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Mitigating Distributional Impact of Fuel Pricing Reform

The Indonesian Experience

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In 2005, the Indonesian government implemented a massive fuel price increase. While the benefits of the reform on efficiency grounds have been widely acknowledged, there is still debate about whether the reform was equitable. That question is answered in this paper using a Computable General Equilibrium (CGE) model with disaggregated households that allows for a rich and accurate distributional story. Analysis of various counter-factual scenarios analysis of the reform is carried out. It suggests that the reform could have been progressive if it increased only vehicle fuel prices. However, it tends to increase inequality especially in urban areas when the price of domestic fuel (kerosene) is also increased. Proper and effective compensation is important in mitigating the distributional cost or poverty impact of the reform. A uniform cash transfer to poor households that disregards poor households' heterogeneity tends to over-compensate the rural poor but under-compensate the urban poor.

Keywords: Fuel pricing reform, distribution, Indonesia.

I. Introduction

It has been suggested[1] that global fuel subsidies could amount to between US$250 and US$300 billion a year — enough to comfortably pay off sub-Saharan Africa's entire debt burden and still leaves billions of dollars to spare. These subsidies create a distortion by disregarding the economic value of fuel, creating excess consumption and discouraging energy substitution.

The fossil fuel subsidy is also regarded as a major cause of environmental problems, not only from the pollution created by excessive fossil fuel combustion by industry and vehicles, but also due to excessive traffic and the inconvenience it causes. The fuel subsidy also discourages the development of a more traffic-free public transport infrastructure. In addition to the above efficiency-related problem, the fuel subsidy is often regarded as inequitable. Vehicle owners benefit greatly from the subsidy, and fuel pricing reform has been widely advocated as a means of promoting efficiency as well as equity.

All of these issues are present in Indonesia. They have attracted increased attention since 2004, when the country became a net oil importer

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TABLE 1
Fuel Subsidy, Government Budget, and Oil Price, 1999–2006

	1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Fuel Subsidy (Rp trillion)	40.9	53.8	68.4	31.2	30.0	59.2	89.2	62.7
Government Spending (Rp trillion)	201.9	188.4	260.5	322.2	376.5	430.0	411.6	470.2
Percent	20.26	28.56	26.25	9.68	7.97	13.77	21.67	13.34
World crude oil price ($/barrel)	17.12	27.07	22.72	23.47	27.1	34.62	49.86	60.32

SOURCE: Ministry of Finance, and U.S. IEA.

of oil. However, in the Indonesian context, the biggest concern is the fiscal burden of the subsidy. For example, in the year 2000 the fuel subsidy amounted to 40.9 trillion rupiah, or almost a third of total central government spending (see Table 1). Since the government has always faced resistance with regard to reducing this subsidy, spending has been heavily constrained by fluctuations in the world oil price.

When the world oil price started to increase rapidly from 2004 onward, the government saw no option but to reform its fuel pricing policy radically. In October 2005, the government made a big adjustment in fuel prices following a rapid rise in the world crude oil price. So, in the end, it was the international market and not efficiency arguments from energy-pricing reformists that caused the government to implement the reform.

Over the past few years, reduction of the fuel subsidy has been one of the Indonesian government's main agendas. It has made a gradual reform in fuel pricing policy through adjustments in fuel prices since the year 1999 (see Figure 1).

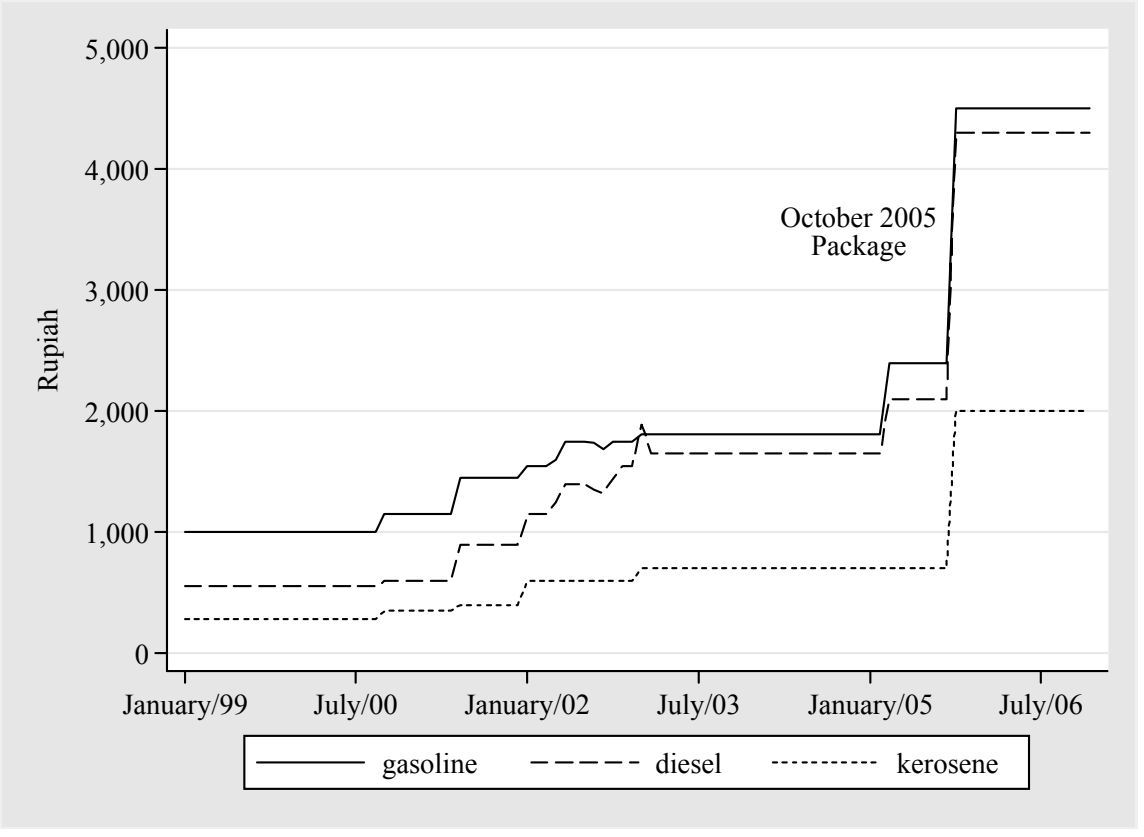
However, strong opposition from the public and parliament has slowed the reform. Most arguments against the reform were based on the concern that increased fuel prices would lead to increases in other prices, which would reduce purchasing power and exacerbate poverty. The rise in fuel prices was feared to create a chain reaction, affecting other costs like transportation and other important commodities, thereby hurting the economy, and the most vulnerable.

