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Black Hole or Black Gold?

The Impact of Oil and Gas Prices on Indonesia's Public Finances

Cut Dian R.D. Agustina
Javier Arze del Granado
Tim Bulman
Wolfgang Fengler
Mohamad Ikhsan

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Abstract

Indonesia's oil revenues and fuel subsidies dominate the nation's economic policy agenda. This paper estimates the impact of higher international oil prices on the Indonesian government's fiscal position in 2008 and beyond. It analyzes the interactions between government revenues and expenditures, as well as international oil prices, energy subsidies, and inter-governmental transfers. Looking at the impact of oil prices over US$100 per barrel, the paper presents five main findings. First, despite record high oil prices, the government's oil and gas revenues have been decreasing relative to non-oil and gas revenues since 2001. Second, fuel subsides will reach record levels in 2008 while electricity subsidies have been increasing even faster. Third, the paper finds that most of the fuel subsidy that directly benefits households goes to the richest 20 percent. Fourth, even at levels above US$100 per barrel, the government receives more revenues from oil and gas than it spends on energy subsidies. However, due to significant revenue-sharing with sub-national governments, high oil prices are net-negative for the central government, while they create fiscal windfalls for many regions. Finally, the oil sector's positive impact on Indonesia's public finances declines as oil prices rise, because subsidies and other expenditures outgrow oil and gas revenues.

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Cut Dian R.D. Agustina,[*] Javier Arze del Granado,[*]
Tim Bulman,[*] Wolfgang Fengler[*] and Mohamad Ikhsan[1]

[*] PREM unit, World Bank Office in Jakarta. Javier Arze del Granado is now affiliated with the International Monetary Fund.
[1] Senior Researcher at LPEM-FEUI and Associate Professor at University of Indonesia.

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1. INTRODUCTION

International crude oil prices have risen fourfold over the past five years. This has significantly impacted the fiscal position of many developing economies. Net energy-exporting economies have enjoyed significant growth in government revenues and hence fiscal space, as their governments' tax and non-tax incomes from energy production have expanded or government-owned energy producers have paid higher dividends. The challenge for these economies is to ensure that these funds are spent in ways that benefit public welfare. Meanwhile, other economies are suffering fiscal pressures due to rapidly expanding state-sponsored subsidies of energy products. Here, the challenge is to minimize macroeconomic instability arising from the growing drain on fiscal resources and the decline in purchasing power resulting from more costly oil, while mitigating the general instability emanating from volatile oil prices. A third group of economies allows world prices to fully pass into retail fuel prices, meaning rising oil prices are creating significant inflationary pressures domestically.

Indonesia's recent experience throws light on both the positive and negative impacts of higher oil prices on developing countries' budgets. In 2008 oil and gas will be a significant source of net income for the Indonesian public sector, although the central government's obligation to share oil and gas revenue with sub-national governments will see it run its largest ever oil and gas net deficit. On the revenue side, oil and gas revenues continue to provide a significant share of Indonesia's government revenue. Indonesia pioneered the use of production sharing oil and gas exploitation contracts, making non-tax oil and gas revenues especially important. Indonesia's oil production peaked over a decade ago, with inadequate investment in exploration reducing the number of new fields to replace the declining output from mature fields. The most recent indicators suggest production has troughed, and the sharp increases in oil prices over 2007 and the first half of 2008 are now lifting revenues from oil production. Section 2 details these trends.

Indonesia subsidizes the retail price of many fuels and electricity. These subsidies have hefty impacts on the government's budget, and on the surrounding political debates. Suharto's New Order regime inherited fuel subsidies in 1967, at first maintaining the subsidized prices in order to avoid social instability in the early years, then allowing them to expand significantly as government revenues surged on the back of global oil prices in the early 1970s. Subsequently, the subsidy regime waxed and waned with movements in international prices and Indonesia's fiscal space. This decade the government has experimented with a number of different subsidy regimes, including fixed local retail prices, linking retail prices to movements in world prices, and adjusting the mix of products subsidized. Recent increases in world crude oil prices have outpaced the government's attempts to bring local energy prices closer to market rates, with energy subsidies now comprising a very large proportion of expenditure. The central government now spends far more on maintaining constant prices on various energy products than it does on capital investment, or than it does on education, healthcare and law and order combined. This remains true even after the 28.7 percent average increase in subsidized fuel prices in May 2008. Section 3 discusses Indonesia's fuel subsidies in detail.

Finally, rising oil prices also eat away at the central government's budget through the sharing of central government revenues with regional governments. These transfers expanded significantly with Indonesia's 'big bang' decentralization of 2001. A combination of realized and projected natural resource revenues are shared directly and indirectly by the central government across sub-national governments and specifically with producing regions, and additional funds are transferred to the special autonomous provinces of Aceh and Papua. This appears as an expenditure item in the central government's budget, increasing its financing needs. However, since these transfers flow into sub-national governments' budgets they have no significant net effect on the consolidated fiscal position. These transfers also create an incentive for the central government to make unrealistically low projections of oil prices — and hence likely revenues, as section 4 explains.

Historically, oil and gas revenues have exceeded fuel subsidy expenditures and regional transfers, the exception being those years with large increases in international oil prices. Table 1 summarizes how these factors have come together over the past decade. It illustrates first the magnitude of oil and gas revenues, and then how these resources flow out of the central government's budget: first, in the form of retail fuel and electricity price subsidies; second, through the fraction of oil and gas revenues that are transferred to sub-national governments as shared revenues, with additional shares of oil & gas revenue flowing to some producing regions; and third, 26 percent of oil and gas revenues projected for each year (net of projected revenue sharing) are transferred to sub-national governments as a 'general allocation fund' (DAU) with some additional funds transferred to oil & gas- producing regions. The first two types of transfer operate *ex post*, with the expenditures reflecting the actual costs of the subsidies and the actual oil & gas receipts, respectively. The third type of transfer, the DAU, is determined *ex ante*. It depends on the oil & gas revenues projected when parliament passes the initial budget for the coming fiscal year. It does not adjust to reflect realized revenues.

Table 1. Central government oil and gas revenue and expenditure cash flows
US$ billion

	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Oil and gas revenues	10.3	10.2	8.6	9.4	12.2	14.3	22.0	18.5	26.0
less:									
Fuel subsidies	6.5	6.7	3.5	3.5	7.8	9.9	7.0	9.2	13.9
Electricity subsidy					0.3	0.4	3.3	3.6	6.6
National balance	3.8	3.5	5.1	5.9	4.2	4.0	11.7	5.7	5.4
less:									
DAU (26% of APBN projected net oil & gas revenue)	0.6	0.9	2.0	1.9	1.9	1.3	1.5	4.4	4.4
Oil and gas revenue sharing	1.5	1.5	1.2	1.5	1.7	2.8	3.1	2.6	3.6
Central government balance	1.1	0.2	2.1	2.3	1.4	-0.2	4.1	-1.3	-1.9
Memo items:									
IDR crude oil price	29	25	22	29	34	52	64	70	95
Oil lifting (thousand bpd)	1,405	1,273	1,320	1,092	1,072	999	1,000	899	927

* 2008 revised budget (APBN-P), except for the DAU allocation, which is based on the initial budget (APBN) for all years.

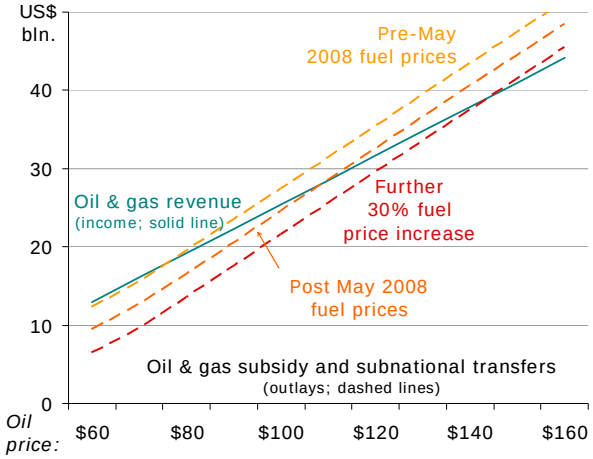
Source: World Bank calculations using Ministry of Finance data.

In 2007, oil production fell short of even the relatively low, initial targets. However, international oil prices were significantly above expectations and more than offset this shortfall by supporting oil and gas-related tax revenues. Tax revenues, which reflect profitability after production sharing, were slightly higher than the government had projected. This was more than offset by the shortfall in non-tax revenues, which largely reflect the government's production-sharing receipts. This shortfall was driven by movements in recoverable production costs and the distribution of production across different oil & gas fields with their differing production contracts. Lower non-tax revenues meant less revenue to transfer from the central government to producing regions. But higher oil prices meant higher energy subsidies — about 33 percent more than projected. Finally, the technical aspects (discussed above and in Section 4) of the inter-governmental revenue transfer arrangements under the DAU meant that these transfers remained at their initially budgeted levels despite the difference between realized oil & gas revenues and the initially budgeted amounts (Table 2).

Table 2: The fiscal impacts of higher oil prices and lower production in 2007						
		Projected		*Outcome*		*Change*
		Units	% GDP	Units	% GDP	%
Indonesian crude	US$/barrel	63.00		69.69		16.20%
Production	m barrel/day	0.950		0.899		-5.40%
Exchange rate	Rp/US$	9,050		9,130		0.90%
Government oil and gas revenues	Rp billion	181,134	4.8	168,784	4.3%	-7%
Tax	Rp billion	41,242	1.1	44,000	1.1%	7%
Non-tax	Rp billion	139,893	3.7	124,784	3.2%	-11%
Government energy subsidies	Rp billion	87,676	2.3	116,890	3.0%	33%
DAU (26% of APBN projected oil and gas revenue)	Rp billion	40,236	1.1	40,236	1.0%	0%
Oil and gas revenue sharing transfers to regions	Rp billion	26,382	0.7	23,394	0.6%	-11%
Oil and gas 'balance'	Rp billion	26,840	0.7	-11,736	-0.3%	-144%
Source: Ministry of Finance.						

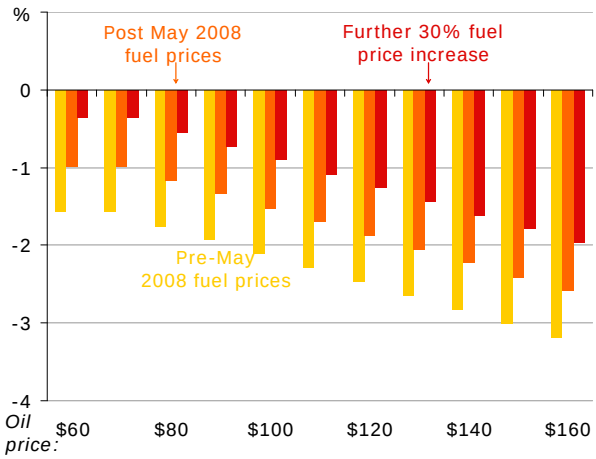
This analysis of recent oil and gas-related fiscal flows enables simulations of the likely impact of higher oil prices on Indonesia's public finances. Figure 1 and Figure 2 bring together the simulated estimates of the impacts of movements in oil and gas prices on revenues, expenditures on energy subsidies plus sub-national transfers, and the overall government deficit. Energy-related expenditures rise faster than revenues due to higher energy consumption. Even with the reduced fuel subsidies post-May 2008, the central government budget balance will become negative if oil prices stay substantially above US$ 100 per barrel (figure 1). Due to the more rapid increase of expenditures, the central government budget deficit increases with rising oil prices – and declines with falling prices (figure 2).

Figure 1. The impact of oil prices on Indonesia's revenues and expenditures *Billions of US dollars*



Source: World Bank staff estimations.

Figure 2. The impact of oil prices and energy subsidies on the central government budget balance *Percent of GDP*



Source: World Bank staff estimations.

