Transport Research Support

MEASURES TO REDUCE THE ECONOMIC AND SOCIAL IMPACT OF HIGH FUEL PRICES

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The Transport Research Support program is a joint World Bank/ DFID initiative focusing on emerging issues in the transport sector. Its goal is to generate knowledge in high priority areas of the transport sector and to disseminate to practitioners and decision-makers in developing countries.

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EXECUTIVE SUMMARY

High volatility in the world prices of crude and refined petroleum has been a feature of the global economy in the last decade. Crude oil prices increased four-fold between 2004 and 2008, and following a drop in price during the second half of 2008, they have been rising again, and they are several times higher than they were two decades ago. These changes were all reflected in retail prices for transport fuels. Since 2008 the volatility of both crude oil and retail prices has continued, Since volatility of petroleum prices is likely to be a feature of the global economy, they merit a reconsideration of the transport policies that were put in place when fuel prices were not such a significant component of trade-related transactions costs and hence external competitiveness of SSA countries.

Retail prices of gasoline and diesel in SSA countries are among the highest in the world. Fuel prices are higher in SSA countries than the global average, and with few exceptions, they are higher than in other regions of the world. And since many of the countries have low per capita incomes, when these are taken into account, fuel prices in SSA counties are the least affordable. Further, retail prices of fuel are higher in the most vulnerable Less Developed Landlocked Countries (LLDCs) than in coastal countries.

Efficient and low transport cost is essential for achieving regional integration in SSA. A recent comprehensive World Bank study on transport costs in Africa region *(Transport Prices and Costs in Africa: A Review of the International Corridors,(October 2008*) identified the high fuel cost as the single greatest contributor to trade-related transaction costs in Africa. Fuel cost account for over a third (about 35 percent) to the total trade-related transaction costs.

Increases in fuel prices adversely affect SSA countries export competitiveness. Total exports relative to GDP and the number of exporters are greater in SSA countries with lower fuel prices. On average, exporters in countries with lower fuel prices have a relatively more diversified export portfolio – both in terms of composition and in terms of geographic diversification. SSA countries that experienced higher growth in their transport fuel prices also experienced higher exit rates of exporters, particularly in sectors with high transport intensity (such as agriculture and mining).

Higher oil prices impact on the prices of goods that use oil as an intermediate input. The most important item of consumer expenditure in low-income countries is food, on which the poor spend a disproportionately high share of total household expenditures. Food prices are higher where transport costs

are higher, and they can account for up to 40% of the retail prices of basic foods. Likewise, the operating cost of buses impacts directly on the cost of public transport.

To reduce the impact of high transport fuel prices on export competitiveness, there are two spheres of potential action: First, through six possible ways of reducing the high prices of fuel, and second by increasing the efficiency with which the fuel is used in transport.

Six areas of action to reduce fuel prices

1. **Reduce FOB and/or CIF prices: FOB prices account for more than half the retail price of transport fuel**. Market size is an important determinant of FOB price. The domestic market for fuel in most SSA countries is small - -with annual domestic consumption of fuel less than 25,000 barrels. In small economies, the suppliers are not able to obtain the lowest possible price for imported fuel. Although the FOB prices that country pay is determined by market size, their procurement procedures also influence prices. One way of overcoming the problem of size is through relying on a single buyer. The single buyer can be either the state, or bulk purchasing agencies or agreements between countries. The scheme however needs to be transparent for ensuring that the FOB prices paid are lower and that cost savings are passed to end-users of transport services.

Sourcing imports based on lowest FOB price may not necessarily be the cost-effective option, if the cost of transport and insurance are high and the lowest FOB price is from a distant location. It may be more cost effective to source imports on least CIF price, which would also give responsibility for the maritime transport to the supplier, who is likely to obtain lower maritime costs then the buying nation.

2. **Reduce the land transport cost: Few SSA countries have efficient land transport systems for bringing fuel from the port to the consumer.** Particularly for many land-locked countries, the cost of transporting fuel by rail rather than road would be almost 20% less costly, given the distances and volumes of fuel imported. Even for most coastal SSA

3. **Restructure markets for transport fuels**: Standard measures of market concentration show that many SSA countries have highly concentrated markets for transport fuels, while some others have so many distributors that none of them can be profitable. While difficult to implement, policies that encourage enough competition to avoid the dangers of concentration but not so much as to prevent profitability could have a small but measureable impact on retail prices.

4. **Reduce protection to small inefficient refineries**: Nine of the twenty two SSA countries included in the survey of transport fuel prices have

refineries that are too small to be efficient and would be too expensive to upgrade for the relatively small markets they serve. Without price or market protection these refineries could not survive. Since it is the consumers (through high retail prices) or the government (through subsidies) that pay the price for keeping these refineries in operation, the merits of such policies merit serious reconsideration.

5. **Increase storage capacity for buffer stocks**: Requirements for the marketing companies to carry adequate fuel stocks (measured in terms of given number of days of normal consumption) as a buffer against supply disruptions caused by possible delivery delays would be beneficial for the landlocked countries which are the most vulnerable to supply disruptions. While there might be a short term increase in retail prices to cover the investment and operating cost, in the medium and long term there would be much greater price stability and possibly lower average prices. As a alternative, governments could establish their own security stocks and charge distributors when the stocks are called on to maintain supplies.

6. **Lower taxes on diesel for export competitiveness.** In countries where the taxes on diesel are higher than on gasoline, a policy that would increase export competitiveness and reduce local food costs would be to lower the taxes on diesel to a level that covered the costs of externalities, and increase the gasoline tax to retain revenue neutrality. Diesel is mainly used by trucks moving export and import freight and domestic food supplies, while gasoline is mainly used by private and commercially used light vehicles. In particular, the change would benefit importers and exporters in landlocked countries as these have the highest road freight costs.

Three areas of action to increase fuel efficiency

1. **Modernize the trucking fleet**. The new trucks are more efficient than the old small ones. . The vehicle taxation system should be changed to give preference to newer rather than old vehicles. For import excise duties, schemes similar to those implemented in Ghana are recommended, so that the difference in import duties between older and newer vehicles is reduced. For vehicle ownership duties, annual license fees need to be graded according to the age of the vehicle as a proxy for its fuel consumption.

2. **Restructure the trucking industy**: Larger trucking comanpies are more fuel efficient than individual owner drivers. They can afford larger and newer fuel efficient vehicles; they are also better placed to find return loads; more of the distance their trucks operates is revenue earning, contibuting further to the companies ability to afford more fuel efficiency trucks.

International trucking is a good place to start with industry reforms. Some countries require that a transport contract be in force for a trucking company to do business in a port, and only companies that meet minimum criteria can

enter into transport contracts. Once reforms have been introduced to international trucking companies, it could be feasible to introduce a two-tier structure for domestic trucking. Current services that are low cost but provide only a basic services would continue. But they would be complemented higher quality services to larger clients which demand more reliable services. This is already happening in some markets in East Africa, where integrated trucking and terminal companies are providing guaranteed quality services.

3. **Better train and certificate drivers**. Evidence from developed countries is that better training of truck drivers can reduce fuel consumption by as much as 5% as well as dramatically reducing accidents, vehicle damage and maintenance costs. The IRU can provide "train the trainers" schemes and it has an on-line training and certification for drivers that could be implemented in SSA countries.

Next Step

The next steps are closely related to the recommendations of the report.

A first step for all the proposed actions would be a workshop/seminar to present the results of this report and determine the level of private sector (mostly the trucking industry) and government (mostly Ministries of Transport and Energy) support for more detailed assessments at a national level.

The Actions are therefore in two sets, those related to fuel prices and those related to improving fuel consumption.

Diesel fuel prices tend to be higher in East Africa and in land-locked countries. They also tend to be those where high fuel costs have the largest negative impact on export competiveness, so these are perhaps the countries where first attention could be given to measures to reduce high diesel fuel prices.

In West and Central Africa the trucking industries tend to operate less efficienctly and with higher fuel consumption, so in these countries it is perhaps the truck fleet, the trucking industry and driver training that merits first attention.

Although some relatively simple measures can be taken to improve the efficiency of use of diesel fuel, sustainable measures will need more fundamentacl changes. These are in the regulatory structure of the trucking industry itself and in the way trucking services are contracted.

1 INTRODUCTION

High volatility in the world prices of petroleum has been a characteristic feature of the global economy in the last decade. World petroleum prices increased four-fold between 2004 and 2008 and, and following a drop in prices in the second half of 2008, petroleum prices have been rising again, and they are several times higher than they were two decades ago. [1] Since high and volatility of prices is likely to be a permanent feature of the global economy for the foreseeable future, they merit a reconsideration of the national transport and taxation policies that were put in place when fuel prices were not such a significant component of trade-related transactions costs in SSA countries. Transport practices that were based on the assumption of low price of fuel are not sustainable, and policies neglect fuel efficiency considerations through lowering the fuel consumption of vehicles measures are no longer sustainable.