The reform package was announced on 1 October 2005, increasing retail fuel prices for gasoline, kerosene, and diesel. The price of gasoline was increased by 87.5 per cent, diesel by 104.7 per cent and kerosene, surprisingly, by 185.7 per cent. The huge increase in the kerosene price stirred doubt among many economists who initially regarded subsidy reduction as equitable over the distributional direction of this reform[2] because kerosene is the primary energy source for urban poor.

The main objective of this paper is to analyse the distributional impact of fuel pricing reform as implemented by Indonesia in October 2005. The questions addressed are whether removing the fuel subsidy in Indonesia constitutes a progressive reform; whether the cash transfers that complemented the reform mitigate its distributional impact effectively; and what lessons can be learned for mitigating similar reform in the future? INDONESIA-E3, a Computable General Equilibrium (CGE) model with highly disaggregated household, is used for the analysis.

The paper is organized as follows: Section II discusses some relevant previous work. Section III briefly describes the model. Section IV discusses the scenarios, and the results are discussed in section V. Section VI concludes.

FIGURE 1
Price of Gasoline, Diesel, and Kerosene, 1999–2006



SOURCE: PERTAMINA.

II. Previous Studies

The World Bank (2006) is the only available study that assesses the distributional impact of the October 2005 Package. Other studies do exist but not explicitly analyse the October 2005 reform. These are Clements, Gupta, and Jung (2003), Sugema et al. (2005), and Ikhsan et al. (2005) published before the October 2005 package was implemented.

The World Bank (2006) looks at the impact of the increase in various fuel prices on household expenditure using SUSENAS 2004 data. The result suggests that, in the absence of any compensatory measures, the October 2005 package would have led to a 5.6 per cent increase in poverty incidence. Compensation in the form of an unconditional cash transfer to poor and near-poor households would, on average, more than offset the negative impact of the fuel price increase.

Ikhsan et al. (2005) analyses the distributional impact of the March 2005 fuel price adjustment that increased the price of kerosene to industry[3] by 22.22 per cent; gasoline by 32.6 per cent; diesel for transportation by 27.27 per cent; diesel for industry by 33.33 per cent; and diesel oil and fuel oil by 39.39 per cent. Ikhsan et al. (2005) used a

combination of a Computable General Equilibrium (CGE) model[4] and a simulation using household survey data. The result suggests that poverty rises by 0.24 per cent without compensation, whereas poverty falls by 2.6 per cent with fully-effective compensation and by 1.89 per cent with compensation that is 75 per cent effective (Ikhsan et al. 2005, Table 9). The policies simulated reduce inequality slightly.

The March 2005 fuel price adjustment is also analysed by Sugema et al. (2005), where the poverty impact analysis is carried out using a SUSENAS-based micro-simulation, and the macro-impact is analysed using an ORANI-based CGE model. The result suggests poverty would rise by 1.95 per cent. This poverty impact seems relatively high considering the petroleum price only rises by 29 per cent.

Clements, Gupta, and Jung (2003) examine the scenario of increasing the price of petroleum products by 25 per cent using a CGE model. The study suggests that aggregate real household consumption falls from 2.1 per cent to 2.7 per cent following a 25 per cent increase in the price of petroleum products. Urban and high-income households suffer the most, indicating the progressivity of the reform.

From a methodological point of view, among the weaknesses of those studies is the incompleteness or inaccuracy in the distributional analysis. In a market economy, the effect of a policy shocks on household's welfare works through both the market for commodities (through changing commodity prices) and the market for factors of production (through changing factor prices or employment). The change in real expenditure of various households then depends on both expenditure and factor ownership patterns of each of the respective households. Taking into account either one gives a one-sided story. This incompleteness could be solved by an economy-wide framework, but using a model that has highly disaggregated households to maintain accuracy in distributional story. It is very important to acknowledge that commodity prices, household expenditure, factor prices, and household income are all endogenous and solved simultaneously in the model. Household's heterogeneity is also inherent and should be integrated in the model.

The World Bank's (2006) assessment, for example, is a partial equilibrium story, overlooking the factor-income effect. Ikhsan et al.'s (2005) study, despite combining a CGE model and a micro-simulation, is a top-down approach, where commodity prices are exogenous in the micro-simulation, and commodity prices from the CGE model are determined by a single representative household. There is no connection between the economy-wide model and SUSENAS micro-simulation in Sugema et al.'s (2005) study. Finally, the Clements et al. (2003) study was based on only ten representative households, reducing the accuracy of the distributional analysis.

The innovation used in the model for this paper includes highly disaggregated households into one integrated economy-wide framework. Because the households are classified by centile of real expenditure per capita, the model is not only able to capture expenditure and factor ownership patterns of households, but also distributional impacts. The cumulative density function (CDF) of real expenditure per capita before and after the shock can be pictured. Therefore, an objective answer to the question of whether a policy shock is progressive or regressive is readily available. While Warr (2006) used this approach for Lao PDR to assess the poverty impact of large irrigation investments, this paper is the first to apply such a model to Indonesia.

