	21	35	26	6	12

Sources: Table A1.4 and author's calculations

Notes: Oil import status in 2008. Med = median in percentage of GDP, LM = lower middle, UM = upper middle, EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SSA = Sub-Saharan Africa. The median for ΔP is equal to zero except among high-income countries, for which the median is -0.03.

Table 2: Distribution of production and consumption effects by income and region among net oil exporters, 1999–2008 (percentage of countries in each category except for the median)

Category (number of countries)	ΔP					ΔC					
	Med	< -20%	-20 to -10%	-10 to 0%	>0%	Med	<0%	0– 2.5%	2.5– 5%	5– 10%	>10 %
Income											
Low (2)	-28.6	50	0	50	0	1.1	0	100	0	0	0
LM (11)	-5.1	9	0	64	27	7.9	0	18	27	18	36
UM (16)	-12.0	19	38	31	13	3.7	31	6	31	25	6
High (10)	-7.2	20	20	50	10	2.9	10	30	40	10	10
Region (excluding high-income countries)											
EAP (3)	-4.8	0	0	67	33	8.3	0	0	33	33	33
ECA (4)	-6.9	25	25	0	50	-1.9	100	0	0	0	0
LAC (6)	-8.6	0	50	50	0	5.3	0	17	17	67	0
MENA (7)	-9.8	29	14	57	0	10.5	0	0	29	14	57
SSA (9)	-5.8	22	11	44	22	2.4	11	44	44	0	0

Sources: Table A1.4 and author's calculations

Notes: Oil export status in 2008. No country in South Asia was a net oil exporter. Retention of three figures for medians exceeding 10 percent is for formatting purposes and is not intended to imply that the number of significant

figures is three. Med = median in percentage of GDP, LM = lower middle, UM = upper middle, EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SSA = Sub-Saharan Africa.

Changes in vulnerability arising from changes in oil intensity and the exchange rate are shown by income in figure 7. High-income countries had the largest proportion of countries with declining oil intensity of GDP and currency appreciation against the U.S. dollar. Upper-middle-income countries had the highest proportion of countries with offsetting coefficients exceeding 20 percent.

Figure 7: Impact of oil intensity of the economy and exchange rate on the change in vulnerability by income, 1999–2008

Sources: Table A1.4 and author's calculations.

It is sometimes argued that the energy intensity of an economy growing from a low base may need to increase as the economy ramps up its use of modern commercial energy. The percentage of countries with declining energy intensity was indeed smallest for low-income countries and increased with rising per capita GDP (see table A1.6 in appendix 1), but more than half of low-income countries reduced energy intensity. During the same period, more than one-third of low-income countries reduced the oil share of energy consumption. All in all, oil intensity declined in more than half of low-income countries, and one-fifth even managed to offset 20 percent or more of the effect of soaring world oil prices via consumption with a reduction in oil intensity.

Figure 8 shows the above results by region, excluding high-income countries. Oil intensity declined in at least half of the countries in every region, and in three-quarters or more of the countries in Europe and Central Asia, the Middle East and North Africa, and South Asia. Europe and Central Asia had the highest percentage of countries in which oil intensity declined, the offsetting coefficients exceeded 20 percent (although even after recent improvement, energy efficiency remains relatively low in that region), and the local currency appreciated against the U.S. dollar.

Figure 8: Impact of oil intensity of the economy and exchange rate on the change in vulnerability in the developing world by region, 1999–2008

Sources: Table A1.4 and author's calculations.

Corresponding results for 1999–2009 can be found in appendix 1, figure A1.1. The general trends were broadly comparable to those from 1999–2008.

3.2 Retail prices and pass-through coefficients

Retail prices of gasoline and diesel in January 2012, converted to current U.S. dollars, are shown in figures 9–10. Predictably, the countries with the lowest prices were all major hydrocarbon producers, where upstream oil revenue is effectively used to cross-subsidize downstream fuel prices. República Bolivariana de Venezuela stands out as having exceptionally low prices, less than a tenth of the next lowest-price country. Malawi had the highest retail prices for both fuels, although this is in part because the value of its currency had been kept artificially high for quite some time; since the devaluation in May 2012, the currency has depreciated by more than two-thirds. Turkey, Uruguay, and Senegal are other developing countries with high retail prices. The United States had one of the lowest gasoline prices among the sampled countries, reflecting the economies of scale in the market, its high efficiency, and its low fuel taxation: at the national level, the excise tax on gasoline has been frozen at a mere 4.9 U.S. cents per liter since 1993, and total federal and state taxes and fees amounted to 12.9 U.S. cents per liter in January 2012 (API 2012). Further, January 2012 also saw one of the lowest margins (sum of distribution and marketing costs and margins) in a decade.³

³ Based on the difference between retail prices and spot prices for conventional regular gasoline using price data from the U.S. EIA available at www.eia.gov/petroleum/data.cfm#prices.

Figure 9: Retail gasoline prices in January 2012, US\$ per liter

Sources: Table A2.1 and author's calculations.

Figure 10: Retail diesel prices in January 2012, US\$ per liter

Sources: Table A2.1 and author's calculations.

Retail kerosene prices are shown in figure 11. Kerosene is an important household fuel for lighting, cooking, or heating in many developing countries. It is the most common source of energy for lighting among those without access to any electricity. Where kerosene is markedly cheaper than gas alternatives (such as LPG or biogas), it is also used for cooking and sometimes heating by those who can afford it.

Figure 11: Retail kerosene prices in January 2012, US\$ per liter

Sources: Table A2.1 and author's calculations.

International FOB prices of kerosene and diesel are essentially the same, so that if the same tax policy is applied, retail kerosene and diesel prices should be comparable. But many governments subsidize non-aviation kerosene more than diesel or tax it less on the grounds that kerosene is a fuel of the poor, leading to a large difference in the prices of these two fuels. The distribution of the ratios of retail kerosene and diesel prices is shown in figure 12. When there is a large price difference in favor of kerosene—if this ratio is markedly smaller than 1—kerosene is inevitably diverted to the automotive diesel market. In most countries, gasoline is just as expensive, if not more so, than diesel, so that gasoline may also be adulterated with kerosene. However, adulteration of gasoline with kerosene is readily detected by vehicle drivers unless kerosene is added in very small quantities. In contrast, kerosene is a nearly perfect substitute for diesel and a large quantity of kerosene can be blended in diesel without detection. For this reason, international experience has demonstrated that even a small difference in price in favor of kerosene can lead to large-scale diversion, making the subsidy for kerosene regressive while fueling corruption and criminal activities.

Figure 12: Distribution of the ratio of retail prices of kerosene to diesel in January 2012

Sources: Figure A2.1 and author's calculations.

Lastly, retail prices of LPG sold in cylinders typically used by households are shown in figure 13. Among the four fuels, FOB prices of LPG had the largest regional variation, in part because North American prices have been markedly lower than in the rest of the world in recent years. Another reason is that LPG consists of propane and butane, butane prices are higher—and sometimes much higher—than propane prices, and the relative amounts of propane and butane in LPG vary from market to market. As a result, the reference FOB prices for LPG in January 2012 varied from US\$0.67 per kilogram (kg) in the United States to US\$0.91 per kg in countries where LPG consists primarily of butane. The differences in retail prices, however, were much larger: the prices in the 52 countries in the sample varied by two orders of magnitude, ranging from a mere US\$0.04 per kg in the Arab Republic of Egypt to US\$4.56 per kg in Japan.

Figure 13: Retail LPG prices in January 2012, US\$ per kilogram

Sources: Table A2.1 and author's calculations.

Summary statistics of pass-through coefficients for the four fuels are provided in table 3. Gasoline had the highest degree of pass-through, followed by LPG or diesel depending on the

statistical measure, and kerosene had the lowest pass-through, signifying the reluctance of many governments to raise the price of kerosene for household use.

Table 3: Summary of pass-through statistics for January 2009–January 2012, all countries

Parameter	Gasoline	Diesel	Kerosene	LPG
Number of countries	73	73	45	52
Average pass-through (%)	83	71	56	78
Median pass-through (%)	95	84	61	75
Percentage of countries				
Pass-through greater than 50%	71	70	56	58
Pass-through greater than 75%	60	55	38	50
Pass-through greater than 100%	42	34	20	38
Pass-through greater than 150%	10	1	0	13

Sources: Tables A2.1 and A2.3, and author's calculations.

Statistics by income, oil trade status, and region for each fuel can be found in tables 4–7. As expected, net oil importers were much more likely to pass through price increases on the world market. For gasoline, diesel, and kerosene, the percentage of countries with pass-through coefficients higher than 75 percent and the median pass-through increased with rising income. This income trend is somewhat surprising for gasoline, which would generally be a fuel of the rich in low-income countries. For LPG, the degree of pass-through was highest for low-income countries, although this needs to be interpreted with caution because there were only seven countries in that income group. Because LPG use occurs most frequently among better-off urban households in low-income countries, this pattern of pass-through as a function of income would be progressive. These relationships between the country's income and pass-through hold when the findings are confined to net importers. By region, Latin America and the Caribbean had the highest pass-through for every fuel by various measures—median, mean, and the percentage of countries with coefficients greater than 75 percent. East Asia and the Pacific ranked second for gasoline, diesel, and kerosene, and South Asia for LPG. Europe and Central Asia are excluded from consideration because there were not enough countries in the sample.

Table 4: Summary statistics for pass-through coefficients for gasoline (percentage of countries in each category except for the median)

Parameter (number of countries)	Median	<0%	0–50%	50–75%	75–100%	100–150%	>150%
Income category							
Low income (16)	65	0	31	25	13	19	13
Lower-middle income (24)	78	13	25	8	21	33	0
Upper-middle income (25)	95	12	16	8	20	32	12
High income (8)	135	0	0	0	13	63	25
Developing countries only (excluding high-income countries)							
Net oil importer in 2009 (45)	99	2	18	11	20	38	11
Net oil exporter in 2009 (20)	36	25	35	15	15	10	0
East Asia & Pacific (9)	100	0	22	0	22	56	0
Europe and Central Asia (4)	92	0	25	25	0	25	25
Latin America & the Caribbean (17)	103	6	12	0	24	47	12
Middle East & North Africa (8)	9	38	25	13	13	13	0
South Asia (5)	59	0	40	40	20	0	0
Sub-Saharan Africa (22)	67	9	27	18	18	18	9

Sources: Tables A2.1 and A2.3, and author's calculations.

Note: The median is that for pass-through coefficients.

Table 5: Summary statistics for pass-through coefficients for diesel (percentage of countries in each category except for the median)

Parameter (number of countries)	Median	<0%	0–50%	50–75%	75–100%	100–150%	>150%
Income category							
Low income (16)	61	0	31	25	25	19	0
Lower-middle income (24)	70	21	25	8	21	25	0
Upper-middle income (25)	96	8	16	20	20	32	4
High income (8)	114	0	0	0	13	88	0
Developing countries only (excluding high-income countries)							
Net oil importer in 2009 (45)	90	2	20	13	29	33	2
Net oil exporter in 2009 (20)	18	30	30	25	5	10	0
East Asia & Pacific (9)	89	0	22	22	33	22	0
Europe and Central Asia (4)	88	0	25	25	0	50	0
Latin America & the Caribbean (17)	101	6	6	12	24	47	6
Middle East & North Africa (8)	-3	63	13	25	0	0	0
South Asia (5)	30	0	80	0	20	0	0
Sub-Saharan Africa (22)	70	5	27	18	27	23	0

Sources: Tables A2.1 and A2.3, and author's calculations.

Note: The median is that for pass-through coefficients.

Table 6: Summary statistics for pass-through coefficients for kerosene (percentage of countries in each category except for the median)

Parameter (number of countries)	Median	<0%	0–50%	50–75%	75–100%	100–150%	>150%
Income category							
Low income (11)	49	18	36	18	9	18	0
Lower-middle income (19)	44	16	37	21	16	11	0
Upper-middle income (14)	81	14	14	14	21	36	0
Developing countries only (excluding high-income countries)							
Net oil importer in 2009 (32)	63	6	31	19	19	25	0
Net oil exporter in 2009 (12)	9	42	17	25	8	8	0
East Asia & Pacific (5)	63	0	40	20	20	20	0
Latin America & the Caribbean (11)	84	0	9	18	27	45	0
Middle East & North Africa (5)	14	20	60	20	0	0	0
South Asia (5)	44	0	80	0	20	0	0
Sub-Saharan Africa (17)	38	35	18	24	6	18	0

Sources: Tables A2.1 and A2.3, and author's calculations.

Notes: The median is that for pass-through coefficients. The income category does not include high-income countries because there was only one. Europe and Central Asia is similarly excluded because there was only one country.

Table 7: Summary statistics for pass-through coefficients for LPG (percentage of countries in each category except for the median)

Parameter (number of countries)	Median	<0%	0–50% ^a	50–75%	75–100%	100–150%	>150%
Income category							
Low income (7)	91	0	14	14	29	43	0
Lower-middle income (22)	58	18	32	5	14	18	14
Upper-middle income (20)	64	24	24	10	0	24	19
Developing countries only (excluding high-income countries)							
Net oil importer in 2009 (33)	91	3	24	12	12	33	15
Net oil exporter in 2009 (17)	1	47	29	0	6	6	12
East Asia & Pacific (8)	58	0	50	13	13	25	0
Latin America & the Caribbean (16)	128	12	18	6	0	29	35
Middle East & North Africa (7)	1	43	43	0	14	0	0
South Asia (5)	88	0	40	0	40	20	0
Sub-Saharan Africa (12)	64	33	8	17	8	25	8

Sources: Tables A2.1 and A2.3, and author's calculations.

Notes: The median is that for pass-through coefficients. The income category does not include high-income countries because there were only two. Europe and Central Asia is similarly excluded because there was only one country.

a. Includes pass-through coefficients equal to 0 percent.

The pricing policy of each government is briefly summarized in table A2.2 in appendix 2. Bolivia, Cameroon, Egypt, Indonesia, and República Bolivariana de Venezuela froze the prices of the four fuels in local currency between January 2009 and January 2012. Currency depreciation in Cameroon, Egypt, and Venezuela made pass-through coefficients based on U.S. dollars negative, while Bolivia's currency appreciated slightly during the interval and Indonesia's appreciably, but even in Indonesia not nearly enough to offset the price freeze. Gabon also effectively froze fuel prices in local currency despite slight currency depreciation—

the price of kerosene was kept the same, LPG and gasoline prices were lowered slightly, and the diesel price was raised by 4 percent. Currency movements did not offset very small or even negative price adjustments in local currency for gasoline in Iraq and Morocco; diesel in Brazil, Côte d'Ivoire, Iraq, Morocco, and the Syrian Arab Republic; kerosene in Angola, Nigeria, and Thailand; and LPG in Angola, Argentina, Côte d'Ivoire, Iraq, Jordan, Morocco, Panama, Thailand, and Tunisia.

To assess what factors might be correlated with the degree of pass-through, several parameters were examined for developing countries, with results summarized in table 8:

- Vulnerability in 2009
- Vulnerability in 2008, which is used as a proxy for 2011 (given the near-match in world fuel prices in real terms between 2008 and 2011)
- Change in vulnerability between 2009 and 2008 as a proxy for the change in vulnerability between 2009 and 2011
- Currency appreciation against the U.S. dollar between January 2009 and January 2012
- Net oil import status, with a dummy of 1 for net importers in 2009
- Current account balance as a percentage of GDP in 2009
- Months of import cover in 2009
- GDP per capita in 2009, valued at purchasing power parity as well as the market exchange rate
- Logarithms of fuel prices in January 2009
- Pass-through coefficients

Table 8: Correlation coefficients between pass-through coefficients and vulnerability, macroeconomic variables, and price levels for developing countries

Parameter	Gasoline pass- through	Diesel pass- through	Kerosene pass- through	LPG pass- through
Vulnerability in 2009	0.40	0.35	0.40	0.26
Vulnerability in 2008	0.41	0.38	0.44	0.29
Change in vulnerability, 2009–2008	0.42	0.40	0.51	0.35
Currency appreciation, Jan 2009–Jan 2012	0.21	0.15	0.13	0.34
Net exporter status (1 for net importer)	-0.45	-0.44	-0.33	-0.29
Current account balance as % of GDP	-0.09	0.00	-0.08	-0.09
Months of import cover	-0.16	-0.19	-0.18	-0.18
GDP per capita in 2009, purchasing power parity	0.07	0.10	0.23	0.03
GDP per capita in 2009, market exchange rate	0.09	0.09	0.27	0.05
Net importers only	0.46	0.37	0.37	0.27
Logarithm of gasoline price in Jan 2009	0.10	0.09	0.07	0.17
Gasoline pass-through coefficient	1.00	0.86	0.62	0.57
Logarithm of diesel price in Jan 2009	0.20	0.19	0.24	0.23
Diesel pass-through coefficient	0.86	1.00	0.62	0.60
Logarithm of kerosene price in Jan 2009	0.35	0.46	0.31	0.22
Kerosene pass-through coefficient	0.62	0.62	1.00	0.62
Logarithm of LPG price in Jan 2009	0.30	0.35	0.20	0.34
LPG pass-through coefficient	0.57	0.60	0.62	1.00

Source: Author's calculations.

The three vulnerability parameters—which also capture a country's oil trade status—and pass-through coefficients for other fuels showed medium or strong correlations with the pass-through coefficient of a given fuel. Vulnerability was not strongly correlated with the pass-through coefficients but appeared to affect gasoline, diesel, and kerosene more than LPG, while the correlation coefficient for the change in vulnerability was larger for kerosene price pass-through than for gasoline or diesel. High vulnerability or a large increase in vulnerability may have served as an incentive to make adequate adjustments so as to encourage fuel conservation and reduce the fiscal burden, if any. Conversely, a country with a large, negative vulnerability index would be a major net oil exporter and may not have a strong incentive—or the political flexibility—to adjust prices on the domestic market. Currency appreciation was weakly correlated with pass-through, which may be expected: while currency appreciation may make it easier to pass through price increases, currency depreciation makes the adjustments even harder for the economy to bear. Contrary to the income trends observed when considering medians, GDP per capita was very weakly correlated. A correlation coefficient of 0.88 between gasoline and diesel pass-through coefficients suggests that governments tend to adjust gasoline and diesel prices in similar proportions. Other pass-through coefficients were similarly well correlated with one another, although not as strongly. Correlations with price levels in January 2009 were generally weak, although high initial prices of kerosene and, to a lesser extent LPG, tended to be found in countries with high pass-through coefficients for gasoline and diesel, suggesting that the

more a government subsidizes the prices of kerosene or LPG, the less likely domestic gasoline and diesel prices tend to track world prices.

