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GHANA

Evaluating the Fiscal and Social Costs of Increases in Domestic Fuel Prices

DAVID COADY AND DAVID NEWHOUSE

Recent increases in international oil prices have resulted in substantial fuel subsidies in many developing and emerging market economies. After a long period of stability over the last two decades, international oil prices increased substantially from 2002. Prices increased from around US$25 per barrel in January 2003 to over US$65 per barrel by August 2005, an increase of about 260 percent. Rising fuel subsidies reflect the fact that many countries regulate domestic prices and, especially in the face of sharp price increases, do not pass on higher world prices to domestic consumers.[1]

These subsidies have adverse consequences both for government finances and the efficient use of energy. Large subsidies redirect public expenditures away from other valuable social expenditures or contribute to unsustainable budget deficits. Low energy prices fail to provide the appropriate incentive to households to be more efficient in their use of energy, which would help to mitigate the adverse effect of higher international prices on households and the economy. In fact, given the relatively low price elasticity of energy demand and the negative consumption externalities associated with its use, taxing energy consumption is generally regarded as an efficient way of raising government revenue.

A key motivation behind such price subsidies is to protect the real incomes of households, especially poor households. However, it is also the case that energy subsidies may not be a very cost-effective approach to protecting the real incomes of poor households and that large cost

savings can be provided through the use of better-targeted subsidies, transfers, or other social expenditures. Therefore a comprehensive evaluation of energy price reforms must explicitly incorporate both the range of alternative social protection mechanisms that could be used and other public expenditures that could be financed from the budgetary savings resulting from the reduction or elimination of fuel subsidies.

Over the course of 2004–5, for a number of countries, the Poverty and Social Impact Analysis (PSIA) Group at the International Monetary Fund (IMF) evaluated the fiscal and social implications of domestic fuel price increases. In this chapter we present the analysis undertaken for Ghana, which was the first of the evaluations undertaken by the group.[2] The format of the chapter is as follows. In order to provide some general insights into the PSIA process and to motivate our approach to PSIA in the present context, in the second section we briefly describe the policy background and timeline of the analysis and how the IMF engaged with the government and other stakeholders during its execution. In the following section we describe the methodology used to evaluate the likely real income effects of price increases and present the model used to calculate these effects. The methodology employed reflects the tradeoff between modeling complexity and resource requirements and the need for a timely policy analysis that informed policy decisions that were to be taken in the very short term. In the fourth section we briefly set out the structure of the petroleum sector and the background to the proposed price reforms. In the fifth section we present the results of our application of the model to evaluate the effect of higher domestic petroleum prices in Ghana. Special emphasis is given to the identification of alternative approaches to mitigating the adverse effects on the real incomes of low-income households as well as identifying alternative public expenditures that could be financed by the budgetary savings resulting from the elimination of fuel subsidies. In the next section we conclude by summarizing the general policy lessons from the evaluations, emphasizing the limitations of using fuel subsidies to protect the real incomes of low-income households. We also discuss the policy responses of the government subsequent to the analysis. Finally, we highlight some lessons for the PSIA process and the importance of recognizing the tradeoffs that need to be incorporated in practice when determining the nature and role of PSIA.

BACKGROUND

Reform of the petroleum sector has been an important component of the IMF-supported Poverty Reduction and Growth Facility (PRGF) program in Ghana (IMF 2004). A combination of low government-controlled

petroleum prices and operational inefficiencies has continually resulted in large quasi-fiscal deficits and sector debt in this country. The cost of petroleum subsidies reached 2 percent of GDP in 2002, and in January 2003 the government introduced a pricing formula linking domestic prices to world prices, resulting in an average increase in domestic prices of approximately 90 percent.[3] However, the formula had been effectively abandoned and further increases in world prices were not passed onto consumers: the total subsidy bill in 2004 reached 2.2 percent of GDP. Faced with rising budgetary costs, in early 2005 the government announced that it intended to introduce a new pricing formula. Concerns about the adverse effect of higher domestic prices on the real incomes of poor households led the government to request the IMF to provide technical assistance to evaluate the likely magnitude of these effects and to identify measures to help mitigate them.

In early January 2005, the PSIA Group at the IMF began working on an ex-ante evaluation of the likely impact of higher domestic petroleum prices on household real incomes and how these would be distributed across the population. Particular emphasis was placed on the need to identify this probable impact on the real incomes of the poorest households as well as on identifying alternative approaches to mitigating these effects. Existing PSIA reports on the petroleum sector had focused on the sources and uses of energy and broader structural reforms of the sector (Armah and Associates 2004; Mercados et al. 2004), but little detail had been provided on the magnitude of the likely real income effects from price increases or on the alternative approaches that could be used to mitigate the adverse effects on poor households. For this reason, the government felt unable to proceed with price reforms until such information was available.

Prior to visiting Ghana, the PSIA Group worked very closely with the country teams both at the IMF (including its resident representative in Ghana) and at the World Bank. Through a number of meetings over a period of three weeks the group was able to clarify the policy background and issues, to identify existing reports related to proposed government reforms in the petroleum sector, and to identify and gain access to the data necessary to undertake the analysis.[4] The group also contacted various academic economists who had previously worked on economic analyses in Ghana and also had information on important stakeholders.[5] The U.K. Department for International Development, which has a very active engagement with the government and other policy actors and stakeholders, also provided valuable information and was kept informed of progress with the report. By being able to secure quick access to many of the data

prior to visiting Ghana, the group was in a position to undertake a preliminary analysis that would help to identify key gaps in terms of their knowledge of the policy background and further data requirements. This facilitated the scheduling of important meetings with government and other stakeholders during the first few days of trip to Ghana.

In late January 2005 the PSIA Group sent a technical assistance mission to Ghana, made up of the two authors of this chapter. The first few days of the trip were allocated to prescheduled meetings with various government departments and other stakeholders. Meetings with government officials from the Ministry of Finance and the Central Bank helped to clarify the policy context for the analysis and issues they saw as crucial to address in the report. Meetings with the Ministries of Education and Health helped to identify alternative uses of some of the budgetary savings from eliminating energy subsidies and their likely effectiveness at mitigating the adverse impacts of price increases on poor households. Meetings with the Ministry of Energy provided a clearer picture of energy requirements and sources in Ghana as well as broader energy-related policies. A meeting with the Ghana Statistics Service helped to identify data that could be used for the analysis. With all of these government departments we highlighted and discussed the importance of having access to reliable, up-to-date data for credible and relevant policy analysis more generally. A common emphasis by each of the ministries, as well as by stakeholders outside of government, was the importance of identifying in the report measures to mitigate the adverse impact of price rises on the poor.