III. The Computable General Equlibrium (CGE) Model

The analysis uses INDONESIA-E3 (Economy-Equity-Environment) model, a CGE model with a strong feature in distributional analysis. The structure of the model is based on ORANI-G model (Horridge 2000) with at least two important modifications. First, it allows substitution among energy commodities, and between primary factors (capital, labour, and land) and energy. In this respect, the model has thirty-eight industries, and forty-three commodities with detailed energy sectors. Energy commodities include coals, natural

gas, gasoline, automotive diesel oil, industrial diesel oil, kerosene, LPG, and other fuels. Secondly, a multi-household feature is added to the standard model not only to the expenditure or demand side of the model, but also to the income side of the households. The household demand system follows the Linear Expenditure Demand (LES) system, where its parameters are econometrically estimated.[5]

The integration of highly disaggregated households adequate for accurate distributional analysis is made possible by constructing an Indonesian Social Accounting Matrix (SAM) 2003, which serves as the core database to the CGE model. The SAM is specially constructed, consisting of 181 industries, 181 commodities, and 200 households (100 urban and 100 rural households grouped by centile of real expenditure per capita). The SAM (with 768 × 768 accounts) constitutes the most disaggregated SAM yet for Indonesia at both the sectoral and household level. The data used for constructing the SAM include the Indonesian Input-Output Table, the official SAM and, most importantly, household level survey data (SUSENAS). Details on construction of the SAM can be found in Yusuf (2006); the structure of the SAM can be seen in Table 2.

IV. Scenario and Simulation Strategy

Table 3 summarizes the scenarios to be simulated, all of which are related to the October 2005 package of fuel pricing reforms, i.e., increasing the price of gasoline by 87.5 per cent, diesel by 104.7 per cent, and kerosene by 185.7 per cent.[6]

The objective of Simulation 1 (SIM 1 NO-KEROSENE) is to see what the distributional effect would have been if the kerosene price increase not been part of the reform. Many Indonesian economists believe that a fuel price subsidy benefits the rich more, hence its removal or reduction will hurt them more than the poor, and would therefore be considered progressive. This expectation is usually based on anecdotal evidence of vehicle ownership where vehicle fuels are an important part of the expenditure of the rich. However, because kerosene is an important part of the consumption of the poor in urban areas, it may be incorrect to generalize that a subsidy on all types of fuels is regressive. In this scenario, the price of gasoline and diesel will be increased, but kerosene will be excluded. Compensation is also excluded to examine the initial distributional direction of the impact of the subsidy reduction policy. In Simulation 2 (SIM 2 ALL FUELS), increasing the price of gasoline is included. Simulation 3 (SIM 3 UT) trys to mimic exactly what was implemented by the government: an increase in the price of gasoline, diesel, and kerosene, plus unconditional cash transfers to targeted households.

In all the simulations, initial or ex-ante poverty incidence is based on the official SUSENAS-based poverty incidence in 2005.[7] However, it transpired that the target of the compensation was not only those below the official poverty line, but also those known as the "near poor". The number of targeted households was therefore greater than the number of the "officially" poor. Based on data on the number of recipients of the compensation, the cash transfers in the simulation will be given to the lowest 24 per cent of the population in urban areas, and the lowest 42 per cent in rural areas (twice the percentage of the poor in the respected population). The total amount transferred is 18.3 trillion rupiah.[8]

Another issue that has not been well addressed in public discussion about the effectiveness of the compensation scheme is the rather simplistic approach of giving the same amount of money to all households across Indonesia. As a large country comprising thousands of islands, price levels vary greatly across regions. Simply by using information from the most recent household survey, it is easy to see that urban households will be hurt more than rural households by any jump in the kerosene price. Therefore, giving more money to the urban poor and less to the rural poor can be regarded as a sensible option. To examine this issue in Simulation 4 (SIM 4 UTUR), a slight modification to the scheme is simulated by giving different amounts of transfers to urban and rural households, recognizing the possibility that urban households would be affected more by the reform.

TABLE 2
Structure of 768 × 768 Indonesian SAM

		Activities *1…181*	*Commodity*		*Factor*		*Ind. Tax*	*S-I*	*Households* *1…200*	*Transfers*	*Enterprises*	*Govt*	*ROW*	*TOTAL*
			Domestic *1…181*	*Imported* *1…181*	*labour* *1…16*	*Ind. Tax* *Capital*								
Activities	1 … 181		MAKE Matrix											Industry Sales
Domestic Commo-dities	1 … 181	Domestic Intermedi-ate Input						Domestic Invest-ment	Domestic Hou. Con-sumption			Domestic Govt Con-sumption	Export	Total Dom. Demand
Imported Commo-dities	1 … 181	Imported Intermedi-ate Input						Imported Invest-ment	Imported Hou. Con-sumption			Imported Govt Con-sumption		Total Import
Labour	1 … 16	Salary and Wages											Labour used abroad	Total Labour Demand
Capital	Non-labour												Cap. used abroad	Capital Demand
Ind. Tax		Tax/ Subsidy		Tariff										Ind. Tax Reven.
Urban HH	1 … 100				Labour Income: Urban	Capital Income: Urban				Inter-Hous. Transfer			ROW transfer to HH	Total Hous. Income
Rural HH	1 … 100				Labour Income: Rural	Capital Income: Rural				Inter-Hous. Transfer			ROW transfer to HH	Total Hous. Income
Transfer									Transfer to HH					Int. Hou. Transter
S-I									Household Saving		Enterprise Saving	Govt Saving		Total Saving
Govern-ment							Ind.Tax Revenue		Direct Tax		Ent. Traps. to Govt	Inter G Transfer	ROW Tans. to Govt	Govt Revenue
Enter-prises						Enter-Enter-					Inter Ent. itans.		ROW Trans. to Enter.	Ente. Income
ROW				Import	Foreign Labour	Foreign Capital			HH Transfer to abroad		Ent Trans. to abroad	G. Transfer to abroad		Forex Outflow
TOTAL		Industry Costs	Dom. Supply	Import Supply	Labour Supply	Capital Supply	Ind. Tax Revenue	Total Invest.	Household Spending	Int. Hou. Transfer	Enter. Spending	Govt Spending	Forex Inflow	

TABLE 3
Simulation Scenarios

	Scenario	*Note*
SIM 1.	NO-KER	October 2005 Package without increasing kerosene price (Gasoline 87.5%, Diesel 104.7%)
SIM 2.	ALL FUELS	October 2005 Package (Gasoline 87.5%, Diesel 104.7%, Kerosene 185.7%)
SIM 3.	UT	October 2005 Package with unconditional cash transfers to targeted household of 1.2 million rupiah
SIM 4.	UTUR	October 2005 Package with unconditional cash transfers to targeted household with higher amount to urban household and lower amount to rural household (100% effectiveness)
SIM 5.	SUB	October 2005 Package with subsidy on education and health

Urban households receive 70 per cent more and rural households receive 30 per cent less, given the same budget.