Efficient and low transport cost is essential to achieve regional economic integration and strengthen Africa's competitiveness. in external markets. A recent comprehensive World Bank study on transport costs in Africa region *(Transport Prices and Costs in Africa: A Review of the International Corridors,(October 2008*) identified the high fuel cost as the single greatest contributor to total trade-related transport costs in Africa.[2] The study analyzed the causes for the high transport costs by grouping a number of cost factors into three main categories.(1) Transport road network quality and coverage. (2) Factors costs such as fuel, labor and equipment and (3) market economics (including regulatory prices, transports and trade procedures.

High fuel prices were estimated to account for more than a third (about 35%) to the total trade-related transaction cost. The study estimated that reducing fuel prices by 20 percent could lead to a reduction of trade -related

[1] A GIZ (The Deutsche Gesellschaft fur Internationale Zusammenabeit, formerly GTZ), provides a survey of transport fuel prices in 2008. The survey found the average price of diesel fuel n SSA countries to be about 250 higher than ten years earlier. The survey can be accessed from: www.gtz.de/fuelprices.

[2] World Bank (2009)

transactions costs by 9 percent, 12 percent and 10 percent in Central and West Africa, East Africa and Southern Africa respectively.

Higher diesel prices also impact on the prices of all other goods which use diesel as an intermediate input. The most significant among them with implications for the poor in low-income developing countries is food, on which the poor spend a disproportionately high share of their total household expenditures. Transport fuel costs can make up more than a third of the retail price of food. Likewise, the operating cost of buses impacts directly on the cost of public transport

Diesel and gasoline are the primary fuels used worldwide in road transport – the main transport mode for carrying freight in most SSA countries. Nearly all large vehicles used for long-haul cross-border and regional trade (trucks and full size buses) are fueled by diesel, and because diesel engine technology (compression ignition) is more efficient than gasoline, many medium-size vehicles (medium-size trucks, goods delivery vans and mini-buses) also use diesel. Gasoline, on the other hand, is mainly used by private and commercially-used light vehicles. While this study covers both gasoline and diesel, it focuses on diesel prices as the main contributor to the costs of exports, and public transport.

This report is in three parts

In the first Part, transport fuel prices in the countries of Sub-Saharan Africa (SSA) are compared with those of other regions of the world. The comparison is not only in terms of the actual retail prices but also, but taking account of per capita incomes and truck revenues, also in terms of affordability. This Part also provides evidence of the make-up of transport fuel prices in SSA countries, as a first step in assessing how they can be dealt with.

The second Part provides new evidence of the impact of these high fuel prices on the export competiveness of a sample of six SSA countries. It also provides a shorter description of the results of a study of the impact of fuel prices on logistics costs in Central America, since so far there have not been any studies of the impact of high transport fuel prices on logistics and food costs in SSA countries.

The third Part deals with the ways in which the impact of high transport fuel prices can be addressed. Two main areas of action are described, those that would reduce the retail price of transport fuel and those that would increase fuel efficiency, so they impact of high prices would be reduced. This section focuses on diesel fuel, as this is by far the most used by the trucks that transport export products and are involved in domestic logistics. This section concludes with some ideas on what could be done next to make progress on implementing the most promising ideas for reducing the impact of high transport fuel prices.

2 Sub Sahara Africa transport fuel prices are among the world's highest

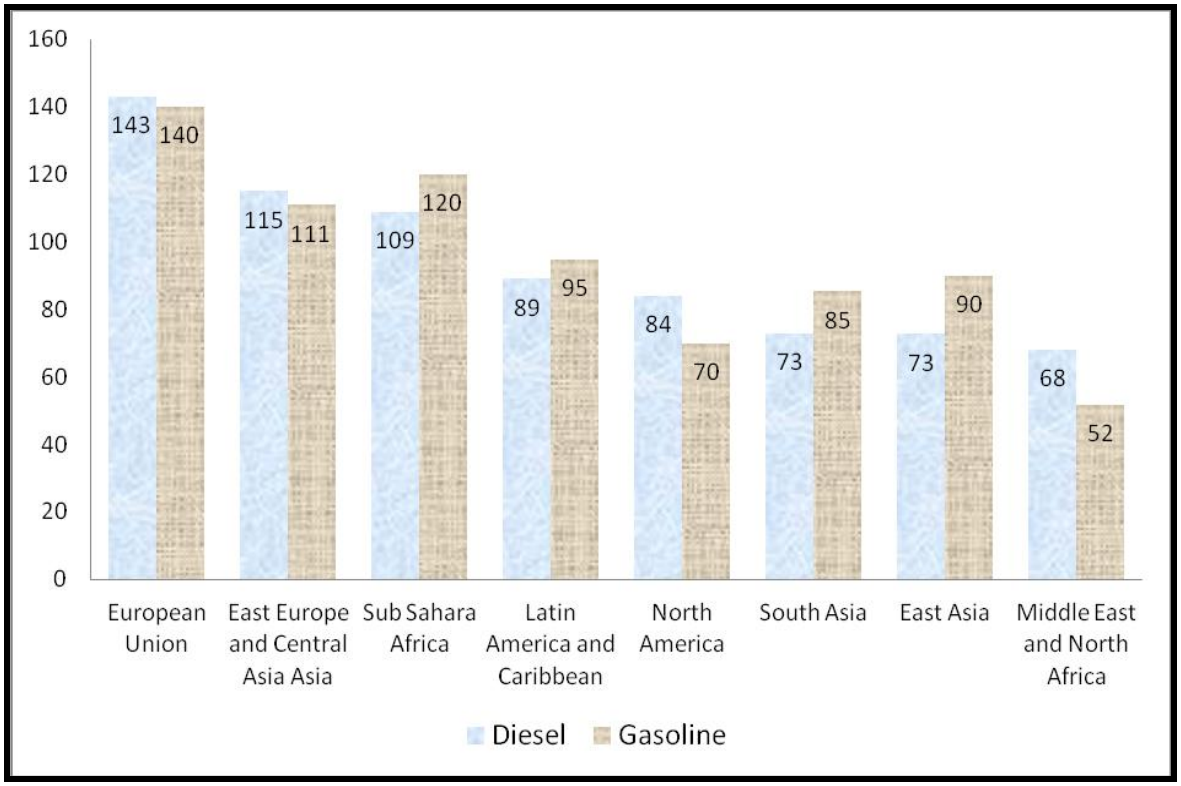
2.1 Comparison with other regions and between Sub Sahara Africa countries

Until recently there were several partial data sets of transport fuel prices for the countries of sub-Saharan Africa[3], but none of them were sufficiently complete or current. To fill the gaps, a questionnaire was designed and sent to World Bank transport sector task managers in SSA countries. The structure of the questionnaire was based on a standard format developed by the Energy Sector (Annex One). A total of 22 completed and useable questionnaires were returned and these form the basis for the analyses of this study. For comparisons of fuel prices in SSA countries with those of other regions in the world, the global fuel prices for 174 countries were taken from the GTZ website.[4]

[3] GTZ and SSATP. GTZ quoted in WB database

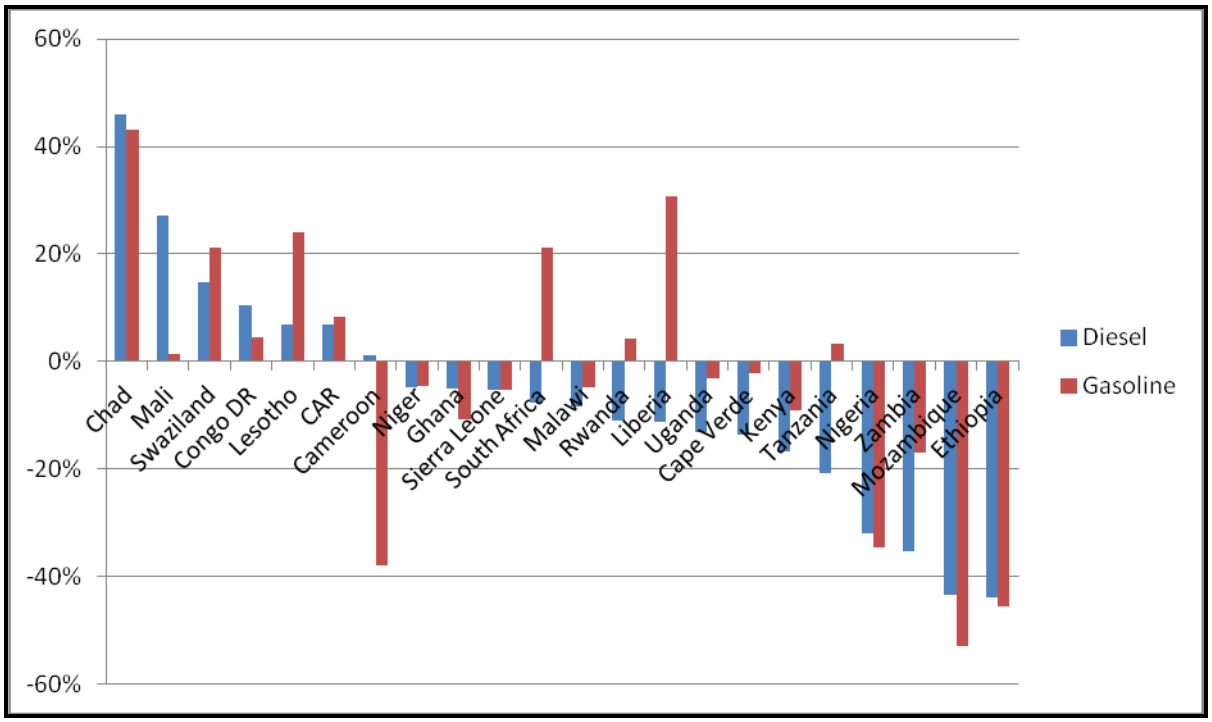
[4] For diesel, we used the price of diesel fuel with a maximum of 500 ppm of sulphur as this is the most widely used fuel in SSA countries for commercial vehicles. For gasoline, we used low octane, as this is the most commonly used fuel in SSA for privately-owned vehicles.