This paper estimates the impact of higher international oil prices on the government's fiscal position in 2008 and beyond. It does this by describing the link between the government's revenues and expenditures, international oil prices, and domestic subsidized product prices and inter-governmental transfers. Section 2 overviews the process by which extracted oil and gas is converted into government revenue, and simulates the effects of an increase in international oil prices. It lays out the main

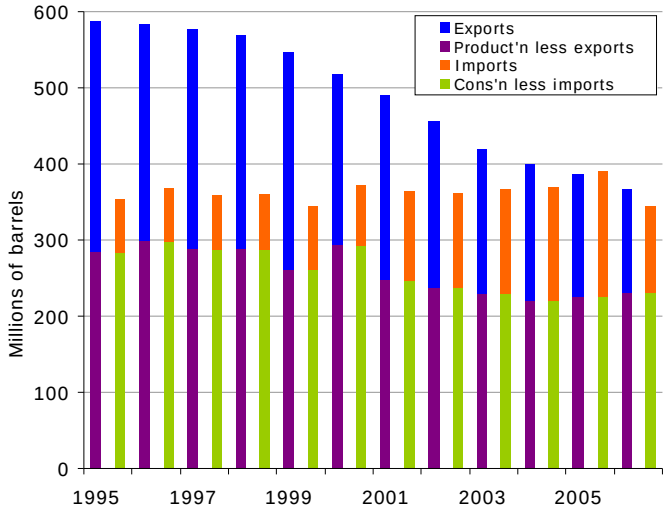
characteristics of the upstream oil production sector and outlines how private contractors' production is shared with the government, then proposes an approach to estimating how changes in international oil prices affect Indonesian national revenue. Section 3 focuses on the expenditure side of the budget, highlighting the main characteristics of current fuel price subsidy mechanisms. It examines the degree of pass-through of international crude oil prices to domestic petroleum product prices, and the effects of hypothetical domestic price changes on overall subsidy expenditures, accounting for consumers' response to those price changes. Section 4 looks at the central government's other oil and gas expenditure items, namely the transfers and revenue-sharing arrangements with sub-national governments.

2. Oil and Gas Revenue Trends

Despite unexpectedly high international crude oil prices, realized Indonesian government revenues from oil and gas production have consistently fallen below the government's budget projections. This disappointment largely stems from poor oil production. The older oilfields are generally more lucrative, with lower production costs and the chemical composition of the oil makes it relatively more valuable for international refiners. Production from these fields is now declining and, as they age, each barrel of oil costs more to extract. Offsetting this declining revenue stream has been higher gas production. However, in the current circumstances, gas production is less lucrative for the government given that many of the gas purchasing contracts have been agreed several years in advance at fixed prices which were substantially lower than they are today.

Indonesia is a net energy exporter. It also remains a net crude oil exporter, despite the one-third decline in production since 2000 — although it did become a net fuel and oil importer in 2003 as production and domestic refining capacity stagnated at a time when consumption grew rapidly. Over the first half of 2008, net gas exports approximately balanced net oil and oil product imports. Crude oil exports decreased from 85 percent of consumption in 1995 to 40 percent in 2006, mainly due to a lack of investment in exploration and declining production from maturing fields. At the same time, Indonesia also imports crude oil, as some of its refineries are not able to process domestic crudes for technical reasons. Meanwhile, petroleum product imports have increased significantly over the past decade, from 20 percent of total domestic consumption in 1995 to 46 percent in 2005. This follows limited growth in domestic refining capacity relative to product consumption, although the impact on government revenue of increasing use of overseas refineries to satisfy Indonesia's fuel consumption is minor relative to the movements in crude oil production and prices.

Figure 3. Declining crude oil production and exports



Source: Statistik Ekonomi Energi Indonesia 2006 and 2007

Proven oil reserves have stabilized over the past two years and now approach 13 years of 2007 production levels (Figure 4). Meanwhile, proven gas reserves have trended upwards since significant restatements in the late 1980s. Reserves have grown faster than production over the past 15 years, and would now cover 45 years of production at 2007 levels (Figure 5). These two pictures together suggest that gas production is likely to drive future growth in Indonesia's energy exports.

Figure 4. Oil reserves have stabilized

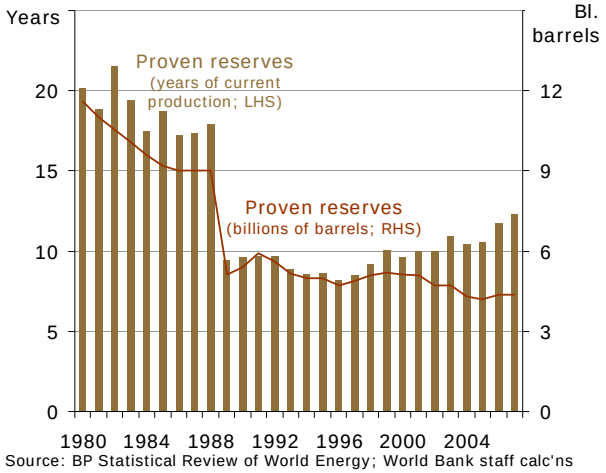
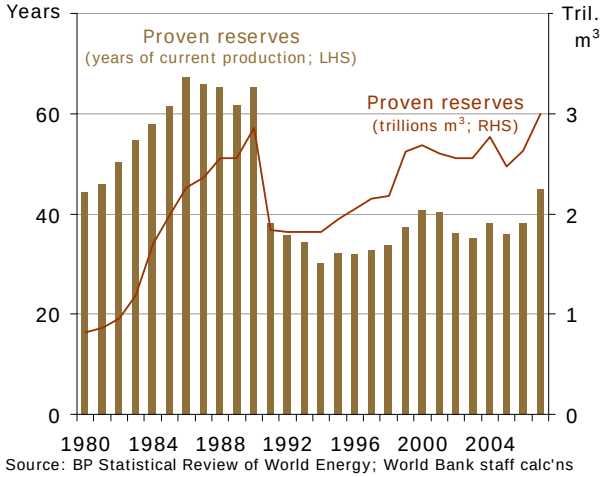


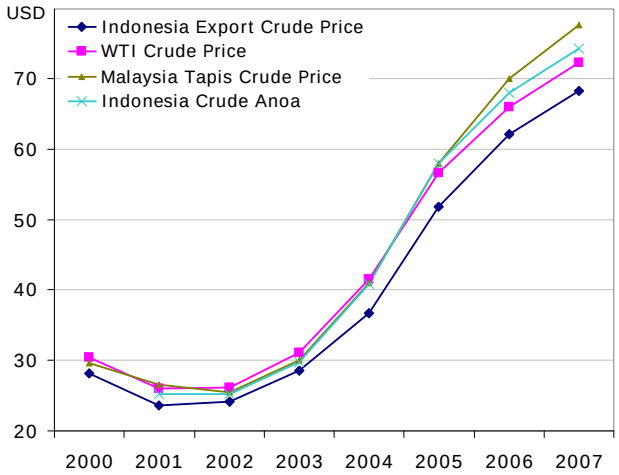
Figure 5. Gas reserves trending higher



The Indonesian Crude Price (ICP) is the oil price referred to in the government budget documents and related discussions. However, this single reference price masks the diversity of the various crude oils produced in Indonesia and the shift in the country's production towards lower-grade 'sour' crude oils. The margin between the price of Indonesia's overall crude oil exports and the international benchmark of West Texas Intermediate (WTI) has widened marginally this decade. However, prices of Malaysian Tapis crudes have risen significantly above WTI, while the equivalent Indonesian crudes have followed this trend of an increasing premium (Figure 6). These developments coincide with declining output and

exports of higher-valued, sweeter crudes, such as those from North Sumatra (Figure 7). For example, exports of Sumatran Light Crude have declined from over 170,000 barrels per day in 2000 to less than 39,000 in 2007.

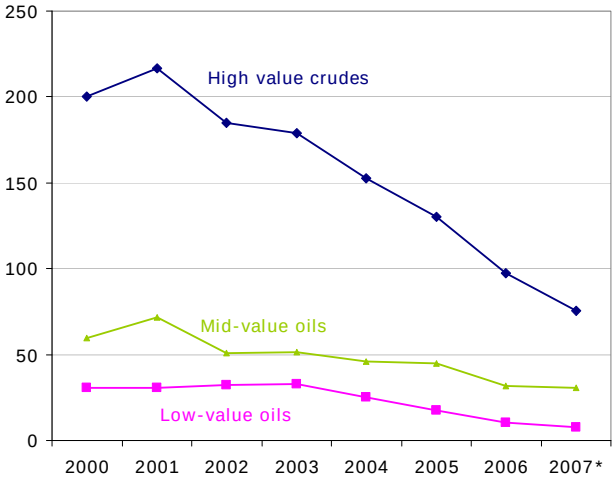
Figure 6. Prices of Asian sweet crude oils are drawing ahead of WTI, while the average price of Indonesia's oil exports lags



Source: World Bank staff calculations and DGMIGAS

Figure 7. High-value crude oils make up less of Indonesia's exports

Million barrels of selected crudes



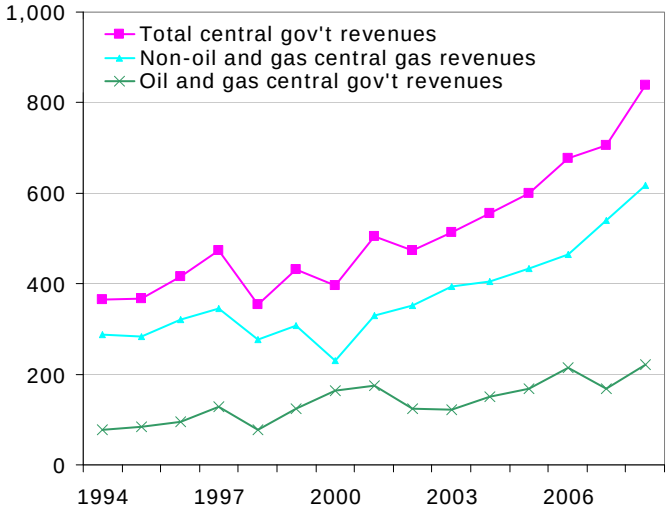
Note: The type of crude is determined by its average price per barrel in 2007. High-value oils recorded an average price above US$90; mid-value, US$80-89; and the price of low value oils was below US$80. These data do not fully enumerate Indonesia's oil exports.

Source: DGMIGAS; World Bank staff calculations

Indonesia's budget is becoming less dependent on oil and gas revenues, but these revenues remain highly important. With record prices in 2007, these revenues accounted for 23 percent of the total. Indeed, over a longer horizon oil and gas revenues have increased far less quickly than other sources in real terms (Figure 8). In 2007, total revenues and expenditures are estimated to have increased by 11.6 and 13.2 percent respectively, while the government projects 2008 revenues to grow by 7 percent, while expenditures are expected to increase by almost 11 percent (these figures are all nominal).

Oil and gas revenues flow to the government either as taxes or non tax revenues. Non-tax oil and gas revenues are far greater than oil and gas tax revenues (Table 3)**.** In the 2008 budget non-tax revenues contribute 16 percent of total government revenue, while tax revenues only account for 5.4 percent of total revenue. This difference has widened somewhat in recent years. Non-tax oil and gas revenues also represent the largest share in total natural resource revenues, accounting for 94 percent of the total. In turn, oil non-tax revenues were almost three times as large as gas non-tax revenues in 2007, although the difference is shrinking fast — non-tax oil revenues were almost four times as large as gas revenues as recently as 2006.

Figure 8. Stable oil and gas revenue while government non-oil and gas revenue grows faster



Note: Deflated by the implicit GDP deflator. Projected 2008 deflator growth of 12 percent.
Source: Ministry of Finance, various APBN data and reports, World Bank staff calculations.