Extensive discussions were also held with various policy actors, including the Institute of Statistical Social and Economic Research (ISSER) and the Centre for Economic Policy Analysis (CEPA).[6] We also met the authors of an existing study of petroleum use by households (Armah and Associates 2004) as well as the authors of a study on structural reforms in the petroleum sector in Ghana (Mercados et al. 2004). With each of these stakeholders we discussed the purpose of our report and the details of the methodological approach we would use.

Before leaving the country, the results of a preliminary analysis were presented at a meeting organized by the Ministry of Finance at which a number of the above stakeholders were present. We discussed a range of issues that arose during the discussion and how we would try to address these in a future revised version of the report. Based on comments received at this presentation, the report was revised and reviewed at the IMF headquarters. The revised report was completed by mid-March 2005 and sent to the government in May 2005. Permission to circulate the report widely was received from the government in early July 2005. Since then the PSIA

Group has continually monitored the progress in price reforms and the implementation of mitigating measures to ensure that the findings of the report are integrated into the PRGF program.

APPROACH AND UNDERLYING MODEL

This section sets out the details of the approach used to evaluate the likely impact of increases in petroleum prices on the real incomes of households as well as the approach to identifying alternative measures that help mitigate the associated adverse effects on household real incomes. The approach adopted reflects the necessity to trade off modeling sophistication against data and time resources (see Coady 2005 for more detailed discussion on methodologies). However, we believe that the approach taken provides extremely valuable quantitative information for the policy debate, especially when nuanced through a more qualitative discussion of broader policy implications.

Typically the bulk of total petroleum products is not consumed directly by households but indirectly through their consumption of other goods and services that use petroleum products as inputs. Therefore, the welfare effect of higher petroleum prices on household real incomes will depend both on the *direct effect* of higher prices for petroleum products consumed by households and on the *indirect effect* arising from higher prices for other goods and services consumed by households to the extent that higher petroleum costs are passed on to consumer prices.

Modeling the direct effect, and how it is distributed across income groups, essentially requires information on the level of direct consumption of various petroleum products (for example, gasoline, kerosene, diesel, LPG) by households in different parts of the national income distribution. Modeling the indirect effect requires a model of price-shifting behavior. We start by describing the model underlying our calculation of the price effects resulting from the increase in the price of petroleum products, which are intermediate as well as final goods. This is followed by a discussion of how the resulting price changes can be translated into changes in real income and used as the basis for an analysis of the distributional impact of price changes.

A Price-Shifting Model

To analyze the distributional consequences of price changes for commodities that are intermediate goods one needs to specify a price-shifting model that allows one to identify how higher petroleum costs are shifted on to prices in other sectors of the economy. The implications of higher

costs for output or factor prices will, of course, depend on the structure of the economy—for example, whether commodities are traded internationally or nontraded, the nature of commodity taxes, and whether prices are controlled by the government. We therefore start by grouping commodities into three broad classifications reflecting the assumed relationships between higher production costs and output prices:

- ***Cost-Push Sectors.*** These are sectors where higher input costs are pushed fully on to output prices. We can therefore (loosely) think of these as nontraded commodities (for example, government services, public utilities, construction, trade and transportation, and retail and wholesale trade).
- ***Traded Sectors.*** These are sectors that compete with internationally traded goods and that have output prices determined by world prices and the import or export tax regime. Therefore, higher input costs are not pushed forward onto output prices, so the brunt of these higher costs is borne by lower factor prices or lower profits.
- ***Controlled Sectors.*** These are sectors where output prices are controlled by the government. The relationship between output prices and production costs depends on if and how the government adjusts controlled prices. If controlled prices are not adjusted, then the burden of higher costs will be borne by factor prices, profits, or government revenue.

When modeling *price changes* it is useful to think of "aggregate" commodity categories (for example, the aggregate categories available from an input-output table) as made up of a certain proportion of cost-push, traded, and controlled commodities, with these proportions given by α, β, and γ respectively. These proportions should obviously sum to unity and never be negative, that is, $0 \leq (\alpha, \beta, \gamma) \leq 1$ and $\alpha + \beta + \delta = 1$. The technology of domestic firms is captured by a standard input-output coefficient matrix, A, with typical a_{ij} denoting the cost of input i in producing one unit of output j—think of units of output defined such that they have a user price of unity so that price changes below can be interpreted as percentage changes. Consistent with the interpretation of A as capturing an underlying Leontief (that is, fixed coefficient) production technology, we can interpret a_{ij}s as the change in the cost of producing a unit of j due to a unit change in the price of input i.

For *traded* sectors, user prices, $q^\star$, are determined by world prices, p^w, and by trade taxes (including tariffs and sales taxes), $t^\star$:

$$q^\star = p^w + t^\star \tag{11.1}$$

In this sense, foreign goods are deemed to be perfectly competitive with domestically produced traded goods. Changes in the user prices for traded sectors are then given by

$$\Delta q^{\star} = \Delta p^{w} + \Delta t^{\star} \tag{11.2}$$

and both terms on the right-hand side will be specified exogenously by the reform package under consideration.

For *controlled* sectors, producer prices are determined by pricing controls (say, $\tilde{p}$) and we can think of domestic taxes as zero for convenience, so that

$$\tilde{q} = \tilde{p} \tag{11.3}$$

Alternatively, one could think of the difference between user prices and average unit production costs as an implicit tax. The formula for price changes is then given simply as

$$\Delta\tilde{q} = \Delta\tilde{p} \tag{11.4}$$

where the right-hand side is specified exogenously in the reform package.