4. Observations

Government policy instruments can, to varying degrees, influence import dependence, the share of oil in energy use, the economy's energy intensity, and the exchange rate. The analysis in this paper is a starting point for linking these factors to changes in vulnerability. Countries can reduce the share of oil in energy use by diversifying away from oil, increasing the efficiency of oil use, and reducing demand for oil-consuming activities. Such efforts will face difficulties if oil product prices are kept low, leading to diminished incentives to reduce oil consumption. Similarly, countries can lower energy intensity by improving efficiency, managing demand, and moving the economy toward less energy-intensive sectors. Again, demand management is difficult if energy prices are kept artificially low, for example through power tariff subsidies—which would affect oil consumption if fuel oil or diesel is used for power generation. A large reduction in energy intensity also often signals structural changes in the economy, especially from industry to the service sector. This shift occurs with rising income and has been going on in high-income countries for several decades. Low-income countries, many currently dominated by agriculture, may pursue industry development initially to boost economic growth, posing challenges to reducing energy intensity and oil intensity. This makes the pursuit of energy conservation through energy efficiency improvement and minimization of nonessential energy use all the more important.

Among net oil importers, the median vulnerability to oil price increases doubled between 1999 and 2009, when world oil prices increased by a factor of 2.7 in real terms, and tripled between 1999 and 2008, when world oil prices increased by a factor of 4.3. Due to much higher oil prices in 2008, net oil exporters saw the magnitude of vulnerability increase (and the median vulnerability decline) between 1999 and 2008, signaling much greater dependence on oil revenue and potentially greater vulnerability to oil price shocks. The magnitude of vulnerability declined slightly between 1999 and 2009, reflecting declining oil revenue relative to GDP. Across all countries, the median vulnerability was the same for low, lower-middle, and upper-middle-income countries and lower for high-income countries in 2009, but low-income countries had the highest median vulnerability in 2008.

Three-fifths or more of the countries in every income category managed to offset the potential increase in vulnerability from oil consumption partially by reducing the oil intensity of GDP. Had these countries not reduced oil intensity since 1999, the median vulnerability in 2008 would have been higher by 1.1 percentage points when all countries in the sample are considered. The countries that offset the price effect via consumption in 2008 managed to decrease vulnerability by about one-third on average. By region, countries in Europe and Central Asia, with historically high energy intensity of GDP, would have seen the highest increase in median vulnerability (2.8 percentage points), followed by the Middle East and North Africa (2.0

percentage points). Not surprisingly, net oil importers reduced oil intensity more than net oil exporters by one measure: the median vulnerability would have been 1.2 percentage points higher—had those countries that had reduced oil intensity not done so—against 0.6 percentage points for net oil exporters.

Both the share of oil in energy use and the energy intensity of GDP declined the least in low-income countries between 1999 and 2008. Against the backdrop of high world oil prices and oil price volatility, low-income countries arguably need to reduce oil dependence the most, but it can be challenging to reduce oil and energy dependence when starting from a low level of commercial energy consumption. By region, Sub-Saharan Africa—where low-income countries are disproportionately concentrated—reduced the oil share of energy the least, and was second only to the Middle East and North Africa in having the smallest reduction in energy intensity.

Oil production is largely a function of geology, but upstream fiscal, contractual, and regulatory frameworks—which are entirely under government control—also affect oil production. In 2008, one-tenth of oil producers, primarily in lower-middle-income countries, were not able to offset declining oil production with higher oil prices compared to 1999. In 2009, when world oil prices fell, the fraction of oil producers that were not able to offset declining oil production rose to nearly one-fourth, and this share rose to one-half in lower-middle-income countries. By region, Europe and Central Asia had the highest percentage of countries with increasing vulnerability arising from falling oil production.

The wide range of retail prices observed in January 2012, varying by as much as nearly 200-fold for diesel, demonstrates the large differences in tax and subsidy policies across the 73 countries studied. The generally regressive nature of fuel price subsidies and large leakages associated with them—as demonstrated by high black market prices in a number of countries and shortages of subsidized fuels faced particularly by the poor, for whom the subsidies are often intended—testify to the inefficiency of these subsidies, but there are difficult political-economy issues associated with subsidy reform. Fuel pricing policy will be discussed in more detail in a future companion paper.

Not surprisingly, retail fuel prices in countries with high dependence on imported oil tended to track world prices more than those in major oil exporting countries. The median degree of pass-through was the highest for gasoline—regarded as a fuel of the rich in many developing countries—followed by diesel, LPG, and kerosene. Although the correlation between pass-through coefficients and per capita income was weak, the median pass-through increased with income for all fuels but LPG, this when, from the point of view of budgetary resources, low-income countries are arguably least able to shoulder the costs of shielding consumers from price increases.

At the upper end of the price spectrum, several developing countries have high retail prices despite low fuel taxes. High prices are primarily due to high costs of transport, storage, and distribution, and high marketing margins, and, in some countries, protection afforded to

domestic refineries that cannot compete without imports otherwise. Actual fuel prices paid by consumers can be even higher because of short-selling—common particularly for LPG, because LPG cylinders are opaque and customers usually do not have ready access to an accurate scale to weigh the cylinder, accurate information on the cylinder tare weight, or both—and other forms of commercial malpractice. There are steps governments can take to reduce these costs.

Encouraging hospitality arrangements and third-party access to import terminals and storage facilities can lower the barrier to entry by eliminating the need for high upfront investment costs, enabling small operators to enter the market and all to take advantage of economies of scale.

Facilitate around-the-clock port staffing can dramatically reduce demurrage charges, which add considerably to costs especially in Sub-Saharan Africa. Governments can also monitor more closely and fine companies caught short-selling, and “name and shame” the offenders by publishing their names (Kojima 2011). Where uniform prices are not imposed, governments can make price information available to encourage price competition. An example is the practice by the Ministry of Economy in El Salvador of posting the names and locations of filling stations with the lowest prices in several locations in the country. These and other aspects of policy responses to high oil prices will be the subject of a future publication under the overall study program.

Appendix 1: Vulnerability calculations

The results by country using the first set of data sources are shown in tables A1.1–A1.3. For these tables, import and export statistics from the IEA are always used if available. Tables A1.4 (1999–2008) and A1.8 (1999–2009) give the results of decomposition analysis by country. Tables A1.5–A1.7 (1999–2008) and tables A1.9–A1.11 (1999–2009) give the distribution of the oil share effect, energy intensity effect, and offsetting coefficients by income and region. Figure A1.1 reports the results in figure 8 for the second period. For decomposition analysis, where net oil imports calculated from the import and export statistics from the IEA differ markedly from those calculated taking the difference between production and consumption statistics from the IEA and EIA databases, the country is dropped. For the remaining countries for which both the IEA and EIA data are available, the data sets of production and consumption statistics that more closely approximate net imports derived from the IEA’s import and export statistics are used.

Table A1.1: Vulnerability and changes in vulnerability (percentage of GDP)

Country	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09	Data source
Albania	2.7	4.9	1.3	2.2	-1.4	IEA
Algeria	-17.5	-32.8	-23.1	-15.3	-5.6	IEA
Angola	-75.7	-76.7	-52.0	-1.0	23.7	IEA
Antigua and Barbuda	3.4	12.1	8.7	8.6	5.2	EIA
Argentina	-0.8	-1.5	-1.2	-0.7	-0.4	IEA
Armenia	1.4	3.0	2.1	1.6	0.7	IEA
Australia	0.4	1.3	0.9	0.9	0.6	IEA
Austria	0.7	2.1	1.4	1.4	0.7	IEA
Azerbaijan	-23.0	-57.8	-47.6	-34.8	-24.6	IEA
Bahamas, The	2.4	14.4	10.1	12.0	7.7	EIA
Bahrain	-17.1	-22.1	-12.5	-5.0	4.7	IEA
Bangladesh	1.0	4.1	2.3	3.1	1.3	IEA
Barbados	2.1	6.4	4.8	4.3	2.8	EIA
Belarus	6.1	8.0	6.5	1.9	0.4	IEA
Belgium	1.5	4.8	3.0	3.4	1.5	IEA
Belize	2.9	10.1	5.4	7.2	2.5	EIA
Benin	3.0	14.8	10.5	11.8	7.5	IEA
Bermuda	0.7	2.8	1.9	2.1	1.2	EIA
Bhutan	1.6	4.5	3.0	2.9	1.4	EIA
Bolivia	0.1	-0.4	0.5	-0.5	0.4	IEA
Bosnia and Herzegovina	2.1	5.2	3.7	3.1	1.6	IEA
Botswana	1.2	5.0	3.5	3.8	2.3	IEA
Brazil	0.8	0.3	0.0	-0.5	-0.8	IEA
Brunei Darussalam	-25.8	-44.3	-32.1	-18.5	-6.3	IEA
Bulgaria	4.1	6.8	4.3	2.6	0.1	IEA
Burkina Faso	1.6	3.9	2.4	2.3	0.9	EIA
Burundi	2.2	4.0	3.6	1.9	1.4	EIA
Cambodia	3.0	11.6	6.9	8.6	3.9	IEA
Cameroon	-6.0	-8.8	-4.4	-2.8	1.6	IEA
Canada	-0.8	-3.0	-2.3	-2.2	-1.6	IEA

Country	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09	Data source
Cape Verde	1.0	5.5	3.6	4.5	2.5	EIA
Central African Republic	1.3	4.4	3.0	3.1	1.7	EIA
Chad	0.5	-53.0	-37.2	-53.6	-37.8	EIA
Chile	2.0	6.9	4.3	4.9	2.4	IEA
China	0.6	3.1	2.0	2.6	1.4	IEA
Colombia	-4.4	-4.4	-3.8	0.0	0.6	IEA
Comoros	1.7	6.7	4.2	5.0	2.5	EIA
Congo, Dem. Rep.	-2.0	-3.3	-2.2	-1.4	-0.3	IEA
Congo, Rep.	-74.0	-66.9	-63.9	7.1	10.1	IEA
Costa Rica	1.5	5.9	3.5	4.4	2.0	IEA
Cote d'Ivoire	1.3	-3.9	-2.7	-5.2	-4.0	IEA
Croatia	1.6	3.7	2.3	2.1	0.7	IEA
Cuba	2.7	5.2		2.6		IEA
Cyprus	3.3	8.4	5.6	5.1	2.2	IEA
Czech Republic	1.8	3.2	2.2	1.4	0.4	IEA
Denmark	-0.3	-0.9	-0.7	-0.6	-0.3	IEA
Djibouti	13.7	28.7	19.3	15.0	5.6	EIA
Dominica	1.5	7.0	4.8	5.5	3.3	EIA
Dominican Republic	3.7	8.8	5.4	5.1	1.7	IEA
Ecuador	-9.3	-20.5	-11.9	-11.2	-2.5	IEA
Egypt, Arab Rep.	-1.6	-0.5	0.2	1.1	1.8	IEA
El Salvador	1.9	6.9	4.6	5.0	2.7	IEA
Equatorial Guinea	-76.4	-68.8	-63.6	7.6	12.8	EIA
Eritrea	3.8	7.7	3.6	3.9	-0.2	IEA
Estonia	2.3	2.7	1.9	0.4	-0.4	IEA
Ethiopia	1.9	5.6	3.2	3.7	1.4	IEA
Faeroe Islands	2.6	7.1	5.1	4.6	2.6	EIA
Fiji	2.6	18.1	15.9	15.5	13.3	EIA
Finland	1.0	2.9	1.9	1.9	0.9	IEA
France	0.8	2.3	1.5	1.4	0.7	IEA
Gabon	-43.6	-54.1	-47.2	-10.5	-3.6	IEA
Gambia, The	2.4	12.4	9.2	9.9	6.8	EIA
Georgia	4.7	5.0	8.0	0.3	3.2	IEA
Germany	0.8	2.3	1.5	1.5	0.7	IEA
Ghana	3.6	6.9	4.5	3.4	0.9	IEA
Greece	1.8	4.3	2.6	2.5	0.9	IEA
Greenland	2.1	8.8	7.8	6.7	5.7	EIA
Grenada	2.4	8.4	6.2	6.0	3.8	EIA
Guatemala	1.3	4.9	4.0	3.6	2.7	IEA
Guinea	1.5	8.4	4.7	6.9	3.1	EIA
Guinea-Bissau	6.1	10.8	8.1	4.7	2.0	EIA
Guyana	9.4	19.7	11.1	10.3	1.8	EIA
Haiti	1.6	9.4	5.2	7.8	3.6	IEA
Honduras	3.4	12.0	6.8	8.5	3.4	IEA
Hungary	1.5	2.8	2.0	1.3	0.6	IEA
Iceland	1.4	4.2	3.3	2.8	1.9	IEA

Country	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09	Data source
India	2.2	6.5	4.1	4.3	1.8	IEA
Indonesia	-2.3	1.8	1.3	4.1	3.6	IEA
Iran, Islamic Rep.	-16.6	-28.7	-17.8	-12.1	-1.2	IEA
Iraq	-77.2	-67.4	-59.9	9.9	17.4	IEA
Ireland	1.1	2.3	1.6	1.2	0.5	IEA
Israel	1.3	4.1	2.5	2.8	1.2	IEA
Italy	1.0	2.2	1.4	1.3	0.5	IEA
Jamaica	4.7	20.4	9.9	15.7	5.2	IEA
Japan	0.8	3.4	1.9	2.5	1.1	IEA
Jordan	7.4	14.2	8.3	6.7	0.8	IEA
Kazakhstan	-18.8	-33.6	-26.6	-14.8	-7.8	IEA
Kenya	3.1	7.3	5.2	4.2	2.2	IEA
Kiribati	1.4	7.0	5.3	5.6	3.9	EIA
Korea, Rep.	3.2	7.8	5.8	4.6	2.6	IEA
Kuwait	-39.1	-58.4	-41.0	-19.3	-1.9	IEA
Kyrgyz Republic	4.8	17.2	15.9	12.5	11.1	IEA
Lao PDR	1.2	2.1	1.3	0.8	0.1	EIA
Latvia	2.2	3.7	2.8	1.5	0.6	IEA
Lebanon	3.9	12.5	8.3	8.5	4.4	IEA
Lesotho	1.0	3.9	2.4	2.9	1.4	EIA
Liberia	4.1	17.0	11.0	12.9	6.9	EIA
Libya	-23.0	-55.7	-43.2	-32.7	-20.2	IEA
Lithuania	2.9	3.6	2.6	0.7	-0.4	IEA
Luxembourg	1.4	3.7	2.5	2.4	1.1	IEA
Macedonia, FYR	3.6	6.7	4.8	3.1	1.3	EIA
Madagascar	1.5	7.0	5.1	5.5	3.6	EIA
Malawi	1.9	6.3	3.6	4.4	1.7	EIA
Malaysia	-2.5	-2.7	-2.3	-0.2	0.2	IEA
Maldives	2.5	12.3	7.8	9.9	5.3	EIA
Mali	1.0	1.9	1.3	0.9	0.3	EIA
Malta	3.2	14.7	10.8	11.5	7.6	IEA
Mauritania	10.9	8.1	6.9	-2.8	-4.0	EIA
Mauritius	2.5	8.4	5.9	5.8	3.4	EIA
Mexico	-1.9	-3.4	-2.5	-1.4	-0.5	IEA
Moldova	4.5	9.4	6.2	4.8	1.7	IEA
Mongolia	5.6	9.4	5.9	3.8	0.3	IEA
Morocco	2.6	9.0	6.0	6.4	3.4	IEA
Mozambique	1.2	4.7	3.5	3.5	2.3	IEA
Namibia	2.5	8.7	5.4	6.2	2.9	IEA
Nepal	2.0	4.8	3.5	2.8	1.5	IEA
Netherlands	1.2	4.2	2.8	3.0	1.6	IEA
New Zealand	1.1	2.8	1.7	1.7	0.6	IEA
Nicaragua	3.9	15.0	10.2	11.1	6.3	IEA
Niger	1.6	2.2	1.7	0.6	0.2	EIA
Nigeria	-38.3	-35.7	-30.6	2.6	7.6	IEA
Norway	-11.8	-16.5	-12.3	-4.7	-0.5	IEA

Country	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09	Data source
Oman	-36.4	-37.9	-34.6	-1.6	1.7	IEA
Pakistan	3.3	7.2	4.6	3.9	1.3	IEA
Panama	2.1	7.0	4.9	4.9	2.8	IEA
Papua New Guinea	-15.5	-3.1	-0.3	12.4	15.2	EIA
Paraguay	2.4	5.7	4.6	3.2	2.1	IEA
Peru	0.5	1.6	0.6	1.1	0.1	IEA
Philippines	2.8	5.1	3.4	2.3	0.7	IEA
Poland	1.5	3.4	2.7	1.9	1.1	IEA
Portugal	1.8	4.0	2.5	2.2	0.7	IEA
Qatar	-39.2	-42.8	-30.1	-3.6	9.1	IEA
Romania	1.3	1.8	1.3	0.5	0.0	IEA
Russian Federation	-11.9	-14.3	-12.8	-2.3	-0.9	IEA
Rwanda	1.7	3.8	2.1	2.1	0.5	EIA
Samoa	2.7	7.0	4.3	4.3	1.6	EIA
Sao Tome and Principe		18.4	11.9			EIA
Saudi Arabia	-28.6	-63.4	-45.7	-34.8	-17.1	IEA
Senegal	3.6	10.8	6.2	7.3	2.6	IEA
Serbia	0.4	5.7	3.7	5.3	3.3	IEA
Seychelles	3.9	26.6	20.0	22.7	16.1	EIA
Sierra Leone	5.7	18.1	10.9	12.3	5.2	EIA
Singapore	5.6	18.2	11.8	12.6	6.2	IEA
Slovak Republic	1.4	2.5	1.6	1.1	0.2	IEA
Slovenia	1.5	4.2	2.5	2.7	0.9	IEA
Solomon Islands	1.6	7.9	6.0	6.3	4.4	EIA
South Africa	1.6	6.4	4.6	4.9	3.0	IEA
Spain	1.5	3.4	2.2	1.9	0.7	IEA
Sri Lanka	2.7	7.3	4.6	4.6	1.8	IEA
St. Kitts and Nevis	1.5	8.6	6.7	7.0	5.2	EIA
St. Lucia	1.4	9.3	6.1	7.9	4.7	EIA
St. Vincent and the Grenadines	2.4	7.4	5.2	5.1	2.8	EIA
Sudan	-0.6	-22.0	-14.9	-21.4	-14.3	IEA
Suriname	-0.1	-3.5	-2.1	-3.5	-2.0	EIA
Swaziland	1.5	5.7	3.4	4.3	1.9	EIA
Sweden	0.8	2.5	1.7	1.7	0.9	IEA
Switzerland	0.6	1.8	1.2	1.2	0.6	IEA
Syrian Arab Rep.	-15.6	-3.2	-3.3	12.4	12.3	IEA
Tajikistan	3.6	7.5	4.5	3.9	0.9	IEA
Tanzania	1.0	5.6	3.6	4.6	2.6	IEA
Thailand	3.4	7.7	5.5	4.3	2.1	IEA
Togo	3.3	7.8	5.0	4.5	1.7	IEA
Tonga	3.0	12.2	7.2	9.2	4.2	EIA
Trinidad and Tobago	-11.5	-18.3	-16.4	-6.7	-4.8	IEA
Tunisia	-0.2	-0.2	-0.1	0.0	0.1	IEA
Turkey	1.5	3.0	2.2	1.5	0.7	IEA
Turkmenistan	-21.5	-21.5	-12.4	0.0	9.1	IEA
Uganda	0.9	3.3	2.0	2.4	1.1	EIA

Country	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09	Data source
Ukraine	3.9	4.2	3.6	0.3	-0.3	IEA
United Arab Emirates	-15.1	-27.6	-17.8	-12.5	-2.7	IEA
United Kingdom	-0.5	0.2	0.1	0.7	0.6	IEA
United States	0.7	2.9	1.6	2.2	0.9	IEA
Uruguay	1.1	5.5	3.6	4.4	2.5	IEA
Uzbekistan	-0.9	-0.6	-0.4	0.3	0.5	IEA
Vanuatu	1.1	4.0	3.8	3.0	2.7	EIA
Venezuela, RB	-18.9	-26.8	-15.7	-7.8	3.2	IEA
Vietnam	-3.6	0.4	0.1	4.0	3.7	IEA
Yemen, Rep.	-26.6	-21.0	-14.0	5.5	12.6	IEA
Zambia	2.1	2.9	2.3	0.8	0.2	IEA
Zimbabwe	2.9	10.4	4.6	7.5	1.7	IEA

Source: Author's calculations.