Table 3. Oil and gas revenues relative to domestic revenues
Rupiah trillion

	%	2003	%	2006	%	2007	%	2008*	%
I. Domestic Revenue	**100%**	**340.9**	**100%**	**636.2**	**100%**	**706.1**	**100%**	**892.0**	**100%**
1. Tax revenues	**56%**	**242.0**	**71%**	**409.2**	**64%**	**491.0**	**70%**	**609.2**	**68%**
Income tax	28%	115.0	34%	208.8	33%	238.4	34%	305.0	34%
- Non-Oil and Gas	19%	96.1	28%	165.6	26%	194.4	28%	251.4	28%
- Oil and Gas	9%	19.0	6%	43.2	7%	44.0	6%	53.6	6%
2. Non Tax receipts	**44%**	**98.9**	**29%**	**227.0**	**36%**	**215.1**	**30%**	**282.8**	**32%**
Natural Resources	37%	67.5	20%	167.5	26%	132.9	19%	192.8	22%
- Oil and Gas	32%	61.5	18%	158.1	25%	124.8	18%	182.9	21%
i. Oil	25%	43.0	13%	125.1	20%	93.6	13%	149.1	17%
ii. Gas	8%	18.5	5%	32.9	5%	31.2	4%	33.8	4%

Note: *2008 revised budget (APBN-P)
Source: World Bank calculations based on Ministry of Finance publications.

Non-tax oil and gas revenues: distributing production between the producer and the state

The vast majority of Indonesia's oil and gas output has been extracted under contracts with private investors. The state-owned oil company, Pertamina, produced only 5 percent of total output independently in 2004, the most recent year for which data are available. Private contractors share their revenues with the government through revenue-sharing agreements. These are based on Net Operating Income (NOI), or "profit oil", which is the amount of oil and gas production in excess of the amount needed to cover the costs of production ("cost oil"), not including any production-related government taxes and charges. Such taxes and charges include the central government's corporate income tax, interest dividend tax, royalties, and Pertamina's retention fee. They also include local taxes (land and building taxes), since there are a

separate set of revenue-sharing agreements between the central and sub-national governments (discussed in Section 4 below).

The government's revenue from an oil or gas operation depends on the type of contract agreement between the national government and the contractors. There are three types of contract:

1) Production Sharing Contracts (PSC) are the dominant types (Figure 9). The government is represented by BP Migas and the Ministry of Energy and Mineral Resources. Under this type of contract government revenues take the form of cash rather than physical output, and this is paid to the Ministry of Finance. Operating costs are deducted from production through 'contractor cost oil' formula defined in the PSC.

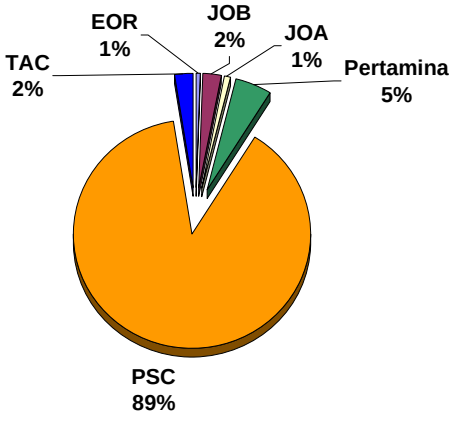
2) Contracts between the private contractor and Pertamina, generally taking the form of Enhanced Oil Recovery (EOR). The equity share received by the government, represented by Pertamina, is in the form of physical production, with the government receiving the revenues indirectly, as a tax on the net profits of Pertamina.

3) Technical Assistance Contracts (TAC). These are a type of PSCs that are usually limited to exploitation, unless the contract involves a special area in which the government has encouraged exploration. BP Migas is phasing these contracts out, with Oil and Gas Law No. 22/2001 mandating that existing TACs not be extended.

These three contract types are not the exclusive forms of rights for exploration and exploitation, as parties are also able to enter into original agreements (USAID, 2006). There are two types of such agreements: Joint Operation Agreements (JOAs) and Joint Operation Bodies (JOBs). JOAs regulate the relations of the participating interest-holders, defining their rights and obligations and describing the procedures that the contractors must follow. BP Migas supervises the JOAs. JOB agreements create a non-legal entity that manages the operations on behalf of the participating interest-holders. JOB agreements are typically part of a JOA.

Among all these types of contract, PSCs are by far the most important, accounting for 89 percent of production, while 6 percent of production is distributed among TAC, EOR, JOB and JOA contract types (Figure 9).

Figure 9. Production by type of contract *(2004 data)*



Source: World Bank calculations from Migas-Production data reported in USAID (2006)

Estimating the revenue flows

Extracted oil or gas cascades through a series of mechanisms that apportion income and costs to producers and the government. The exact nature and quantity of these mechanisms varies by contract and is also dependant on the original date of a field. The most important of these mechanisms and their relative magnitude in enabling the impact of oil price movements on government revenues to be simulated are listed below. The following describes these mechanisms qualitatively. Figure 10 illustrates the mechanisms, while Annex 1 provides them mathematically.

- The First Tranche Petroleum (commonly referred to as 'FTP'), is normally 20 percent of the gross revenue. The FTP is divided between the government and contractor.

- The government typically receives 73.2 percent of the FTP, plus the 'equity to be split' between the government and the contractor.

- The equity to be split is the site's gross revenue, less the FTP, the cost of production and additional investment costs incurred by the contractor. Estimating production costs requires making assumptions about extraction, refining and other costs.

- The contractor's gross share is the remainder of the FTP (about 26.8 percent) plus an equity share in the field's production that accrues to the contractor. The exploitation contract defines these values.

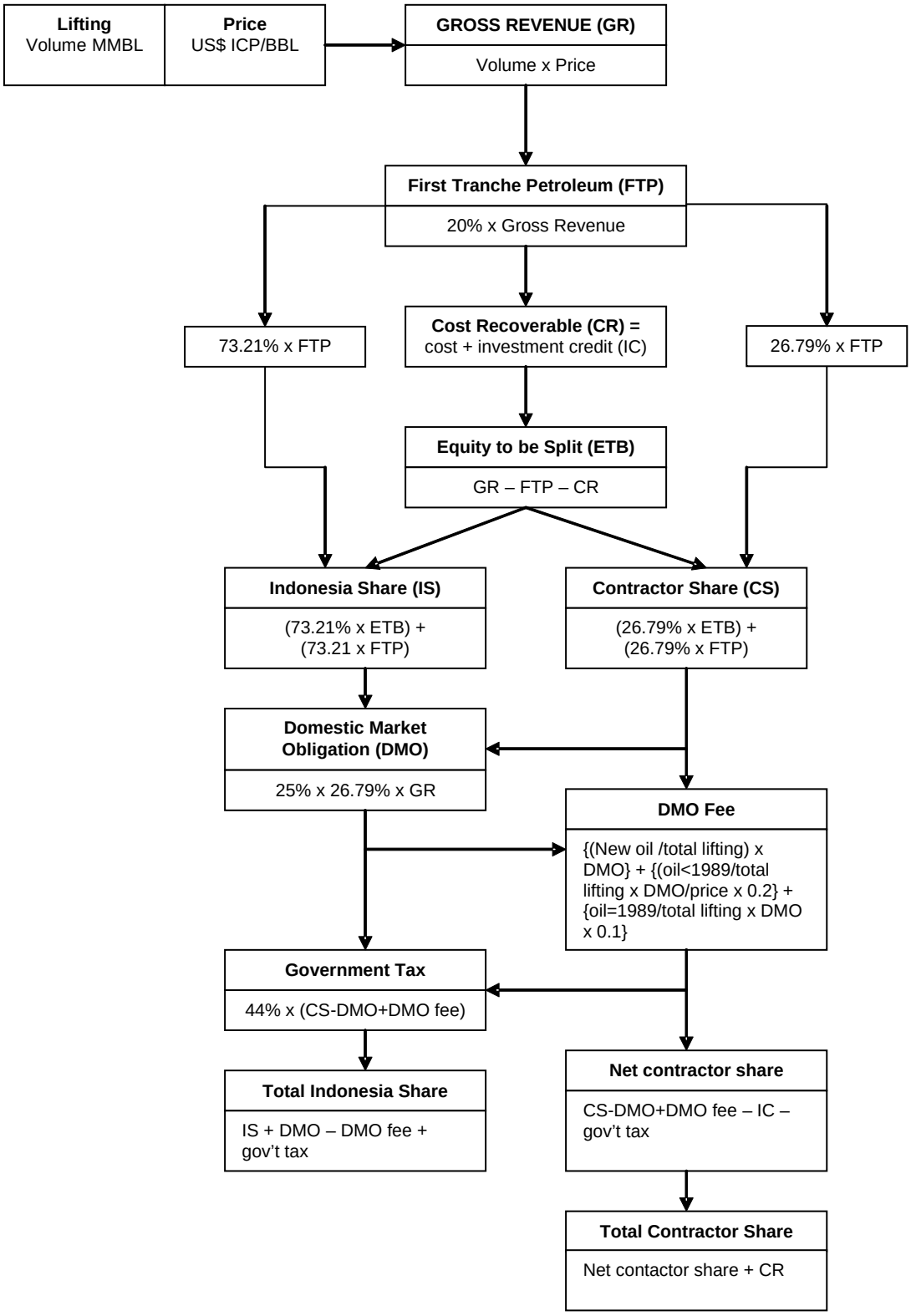
- The net contractual share is the gross contractual share less the contractor's taxes and other obligations to the government.

- An important component of the contractor's tax obligations is its domestic market obligation ('DMO') net of the 'domestic market obligation fee' it is paid by the government. These values are defined on the basis of when the contract was entered (Appendix 1 details this). In a typical contract, the DMO is 25 percent of the contractor's share of the gross revenue.

- Finally, the government applies a tax rate to the taxable share of production. This tax rate varies under the relevant law by when the contract was entered, with lower rates applied to more recent contracts.

Figure 10 illustrates how production revenue is distributed in a typical production contract. Putting together all these components, we can simulate the revenue effects of a change in world oil prices, and these simulations feed into Figure 1 and Figure 2.

Figure 10. Tax and non-tax revenue sharing for oil under a typical production sharing contract



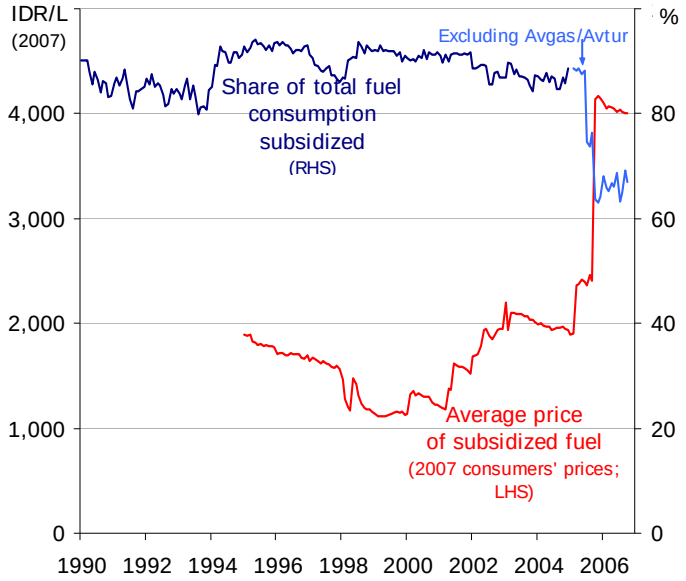
* Note: Contractor tax consists of income tax (30%) and dividend tax (20%). Total tax as a percent of the equity to be split is calculated as: income tax (0.3*0.3=0.09) + [dividend tax rate (=0.2)* (0.3-0.0=0.21)] = 0.13 percent. Or equivalently, income tax (30%) + [dividend tax (=0.2)* (100 – 0.3)} = 44 percent *of the contractor share* is paid to the government.

3. Oil and Gas-related Fiscal Expenditure on Fuel Subsidies

Fuel subsidy trends

The central government subsidizes the price of a variety of energy products, including low-octane gasoline, kerosene, diesel, LPG and electricity. Subsidies in Indonesia have fluctuated widely over the past decade, following movements in international prices and the exchange rate, and adjustments to the subsidy regime (Figure 11 and Table 4). Fuel subsidies increased markedly from 1998 to 2000 following the sharp depreciation of the rupiah relative to the US dollar (which reached its nadir in 2001). They peaked in 2000, accounting for 28.6 percent of total spending.