For *cost-push* sectors, the relationship between user and producer prices is given by

$$q^{c} = p^{c} + t^{c} \tag{11.5}$$

where q^{c} is the price paid by users of a commodity and p^{c} is the price received by producers, the difference between these being any sales or excise taxes, t^{c}, imposed by the government. Producer prices are, in turn, determined as follows:

$$p^{c} = p^{c}(q, w) \tag{11.6}$$

where q are the user costs of intermediate inputs and w are factor prices. For these sectors, cost increases are assumed to be fully pushed forward onto user prices so that factor payments are fixed. From (11.5) one gets

$$\Delta q^{c} = \Delta p^{c} + \Delta t^{c} \tag{11.7}$$

Using (11.6), the input-output coefficient matrix and assuming factor prices are fixed, and the change in producer prices is derived as

$$\Delta p^{c} = \Delta q^{c}.\alpha.A + \Delta q^{\star}.\beta.A + \Delta\tilde{p}.\gamma.A \tag{11.8}$$

where Δ signifies a price change, all price changes are interpreted as $n \times 1$ row vectors where n is the number of commodity groups, (α, β, γ) are

now $n \times 1$ diagonal matrices, and A is an $n \times n$ input-output coefficient matrix. Substituting in from (11.7) and (11.2) one gets

$$\Delta p^c = \Delta p^c.\alpha.A + \Delta t^c.\alpha.A + \Delta p^w\beta.A + \Delta t^\star.\beta.A + \Delta\tilde{p}.\gamma.A$$

so that

$$\Delta p^c = \Delta t^c.\alpha.A.V + \Delta p^w.\beta.A.V + \Delta t^\star.\beta.A.V + \Delta\tilde{p}.\gamma.A.V \qquad (11.9)$$

where $V = (I - \alpha.A)^{-1}$ with I being an $n \times n$ identity matrix. The typical element of the inverse matrix V, v_{ij}, captures the combined direct and indirect use of cost-push sector i used to produce one unit of cost-push sector j. Notice that if the only price changes are changes in controlled prices, then we have $\Delta t^c = \Delta p^w = \Delta t^\star = 0$ so that the final term of (11.9) gives the effect on cost-push sectors of a change in these controlled prices and also $\Delta q^c = \Delta p^c$. The change in sector aggregate prices is then given by

$$\Delta q = \alpha.\Delta q^c + \beta.\Delta q^\star + \gamma.\Delta\tilde{q}. \qquad (11.10)$$

In our applications below we assume that all petroleum products are within the controlled sector and all other products are cost-push sectors. Given that the nontraded domestic trade and transport sectors are the main consumers of petroleum products and the effect on traded good prices would come through this component, this assumption is likely to be a good approximation of reality.

Applying the Model

Applying the model to an evaluation of the likely real income effect of petroleum price increases and its distribution across different income groups requires two sets of data. First, one requires information on consumption patterns across households, including direct household consumption of petroleum products (for example, consumption of gasoline, diesel, liquid petroleum gas and kerosene). Typically one finds very different consumption patterns for petroleum products across households with, for example, low-income households allocating a relatively high proportion of total consumption to the consumption of kerosene and a relatively low share to gasoline. Note that one should validate how adequately consumption of petroleum products is captured by the household survey used, for example, by dividing total consumption expenditures for each product by the price pertaining at the survey date to get physical quantities and by

comparing total physical consumption to secondary data on aggregate national consumption.

Second, one needs information on the production structure of various sectors of the economy—that is, an input-output matrix showing the use of various sectoral inputs in the production of sectoral outputs, in particular information on the use of petroleum products as inputs by various sectors. Often one has information only for an aggregate amount of petroleum product inputs, that is, the data are not broken down into different petroleum products. In this case one can try to use secondary information to disaggregate these sectors, which involves disaggregating the petroleum product inputs for each sector in the economy as well as disaggregating the petroleum product technology by product type. Alternatively, one can undertake the analysis of indirect price effects using an aggregate petroleum price change while using the disaggregated information available in the household data to evaluate the direct effect for each petroleum product separately.

Using information on the likely increases in petroleum product prices one can use (11.10) to evaluate the impact on consumer prices for the range of sectors available in the input-output table. One then maps the detailed consumption information available in the household data into the input-output sectors to get the budget shares for each commodity category and for each household. Multiplying the budget shares for each commodity category by the corresponding price increase for that commodity gives the percentage change in household real income that is the result of that specific price increase. One can then calculate separately the direct effect by aggregating these real income changes across petroleum products and the indirect effect by aggregating these real income changes across all other commodities. To analyze the distribution of these real income effects one can categorize households by income groups—typically this is based on some household consumption measure such as per capita consumption or consumption per adult equivalent—and, for each income group, look at the average of the real income effect as a percentage of total household income. The direct and indirect effects are added to get the total effect. Where the percentage loss in real income increases (decreases) with household income, the distribution of the total burden is said to be progressive (regressive).

Alternative Mitigating Measures

Since a key motivation for energy subsidies is to protect the real incomes of poor households, it is important to identify alternative approaches to

achieving these ends and to compare these to the situation under energy subsidies. Below we consider the following range of alternatives:

- maintaining kerosene subsidies,
- using some of the budgetary savings from eliminating subsidies to finance the introduction or expansion of a cash or in-kind transfer program, and
- using these savings to finance other increases in social expenditures.

The first of these options essentially involves analyzing alternative reforms of energy prices. The last two options can typically be evaluated using information available in household surveys on access to existing transfer programs or existing utilization patterns of other social services such as education and health services. Alternatively one can simulate hypothetical targeted transfer programs in order to highlight the potential returns from introducing such programs or reforming badly targeted existing programs. Note that even if the distribution of existing subsidy benefits is progressive, in the sense that the benefit as a percentage of household incomes is higher for lower income groups (that is, lower income groups receive more than their income share), the subsidies can be badly targeted because the lower income groups receive less than their population share. The policy objective then is to identify alternative and better-targeted programs to protect the real incomes of poor households.

How a government goes about choosing from among these alternatives will, of course, depend as much on political economy issues as on pure economic considerations. Successful packaging of the subsidy removals with one of the above approaches can play a crucial role in generating acceptance of the reforms by the public and avoiding social conflict. A successful reform strategy is likely to generate substantial efficiency gains by providing appropriate price incentives for more efficient use of petroleum products as well as by providing the funds necessary to increase other development and social expenditures.

In this chapter, we are primarily (although not exclusively) concerned with evaluating the distributional implications of petroleum subsidies. Our evaluation focuses on the first-order income effects of price changes—that is, it implicitly assumes that demand and budget shares are fixed. Where households can avoid taxation by switching between commodities, these first-order effects will tend to overestimate the adverse income losses from price increases (Banks, Blundell, and Lewbel 1996). Therefore, our estimates below should be interpreted as upper bounds on the magnitude of income effects. Note, however, that to the extent that responses are similar

across income groups, our evaluation of the distributional implications of price changes is likely to be more robust. Our focus on first-order effects reflects the combination of data and time constraints that typically face policy analysts.