The compensation scheme being an unconditional lump-sum cash transfer has attracted much criticism. Giving poor households total discretion as to how to spend the transfer has been seen as a less effective way of helping the poor compared to giving them education, for example. However, critics may be missing the point that this transfer is by nature compensation. The idea is to mitigate the adverse distributional effect of fiscal and efficiency-motivated reform. To look at this issue, in Simulation 5 (SIM 5 SUB), the compensation budget with the same amount is allocated through subsidizing the poor's expenditure on health and education, to compare its effectiveness in mitigating the fuel pricing reform.

V. Results and Discussion

V.1 Macroeconomic and Industry Results

Table 4 shows the impact of various different scenarios on selected macroeconomic variables and industry output. In all simulations, industry output falls as a result of the increase in the price of petroleum products. The increase in fuel prices lowers fuel demand, resulting in an immediate reduction in the output of the refinery industry. The final (new equilibrium) reduction in the output of petroleum refineries is around 8 per cent (relative to baseline without the reform) in all simulations except Simulation 1. Other industries that experience big contractions are those closely related to the petroleum refinery sector. For example, in Simulation 2, these are road transportation (–4.9 per cent), other transportation (–6.72 per cent), utility sectors (electricity by –3 per cent, and water and gas by –4.2 per cent), and some manufacturing industry (automotive by –4.4 per cent and rubber and products by –4.9 per cent). (After simulating an increase in the price of petroleum products, Clements, Gupta, and Jung (2003) report industries that experience a large contraction are similar to the industries just mentioned.)

V.2 Distributional Results

Table 5 summarizes the distributional results of the simulations while Figure 2 illustrates the impact of each scenario on household real expenditure, income, and household specific

TABLE 4
Simulated Macroeconomic and Industry Results
(In percentages)

Scenario	*1*	*2*	*3*	*4*	*5*
Macroeconomic					
Gross Domestic Product (real)	–1.72	–2.67	–2.68	–2.67	–2.42
Household expenditure	–2.61	–4.03	–4.03	–4.02	–3.65
Export	–1.72	–2.40	–2.46	–2.45	–2.07
Import	–2.38	–3.32	–3.40	–3.39	–2.86
Employment	–3.32	–5.52	–5.53	–5.52	–4.19
Industry output					
Paddy	–0.57	–1.22	–0.88	–0.97	–0.97
Other food crops	–1.04	–2.06	–1.81	–1.85	–1.81
Estate crops	–1.57	–2.81	–2.71	–2.72	–2.39
Livestock	–1.67	–3.13	–2.91	–2.94	–2.81
Wood and forests	–0.96	–1.71	–1.69	–1.70	–1.40
Fish	–1.08	–1.91	–1.76	–1.80	–1.76
Coal	–0.06	–0.12	–0.12	–0.12	–0.10
Crude oil	–0.14	–0.16	–0.17	–0.17	–0.15
Natural gas	–0.19	–0.21	–0.21	–0.21	–0.19
Other mining	–0.52	–0.75	–0.76	–0.76	–0.64
Rice	–0.52	–1.14	–0.79	–0.89	–0.91
Other food (manufactured)	–1.91	–3.37	–3.13	–3.16	–3.07
Clothing	–2.14	–3.71	–3.67	–3.68	–3.23
Wood products	–1.10	–1.98	–2.10	–2.11	–1.74
Pulp and paper	–2.32	–3.57	–3.63	–3.59	–2.02
Chemical product	–2.79	–4.08	–4.02	–4.03	–3.53
Petroleum refinery	–4.57	–7.93	–7.95	–7.95	–7.85
LNG	–0.83	–0.79	–0.79	–0.79	–0.77
Rubber and products	–3.34	–4.91	–5.09	–5.08	–4.35
Plastic and products	–1.97	–3.16	–3.18	–3.21	–2.80
Nonferrous metal	–1.09	–1.63	–1.61	–1.62	–1.34
Other metal	–1.53	–2.19	–2.22	–2.23	–1.85
Machineries	–3.16	–4.79	–4.95	–4.97	–4.27
Automotive industries	–3.10	–4.42	–5.02	–5.01	–4.03
Other manufacturing	–2.36	–3.87	–3.70	–3.73	–3.28
Electricity	–1.98	–2.99	–2.91	–2.86	–2.60
Water and gas	–2.98	–4.15	–4.49	–4.35	–3.78
Construction	–0.15	–0.22	–0.22	–0.22	–0.01
Trade	–1.95	–3.29	–3.17	–3.14	–2.81
Hotel and restaurants	–2.13	–3.78	–3.81	–3.73	–3.30
Road transportation	–3.53	–4.87	–4.91	–4.86	–4.32
Other transportation	–5.18	–6.62	–6.70	–6.66	–5.97
Banking and finance	–1.63	–2.72	–2.90	–2.85	–2.38
General government	–0.08	–0.12	–0.13	–0.13	–0.11
Education	–1.58	–2.52	–2.52	–2.40	7.29
Health	–1.50	–2.56	–2.51	–2.52	8.69
Entertainment	–2.26	–3.86	–4.22	–4.19	–3.29
Other services	–2.36	–3.65	–4.05	–4.00	–3.36