Figure 11. Most of Indonesia's fuel is subsidized



Source: World Bank calculations

Fuel subsidies decreased again in 2001, following the government's fuel price increase in February 2000 and in June 2001. The subsidy reduction in 2002 is the unique case in Indonesia's recent past of incremental adjustment of fuel prices. Through 2002 domestic market prices moved with world prices, and even fell through the middle of the year as the appreciating exchange rate lowered the rupiah cost of fuel. In early 2003 the government attempted to close the gap between domestic and international fuel prices. However, this bold reform was ill-prepared and poorly communicated. On 1 January 2003, the government increased fuel prices, the same day it increased various utility prices. At the same time, the government was still re-building its reputation following the crisis of the late 1990s, and public confidence in its other expenditure programs remained low. The result was public protests, and the government rolled back most of the increase and broke the link to world prices.

Fuel subsidies then increased sharply in 2004 and 2005 following increases in international oil prices (increase of 97 percent in 2004 relative to 2003), but then decreased again after the government increased the price of the subsidized products and reduced the number of products eligible for the subsidy in March and October 2005. Increasing international oil prices and a recovery in consumption suggest subsidies are likely to exceed their 2005 levels this year.

Table 4. Subsidy trends

Rupiah trillion, constant 2007 prices

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Total subsidies	0.9	7.9	89.4	86.1	139.0	160.9	130.3	69.3	66.1	127.2	146.6	114.3	150.2	220.1
Fuel subsidies	-	6.7	41.4	68.9	86.3	138.0	115.1	49.5	45.3	95.8	116.1	68.3	83.8	119.1
Non fuel subsidies	-	-	44.7	12.7	52.7	22.9	15.3	19.8	20.9	31.4	30.4	46.0	66.4	101.0
ER thousand Rp to USD (yr average)	2.2	2.3	2.9	10.0	7.9	8.4	10.3	9.3	8.6	8.9	9.8	9.1	9.1	9.1
Fuel subsidies as % total expenditure	0%	2%	9%	17%	20%	29%	20%	10%	8%	16%	19%	10%	11%	13%

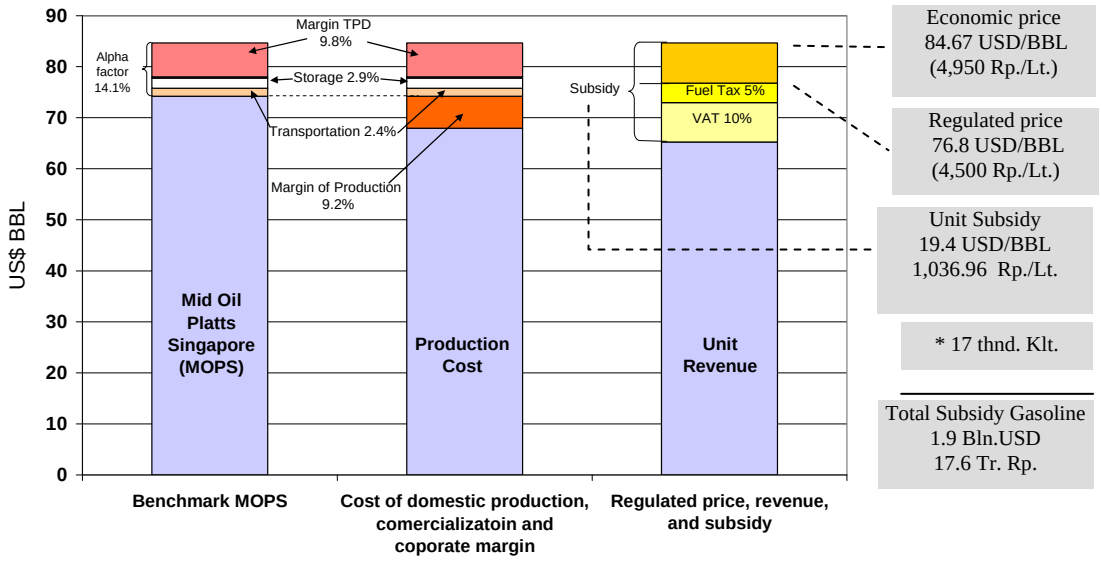
*2008 Revised Budget (APBN-P), assuming oil prices at US$95. Prices are deflated by the GDP deflator.

Source: World Bank calculations based on Ministry of Finance publications.

Fuel subsidy and domestic fuel price regime

Prices of refined fuel products for households, small businesses, transportation, and public service are regulated on an ad hoc basis by the central government.[2] The fuel subsidy is defined as the difference between the regulated retail price and an agreed benchmark price which is an estimate of the "economic price". Given that Indonesia is a net importer of fuel products, the economic price is therefore the price in the international market, currently set as the Mid Oil Platts Singapore price (MOPS), plus a factor to cover freight, taxes, and margins for corporate profit (i.e. so that the economic price allows for an agreed level of accounting profit). For 2008, the economic price is set as MOPS plus an adjustment factor of 9.5 percent (Figure 12). This adjustment factor is often called the "alpha factor". The adjustment factor is the same for gasoline, kerosene, and diesel. Yet given that MOPS varies for each one of these products, the factor is kept constant by adjusting the margin of production and margin TPD for each one of these products (Table 5). Annex 2 describes algebraically how the subsidy is calculated.

Figure 12. Domestic prices, regulated price, and subsidy for gasoline (premium), 2007



Source: World Bank calculations based on Ministry of Energy and Mineral Resources 2007 data.

Total budgeted fuel subsidies amounted to Rp 83 trillion in 2007, equivalent to 11 percent of total government expenditure and 2.2 percent of GDP. The total subsidy is determined by multiplying the product-specific unit subsidy by the estimated level of consumption for each product. Kerosene is the

[2] See IMF (2007) for a detail of countries that have liberalized petroleum product prices and those that are set by governments on an ad hoc basis or using an automatic formula.

more heavily subsidized oil derivate product, with a per unit subsidy (Rp 3,671 per liter, using 2007 average prices) of more than two times its retail price (Rp 1,818 per liter). Thus, while kerosene represents only slightly more than a quarter of the total consumption, it absorbs more than half of the total subsidy; gasoline and diesel account for roughly one quarter of the total each (Table 6).[3] Large-scale household consumption surveys consistently indicate that households directly absorb a very large share of the kerosene subsidy, much of the gasoline subsidy and relatively little of the diesel subsidy.[4]

Table 5. Fuel subsidies price benchmark and adjustment factor, 2007

		Gasoline Premium		Kerosene		Diesel	
		US$/BBL	% of (1)	US$/BBL	% of (1)	US$/BBL	% of (1)
(1)	Production	67.95		67.95		67.95	
(2)	Transportation	1.60	2.4	1.60	2.4	1.60	2.4
(3)	Distribution	0.23	0.3		0.3		0.3
(4)	Storage	1.95	2.9	1.95	2.9	1.95	2.9
(5) = (1+2+4)	Cost of Supply	71.73		71.73		71.73	
(6) % relative to (5)	Margin of Production	6.26	9.2	14.37	9.2	10.00	9.2
(7) % relative to (9)	Margin TPD	6.68	9.8	7.83	9.8	7.21	9.8
(8) = (6)+(7)	Gross Corporate Margin (GCM)	12.94		22.20		17.21	
(9) = (5)+(8)	Cost of supply + GCM Margin	84.67		93.93		88.94	
(10)	MOPS	74.21		82.32		77.95	
(11) = [(9)/(10)-1]*100	**Adjustment factor**	**14.10** (% of MOPS:)	**24.6**	**14.10** (% of MOPS:)	**38.2**	**14.1** (% of MOPS:)	**30.9**

Source: World Bank estimates based on Ministry of Energy and Mineral Resources/Directorate General Oil and Gas presentation.

Breaking the link between international market costs of petroleum products and their domestic retail prices requires a country to finance an explicit or implicit subsidy, depending on whether the gaps take the form of fiscal costs that appear directly in the budget, or quasi-fiscal costs that are nominally borne by government owned companies but still effectively burden the budget through depressed dividends or losses and debts accrued by state-owned or affiliated enterprises.[5] There are various means of setting retail product prices. A review of the international experience in management of domestic petroleum prices by Baig et al. (2007), reports that from a survey of 51 countries, nearly half had an ad hoc pricing mechanism where the government adjusted the price level irregularly, 14 percent an automatic adjusting mechanism that holds the margin between world and local prices constant while allowing domestic prices to adjust, and 37 percent enjoyed a liberalized pricing system. The study finds that fuel retail prices in countries that have liberalized markets are on average 20 percent higher than countries in which prices are subject to automatic adjustments (Figure 13).

[3] See Annex 8 for a distribution consumption of all fuel products from 1999 to 2005.

[4] Poor coverage in these household surveys of the richest households, which consume the most fuel, make the exact results unreliable.

[5] There was a brief period during the 1980s when Indonesian retail prices were *above* international market prices, during which the fuel price regime acted as a tax on consumers.

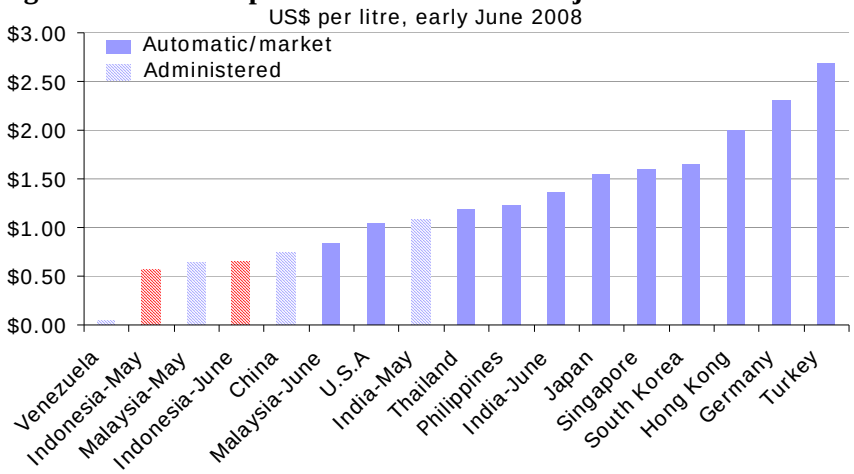
Table 6. Fuel subsidy per fuel refined product, 2006

	Gasoline	Kerosene	Diesel	Total
Economic Price (Rp/liter)	4,950	5,490	5,200	
Price sales (Rp/liter)	4,500	2,000	4,300	
Value added tax (Rp.) -10%	391	182	374	
PBBKB (Rp) – 5%	196		187	
Net sale price (Rp)	3,913	1,818	3,739	
Volume (million K liter)	17	10	11	38
as percent of total volume (%)	45	26	29	100
Fuel Subsidy per liter	1,037	3,672	1,461	
as percent of net sale price (%)	27	202	39	
Fuel subsidy (Rp trillion)	17.6	36.3	16	70.0
as percent of total fuel subsidy (%)	25	52	23	100
as percent of GDP (%)	0.5	1.0	0.5	2.0

Source: World Bank calculations from presentation by the Ministry of Energy and Mineral Resources/Directorate General Oil and Gas.

International increases in oil prices raise the cost of oil imports as well as the opportunity cost of exports. Fuel subsidies that maintain oil prices below international levels are thus impacted by any fluctuations in international oil prices. If international prices are low enough a liberalization of the fuel market could be executed without an immediate price shock. These international "break even" prices, however, should also be adjusted by taxes and the alpha factor. Thus in January 2007, the international price was only 5 percent higher than the break even price of 'premium' low-octane gasoline, 150 percent higher than the kerosene break even price, and 22 percent higher than the automotive diesel break even price. Twelve months later these margins were far greater, making price liberalization far more difficult.

Figure 13. Gasoline prices across Asia and major economies



Source: World Bank calculations based on various national sources and CEIC.

Fuel subsidies tend to be highly regressive in a nation like Indonesia, as the box below describes. There are many additional reasons that make fuel subsidies a far from ideal social safety net:

1) Subsidies are grossly inefficient in targeting the poor and thus inefficiently achieve their claimed role of a social safety net (see below on incidence of the Indonesian fuel subsidy).

2) Subsidies undermine macroeconomic stability given the pro-cyclicality of international oil price fluctuations. Expenditures on subsidies increase when world oil prices increase, can also be

periods of economic expansion, bundling fuel prices volatility to economic volatility (Gupta, 2002).