THE PETROLEUM SECTOR AND PRICE REFORMS

In this section we apply the approach described above to evaluate the impact of increases in petroleum products on household real incomes for Ghana. We start with a brief discussion of the structure of the petroleum sector and the structure and magnitude of the proposed price reforms. We then present the results in terms of the direct, indirect, and total real income effects and how these are distributed across households in different parts of the national income distribution. This presentation is followed by a discussion of alternative approaches to protecting the real incomes of poor households, which can be used to mitigate the adverse poverty effects of price increases. We conclude with a discussion on policy implications of the analysis.

The Petroleum Sector and Price Reforms

Petroleum products constitute around 30 percent of total energy demand in Ghana (ISSER 2004). The total supply of petroleum products in Ghana was 1.64 million metric tons in 2003, of which diesel accounted for 50 percent, gasoline 32 percent, and kerosene 10 percent. The transport sector is the main consumer of petroleum products, accounting for over 80 percent of total consumption in 2003. Households accounted for 6.2 percent, industry 6.7 percent, and agriculture 4.2 percent. In general, household use of petroleum products is generally restricted to the use of LPG and kerosene for cooking and lighting, respectively.

Ghana has little domestic supply of crude oil; most of its crude oil demand is met by imports from Nigeria. In September 1996, the state-owned Tema Oil Refinery (TOR) acquired sole responsibility for importing crude oil and refined petroleum products into Ghana. TOR is able to meet only around 70 percent of Ghana's demand for petroleum products. The domestic supply of petroleum products is supplemented with imports from Europe. Both imported and domestically produced petroleum products are stored at TOR's refining facilities for further domestic distribution. In 2004, imports of refined products stood at 153,000 metric tons of diesel and 85,000 metric tons of premium gasoline.

Liberalization of the petroleum sector is currently underway to allow private sector participation in the procurement of crude oil as well as the private import of refined products through tenders. Since the beginning of 2004, TOR ceased to have a monopoly on the importation of petroleum products, and from July 2004 it has been prohibited from importing petroleum products. In March 2004, private oil marketing companies (OMCs) participated in the first competitive tender for gasoline with financing provided by a syndicate of banks. The National Petroleum Tender Board (NPTB) arranges for procurement of crude oil for TOR through international competitive bidding. Eventually, it is intended that only the OMCs will be allowed to import both crude oil and petroleum products; TOR will be converted to a tolling refinery that operates and maintains the refining facility and processes crude oil for a fee. There are currently 26 OMCs, but four of them (Shell, Mobil, Total, and GOIL) control over 80 percent of the market. GOIL, which has an obligation to supply products in all outlying and remote areas, is the only state-owned company distributing oil products and has a market share of around 23 percent.

According to the new formula being discussed by the government, domestic ex-pump prices were to be linked to world prices adjusted for international and domestic distribution costs but also including various taxes and levies. The cost, insurance, and freight (CIF) world price is taken as the sum of the free on board (FOB) Mediterranean price (averaged for the previous three Platt's Oligram Price Report calendar months), the suppliers commission, and insurance costs. Import margins are set to cover the costs of getting imports from the port to TOR facilities and set at 13.8 percent of the import CIF price. Taxes and levies include a 15 percent ad valorem excise tax levied on the CIF price, specific excises, a road fund levy, an energy fund levy, an exploration levy, a stock fund levy, and a debt-recovery levy. The domestic distribution margin includes the cost of bulk storage and transportation services, a primary distribution margin, a margin that equalizes domestic prices across the country, a dealers margin, and a marketing margin.[7]

Current ex-pump prices are substantially below those required by the above formula. Table 11.1 compares actual (A) to formula (F) prices for the various petroleum products, and indicates the required increase in prices under the formula. Although all products are currently heavily subsidized *relative to the formula price,* which includes taxes, the extent of the subsidy varies substantially across products. The required increases are highest for LPG and diesel (at 108 percent and 67 percent, respectively) and lowest for premium gasoline and kerosene (at 17 percent and 49 percent, respectively).

Table 11.1 Actual and Formula Petroleum Product Prices and Subsidies
Ghanaian cedis

Components of formula	*Petrol per liter*	*Kerosene per liter*	*Diesel per liter*	*Fuel Oil per liter*	*LPG per kilogram*
World CIF price (F)	2,890	3,761	3,884	1,750	5,355
Total taxes (F)	1,711	1,342	1,811	1,141	1,543
Domestic margins	577	677	577	0	990
Ex-pump price (F)	5,179	5,780	5,940	2,891	7,888
Ex-pump price (A)	4,444	3,889	3,556	1,927	3,800
Required increase in current prices	17 percent	49 percent	67 percent	50 percent	108 percent

Source: Ministry of Finance, Ghana.
Note: A and F denote that prices are based on actual and formula levels, respectively. Ex-refinery price F is based on an average of Platt prices for October–December 2004, an exchange rate of 9,133.33 cedis per U.S. dollar and import margins at 13.8 percent of import CIF price. Included in taxes is an ad valorem excise set at 15 percent of the ex-refinery price.

The Welfare Impact of Price Increases

Determining the total impact of price increases on the welfare of poor households requires one to identify both the direct impact from the higher fuel prices paid by households as well as the indirect impact from higher prices for other goods and services when higher fuel costs are passed through to these prices. We discuss each in turn.

Direct Impact

The top panel of table 11.2 presents the budget shares of households by welfare quintile for petrol, kerosene, and LPG. The highest budget share is for kerosene—on average, households allocate 3.5 percent of total consumption to kerosene consumption; this is higher for lower-income households. Petroleum consumption is also an important consumption item for households in the top quintile, where it accounts for just over 2 percent of total consumption.

