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Searching for Equitable Energy Pricing Reform for Indonesia*

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Abstract

Indonesian government implemented a massive fuel price increase in 2005. While the benefit of the reform from efficiency ground had been widely acknowledged, whether such a reform was equitable still open for debate. In this paper, this question is answered using a Computable General Equilibrium (CGE) model with disaggregated households that allows for rich and accurate distributional story. Various counter-factual scenarios analysis of the reform is carried out. It suggests that the reform could have been progressive if it increases only `vehicle fuel' prices. It, however, tends to increase inequality especially in urban area when the price of domestic fuel (kerosene) is also increased. Proper and effective compensation matters in mitigating the distributional cost or poverty impact of the reform. A uniform cash transfer to poor households disregarding poor households' heterogeneity tends to over-compensate rural but under-compensate the urban poor.

Keywords: Energy pricing reform, Distribution, Indonesia
JEL Classification: D30; D50

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1 Introduction

It was suggested[1] that the global fuel subsidy could amount to between 250 and 300 billion dollars a year, which could comfortably pay off sub-Saharan Africa's entire debt burden and still leaves billions of dollars to spare. The fuel subsidy creates a distortion by disregarding the economic value of fuel, creating excess consumption and discouraging energy substitution. The fuel subsidy has been a constraint on the agenda to switch the future direction of the country's energy mix following Indonesia being a net oil importer since 2004.

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 most big Indonesian cities, this is already a major public concern.

In addition to the above efficiency-related problem, the fuel subsidy is often regarded as inequitable. Vehicle owners benefit greatly from the subsidy, and energy pricing reform has been widely advocated as a means of promoting efficiency as well as equity.

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 always has a political constraint with regard to reducing this subsidy, spending has been heavily constrained by the fluctuation in the world oil price.

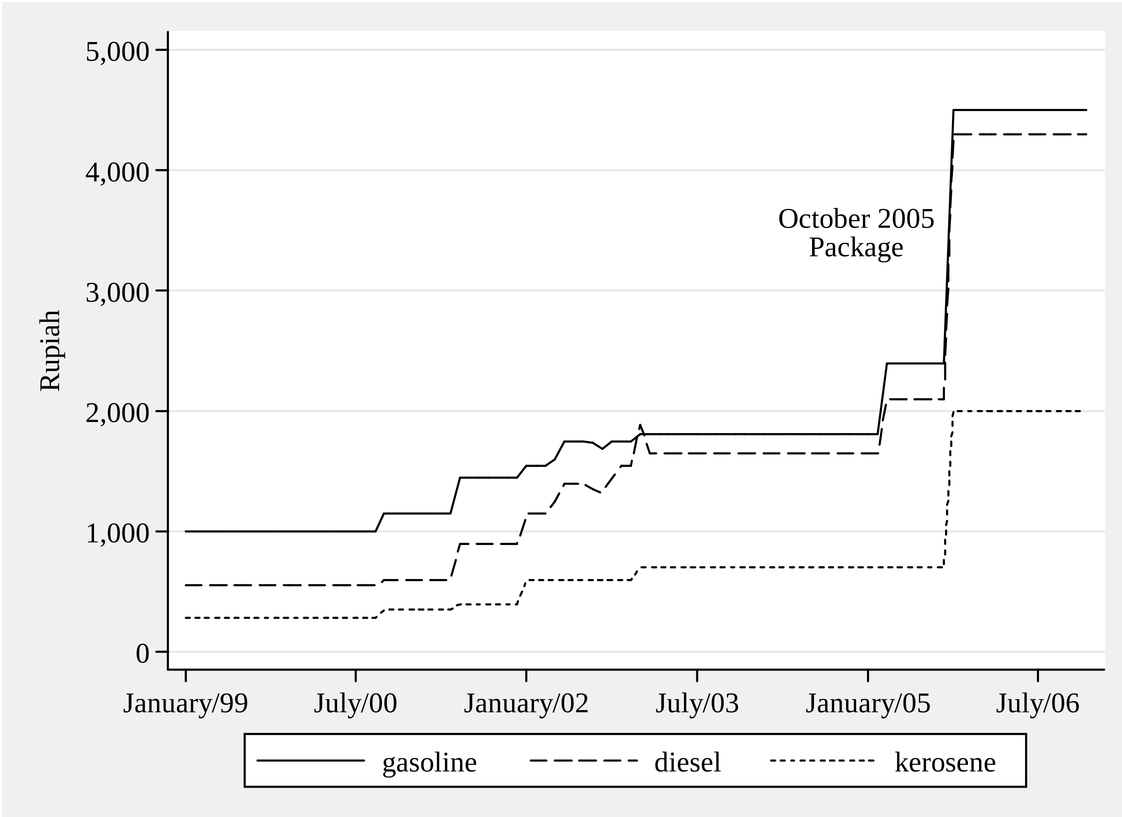
Table 1: Fuel Subsidy, Government Budget, and Oil Price, 1999 - 2006