FIGURE 1: AVERAGE FUEL PRICES BY REGION (U$ CENTS PER LITER)



Source: GTZ International Fuel Prices, 2009

FIGURE 2: VARIATION OF CHANGES IN DIESEL AND GASOLINE RETAIL PRICE BY COUNTRY



Source: Responses to 2010 WB Survey of transport fuel prices

2.1.1 Land-locked and coastal countries

Average retail price of fuel is higher in landlocked countries: The survey returns show that the average price of fuel for all SSA countries responding to the questionnaires was about US 110 cents per liter for diesel and about US cents per liter for gasoline. The average price of diesel for the land-locked countries was higher at US 122 cents for diesel and US 126 cents per liter (as compared to the average price for coastal countries for both diesel and gasoline at about US 97 cents). The four countries with the highest diesel prices are all land-locked while the seven countries with the lowest price are all coastal countries Long distances from the port to final market destinations, transit charges and ground transpiration charges are some of the reasons why retail prices are higher in landlocked countries as compared to in coastal countries.

Table 1: Retail fuel prices in land locked and coastal countries

	Diesel US cents/liter	Gasoline US cents/liter
Land locked countries	122.1	126.0
Coastal countries	97.3	97.4
All countries	110.0	118.0

Source: WB Survey 2010

2.1.2 Colonial heritage

Countries with different colonial heritages have different policies towards transport fuel prices, perhaps providing different levels of subsidy or imposing different levels of taxation, or having different perceptions of the role of government in determining prices. Whatever the reasons, there are significant differences in the retail prices of transport fuels in countries with a British or Portuguese colonial heritage as compared to in countries with a French heritage. Diesel prices in countries with a French heritage are on average about 30 per cent higher than in countries with British or Portuguese heritage, and gasoline prices in British heritage countries are about 30 percent lower than in those with a French or Portuguese heritage. Countries with the Portuguese heritage show no clear pattern, as these countries have a low end diesel price but high end gasoline prices.

Table 2: Retail fuel prices based on colonial heritage

Colonial heritage	Diesel US cents/liter	Gasoline US cents/liter
Portuguese	100.5	130.1
French	135.2	130.2
British	95.6	92.6
All countries	110.0	118.0

Source: WB Survey 2010

2.1.3 Per capita income

Retail diesel and gasoline prices are significantly higher in low income countries than in middle income countries, as per the World Bank classification of countries based on per capita income.[5].

Table 3: Retail fuel price variation by per capital income

Country per capita income group	Diesel US cents/liter	Gasoline US cents/liter
Low income	112.1	114.6
Lower middle income	102.3	98.3
Upper middle income	87.8	104.7
All countries	110.0	118.0

Source: WB Survey 2010

2.2 Make up of fuel prices in Sub-Sahara Africa countries

The policy options regarding fuel prices raises complex issues in the context of developing countries, in view of the following considerations.[6] One, the level of fuel prices should allow for full cost recovery of producers/importers, refiners and distributors including the costs of adequate maintenance of facilities and other assets.

Two, fuel taxes are a means of generating revenues for the public budget. Countries with weak central institutions have difficulties in collecting taxes on both income and personal expenditure. Fuel consumption is an exception to the difficulties of expenditure taxes as it can be collected directly from a small number of importing or refining companies rather than from thousands of retailers or millions of final consumers. So taxes on fuel are a relatively effective source of revenue for governments. When taxes on income (personal and corporate) are difficult to collect and there is no reliable system for taxing sales (perhaps because the retail sector is largely informal), taxes on transport fuels can account for a large proportion of their retail price. While being an efficient source of government revenue, the impact on fuel prices and through those on production costs can have a detrimental effect on export competitiveness as well as on the cost of living.

Given these considerations, we look at the main components of retail prices of fuel in SSA countries. The components are the FOB cost, taxes, the add-on of

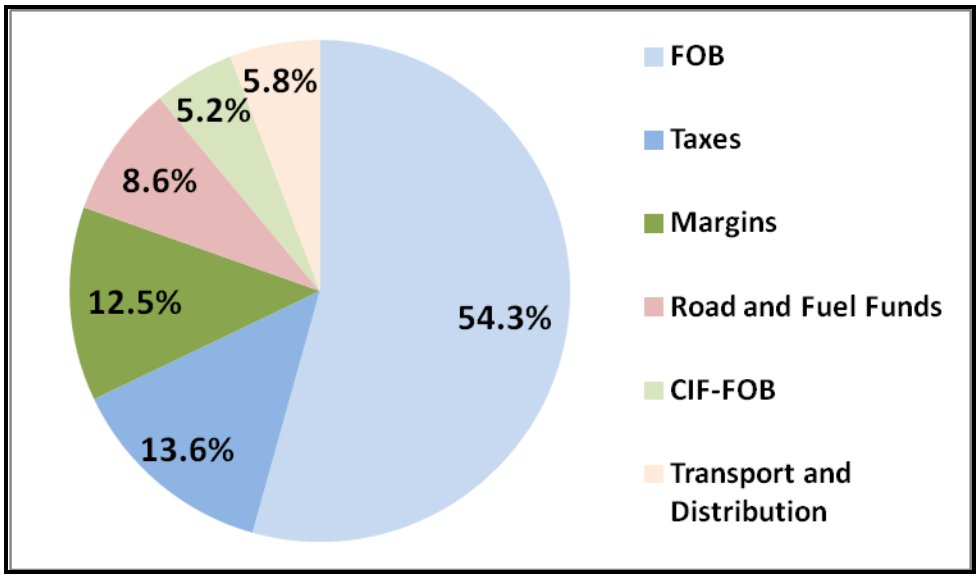
[5] For operational and analytical purposes, the World Bank's main criterion for classifying economies in Gross National Income (GNI). Per capita. Countries with a GNI per capita of US$ 1,005 or less are classified as low-income countries. Countries with a GNI per capita of over US$ 1005 but under US $ 3,975 are classified as lower middle income countries and countries with a GNI per capita of over US$ 3,975 but under US$ 12,275 are classified as upper middle income countries and countries with a GNI per capita of over US$ 12,275 are classified as high income countries.

[6] International Fuel Prices (2009)

maritime transport and insurance (the IF of CIF), the costs of storage, transport and distribution of the fuel, wholesale and retail cost and the margins that are charged for wholesale and retail distribution, and the taxes and other charges that are charged by different levels and institutions of government.

FOB cost followed by taxes are the main components of retail prices of fuel: For both diesel and gasoline the FOB cost accounts for over half (about 55 percent) of the total, with the next highest share coming from federal and other taxes at almost 14 percent.. Wholesale and retail margins are the next largest contributors at more than 12 percent respectively, while Road Funds and Energy Stabilization Fund charges (from most perspectives these are user charges and ***not*** taxes)[7] account for rather less than 9 percent of the total, with transport and distribution costs and the additional CIF charge over the FOB charge adding about 5 percent. The wholesale and retail margins as observed in SSA countries are not inordinately high, as they are comparable to the margins observed elsewhere.[8]

FIGURE 3: AVERAGE COMPOSITIONS OF RETAIL FUEL PRICES IN SUB SAHARA AFRICA



Note: The data are averages of diesel and gasoline percentages. There are differences between diesel and gasoline of up to 2% for each component

The share of costs for the land-locked countries in the sample is little different to that of the sample as a whole. For diesel fuel, the CIF share is about the same, but the distribution and transportation increases by 2 percentage points and the federal tax share increases by 3 percentage points.