The second panel of table 11.2 presents the direct effect on households of the planned price increases if the pricing formula were applied. For each household, the budget share of each petroleum product is multiplied by the percentage price increase to get the equivalent percentage change in household real income. These are then aggregated across products and divided by total household consumption to get the total percentage decrease in household real income. On average, households experience a 1.9 percent decline in real income. The incidence of this

Table 11.2 Real Income Effects and Share of the Burden of Price Changes

Budget shares, income effect, and burden shares	*Bottom*	*2nd Quintile*	*3rd Quintile*	*4th Quintile*	*Top*	*All*
Household budget share (item expenditure/total expenditure)						
Petrol	0.001	0.001	0.002	0.002	0.021	0.006
Kerosene	0.059	0.041	0.034	0.024	0.016	0.035
LPGas	0	0	0	0.001	0.002	0.001
Real income effect (percentage change in consumption)						
Direct effect	0.029	0.020	0.017	0.013	0.014	0.019
Indirect effect	0.062	0.066	0.067	0.069	0.068	0.067
Total effect	0.091	0.087	0.085	0.082	0.082	0.085
Indirect as percent of total	68 percent	77 percent	80 percent	84 percent	83 percent	80 percent
Share of the aggregate loss (household loss/total loss)						
Direct effect	0.135	0.160	0.180	0.193	0.332	1.000
Indirect effect	0.077	0.137	0.184	0.256	0.346	1.000
Total effect	0.088	0.142	0.184	0.244	0.343	1.000
Mean consumption (Ratio to bottom quintile)	1.00	1.76	2.55	3.80	7.48	3.31

Source: Authors' estimates.
Note: Quintiles are based on the national per equivalent adult consumption distribution. Budget shares are calculated using data from the Ghana Living Standards Survey (GLSS) 1999. Expenditures on petroleum products have been increased to reflect the substantial increase in their real prices between 1999 and 2004, and total consumption has also been adjusted accordingly. Percentage real income effects are calculated by multiplying household budget shares by the price increases presented in table 11.1, aggregating across petroleum products and dividing by household total consumption. Mean consumption is based on per adult equivalent consumption.

decrease is regressive in the sense that the poorest households are worst hit, experiencing a 2.9 percent decrease in real income, compared with a 1.4 percent decrease for households in the top consumption quintile.

The bottom panel of table 11.2 translates these percentage changes into the share of the aggregate direct real income loss borne by each quintile. We find that the top two quintiles account for around 53 percent of the total loss while the bottom two quintiles account for less than 30 percent of the aggregate loss.

Indirect Impact

Table 11.3 presents the impact of higher petroleum prices on the prices in other sectors. Multiplying these price increases by the corresponding household budget shares and aggregating across goods and services gives

Table 11.3 Indirect Price and Real Income Effects by Sector

Sector	*(Budget share (item expenditure/ total expenditure) BS*	*Price effect (proportionate (increase in prices) dP*	*Impact = BS*dP*
Agriculture	0.452	0.066	0.030
Utilities and mining	0.021	0.116	0.002
Manufacturing	0.253	0.052	0.013
Construction	0.000	0.107	0.000
Trade	0.070	0.107	0.007
Transport	0.032	0.267	0.008
Business	0.025	0.025	0.001
Community	0.097	0.048	0.005
Electricity	0.008	0.000	0.000

Source: Authors' estimates.
Note: Budget shares are derived from GLSS 1999 based on commodity groupings that match the more aggregated input-output table sectoral breakdown available in the 1993 Social Accounting Matrix for Ghana constructed by Powell and Round (1998). Petroleum products are separated from the Manufacturing sector, creating separate entries for five different petroleum product categories: Diesel, Petrol, Liquid Petroleum Gas, Residual Fuel Oil, and Kerosene. The relevant coefficients on individual fuel types were based on information on fuel usage in different sectors available in ISSER (2004). The single Electricity and Mining sector was separated into "Utilities and Mining" and "Electricity" components to allow for the fact that the price of electricity is controlled by the government.

the percentage decrease in consumption due to the indirect price increases. The total indirect real income effect is also presented in table 11.2. On average, indirect price increases decrease household real income by 6.7 percent. These losses are moderately progressive, with the bottom quintile experiencing a 6.2 percent decrease in consumption compared with 6.8 percent for the top quintile. The bottom panel of table 11.2 translates these percentage changes into the share of the aggregate real income loss borne by each quintile. Reflecting their share of total petroleum product consumption, the top two quintiles account for over 60 percent of the total loss whereas the bottom two quintiles account for just over 20 percent of the loss.

Direct and Indirect Impacts

In the second panel of table 11.2, the direct and indirect effects are combined into the total effect. Overall, the average effect is substantial, with the removal of petroleum subsidies resulting in an 8.5 percent decrease in real income. The incidence of this burden is slightly regressive, with the bottom quintile experiencing a decrease of 9.1 percent compared with an 8.2 percent decrease for the top quintile. On average, the indirect effect

accounts for 80 percent of the total effect. It is also noticeable that the share of the indirect effect is lowest for the poorest households, accounting for 68 percent of the total effect for the lowest quintile compared with 83 percent for the top quintile.

The bottom panel of table 11.2 translates these percentage effects into the share of the real income loss borne by each quintile. The relatively high share borne by the top two quintiles reflects the same patterns observed for both indirect and direct effects earlier. The top two quintiles account for just below 60 percent of the total loss, compared with 23 percent for the bottom two quintiles. Of course, this also highlights the fact that the benefits from the existing subsidies are very badly targeted, with enormous leakage to higher income households.

Alternative Mitigating Approaches

The above results show that although the direct effect of the removal of petroleum price subsidies looks regressive, with the percentage decrease in income being highest for the poorest quintiles, this effect is dominated by the indirect effect, which is slightly progressive. The total loss from the removal of price subsidies is, thus, only slightly regressive. However, more important from the perspective of poverty reduction is the magnitude of the impact on the poorest households. Our results indicate that the effect for the poorest households is substantial, with the poorest quintile experiencing a 9.1 percent decrease in real income.

Although price subsidies are often justified as a way of protecting the real incomes of poor households, the results above clearly indicate that a very small share of either the total direct or indirect benefits inherent in the price subsidies reach the poorest households, with substantial leakage to higher-income households. It is important therefore to consider alternative approaches to protecting the incomes of the poor, which can be used to mitigate the adverse impacts of petroleum subsidy removal on the poorest households. One can think of a range of approaches, including:

- ***Differential petroleum taxes.*** Instead of increasing all petroleum prices to world prices and applying the present system of taxes, one could adjust the taxes so that those products that are more important for the poorest households are taxed at a lower rate or even subsidized. In the present context, this would involve lower price increases for kerosene, which is by far the most important petroleum product directly consumed by the poor.