	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

When the world oil price started to increase rapidly from 2004 onward, the government saw no option but to reform its energy 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 international market and not the efficiency argument campaigns from energy-pricing reformists that urged 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 energy pricing policy through adjustments in fuel prices since the year 1999 (see Figure 1).



Source: PERTAMINA

Figure 1. Price of gasoline, diesel, and kerosene, 1999 – 2006

However, strong opposition from the people and parliament has slowed the reform. Most arguments against the reform were based on the concern that an increase in fuel prices would translate into an increase in other prices, and that would reduce purchasing power, and exacerbate poverty. The fear was that the rise in fuel prices would 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%, diesel by 104.7% and surprisingly kerosene by 185.7%. The huge increase in the kerosene price stirred doubt among many economists - who initially regarded subsidy reduction was 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 analyze the distributional impact of energy pricing reform using Indonesian experience as implemented in October 2005. Questions to be asked among others are whether removing fuel subsidy in Indonesia constitutes a progressive reform; whether the cash transfers that complemented the reform mitigate its distributional impact effectively; and what lessons to 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 2 discusses some relevant previous works. Section 3 briefly describes the model. Section 4 discusses the scenarios, and the result is discussed in Section 5. Section 6 concludes.

2 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 analyze 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 percentage point 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%; gasoline by 32.60%; diesel for transportation by 27.27%; diesel for industry by 33.33; and diesel oil and fuel oil by 39.39%. 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% without compensation, whereas poverty falls by 2.6% with fully-effective and by 1.89% with compensation that is 75% effective (Ikhsan et al., 2005, Table 9). The policies simulated reduce inequality slightly.

March 2005 fuel price adjustment is also analyzed 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%. This poverty impact seems relatively high considering the petroleum price only rises by 29%.

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

From methodological point of view, among the weaknesses of those studies is either 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 of commodities (through changing commodity prices) and the market of 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 pattern of each of the respective households. Taking into account either one is only 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 is 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 only based on 10 representative households preventing accuracy in distributional analysis.

The innovation used in the model for this paper is including 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 both expenditure and factor ownership pattern of househodlds, but also to assess the distributional impact more accurately. 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. This model is yet the first of its kind for Indonesia. Warr (2006), for example, used this approach for Laos in assessing the poverty impact of large scale irrigation investment.

3 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 built based on ORANI-G model (Horridge, 2000) with two, among others, important modifications. First is allowing substitution among energy commodities, and also between primary factors (capital, labor, and land) and energy. In this respect, this model has 38 industries, and 43 commodities with detail energy sectors. Energy commodities include coals, natural gas, gasoline, automotive diesel oil, industrial diesel oil, kerosene, LPG, and other fuels. Secondly, 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. 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 the size of 768x768 accounts) constitutes yet the most disaggregated SAM for Indonesia at both the sectoral and household level. The data used for constructing the SAM include Indonesian Input-Output Table, official SAM, and most importantly household level survey data (SUSENAS). Detail construction of the SAM can be found in Yusuf (2006) and its structure of the SAM can be seen from Table 2.

Table 2: Structure of 768 x 768 Indonesian SAM

		Activities 1…181	Commodity		Factor		Ind. Tax	S-I	Households 1…200	Transfers	Enterprises	Gov't	ROW	TOTAL
			Domestic 1…181	Imported 1…181	labour 1…16	Capital								
Activities	1 … 181		MAKE Matrix											Industry Sales
Domestic Commo-dities	1 … 181	_Domestic Intermedi-ate Input						Domestic Invest-ment	Domestic Hou. Con-sumption			_Domeatic Gov't Lon-sumption	Export	Total Dom. Demand
Imported Commo-dities	1 … 181	Imported Intermedi-ate Input						Imported Invest-ment	Imported Hou. Con-sumption			Imported Gov't 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	Gov't Saving		Total Saving
Govern-ment							Ind.Tax Revenue		Direct Tax		Ent. _Traps. to Gov t	Inter G Transfer	ROW Tans. to Gov t	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	Govern. Spending	Forex Inflow	

4 Scenario and simulation strategy

Table 3 summarizes the scenarios to be simulated. All of these scenarios are related to the October 2005 package of energy pricing reform, i.e., increasing the price of gasoline by 87.5%, diesel by 104.7%, and kerosene by 185.7%[6].