[7] As recommended by the World Bank, a rate of US 10 cents was adopted within the International Road Maintenance Initiative for less developed countries. The US 10 cents rule is also endorsed by the Annual Sub-Saharan Africa Transport Policy Program in 2008 (Source: International Fuel Prices 2009).

[8] International Fuel Prices (2009)

The corresponding reductions are in the contribution to Road and Energy Stabilization funds and a small reduction in the wholesale and retail margins.

TABLE 4: LAND LOCKED COUNTRIES: MAKE UP OF RETAIL PRICES FOR DIESEL AND GASOLINE FUEL

Cost source	Diesel		Gasoline	
	Mean	Standard Deviation	Mean	Standard deviation
CIF	50%	21%	46%	20%
Distribution and storage	9%	7%	8%	6%
Federal and other taxes	21%	15%	23%	19%
Road and Energy Funds	7%	5%	9%	7%
Wholesale and retail margins	13%	9%	14%	8%
Total	100%		100%	

Source: WB Survey 2010

Where fuel prices are controlled by the government at levels below the sum of import and production costs, there is an effective subsidy. This subsidy is usually funded from public revenue and so is equivalent to a negative tax. It is mostly the oil producing countries that have prices below full commercial prices, predicated on their production costs. However, conventional wisdom holds that fuel prices should be priced at their "border price." For an oil producing country this is the price at which it could be exported. Any domestic consumption for an exporting country represents a loss of exports and these could have earned the country a price equal to the border price, which in this case is the FOB price. So unless domestic fuel is priced at least at the FOB price (with additions for the costs of distribution and storage) there is a loss to the national revenue at least equal to the tax and excise charges that would have been earned if the same fuel had been exported.

The make-up of high transport fuel prices gives an indication of where efforts can best be made to reduce them (see Chapter Four). The high FOB contribution to the retail price might indicate that this is a good point to try to reduce the high retail costs, but our research shows that the FOB prices paid by SSA countries are not a significantly higher than the prices paid by other countries. On average about 55 percent of the retail prices of fuel is accounted for by the FOB price. This is about the same as in South Asia and Latin America (although FOB prices account for less than 50 percent of the retail price of fuel in Middle East, and East Asia.[9]

2.3 AFFORDABILITY OF FUEL PRICES

Affordability reinforces the impact of the high prices in Sub Saharan Africa more significant, as it not only has close to the lowest per capita incomes. The impact of high fuel prices is further increased by the low efficiency of fuel consumption of its vehicle. Even without taking account of the worse

[9] International Fuel Prices (2009)

consumption, considering an average car that uses about 11.5 liters per 100km, and travels 10,000km a year, the fuel cost per person in the EU area would only be about 4% of their income whereas in Sub Sahara Africa and South Asia it would cost more than 125% of personal income.

TABLE 5: AFFORDABILITY OF TRANSPORT FUEL FOR PRIVATE VEHICLES

	Per capita income (U$ in 2008)	Gasoline cost as % of income
Sub Sahara Africa	1,104	125%
Latin America and Caribbean	7,448	15%
East Asia	2,952	36%
European Union	41,654	4%
East Europe and Central Asia	8,736	16%
South Asia	951	132%
Middle East and North Africa	3,303	36%
Total	9,042	14%

Source: per capita income from World Bank database, http://data.worldbank.org/data-catalog

The impact of diesel prices on the profitability of trucking companies is similar but more complicated to assess. There are many parameters that affect the affordability of fuel prices to trucking companies, including but not limited to the types of truck they operate and their fuel efficiency, the utilization of those trucks and their load factors. The comparison is made even more difficult than for personal cars because there is no standard measure of income for a trucking company against which to measure the cost of fuel that is comparable to the per capita income for the affordability of fuel for personal cars.

One summary measure that can be used as a proxy measure of income is in the average tariff that is charged for truck transport, but this itself has a wide variation depending on market conditions, the average distance travelled etc. While for most uses of international trucking prices it is helpful to consider a standard type of vehicle, that is not the case here as we are trying to assess the average tariff for all road freight operations.

Since the tariff varies significantly by truck type and the competitiveness of the markets in which they operate, the tariffs quoted here are not comparable with those in studies that have used standard vehicle types[10].

Other studies have mostly examined international or long distance road freight movements, for which the quality of service and the resulting tariff is higher than the average, so the tariffs we have used here are lower than in most other studies. But if the average tariffs are accepted, the fuel cost can be assessed as a percentage of the tariff that can be earned, but even this

[10] Such as Transport Prices and Costs in Africa, Supee Teravaninthorn and Gael Raballand. World Bank, 2008

measure is to some extent circular, as the tariff is to some extent dependent on the fuel price.

TABLE 6: AFFORDABILITY OF TRANSPORT FUEL FOR COMMERCIAL VEHICLES

Region	Diesel price	Consumption	Transport tariffs	% of tariff
Sub Sahara Africa	110	45	1.00	50%
Latin America and	95	35	1.30	26%
East Asia	83	35	1.10	26%
European Union	141	25	2.20	16%
East Europe and	115	30	1.80	19%
South Asia	79	40	1.20	26%
Middle East and	108	35	1.50	25%
Total	100	30	1.80	17%

Sources: Truck tariffs from various WB reports for SSA, Pakistan, Vietnam. See bibliography

Based on this analysis, fuel costs account for a much higher share of the potential revenue for truck operations in Sub Sahara Africa than in other regions. In large part this is attributable to the high fuel consumption of the older and less well maintained trucks operated in most of the region and to the relatively low truck tariffs.

3 ADVERSE ECONOMIC IMPACTS OF HIGH TRANSPORT FUEL PRICES

High and increasing oil prices can have wide range of adverse economic impacts, ranging from a reduction in economic growth, export competitiveness, logistics costs, public transport affordability and reduced household consumption of essentials such as food, to external accounts disequilibria and inflation (see e.g., Kpodar, 2006; Bouakez and Vencatachellum, 2008; Kilian, Rebucci, and Spatafora, 2009; World Bank, 2008).11 In this Chapter we focus on one of the impacts, that of export competitiveness, but also provide some evidence on the impact on domestic logistics costs to emphasize the broad impact of high transport fuel prices.

3.1 EXPORT COMPETITIVENESS

There have been few studies that examine the effects of domestic transport costs (and by implication, fuel prices) on trade flows and export competitiveness. Until very recently, the few studies that were reported were macro-economic studies that used distance as a proxy for transport costs, but this proxy did not permit the studies to evaluate policies that would reduce transport costs (distance between countries is a geographic data).

At the macro-economic level, there is much evidence that transport costs matter for international trade. Studies based on the standard gravity model indicate that the volume of trade between countries rapidly declines as distance increases, and Hummels (2007) demonstrates that distance matters because of transportation costs. In more detail, Limao and Venables (2001) estimated the elasticity of trade value to transport costs, and found that a 10-percentage point increase in transport costs reduces trade volumes by approximately 20%. But all these measures of transport cost are maritime costs, and do not include the costs of getting to or from a port, and they do not distinguish between the impact on exports and imports.

[11] Bouakez and Vencatachellum (2008) used a model tailored to reflect the characteristics of African economies and show that a doubling of the international price of oil with complete pass-through to oil consumers would lead to a contraction of output in the median net-oil importing African country in the first year but if that country were to adopt a no pass-through strategy, output would not be significantly affected but the country's budget deficit would increase.

Of the studies that did focus on exports, Venables and Limao (1999) found that for Sub-Saharan Africa, poor external geography, poor internal geography, and poor institutional quality contributed in approximately equal terms to export performance. Of the very few studies that focused on exports and took account of domestic transport costs, Francois and Manchin (2007) showed that domestic transport infrastructure is a significant determinant not only of export levels, but also of the likelihood that exports take place, and that it is a more important determinant of export volumes than are trade tariffs.

But in the last year or so there have started to appear reports of studies at transport costs and trade competitiveness at a micro level.

One of the most relevant of these studies (Nylde, 2010) is one that evaluated the impact of total transport costs between an inland production center and a deep water port in Colombia.[12] It found that Colombian regions within the lowest quartile of transport costs to a port exported more than twice as much as regions in the highest quartile of transport costs. Further, it found that regions with a higher initial transport costs would benefit more from a reduction in transport costs than regions with lower initial transport costs. The same study found that an improvement in road quality that generates an average reduction of 12% in transport costs increases average exports by about 9%. An earlier study (Albarran et al, 2009) looked at the impact of transport time on the probability of exporting for regions in Spain.[13] It found evidence of a negative effect of travel time to a European border and a positive effect for the presence of an international seaport in some sectors.