3) Subsidies hinder competitiveness. In Indonesia, Pertamina is currently the sole company responsible for fulfilling Public Service Obligation (PSO) and thus the only channel for subsidies to flow to retail consumers. Other companies have recently been allowed to sell market-priced higher octane fuels and other products, but their penetration remains very small, mainly because their non-subsidized fuels can be at least 50 percent more expensive than Pertamina's subsidized prices.[6]

4) Subsidies distort price signals to industry and households. As a consequence, they make inefficient and internationally uncompetitive choices, resources are used in ways that do not maximize their returns, and production processes are less efficient than they would be if producers faced the true cost of their activities (e.g., consumers buy fewer fuel efficient cars or live further from their workplaces than they would if they faced the true opportunity cost of their fuel consumption). In turn, inefficient production technologies entail higher costs and more energy-intensive production and, thus, higher subsidies. Additionally, these distorted price signals lead to wasteful or economically excessive consumption of petroleum products with the associated environmental effects, and ensuing health costs. Energy-wasteful and polluting production choices are likely to become far more expensive when carbon emissions are priced globally. The costs are immediate: fuel subsidies undermine the price inducement to innovate in terms of alternative fuels to more efficient urban design. They are also long term: today's distorted choices are creating an uncompetitive capital stock, and the costs of adjusting away from that stock will grow as oil prices rise.

5) Subsidies reduce fiscal space. This means the government has fewer resources to promote growth through investments in infrastructure or human capital.

6) Lastly, subsidies generate opportunities for corruption and smuggling. Products bought domestically at below-market prices can be profitably smuggled to neighboring countries, or they can be used for unintended purposes, such as mixing the subsidized, household fuel with other fuel types and using the doctored fuel for industrial purposes. This in turn may undermine governance institutions and the rule of law. This also represents an inefficient use of scarce entrepreneurial talent.

[6] See World Bank (2007b) for a detailed discussion of the policy reforms of the downstream industry required for a liberalization of the fuel market in Indonesia.

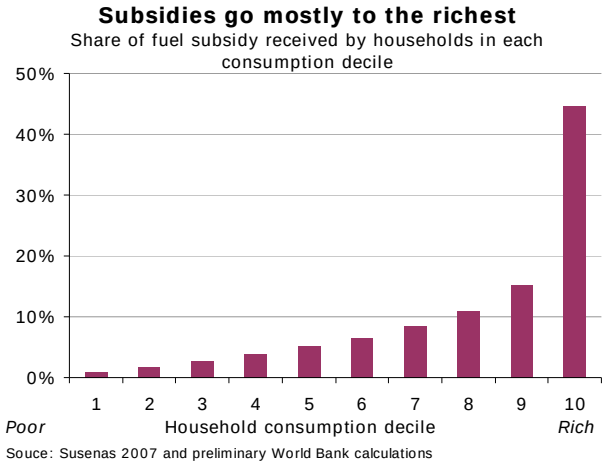
Box: The fuel subsidy and Indonesia's poor

Domestic fuel prices (and, implicitly, subsidies) have direct and indirect effects on household real income. The direct effect of the subsidies' is seen in the gain in disposable income due to lower prices paid by households for consumption of fuel products. The indirect effect is seen in the lower prices paid by households for other goods and services led by the lower costs for fuel-based inputs of production, for example, the food cooked by street vendors using kerosene stoves.

Precisely quantifying these effects is difficult. We cannot directly observe which socio-economic groups consume which products and at what price. The official energy statistics handbook in Indonesia reports only aggregate fuel consumption by sectors, while the disaggregation by refined products (e.g. premium, diesel, kerosene) is not available by the sector of the economy consuming the fuel.[7] This is probably because retail sales of refined products do not record whether the purchased product will be used for domestic or commercial transport purposes. A 2004 household survey found that households consume 5.2 million liters of gasoline or 30 percent out of total retail sales (17.5 million liters); 291,000 liters of diesel, or 1 percent of the total retail sales (27.1 million liters); and 10.1 million liters of kerosene or 89 percent of the total retail sales (11.4 million liters). If the same consumption shares are assumed for 2007, then 51 percent of the total amount budgeted for fuel subsidies would be absorbed by households.

Indonesia's fuel subsidies are regressive. Benefit incidence results can be drawn based on the 2007 National Household Survey. Defining the lowest income quintile of the population as poor,[8] more than 90 percent of fuel subsidies benefit the non-poor. Assuming that consumers pay the same price regardless of their income, we can see that the pattern of fuel products consumption directly determines the distribution of the subsidy. It is commonly argued, for example, that the significant subsidies for kerosene are justified on grounds that kerosene is largely the only fuel product consumed by the lower income population. Yet, while the poor consume more kerosene than any other fuel, national survey data reveal that kerosene consumption increases with income level, with the only exception of the highest 10 percent of the income distribution, for whom kerosene appears to be an inferior good (Annex 9).

Figure 14. Incidence of fuel subsidies, 2007



Source: World Bank calculations from Susenas 2007

[7] Annex 9 describes the distribution of refined fuel products by overall consumption decile, based on the 2004 National Household Survey.

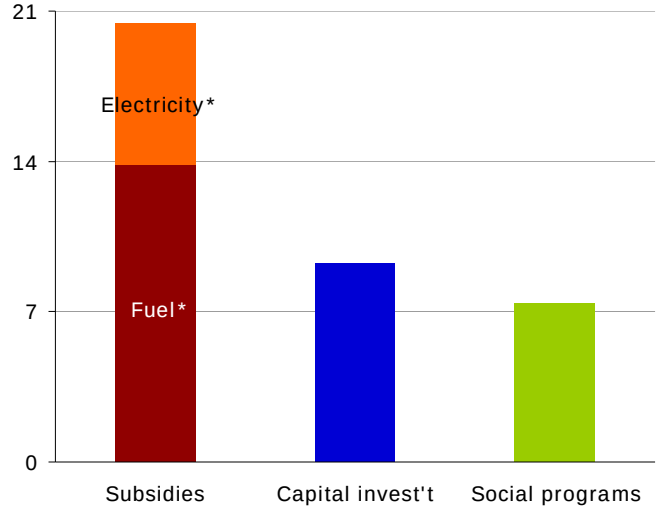
[8] About 15 percent of the population was defined as poor in 2008.

Fuel subsidy expenditures and international oil prices

Higher international oil prices mean a wider gap with the domestic retail price, and larger subsidies as a result. In turn, increasing the subsidized retail price of fuel products lowers the government's total subsidy payments. Here we present some estimates of the effects of some plausible increases in international oil prices on government expenditure. The effects are dramatic. This analysis also answers the policy-makers' question of how much retail fuel prices may have to increase to hold fuel subsidy spending constant given increases in oil prices .

For 2008, the revised Indonesian government projects energy subsidies at US$ 17 billion (Rp. 160 trillion). This projection is based on an oil price assumption of US$95 per barrel and even oil prices, energy subsides would be higher than capital investments and social programs combined (see Figure 15). It is worth noting that the approach taken here to estimate fuel subsidies — in contrast to the government's approach — accounts for a potential source of underestimation of the total cost of fuel subsidies insofar as it includes the cost of levying value added taxes on an artificially low price (Annex 3 describes this potential source of underestimation).

Figure 15. Energy subsidies dominate 2008 central government expenditure
Billions of US dollars



Source: Ministry of Finance, 2008 APBN-P, assuming oil at US$95; social program expenditure data from 2008 APBN.

Energy subsides cover more than just artificially low prices for certain fuels. Subsidies to the state-owned electricity generator PLN are also highly significant – they are likely to approach US$ 10 billion in 2008. The government also subsidies the cost of low-volume LPG cylinders (typically bought by poorer households) but the difference between the subsidized price and cost is relatively small and volumes are low. The subsidy to PLN is highly complex, given the differential supply cost across the archipelago and the complex array of tariffs levied depending on the type of user and their connection's capacity. For this exercise we reduce that complexity to a ratio between PLN's generating costs, the USD price of oil and the rupiah exchange rate: a US$1-per-barrel increase in the price of crude oil increases the required subsidy by Rp 790 billion in 2008. Finally, the state-owned railway company receives subsidized fuel, however we do not consider these given their small order of magnitude relative to the other subsidies.

These estimates allow for international higher oil prices to affect the quantity of subsidized fuel consumed, hence the total cost of the fuel subsidy. Two factors are likely to drive the response of

subsidized fuel consumption to the market price: high-income consumers have more incentive to switch from higher octane, non-subsidized fuel to lower octane, subsidized fuel; and the smuggling of subsidized fuel to other economies and its mixing with other fuel types. Smuggling is likely to swell where neighboring economies allow their fuel prices to move with international prices and the difference between Indonesian prices and international prices expands, creating an increasing incentive to smuggle Indonesian fuel products to other neighboring economies. Some anecdotal evidence suggests that when the gap between Indonesian and neighboring economies' fuel prices is wide, smuggling is very significant, but estimates of the volume of smuggling vary widely and limited data restrict our ability to disentangle smuggling from other determents of fuel demand. More detailed data would enable better estimates, for example monthly data on fuel consumption in the provinces near neighboring economies and for otherwise similar provinces where fuel is more likely to only be consumed locally.

Short of a significant drop in international crude oil prices, Indonesia's policy-makers have two means of addressing expanding fuel subsidy costs: increase the retail price of the subsidized products, or reduce the quantity of subsidized products consumed. As measures to restrict consumers purchasing of subsidized products are likely to be technically demanding,[9] we explore the re-pricing option here. Increasing the price of one of these fuel products will lead households to reduce their consumption of that product, and to switch to other products. Increasing prices by another US 10 cent per liter (Rp 1,000 or 17%) from the current price of Rp 6,000 is estimated to reduce gasoline consumption by 3 percent but increase transport diesel consumption by almost 1½ percent. A 20 percent increase in the price of kerosene — relatively modest given its very large subsidy — would lead to about 3½ percent less kerosene being consumed. These elasticity estimates, and the error correction models used to estimate them, are tabled in Annex 4. Accounting for these estimates of demand responses, the lower panel in Table 7 reports our estimates of the likely spending on fuel and energy subsidies overall with various increases in domestic fuel prices given various world crude oil prices**.**

Table 7. Estimated central government expenditure on energy subsidies

International Crude Oil Prices (US$):		$60	$70	$80	$90	$100	$110	$120	$130	$140	$150	$160
Oil & gas revenues	US$ bil.	13.0	16.1	19.2	22.3	25.4	28.5	31.7	34.8	37.9	41.0	44.1
	% GDP	2.6	3.3	3.9	4.6	5.2	5.8	6.5	7.1	7.7	8.4	9.0
Oil & gas-related outlays:												
No change in subsdized	US$ bil.	9.2	12.3	16.3	20.3	24.3	28.3	32.3	36.3	40.3	44.3	48.3
product prices	% GDP	1.9	2.5	3.3	4.1	5.0	5.8	6.6	7.4	8.2	9.0	9.8
Increasing regulated kerosene, gasoline, diesel and LPG prices by:												
15%	US$ bil.	7.2	10.3	14.3	18.3	22.3	26.3	30.3	34.3	38.3	42.3	46.3
	% GDP	1.5	2.1	2.9	3.7	4.6	5.4	6.2	7.0	7.8	8.6	9.4
30%	US$ bil.	5.2	8.3	12.3	16.3	20.3	24.3	28.3	32.3	36.3	40.3	44.2
	% GDP	1.1	1.7	2.5	3.3	4.1	5.0	5.8	6.6	7.4	8.2	9.0
50%	US$ bil.	2.5	5.7	9.7	13.7	17.7	21.7	25.7	29.6	33.6	37.6	41.6
	% GDP	0.5	1.2	2.0	2.8	3.6	4.4	5.2	6.0	6.9	7.7	8.5
100%	US$ bil.	-4.2	-1.1	3.0	7.0	11.0	15.0	19.0	23.0	27.0	31.0	35.0
	% GDP	-0.9	-0.2	0.6	1.4	2.2	3.1	3.9	4.7	5.5	6.3	7.1

Note: Estimates are made from a June-2008 baseline, of WTI at US$110 and after the May-08 product price increases.
Source: World Bank staff estimates.