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 Rp. 1.2 million
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

The objective of Simulation 1 (SIM 1 NO-KEROSENE) is to see the distributional effect had the kerosene price increase not been part of the reform. Many Indonesian economists believe 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 too 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) is trying to mimic exactly what was implemented by the government. It is 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 near poor. The number of targeted households was greater than the number of the ‘officially’ poor. Based on the data on the number of recipients of the compensation, the cash transfers in the simulation will be given to the lowest 24% of the population in urban areas, and the lowest 42% in rural areas (twice the percentage of the poor in the respected population). The total amount transferred is Rp. 18.3 trillion rupiah[8].

Another issue that seems missing in the public discussion with regard to 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, Indonesian geographic nature comprising an archipelago of thousands of islands is one of the reasons why price level, for example, 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 urban poor and less to rural poor can be regarded as a sensible option. To look at 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. Urban households receive 70 percent more and rural households receive 30 percent less, given the same budget.

The compensation scheme being an unconditional lump-sum cash transfer invites much criticism. Giving a cash lump-sum to poor households with total discretion as to its spending left up to them can be seen to be a less wise 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 energy pricing reform.

5 Results and discussion

5.1 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 percent (relative to baseline without the reform) in all simulations except Simulation 1. Other industries which experience big contractions are those closely related to the petroleum refinery sector. For example, in Simulation 2, these are road transportation (-4.87%), other transportation (-6.62%), utility sectors (electricity by -3%, and water and gas by -4.15%), and some manufacturing industry (automotive by -4.4% and rubber and products by -4.91%). After simulating an increase in the price of petroleum products, Clements, et al (2003) report industries which experience a large contraction are similar type of industries to those just mentioned.

Table 4: Simulated Macroeconomic and Industry Results (%)

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

5.2 Distributional results

Table 5 summarizes the distributional results of the simulations while figures 2 illustrate the impact of each scenario on household real expenditure, income, and household specific consumer price index (CPI) for urban and rural households as well as across centiles. The percentage change in real expenditure is used to calculate inequality and poverty incidence after each shock (ex-post).

Table 5: Summary of distributional results

	SIM 1 PAKTO'05 NO-KER	SIM 2 PAKTO'05 ALL FUELS	SIM 3 PAKTO'05 UT	SIM 4 PAKTO'05 UTUR	SIM 5 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

The change in the 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 labor by skill types, capital, land, and transfers (including from compensation).

Before the implementation of the energy 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 the 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 pattern (by the pattern of the change in household income). Richer households tend to experience a greater increase in consumer price, reflecting their higher dependence on nonkerosene 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 the bigger consumer of kerosene and the actual reform package implemented increased its price much more than other fuels. The kerosene administered price was drastically increased (185.7 percent), much more than the increase in other fuel prices (87.5 percent for gasoline, and 104.7 percent for diesel). Simulation 2 attempts to examine whether the reform being implemented this way can still be regarded progressive.