Note: Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three significant figures.

Table A1.2: Median vulnerability and changes in vulnerability by income and oil trade status

Income	Oil trade	Number of countries			Median in percentage of GDP				
		1999	2008	2009	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09
Low	Import	31	30	30	1.9	7.1	4.4	4.3	1.7
	Export	1	2	2	-2.0	-28.2	-19.7	-27.5	-19.0
Lower middle	Import	36	36	38	2.6	6.9	4.5	4.2	1.9
	Export	12	12	10	-10.7	-6.4	-9.2	1.8	8.9
Upper middle	Import	33	33	31	2.4	6.9	4.8	4.9	2.4
	Export	17	17	18	-16.6	-21.5	-12.6	-3.5	-0.8
High	Import	37	38	38	1.5	3.4	2.2	2.1	0.9
	Export	13	12	12	-17.1	-32.8	-23.9	-4.8	-1.0

Sources: Table A1.1 and author's calculations.

Notes: The oil trade status refers to being a net oil importer or exporter in the year specified for V and in the terminal year for ΔV . Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three significant figures.

Table A1.3: Median vulnerability and changes in vulnerability by region and oil trade status, excluding high-income countries

Region	Oil trade	Number of countries			Median in percentage of GDP				
		1999	2008	2009	V 1999	V 2008	V 2009	ΔV 99–08	ΔV 99–09
East Asia & Pacific	Import	12	14	14	2.6	7.0	4.8	4.2	3.2
	Export	4	2	2	-3.1	-2.9	-1.3	6.1	7.7
Europe and Central Asia	Import	16	16	16	3.3	5.1	3.7	2.1	0.7
	Export	5	5	5	-18.8	-21.5	-12.8	-2.3	-0.9
Latin America & the Caribbean	Import	23	22	21	2.1	7.2	5.2	5.1	2.7
	Export	6	7	7	-3.2	-3.5	-2.5	-1.4	-0.5
Middle East & North Africa	Import	4	4	5	5.7	13.3	8.3	7.6	3.4
	Export	8	8	7	-17.0	-24.9	-17.8	0.6	0.1
South Asia	Import	7	7	7	2.2	6.5	4.1	3.9	1.5
	Export	0	0	0	—	—	—	—	—
Sub-Saharan Africa	Import	38	36	36	1.9	6.8	4.4	4.3	2.0
	Export	7	9	9	-38.3	-35.7	-30.6	-2.8	-0.3

Sources: Table A1.1 and author's calculations.

Notes: The oil trade status refers to being a net oil importer or exporter in the year specified for V and in the terminal year for ΔV . Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three significant figures. — = not applicable.

Table A1.4: Decomposition analysis for 1999–2008 (percentage of GDP)

Country	V 1999	V 2008	ΔV	ΔP	ΔC	Data source
Albania	2.7	4.1	1.4	-1.9	3.3	IEA
Algeria	-17.1	-32.3	-15.2	-18.4	3.2	IEA
Angola	-76.5	-77.5	-1.0	-0.7	-0.4	IEA
Antigua and Barbuda	3.4	12.1	8.6	0.0	8.6	EIA
Argentina	-0.8	-1.6	-0.9	-6.3	5.5	EIA
Armenia	1.4	3.0	1.6	0.0	1.6	IEA
Australia	0.4	1.4	0.9	-0.8	1.7	EIA
Austria	0.7	2.2	1.5	-0.1	1.6	EIA
Azerbaijan	-24.3	-59.3	-34.9	-25.7	-9.2	IEA
Bahamas, The	2.4	14.4	12.0	0.0	12.0	EIA
Bahrain	-16.6	-24.2	-7.6	-12.0	4.4	IEA
Bangladesh	0.9	3.9	3.0	-0.2	3.2	EIA
Barbados	2.1	6.4	4.3	-0.5	4.8	EIA
Belarus	6.1	7.1	1.0	0.0	1.0	EIA
Belgium	1.5	5.0	3.5	0.0	3.5	EIA
Belize	2.9	10.1	7.2	-9.1	16.3	EIA
Benin	2.8	14.8	12.1	0.0	12.1	IEA
Bhutan	1.6	4.5	2.9	0.0	2.9	EIA
Bosnia and Herzegovina	3.0	5.2	2.2	0.0	2.2	EIA
Botswana	1.2	5.0	3.8	0.0	3.8	IEA
Brazil	0.8	0.0	-0.8	-3.5	2.7	EIA

Country	V 1999	V 2008	ΔV	ΔP	ΔC	Data source
Brunei Darussalam	-26.1	-45.5	-19.4	-21.5	2.1	IEA
Bulgaria	4.8	7.1	2.3	0.0	2.3	EIA
Burkina Faso	1.6	3.9	2.3	0.0	2.3	EIA
Burundi	2.2	4.0	1.9	0.0	1.9	EIA
Cambodia	3.0	11.6	8.6	0.0	8.6	IEA
Cameroon	-4.9	-7.6	-2.6	-5.8	3.2	EIA
Canada	-0.5	-2.5	-1.9	-5.2	3.2	EIA
Cape Verde	1.0	5.5	4.5	0.0	4.5	EIA
Central African Republic	1.3	4.4	3.1	0.0	3.1	EIA
Chad	0.5	-53.0	-53.6	-53.8	0.2	EIA
Chile	2.3	7.4	5.2	-0.2	5.3	IEA
China	0.7	3.3	2.5	-1.0	3.6	EIA
Colombia	-4.2	-4.7	-0.5	-2.3	1.8	EIA
Comoros	1.7	6.7	5.0	0.0	5.0	EIA
Congo, Dem. Rep.	-2.0	-3.3	-1.4	-3.3	2.0	IEA
Congo, Rep.	-74.0	-67.5	6.5	4.1	2.4	IEA
Costa Rica	1.5	5.9	4.4	0.0	4.4	EIA
Cote d'Ivoire	0.8	-4.7	-5.5	-8.2	2.7	EIA
Croatia	1.7	3.9	2.2	0.0	2.2	EIA
Cyprus	3.2	8.4	5.1	0.0	5.1	IEA
Czech Republic	1.8	3.3	1.5	0.0	1.6	EIA
Denmark	-0.3	-1.1	-0.8	-1.8	1.0	EIA
Djibouti	13.7	28.7	15.0	0.0	15.0	EIA
Dominica	1.5	7.0	5.5	0.0	5.5	EIA
Dominican Republic	3.5	9.2	5.7	0.0	5.7	IEA
Ecuador	-9.8	-18.6	-8.8	-18.2	9.4	EIA
Egypt, Arab Rep.	-2.1	-0.8	1.3	-9.8	11.1	IEA
El Salvador	2.0	6.9	4.9	0.0	4.9	EIA
Equatorial Guinea	-76.4	-68.8	7.6	8.1	-0.5	EIA
Eritrea	3.8	7.7	3.9	0.0	3.9	IEA
Estonia	2.5	2.9	0.3	-0.9	1.2	IEA
Ethiopia	1.8	6.2	4.5	0.0	4.5	EIA
Fiji	2.6	18.1	15.5	0.0	15.5	EIA
Finland	1.1	2.8	1.8	0.0	1.8	EIA
France	0.9	2.4	1.5	0.0	1.5	EIA
Gabon	-43.0	-53.6	-10.6	-13.2	2.6	IEA
Gambia, The	2.4	12.4	9.9	0.0	9.9	EIA
Georgia	4.7	5.0	0.3	0.2	0.1	IEA
Germany	0.9	2.4	1.5	-0.1	1.6	EIA
Ghana	2.2	4.8	2.6	-0.2	2.8	EIA
Greece	1.9	4.4	2.5	0.0	2.6	EIA
Grenada	2.4	8.4	6.0	0.0	6.0	EIA
Guatemala	1.3	5.0	3.7	-0.4	4.1	IEA
Guinea	1.5	8.4	6.9	0.0	6.9	EIA
Guinea-Bissau	6.1	10.8	4.7	0.0	4.7	EIA
Guyana	9.4	19.7	10.3	0.0	10.3	EIA

Country	V 1999	V 2008	ΔV	ΔP	ΔC	Data source
Haiti	1.6	9.2	7.5	0.0	7.5	EIA
Honduras	3.6	12.2	8.7	0.0	8.7	IEA
Hungary	1.5	2.9	1.4	-0.2	1.6	IEA
Iceland	1.4	4.2	2.8	0.0	2.8	IEA
India	1.9	6.1	4.2	-1.3	5.5	EIA
Indonesia	-2.3	2.0	4.3	0.3	4.0	IEA
Iran, Islamic Rep.	-15.3	-25.7	-10.4	-20.8	10.5	EIA
Iraq	-76.6	-69.3	7.3	-0.6	7.9	IEA
Ireland	1.1	2.6	1.4	0.0	1.4	EIA
Israel	1.4	4.4	3.0	0.0	3.0	IEA
Italy	1.0	2.4	1.4	-0.1	1.5	IEA
Jamaica	4.9	20.4	15.5	0.0	15.5	IEA
Japan	0.8	3.3	2.5	0.0	2.5	IEA
Jordan	7.7	14.5	6.8	0.0	6.8	IEA
Kazakhstan	-16.9	-31.2	-14.3	-14.2	-0.1	EIA
Kenya	2.7	7.9	5.2	0.0	5.2	EIA
Kiribati	1.4	7.0	5.6	0.0	5.6	EIA
Korea, Rep.	3.1	8.1	5.0	0.0	5.1	EIA
Kyrgyz Republic	4.8	17.2	12.5	0.4	12.1	IEA
Lao PDR	1.2	2.1	0.8	0.0	0.8	EIA
Latvia	2.8	3.8	1.0	0.0	1.0	EIA
Lebanon	3.9	12.5	8.5	0.0	8.5	IEA
Lesotho	1.0	3.9	2.9	0.0	2.9	EIA
Liberia	4.1	17.0	12.9	0.0	12.9	EIA
Libya	-23.6	-56.8	-33.2	-38.0	4.8	IEA
Lithuania	3.4	4.3	1.0	-0.1	1.1	IEA
Luxembourg	1.4	3.7	2.3	0.0	2.3	IEA
Macedonia, FYR	3.6	6.7	3.1	0.0	3.1	EIA
Madagascar	1.5	7.0	5.5	0.0	5.5	EIA
Malawi	1.9	6.3	4.4	0.0	4.4	EIA
Malaysia	-2.8	-2.8	-0.1	-4.8	4.7	EIA
Maldives	2.5	12.3	9.9	0.0	9.9	EIA
Mali	1.0	1.9	0.9	0.0	0.9	EIA
Malta	2.9	14.7	11.8	0.0	11.8	IEA
Mauritania	10.9	8.1	-2.8	-12.7	9.8	EIA
Mauritius	2.5	8.4	5.8	0.0	5.8	EIA
Mexico	-1.8	-3.2	-1.4	-5.6	4.2	EIA
Moldova	5.6	9.9	4.3	0.0	4.3	IEA
Mongolia	5.6	9.4	3.8	-1.9	5.7	IEA
Morocco	2.6	9.2	6.6	0.0	6.6	IEA
Mozambique	1.2	4.7	3.5	0.0	3.5	IEA
Namibia	2.5	8.7	6.2	0.0	6.2	IEA
Nepal	2.0	4.5	2.5	0.0	2.5	IEA
Netherlands	1.2	4.1	2.8	-0.2	3.0	IEA
New Zealand	0.9	2.9	1.9	-1.3	3.2	IEA
Nicaragua	4.1	15.6	11.5	0.0	11.5	IEA

Country	V 1999	V 2008	ΔV	ΔP	ΔC	Data source
Niger	1.6	2.2	0.6	0.0	0.6	EIA
Nigeria	-38.4	-35.2	3.2	2.7	0.5	IEA
Norway	-12.1	-17.4	-5.3	-6.1	0.9	EIA
Oman	-35.6	-36.8	-1.1	-6.4	5.3	IEA
Pakistan	3.3	7.1	3.8	-0.8	4.6	EIA
Panama	2.0	7.8	5.8	0.0	5.8	IEA
Papua New Guinea	-15.5	-3.1	12.4	1.5	10.9	EIA
Paraguay	2.4	5.9	3.5	0.0	3.5	EIA
Peru	0.8	1.7	0.9	-2.1	3.0	IEA
Philippines	2.9	5.2	2.3	-0.5	2.9	IEA
Poland	1.6	3.4	1.8	-0.1	1.9	EIA
Portugal	1.8	4.0	2.3	0.0	2.3	IEA
Romania	1.3	2.1	0.8	0.7	0.1	IEA
Russian Federation	-12.7	-14.8	-2.1	0.4	-2.5	EIA
Rwanda	1.7	3.8	2.1	0.0	2.1	EIA
Samoa	2.7	7.0	4.3	0.0	4.3	EIA
Saudi Arabia	-28.6	-62.4	-33.8	-44.4	10.6	IEA
Senegal	3.7	10.3	6.6	0.0	6.6	IEA
Serbia	0.7	5.5	4.8	-0.2	5.0	IEA
Seychelles	3.9	26.6	22.7	0.0	22.7	EIA
Sierra Leone	5.7	18.1	12.3	0.0	12.3	EIA
Singapore	4.9	20.0	15.1	0.0	15.1	EIA
Slovak Republic	1.4	2.7	1.2	-0.4	1.6	IEA
Slovenia	1.5	4.1	2.6	0.0	2.6	IEA
Solomon Islands	1.6	7.9	6.3	0.0	6.3	EIA
South Africa	1.4	5.3	3.9	-1.7	5.6	IEA
Spain	1.5	3.4	1.9	0.0	2.0	IEA
Sri Lanka	2.8	7.5	4.8	0.0	4.8	EIA
St. Kitts and Nevis	1.5	8.6	7.0	0.0	7.0	EIA
St. Lucia	1.4	9.3	7.9	0.0	7.9	EIA
St. Vincent and the Grenadines	2.4	7.4	5.1	0.0	5.1	EIA
Sudan	-2.4	-23.4	-21.0	-24.9	3.9	EIA
Suriname	-0.1	-3.5	-3.5	-10.8	7.4	EIA
Swaziland	1.5	5.7	4.3	0.0	4.3	EIA
Sweden	1.0	2.5	1.4	0.0	1.4	EIA
Switzerland	0.7	1.9	1.2	0.0	1.2	EIA
Syrian Arab Rep.	-14.2	-1.1	13.0	-1.2	14.2	IEA
Tajikistan	3.6	7.5	3.9	0.0	3.9	IEA
Tanzania	1.0	5.6	4.6	0.0	4.6	IEA
Thailand	3.3	8.1	4.8	-4.2	9.0	IEA
Togo	3.3	10.1	6.7	0.0	6.7	IEA
Tonga	3.0	12.2	9.2	0.0	9.2	EIA
Trinidad and Tobago	-10.9	-16.3	-5.4	-8.0	2.6	IEA
Tunisia	-0.1	0.4	0.5	-4.5	5.0	EIA
Turkey	1.5	3.1	1.6	0.0	1.6	EIA
Turkmenistan	-21.3	-21.3	0.0	1.4	-1.4	IEA

Country	V 1999	V 2008	ΔV	ΔP	ΔC	Data source
Uganda	0.9	3.3	2.4	0.0	2.4	EIA
Ukraine	3.8	4.3	0.5	-0.1	0.6	IEA
United Arab Emirates	-15.7	-28.2	-12.6	-16.0	3.4	EIA
United Kingdom	-0.5	0.2	0.7	-0.8	1.5	IEA
United States	0.8	3.0	2.2	-1.3	3.4	EIA
Uruguay	1.3	6.9	5.6	0.0	5.6	EIA
Vanuatu	1.1	4.0	3.0	0.0	3.0	EIA
Venezuela, RB	-18.5	-27.6	-9.1	-14.3	5.1	IEA
Vietnam	-3.8	-0.6	3.2	-5.1	8.3	IEA
Yemen, Rep.	-26.9	-20.9	6.0	-6.6	12.6	IEA
Zambia	2.1	2.9	0.8	0.0	0.8	IEA

Sources: EIA 2012, IEA 2012, WDI 2012, and author's calculations.

Note: Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three significant figures.