But both studies were more interested in the benefits of improving road infrastructure than in reducing truck operating costs through fuel price reductions and fuel efficiency increases. However, the conclusions are directly comparable with those of this study since all three studies have related transport costs (whether fuel costs, total transport costs, or transport travel time costs) to export competitiveness.

Given the lack of information on the impact of high fuel prices on export competitiveness, and even the paucity of the impact of transport or logistics costs, we commissioned a special study that made use of a new and powerful database of firm-level measures of export competitiveness. This was used to assess the impact of fuel prices on export competitiveness. A selection of six

[12] Pacing the roads to export: The Trade Impact of Domestic Transport Costs and Road Quality, Juan Blyde, Inter America Bank, July 2010.

[13] Transport infrastructure, sunk costs and firm's export behavior, Albarran, P.,Carrasco, R., and Holl,A., Working Paper 09-22, Universidad Carlos III de Madrid, 2009

SSA countries - Burkina Faso, Kenya, Malawi, Senegal, Tanzania, and Uganda[14] - was taken from the dataset for the analysis.

The five indicators used to measure the export competitiveness

1. total export values relative to GDP,
2. numbers of exporters,
3. average size of exporters,
4. average number of exported products and destination countries reached per exporter,
5. entry and exit rates from exporting, and survival rates of new exporters – covered exporter behavior, entrepreneurship, and diversification.

Three different analyses were carried out:

- a general competitiveness analysis,
- a competitiveness analysis by economic sector and country, and
- an econometeric analysis using a difference-in-difference empirical specification.

3.1.1 General competitiveness analysis

The first of these was a simple graphical comparison of export competitiveness measures across countries that differ in fuel prices patterns and in whether they are coastal or landlocked. The high correlation between being landlocked and having high transport fuel prices made it difficult to isolate the causal relationships between geography, fuel prices and export competitiveness. However, the comparison did demonstrate that:

- exports are a higher share of GDP and the number of exporters is larger in coastal countries with lower fuel prices than in landlocked countries with higher transport fuel prices;
- coastal countries (with lower transport fuel prices) exhibit more export diversification in terms of composition of exports, with a higher average number of products per exporter than landlocked countries, and
- exporter entry rates are higher in countries with lower fuel prices.

3.1.2 Competitiveness Analysis by Sector and Country

A simplifying assumption in the general competitiveness analysis was that all exporting sectors within a country would all be similarly affected by high fuel prices. In reality, this is highly, given technological differences across sectors in differences in their reliance on oil for production and in their transport intensity. Ideally, a measure of sectoral fuel intensity should capture oil usage in both production and transportation (or logistics) for each sector in each

[14] Fuel Prices and Export Competitiveness in Africa, Tolga Cebecci, Ana M. Fernandes and Marhe Denisse Pierola, PRWP forthcoming

country, but such a measure does not exist. Two proxies were used for such a measure, one for the oil intensity of production and the other for the transport fuel intensity of exports:

- the first was the revealed factor intensity indices computed by Cadot, Tumurchudur, and Shirotori (2009), which reflect the natural resource (mostly oil) intensity of exports and
- the second was the transport cost intensities derived from average weight-to-export value ratios, using an assumption that products with a higher weight to value ratio will have higher transport and fuel costs per unit ot output.

TABLE 7: NATIONAL OIL PODUCTION OIL INTENSITY AND TRANSPORT FUEL INTENSITY

Country	Oil intensity	Transport intensity Kg/U$ of export value
Burkina Faso	4.32	1.32
Kenya	4.02	1.53
Malawi	3.10	0.92
Senegal	7.06	3.50
Tanzania	5.22	0.40
Uganda	4.60	1.36
Average	4.08	0.51

Source: Cebeci,T, Fernandes A, Pierola M,2010

Once these proxies are used to add a sectoral dimension to the graphical comparison of export competitiveness, two noticeable patterns emerge.

First, total exports relative to GDP and the average size of exporters tend to be higher in sectors that are less fuel-intensive (for both production and transport fuel intensity) and the differences across sectors are particularly large in the countries with lower fuel prices - Kenya and Tanzania - which are also coastal countries. Second, within countries exporters operating in sectors with lower fuel intensity tend to be more geographically diversified than exporters operating in sectors with higher fuel intensity (again using a combination of both production and transport fuel intensity).

3.1.3 ECONOMETRIC ANALYSIS

The econometric analysis used a pooled sample from the dataset, including all 2-digit HS sectors for all six African countries for the period 2004-2008.

The objective was to see whether fuel price increases reduce export competitiveness of African countries through higher fuel input costs and higher transport costs. The method used was to examine whether sectors that might be more affected by higher fuel prices (given their higher oil intensities and/or transport intensities) exhibit impaired export performance relative to the other sectors.

It involved estimating a difference-in-difference specification of the evolution of export competitiveness of a given sector in a given country over time as growth in fuel prices also change over time. The specification used was of the form:

$$Y_{jct} = \beta_0 + \beta_1 \text{int}_j * \Delta fuelprice_{ct} + I_j + I_c + I_t + gdppc_{ct} + \varepsilon_{jct} \quad (1)$$

where j designates an HS 2-digit sector

c designates a country

I_j is a vector of sector dummies,

I_c is a vector of country dummies,

I_t is a vector of year dummies, and

$gdppc_{ct}$ is GDP per capita.

t designates a year, and

Y_{jct} is alternatively each of the export competitiveness indicators: the ratio of total exports to GDP, average exports per firm, the average number of products exported per firm, the average number of destinations served per firm, exporter entry rates, exporter exit rates, and one-year survival rates of entrants into export markets.

The econometric analyses showed four significant impacts of high fuel prices on export competitiveness.

- First, that strong growth in fuel prices had been detrimental to the export competitiveness of Burkina Faso, Kenya, Malawi, Senegal, Tanzania, and Uganda, and in those countries, particularly for their sectors that are more oil-intensive and more transport-intensive.
- Second, that the countries where fuel price growth has been highest exhibit significantly lower export volumes (as a percent of GDP) in sectors with higher fuel intensity and with higher transport intensity.
- Third, that increases in fuel prices lead to a reduction in the average size of exporters in both oil-intensive and transport-intensive sectors.
- Fourth, those countries where fuel price growth has been higher experienced relatively higher exit rates of exporters in their sectors with higher oil intensity and transport intensity.

Taken together, the indications from the three analyses are that there is a noticeable negative impact of fuel prices on the volume of exports, particularly

in those industries where production is energy intensive or where transport is fuel intensive. They also show that exports from counties with high transport fuel intensity tend to be less diversified, and that exporting companies in countries with high transport fuel intensity tend to be smaller and less stable than in those where it is less intense.

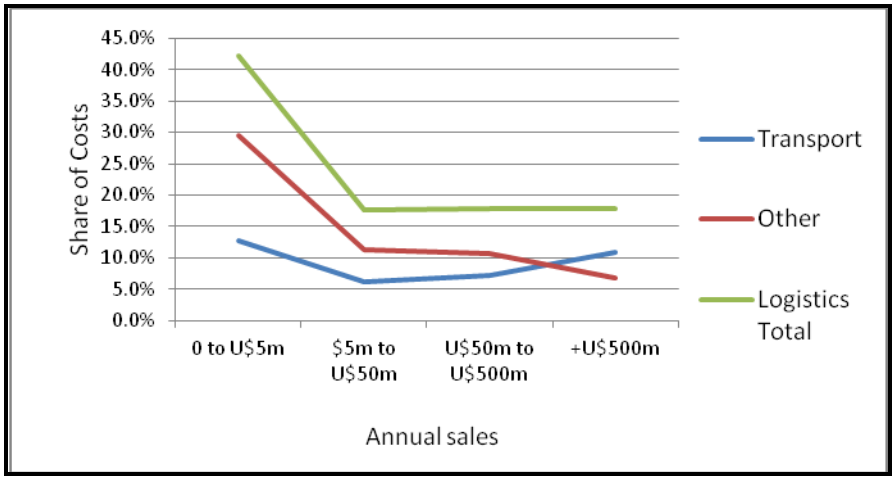
These indications demonstrate that there would be much to be gained in respect of export competitiveness by reducing the fuel intensity of transport of export products. It is the ways of achieving such reductions that are the topic of the next two Chapters. But first we turn to the impact on high fuel prices on domestic logistics costs.

3.2 Logistics costs

Until now here has not been a study of the impact of high fuel prices on logistics costs in sub-Saharan Africa, so used a study in Central America and indicate how the results are most probably transferable.

Transport of food products is one of the major tasks of the transport sector in SSA countries. High fuel costs increase the transport costs of food and therefore impact on the final prices of those foods. Since food costs comprise a disproportionately large share of the total disposable income of people on low incomes, the impact of high fuel prices on food prices is regressive.