[9] From late 2007 the Ministry of Energy proposed distributing a so-called 'smart card' to households, that would entitle the holder to purchase a limited quantify of fuel each month, requiring larger consumers (generally richer households) to pay the economic cost for any additional fuel. This proposal was dropped mid-2008 due to concerns about its technical feasibility.

4. INTERGOVERNMENTAL FISCAL TRANSFERS

Oil and gas production not only provides a significant amount of revenue to the central government. It also funds Indonesia's far-reaching decentralization, using an array of formal revenue-sharing agreements with sub-national governments. Indonesia's 434 districts and 33 provinces now spend as much as 36 percent of the country's total public expenditures. But vertical fiscal imbalance in terms of revenue raising is very high: these units raise only about 5 percent of their expenditure themselves. Sub-national governments instead rely on various forms of revenue sharing, including sharing of oil and gas revenues, as well as an equalization block grant and smaller special, earmarked grants.

While these shared revenues appear as an expense for the central government, they flow directly to sub-national governments and so have a little impact on Indonesia's overall public sector fiscal position. The following paragraphs describe how the different procedures relating to oil and gas revenue function, how movements in oil prices impact on these transfers and hence central government expenditures, and how the formula for calculating these transfers influence the central government's choice of budget assumptions.

The main intergovernmental transfer affected by oil and gas receipts is 'revenue sharing'. Its size relative to the national budget has slightly increased from 2001 to 2007 (from 6 percent to 9 percent of total central government expenditures). It continues to represent just above a quarter of total transfers in the country, as other types of transfers have kept pace with its growth (Table 8, see Annex 5 for transfers in Rupiah). The regions where the oil and gas is extracted receive additional shares of oil and gas revenue, as do the special autonomy regions of Papua and Aceh.

Table 8. Intergovernmental transfers
Percentage of total national expenditures

	2001	2002	2003	2004	2005	2006	2007	2008*
Total Transfer to Regions	24%	31%	32%	31%	29%	34%	33%	30%
Revenue Sharing	6%	8%	8%	9%	10%	10%	8%	8%
General Allocation funds (DAU)	18%	22%	20%	19%	17%	22%	22%	18%
Special Allocation funds (DAK)	0%	0%	1%	1%	1%	2%	2%	2%
Special Autonomy and Adj. Funds	0%	1%	2%	2%	1%	1%	1%	1%

*2008 Revised budget (APBN-P).
Source: World Bank calculations base by Ministry of Finance publications.

Sharing of tax and non-tax revenues

Revenue sharing is determined by formula that was formalized into legislation in 2004 and 2005 (Article 11, Law No. 33/2004 and GR No. 55/2005). In summary, the following proportions of government revenue are shared:

Taxes

20 percent of personal income tax (PPh)[10]
90 percent of land and building tax (PBB)
80 percent of property title transfer tax (PBHTB)

Non taxes

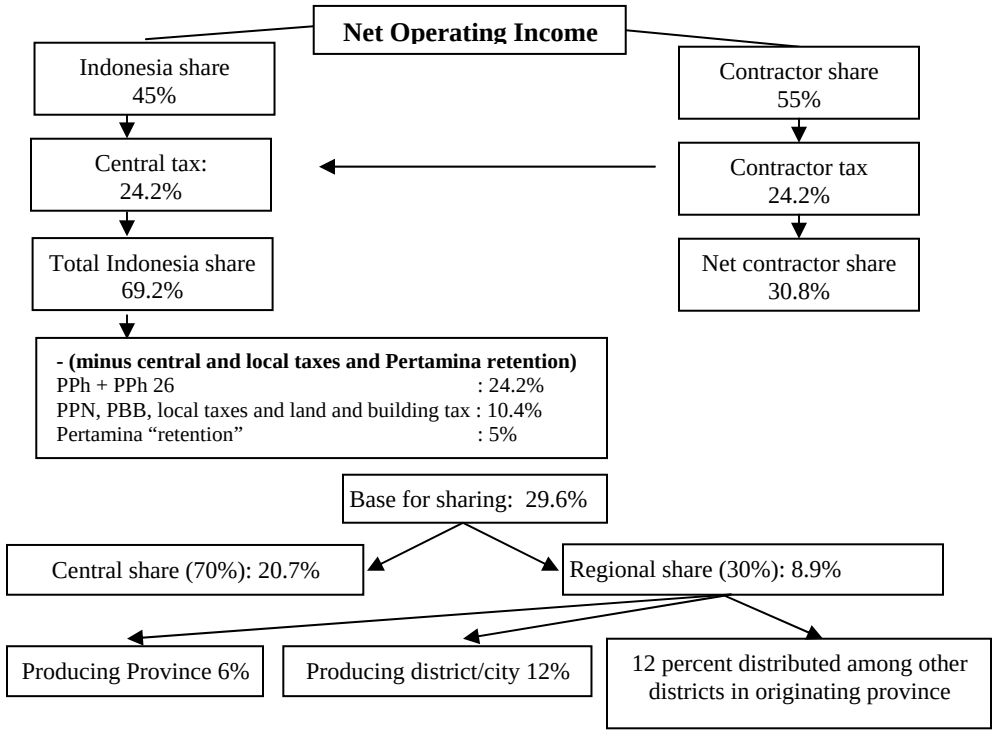
15 percent of net oil revenue resources
30 percent of net gas revenue resources
80 percent of natural revenue resources from mining, forestry, fisheries

Special autonomy regulations give Aceh and Papua additional revenues of 70 percent of oil revenues and natural gas revenues generated in their regions (Law No. 18/2001 and Law No. 21/2001, respectively). In 2009, an additional 5 percent of oil and gas revenues will be transferred to regional governments, with the relevant legislation requiring that these be spent on primary education (Law No. 33/2004, Article 20 and Article 106). With increasing oil and gas prices, transfers to oil producing regions (and their neighbors) have more than doubled since 2003.

Intergovernmental revenue-sharing is based on net oil and gas revenue, which is largely equivalent to profits after cost recovery and deduction of the PSC's share but before tax. This is additional to the First Tranche of 10 percent of revenues that are directly transferred to the government prior to cost recovery. It is allocated to the regions where the oil revenue was generated. Thus net oil revenues are distributed 85 percent to the central government and 15 percent to the relevant sub-national government (Law No. 33/2004, Article 14). Net gas revenues are divided 69.5 to the central government; and 30.5 to sub-national governments. The regions' *oil* share (15 percent) is divided, in turn, in the following way: 3 percent to the province where the oil was produced, 6 percent to the producing district, and the remaining 6 percent of total net revenue to other districts in the producing province (Law No. 33/2004, Article 19, Paragraph 2; see Annex 6 and Figure 16). The region's *gas* share (30 percent) is allocated in the following way: 6 percent producing province, 12 percent to producing district, and 12 percent to other districts in the producing province. (Law No. 33/2004, Article 19, Paragraph 3. See Figure 16 and Annex 6.)

[10] Income tax sharing was instituted in 2000 (Article 31 Law No. 17/2000), with pre-determined ratios of 20 percent of personal income tax shared with regional governments, with 8 percent going to the provincial government whence the revenue originated, and 12 percent to the originating district/city government).

Figure 16. Example of tax and non-tax revenue sharing for gas, in a PSC sharing of 45 percent government and 55 percent contractor



Note: The calculation of contractor tax is the same as that for oil sharing (Figure 10).

Financial Management and Budgeting

The allocation of funds for revenue-sharing is based on the actual, realized oil and gas revenue. This means that it is based on actual oil profits reported from the state-owned oil company, Pertamina, plus any additional non-tax revenues received directly from oil producers and reflects both the actual price received and quantity produced. Pertamina has often delayed transferring profits to the Ministry of Finance. For example, profits in 2006 were only transferred in December. This has been partly explained by the government's delay in transferring the cost of subsidies to Petermina. Despite these delays, there have not been major delays in the transfers of shared revenue to regional governments as the central government makes the transfers quarterly, based on estimated profits for the current quarter and with an adjustment for the differences between projected and actual profits in the previous quarter's transfer.[11]

Over the period 2002-06, the budgeted oil price was constantly underestimated (and subsequently revised upwards) while the budgeted quantity was overestimated (and subsequently revised downwards). For example, oil prices were underestimated by more than 100 percent in 2005 (Table 9). While no regulatory changes have been made regarding the oil price budgeting process, the 2006 budget was based on more realistic oil price assumptions. In principle this should decrease the differences over the four stages of the budget from its original to the latest revision.[12] On the other hand, the quantity of crude oil production was constantly overestimated, by an average of 9 percent from 2000 to 2006.

[11] There were however, some delays in the transfer of revenues to regions. These delays follow the late reporting of profit estimates by the Ministry of Energy and Mineral Resources.

[12] That is: the RAPBN: draft presented to parliament in August previous year; APBN: approved October previous year; RAPBN-P draft revision presented to parliament in the first part of the budget year; APBN-P revised budget approved in the current year.

Table 9. Prices and production of oil in Indonesia (budgeted and actual)

		2000	2001	2002	2003	2004	2005	2006	2007	2008 *	Avg. 2000-07
Oil price- budget (US$)		18.00	22.00	22.00	22.00	22.00	24.00	57.00	63.00	95.00	31.25
Oil price- actual (US$)		29.10	24.60	23.50	28.75	37.17	51.80	64.00	69.69	--	41.08
percent difference		*62%*	*12%*	*7%*	*31%*	*69%*	*116%*	*12%*	*11%*	--	*31%*
Oil produc'n- budget (MBPD)		1.46	1.46	1.32	1.27	1.15	1.13	1.05	1.00	0.927	1.23
Oil produc'n- actual (MBPD)		1.41	1.34	1.26	1.09	1.04	0.99	0.96	0.90	--	1.12
percent difference		*-3%*	*-8%*	*-5%*	*-14%*	*-10%*	*-12%*	*-9%*	*-10%*	--	*-8.7%*
Oil & gas-related DAU:											
Actual transfer, based on projected rev.	*Rp tr.*	9.6	18.1	16.4	17.3	12.5	13.3	40.7	40.2	34.3	
	% tot. rev†	6.3%	6.9%	5.4%	5.1%	3.6%	3.6%	6.5%	5.6%	4.5%	5.3%
Hypothetical transfer, based on realized rev.	*Rp tr.*	22.2	27.1	20.1	20.9	28.2	36.1	52.3	43.9	61.5	
	% tot. rev‡	10.8 %	9.0%	6.7%	6.1%	7.0%	7.3%	8.2%	6.2%	6.9%	7.6%

*2008 Revised budget (APBN-P). † Percent of total government revenue projected in the APBN. ‡ Percent of realized total government revenue.
Source: World Bank calculations based on Ministry of Finance publications.

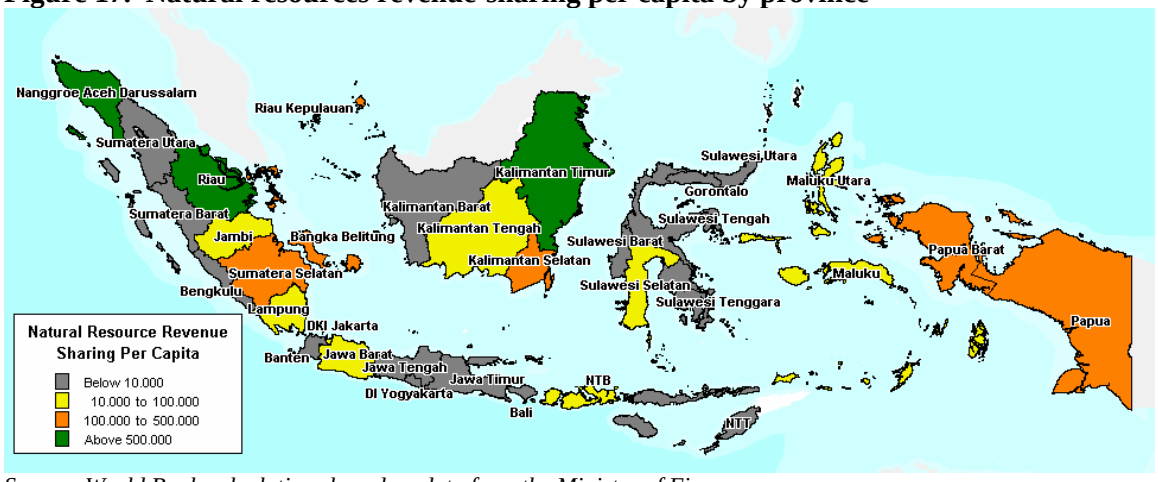
The most important element of Indonesia's transfer system – and the single largest item in the central government budget – is the general allocation grant *Dana Alokasi Umum* (DAU) which represents 26 percent of the national budget. The DAU is based on the forward estimates of total government revenue made as the budget is approved – and not on realized outcomes. The central government retains any revenue above its projected revenue pool but must finance and transfer any over-estimate of DAU resources if oil and gas revenues turn out to be lower than projections (e.g., if oil prices and/or production are less than expected). Historically, this created an incentive for the central government to underestimate its likely revenue by projecting an unrealistically low oil price. Until 2006, this underestimation of the oil price assumption resulted in significant discrepancies between budgeted revenues and actual realizations, and between the amount of funds transferred under the DAU and the amount that would have been transferred based on realized receipts. (Table 9; see World Bank 2007a).