TABLE 5
Summary of Distributional Results

	SIM 1 PAKTO'05 NO-KER	*SIM 2 PAKTO'05 ALL FUELS*	*SIM 3 PAKTO'05 UT*	*SIM 5 PAKTO'05 UTUR*	*SIM 7 PAKTO'05 SUB*
Urban (percent)					
Ex-ante Poverty Incidence	11.370	11.370	11.370	11.370	11.370
Ex-post Poverty Incidence	12.525	14.002	12.485	11.400	12.311
Change in Poverty Incidence	1.155	2.632	1.115	0.030	0.941
Rural (percent)					
Ex-ante Poverty Incidence	19.510	19.510	19.510	19.510	19.510
Ex-post Poverty Incidence	20.067	21.341	17.415	19.158	19.864
Change in Poverty Incidence	0.557	1.831	–2.095	-0.352	0.354
Urban + Rural (percent)					
Ex-ante Poverty Incidence	15.803	15.803	15.803	15.803	15.803
Ex-post Poverty Incidence	16.632	17.999	15.170	15.625	16.424
Change in Poverty Incidence	0.829	2.196	–0.633	–0.178	0.621
Urban					
Ex-ante Gini Coefficient	0.347	0.347	0.347	0.347	0.347
Ex-post Gini Coefficient	0.344	0.352	0.345	0.341	0.346
Change in Gini Coefficient	–0.003	0.005	–0.001	–0.006	–0.001
Rural					
Ex-ante Gini Coefficient	0.277	0.277	0.277	0.277	0.277
Ex-post Gini Coefficient	0.272	0.274	0.258	0.262	0.268
Change in Gini Coefficient	–0.005	–0.003	–0.019	–0.014	–0.009
Urban + Rural					
Ex-ante Gini Coefficient	0.350	0.350	0.350	0.350	0.350
Ex-post Gini Coefficient	0.345	0.350	0.339	0.340	0.344
Change in Gini Coefficient	–0.005	0.000	–0.011	–0.010	–0.006

consumer price index (CPI) for urban and rural households, as well as across centiles. The percentage change in real expenditure is used to calculate the inequality and poverty incidence after each shock (ex-post).

The change in household nominal income and household-specific CPI indicate how the expenditure and factor income patterns of each household contribute to the distributional results. Household-specific CPI is a consumption-weighted average of the price increase of every commodity consumed by the respective household. It reflects the contribution of its household expenditure pattern and behavior. On the other hand, the change in household income reflects the changes in all sources of household income, comprising income from labour by skill types, capital, land, and transfers (including from compensation).

Before the implementation of the fuel pricing reform in October 2005, the fuel subsidy was long regarded as inequitable. To some extent, Simulation 1 (SIM 1 NO-KEROSENE) supports this view. The fuel subsidy on gasoline and diesel has been indeed inequitable, so that cutting the subsidy on these vehicle fuels would be a progressive reform.

The declining pattern of the fall in real expenditure over centiles of expenditure as shown

in Figure 2 suggests progressivity. This happens in both urban and rural areas. This progressivity is driven both by household consumption (by the pattern of the change in household CPI) and income patterns (by the pattern of the change in household income). Richer households tend to experience a greater increase in consumer prices, reflecting their higher dependence on non-kerosene vehicle fuel consumption. The fall in their income is also higher compared to poorer households, reflecting the adjustment in the factor market, which does not favor the factor endowment of high income households.

However, the urban poor is a bigger consumer of kerosene and the reform package implemented actually increased its price much more than other fuels. Kerosene's administered price was drastically increased (by 185.7 per cent), much more than the increase in other fuel prices (87.5 per cent for gasoline, and 104.7 per cent for diesel). Simulation 2 attempts to examine whether a reform implemented in this way can be regarded as progressive.

The simulation produces a markedly different distributional story from SIM 1 (NO KEROSENE). In urban areas, real expenditure of the poorest 20 per cent of households declines by 5–7 per cent, whereas the richest 20 per cent of households experience a decline of only 2–4 per cent. The pattern of the fall in the real expenditure of urban households clearly increases over centiles. As a result, inequality increases in urban areas.

In contrast, the distributional impact is still slightly progressive in rural areas. Real expenditure of the poorest 20 per cent falls by around 3 per cent, while the richest 20 per cent falls by around 4 per cent. Overall, the impact reduces inequality. Nationwide (urban and rural areas combined), the October 2005 package without compensation is neutral, with a negligible impact on the Gini coefficient.

As Figure 2 suggests, the main driver of the regressive result in urban areas is the dependence of urban lower income households on kerosene consumption, and fuel-related commodities such as transportation. This is reflected by the increase in their household-specific CPI, which is far higher than that of higher income households.

As illustrated in Figure 2 both in urban and rural areas, richer households experience more adverse income shocks. This indicates that the impact of fuel price rises on industrial employment of capital and labor are biased against urban and richer households. In rural areas, this helps in shaping the progressivity of the reform. However, in urban areas, because the impact through the consumption pattern is far more severe, the reform cannot avoid being regressive.

The October 2005 package without compensation may have a significant impact on poverty as well. As shown in Figure 3, poverty incidence increases by 2.6 per cent in urban areas and by 1.8 per cent in rural areas.[9] In all, poverty incidence nationwide, rises by 2.2 per cent. Using the population data for 2005, it suggests that, without compensation, the reform package could have driven around 5 million people into poverty. Analysis of the "what-if" scenarios in SIM 2 suggests that, while the reduction in fuel subsidies as part of the fuel pricing reform has a strong basis in term of economic efficiency, its implementation can have important distributional effects. Reducing the fuel subsidy per se, without careful prior examination as to how the reform will affect the poor, may generate an adverse distributional impact.

The result of SIM 3 (UT) does not support the claim that the cash transfer more than compensates for the adverse welfare impact on the poor. This is true only in the case of the rural poor. Although some of the poorest centiles of the urban poor gain positive (nominal) income because of the transfer, when it is deflated by the increase in their specific CPI, the net real expenditure effect is still negative. In urban areas, none of the targeted households experience a positive welfare gain. The scheme over-compensates the rural poor and under-compensates the urban poor. However, the October 2005 package reduces inequality, especially in rural areas, reducing the Gini coefficient. This decline in inequality is driven mainly by the significant increase in the real

FIGURE 2A
SIM 1 (No Kerosene, No Compensation)

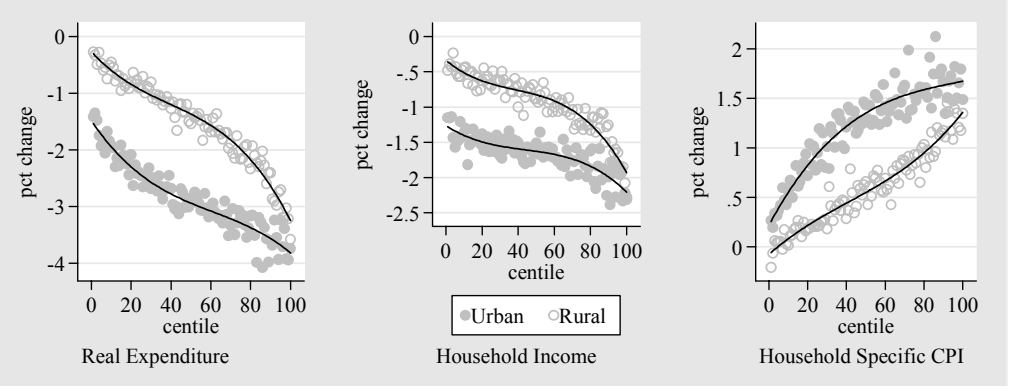


FIGURE 2B
SIM 2 (All Fuels, No Compensation)