Figure 4 : Variation of transport and logistics costs with size of firm in Latin America



Source: Logistics, Transport and Food Prices in LAC, World Bank and Inter American Development Bank, July, 2009

One of the few recent assessments of the importance of transport and logistics costs on food prices in a developing region was recently completed for Latin America[15]. Many of the assessments are also relevant to SSA countries, perhaps with even more emphasis given the incidence of higher transport fuel

[15] Logistics, Transport and Food Prices in LAC, World Bank and Inter American Development Bank, July, 2009

costs, lower transport operating efficiency and higher logistics costs than in Latin America.

Transport and logistics costs are high in the LAC region, estimated at between 16 and 26 percent of GDP, compared to the average OECD share of about 9 percent. These costs represent an even greater barrier to trade in the region than import tariffs and make up a larger part of the delivered cost of food products. Ad valorem import tariffs have decreased to less than 10 percent of product value (although duties on imported trucks remain much higher). But transport and logistics costs, at an average of more than 20 percent of the FOB value of goods, are approximately double the average import tariff. By the time products are transferred, handled, stored and distributed domestically, the logistics component of the delivered good is often more than 50 percent of the final price to consumers.

Household expenditures of the poor remain disproportionately sensitive to food prices. Household and other expenditure surveys indicate that food continues to be the largest category of household expenditure. Consumer expenditure by the poor on food products ranges from 30% to more than 70% of their total income. If logistics costs make up 40% of the cost of those products, as they do in many rural areas, and if transport costs make up one third of the logistics costs and fuel costs make up 40% of the transport costs, then fuel costs account for more than 10% of the price of food.

The same study found that the logistics costs of small companies were much higher than those of larger companies, so countries such as those of SSA where most of food distribution in undertaken by smaller companies or even by individuals, the cost of transporting food would be expected to be high.

Likewise, in cities where urban public transport is provided by large diesel engine buses, diesel fuel prices impact heavily on bus operating costs and through these on bus fares. As public bus transport is used mostly by people on low incomes, high fuel prices are regressive. There have been few studies of the impact of high fuel prices on income distribution in SSA countries, but a recent study of fuel price increases in Costa Rica[16] is indicative of the situation in SSA.

The Costa Rica study found that an increase in the price of gasoline would be progressive, that is that households in the highest socioeconomic strata would be most affected. In contrast, an increase in the price of diesel fuel would be regressive: households in lower and middle socioeconomic strata would be most affected, and most of that impact would be on the price of bus transport.

[16] Fuel Tax Incidence in Developing Countries: The Case of Costa Rica, *Resources for the Future Inc, Washington DC, 2008*

High transport fuel prices have multiple negative impacts on export competitiveness, particularly low unit value agricultural and mining products where transport represents a high share of the delivered cost to a port. In addition, high transport fuel prices have a regressive impact on income distribution, particular on the costs of basic foods and urban public transport.

4 How to lessen the impact of high transport fuel prices

There are two spheres of action to reduce the impact of high transport fuel prices:

- Policies aimed at reducing the high prices themselves and;
- Policies aimed at increasing the efficiency with which the fuel is used in transport.

Since the vast majority of trucks used to transport export and food products are fueled by diesel, it is the price of diesel rather than gasoline that needs to be reduced, and the efficiency of consumption of diesel fuel that needs to be increased. The next Chapter addresses measures to reduce the price of diesel fuel while the following Chapter addresses ways to increase fuel efficiency through lowering the fuel consumption of vehicles.

4.1 Policies to reduce high prices

Although fuel prices in SSA countries have been higher than the global average and above those of most regions of the world for as long as comprehensive retail price data has been collected, that does not detract from the possibility of reducing those prices to bring them closer to the global average.

It would only take a 7% reduction to bring SSA diesel prices (U$109 cents per liter) down to the global average, but the global average is heavily influenced by countries of the EU that have retail prices more than one third higher than the global average ((U$ 143 cents and U$140 cents per liter respectively for diesel and gasoline, compared with global averages of U$ 102 cents and U$104 cents per liter respectively). The average retail prices for the developing countries included in the survey are U$79 cents and U$84 cents for diesel and gasoline respectively, and these are more plausible benchmarks for the countries of SSA. To reduce its retail prices to these benchmarks would require reductions of 38% and 43% respectively for diesel and gasoline. Reaching these benchmarks would also go a long way in making SSA's transport fuels as affordable as those in other developing countries.

The possible measures to reduce to retail fuel prices include[17]:

a. Reduce the FOB and CIF prices by revising procurement arrangements
b. Reduce land transport costs
c. Restructure markets for transport fuels
d. Reduce protection for small, inefficient refineries.
e. Increase storage capacities and buffer stocks of diesel.
f. Restructure taxes on transport fuels

4.1.1 Reduce FOB and CIF prices

Any attempt to address the high costs of transport fuels should start with the high FOB and CIF prices as a first priority. Figure 3 showed that on average in SSA countries, FOB prices account for more than half the retail price of transport fuels, so this is where the greatest potential to reduce retail prices is to be found. This potential is reinforced by the large variation in FOB prices between SSA countries. Table Five shows the FOB price paid by the oil importing countries in selected SSA countries, whether public or private and/or their agents.

Table 8: FOB fuel prices in countries responding to questionnaire

	FOB price In US cents/liter		Country	FOB price In US cents/liter	
	Diesel	Gasoline		Diesel	Gasoline
Cape Verde	52.80	54.30	Mali*	79.64	73.95
Cameroon	58.91	59.14	Mozambique	32.74	32.74
CAR*	67.02	73.63	Niger*	60.82	61.55
Chad	106.53	85.71	Nigeria	0.00	0.00
Congo DR	81.58	81.52	Rwanda*	58.45	59.41
Ethiopia*	24.91	24.91	Sierra Leone	0.02	0.01
Ghana	0.00	0.00	South Africa	0.00	0.00
Kenya	50.56	49.86	Swaziland*	59.59	58.63
Liberia	58.82	65.69	Tanzania	46.67	55.61
Lesotho*	55.50	55.80	Uganda*	51.60	0.02
Malawi*	46.32	43.15	Zambia*	66.83	0.00

Note: 1. * indicates Land-locked countries
2. CAR and Rwanda are the averages of two FOB values for imports through different countries. Similarly, the DRC values are the average for three regions.
Source: Responses to questionnaires converted to US cents using UN Exchange rates

It is however important to note that fob prices paid by the oil importing countries depend to some extent on the quality of fuel. The specification of

[17] This section is largely based on Petroleum Markets in Sub-Saharan Africa, Masami Kojima, Energy Sector Management Assistance Program (ESMAP), World Bank, 2010

transport fuel vary across countries, not only in terms of octane (for gasoline) or cetane (for diesel), but also in terms of other factors - including sulfur levels, aromatic contents and other fuel parameters. Hence although these prices are not strictly comparable across countries, the differences are considerably more than what could be accounted for by differences in the quality of fuel.

Although spot prices of fuel are standard and non-negotiable, few, if any, importing companies pay spot prices, and instead negotiate contacts for periods of months or even years. The negotiating capacity of an importing company depends on, the quantities imported, on whether the main product is crude oil or already refined petroleum products, on the product specifications (for instance, low sulfur diesel fuel is considerably more expensive than diesel fuel with high sulfur content) and on the payment history of the importing company.

4.1.1.1 Revise procurement arrangements

There are at least two ways of revising the procurement arrangements of SSA countries that could lessen the FOB and CIF prices. The first is applicable to the smaller countries and involves coordination of marketing to increase the size of purchasing contracts, both between importers in a particular country and possible even between countries. The second is to procure on a CIF rather than FOB price basis.

Coordinated contracting

Market size- in terms of annual domestic consumption of fuel -is an important determinant of FOB price. Large economies enjoy economies of scale in procurement and supply infrastructure, and such economies can accommodate enough large actors to create healthy and effective competition. Economies of scale are particularly important for refining.

With few exceptions, the domestic market for fuel in SSA countries is small - - with the annual domestic consumption of fuel at less than 25,000 barrels, against a world scale refinery size of at least 100,000 barrels a day [18] In small economies, the suppliers may be too small to obtain the lowest possible price for imported fuel. Because of economies of scale in shipping crude oil and petroleum products, importing products in small parcels can be costly.

One way of overcoming the problem of size is through relying on a single buyer to take advantage of the resulting scale economies. The single buyer can either be state-owned or bulk purchasing agencies or agreements between countries so that economies of scale through single purchasing agreements can be obtained. The implementation of such a scheme needs transparency in

[18] A World Bank Study (2009) of 12 oil-importing countries in SSA found that the market size of the countries varied from 450,000 barrels a day – in South Africa to 3,600 barrels in Niger. Daily consumption in Senegal, the third larges market was 32,000 barrels which is small by any global measure

order to ensure that prices paid are indeed lower and that cost savings are passed to end-users of transport services. There are different options.