Oil prices play an indirect role in the resource transfers to the regions and it is not only the oil producing regions which will continue to benefit from high oil prices. In 2006, the DAU increased by 75 percent after the Government increased the oil price assumption from US$ 30 to US$ 60 per barrel, which was part of a broader improvement in revenue mobilization. Since then, sub-national government had even more difficulties spending their resources and by end-2006, their financial reserves reached US$ 10 billion First, oil tax and non-tax revenues represent 20 percent of national domestic revenues. Thus, a given percentage increase in the price of oil does not translate in to the same percentage increase in total domestic revenues net of revenue-sharing (which is used as a base for determining the pool of transfers). Second, only 10 percent of regional governments receive oil and gas revenue-sharing funds. Third, regional governments receiving oil and gas revenues have accumulated a windfall of financial resources in the past few years and still hold unused revenues in bank accounts. Estimates of oil-price to sub-national revenue elasticities range across transfers from 0.19 for both the general allocation transfer DAU and the special autonomy and adjustment fund, to 0.37 for revenue-sharing (World Bank, 2007a).

Fiscal equality and the geographic distribution of revenue-sharing

Due to the revenue sharing mechanism for revenues from natural resources (Figure 16), there are large disparities in revenue-sharing across districts (Figure 17). These reflect the endowment of resources available in the geographic area.[13] Thus, the oil-rich province of East Kalimantan (Kalimantan Timur) receives per capita natural revenue-sharing of Rp 3.8 million, in contrast to the province Central Java (Jawa Tengah), which receives per capita revenue of only Rp 37,000.

Figure 17. Natural resources revenue-sharing per capita by province



Source: World Bank calculations based on data from the Ministry of Finance.

Like in other countries, high oil prices increase inequalities between oil producing regions and non-producing regions. Some resource rich regions, particularly in East Kalimantan and Riau, are benefiting disproportionately from high oil prices. However, in Indonesia these inequalities are less pronounced and currently not a major policy issue because all provinces – particularly the poorest – have received substantial inflows of additional transfers from the center. Almost all of Indonesia's regions receive more than sufficient funds to cover their existing costs. Their challenge is to spend their resources well.

[13] See Annex 10 for a review of nominal per capita revenue sharing across provinces and natural revenue sharing relative to other lines of sub-national revenue. Annex 11 provides an analysis of the equalization impact of DAU allocations compared to natural resource revenues.

ANNEXES

Annex 1. Estimating revenue flows

Estimating with any accuracy how a given oil price and production level flows into government revenues requires detailed information of each of the production contracts. But this is not available for any of the contract types described in Section 2. Rather, publicly available information throws enough light to describe in approximate terms the linkages between total production income and the government's receipts. We can mathematically describe the distribution of revenues between government and private contractors as follows. The Indonesian Government's share can be written as:

$$Gs = F + E - Cs$$

where *Gs* is the government share**,** *F* is First Tranche Portion (equal to 20 percent of Gross Revenue), *E* is Equity to be split, and *Cs* is the Contractual Share of the contractor. In turn, each of this formula's subcomponents can be defined as follows.

$$E = R - F - C - Ic$$

where *R* is gross revenue, C is the cost of production (requiring assumptions about extraction, refining and other costs). and *Ic* denotes additional investment cost incurred by the contractor.

The gross contractual share (*Cs*) can be broadly defined as:

$$Cs = Fs + Es$$

where Fs is the FTP share (portion of the FTP that is excluded from the government share), and Es is the equity share (share of the equity that accrues to the contractor). The shares of *FTP* and *E* that go to the contractor is specific to each exploitation contract - call the shares *Ff* and *Ef* factor shares. Contractors must pay taxes and other obligations to the government and so the net contractual share (*Ns*) can be defined as follows:

$$Ns = Nc + Cr$$

where Cr is cost recoverable $Cr = C + Ic$, and *Nc* is the net contractual obligation defined as:

$$Nc = Ts - Ic - T$$

where Ts is taxable share,

$$Ts = Cs - D + Df + Ic$$

where the new variables are *D* domestic market obligation (DMO) and *Df*, the domestic market obligation fee. The domestic market obligation and fees are determined based on the date the contract became effective, on the basis of :

$$D = 0.25 * Ff * R \quad \text{if } (0.25 * Ff * R) > Es \text{ , else } D = Es \text{ ; and}$$

$$Df = (S^1 * D) + (S^2 * D * 0.2) + (S^3 * D * 0.1)$$

$$S^1 = O_{old} / TotalOil \ , \ S^2 = O_{89} / TotalOil \ , \ S^3 = O_{new} / TotalOil \ .$$

Finally the tax due to government (*T*) equals:

$$T = Ts * 0.48$$

Annex 2. A mathematical presentation of petroleum subsidies

Mathematically the subsidy for petroleum product *i* in time (year) *t* can be defined as the difference between the estimated economic price ($E_{i,t}$) and the net of tax retail price ($P_{i,t}$) prescribed by the government (equation 1),

$$S_{i,t} = E_{i,t} - P_{i,t} \qquad (1)$$

where the economic price is defined as the price that would prevail in the market in the absence of any government regulation. This is defined as the border wholesale price of refined product ($W_{i,}t$), plus costs of transportation, storage, and distribution ($F_{i,t}$), consumption taxes ($T_{i,t}$) (VAT and fuel tax), and a margin of profit to retail stations ($M\ i,t$), (equation 2).

$$E_{i,t} = W_{i,t} + F_{i,t} + T_{i,t} + M_{i,t} \qquad (2)$$

The difference between the border wholesale price ($W_{i,}t$) and the domestic cost of production ($C_{i,t}$) determines the margin of production ($Mp_{i,t}$) (equation 3). The difference between the economic price and the wholesale border price is commonly called 'factor alpha' in Indonesian national debate as and usually expressed as a percentage of the latter (equation 4):

$$Mp_{i,t} = W_{i,t} - C_{i,t} \qquad (3)$$

$$\alpha = \frac{\left(E_{i,t} - W_{i,t}\right)}{W_{i,t}} \qquad (4)$$

The adjustment factor is the same for gasoline, kerosene, and diesel. Yet given that MOPS varies for each one of these products, the factor is kept constant by adjusting the margin of production and margin TPD for each one of these products (Table 5). The difference between the cost of production and the estimated economic price, accounts for 24.6 percent of the production cost of gasoline, while the analogous figures for kerosene and diesel are 38.2 percent and 30.9 percent, respectively.

Annex 3. An explanation for the under-estimation of fuel subsidies

Let $P^{eb} = P_{oil} + \alpha$, economic price of oil product at border

α = all refining, distribution and transportation margins plus economic profit
P^e = economic price after tax and let π be (1 + VAT + PBBM) ; VAT and PBBM are 10 percent and 5 percent respectively. P^d is domestic retail price. Q is total consumption of fuel type *i*.

Then $P^e = P^{eb} \times \pi$
The subsidy at the economic price of the fuel product is simply:

$$S^e = (P^e - P^d) \times Q$$

The government's current formula is:

$$S^g = (P^{eb} - P^d/\pi) \times Q$$

Since $P^{eb} = P^e/\pi$ then

$$S^g = ((P^e - P^d)/\pi) \times Q.$$

Therefore the amount of the fuel subsidy will be underestimated by:

$$S^e - S^g = ((\pi - 1)/\pi \times (P^e - P^d)) \times Q$$

Since $\pi = 1.15$ for gasoline and diesel oil and $\pi = 1.1$ for kerosene:

$S^e - S^g = (0.15/1.15) \times (P^e - P^d) \times Q$ for gasoline and diesel oil and
$= (0.1/1.1) \times (P^e - P^d) \times Q$ for kerosene.

Annex 4. Elasticity estimates of demand of subsidized fuel products

Very few attempts have been made for developing economies to estimate the responsiveness of demand for subsidized fuel products to those products own price, prices of substitute products, and to national income (Epsey 1998 surveys the literature). The elasticities underlying the discussion in Section 3 above are estimated in both one- and two-stage error correction frameworks. The table below reports the model specifications and coefficients. The cumulative impacts are based on impulse-response exercises using the estimated coefficients. These coefficient estimates were corroborated through simple dynamic models. The coefficients were estimated using monthly aggregate data of Indonesian consumption and prices of various fuel products. The income variable is interpolated aggregate GDP (measurement issues precluded use of gross national income, while monthly income indicators are not available for Indonesia).

The models estimated are based on the following form, comprised of a long-run component and a short-run component:

$$\Delta \ln(q_t^s) = \alpha + \gamma(\ln(q_{t-1}^s) - \beta_1 \ln(p_{t-1}^s) - \beta_2 \ln(p_{t-1}^e) - \beta_3 \ln(i_{t-1}))$$
$$+ \beta_4 \Delta \ln(q_{t-1}^s) + \beta_5 \Delta \ln(p_{t-1}^s) + \beta_6 \Delta \ln(p_{t-1}^e) + \beta_7 \Delta \ln(i_{t-1})$$

Estimates of subsidized fuel product elasticities

Dependent variable: change in product consumption of	*Gasoline*	*Diesel*	*Kerosene*
Lagged change in (log) product consumption:	0.01 *0.11*	-0.17 *0.10*	-0.04 *0.10*
Product price (log):	-0.26 *0.06*	-0.81 *0.30*	-0.16 *0.02*
Change in (log) product price:	-0.35 *0.09*	-- --	-0.06 *0.07*
Cumulative price elasticity:	-0.25	-0.78	-0.13
Price of a substitute product (log):	0.11 *0.07*	-- --	-- --
Change in substitute (log) product price:	0.11 *0.08*	0.44 *0.21*	-- --
Substitute product:	Unregulated petrol prices	Industrial kerosene	--
Cumulative cross-price elasticity:	0.12	SR: 0.4 ; LR: 0	--
Income (log):	1.77 *0.16*	1.27 *1.73*	-- --
Change in (log) income:	-- --	-- --	0.78 *1.03*
Cumulative income elasticity:	1.90	1.35	SR: 0.8 ; LR: 0
Speed of adjustment:	-0.86 *0.14*	-0.47 *0.10*	-0.82 *0.13*
Adjusted R2	0.50	0.31	0.45
Durban-Watson	2.07	2.00	2.04

Note: Standard errors reported in italics below coefficients. Intercepts not reported.
Source: World Bank staff calculations, using data collected through CEIC.

The levels of the quantify of subsidized fuel consumed, and the price of subsidized fuel, the market price of fuel and income levels are all I(1), and the respective cointegrating relationships pass the usual tests (Johansen test for cointegration; detailed results are available from the authors on request).