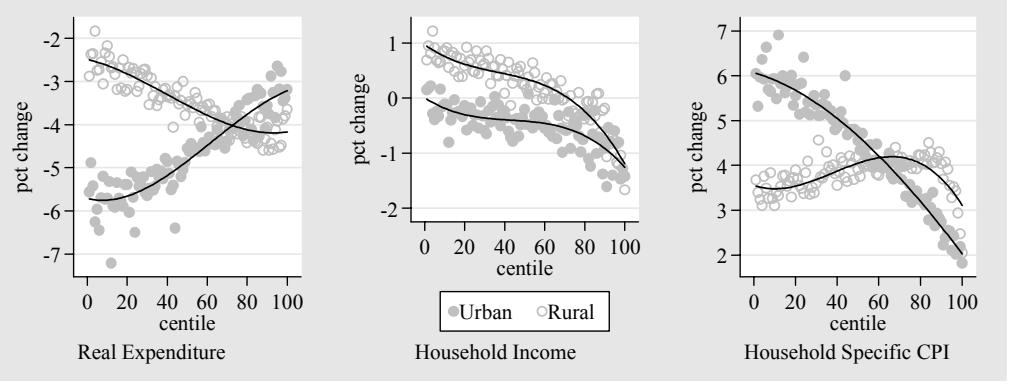


FIGURE 2C
SIM 3 (All fuels, Uniform Cash Compensation)

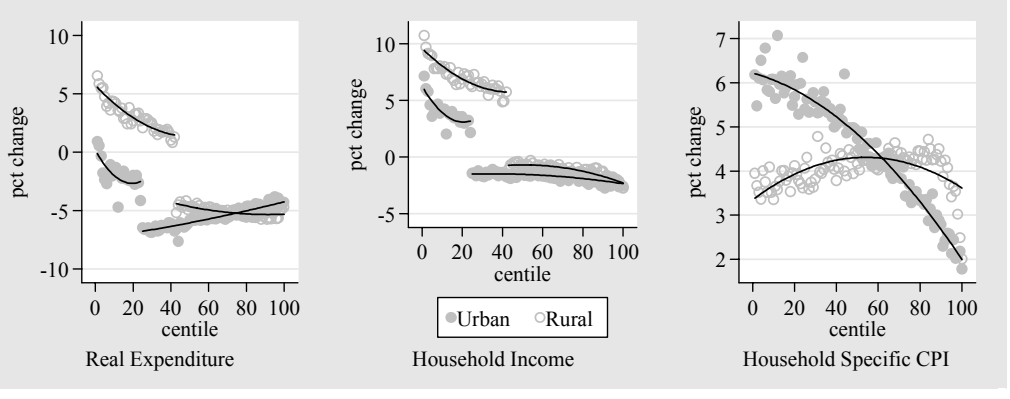


FIGURE 2D
SIM 4 (All fuels, Compensation, More to Urban, Less to Rural)

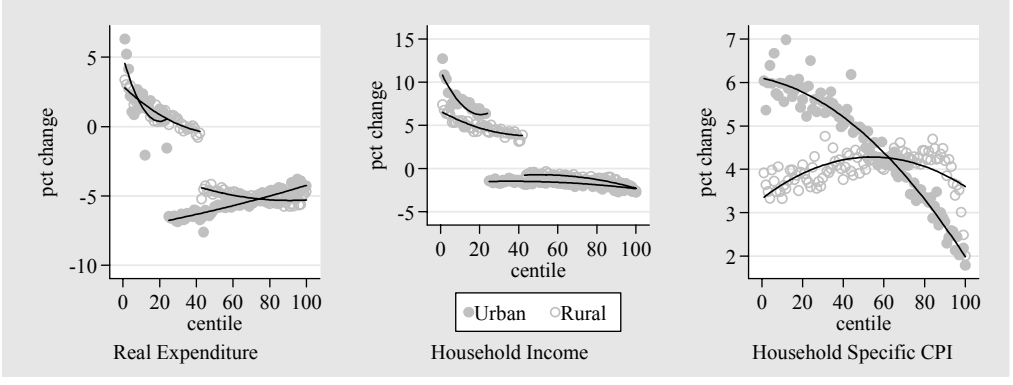
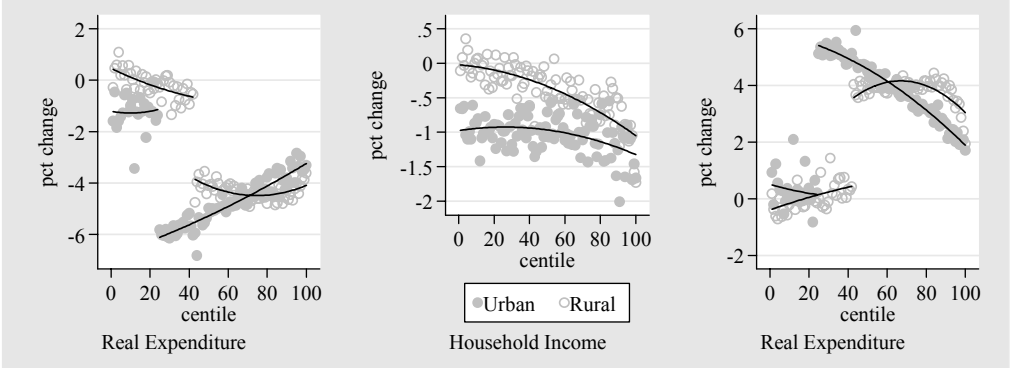


FIGURE 2E
SIM 5 (All fuels, Compensation, Price Subsidy on Health and Education)



expenditure of the rural poor; the less severe fall in the real expenditure of the urban poor (because of compensation) than the urban non-poor; and the sharp decline in real expenditures of the non-targeted (non-poor or richer) households.