Table A1.4: Decomposition analysis for 1999–2008, continued

Country	Price	ΔP Output	GDP	Price	Oil	ΔC Energy	GDP	Exch.
Albania	-4.3	-1.7	4.1	10.7	0.7	-2.4	-2.2	-3.5
Algeria	-62.0	-9.2	52.8	8.8	-0.1	0.0	-5.3	-0.2
Angola	-292.8	-172.5	464.6	74.0	18.9	-30.1	-175.5	112.4
Antigua and Barbuda	0.0	0.0	0.0	12.4	0.0	-1.1	-2.6	0.0
Argentina	-7.7	0.6	0.8	6.5	-0.4	-0.3	-5.1	4.8
Armenia	0.0	0.0	0.0	4.3	1.2	-1.3	-1.0	-1.6
Australia	-3.0	0.2	2.0	4.3	-0.2	-0.4	-1.0	-1.0
Austria	-0.2	0.0	0.1	2.7	0.0	-0.2	-0.3	-0.6
Azerbaijan	-173.4	-127.6	275.3	29.0	-6.3	-17.1	-14.9	0.0
Bahamas, The	0.0	0.0	0.0	11.3	0.2	1.9	-1.4	0.0
Bahrain	-55.0	0.0	42.9	8.7	0.0	-0.4	-3.9	0.0
Bangladesh	-0.2	-0.1	0.1	3.9	-0.9	0.3	-1.2	1.0
Barbados	-1.5	0.6	0.4	8.6	-0.1	-1.6	-1.9	0.0
Belarus	-5.1	0.1	4.9	52.0	-2.7	-19.7	-91.8	63.3
Belgium	0.0	0.0	0.0	5.4	0.4	-0.3	-0.7	-1.2
Belize	-4.8	-7.2	2.8	14.3	0.3	3.2	-1.5	0.0
Benin	0.0	0.0	0.0	12.8	5.8	-0.2	-3.2	-3.1
Bhutan	0.0	0.0	0.0	5.5	-2.5	1.4	-1.6	0.0
Bosnia and Herzegovina	0.0	0.0	0.0	8.2	-1.0	-0.2	-3.1	-1.7
Botswana	0.0	0.0	0.0	5.1	1.2	-0.9	-3.0	1.3
Brazil	-6.0	-2.2	4.6	7.1	-0.5	-0.5	-3.5	0.1
Brunei Darussalam	-81.6	-1.6	61.7	5.6	-0.7	0.9	-3.1	-0.7
Bulgaria	-0.1	0.0	0.1	12.5	0.2	-3.6	-4.3	-2.5
Burkina Faso	0.0	0.0	0.0	4.8	-0.1	-0.7	-0.7	-1.0
Burundi	0.0	0.0	0.0	6.8	-0.9	-3.2	-4.0	3.2
Cambodia	0.0	0.0	0.0	11.8	3.7	-4.4	-3.0	0.5
Cameroon	-18.2	2.5	9.9	4.8	0.2	-0.1	-0.8	-0.9
Canada	-9.0	-1.5	5.3	6.4	0.1	-0.7	-1.1	-1.4

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Cape Verde	0.0	0.0	0.0	4.5	0.0	1.1	0.0	-1.1
Central African Republic	0.0	0.0	0.0	4.6	-0.1	0.5	-0.8	-1.0
Chad	-54.3	-86.5	87.0	1.3	0.0	-0.4	-0.5	-0.3
Chile	-0.3	-0.1	0.2	8.3	1.0	-1.2	-3.0	0.2
China	-5.7	-0.6	5.2	8.0	-1.3	-0.3	-2.0	-0.9
Colombia	-16.4	3.3	10.8	6.0	-0.6	-1.0	-3.1	0.4
Comoros	0.0	0.0	0.0	6.7	0.1	1.6	-1.8	-1.5
Congo, Dem. Rep.	-10.6	0.8	6.4	58.3	-18.5	6.0	-137.8	94.0
Congo, Rep.	-187.2	13.6	177.7	3.6	1.7	0.5	-2.5	-0.8
Costa Rica	0.0	0.0	0.0	6.1	-0.1	-0.2	-3.9	2.5
Cote d'Ivoire	-6.1	-5.3	3.3	5.1	-0.3	0.1	-1.0	-1.1
Croatia	-2.2	0.7	1.4	7.2	-0.2	-1.4	-1.7	-1.7
Cyprus	0.0	0.0	0.0	10.2	-0.3	-0.5	-2.2	-2.1
Czech Republic	-0.2	0.0	0.2	5.3	0.0	-0.6	-0.7	-2.5
Denmark	-3.7	0.1	1.7	2.5	-0.2	-0.3	-0.4	-0.5
Djibouti	0.0	0.0	0.0	40.7	1.7	-19.2	-8.1	0.0
Dominica	0.0	0.0	0.0	6.1	0.5	0.3	-1.5	0.0
Dominican Republic	0.0	0.0	0.0	12.7	-0.5	-3.2	-9.6	6.3
Ecuador	-48.6	-9.4	39.8	17.2	0.1	1.1	-9.0	0.0
Egypt, Arab Rep.	-19.8	2.0	8.0	15.8	-2.4	0.0	-7.4	5.1
El Salvador	0.0	0.0	0.0	7.2	-0.3	-0.4	-1.6	0.0
Equatorial Guinea	-331.5	-256.9	596.5	2.2	-2.8	1.9	-1.3	-0.4
Eritrea	0.0	0.0	0.0	13.0	-2.2	0.7	-12.9	5.3
Estonia	-1.6	-1.0	1.7	7.3	-0.2	-2.2	-2.3	-1.4
Ethiopia	0.0	0.0	0.0	6.7	0.1	0.4	-3.7	1.0
Fiji	0.0	0.0	0.0	13.6	1.5	5.6	-3.0	-2.2
Finland	0.0	0.0	0.0	3.4	-0.1	-0.5	-0.3	-0.7
France	-0.1	0.0	0.0	2.9	-0.2	-0.2	-0.4	-0.6
Gabon	-116.4	20.7	82.4	6.1	0.0	0.6	-2.8	-1.3
Gambia, The	0.0	0.0	0.0	11.7	0.0	2.1	-9.3	5.3
Georgia	-1.0	0.4	0.8	11.7	-1.6	-3.7	-4.3	-2.1
Germany	-0.1	0.0	0.0	2.9	-0.2	-0.2	-0.1	-0.6
Ghana	-1.4	0.0	1.2	12.8	0.8	-2.1	-19.6	10.8
Greece	0.0	0.0	0.0	5.7	-0.1	-0.7	-1.2	-1.2
Grenada	0.0	0.0	0.0	8.7	0.1	0.4	-3.2	0.0
Guatemala	-2.2	0.7	1.1	7.1	-0.1	-0.8	-2.2	0.1
Guinea	0.0	0.0	0.0	8.8	-0.1	-0.9	-8.5	7.5
Guinea-Bissau	0.0	0.0	0.0	17.2	0.1	0.9	-9.8	-3.6
Guyana	0.0	0.0	0.0	28.7	0.3	-1.8	-19.5	2.5
Haiti	0.0	0.0	0.0	8.9	0.5	2.4	-9.1	4.9
Honduras	0.0	0.0	0.0	13.3	0.5	0.0	-7.6	2.5
Hungary	-1.4	0.2	1.0	5.6	0.1	-0.9	-2.0	-1.2
Iceland	0.0	0.0	0.0	4.8	-1.6	0.7	-1.6	0.6
India	-3.4	-0.2	2.3	9.8	-0.5	-1.2	-3.0	0.4
Indonesia	-17.3	4.5	13.2	14.6	-0.3	-2.1	-10.2	2.0
Iran, Islamic Rep.	-69.5	-6.3	55.0	28.8	-3.0	0.7	-31.0	15.0

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Iraq	-238.8	14.7	223.5	50.1	-2.1	16.2	-40.3	-16.1
Ireland	0.0	0.0	0.0	3.4	-0.2	-0.5	-0.7	-0.7
Israel	0.0	0.0	0.0	4.8	-0.7	-0.2	-0.4	-0.5
Italy	-0.2	0.0	0.1	3.2	-0.4	-0.1	-0.5	-0.7
Jamaica	0.0	0.0	0.0	21.0	1.0	0.4	-15.5	8.7
Japan	0.0	0.0	0.0	3.2	-0.4	-0.4	0.2	-0.2
Jordan	0.0	0.0	0.0	21.5	-6.2	-2.3	-6.3	0.0
Kazakhstan	-87.3	-47.4	120.5	16.2	0.9	-5.1	-12.1	0.1
Kenya	0.0	0.0	0.0	9.0	-0.1	-0.3	-3.3	-0.1
Kiribati	0.0	0.0	0.0	6.0	0.2	1.5	-0.9	-1.2
Korea, Rep.	-0.1	0.0	0.0	9.8	-1.7	-1.0	-1.6	-0.5
Kyrgyz Republic	-2.3	0.9	1.8	22.0	10.5	-4.7	-14.7	-1.0
Lao PDR	0.0	0.0	0.0	3.5	-0.6	-0.4	-2.1	0.5
Latvia	0.0	0.0	0.0	7.0	0.2	-2.3	-3.1	-0.9
Lebanon	0.0	0.0	0.0	13.6	0.2	-3.5	-1.7	0.0
Lesotho	0.0	0.0	0.0	4.0	0.5	-0.3	-2.1	0.8
Liberia	0.0	0.0	0.0	16.9	0.1	1.8	-10.7	4.7
Libya	-94.2	-17.4	73.6	18.7	-1.3	-2.3	-21.7	11.4
Lithuania	-0.9	-0.1	0.8	9.0	-0.5	-2.6	-1.8	-2.9
Luxembourg	0.0	0.0	0.0	4.5	0.0	-0.3	-0.9	-1.0
Macedonia, FYR	0.0	0.0	0.0	10.0	0.1	-2.3	-2.6	-2.0
Madagascar	0.0	0.0	0.0	6.7	0.5	1.5	-4.7	1.4
Malawi	0.0	0.0	0.0	9.1	0.2	0.0	-11.6	6.6
Malaysia	-18.7	1.2	12.7	11.3	-1.8	-0.6	-3.2	-1.0
Maldives	0.0	0.0	0.0	10.7	0.1	2.2	-3.7	0.6
Mali	0.0	0.0	0.0	2.7	0.0	-0.5	-0.8	-0.6
Malta	0.0	0.0	0.0	12.9	5.8	-1.3	-2.6	-3.0
Mauritania	-7.8	-12.0	7.2	31.4	0.1	-11.4	-12.8	2.6
Mauritius	0.0	0.0	0.0	9.0	-0.9	0.6	-3.5	0.7
Mexico	-14.1	0.5	7.9	8.9	-0.8	-0.4	-4.5	0.9
Moldova	0.0	0.0	0.0	17.2	6.0	-6.1	-12.7	-0.1
Mongolia	-1.9	-3.0	3.0	17.9	4.3	-3.3	-14.8	1.5
Morocco	0.0	0.0	0.0	9.3	0.1	-0.2	-1.0	-1.6
Mozambique	0.0	0.0	0.0	4.9	0.5	-1.1	-2.9	2.0
Namibia	0.0	0.0	0.0	9.5	-0.6	1.1	-5.9	1.9
Nepal	0.0	0.0	0.0	5.9	-0.6	-0.5	-2.1	-0.2
Netherlands	-0.3	0.0	0.2	4.6	0.5	-0.3	-0.8	-1.0
New Zealand	-2.0	-0.4	1.1	5.2	0.5	-0.7	-1.0	-0.7
Nicaragua	0.0	0.0	0.0	16.0	0.6	-2.2	-8.3	5.3
Niger	0.0	0.0	0.0	3.9	-0.6	-1.2	-0.7	-0.8
Nigeria	-109.7	-2.5	115.0	10.4	-0.1	-1.9	-9.5	1.6
Norway	-34.9	5.4	23.3	2.6	0.0	-0.3	-0.9	-0.6
Oman	-97.8	10.6	80.8	8.8	-0.1	2.2	-5.7	0.0
Pakistan	-1.9	-0.1	1.2	11.9	-2.1	-0.8	-6.8	2.3
Panama	0.0	0.0	0.0	7.6	1.5	-2.3	-0.9	0.0
Papua New Guinea	-42.3	23.1	20.7	12.4	1.1	3.4	-6.5	0.5

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Paraguay	0.0	0.0	0.0	8.0	0.0	-1.2	-5.1	1.7
Peru	-4.6	-0.4	2.9	6.6	-0.6	-1.3	-1.2	-0.6
Philippines	-0.3	-0.4	0.2	8.4	-1.5	-2.3	-2.4	0.7
Poland	-0.2	-0.1	0.2	5.0	0.8	-1.3	-0.9	-1.7
Portugal	0.0	0.0	0.0	5.3	-0.5	-0.4	-0.9	-1.1
Romania	-5.8	0.9	5.5	10.2	0.0	-2.8	-10.4	3.1
Russian Federation	-62.4	-17.0	79.8	19.3	-0.3	-5.1	-16.4	0.1
Rwanda	0.0	0.0	0.0	5.5	0.3	-2.8	-2.6	1.7
Samoa	0.0	0.0	0.0	8.5	0.0	-1.0	-2.1	-1.0
Saudi Arabia	-112.7	-16.6	84.9	20.9	-1.1	2.0	-11.1	0.0
Senegal	0.0	0.0	0.0	12.1	0.5	-1.1	-2.2	-2.6
Serbia	-1.9	0.5	1.2	10.4	3.5	-0.9	-17.9	9.9
Seychelles	0.0	0.0	0.0	21.3	-0.1	6.9	-13.8	8.4
Sierra Leone	0.0	0.0	0.0	20.8	0.1	-4.9	-10.7	6.9
Singapore	0.0	0.0	0.0	18.9	-1.2	0.5	-1.6	-1.4
Slovak Republic	-0.4	-0.4	0.4	4.3	0.6	-1.3	-1.1	-0.9
Slovenia	0.0	0.0	0.0	4.9	0.1	-0.7	-1.4	-0.4
Solomon Islands	0.0	0.0	0.0	7.0	0.1	0.3	-3.4	2.3
South Africa	-3.0	-0.3	1.5	8.4	0.1	-0.6	-4.0	1.7
Spain	0.0	0.0	0.0	4.5	-0.2	-0.3	-1.0	-1.0
Sri Lanka	0.0	0.0	0.0	9.6	0.4	-1.6	-6.4	2.7
St. Kitts and Nevis	0.0	0.0	0.0	7.1	-0.1	2.6	-2.5	0.0
St. Lucia	0.0	0.0	0.0	7.0	0.0	2.4	-1.5	0.0
St. Vincent and the Grenadines	0.0	0.0	0.0	8.1	0.1	-0.8	-2.4	0.0
Sudan	-36.2	-40.1	51.3	6.7	0.6	1.9	-4.4	-0.9
Suriname	-26.0	-7.8	22.9	31.6	4.5	-8.0	-43.5	22.8
Swaziland	0.0	0.0	0.0	5.9	1.0	-0.5	-3.3	1.2
Sweden	0.0	0.0	0.0	3.1	-0.2	-0.6	-0.3	-0.5
Switzerland	0.0	0.0	0.0	2.2	-0.1	-0.3	-0.2	-0.5
Syrian Arab Rep.	-57.8	15.2	41.4	30.4	-0.9	1.1	-14.2	-2.1
Tajikistan	0.0	0.0	0.0	15.3	5.0	-7.0	-19.2	9.8
Tanzania	0.0	0.0	0.0	4.8	1.3	-0.7	-2.4	1.6
Thailand	-4.4	-2.6	2.8	14.2	-1.4	-0.1	-2.5	-1.2
Togo	0.0	0.0	0.0	11.2	-0.6	0.1	-1.5	-2.5
Tonga	0.0	0.0	0.0	11.9	-0.3	1.4	-5.4	1.4
Trinidad and Tobago	-39.7	-4.2	35.9	7.7	-1.9	0.6	-3.8	0.0
Tunisia	-8.1	-0.2	3.8	7.8	-0.5	-1.0	-1.6	0.2
Turkey	-0.4	0.1	0.3	6.6	-1.4	-0.1	-8.2	4.7
Turkmenistan	-120.9	-26.2	148.5	52.6	-4.4	-26.5	-37.5	14.3
Uganda	0.0	0.0	0.0	3.4	0.2	-0.5	-1.2	0.5
Ukraine	-4.7	-0.4	5.0	14.6	1.5	-5.3	-12.3	2.2
United Arab Emirates	-56.6	-9.7	50.3	7.9	-0.4	0.2	-4.3	0.0
United Kingdom	-3.5	1.4	1.3	2.6	0.0	-0.5	-0.4	-0.2
United States	-2.0	0.1	0.6	4.9	-0.1	-0.6	-0.8	0.0
Uruguay	0.0	0.0	0.0	6.2	0.5	-0.3	-3.3	2.6
Vanuatu	0.0	0.0	0.0	4.0	0.0	0.4	-0.7	-0.7

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Venezuela, RB	-61.6	0.7	46.6	15.7	2.7	-2.3	-23.3	12.3
Vietnam	-20.7	-0.2	15.8	12.5	1.8	-1.3	-6.0	1.3
Yemen, Rep.	-89.0	13.7	68.7	27.5	0.8	2.1	-22.4	4.5
Zambia	0.0	0.0	0.0	6.1	-0.2	-0.9	-6.1	1.7

Sources: EIA 2012, IEA 2012, WDI 2012, and author's calculations.

Note: Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three or four significant figures.

Table A1.5: Distribution of the change in oil share of energy by income and region for 1999–2008 (percentage of countries in each category except for the median)

Category	Below -5%	-5 to 0%	0 to 5%	Above 5%	Median ^a
Income					
Low	3	32	58	6	0.1
Lower middle	0	40	58	2	0.2
Upper middle	4	51	43	2	-0.1
High	0	67	31	2	-0.1
Region (excluding high-income countries)					
East Asia & Pacific	0	50	50	0	0.0
Europe & Central Asia	5	40	45	10	0.1
Latin America & Caribbean	0	37	63	0	0.1
Middle East & North Africa	8	58	33	0	-0.7
South Asia	0	71	29	0	-0.6
Sub-Saharan Africa	2	35	58	5	0.1

Sources: Table A1.4 and author's calculations.

a. The median is in percentage of GDP.

Table A1.6: Distribution of the change in energy intensity by income and region for 1999–2008 (percentage of countries in each category except for the median)

Category	< -15%	-15 to -5%	-5 to 0%	0 to 5%	>5%	Median ^a
Income						
Low	0	6	52	39	3	-0.4
Lower middle	2	4	56	33	4	-0.5
Upper middle	8	6	61	22	2	-0.9
High	0	0	78	22	0	-0.4
Region (excluding high-income countries)						
East Asia & Pacific	0	0	63	31	6	-0.3
Europe & Central Asia	15	25	60	0	15	-3.6
Latin America & Caribbean	0	4	67	30	0	-0.5
Middle East & North Africa	8	0	42	42	8	-0.1
South Asia	0	0	57	43	0	-0.5
Sub-Saharan Africa	2	2	51	40	5	-0.3

Sources: Table A1.4 and author's calculations.

a. The median is in percentage of GDP.

Table A1.7: Distribution of offsetting coefficients by income and region for 1999–2008
(percentage of countries in each category except for the median)

Category	< -20%	-20–0%	0–10%	10–20%	>20%	Median ^a
Income						
Low	16	23	10	29	23	10
Lower middle	18	24	20	24	13	5
Upper middle	8	18	16	22	35	11
High	7	11	20	44	18	14
Region (excluding high-income countries)						
East Asia & Pacific	19	31	6	25	19	1
Europe & Central Asia	10	0	10	15	65	26
Latin America & Caribbean	11	26	26	26	11	8
Middle East & North Africa	8	17	25	25	25	12
South Asia	14	0	0	71	14	17
Sub-Saharan Africa	16	30	16	21	16	5

Sources: Table A1.4 and author's calculations.

a. The median is in percentage of the price effect for consumption.