In the sample of 12 SSA countries reviewed in Kojima (2010), Botswana, Madagascar, South Africa, Tanzania, and Uganda allowed local oil marketing companies to procure all petroleum products, free of government involvement. In Burkina Faso and Niger, a state-owned company had a legal monopoly for importing and storing petroleum products. The company used a combination of procurement modalities including international competitive bidding, restricted tenders, and direct purchases, and long-term contracts.

Kenya, Madagascar and Malawi, on the other hand, have joint purchases of product imports. In Madagascar, oil companies voluntarily import on a joint cargo basis for minimizing transport costs. In Malawi, a private company consisting of the four oil marketing companies operating in the country handles all fuel imports.

In Kenya, the government has an Open Tender System for importing crude oil and petroleum products. Under the system, crude oil and petroleum products are purchased every month by a single company for the entire market on the basis of a public tender. These are transported through one terminal, and shared among all marketing companies in proportion to their share of the market. The system is intended to have the dual benefit of ensuring competitive prices (which are made public) and transporting the oil in a way that would minimize import duty evasion. Each company is required to take the crude oil allocation and pay for the consignment within a specified time frame or risk penalties for late payment. Import of petroleum products—and crude oil in the case of South Africa—to Botswana, Mali, South Africa, Tanzania, and Uganda is liberalized.

Potential impact: The impact of cost savings due to more efficient procurement is very specific to each country and requires country-specific information on procurement procedures, which are beyond the scope of this study. However, our tentative estimates are that the FOB price of both diesel and gasoline could be reduced up to 10 percent and for coastal countries by 8 percent through procures that procedures that involve one agency (could be the state, bulk purchasing or agreements between countries) purchasing on behalf of all importers. These estimates are based on a reduction by a half of the difference between the FOB price of the larger and smaller SSA importing countries.

Procuring on a CIF rather than FOB basis

For small SSA countries, sourcing imports from least cost global oil-producing countries at the fob price may not necessarily be cost-effective, particularly if the cost of transport and insurance are high. There are several regional markets that have their own prices for petroleum prices, with the least costs often being found in Singapore or London. However, these markets are far

from Africa, and so delivery to their African destination can incur high transport and insurance costs, particularly if the procurement is for the small quantities often purchased by small countries with limited storage. When these high transport and insurance costs are added to the FOB price the resulting delivered price can be higher than the least CIF cost. So there could be advantages in procurement on a CIF rather than FOB basis. This would also pass responsibility for the maritime transport from the purchasing country to the supplier of the fuel products, also possibly advantageous as the supplier is likely to be better placed to secure low cost transportation.

Potential impact: Maritime transport and insurance costs at best account for about 5 percent of the retail price of transport fuels and the opportunities for reducing them, while worth taking, will not result in large reductions. Our tentative estimates are that the overall cif prices could be reduced by about 5% by purchasing on a CIF rather than FOB basis, and this would reduce the final retail prices by about 0.25%. The estimates are based on comparisons of the 2010 fob and cif prices in the major oil markets sourced by the SSA countries included in the sample and adding the reported maritime transport and insurance costs to the cob prices.

4.2 Reduce the land transport cost of transport fuels

The cost of transporting fuels from the port at which they are delivered to a land-locked country is three times more than the cost for the equivalent land transport in a coastal country. Much of this difference is attributable to the longer distances involved, for example the transport distance to land-locked countries in East Africa is 1,450km, in West Africa 1,365km and in Southern Africa 615km. But the impact of these long distances is exaggerated by the inefficient methods used to transport the fuel to the final destination.

If the volumes to be transported are large enough, transport by pipeline is the least costly, but none of the land-locked countries in SSA consume enough oil derived fuel to justify the construction of a pipeline. The second least cost method is by inland waterway, but few of the SSA land-locked countries have navigable river or waterways available, and where they do there is not a suitable deep-water port at the mouth of the river. So the main alternative modes are available are rail and road.

If the railway already exists and is used to transport other bulk products that can help to bear the fixed costs of maintenance, the cost of transporting the oil could be as low as U$ 4 cents per ton km (based on a unit train transporting about 800 tons of oil), compared to more than double that for efficient road transport (based on a five-axle semi-trailer transporting about 22 tons of oil).

TABLE 9: CURRENT AND POTENTIAL TRANSPORT AND DISTRIBUTION COSTS (U$ CENTS PER LITER)

Country type		Land transport cost in U$ cents per liter	
		Diesel	Gasoline
LLCD	Current cost	11.0	10.3
	Potential cost	9.4	8.8
Coastal	Current cost	3.8	4.3
	Potential cost	3.6	4.0

Source: Sub-Saharan Africa: Impact of Fuel Prices on Economic and Social Progress, Revised Phase 1 Report, World Bank, January, 2011

Of the 15 land-locked SSA countries about half have a rail connection to a deep water port in a neighboring coastal country (Burkina Faso to Abidjan, Ethiopia to Djibouti, Malawi to Nacala (but this port has no oil facilities), Mali to Dakar, Uganda to Mombasa, Zambia to Dar es Salaam and to Durban, Zimbabwe to Durban. Of these, only the link from Uganda to Mombasa is currently used to transport fuel, and even that link only has a small market share. Only the Burkina Faso to Abidjan, Ethiopia to Djibouti and Uganda to Mombasa lines have the potential to transport large volumes of bulk freight without major infrastructure investments and so realize the low cost of rail transport. So on this and other corridors, the cost of transporting oil to the land-locked countries by road involves costs several times greater than it need be.

And even where the transport is by road, the cost is much higher than is necessary. Although different countries use different methods for contracting their road transport, the land-locked countries are not usually able to contract with a national company for the transport in the land-locked count.

Likely impact: Our tentative estimates are that transport and distribution costs to land-locked countries could be reduced by about 15 percent, and to coastal countries by about 5 percent. These estimates are averages and the potential reductions for specific countries could differ. Given that the transport and distribution costs per liter component of the retail prices of fuel are much less than the FOB and tax costs, the impact of these reductions may be small but not insignificant. Our preliminary estimates are that for land-locked countries the cost reduction per liter would be about U$1.5 cents while for coastal countries it would only be about U$0.2 cents to U$0.3 cents per liter. These estimates are based on an average transport distance of 1500km for land locked countries and 500km for coastal countries, and the rail and road transport costs cited above

4.3 RESTRUCTURE MARKETS FOR TRANSPORT FUELS

International experience points to the importance of establishing healthy and transparent competition in the petroleum sector. An effective and well-regulated competitive market imposes pressure on the various participants to improve efficiency in the petroleum sector.

There are at least four stages in the production and distribution of transport fuels where the market structure can influence the level of competition in the

petroleum sector. The first stage is the procurement of fuel to be imported. A second possible source of competition is in the transport of fuels from the port to the refinery (if crude oil is imported) or to the storage center. The third stage for competition is in the refining of crude petroleum, but few SSA countries have more than one refinery so competition in this stage is very limited. The fourth stage is in the wholesale and retail distribution of fuel. The measures of market concentration, for the twelve countries that were covered in World Bank oil survey of Petroleum Markets in Sub-Saharan Africa is shown in Table seven.

4.3.1 Measures of market concentration and scale economies

A standard measure of industrial concentration is the Herfindahl-Hirschman index (HHI)[19]. For 12 SSA countries, Table 9 shows the total number of oil marketing companies, the market share of the company with the largest market share, the combined market share of the top four companies, and the HHI value. The data indicates that in eight of the twelve countries the fuel distribution industry is heavily concentrated and only one of the twelve has a competitive market structure.

Mali has the largest number of operators and its wholesale and retail distribution is the least concentrated of the twelve countries. Tanzania also has a large number of retail companies for the size of its market and its HHI value indicates that it has adequate competition. The Niger market is the most concentrated and is closely followed by those of Malawi, Madagascar, Senegal, and Botswana. All of these countries would benefit from more retail competition. The concentration of the Senegal market is surprising because significant legislative measures have been taken to promote open access to the depot in Dakar. Burkina Faso, Kenya, Uganda South Africa and Cote d'Ivoire have HHI values that indicate the retail market is moderately concentrated and could benefit from increased competition.

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[19] The Herfindahl-Hirschman Index (HHI) is a commonly used and widely accepted measure of market concentration. It is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. For example, for a market consisting of four firms with shares of thirty, thirty, twenty and twenty percent, the HHI is 2600 (302 + 302 + 202 + 202 = 2600). The HHI takes into account the relative size and distribution of the firms in a market. Its value approaches zero when a market consists of a large number of firms of relatively equal size, and its value increases as both the number of firms in the market decreases and the disparity in size between those firms increases. Markets in which the HHI is between 1000 and 1800 points are considered to be moderately concentrated, and those in which the HHI is in excess of 1800 points are considered to be highly concentrated.