Figure 4 illustrates the poverty impact of SIM 3 (UT). Due mainly to under-compensation of the urban poor, the October 2005 package (with compensation) still cannot prevent urban poverty incidence from rising. However, the overall net nationwide impact is a slight decline in poverty incidence. As the population is higher in rural areas, the decline in rural poverty incidence helps prevent an overall increase in the nation-wide poverty incidence.

Modifying the compensation scheme by giving more to urban households (SIM 4 UTUR) may prevent a significant number of urban households from falling into poverty, while leaving the poverty incidence in rural areas intact. In this simulation, the poverty incidence in urban area increases by a negligible amount, in contrast to 1.1 per cent if the amount of money is uniform across urban and rural households. In rural areas, poverty incidence still falls. The number of people in urban areas falling into poverty due to the reform might have been reduced significantly had the compensation been modified in this way.

The purpose of the compensation scheme is to mitigate the poverty or distributional impact of a

FIGURE 3
Simulated Poverty Impact of SIM 2 (No Compensation)

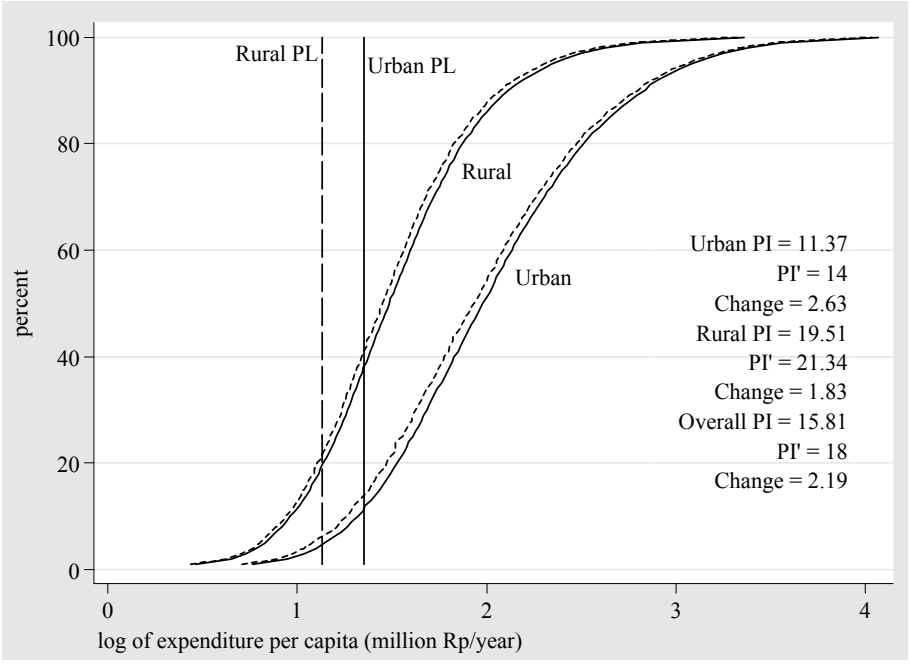
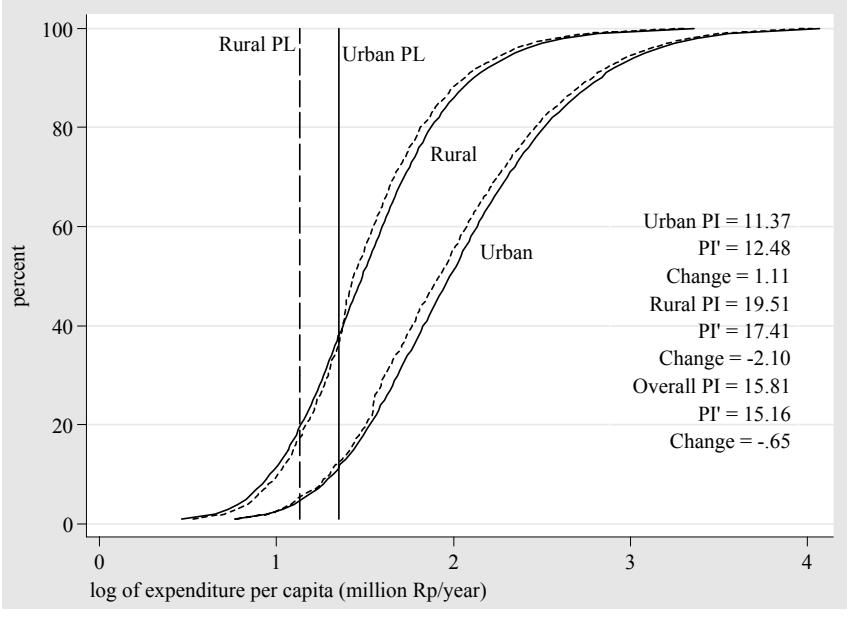


FIGURE 4
Simulated Poverty Impact of SIM 3 (With Compensation)



reform. It is not a structural poverty eradication programme. The objective of the scheme is simply to compensate households for any adverse impacts of the reform. Therefore, even if the uniform compensation scheme could potentially reduce poverty nationwide due to the over-compensation in rural areas, if this was at the cost of a huge increase in poverty in urban area, a slightly modified compensation scheme may still be preferable. In terms of policy effectiveness, it might even have another advantage by minimizing resistance to the reform due to the fact that the urban poor are generally stronger politically than the rural poor.

SIM 5 (SUB) tries to reveal the likely distributional impact of a price subsidy given to targeted households in the form of an education and health subsidy (using the same budget as the cash transfers). The results suggests that the inequality impact is neutral in urban areas, progressive in rural areas and slightly progressive nationwide. However, because the expansion in the education and health sectors increases demand for more skilled labour and capital, for which higher income households have proportionally greater endowments, it creates regressive results through changes in the income pattern. The pattern of the fall in household income shows increasing trends towards higher income groups (see Figure 2). In urban areas, the progressivity is weakened by the high dependence of the urban poor on kerosene and other fuel-related consumption, such as transportation.