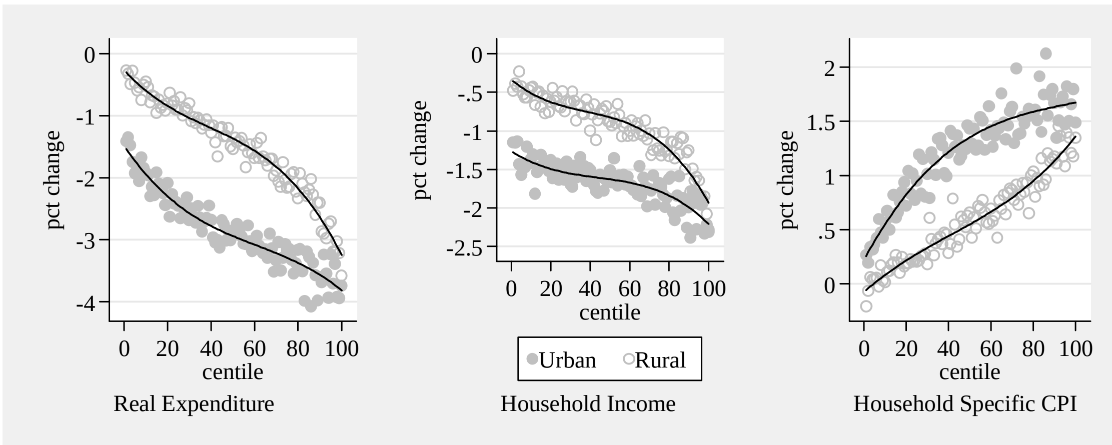


Figure 2a. SIM 1 (No Kerosene, No Compensation)

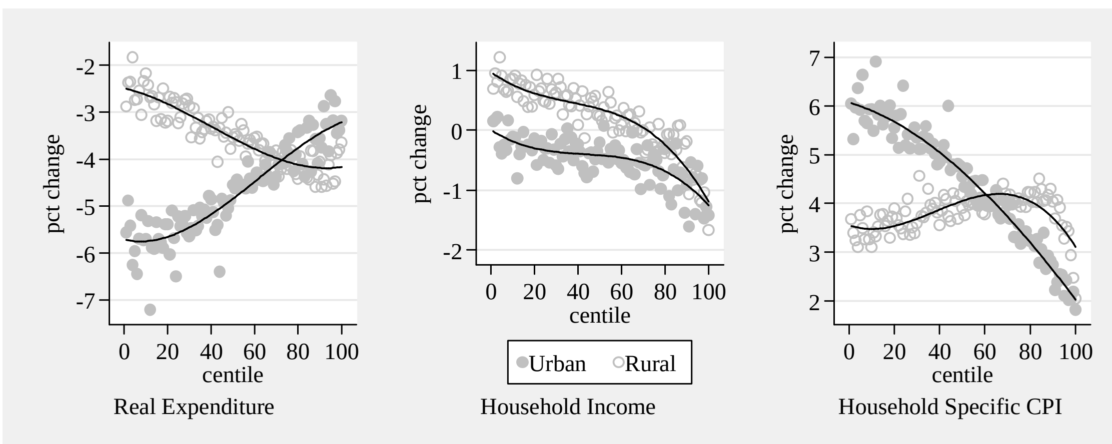


Figure 2b. SIM 2 (All Fuels, No Compensation)

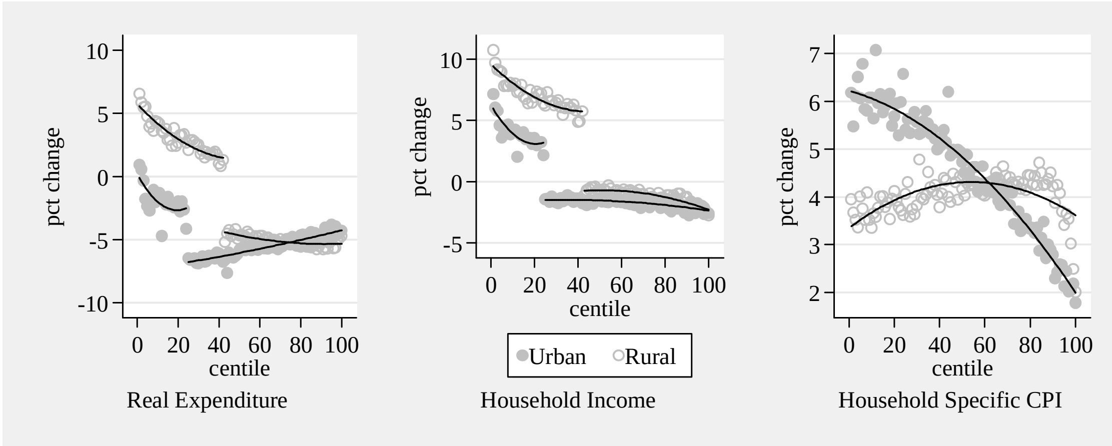


Figure 2c. SIM 3 (All fuels, Uniform Cash Compensation)