Table A1.8: Decomposition analysis for 1999–2009 (percentage of GDP)

Country	V 1999	V 2009	ΔV	ΔP	ΔC	Data source
Albania	2.7	1.1	-1.6	-0.9	-0.7	IEA
Algeria	-17.1	-23.2	-6.1	-8.3	2.2	IEA
Angola	-76.5	-52.0	24.6	25.6	-1.0	IEA
Antigua and Barbuda	3.4	8.7	5.2	0.0	5.2	EIA
Argentina	-0.8	-1.3	-0.5	-3.7	3.2	EIA
Armenia	1.4	2.1	0.7	0.0	0.7	IEA
Australia	0.4	1.0	0.5	-0.3	0.8	EIA
Austria	0.7	1.5	0.7	-0.1	0.8	EIA
Azerbaijan	-24.3	-48.3	-24.0	-12.2	-11.7	IEA
Bahamas, The	2.4	10.1	7.7	0.0	7.7	EIA
Bangladesh	0.9	2.3	1.3	-0.1	1.4	EIA
Barbados	2.1	4.8	2.8	0.0	2.7	EIA
Belgium	1.5	3.0	1.5	0.0	1.5	EIA
Belize	2.9	5.4	2.5	-6.7	9.2	EIA
Benin	2.8	10.5	7.8	0.0	7.8	IEA
Bhutan	1.6	3.0	1.4	0.0	1.4	EIA
Bolivia	-0.4	1.0	1.4	-3.1	4.5	IEA
Bosnia and Herzegovina	3.0	3.7	0.7	0.0	0.7	EIA
Botswana	1.2	3.5	2.3	0.0	2.3	IEA
Brazil	0.8	-0.1	-1.0	-2.0	1.0	EIA
Brunei Darussalam	-26.1	-33.2	-7.1	-8.6	1.5	IEA
Bulgaria	4.8	5.1	0.2	0.0	0.3	EIA
Burkina Faso	1.6	2.4	0.9	0.0	0.9	EIA
Burundi	2.2	3.6	1.4	0.0	1.4	EIA
Cambodia	3.0	6.9	3.9	0.0	3.9	IEA
Cameroon	-6.0	-4.2	1.9	-0.3	2.2	IEA

Country	V 1999	V 2009	ΔV	ΔP	ΔC	Data source
Canada	-0.5	-1.8	-1.3	-2.9	1.6	EIA
Cape Verde	1.0	3.6	2.5	0.0	2.5	EIA
Central African Republic	1.3	3.0	1.7	0.0	1.7	EIA
Chad	0.5	-37.2	-37.8	-37.9	0.1	EIA
Chile	2.3	4.7	2.4	-0.1	2.5	IEA
China	0.7	2.1	1.4	0.2	1.2	EIA
Colombia	-4.2	-4.0	0.2	-0.2	0.4	EIA
Comoros	1.7	4.2	2.5	0.0	2.5	EIA
Congo, Dem. Rep.	-2.0	-2.0	-0.1	-0.8	0.7	IEA
Congo, Rep.	-74.0	-62.3	11.7	10.0	1.7	IEA
Costa Rica	1.5	3.6	2.2	0.0	2.2	IEA
Cote d'Ivoire	0.8	-2.7	-3.5	-4.9	1.4	EIA
Croatia	1.8	2.6	0.8	0.2	0.6	IEA
Cyprus	3.2	5.6	2.4	0.0	2.4	IEA
Czech Republic	1.8	2.4	0.5	0.0	0.5	EIA
Denmark	-0.3	-0.7	-0.4	-0.7	0.4	EIA
Djibouti	13.7	19.3	5.6	0.0	5.6	EIA
Dominica	1.5	4.8	3.3	0.0	3.3	EIA
Dominican Republic	3.5	5.3	1.8	0.0	1.8	IEA
Ecuador	-9.8	-11.2	-1.4	-6.2	4.8	EIA
Egypt, Arab Rep.	-2.1	-0.1	2.0	-2.2	4.2	IEA
El Salvador	2.0	4.7	2.7	0.0	2.7	EIA
Equatorial Guinea	-76.4	-63.6	12.8	13.3	-0.5	EIA
Eritrea	3.8	3.6	-0.2	0.0	-0.2	IEA
Estonia	2.5	1.9	-0.7	-0.7	0.0	IEA
Ethiopia	1.8	3.4	1.6	0.0	1.6	EIA
Fiji	2.6	15.9	13.3	0.0	13.3	EIA
Finland	1.1	1.9	0.9	0.0	0.9	EIA
France	0.9	1.6	0.7	0.0	0.7	EIA
Gabon	-43.0	-47.0	-4.0	-4.7	0.7	IEA
Gambia, The	2.4	9.2	6.8	0.0	6.8	EIA
Georgia	4.7	8.0	3.2	0.3	3.0	IEA
Germany	0.9	1.6	0.8	0.0	0.8	EIA
Ghana	2.2	3.6	1.4	0.0	1.4	EIA
Greece	1.9	2.8	0.9	0.0	0.9	EIA
Grenada	2.4	6.2	3.8	0.0	3.8	EIA
Guatemala	1.3	3.8	2.5	0.0	2.5	IEA
Guinea	1.5	4.7	3.1	0.0	3.1	EIA
Guinea-Bissau	6.1	8.1	2.0	0.0	2.0	EIA
Guyana	9.4	11.1	1.8	0.0	1.8	EIA
Haiti	1.6	5.9	4.3	0.0	4.3	EIA
Honduras	3.6	7.3	3.8	0.0	3.8	IEA
Hungary	1.5	2.2	0.8	0.0	0.8	IEA
Iceland	1.4	3.3	2.0	0.0	2.0	IEA
India	1.9	3.6	1.7	-0.2	1.9	EIA
Indonesia	-2.3	1.7	3.9	3.2	0.8	IEA

Country	V 1999	V 2009	ΔV	ΔP	ΔC	Data source
Iran, Islamic Rep.	-15.3	-16.4	-1.1	-5.5	4.5	EIA
Iraq	-76.6	-58.7	17.9	12.3	5.6	IEA
Ireland	1.1	1.6	0.5	0.0	0.5	EIA
Israel	1.4	2.7	1.3	0.0	1.3	IEA
Italy	1.0	1.5	0.5	-0.1	0.6	IEA
Jamaica	4.9	10.2	5.4	0.0	5.4	IEA
Japan	0.8	2.0	1.1	0.0	1.1	IEA
Jordan	7.7	8.5	0.8	0.0	0.8	IEA
Kazakhstan	-16.9	-25.3	-8.4	-6.4	-2.0	EIA
Kenya	2.7	5.3	2.6	0.0	2.6	EIA
Kiribati	1.4	5.3	3.9	0.0	3.9	EIA
Korea, Rep.	3.1	5.9	2.8	0.0	2.8	EIA
Kyrgyz Republic	4.8	15.4	10.6	0.1	10.5	IEA
Lao PDR	1.2	1.3	0.1	0.0	0.1	EIA
Latvia	2.8	3.3	0.5	0.0	0.5	EIA
Lebanon	3.9	8.3	4.4	0.0	4.4	IEA
Lesotho	1.0	2.4	1.4	0.0	1.4	EIA
Liberia	4.1	11.0	6.9	0.0	6.9	EIA
Libya	-23.6	-44.4	-20.8	-25.8	5.0	IEA
Lithuania	3.4	3.1	-0.3	0.0	-0.3	IEA
Luxembourg	1.4	2.5	1.1	0.0	1.1	IEA
Macedonia, FYR	3.6	4.8	1.3	0.0	1.3	EIA
Madagascar	1.5	5.1	3.6	0.0	3.6	EIA
Malawi	1.9	3.6	1.7	0.0	1.7	EIA
Malaysia	-2.5	-1.8	0.7	-2.0	2.6	IEA
Maldives	2.5	7.8	5.3	0.0	5.3	EIA
Mali	1.0	1.3	0.3	0.0	0.3	EIA
Malta	2.9	10.8	7.9	0.0	7.9	IEA
Mauritania	10.9	6.9	-4.0	-8.4	4.4	EIA
Mauritius	2.5	5.9	3.4	0.0	3.4	EIA
Mexico	-1.8	-2.3	-0.5	-3.0	2.5	EIA
Moldova	5.5	6.8	1.3	0.0	1.3	EIA
Mongolia	5.6	5.9	0.3	-2.5	2.7	IEA
Morocco	2.6	5.8	3.2	0.0	3.2	IEA
Mozambique	1.2	3.5	2.3	0.0	2.3	IEA
Namibia	2.5	5.4	2.9	0.0	2.9	IEA
Nepal	2.0	3.5	1.5	0.0	1.5	IEA
Netherlands	1.2	2.7	1.5	-0.1	1.5	IEA
New Zealand	0.9	1.6	0.7	-0.5	1.2	IEA
Nicaragua	4.1	10.2	6.1	0.0	6.1	IEA
Niger	1.6	1.7	0.2	0.0	0.2	EIA
Nigeria	-38.4	-29.9	8.5	9.3	-0.8	IEA
Norway	-12.1	-12.7	-0.6	-1.1	0.4	EIA
Oman	-36.2	-34.5	1.7	-0.9	2.6	EIA
Pakistan	3.3	4.7	1.4	-0.2	1.7	EIA
Panama	2.0	5.3	3.3	0.0	3.3	IEA

Country	V 1999	V 2009	ΔV	ΔP	ΔC	Data source
Papua New Guinea	-15.5	-0.3	15.2	8.4	6.8	EIA
Paraguay	2.4	4.4	2.0	0.0	2.0	EIA
Peru	0.8	0.8	0.0	-1.3	1.2	IEA
Philippines	2.9	3.5	0.6	-0.5	1.0	IEA
Poland	1.6	2.7	1.1	-0.1	1.2	EIA
Portugal	1.8	2.6	0.8	0.0	0.9	IEA
Romania	1.3	1.4	0.1	1.1	-1.0	IEA
Russian Federation	-11.8	-12.7	-0.9	2.3	-3.3	IEA
Rwanda	1.7	2.1	0.5	0.0	0.5	EIA
Samoa	2.7	4.3	1.6	0.0	1.6	EIA
Saudi Arabia	-28.6	-43.8	-15.2	-23.8	8.6	IEA
Senegal	3.7	6.4	2.6	0.0	2.6	IEA
Serbia	0.7	3.9	3.2	0.0	3.2	IEA
Seychelles	3.9	20.0	16.1	0.0	16.1	EIA
Sierra Leone	5.7	10.9	5.2	0.0	5.2	EIA
Singapore	4.9	11.4	6.5	0.0	6.5	EIA
Slovak Republic	1.4	1.8	0.3	-0.2	0.6	IEA
Slovenia	1.5	2.5	1.0	0.0	1.0	IEA
Solomon Islands	1.6	6.0	4.4	0.0	4.4	EIA
South Africa	1.4	3.3	1.9	-0.7	2.6	IEA
Spain	1.5	2.2	0.7	0.0	0.8	IEA
Sri Lanka	2.8	4.6	1.8	0.0	1.8	EIA
St. Kitts and Nevis	1.5	6.7	5.2	0.0	5.2	EIA
St. Lucia	1.4	6.1	4.7	0.0	4.7	EIA
St. Vincent and the Grenadines	2.4	5.2	2.8	0.0	2.8	EIA
Sudan	-2.4	-16.2	-13.7	-15.7	2.0	EIA
Suriname	-0.1	-2.1	-2.0	-3.6	1.6	EIA
Swaziland	1.5	3.4	1.9	0.0	1.9	EIA
Sweden	1.0	1.8	0.8	0.0	0.8	EIA
Switzerland	0.7	1.2	0.5	0.0	0.5	EIA
Syrian Arab Rep.	-14.2	-2.1	12.0	8.5	3.6	IEA
Tajikistan	3.6	4.1	0.4	-0.5	0.9	IEA
Tanzania	1.0	3.6	2.6	0.0	2.6	IEA
Thailand	3.3	5.4	2.1	-2.6	4.6	IEA
Togo	3.3	6.4	3.1	0.0	3.1	IEA
Tonga	3.0	7.2	4.2	0.0	4.2	EIA
Trinidad and Tobago	-10.9	-15.1	-4.2	-6.2	2.1	IEA
Tunisia	-0.1	0.0	0.1	-2.3	2.5	EIA
Turkey	1.5	2.4	0.9	0.0	0.9	EIA
Turkmenistan	-21.3	-12.3	8.9	18.2	-9.3	IEA
Uganda	0.9	2.0	1.1	0.0	1.1	EIA
Ukraine	3.8	3.7	-0.1	0.1	-0.2	IEA
United Arab Emirates	-15.7	-18.9	-3.2	-5.0	1.8	EIA
United Kingdom	-0.5	0.2	0.7	-0.3	0.9	IEA
United States	0.8	1.7	0.9	-0.7	1.6	EIA
Uruguay	1.3	3.9	2.5	0.0	2.5	EIA

Country	V 1999	V 2009	ΔV	ΔP	ΔC	Data source
Uzbekistan	-2.0	-1.4	0.6	0.0	0.6	IEA
Vanuatu	1.1	3.8	2.7	0.0	2.7	EIA
Venezuela, RB	-18.5	-16.1	2.4	0.3	2.0	IEA
Vietnam	-3.8	0.2	4.0	-0.9	4.9	IEA
Yemen, Rep.	-26.9	-12.8	14.1	7.5	6.6	IEA
Zambia	2.1	2.1	0.0	0.0	0.0	IEA

Sources: EIA 2012, IEA 2012, WDI 2012, and author's calculations.

Note: Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three significant figures.

Table A1.8: Decomposition analysis for 1999–2009, continued

Country	Price	ΔP Output	GDP	Price	Oil	ΔC Energy	GDP	Exch.
Albania	-2.4	-1.2	2.7	5.2	-0.6	-2.3	-1.4	-1.5
Algeria	-35.1	-4.8	31.6	5.4	-0.1	0.2	-3.7	0.4
Angola	-159.1	-116.9	301.6	46.0	18.4	-22.1	-136.0	92.7
Antigua and Barbuda	0.0	0.0	0.0	7.2	0.0	0.1	-2.1	0.0
Argentina	-4.4	0.3	0.3	3.9	-0.3	-0.3	-4.1	4.1
Armenia	0.0	0.0	0.0	2.4	0.7	-0.9	-0.7	-0.8
Australia	-1.7	0.1	1.2	2.5	-0.1	-0.4	-0.8	-0.3
Austria	-0.1	0.0	0.1	1.5	0.0	-0.1	-0.2	-0.4
Azerbaijan	-105.5	-111.6	204.9	16.0	-5.0	-13.9	-8.6	-0.3
Bahamas, The	0.0	0.0	0.0	6.6	0.1	2.0	-1.0	0.0
Bangladesh	-0.1	-0.1	0.1	2.1	-0.7	0.3	-0.9	0.7
Barbados	-0.8	0.6	0.2	5.0	-0.3	-0.3	-1.6	0.0
Belgium	0.0	0.0	0.0	2.9	0.2	-0.4	-0.5	-0.7
Belize	-3.0	-5.8	2.1	7.9	0.2	2.1	-1.0	0.0
Benin	0.0	0.0	0.0	7.5	4.6	0.0	-2.4	-1.9
Bhutan	0.0	0.0	0.0	3.1	-1.5	0.8	-1.3	0.3
Bolivia	-6.3	-1.0	4.2	6.2	0.7	-0.2	-3.3	1.0
Bosnia and Herzegovina	0.0	0.0	0.0	4.7	-0.8	0.1	-2.3	-1.0
Botswana	0.0	0.0	0.0	2.9	0.9	-0.7	-2.0	1.1
Brazil	-3.5	-1.7	3.2	4.1	-0.3	-0.3	-2.7	0.3
Brunei Darussalam	-46.0	4.4	33.0	3.4	-0.1	0.3	-1.7	-0.5
Bulgaria	-0.1	0.0	0.1	7.3	0.9	-2.9	-3.5	-1.6
Burkina Faso	0.0	0.0	0.0	2.7	0.0	-0.6	-0.6	-0.6
Burundi	0.0	0.0	0.0	4.3	-1.1	-0.8	-3.8	2.8
Cambodia	0.0	0.0	0.0	6.3	2.2	-2.9	-2.1	0.5
Cameroon	-10.8	3.8	6.6	2.6	1.1	-0.5	-0.5	-0.5
Canada	-5.2	-1.0	3.3	3.6	0.2	-0.6	-0.8	-0.8
Cape Verde	0.0	0.0	0.0	2.5	0.1	0.6	-0.1	-0.6
Central African Republic	0.0	0.0	0.0	2.6	0.4	0.0	-0.7	-0.6
Chad	-28.8	-59.0	50.0	0.8	0.0	-0.2	-0.3	-0.2
Chile	-0.2	-0.1	0.1	4.6	0.5	-0.8	-2.2	0.4
China	-3.1	-0.4	3.7	4.4	-0.9	-0.3	-1.3	-0.7
Colombia	-9.6	1.5	7.9	3.4	-0.5	-0.8	-2.3	0.6

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Comoros	0.0	0.0	0.0	3.6	0.0	1.1	-1.4	-0.9
Congo, Dem. Rep.	-5.8	0.8	4.2	45.5	-19.3	6.0	-131.3	100.0
Congo, Rep.	-114.1	-3.1	127.2	2.1	1.1	0.4	-1.4	-0.5
Costa Rica	0.0	0.0	0.0	3.4	-0.9	0.6	-2.9	2.0
Cote d'Ivoire	-3.4	-3.6	2.1	2.9	-0.1	0.0	-0.8	-0.7
Croatia	-1.2	0.5	0.9	4.1	-0.3	-0.8	-1.4	-1.0
Cyprus	0.0	0.0	0.0	5.8	-0.1	-0.4	-1.5	-1.3
Czech Republic	-0.1	0.0	0.1	3.0	0.1	-0.5	-0.6	-1.5
Denmark	-2.0	0.2	1.0	1.4	-0.2	-0.2	-0.3	-0.3
Djibouti	0.0	0.0	0.0	22.5	-4.7	-6.0	-6.1	0.0
Dominica	0.0	0.0	0.0	3.6	0.3	0.6	-1.1	0.0
Dominican Republic	0.0	0.0	0.0	6.8	-0.8	-2.4	-6.4	4.6
Ecuador	-26.7	-5.8	26.2	9.8	1.2	-0.1	-6.1	0.0
Egypt, Arab Rep.	-10.3	1.6	6.4	8.3	-1.7	-0.2	-5.6	3.4
El Salvador	0.0	0.0	0.0	4.1	-0.1	-0.2	-1.1	0.0
Equatorial Guinea	-184.9	-183.8	382.1	1.3	-2.4	1.5	-0.7	-0.3
Eritrea	0.0	0.0	0.0	6.8	-1.8	0.6	-9.3	3.5
Estonia	-1.0	-0.9	1.2	4.2	0.0	-1.6	-1.7	-0.9
Ethiopia	0.0	0.0	0.0	3.6	0.2	0.0	-3.1	1.0
Fiji	0.0	0.0	0.0	9.0	1.4	5.4	-2.5	-0.1
Finland	0.0	0.0	0.0	1.9	0.0	-0.3	-0.3	-0.4
France	0.0	0.0	0.0	1.6	-0.1	-0.2	-0.3	-0.4
Gabon	-69.4	15.9	48.9	3.2	-0.7	0.1	-1.2	-0.7
Gambia, The	0.0	0.0	0.0	7.2	-0.3	1.8	-7.2	5.2
Georgia	-0.6	0.3	0.5	9.3	3.4	-3.4	-4.8	-1.5
Germany	-0.1	0.0	0.0	1.6	-0.1	-0.2	-0.1	-0.4
Ghana	-0.8	0.0	0.8	8.6	-0.5	-0.4	-17.4	11.2
Greece	0.0	0.0	0.0	3.2	-0.2	-0.5	-0.9	-0.7
Grenada	0.0	0.0	0.0	5.2	-0.5	1.5	-2.4	0.0
Guatemala	-1.2	0.5	0.7	4.2	-0.3	0.1	-1.9	0.4
Guinea	0.0	0.0	0.0	4.6	0.0	-0.8	-5.6	5.0
Guinea-Bissau	0.0	0.0	0.0	10.2	0.0	1.8	-7.7	-2.3
Guyana	0.0	0.0	0.0	15.2	0.1	-2.3	-12.9	1.7
Haiti	0.0	0.0	0.0	5.0	1.0	1.0	-6.5	3.7
Honduras	0.0	0.0	0.0	7.2	0.3	-0.1	-5.3	1.7
Hungary	-0.8	0.2	0.6	3.3	0.2	-0.7	-1.7	-0.4
Iceland	0.0	0.0	0.0	3.0	-1.6	0.7	-1.6	1.4
India	-1.8	-0.1	1.7	5.3	-0.5	-0.8	-2.4	0.4
Indonesia	-9.4	3.3	9.3	8.2	-0.1	-1.5	-7.8	1.9
Iran, Islamic Rep.	-38.7	-4.5	37.6	16.5	-3.4	1.8	-22.2	11.8
Iraq	-140.6	9.0	143.9	30.2	1.9	10.3	-23.5	-13.4
Ireland	0.0	0.0	0.0	1.9	-0.2	-0.3	-0.4	-0.4
Israel	0.0	0.0	0.0	2.6	-0.5	-0.2	-0.4	-0.1
Italy	-0.1	0.0	0.1	1.8	-0.3	-0.1	-0.4	-0.4
Jamaica	0.0	0.0	0.0	10.8	-0.2	-2.1	-10.6	7.4
Japan	0.0	0.0	0.0	1.7	-0.2	-0.2	0.2	-0.3