- ***Increase expenditures on social services.*** Some of the public funds generated through subsidy savings can be used to increase social expenditures on such things as public education, health, and nutrition services. The relative impact of these expenditures on the poor will depend on such things as the existing level of access of the poor to these services, and whether these expenditures can be targeted to the poor through, for example, expansion of services into the poorest areas.
- ***Increase "related" expenditures.*** A key policy issue concerns the issue of access to clean and affordable energy by the poor. Often the poor have to rely on unclean fuels with adverse consequences for their health and environmental degradation. Similarly, the poor often lack access to efficient public transport or quality roads. Higher fuel prices may thus further exacerbate the situation. To address this, some of the budgetary savings generated by subsidy removal could be used to finance expenditures aimed at improving mass transport systems in urban areas, or the rural roads system, or an intensification of the rural electrification scheme. The transport sector is the most energy-intensive sector, so improving access to efficient transport services can help to mitigate the effects of increases in the prices of petroleum products. Similarly, electricity is typically a cheaper and cleaner source of energy than petroleum-based fuels for households.
- ***Targeted social protection programs.*** The budgetary savings of removing or reducing subsidies could be used to increase financing for an existing social protection program or to create a new targeted program.

In order to evaluate the above alternatives we use information in the national household survey for 1999 (GLSS 1999). For education expenditures, we identify households that have children aged 5–11 years enrolled in school and give a uniform transfer to each of these households. Using existing access as the basis for determining transfers can be interpreted as an expansion of existing education expenditures, and thus it captures the "average benefit incidence" of education expenditures. However, there apparently have been some attempts to target additional expenditures better toward the poorest areas of the country so that the incidence of expenditures allocated to expanding these schemes may be substantially more progressive that the average benefit incidence of all existing expenditures—that is, the "marginal benefit incidence" of public expenditures may be substantially better than the average benefit incidence. In education, the concept of capitation grants has been introduced since September 2004 in 40 of the most deprived districts in the country (out of a total of 138 districts).[8] To evaluate the likely distributional

impact of this program we use information on the districts currently participating in the scheme and identify beneficiary households as those with children in primary school.[9]

A similar procedure was followed to determine which households would receive health subsidies based on existing access patterns in all districts as well as the same targeted districts. The Community Health Compound scheme targets areas without basic health facilities, constructs health compounds in these areas, and provides a community nurse, basic infrastructure, training, and basic transport. This scheme also targets communities in the poorest 40 districts.

We also simulate the likely incidence of expenditures on rural electrification and urban transport programs. For rural electrification, we identify villages in the sample in which no household reported using electricity as their main source of lighting and evaluated the incidence of giving a uniform transfer to all households residing in these villages. This simulation can be interpreted as capturing the marginal benefit incidence of expenditures on rural electrification. To simulate the average benefit incidence of a transportation subsidy, the analysis gives a transfer to urban households in proportion to their expenditure on intra-city bus transport.

Finally, we simulate the benefit incidence from a program that identifies beneficiaries through a proxy-means algorithm based on a consumption model, with 30 percent of households with the lowest predicted consumption receiving a uniform transfer. Since the transfer could be either in cash or consist of health, education, energy, or other subsidies, this program can be interpreted as an alternative approach which could be used to improve expenditure targeting.[10] It may be that one can achieve better incidence outcomes using a more sophisticated statistical approach than the one used here, or by combining proxy-means targeting with other targeting methods. However, one should also recognize that the proxy-means outcomes evaluated implicitly assume perfect implementation, when in practice we know that implementation effectiveness is as important as design in determining the actual performance of programs.[11]

Table 11.4 presents the distribution of transfers across income quintiles for each of the transfers programs. In the case of kerosene subsidies, only 39 percent (that is, 17.8 percent plus 21.1 percent) of transfers go to the poorest 40 percent of households. This targeting performance is dominated by all of the other transfer programs considered with the exception of health subsidies. Below we focus solely on the targeted education transfer (where 48 percent of transfers accrue to the poorest 40 percent of households) and the hypothetical proxy-means targeting approach (where 65 percent of transfers accrue to these households). We analyze the

Table 11.4 Share of Benefits from Alternative Transfer Programs
household benefits/total benefits

	Bottom	2nd Quintile	3rd Quintile	4th Quintile	Top
Benefit share					
Education					
Untargeted	0.215	0.225	0.219	0.187	0.154
Targeted	0.204	0.279	0.249	0.17	0.098
Health					
Untargeted	0.149	0.193	0.208	0.207	0.244
Targeted	0.148	0.229	0.208	0.226	0.189
Rural electrification	0.329	0.251	0.212	0.135	0.074
Urban transport	0.299	0.128	0.185	0.28	0.376
Proxy-means targeting	0.373	0.277	0.205	0.111	0.347
Kerosene subsidy	0.178	0.211	0.227	0.209	0.174

Source: Authors' estimates.
Note: Quintiles are based on the national distribution of household consumption per adult equivalent.

net real income effects when petroleum prices are increased in line with the formula, but where a fixed amount of revenue is returned to households through these three programs.

Table 11.5 presents the revenue implications of removing all petroleum subsidies and shows clearly that the bulk of the revenue will come from diesel (54 percent) and petrol (38 percent). In all cases, the net

Table 11.5 Revenue Effects from Subsidy Removal and Zero Kerosene Tax

Supply characteristic	Diesel	Petrol	Kerosene	LPG	Fuel oil
Total supply (million liters)	968	726	87	58	53
Ex-refinery price (F)	3,552	2,890	3,761	5,355	1,750
Tax rates (percentage of ex-ref. F)	0.51	0.59	0.36	0.29	0.65
Revenue (billion Ghanaian cedis)	1753	1243	117	90	60
Revenue share (product revenue/total revenue)	0.54	0.38	0.04	0.03	0.02

Source: Authors' estimates.
Note: Supplies are for 2003. A billion is 1,000 million. Nominal GDP in 2004 was 79,865 billion Ghanaian cedis. Total revenue from the above petroleum is ¢3,263 billion, which is approximately 4.0 percent of GDP. Total tax revenue in 2004 was estimated by the IMF (2004) at ¢16,761 billion, which was around 21.3 percent of GDP. In addition to tax revenue, under the assumption that the production activities of the Tema refinery break even at the current world prices, increases in the ex-refinery prices result in a lower quasi-fiscal deficit equivalent to 3.2 percent of GDP.

revenue raised (or funds allocated to the transfer programs) is kept constant across programs. The transfer budget is determined by the revenue lost by keeping the kerosene tax at zero compared with the price formula level of 36 percent, which leads to a decrease in revenue of 3.6 percent compared with the full price adjustment. We then ask how net benefits would be distributed if we allocated this same revenue using alternative transfer programs—that is, if we used a targeted education program and a hypothetical transfer program based on a household proxy-means approach.