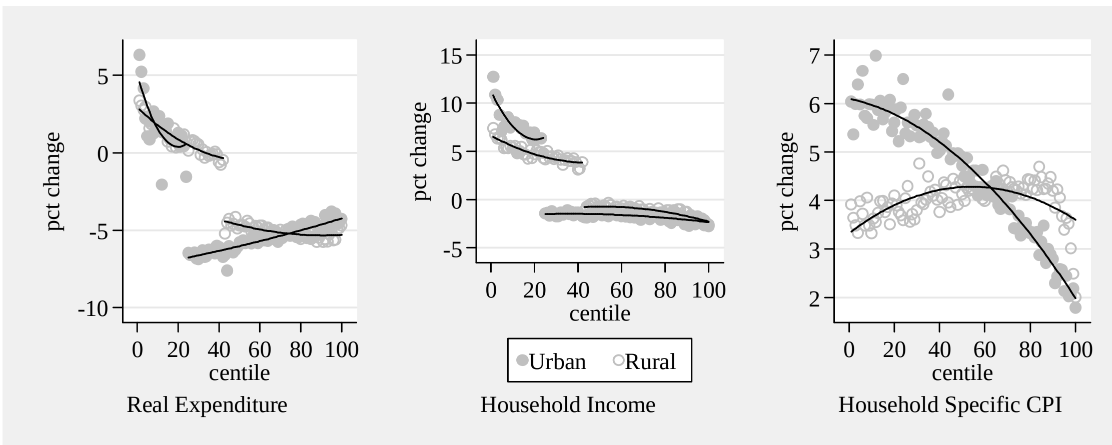


Figure 2d. SIM 4 (All fuels, Compesation, More to Urban, Less to Rural)

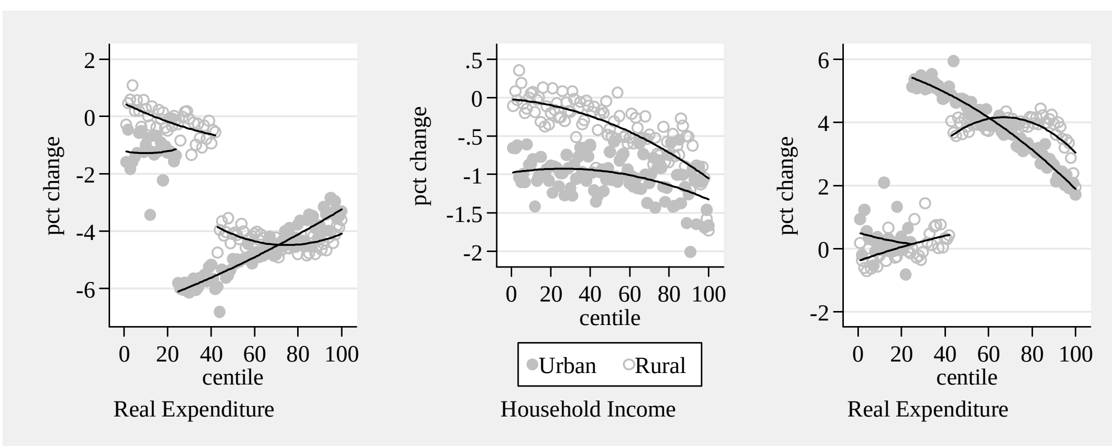


Figure 2e. SIM 5 (All fuels, Compesation, Price Subsidy on Health and Education)

The simulation produces a markedly different distributional story than SIM 1 (NO KEROSENE). In urban areas, real expenditure of the 20 percent poorest households declines within the magnitude of about 5 to 7 percent, whereas the richest 20 percent households experience a decline of only about 2 to 4 percent. 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% falls by around 3%, while the richest 20% falls by around 4%. 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, as well as on other commodities related to fuels such as spending on 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 the impact of fuel price rises through industry 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 2.63% in urban areas and by 1.83 percent in rural areas[9]. In all, poverty incidence, nation-wide, rises by 2.19 percent. Using the population data for 2005, it suggests that without compensation the reform package could have driven around 5 million people into poverty. The analysis of the `what-if' scenarios exercised in SIM 2 suggests that while the reduction in fuel subsidy as part of the energy pricing reform has a strong basis in term of economic efficiency, how it is implemented is important in relation to the concern about 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 compensated for the adverse welfare impact on the poor. It is only true 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 with 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 and reduces the overall Gini coefficient from. This decline in inequality is driven mainly by the significant increase in the real expenditure of the rural poor; the less severe fall in the real expenditure of the urban poor (due to the compensation) than the urban non-poor, and the sharp decline in the real expenditure 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.