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Jordan	0.0	0.0	0.0	11.6	-4.5	-1.3	-5.0	0.0
Kazakhstan	-51.7	-39.8	85.1	9.6	1.0	-4.6	-9.6	1.6
Kenya	0.0	0.0	0.0	5.1	0.0	-0.2	-2.8	0.4
Kiribati	0.0	0.0	0.0	3.6	0.0	1.7	-0.8	-0.7
Korea, Rep.	0.0	0.0	0.0	5.7	-1.2	-0.7	-1.4	0.4
Kyrgyz Republic	-1.6	0.0	1.7	14.8	11.3	-3.2	-13.6	1.3
Lao PDR	0.0	0.0	0.0	1.9	-0.3	-0.4	-1.4	0.3
Latvia	0.0	0.0	0.0	4.3	0.1	-0.9	-2.5	-0.5
Lebanon	0.0	0.0	0.0	7.6	0.1	-1.6	-1.7	0.0
Lesotho	0.0	0.0	0.0	2.2	0.3	-0.2	-1.5	0.6
Liberia	0.0	0.0	0.0	9.7	-0.8	2.3	-8.3	4.1
Libya	-54.7	-6.1	35.0	11.7	-0.9	-1.5	-14.0	9.6
Lithuania	-0.5	0.0	0.5	5.1	-0.6	-1.6	-1.2	-2.0
Luxembourg	0.0	0.0	0.0	2.5	0.0	-0.2	-0.7	-0.6
Macedonia, FYR	0.0	0.0	0.0	5.8	0.4	-1.8	-2.0	-1.2
Madagascar	0.0	0.0	0.0	4.1	0.4	1.5	-3.9	1.6
Malawi	0.0	0.0	0.0	4.9	0.0	0.0	-7.8	4.7
Malaysia	-10.3	0.6	7.8	6.6	-1.7	0.2	-2.0	-0.4
Maldives	0.0	0.0	0.0	5.9	0.0	1.7	-2.8	0.4
Mali	0.0	0.0	0.0	1.5	0.0	-0.3	-0.6	-0.3
Malta	0.0	0.0	0.0	7.8	5.1	-0.9	-2.2	-1.9
Mauritania	-4.1	-8.0	3.7	18.4	-0.1	-8.7	-8.8	3.5
Mauritius	0.0	0.0	0.0	5.2	-0.7	0.4	-2.6	1.1
Mexico	-8.1	0.8	4.3	5.4	-0.6	-0.2	-3.7	1.6
Moldova	0.0	0.0	0.0	9.4	2.7	-2.2	-9.1	0.4
Mongolia	-1.8	-3.8	3.1	10.6	2.5	-2.0	-11.4	3.1
Morocco	0.0	0.0	0.0	5.1	0.0	-0.3	-0.8	-0.9
Mozambique	0.0	0.0	0.0	3.0	0.7	-0.9	-2.4	1.9
Namibia	0.0	0.0	0.0	5.3	-0.1	0.5	-4.3	1.5
Nepal	0.0	0.0	0.0	3.6	0.1	-0.4	-2.1	0.4
Netherlands	-0.2	0.0	0.1	2.6	0.2	-0.2	-0.5	-0.6
New Zealand	-1.1	-0.2	0.7	2.7	0.2	-0.4	-0.7	-0.6
Nicaragua	0.0	0.0	0.0	9.1	0.3	-1.2	-6.3	4.2
Niger	0.0	0.0	0.0	2.3	-0.8	-0.2	-0.7	-0.5
Nigeria	-64.4	-5.4	79.1	6.1	-0.4	-1.9	-7.0	2.4
Norway	-20.0	4.8	14.1	1.5	0.0	-0.2	-0.6	-0.3
Oman	-59.3	5.5	52.9	4.6	-1.2	1.7	-2.6	0.0
Pakistan	-1.0	0.0	0.8	7.0	-1.5	-0.7	-6.1	3.0
Panama	0.0	0.0	0.0	4.3	1.2	-1.3	-0.8	0.0
Papua New Guinea	-23.0	17.3	14.1	7.1	1.0	2.5	-4.4	0.5
Paraguay	0.0	0.0	0.0	4.8	0.0	-0.8	-3.9	1.9
Peru	-2.8	-0.7	2.2	3.7	-0.4	-0.8	-0.9	-0.4
Philippines	-0.2	-0.4	0.2	4.8	-0.9	-1.8	-1.9	0.8
Poland	-0.1	-0.1	0.1	3.0	0.6	-1.0	-0.8	-0.6
Portugal	0.0	0.0	0.0	3.0	-0.5	-0.3	-0.7	-0.7
Romania	-3.3	0.8	3.6	6.2	0.1	-2.4	-8.3	3.5

Country	ΔP			ΔC				
	Price	Output	GDP	Price	Oil	Energy	GDP	Exch.
Russian Federation	-35.8	-14.2	52.3	12.6	0.8	-4.6	-14.7	2.6
Rwanda	0.0	0.0	0.0	2.9	0.0	-1.7	-2.0	1.3
Samoa	0.0	0.0	0.0	4.6	-0.1	-0.9	-1.5	-0.4
Saudi Arabia	-64.1	-7.2	47.4	13.1	-0.2	1.9	-6.1	0.0
Senegal	0.0	0.0	0.0	6.6	-0.3	-0.7	-1.4	-1.5
Serbia	-1.1	0.3	0.8	6.7	3.5	-1.5	-14.4	9.0
Seychelles	0.0	0.0	0.0	13.9	0.0	5.7	-14.4	10.9
Sierra Leone	0.0	0.0	0.0	11.6	-0.3	-4.4	-7.9	6.2
Singapore	0.0	0.0	0.0	9.9	-0.2	-0.7	-1.1	-1.5
Slovak Republic	-0.2	-0.3	0.2	2.5	0.5	-1.0	-0.8	-0.6
Slovenia	0.0	0.0	0.0	2.7	-0.1	-0.5	-1.0	-0.1
Solomon Islands	0.0	0.0	0.0	4.4	-1.0	1.7	-2.6	1.9
South Africa	-1.6	-0.2	1.1	4.6	0.2	-0.5	-3.0	1.3
Spain	0.0	0.0	0.0	2.5	-0.1	-0.4	-0.7	-0.6
Sri Lanka	0.0	0.0	0.0	5.3	0.2	-1.3	-4.6	2.2
St. Kitts and Nevis	0.0	0.0	0.0	4.5	-0.1	2.9	-2.1	0.0
St. Lucia	0.0	0.0	0.0	4.0	-0.2	1.9	-1.0	0.0
St. Vincent and the Grenadines	0.0	0.0	0.0	4.7	-1.0	0.9	-1.8	0.0
Sudan	-20.5	-29.6	34.5	3.8	0.1	1.5	-3.1	-0.3
Suriname	-14.2	-5.6	16.2	17.3	3.3	-5.8	-29.5	16.4
Swaziland	0.0	0.0	0.0	3.1	0.4	-0.4	-2.1	0.9
Sweden	0.0	0.0	0.0	1.8	-0.1	-0.5	-0.3	-0.1
Switzerland	0.0	0.0	0.0	1.2	-0.1	-0.2	-0.1	-0.3
Syrian Arab Rep.	-31.7	11.0	29.2	15.8	-0.6	-1.6	-8.7	-1.3
Tajikistan	-0.4	-0.7	0.6	8.9	3.6	-6.2	-14.1	8.7
Tanzania	0.0	0.0	0.0	2.7	0.9	-0.6	-1.9	1.4
Thailand	-2.5	-2.0	1.9	8.0	-0.6	-0.1	-1.9	-0.7
Togo	0.0	0.0	0.0	6.2	-0.5	0.0	-1.2	-1.4
Tonga	0.0	0.0	0.0	6.4	-0.2	0.0	-3.4	1.5
Trinidad and Tobago	-24.2	-4.3	22.3	4.8	-1.6	0.8	-1.9	0.0
Tunisia	-4.6	-0.4	2.7	4.5	0.3	-1.5	-1.3	0.5
Turkey	-0.2	0.0	0.2	4.2	-0.8	-0.1	-6.8	4.5
Turkmenistan	-64.0	-12.4	94.7	29.7	-2.1	-23.2	-26.9	13.2
Uganda	0.0	0.0	0.0	1.9	0.1	-0.4	-1.0	0.5
Ukraine	-2.7	-0.1	2.9	9.7	1.6	-4.7	-11.8	5.1
United Arab Emirates	-31.2	-4.7	30.8	4.6	-0.3	0.2	-2.7	0.0
United Kingdom	-2.0	1.1	0.6	1.6	0.0	-0.4	-0.3	0.1
United States	-1.2	0.0	0.4	2.7	0.0	-0.5	-0.6	0.0
Uruguay	0.0	0.0	0.0	3.2	0.3	-0.6	-2.3	1.9
Uzbekistan	-11.0	5.2	5.8	22.0	-7.9	-12.5	-41.1	40.0
Vanuatu	0.0	0.0	0.0	2.7	0.0	1.2	-0.7	-0.5
Venezuela, RB	-33.4	1.1	32.6	8.8	2.1	-1.2	-16.7	9.1
Vietnam	-11.8	-1.1	11.9	7.4	1.9	-0.8	-4.9	1.3
Yemen, Rep.	-49.4	11.1	45.8	15.7	0.6	1.6	-14.9	3.6
Zambia	0.0	0.0	0.0	3.8	-0.2	-0.8	-5.1	2.3

Sources: EIA 2012, IEA 2012, WDI 2012, and author's calculations.

Note: Reporting to the first decimal point is for formatting purposes and does not imply that numbers exceeding 10 percent have three or four significant figures.

Table A1.9: Distribution of consumption effects by income and region among net oil importers, 1999–2009 (percentage of countries in each category except for the median)

Category (number of countries)	ΔP					ΔC				
	Med	< -5%	-5 to 0%	0%	>0%	Med	0–2.5%	2.5–5%	5–5.5%	>7.5%
Income										
Low (29)	0.0	3	7	86	3	2.3	3	52	28	10
LM (36)	0.0	3	25	64	8	2.3	6	44	39	6
UM (31)	0.0	0	29	65	6	2.5	6	39	42	10
High (35)	0.0	0	51	40	9	0.9	0	83	6	6
Region (excluding high-income countries)										
EAP (14)	0.0	0	29	57	14	3.3	0	36	57	0
ECA (15)	0.0	0	40	33	27	0.7	27	53	13	0
LAC (21)	0.0	5	19	76	0	3.3	0	24	57	14
MENA (5)	0.0	0	20	80	0	3.2	0	40	40	20
SAR (7)	0.0	0	43	57	0	1.7	0	86	0	14
SSA (34)	0.0	3	6	91	0	2.4	3	50	32	9

Sources: Table A1.8 and author's calculations.

Notes: Oil import status in 2009. Med = median in percentage of GDP, LM = lower middle, UM = upper middle, EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SSA = Sub-Saharan Africa.

Table A1.10: Distribution of production and consumption effects by income and region among net oil exporters, 1999–2009 (percentage of countries in each category)

Category (number of countries)	ΔP					ΔC				
	Med	<20%	-20 to -10%	-10 to 0%	>0%	Med	<0%	0–2.5%	2.5–5%	>5%
Income										
Low (2)	-19.3	50	0	50	0	0.4	0	100	0	0
LM (11)	7.5	0	9	27	64	2.2	9	45	18	27
UM (17)	-3.6	6	6	65	24	1.6	29	41	24	6
High (9)	-2.9	11	0	78	11	1.6	11	67	11	11
Region (excluding high-income countries)										
EAP (2)	3.2	0	0	50	50	4.7	0	0	50	50
ECA (5)	0.0	0	20	20	60	-3.3	80	20	0	0
LAC (7)	-3.0	0	0	86	14	2.0	0	71	29	0
MENA (7)	-2.2	14	0	43	43	4.5	0	14	43	43
SSA (9)	-0.8	11	11	44	33	0.7	22	78	0	0

Sources: Table A1.8 and author's calculations

Notes: Oil export status in 2009. Med = median in percentage of GDP, LM = lower middle, UM = upper middle, EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SSA = Sub-Saharan Africa. No country in South Asia was a net oil exporter. Retention of three figures for medians exceeding 10 percent is for formatting purposes and is not intended to imply that the number of significant figures is three.

Table A1.11: Distribution of the change in oil share of energy by income and region for 1999–2009 (percentage of countries in each category except for the median)

Category	Below -5%	-5 to 0%	0 to 5%	Above 5%	Median ^a
Income					
Low	3	48	45	3	0.0
Lower middle	2	45	53	0	0.0
Upper middle	0	56	42	2	-0.2
High	0	66	32	2	-0.1
Region (excluding high-income countries)					
East Asia & Pacific	0	63	38	0	-0.1
Europe & Central Asia	5	30	60	5	0.6
Latin America & Caribbean	0	46	54	0	0.0
Middle East & North Africa	0	58	42	0	-0.3
South Asia	0	57	43	0	-0.5
Sub-Saharan Africa	2	53	42	2	0.0

Sources: Table A1.8 and author's calculations.

a. The median is in percentage of GDP.

Table A1.12: Distribution of the change in energy intensity by income and region for 1999–2009 (percentage of countries in each category except for the median)

Category	< -15%	-15 to -5%	-5 to 0%	0 to 5%	>5%	Median ^a
Income						
Low	0	6	61	29	3	-0.2
Lower middle	0	4	68	23	4	-0.4
Upper middle	4	4	60	29	2	-0.6
High	0	0	80	20	0	-0.3
Region (excluding high-income countries)						
East Asia & Pacific	0	0	63	31	6	-0.2
Europe & Central Asia	5	15	75	5	0	-2.6
Latin America & Caribbean	0	4	64	32	0	-0.3
Middle East & North Africa	0	8	58	25	8	-0.8
South Asia	0	0	57	43	0	-0.4
Sub-Saharan Africa	2	2	60	30	5	-0.2

Sources: Table A1.8 and author's calculations.

a. The median is in percentage of GDP.

Table A1.13: Distribution of offsetting coefficients by income and region for 1999–2009 (percentage of countries in each category except for the median)

Category	< -20%	-20–0%	0–10%	10–25%	>25%	Median ^a
Income						
Low	19	16	16	26	23	9
Lower middle	21	19	17	21	21	6
Upper middle	10	15	19	29	27	15
High	7	9	16	43	25	18

Category	< -20%	-20–0%	0–10%	10–25%	>25%	Median ^a
Region (excluding high-income countries)						
East Asia & Pacific	25	19	13	25	19	6
Europe & Central Asia	10	5	10	20	55	28
Latin America & Caribbean	14	21	25	29	11	6
Middle East & North Africa	8	17	17	33	25	17
South Asia	14	0	14	43	29	20
Sub-Saharan Africa	21	21	19	21	19	6

Sources: Table A1.8 and author's calculations.

a. The median is in percentage of the price effect for consumption.

Figure A1.1: Impact of oil intensity of the economy and exchange rate on the change in vulnerability in the developing world by region, 1999–2009

Sources: Table A1.8 and author's calculations.

Appendix 2: Retail fuel prices and pass-through calculations

Fuel properties and LPG cylinder sizes, the types of fuels for which the prices are reported, and sources of price information are given in table A2.1. Where there is more than one grade of a given fuel, whenever possible, the most commonly used fuel type is selected, unless the fuel quality departs significantly from what is available on the world market. For example, in Bangladesh, regular gasoline has a research octane number (RON) of only 80, more than 10 points lower than what modern gasoline engines require. Under these circumstances, a higher gasoline grade is chosen.

For pass-through calculations, the same grades of fuel and same data sources are used whenever possible for comparability. For example, if there are two grades of diesel available today and the higher grade is more commonly purchased but only the lower grade was sold on the market in January 2009, the prices of the lower grade are compared for pass-through calculations but the price of the higher grade may be reported for retail prices in January 2012. Fuel prices in January 2009 can be found in Kojima (2009b).

Table A2.1: Fuel characteristics and sources of data

Country	Types of fuel and prices	Source
Angola	93 RON gasoline, LPG in 12-kg cylinders.	Announcements on the Ministry of Finance Web site.
Argentina	92–95 RON gasoline, grade 3 diesel (0.005 percent sulfur), LPG in 10-kg cylinders. Prices in Capital Federal, volume-averaged across all oil companies.	res1104.se.gov.ar /consultaprecios.eess.php for gasoline, diesel, and kerosene, and government announcements for LPG.
Bangladesh	95 RON gasoline.	www.bpc.gov.bd. Visits to shops in Dhaka for LPG.
Bolivia	92 RON gasoline.	www.anh.gob.bo.
Brazil	87 octane index gasoline mixed with ethanol, LPG in 13-kg cylinders. Monthly average retail prices for the entire country.	www.anp.gov.br.
Cambodia	92 RON gasoline, LPG in 15-kg cylinders. Prices in Phenon Penh.	World Bank Phenon Penh office.
Cameroon	95 RON gasoline, LPG in 12.5-kg cylinders.	www.csph.cm.
Chile	93 RON gasoline, LPG in 15-kg cylinders. Monthly average prices in Región Metropolitana.	www.cne.cl/estadisticas/energia/hidrocarburos.
China	93 RON gasoline, LPG in 14.5-kg cylinders. Gasoline and diesel prices in Beijing, LPG prices in Nanjing.	Local newspapers.
Colombia	81 octane index gasoline mixed with ethanol (reporting of prices of 87 octane index gasoline stops in December 2011), diesel with 0.05 percent sulfur mixed with biodiesel, LPG in 20-pound (9-kg) cylinders. Maximum selling prices for gasoline and diesel in Bogotá. Wholesale prices for LPG and kerosene for pass-through calculations.	www.sipg.gov.co for gasoline and diesel, www.ecopetrol.com.co for kerosene wholesale prices, and www.anciem.org for LPG prices.
Costa Rica	91 RON gasoline, LPG in 25-pound (11.4-kg) cylinders. LPG prices are the maximum prices set by the regulatory authority. Because prices were adjusted	Government gazette no. 240 in 2008, 12 in 2009, and 248 in 2011.