Table 11.6 (top panel) presents the magnitude and distribution of the real income effect when 3.6 percent of revenue is returned to households under three transfer programs: a zero kerosene tax, a targeted education subsidy, and a proxy-means targeted transfer program. Focusing first on the case of zero kerosene taxes, the lower increase in kerosene prices results in a smaller aggregate real income decrease (from 8.5 to 7.3 percent) as well as a smaller decrease for the poorest quintile (from 9.1 percent to 7 percent). The share of the poorest quintile in the aggregate real income loss falls from 8.8 percent to 7.8 percent. Although the aggregate real income loss is even lower for the two other transfer programs, this simply reflects the different distribution of the same absolute aggregate loss. Under the targeted education subsidy the share of the poorest quintile decreases to 7.1 percent. Under the proxy-means targeted program this share decreases even further, to 4.4 percent.

Of course, the net loss for the poorest quintile could be reduced further if a greater proportion of revenue was transferred back to households under the programs. Table 11.6 (bottom panel) presents the same simulations as above, but now the revenue that is returned to households is increased by 50 percent—that is, 5.4 percent of the revenue is returned to households. The aggregate net loss to households is now lower in all cases. Under this scenario, the net loss to the poorest quintile under the proxy-means targeted program is near zero. These simulations clearly show that, in terms of providing protection to the poorest households, the two targeted transfer programs dominate low kerosene taxes and also avoid the efficiency costs associated with this tax profile. There are also clearly high returns to developing a well-targeted transfer program.

CONCLUDING REMARKS

With the substantial increase in world oil prices since 2003, the issue of petroleum product pricing, and energy pricing more generally, has become increasingly important in developing countries. Reflecting a reluctance of governments to pass these price increases onto energy users, energy price

Table 11.6 Benefit Incidence for Alternative Expenditure Programs

household income impact divided by household total income

Alternative expenditure scenarios	*Bottom*	*2nd Quintile*	*3rd Quintile*	*4th Quintile*	*Top*	*All*
Returning 3.6 percent of revenue						
Net real income loss						
Price formula alone	0.091	0.087	0.085	0.082	0.082	0.085
With zero kerosene tax	0.070	0.072	0.073	0.074	0.077	0.073
With targeted education subsidy	0.057	0.064	0.070	0.075	0.079	0.069
With proxy-means targeting	0.031	0.063	0.073	0.078	0.081	0.065
Share of aggregate loss						
Price formula alone	0.088	0.142	0.183	0.243	0.343	n.a.
With zero kerosene tax	0.078	0.134	0.178	0.248	0.363	n.a.
With targeted education subsidy	0.071	0.122	0.174	0.254	0.378	n.a.
With proxy-means targeting	0.044	0.121	0.180	0.264	0.391	n.a.
Returning 5.4 percent of revenue						
Net real income loss						
Price formula alone	0.091	0.087	0.085	0.082	0.082	0.085
With zero kerosene tax	0.061	0.066	0.068	0.070	0.074	0.068
With targeted education subsidy	0.042	0.054	0.063	0.072	0.078	0.062
With proxy-means targeting	0.003	0.053	0.067	0.075	0.081	0.056
Share of aggregate loss						
Price formula alone	0.088	0.142	0.183	0.243	0.343	n.a.
With zero kerosene tax	0.071	0.129	0.176	0.250	0.373	n.a.
With targeted education subsidy	0.062	0.111	0.169	0.260	0.398	n.a.
With proxy-means targeting	0.019	0.109	0.178	0.276	0.418	n.a.

Source: Authors' estimates.

Note: n.a.: not applicable. Quintiles are based on the national distribution of consumption per adult equivalent.

subsidies are absorbing an increasing amount of scarce public resources, thus exacerbating the constraints to increasing government expenditures in areas such as social and infrastructure expenditures. Governments are often especially concerned about the adverse impact of such price increases on the poorest households. In this chapter, we identify the fiscal implications of these subsidies for Ghana. Our analysis is concerned primarily with evaluating the likely magnitude of the impact of price increases on household real incomes and how these increases are distributed across households at different parts of the income distribution. We also identify alternative approaches to mitigating the adverse effects of price increases on poor households and actual government policy responses.

It is clear that the distribution of the benefits implicit in energy subsidies across households involves substantial leakages of these to higher income households. This finding is extremely robust across a range of countries for which we have recently undertaken similar analyses. It even holds true for kerosene, subsidies on which are often promoted as a way of improving the targeting of energy subsidies. Reflecting this, the real income burden resulting from a withdrawal of energy subsidies is borne disproportionately by higher income households. That said, lower income households do suffer sizeable real income decreases from subsidy removal. Any credible policy strategy therefore needs to address the mitigation of these adverse effects.

In the context of Ghana, our analysis estimates that the poorest households experience a 9.1 percent decline in real incomes. Maintaining lower kerosene prices is a relatively inefficient approach to protecting these households from such losses because of the extent of the leakage of subsidy benefits to high-income households. Better-targeted programs can help to substantially reduce or even eliminate these losses. Of course, to the extent that it takes time to develop well-designed and well-implemented targeted transfer programs, one may wish to gradually introduce price increases, especially for products such as kerosene that are relatively more important for the poorest households. However, there may be substantial efficiency as well as revenue costs associated with such a strategy, related to the substitution of kerosene for other sources of energy. For example, kerosene is often substituted for diesel and even gasoline when substantial price differentials exist between kerosene and these products. Therefore, it is important to see such an approach as a very short term strategy. In addition, since higher prices may exacerbate the lack of access by poor households to clean fuels (with associated negative health and environmental implications), some of the budgetary savings from eliminating fuel subsidies could be allocated to improving access to electricity (typically a

cleaner and cheaper source of energy) as well as to rural roads and urban mass transport.

The results of this analysis were presented to the government in early February 2005. In mid-February 2005 the government increased petroleum prices by, on average, 50 percent and announced its intention of introducing a new pricing formula in order to remove the government from pricing decisions. It also emphasized its commitment to continuing sectoral reforms that would further increase private sector participation in the import and distribution of petroleum products. In May 2005, the government established the National Petroleum Authority to monitor the implementation of the pricing mechanism and facilitate the withdrawal of government from the politically sensitive issue of petroleum pricing. The composition of the authority includes representatives from government, oil-marketing companies, trade unions, nongovernmental organizations such as the association of Ghana Industries, and various experts. This system seems to be working since prices were increased again in June 2005 in response to a continued increase in world petroleum prices.