What is most important, however, is that the fall in household purchasing power (as indicated by the increase in household specific CPI) does not help compensate the poor. In both urban and rural areas, almost all households (including the poor) experience a fall in real expenditure. As a result, poverty rises in urban areas. In contrast to the cash transfers, providing compensation through education and health subsidies increases poverty in rural areas. Because most of the poor population is rural, poverty incidence rises nationwide. A subsidy on health and education may be good as an incentive for human capital investment and a part of a structural poverty alleviation programme, but it is not necessarily effective as a means of short-run compensation to mitigate the impact of a fuel pricing reform.

VII. Concluding Remarks

In 2005, the Indonesian government implemented a massive fuel price increase. While the benefits of the reform on efficiency grounds have been widely acknowledged, whether the reform was equitable is still debated.

This question was answered in this case study using a CGE model with disaggregated households that allows for a rich and accurate distributional story. With this method, an analysis was carried out of the recent energy pricing reform in Indonesia (October 2005 Package) using various counter-factual scenarios.

The simulations suggest the reform could be progressive if only vehicle fuel prices are increased. However, if the price of domestic fuel (kerosene) is also increased at the magnitude implemented in October 2005, this would tend to increase inequality, especially in urban areas. From the comparison of various different scenarios, we conclude that proper and effective compensation is necessary to mitigate the distributional cost or poverty impact of the reform.

Uniform cash transfers to poor households without regard to the latter's heterogeneity tend to over-compensate the rural poor but under-compensate the urban poor. Other results suggest that non-cash compensation in the form of subsidizing education and health for the poor may not be effective in mitigating the reform's impacts, despite its possible desirability for longer-term poverty alleviation.

NOTES

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1. See, for example, NEF (2004).
2. Among others are Azis (2006), Oktaviani et al. (2005), and many other commentators in the media.
3. Kerosene for domestic household use was not increased.
4. It used The INDOCEEM model, an Indonesian CGE model based on ORANI-G developed initially by Monash University and the Indonesian Ministry of Energy.
5. For a more detailed description of the model, refer to Yusuf (2007).
6. To exactly represent the rate of the price increase as announced by the government on 1 October 2005, in the simulation, the price of fuels is set exogenously and the subsidy rate is set to be determined endogenously in the model.
7. The poverty line is calculated based on this official poverty incidence. This poverty line is then used to calculate ex-post poverty incidence from ex-post distribution of real expenditure per capita. The calculation of poverty incidence is all in real term based on the change in real expenditure per capita. The real poverty line, then, is a constant.
8. At the 2003 price level, since the model database is using SAM 2003. For comparison with the actual amount of transfers, it is calculated that with 19.2 million households as beneficiaries, the actual amount at the 2005 price level will be around 23 trillion rupiah.
9. Note that the poverty line in Figure 3 does not change due to the shocks because all variables are in real terms.

REFERENCES

Arndt, Channing. "An Introduction to Systematic Sensitivity Analysis via Gaussian Quadrature". Technical Report 305, Center for Global Trade Analysis, Department of Agricultural Economics, Purdue University, 1996.

Azis, I. J. "A Drastic Reduction of Fuel Subsidies Confuses Ends and Means". *ASEAN Economic Bulletin* 23, no. 1 (2006): 114–36.

Basri, M. Chatib and Arianto Patunru. "Survey Of Recent Developments". *Bulletin of Indonesian Economic Studies* 42, no. 3 (2006): 295–319.

BPS. "Tingkat Kemiskinan di Indonesia, 2005–2006". Technical report Biro Pusat Statistik. *Berita Resmi Statistik*. Jakarta: 2006.

Clements, Benedict J., Sanjeev Gupta and Hong-Sang Jung. "Real and Distributive Effects of Petroleum Price Liberalization: The Case of Indonesia". IMF Working Papers 03204, International Monetary Fund, 2003.

ESMAP. "Coping with Higher Oil Prices". Technical report Energy Sector Management Assistance Program, The World Bank, 2006.

Horridge, Mark. "ORANI-G: A General Equilibrium Model of the Australian Economy". Centre of Policy Studies/ IMPACT Centre Working Papers op-93 Monash University, Centre of Policy Studies/IMPACT Centre, 2000. Available at <http://ideas.repec.org/p/cop/wpaper/op-93.html>.

Ikhsan, M., T. Dartanto, Usman and H. Sulistyo. "Kajian Dampak Kenaikan Harga BBM 2005 terhadap Kemiskinan". LPEM Working Paper, 2005. <http://www.lpem.org>.

Manning, Chris and Kurmya Roesad. "Survey of Recent Developments". *Bulletin of Indonesian Economic Studies* 42, no. 2 (2006): 143–70.

NEF. "Price of Powers". New Economics Foundation, London, 2004. Available at <http://www.neweconomics.org>.

Oktaviani, R., D. Hakim, S. Sahara and H. Siregar. "The Impact of Fiscal Policy on Indonesian Macroeconomic Performance, Agricultural Sector and Poverty Incidences (A Dynamic Computable General Equilibrium Analysis)". Report to the Poverty and Economic Policy (PEP) Network 2005. <http://www.pep-net.org/>.

Pearson, Ken and Charming Arndt. "Implementing Systematic Sensitivity Analysis Using GEMPACK". GTAP Technical Papers 474, Center for Global Trade Analysis, Department of Agricultural Economics, Purdue University, 2000.

Sugema, I., M. Hasan, R. Oktaviani, Aviliani and H. Ritonga. "Dampak Kenaikan Harga BBM dan Efektivitas Program Kompensasi". INDEF Working Paper, 2005. <http://www.indef.or.id/download/pubs/BBM.PDF>.

Warr, P. "The Gregory Thesis Visits the Tropics". *Economic Record* 82, no. 257 (2006): 177–94.

World Bank. *Making the New Indonesia Work for the Poor*. World Bank, 2006.

Yusuf, Arief Anshory. "Constructing Indonesian Social Accounting Matrix for Distributional Analysis in the CGE Modeling Framework". Working Papers in Economics and Development Studies 200604, Department of Economics, Padjadjaran University, 2006. Available at <http://ideas.repec.org/p/unp/wpaper/200604.html>.
———. "Equity and Environmental Policy in Indonesia". Ph.D. thesis, Australian National University, 2007.

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