Country	Types of fuel and prices	Source
	effective Jan 20, 2009, they are weight-averaged for that month.	
Côte d'Ivoire	91 RON gasoline, LPG in 6-kg cylinders in Abijan. All prices maximum retail prices.	Government announcements at www.commerce.gouv.ci .
Dominican Republic	89 RON gasoline, premium diesel with 0.2 percent sulfur. Weekly prices are averaged for the month of Jan.	www.seic.gov.do .
Egypt, Arab Rep.	90 RON gasoline, LPG in 12.5-kg cylinders	Government announcements
El Salvador	90 RON gasoline, LPG in 25-pound (11.4-kg) cylinders. Retail reference prices set by government for gasoline and diesel, maximum retail prices for LPG.	www.minec.gob.sv
Ethiopia	91 RON gasoline, LPG in 12.5-kg cylinders. All retail prices in Addis Ababa, averaged over the month for gasoline, diesel, and kerosene accounting for price adjustments during the month.	Ministry of Trade and Industry for gasoline, diesel, and kerosene, www.csa.gov.et for LPG
Gabon	91 RON gasoline, LPG in 12.5-kg cylinders in Libreville.	www.totalmarketing.ga
Ghana	91 RON gasoline, LPG price independent of cylinder size.	www.npa.gov.gh .
Guatemala	88 RON gasoline, LPG in 25-pound (11.4-kg) cylinders. All prices in Guatemala City.	www.mem.gob.gt .
Guinea-Bissau	Prices are for gasoline and diesel that are not duty-free.	World Bank office in Bissau.
Honduras	87/88 RON gasoline, LPG in 25-pound (11.4-kg) cylinders.	www.sieca.int .
India	91 RON non-branded gasoline, non-branded diesel, subsidized kerosene sold through the Public Distribution System, and subsidized LPG in 14.2-kg cylinders, all in New Delhi.	www.iocl.com .
Indonesia	88 RON subsidized gasoline, subsidized diesel, subsidized kerosene, and LPG sold in 3-kg cylinders.	www.pertamina.com .
Iran, Islamic Rep.	Rationed and subsidized gasoline. See table A2.2 for more detail. For Jan 2012, this paper takes 4,000 rials per liter for regular gasoline and 3,500 rials per liter for diesel.	www.niordc.ir .
Iraq	Regular gasoline with 84 RON	Central Organization for Statistics.
Jamaica	87 octane index gasoline containing 10% ethanol. Ex-refinery prices inclusive of taxes for pass-through calculations.	www.petrojam.com .
Jordan	90 RON gasoline, LPG in 12.5-kg cylinders.	www.jopetrol.jo .
Kazakhstan	92 RON gasoline. Country-wide averages of gasoline and diesel prices for the month of January.	www.stat.kz .
Kenya	91 RON gasoline. For Jan 2012, regulated maximum prices for gasoline, diesel, and kerosene in Nairobi and reported LPG prices in Mombasa.	www.erc.go.ke for gasoline, diesel, and kerosene, and news articles for LPG.
Lao PDR	91 RON gasoline, prices in Vientiane.	laostatefuel.com/ for gasoline and diesel, Vientiane Times for LPG.
Liberia	Maximum prices set by government.	Announcements by the Ministry of Commerce and Industry.
Madagascar	Gasoline with 95 RON (regular gasoline with 91 RON was phased out in 2011), LPG in 12.5-kg cylinders. Maximum prices for gasoline, diesel, and kerosene, and average LPG prices in Antananarivo.	www.omh.mg .

Country	Types of fuel and prices	Source
Malawi	Maximum prices set by government.	meramalawi.mw
Malaysia	95 RON gasoline in Jan 2012 (introduced in May 2009), 92 RON gasoline in Jan 2009 (discontinued in May 2009), diesel sulfur limited to 0.3 percent in Jan 2009 and to 0.05 percent in Jan 2012. LPG sold in 10-, 12-, and 14-kg cylinders has the same unit price.	www.caltex.com/my/
Mexico	87 octane index gasoline. LPG prices in Distrito Federal.	sie.energia.gob.mx.
Mongolia	92 RON gasoline.	News reports
Morocco	95 RON gasoline, diesel with 0.005 percent sulfur. LPG sold in 3-, 6-, and 12-kg cylinders has the same unit price.	News reports of government price announcements.
Mozambique	Maximum prices set by government.	www.portaldogoverno.gov.mz.
Namibia	93 RON gasoline. Prices in Walvis Bay averaged for the month of Jan.	www.mme.gov.na
Nepal	88 RON gasoline and LPG in 14.2-kg cylinders. Prices in Kathmandu.	www.nepaloil.com.np
Nicaragua	87/88 RON gasoline, LPG in 25-pound (11.4-kg) cylinders. Monthly averages of weekly price surveys conducted at 74 service stations in Managua for gasoline, diesel, and kerosene, and monthly averages of weekly official price ceilings in Managua for LPG.	www.ine.gob.ni
Niger	91 RON gasoline	www.sonidep.net
Nigeria	90 RON gasoline. Price of subsidized kerosene as supplied by the Nigerian National Petroleum Corporation.	www.pppra-nigeria.org
Pakistan	87 RON gasoline. For figures 9, 10, and 13, Islamabad-wide average retail prices notified by oil companies. For pass-through calculations and figure 11, gasoline, diesel and kerosene retail sale prices posted on the web site of Pakistan State Oil and LPG prices in Karachi.	www.ogra.org.pk, www.psopk.com
Panama	91 RON gasoline, LPG in 25-pound (11.4-kg) cylinders. Maximum retail price of LPG in Panama City.	www.autoridaddelconsumidor.gob.pa.
Peru	90 RON gasoline containing ethanol, LPG in 10-kg cylinders. Lima-wide, monthly average prices.	www.osinerg.gob.pe.
Philippines	93 RON gasoline, LPG in 11-kg cylinders. Retail prices in Manila averaged over Jan and over all companies.	www.doe.gov.ph.
Russian Federation	92 RON gasoline. Moscow prices.	www.mfa.ru.
Rwanda	95 RON gasoline. Monthly average prices.	www.minicom.gov.rw
Senegal	87 RON regular gasoline, LPG in 6-kg cylinders. Retail prices averaged over the month of Jan.	www.eltonoil.com for gasoline, diesel, and kerosene www.total-senegal.com for LPG.
South Africa	93 RON gasoline, diesel with 0.05 percent sulfur. Inland maximum retail prices for gasoline, diesel, and kerosene, and maximum retail LPG prices in zone 9C, which includes Gauteng (which is inland and includes Johannesburg and Pretoria). For pass-through coefficients, LPG prices are maximum refinery gate prices because maximum retail prices for Jan 2009 are not available.	www.energy.gov.za.

Country	Types of fuel and prices	Source
Sri Lanka	90 RON gasoline, LPG in 12.5-kg cylinders in Colombo. For figure 10, super diesel with 0.05 percent sulfur. For pass-through coefficients, auto diesel with 0.3 percent sulfur.	www.ceypetco.gov.lk . litrogas.com for LPG.
Syrian Arab Rep.	90 RON gasoline. LPG price averaged over the month of Jan 2012.	News articles.
Tajikistan	92 RON gasoline	World Food Program price survey.
Tanzania	Maximum retail prices in Dar es Salaam.	www.ewura.com
Thailand	91 RON gasoline, diesel with mandatory 5 percent biodiesel in Jan 2012, LPG for residential users. Weighted-average monthly prices in Bangkok for all fuels.	www.eppo.go.th/info/index_prices.html .
Togo	LPG in 12.5-kg cylinders. All official prices.	World Bank office in Lomé.
Tunisia	95 RON gasoline, diesel with 0.2 percent in figure 10, diesel with 0.005 percent sulfur (Euro 3) for pass-through calculations, LPG in 13-kg cylinders. Prices in Jan 2009 are those revised on Jan 16.	Announcements by the Ministry of Industry and Technology.
Turkey	95 RON gasoline, LPG in 12-kg cylinders. Prices are in Ankara, averaged over the month over all retailers reported.	http://gm.pogas.com.tr/pompafiyat/pompafiyatgrid.aspx . http://lpg.epdk.org.tr/fiyatlar.aspx .
Uganda	LPG in 13-kg cylinders. Prices in Kampala, not averaged over the month.	News reports.
Uruguay	95 RON gasoline with an octane index of 88 (similar to U.S. regular gasoline), diesel with a maximum of 0.7% sulfur. Although diesel with a maximum of 0.05% sulfur is increasingly available, its sale is still restricted and it is expensive.	www.ancap.com.uy .
Venezuela, RB	91 RON gasoline, LPG in 10-kg cylinders.	News reports.
Vietnam	92 RON gasoline, diesel with 0.25 percent sulfur in area 1, LPG in 12-kg cylinders.	www.petrolimex.com.vn News reports for LPG.
Yemen, Rep.	85 RON regular gasoline in Jan 2009, 92 RON super gasoline in Jan 2012. The official price of regular gasoline was 75 rial in Jan 2012, but regular gasoline had been withdrawn from the market, leaving only super gasoline. LPG in 12.5-kg cylinders.	World Bank office in Sana'a.
Zambia	91 RON gasoline. Maximum prices in Lusaka in 2009, uniform country-wide maximum prices in 2012.	www.erb.org.zm .
Canada	87 octane index gasoline.	www.nrcan.gc.ca .
France	95 RON gasoline.	www.iea.org/stats/surveys/mps.pdf .
Germany	95 RON gasoline.	www.iea.org/stats/surveys/mps.pdf .
Italy	95 RON gasoline.	www.iea.org/stats/surveys/mps.pdf .
Japan	90 RON gasoline.	http://oil-info.iecej.or.jp/price/price.html .
Spain	95 RON gasoline.	www.iea.org/stats/surveys/mps.pdf .
United Kingdom	95 RON gasoline.	www.iea.org/stats/surveys/mps.pdf .
United States	87 index gasoline.	www.eia.gov .

Notes: The research octane number represents the ability of gasoline to resist auto-ignition, or knocking, under city (as opposed to highway) driving conditions. The octane index is the average of research and motor octane numbers (motor octane being the ability of gasoline to resist auto-ignition, or knocking, under highway driving conditions). An octane index of 87 in the United States is equivalent to about 91–92 RON.

The ratio of retail kerosene to diesel prices in each country in January 2012 is shown in figure A2.1. The fuel pricing policy in each country is described briefly in table A2.2.

Figure A2.1: Ratio of kerosene prices to diesel prices in January 2012

Sources: Table A2.1 and author's calculations.

Table A2.2: Fuel pricing policy

Country	Policy
Angola	Fuel prices are uniform in the country, controlled by government, and frozen for years at a time.
Argentina	Prices of LPG sold in 10-, 12-, and 15-kg cylinders have been frozen for years. Government influences other petroleum fuel prices and keeps them low through various means, including a price freeze for gasoline and diesel in early 2011.
Bangladesh	Fuel prices are controlled by government and not adjusted regularly.
Bolivia	Fuel prices are uniform and controlled by government and infrequently adjusted.
Brazil	Fuel prices deregulated, but Petrobras has maintained constant ex-refinery prices for months or even years on end. For example, the country-averaged producer price of LPG has been frozen since 2004. Producer prices of diesel in 2012 have been lower than those in January 2009, and similarly producer prices of ethanol-free gasoline have been lower, although by a much smaller margin compared to diesel.
Cambodia	Fuel prices deregulated.
Cameroon	Fuel prices controlled by government and adjusted infrequently. Fuel prices frozen between Jan 2009 and Jan 2012.
Chile	Chile set up a price stabilization fund in 1991 in response to the Persian Gulf War. A second stabilization fund was set up in 2005 and lasted until June 2010. These two have since been replaced by a price smoothing mechanism established by Law 20,493 enacted in Feb 2011. This new approach dampens the impact of price volatility of four automotive fuels—gasoline, diesel, autogas (automotive LPG), and compressed natural gas—through a variable component that is subtracted or added to the base component of the specific tax on the fuel. This tax credit is determined by the price difference between import parity and the upper or lower band of reference prices. The price band is set to $\pm 12.5\%$ of the target price. The precise mechanism for smoothing (averaging period) has been modified since Feb 2011, and hedging options on futures contracts will be included in the near future.
China	A new mechanism introduced in Jan 2009 bases fuel prices on a 22-day moving average of crude oil prices. When the average is below US\$80 a barrel, prices move relatively freely and refiners are expected to earn “normal” margins. Between US\$80 and US\$130 a barrel domestic prices are responsive but refiners no longer make a profit. Above US\$130, tax measures are used to keep domestic prices low. In practice, fuel price adjustments have lagged the world price movement, and refiners have suffered large losses.
Colombia	Gasoline and diesel prices are subsidized by a price stabilization fund established in 2008. Price setting is at the discretion of government.
Costa Rica	The regulatory authority adjusts fuel prices, uniform in the country, once a month according to a formula. LPG prices are independent of cylinder size. The price-setting mechanism formally includes citizen participation whereby objections can be lodged and considered by the regulatory authority.
Côte d’Ivoire	Fuel prices are subject to ceilings, uniform throughout the country for gasoline, diesel, and kerosene. LPG prices have been frozen since 2008, and other fuel prices since April 2010. LPG prices set by the government are meant to be maximum prices, but often they represent minimum prices on the market.
Dominican Republic	Official prices are published every week according to a formula. By regulation, maximum prices for LPG must be the same for residential, commercial, and industrial consumers.
Egypt, Arab Rep.	Fuel prices are uniform in the country, controlled by government, and frozen for years at a time, including between Jan 2009 and Jan 2012.
El Salvador	The Ministry of Economy announces maximum LPG prices for four points in the supply chain every month. Legislation passed in May 2011 waived gasoline’s contribution to a stabilization fund (Fondo de Estabilización y Fomento Económico) in the second half of 2011 to lower prices.
Ethiopia	Government stopped the policy of subsidizing petroleum fuels in 2008 and set domestic prices higher than import costs beginning in Oct 2008 to repay the debt accumulated in the

Country	Policy
	Oil Stabilization Fund.
Gabon	Fuel prices are controlled by government, subsidized, and adjusted infrequently. The price of kerosene has been frozen for years.
Ghana	Fuel prices are controlled by government and have been infrequently adjusted since 2008. No price adjustments were made for any fuel in 2010, and the kerosene price has been frozen since Oct 2009. The gasoline, diesel, and LPG prices were adjusted twice in 2011. Since then, there has been only one price adjustment: price reduction in Feb 2012. In addition, the set ex-refinery price of LPG has been markedly lower than the import-parity cost.
Guatemala	Fuel prices deregulated.
Guinea-Bissau	The increases in world prices were not passed through to consumers in 2008–2010 but government has since been adjusting fuel prices monthly, aiming at full pass through. Raising the import reference price for diesel further is part of the 2012 budget. There is a duty-free category, the volume of which government is trying to reduce.
Honduras	Government adjusts fuel prices every week. LPG for household use is subsidized.
India	Government sets and heavily subsidizes the prices of LPG and kerosene for household use. Although gasoline prices were deregulated in Jun 2010, government retains the right to intervene. Government controls the price of diesel.
Indonesia	Prices of one grade of gasoline, one grade of diesel, and LPG sold in 3-kg cylinders are controlled and heavily subsidized. The kerosene subsidy is being gradually phased out following the kerosene-to-LPG conversion program in which the coverage of areas where subsidized kerosene is being sold will be diminished to zero over time. The last price adjustments for the subsidized gasoline and diesel were made in Jan 2009, when their prices were reduced. The price of subsidized LPG has been frozen for years. The price of LPG sold in larger-size cylinders, although much higher, is subsidized by Pertamina, the national oil company, but not by government.
Iran, Islamic Rep.	Fuel prices are controlled and subsidized by government. Government launched a subsidy reform plan in Dec 2010, and plans to eliminate subsidies over several years. Prices before Dec 2010 were 1,000 rials per liter for regular gasoline, 1,500 rials for premium gasoline, and 165 rials for diesel. After the price increase, regular gasoline has been at 1,000 rials per liter for government vehicles and vehicles used mostly in industrial and agricultural sectors such as vans, rationed amounts at 4,000 rials for domestically manufactured vehicles with an engine size smaller than 2 liters, and 7,000 rials for the rest. Premium gasoline is available only at 8,000 rials per liter. Diesel is now available at 1,500 rials for use in public transportation, industrial, and production sectors, and 3,500 rials per liter for the rest.
Iraq	Fuel prices are uniform throughout the country, controlled by government, and seldom adjusted.
Jamaica	Although petroleum product prices are deregulated in Jamaica, ex-refinery prices continue to be fixed based on import parity prices. The current pricing mechanism is being administered by Petrojam.
Jordan	Fuel prices are controlled and infrequently adjusted. Government removed subsidies from all fuels except LPG in 2008, but has re-introduced subsidies since. Gasoline, diesel, and kerosene prices were not adjusted between Feb 2011 and May 2012. Although gasoline and diesel prices have been increased since, the price of kerosene remains frozen. The price of LPG sold in 12.5-kg cylinders has been frozen for years, except for four weeks between Jan 16 and Feb 13, 2009, when the price was lowered to JD 6.25.
Kazakhstan	Government sets ceilings on retail prices and influences fuel prices through export bans, historically for about six months at a time but more recently year round.
Kenya	Government in Dec 2010 began setting maximum retail prices every month for gasoline, diesel, and kerosene.
Lao PDR	Fuel prices deregulated except LPG. LPG prices are adjusted infrequently.