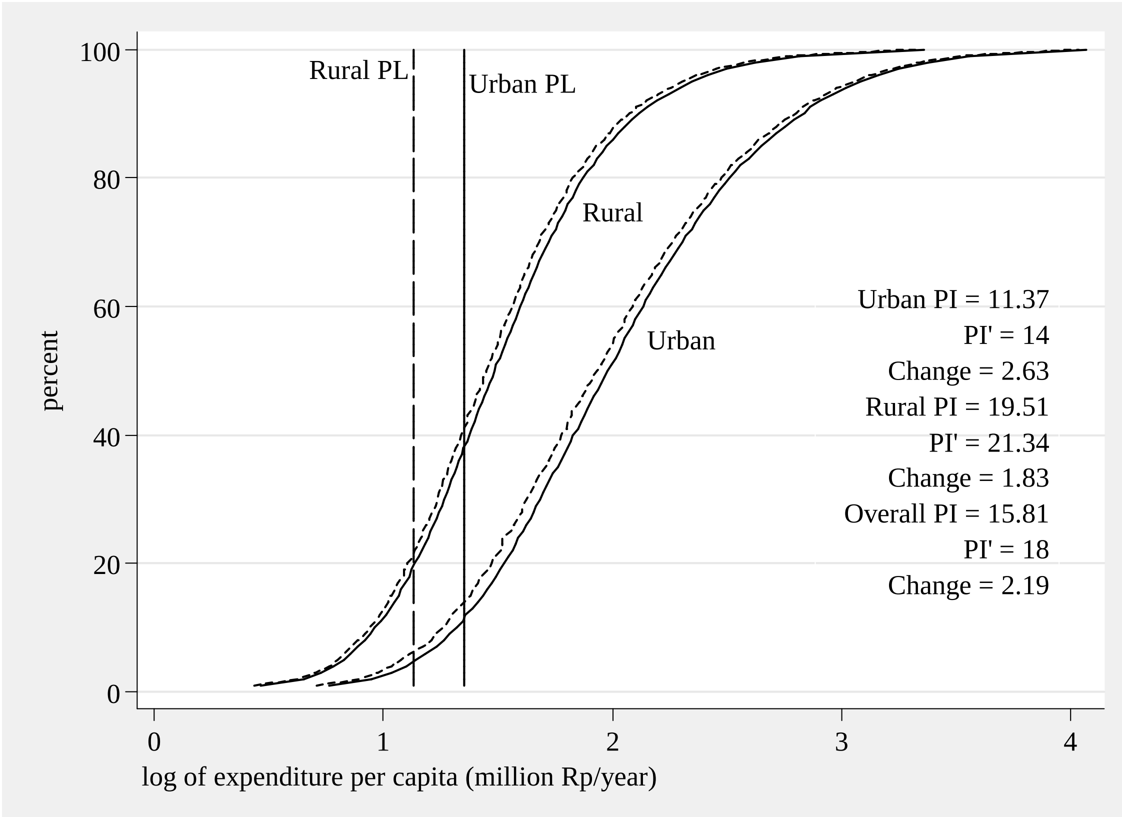


Figure 3. Simulated Poverty Impact of SIM 2 (No Compensation)

The modification to the compensation scheme by giving more to urban households (SIM 4 UTUR) may prevent quite a significant number of urban households from falling into poverty, and still leaves the poverty incidence in rural areas intact. In this simulation, the poverty incidence in urban area increases by a negligible amount, in contrast to 1.11 percent 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 reform. Naturally, it is not a structural poverty eradication program. The objective of the scheme is `to compensate' households for any adverse impact from the reform. Therefore, even if the uniform compensation scheme could potentially reduce poverty nation-wide 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-labor and capital, for which higher income households have proportionally greater endowments, it drives the regressive results through the income pattern. The pattern on the fall in household income shows increasing trends toward 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.