Of equal importance was the introduction of additional expenditure items in the 2005 budget that were intended to mitigate the adverse effects of higher domestic petroleum prices on low-income households. These included the removal of fees charged to primary and junior secondary schools as well as investments in transport and an expansion of the rural electrification scheme. These budgetary expenditures, equivalent to approximately 0.35 percent of GDP, are to be financed by a special "mitigation levy" that was included in the pricing formula.

Our analysis gives a very useful example of how household survey data and input-output data can be used to evaluate the likely welfare implications of higher domestic petroleum prices. The approach presented can be implemented at relatively low resource cost, yet can provide very valuable information for the policy debate surrounding the issue of petroleum price reform. We have emphasized the importance of identifying the tradeoffs inherent in alternative measures that can be used to mitigate the welfare losses for low-income households. In the context of Ghana, the government found this information especially important when designing the policy reform package in a way that was politically acceptable. More generally, it is clear that access to an effective formal social protection system provides a useful mechanism for introducing much-needed structural reforms because it enables the associated efficiency gains to be achieved while simultaneously providing some protection to the poorest households against any adverse effects in the short term.

Finally, the background and timing to this PSIA study helps to highlight the tradeoffs that exist in practice when attempting to undertake "quality PSIA" in order to inform the policy debate. The request for PSIA support came very close to the government budget discussions in parliament during which the policy on price reform was to be announced and debated. This presented a very tight deadline, which strongly influenced the approach adopted in executing the PSIA. Hayes (2005) summarizes the key characteristics or objectives of a "quality PSIA," highlighting that such analyses should be:

- *rigorous* in order to be credible and useful;
- *ex ante* and *timely* in order to influence policy;
- *broad* (that is, include a focus on social, political and institutional as well as economic issues) in order to improve understanding of policy environment in a country and enhance probability that good policies get adopted; and
- *participatory* in order to promote domestic ownership of analysis and its implications, to enhance the chances that the insights will influence policy design, and to help to build domestic capacity for such analyses over time.

In the context of the present Ghana PSIA, the desire to be ex ante and timely meant that the tradeoffs with the other objectives were relatively high, especially the tradeoff with the participatory nature of the process and the breadth of the analysis. For example, in carrying out the PSIA we were able to consult only a relatively narrow group of stakeholders and, reflecting the need for a review and clearance process, the report did not have very wide circulation prior to the policy debate in parliament.[12] However, it should also be recognized that a substantial amount of policy analysis and discussion on the issue already existed and, in fact, were the basis for the government's request for further analysis. The main contribution of the current PSIA was to address in more detail the magnitude and distribution of the likely real income effects resulting from price increases as well as to identify alternative mitigating measures and uses of budgetary savings from elimination of fuel subsidies.

Such tradeoffs across objectives will always exist in practice when undertaking a PSIA. However, one expects that these tradeoffs will become less sharp as the framework and capacity for PSIA is developed over time. In a sense, this is a key contribution of the PRSP process, which is intended to identify a set of policies to be implemented by the government over the period of a few years. This should provide a longer timeline for a higher-

quality PSIA process to occur. But even a thorough PRSP process will not be able to incorporate unanticipated economic shocks, such as a sudden leap in world oil prices, and the need for immediate policy responses. In such situations, having access to lessons from countries that faced similar shocks can be a very valuable input to the policy process. It is hoped that the present analysis, and similar ones being carried out at the IMF, have added value from this perspective.

NOTES

1. See IMF (2004: 20, Box 3), Federico, Daniel, and Bingham (2001), Gupta and Mahler (1995), and Gupta et al. (2002) for more details on fuel pricing in developing and developed countries.
2. The results presented here are based on Coady and Newhouse (2005), which can be consulted for greater detail.
3. Historically, relatively large increases in petroleum prices have not been uncommon. For example, kerosene, diesel, and gasoline prices rose in real terms by 161, 214, and 156 percent, respectively, from 1983 through 1987 (Addison and Osei 2001; Gupta et al. 2002).
4. The following people from the World Bank provided invaluable assistance regarding information on the policy context and reform process in Ghana as well as providing access to household-level and input-output data: Marcelo Andrade, Maurizio Bussolo, Carlos Cavalcanti, Vijay Iyer, and Hans Lofgren.
5. In particular, Ravi Kanbur (Cornell University), Jeff Round (University of Warwick), and Stephen Younger (Cornell University) provided important information on data sources and identified various policy stakeholders and analysts that should be contacted.
6. We benefitted greatly from detailed discussions with Felix Asante and D. Twerefou (both at ISSER) and Nii Sowa and Abena Odouro (both at CEPA).
7. The revised formula also allowed for the adjustment of domestic ex-refinery prices to reflect changes in world prices and/or the exchange rate. Prices would be adjusted according to the formula if there were: (1) a monthly average change in the FOB price of +/–US$5/metric ton (2) a monthly average change in the exchange rate of +/–50 cedis/U.S. dollar, or (3) when the combined effect of the above changes registers an absolute change of 10 cedis/litre compared with prevailing ex-refinery prices.
8. The participating districts were chosen based on an index constructed from annually collected school-level data using information that included the furniture in the school, students' performance in matriculation exams, the number of trained teachers, enrollment rates, participation by girls, and the availability of core textbooks. The objective of the program was to increase the amount of public resources going to these schools to replace the levies typically being charged to households by district assemblies. It is hoped that this

program will also increase participation by girls and children from the poorest households.

9. Note that this simulation may underestimate the marginal benefit incidence of expenditures, since the extra expenditures may act to increase enrollments of children from the poorest families.
10. Recently, such statistical approaches have been used extensively in "conditional transfer programs," which have become increasingly popular in developing countries, especially in Latin America. These programs give cash to identified poor households, but condition receipt of the benefit on regular attendance by children at school and regular attendance of pregnant/lactating women or women with young children at health clinics for basic health and nutrition information and services. These programs have also been found to have a substantial impact on improving the human capital of children from very poor families and help to break the intergenerational transmission of poverty and destitution. For a summary of the design, implementation, and impacts of the most well known of these programs see Morley and Coady (2003) and Rawlings and Rubio (2003).
11. See Coady, Grosh, and Hodinnott (2004) for a more detailed discussion of alternative targeting methods and their targeting performance.
12. For an interesting discussion on the interaction of the PRSP and PSIA processes more generally in Ghana, with a particular focus on the quality of the PSIA process, see Azeem (2005).

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