Annex 5. Transfers in constant 2007 prices, trillion Rupiah

	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Total Transfer to Regions	129	136	156	181	180	183	241	253	261
Revenue Sharing		34	40	47	51	60	69	63	69
General Allocation funds (DAU)		102	110	116	114	108	155	165	160
Special allocation funds (DAK)		1	1	4	6	6	12	16	19
Special Autonomy and Adj. Funds		0	6	14	10	9	4	9	12

*Revised budget (APBN-P).
Note: deflated with implicit GDP deflator. Projected 2008 GDP deflator growth of 12 percent.
Source: World Bank calculations based on Ministry of Finance publications.

Annex 6. Regulations relevant to Sharing of oil revenues between Pertamina and the Government

Law 33/2004
Government revenues from oil and gas are collected from: Pertamina own operations, contractual production sharing, and other sharing contracts.

Summary of PP 41/1982 on responsibility and procedure of payment to government from Own Pertamina Operation and Contract Production Sharing

- Pertamina operations
  Pertamina is mandated to pay every month a tax of 60 percent of Net Operating Income from all own operations to the State Treasury Account in Bank Indonesia.

- Production Sharing Contract
  - Contractors are obligated to pay corporate income tax and interest, dividend, and royalty tax of 56%[14], at the latest date of the 15th of the following month, to the MoF's foreign currency account in Bank Indonesia.
  - Contractors are obligated to deliver monthly and annual reports on the calculation of corporate income tax and interest, dividend, and royalty tax along with payment realization to MoF.
  - Pertamina is obligated to pay directly all revenue from crude oil exports that belongs to the government under PSC to the MoF's foreign currency account in Bank Indonesia after it receives exports payments.
  - Pertamina is obligated to make a payment of crude oil that belongs to the government, which is used for domestic market supply, to the State Treasury Account in Bank Indonesia at the latest, one month after acquiring the oil.
  - Pertamina is obligated to deliver monthly and annual reports on the calculation and payment realizations against government shares.

- Pertamina retention (fee) under PSC scheme
  - Pertamina retention (fee) is 5 percent of Net Operating Income of the related PSC.
  - The retention is subject to 60 percent tax and has to be paid to the State Treasury Account and MoF's foreign currency account in Bank Indonesia every month, at the latest date of 15th in the following month.
  - Pertamina is obligated to deliver monthly and annual report on the calculation and realization of tax payment from the retention.

- Bonus under PSC scheme
  - Bonus is defined as revenue from signing bonus, data compensation bonus, production bonus, and other bonus received by Pertamina from PSC arrangement.
  - Bonus is subject to 60 percent tax and has to be paid to the MoF's foreign currency account in Bank Indonesia.

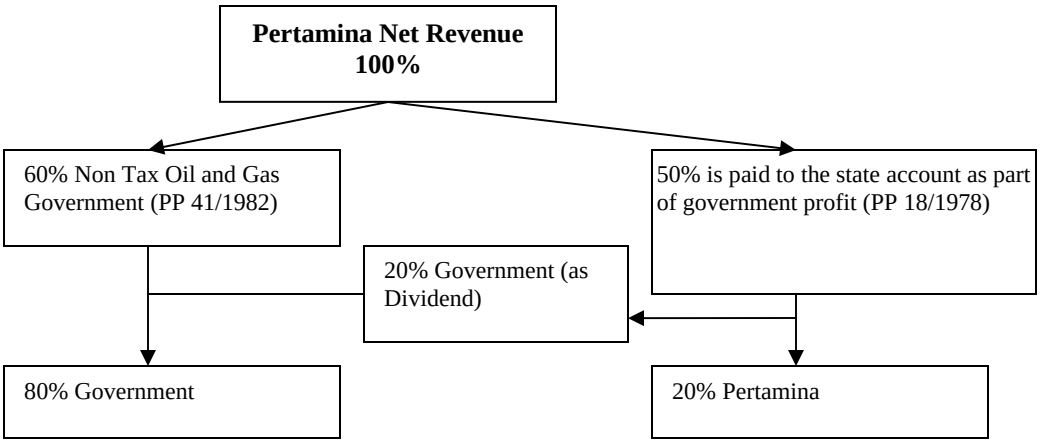
- The calculation and payment of retention and bonus is conducted alone and separated from the calculation and payment of own Pertamina operation from Net Operating Income.

[14] Tax rate can change and is subject to tax regulation. As of 2001 the tax rate is 44 percent.

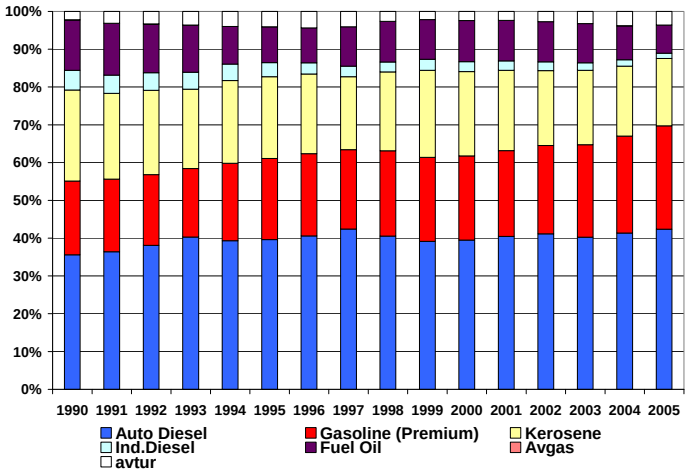
Summary of PP 18/1978 on calculation and utilization of profit and procedure of managing and utilizing Pertamina public reserve and PP 73/2001 on the revision of calculation and utilization of profit and procedure of managing and utilizing Pertamina public reserve.

- Pertamina profit is equal to net revenues from company operations minus payments to the state account and including retention (fee) received by Pertamina.
- Pertamina profit:
    - 50 percent is paid to the state account as part of government profit.
    - The remaining is used for: general reserve, targeted reserved, production services and gratification for staff, government board of directors and board of commissioners, other utilizations.

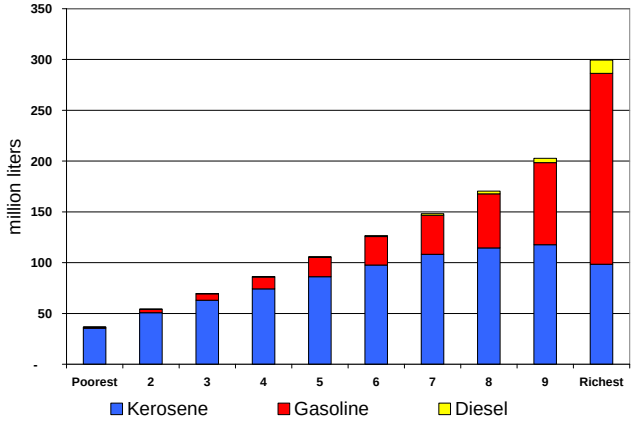
Annex 7. Sharing of Revenue between Pertamina and Government of Indonesia



Annex 8. Domestic fuel consumption (BBM)



Annex 9. Consumption of fuel derivatives



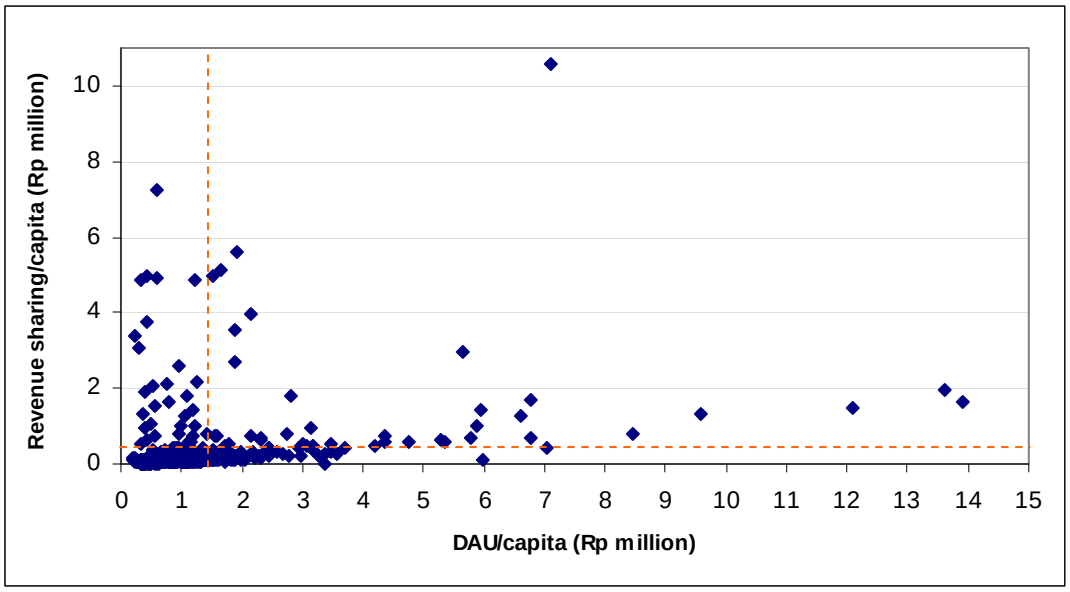
Annex 10. Geographic distribution of Revenue Sharing for year 2005

Province	Revenue sharing tax (Bln. Rph)	Revenue sharing natural resources (Bln. Rph)	Total (Bln. Rph)	Population (million)	Natural resource rev sharing/cap (thousand Rp)	Total Rev Sharing/cap (thousand Rp)
Kalimantan Timur	1,588	9,121	10,709	3	3,245	3,810
Riau	1,112	7,227	8,339	5	1,567	1,808
Irian Jaya Barat	661	131	793	1	204	1,233
Nanggroe Aceh Darussalam	648	3,684	4,332	4	912	1,073
Papua	613	775	1,388	2	413	740
Riau Kepulauan	411	526	937	1	413	735
DKI Jakarta	4,788	498	5,287	9	56	597
Sumatera Selatan	960	1,735	2,695	7	257	399
Maluku Utara	210	88	298	1	99	337
Jambi	493	264	757	3	99	285
Kalimantan Tengah	395	114	509	2	60	267
Kalimantan Selatan	468	345	813	3	106	251
Bangka Belitung	116	141	257	1	133	242
Maluku	236	15	251	1	12	199
Sulawesi Barat	93	8	100	1	8	101
Lampung	307	404	712	7	56	99
Sulawesi Tenggara	177	17	194	2	9	99
Sulawesi Selatan	648	81	728	7	11	97
Sulawesi Tengah	210	11	221	2	5	97
Gorontalo	81	2	84	1	3	92
NTB	198	173	371	4	42	90
Bengkulu	132	7	139	2	4	87
Banten	791	3	794	9	0	85
Sulawesi Utara	175	7	182	2	3	84
Kalimantan Barat	322	20	342	4	5	84
Bali	283	3	286	3	1	83
Sumatera Utara	989	19	1,008	12	2	82
Sumatera Barat	314	22	336	5	5	73
Jawa Barat	2,262	403	2,664	39	10	68
NTT	274	6	280	4	1	66
Jawa Timur	2,008	49	2,058	37	1	56
DI Yogyakarta	176	2	178	3	1	54
Jawa Tengah	1,195	24	1,219	33	1	37

Annex 11. Sub-national revenues and equalization

Indonesia's transfer system is designed to reduce disparities in the country. The DAU, which finances almost two third of sub-national spending, has been the predominant tool in Indonesia's fiscal decentralization policy (World Bank 2007a). However, with the increase in the price of oil, disparities widen as regions with a high share of natural resources are benefitting disproportionately. At the same time, the DAU has increased significantly over the past years providing much needed resources to poor districts. The horizontal doted line in the below figure marks the highest quintile with respect to per capita revenues from revenue sharing (substantially from oil and gas) while the vertical dotted line marks the national average per capita DAU allocation. All the dots above the horizontal line represent the richest districts, which should have enough fiscal resources to fund their expenditure responsibilities without the DAU. Some of these districts were receiving per capita DAU allocations above the national mean (dots above and to the right of the dotted lines in the figure) but this practice has ended with the phasing out of the "hold-harmless" policy in 2008.

Figure Annex 11. Sub-national revenues by type of revenue



Source: World Bank calculations based on Ministry of Finance data. DAU data is for 2007, Natural Resource Revenues represent 2006 data.

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