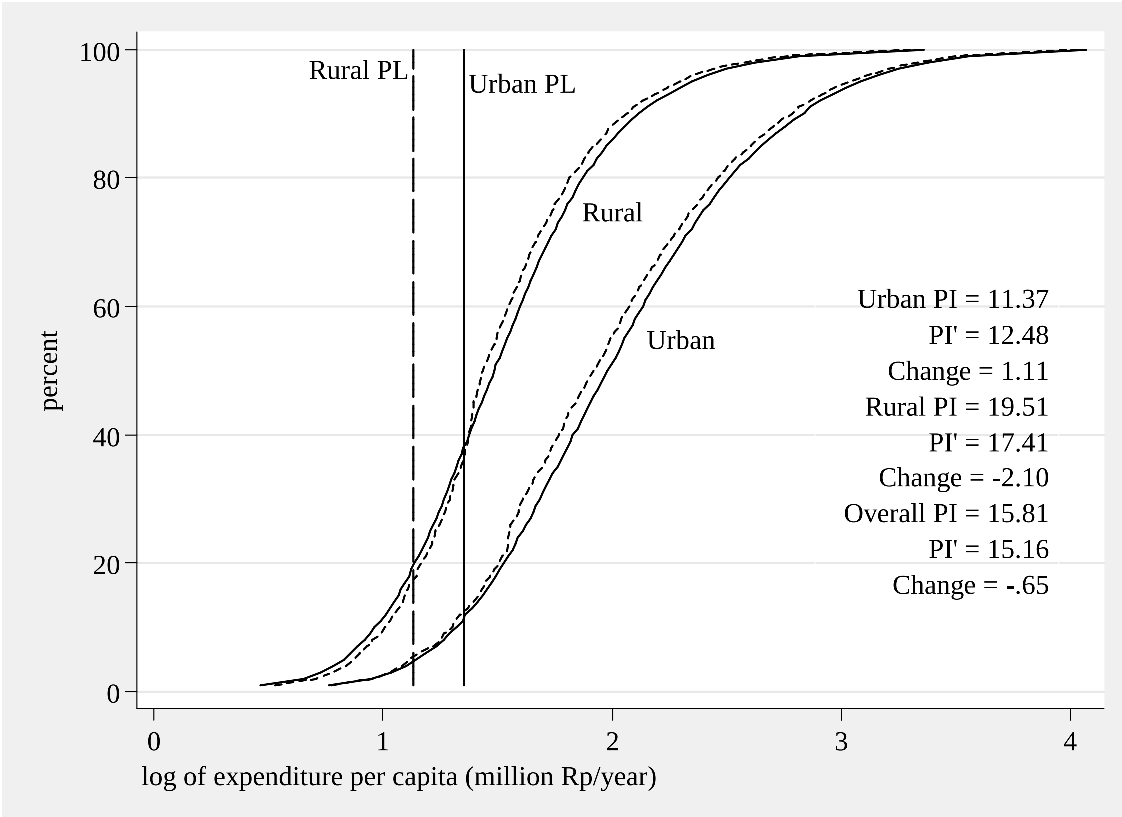


Figure 4. Simulated Poverty Impact of SIM 3 (With Compensation)

What 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. Both in 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, a subsidy on education and health as compensation increases poverty in rural areas and 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, but may not necessarily be effective as a means of short-run compensation to mitigate the adverse poverty impact of a energy pricing reform. It may be better suited for longer-term objectives, especially if combined with policies to promote education spending by modifying the expenditure pattern or demand behavior toward education, especially for rural households. However, this is a longer-term approach of a structural poverty alleviation program, not an ad-hoc occasional compensation scheme to minimize the short term distributional cost of a particular reform such as energy pricing.

7 Concluding Remarks

The Indonesian government implemented a massive fuel price increase in 2005. While the benefit of the reform on efficiency grounds has been widely acknowledged, whether the reform was equitable is still debated.

This question is answered in this case study using a Computable General Equilibrium (CGE) model with disaggregated households that allows for a rich and accurate distributional story. With this method, the analysis is carried out on 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 it may be concluded that proper and effective compensation is important to mitigate the distributional cost or poverty impact of the reform.

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

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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 more detail description of the model please refer to Yusuf (2007).

[6] To exactly represent the rate of the price increase as announced by the government on the 1st of 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] Poverty line is calculated based on this official poverty incidence. This poverty line then will be 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. 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 Rp 23 trillion rupiah.

[9] Note that poverty line in Figure 3 does not change due to the shocks because all variables are in real terms.