Country	Policy
Liberia	Government sets maximum prices for gasoline, diesel, and kerosene.
Madagascar	Government sets maximum prices for gasoline, diesel, and kerosene every month. There is a budget line for subsidies for regular gasoline, diesel, and kerosene.
Malawi	Automatic price adjustment mechanism suspended in 2004 and resumed in Jun 2012. Government sets maximum prices, uniform throughout the country.
Malaysia	Subsidy for 97 RON gasoline eliminated in Jul 2010, other fuels subsidized. Prices of 95 RON gasoline and diesel frozen since Dec 2010.
Mexico	Special tax on production and service is adjusted to smooth prices, negative since Jun 2009 for gasoline and since Jul 2009 for diesel. LPG pricing deviates from import parity to smooth prices.
Mongolia	Fuel prices deregulated, but in Jan 2012 a price control council was established to stabilize the prices of gasoline, food, and public transport fares .
Morocco	Government controls and subsidizes fuel prices and adjusts them infrequently. LPG price frozen since 1995, and other fuel prices between 2008 and Jun 2012.
Mozambique	Government sets maximum prices, providing subsidies in recent years. Fuel prices were adjusted only twice in 2011.
Namibia	Prices are regulated by a 1990 act, and gasoline and diesel prices by location are announced once a month.
Nepal	Government controls and subsidizes the prices of diesel and LPG, and at times kerosene. Prices of kerosene and diesel have been equalized since Nov 2008. Kerosene, but not diesel, is exempt from a value-added tax of 13 percent, a road maintenance cess of Rs 2 per liter, and a pollution charge of Rs 0.5 per liter.
Nicaragua	Prices deregulated in 1999 except LPG, for which maximum prices are set by location.
Niger	Uniform prices throughout the country since Aug 2001. Beginning in Jan 2012, gasoline and diesel prices are set by a ministerial decree. Prices are frozen for months at a time.
Nigeria	Gasoline prices are uniform, controlled by government, and only infrequently adjusted. The price of kerosene for household use was deregulated in 2009 but continues to be sold at a heavily subsidized price by the Nigerian National Petroleum Corporation. Diesel prices have been deregulated for years.
Pakistan	Ex-depot prices of automotive diesel have been deregulated since Jun 2002. Government was setting ceilings for ex-depot prices of other fuels based on an import-parity formula until Jun 2011, when these prices were also deregulated except kerosene. For LPG, government sets ceilings for ex-refinery or ex-processing plant prices of domestically produced LPG but not imported LPG.
Panama	Government sets maximum selling prices for gasoline and diesel every 14 days. The price of LPG sold in 25-pound (11.4-kg) cylinder has been subsidized and frozen since 1992.
Peru	Government publishes reference fuel prices every week and adjusts prices within a price band, transferring funds into and out of the stabilization fund. Stabilization is not intended to result in fuel price subsidies, but it has. After a large budgetary transfer to the fund, another emergency decree was issued in April 2010, requiring the regulatory agency to adjust price bands every two months.
Philippines	Fuel prices are deregulated, although government has negotiated voluntary diesel price discounts with oil companies for transport operators.
Russian Federation	Government uses export tariffs on petroleum products to influence domestic fuel prices. For example, faced with gasoline shortages in the domestic market, government increased gasoline export tariff to US\$408 per tonne in May 2011, a level high enough to act as a de facto export ban.
Rwanda	Government tries to maintain constant prices for at least three months at a time.
Senegal	Government subsidizes fuel prices and adjusts them every four weeks.
South Africa	Government sets maximum retail prices once a month for gasoline, diesel, kerosene, and LPG.

Country	Policy
Sri Lanka	Government controls the prices of gasoline, diesel, and kerosene sold by the Ceylon Petroleum Corporation, which controls two-thirds of the domestic market and which is therefore the price setter. The controlled prices are not regularly adjusted and are often subsidized. An LPG price increase by any party requires government approval.
Syrian Arab Rep.	Fuel prices are controlled and subsidized by government and infrequently adjusted.
Tajikistan	Fuel prices deregulated, but the prices offered by Gazpromneft Tajikistan with a 52% are subject to approval by the antimonopoly agency.
Tanzania	The downstream petroleum sector was deregulated in 2000, but regulations published in Jan 2009 require indicative and maximum prices to be issued. Rules and pricing formulae were amended in Jul 2011. Currently ceilings are set for wholesale (one price for each fuel) and retail (by region) prices of gasoline, diesel, and kerosene.
Thailand	The Oil Fund is used to cross-subsidize fuel prices, and in addition the ex-refinery price of LPG is heavily subsidized, resulting in a large subsidy burden. Government stopped disclosing information on the balance of the Oil Fund in 2011.
Togo	Fuel prices are controlled and subsidized by government. A decree issued in Nov 2010 requires automatic adjustments, but prices were infrequently adjusted until mid-2012.
Tunisia	Fuel prices are controlled and subsidized by government and infrequently adjusted. The prices of gasoline, diesel, and fuel oil were frozen between Dec 2010 and Sep 2012. The kerosene price has not been adjusted since Dec 2010. The price of LPG for household use was lowered in Jan 2011 and has not been adjusted since.
Turkey	Fuel prices deregulated.
Uganda	Fuel prices deregulated.
Uruguay	Government sets maximum prices for gasoline, diesel, and kerosene from time to time. LPG prices are independent of cylinder size.
Venezuela, RB	Fuel prices are subsidized and controlled by government, and frozen for 13 years. Fuel prices along the border are set higher to discourage out-smuggling.
Vietnam	Vietnam has a price stabilization fund, and every liter sold contributes 300 dong (a little over 1 U.S. cent). Until recently, fuel prices were set by government with irregular adjustments. Since mid-2012, price adjustments have been more market-based, with wholesalers allowed to adjust prices (although still subject to final government approval). Where price adjustments exceeding 7 percent are considered necessary, government is to consider other options to stabilize prices, such as reducing import tariffs and drawing down on the stabilization fund.
Yemen, Rep.	Fuel prices are controlled by government and infrequently adjusted. In 2011, regular gasoline was withdrawn from the market, leaving only super gasoline priced at 175 rial. In Apr 2012, super gasoline was withdrawn from the market and regular gasoline was re-introduced at 125 rial.
Zambia	Uniform pump pricing mechanism implemented in Sep 2010. Uniform prices are for gasoline, diesel, and kerosene sold at filling stations only. Wholesale prices are set according to a cost-plus formula for the refinery, which is protected by a 25-percent import tariff.
Canada	Fuel prices deregulated.
France	Fuel prices deregulated.
Germany	Fuel prices deregulated.
Italy	Fuel prices deregulated.
Japan	Fuel prices deregulated.
Spain	Fuel prices deregulated.
United Kingdom	Fuel prices deregulated.
United States	Fuel prices deregulated.

Sources: Government Web sites and announcements in the media.

To compute pass-through coefficients, changes in the FOB prices of petroleum products on the world market are compared to the changes in domestic retail prices. For gasoline, diesel, and kerosene, monthly averages of FOB spot prices in four major refining centers—the U.S. Gulf Coast, Northwest Europe, Persian Gulf, and Singapore—as reported by Platts are taken as reference prices. To the extent possible, the reference and country fuel types are matched. However, the U.S. Gulf Coast prices cited for diesel are for ultralow-sulfur diesel, with sulfur levels much lower than in most developing countries. The highest sulfur level cited for diesel in Northwest Europe is 0.1 percent, also markedly lower than those in some developing countries. Similarly, gasoline available on the U.S. Gulf Coast and Northwest Europe is also the ultralow sulfur grade. In the Persian Gulf, the only grade of gasoline cited is that with 95 RON. While these lead to reference FOB price levels being over-estimated, the effects of quality differences on temporal price differences are expected to be smaller, affecting pass-through calculations less than if price levels themselves were being compared.

LPG prices are taken from three markets: Persian Gulf (Saudi Aramco contract prices), North Africa (Sonatrach contract prices), and Mont Belvieu, Texas (daily spot prices averaged over the month). LPG consists of propane, n-butane, and iso-butane. Only in Mont Belvieu are the prices of n-butane and iso-butane separately reported, whereas Saudi Aramco and Sonatrach announce the price of butane. Because the exact composition of LPG varies from location to location, a 50/50 mixture of propane and butane (n-butane in the case of markets referenced to Mont Belvieu) is assumed, unless a more specific composition is known.

Kerosene as a cooking fuel is virtually non-existent in developed countries, and hence kerosene prices are not reported, except in Japan where kerosene is used as a heating fuel. While LPG is used as a cooking fuel by some households lacking access to natural gas in developed countries, the prices of LPG sold for household (in contrast to automotive) use are not readily available and again not reported, except in Japan and the United States.

Table A2.3 provides information on reference FOB prices, and table A2.4 tabulates pass-through coefficients for each country. Among countries without price control, Uganda stands out with one with low pass-through coefficients. The primary reason appears to be that there were serious fuel shortages in Uganda in January 2009, with many filling stations running out of gasoline altogether during the first few days of the month, thereby pushing up prices markedly. Kerosene and LPG shortages were also reported in mid-January 2009. Very high prices in January 2009 would result in relatively low pass-through coefficients. Moreover, there is no database of retail prices for any location in Uganda, so that monthly average prices could not be computed. This study takes prices reported by newspapers, compromising data accuracy.

Table A2.3: Reference prices

Country	Reference fuel type and location
Angola	Same as South Africa.
Argentina	U.S. Gulf coast pipeline spot prices of 93 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and monthly average spot prices of 50/50 propane/n-butane at Mont Belvieu for LPG.
Bangladesh	Spot prices in Singapore of 95 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Bolivia	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and the monthly average spot prices of 50/50 propane/n-butane at Mont Belvieu for LPG
Brazil	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel, and the monthly average spot prices of 50/50 propane/n-butane at Mont Belvieu for LPG.
Cambodia	Spot prices in Singapore of 92 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Cameroon	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and Sonatrach (Algeria) contract prices of 50/50 propane/butane.
Chile	U.S. Gulf Coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and monthly average spot prices of 50/50 propane/n-butane at Mont Belvieu for LPG.
China	Spot prices in Singapore of 92 RON gasoline and diesel with 0.005 percent sulfur, and Saudi Aramco contract prices of 50/50 propane/butane.
Colombia	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and the monthly average spot price of propane at Mont Belvieu for LPG.
Costa Rica	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and monthly average spot prices of 60/40 propane/n-butane at Mont Belvieu for LPG.
Côte d'Ivoire	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and Sonatrach (Algeria) contract prices of 50/50 propane/butane for LPG.
Dominican Republic	U.S. Gulf Coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and monthly average spot prices of 30/70 propane/n-butane at Mont Belvieu for LPG.
Egypt, Arab Rep.	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and Sonatrach (Algeria) contract prices of 50/50 propane/butane for LPG.
El Salvador	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel, and monthly average spot prices of 60/40 propane/n-butane at Mont Belvieu for LPG.
Ethiopia	Spot FOB prices in Northwest Europe of cargoes of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and Sonatrach (Algeria) contract prices of 50/50 propane/butane for LPG.
Gabon	Spot FOB prices in Northwest Europe of cargoes of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and the monthly Sonatrach (Algeria) contract price of butane for LPG.
Ghana	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and Sonatrach (Algeria) contract prices of 30/70 propane/butane for LPG.
Guatemala	U.S. Gulf Coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and monthly average spot prices of 70/30 propane/n-butane at Mont Belvieu for LPG.

Country	Reference fuel type and location
Guinea-Bissau	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline and diesel with 0.1 percent sulfur.
Honduras	U.S. Gulf Coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and kerosene; and monthly average spot prices of 60/40 propane/n-butane at Mont Belvieu for LPG.
India	Spot prices in the Persian Gulf of 95 RON gasoline, diesel with 0.05 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Indonesia	Spot prices in Singapore of 92 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Iran, Islamic Rep.	Spot prices in the Persian Gulf of 95 RON gasoline and diesel with 0.25 percent sulfur.
Iraq	Spot prices in the Persian Gulf of 95 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Jamaica	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and the monthly average spot price of propane at Mont Belvieu for LPG.
Jordan	Spot prices in the Persian Gulf of 95 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 30/70 propane/butane for LPG.
Kazakhstan	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline and diesel with 0.1 percent sulfur.
Kenya	Spot prices in the Persian Gulf of 95 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 20/80 propane/butane for LPG.
Lao PDR	Spot prices in Singapore of 92 RON gasoline and diesel with 0.25 percent sulfur, and Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Liberia	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene.
Madagascar	Same as South Africa.
Malawi	Same as South Africa.
Malaysia	Spot prices in Singapore of 92 RON gasoline (2009), 95 RON gasoline (2012), diesel with 0.25 percent sulfur (2009), and diesel with 0.05 percent sulfur (2012), and Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Mexico	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel, and monthly average spot prices of 60/40 propane/n-butane at Mont Belvieu for LPG.
Mongolia	Spot prices in Singapore of 92 RON gasoline and diesel with 0.25 percent sulfur.
Morocco	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline, diesel with 0.001 percent sulfur, and jet kerosene; and the monthly Sonatrach (Algeria) contract price of butane for LPG.
Mozambique	Same as South Africa.
Namibia	Same as South Africa.
Nepal	Same as India.
Nicaragua	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline, ultra-low sulfur diesel, and jet kerosene; and monthly average spot prices of 60/40 propane/n-butane at Mont Belvieu for LPG.
Niger	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and monthly Sonatrach (Algeria) contract prices of 50/50 propane/butane for LPG.
Nigeria	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and monthly Sonatrach (Algeria) contract prices of 50/50 propane/butane for LPG.
Pakistan	Spot prices in the Persian Gulf of 95 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 40/60 propane/butane for LPG.
Panama	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur

Country	Reference fuel type and location
	diesel, and the monthly average spot price of n-butane at Mont Belvieu for LPG.
Peru	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel, and monthly average spot prices of 50/50 propane/n-butane at Mont Belvieu for LPG.
Philippines	Spot prices in Singapore of 92 RON gasoline, diesel with 0.05 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG
Russian Federation	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline and diesel with 0.1 percent sulfur.
Rwanda	Same as Kenya
Senegal	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and the monthly Sonatrach (Algeria) contract price of butane for LPG.
South Africa	Average spot prices of 92 RON gasoline in Northwest Europe and Singapore, average spot prices of diesel with 0.1 percent sulfur in Northwest Europe and 0.05 percent in the Persian Gulf, average spot prices of jet kerosene in Northwest Europe and kerosene in the Persian Gulf, and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Sri Lanka	Spot prices in Singapore of 92 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 30/70 propane/butane for LPG.
Syrian Arab Rep.	Spot prices in Singapore of 92 RON gasoline and diesel with 0.25 percent sulfur, and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG
Tajikistan	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline and diesel with 0.1 percent sulfur.
Tanzania	Same as Kenya
Thailand	Spot prices in Singapore of 92 RON gasoline, diesel with 0.05 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 40/60 propane/butane for LPG.
Togo	Spot FOB cargo prices in Northwest Europe of 92 RON gasoline, diesel with 0.1 percent sulfur, and jet kerosene; and monthly Sonatrach (Algeria) contract prices of 50/50 propane/butane for LPG.
Tunisia	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline, diesel with 0.001 percent sulfur, and jet kerosene; and the monthly Sonatrach (Algeria) contract price of butane for LPG.
Turkey	Spot prices in the Persian Gulf of 95 RON gasoline, diesel with 0.001 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 70/30 propane/butane for LPG
Uganda	Same as Kenya.
Uruguay	U.S. Gulf coast pipeline spot prices of 89 octane index gasoline, ultra-low sulfur diesel, and jet kerosene.
Venezuela, RB	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel, and monthly average spot prices of 50/50 propane/n-butane at Mont Belvieu for LPG.
Vietnam	Spot prices in Singapore of 92 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Yemen, Rep.	Spot prices in Singapore of 92 RON gasoline, diesel with 0.25 percent sulfur, and kerosene; and Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Zambia	Same as South Africa.
Canada	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel.
France	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline and diesel with 0.001 percent sulfur.
Germany	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline and diesel with 0.001 percent sulfur.

Country	Reference fuel type and location
Italy	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline and diesel with 0.001 percent sulfur.
Japan	Spot prices in Singapore of 92 RON gasoline, diesel with 0.001 percent sulfur, and kerosene; and monthly Saudi Aramco contract prices of 50/50 propane/butane for LPG.
Spain	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline and diesel with 0.001 percent sulfur.
United Kingdom	Spot FOB cargo prices in Northwest Europe of 95 RON gasoline and diesel with 0.001 percent sulfur.
United States	U.S. Gulf coast pipeline spot prices of 87 octane index gasoline and ultra-low sulfur diesel, and the monthly average spot price of propane at Mont Belvieu for LPG.

Sources: Platts 2009 and 2012.

Notes: The research octane number represents the ability of gasoline to resist auto-ignition, or knocking, under city (as opposed to highway) driving conditions. The octane index is the average of research and motor octane numbers (motor octane being the ability of gasoline to resist auto-ignition, or knocking, under highway driving conditions). An octane index of 87 in the United States is equivalent to about 91–92 RON.

Table A2.4: Pass-through coefficients (percent), January 2009–January 2012

Country	Gasoline	Diesel	Kerosene	LPG
Angola	22	8	-17	-21
Argentina	90	101	78	-24
Bangladesh	2	21	22	103
Bolivia	3	2	1	1
Brazil	103	51	—	146
Cambodia	127	116	123	91
Cameroon	-6	-6	-4	-4
Chile	198	123	84	203
China	95	98	—	71
Colombia	88	96	132	331
Costa Rica	103	83	62	150
Côte d'Ivoire	38	0	67	-3
Dominican Republic	137	130	122	151
Egypt, Arab Rep.	-6	-4	-4	-1
El Salvador	121	121	—	243
Ethiopia	100	90	69	129
Gabon	-9	4	-3	-9
Ghana	98	93	0	1
Guatemala	95	93	61	128
Guinea-Bissau	64	80	—	—
Honduras	117	108	105	166
India	79	30	25	22
Indonesia	21	21	12	18
Iran, Islamic Rep.	57	68	—	—
Iraq	10	-10	39	7
Jamaica	127	121	134	183
Jordan	85	52	54	6
Kazakhstan	34	27	—	—
Kenya	94	84	—	—
Lao PDR	126	117	—	142

Country	Gasoline	Diesel	Kerosene	LPG
Liberia	94	78	75	—
Madagascar	18	2	-2	117
Malawi	115	122	-25	—
Malaysia	28	23	—	24
Mexico	44	54	—	45
Mongolia	100	66	—	—
Morocco	-34	-90	—	-1
Mozambique	179	61	63	87
Namibia	126	107	—	—
Nepal	66	49	49	31
Nicaragua	105	109	78	116
Niger	28	6	31	—
Nigeria	69	117	-6	179
Pakistan	59	86	80	97
Panama	103	96	—	0
Peru	99	104	—	64
Philippines	122	89	95	130
Russian Federation	52	63	—	—
Rwanda	53	54	—	—
Senegal	127	142	109	71
South Africa	161	149	115	121
Sri Lanka	33	28	44	88
Syrian Arab Rep.	8	-62	—	1
Tajikistan	155	147	—	—
Tanzania	61	36	134	—
Thailand	124	98	21	11
Togo	37	58	—	—
Tunisia	-4	-2	4	-6
Turkey	126	117	89	135
Uganda	25	60	38	57
Uruguay	165	158	119	120
Venezuela, RB	-4	-3	—	-22
Vietnam	78	74	63	46
Yemen, Rep.	116	14	14	80
Zambia	97	92	57	—
Canada	130	124	—	—
France	124	104	—	—
Germany	123	102	—	—
Italy	163	150	—	—
Japan	150	111	95	138
Spain	141	116	—	—
United Kingdom	184	144	—	—
United States	100	95	—	98

Source: Author's calculations.

Notes: — = not available or not applicable. Reporting to three figures does not imply that pass-through coefficients exceeding 100 percent have three significant figures.

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