TABLE 10: TRANSPORT FUELS MARKET STRUCTURE

Country	Consumption2007 (m^3 million)	No. of marketing companies	Market share of four largest companies	Annual sales per of each of the four largest	Annual sales of other companies (m^3)	HHI
Malawi	0.35	4	100%	87,500	0	2,800
Madagascar	0.67	4	100%	167,500	0	2,675
Niger	0.21	18	83%	43,575	2,550	2,569
Senegal	1.90	13	84%	399,000	33,778	2,445
Botswana	0.91	5	93%	211,575	63,700	2,357
Burkina	0.59	19	71%	104,725	11,407	1,963
Kenya	3.90	25	80%	780,000	37,143	1,937
Uganda	0.84	40	69%	144,900	7,233	1,831
South Africa	26.00	9	71%	4,615,000	1,508,000	1,699
Cote	1.00	23	75%	187,500	13,158	1,544
Tanzania	1.30	25	50%	162,500	30,952	1,107
Mali	0.75	53	46%	86,250	8,265	915

Source: Petroleum Markets in Sub-Saharan Africa, World Bank, 2009

However, as the experience of Senegal indicates, effective competition in the small petroleum markets of most SSA countries is difficult to achieve. One of the greatest risks of too little competition is that of explicit or implicit price collusion. For this reason, some governments regulate retail prices (such as for example by imposing price ceilings). Having many more firms does not necessarily enhance efficiency if they are individually too small, so any potential benefits of competition are lost through diseconomies of scale. There are no benchmark values for the minimum size of transport fuel marketing company to be efficient, so judgments on this issue are subjective. A company with a single gas station selling about 250 liters per day would sell about 18,000 liters per year, and even this size would be very inefficient other than in a rural area.

Another risk in small markets is that of collusion between regulators and marketing companies. The risk is increased by close physical proximity of the regulators and marketers as well as the close social and economic relationships between them that are inevitable in small populations. Control over refineries, storage facilities and transport services are one of the most common sources of control of a petroleum products market by a dominant company. So regulating third-party access to these facilities and services can enhance competition and reduce costs. Such access is not granted in Côte d'Ivoire and Niger, and is restricted in Botswana, Malawi, and South Africa.

There appears to be an excessive number of marketing companies in Burkina Faso, Cote d'Ivoire, Mali, Niger, and Uganda, as outside of the top four companies in each country there is not enough remaining demand for the

others to avoid major diseconomies of scale. Even Kenya and Tanzania have little demand to be shared between their large numbers of marketing companies, although their HHI values do not indicate excessive lack of concentration. At the other end of the scale, the market in Madagascar is large enough for more companies to operate and for each company still to benefit from most scale economies, and Madagascar is one of the countries with a higher than desirable HHI score.

Zambia is another country (not one of the twelve) with an excess of marketing companies. For a total consumption of about 0.45m it has 27 marketing companies. The market share of the top four is over 75 percent and 15 companies have a market share of less than 1 percent each. Despite the large number of companies, the HHI is more then 2.200[20].

Achieving a retail fuel marketing structure that is neither over concentrated or over competitive is not easy, particularly in the countries that do not have enough demand to support enough distribution companies that can operate efficiently. Without increasing the risks of collusion between marketing companies, It would appear that a reasonable sustainable minimum annual sales for any company would be about 25,000 m^3, and this could be used a criterion for determining a desirable number of marketing companies in addition to the largest four. Where the current number is greatly in excess of this number, policies to encourage amalgamation and some increased market concentration might result in lower distribution costs, so long as the result in not price collusion between the remaining marketing companies.

The benefits from implementing these market enhancing measures would be significant in those countries that currently have HHI values significantly above 1,800. For countries that currently have controlled prices, any liberalization is likely to increase prices to market levels. There would be significant changes in the marketing share of costs in all these countries. The impacts would be much less in the countries that already have effective competition in marketing transport fuel.

Likely outcomes: Our tentative estimates are that a reduction of up to 25 percent in the marketing costs (at current prices these are about U$ 12 cents per liter for diesel and about U$18 cents per liter for gasoline) would be feasible countries that have am HHI value of about 1,800 or more. This could bring their marketing cost to about 125% of that in the EU and US, and could reduce the retail price of their diesel by up to U$3 cents per liter and for gasoline by more than U$4 cents per liter. The estimates need to be substantiated by country-specific studies.

[20] Analysis of the Fuels Industry in Zambia, William G. Matthews, April, 2010

4.4 Reduce protection for inefficient small refineries

Economies of scale are particularly important for refining. Product demand has been increasingly moving away from fuel oil to gasoline, kerosene, and diesel, requiring cracking of residual fuel oil to produce transport and other fuels. At the same time, fuel specifications are being tightened progressively, in particular requiring so-called sulfur-free gasoline and diesel in developed countries.

Producing white products meeting tight fuel specifications requires processing units that enjoy large economies of scale. As a basic rule of thumb, a refinery needs to have a processing capacity of at least 100,000 barrels a day (or 5 million tons a year) to be economic in a liberalized market. Because it is disproportionately expensive to install small cracking units, small refineries tend to be hydroskimming refineries—these have no ability to convert residual fuel oil to other products, and have only the units that raise the octane number of gasoline but not the volume of gasoline produced (Kojima, 2010).

If domestic demand for petroleum products is small and much less than the production capacity of an economic-scale refinery, as in many countries in Sub-Saharan Africa, then a refiner is faced with two options: build a sub-economic-scale refinery to serve primarily the domestic market, or build an economic-scale refinery and export some or even the bulk of the products. A sub-economic-scale refinery is unlikely to be able to compete with product imports from large and efficiently run refineries. A world-scale export refinery can take advantage of economies of scale, but will face full international competition. If a refinery is processing domestic crude oil, it has a potential cost advantage because it does not incur the cost of shipping crude or refined products. Similarly, a refinery may have access to relatively low-cost crude oil if, for example, it is a transit country for a crude oil pipeline. But such a cost advantage can be easily offset by higher refining costs if the refinery is small (World Bank 2008a and 2008b).

Table 11: SSA Countries with small refineries

Country	Refinery Capacity (bbl/day)
Kenya	90,000
Cote d'Ivoire	65,000
Ghana	45,000
Cameroon	42,000
Angola	37,500
Congo	21,000
Gabon	21,000
Eritrea	14,500
Madagascar	12,000

Source: World Bank 2010

The only countries that would be impacted by eliminating the protection of small refineries are the nine included in Table 10 that currently have small refineries that have their operations subsidized. Since refineries with less than about 100,000 bbl/day capacity are unlikely to be able to refine products at less than the border price, so are those that would most likely be impacted by a policy of eliminating or reducing price subsidies.

4.5 Increase storage capacity and stocks

Some governments require marketers to carry a certain amount of fuel security stocks (measured in terms of a giver number of days of normal consumption). This provides for a buffer against supply disruptions caused by possible delivery delays. As a precaution against erratic supply or volatility, governments can increase this requirement, or indeed establish their own security stocks.

Requirements for the marketing companies to carry fuel stocks are useful particularly for the landlocked countries which are usually the most vulnerable to disruptions and have the greatest need of security cover from stocks. Some SSA land locked countries only have storage capacity for less than one month's supply of fuel. This small capacity not only makes the country susceptible to supply interruptions and price spikes but also compels them to procure supplies in small quantities that imply higher FOB and transport and insurance costs.

Such security stocks are useful for smoothing out very violent swings in FOB prices, but this strategy is likely to be effective only when it is clear that the price spike will be short lived. In that case purchasing of supplies from the market can be delayed until the price returns to normal. Maintaining such stocks however requires a mechanism for bearing the cost of the stocks. These costs include both the interest on working capital tied up, as well as the cost of the storage facilities.

In other parts of the world (particularly in Southeast Asia) there have been discussions on establishing regional security stocks, to which producing countries would supply oil that could be drawn by member countries in times of crisis. This proposal is likely to be most effective against supply disruptions, but at a regional level these are much less likely to occur than at an individual country level, since oil is easily transportable and world markets are highly integrated. Financing such a scheme would require intergovernmental cooperation, or cooperation at the regional level.

Our recommendation is that that each SSA country maintains a minimum of three months consumption as a buffer or security stock to protect against possible supply interruptions and price instability. The stocks would be built up when FOB or CIF prices are low and only be used in exceptional circumstances. But their existence would give some protection against price exploitation in

periods of short term price increases. The stocks and storage facilities would be funded by a small surcharge (of the order of U$0.5 cents per liter) on the retail price, as is already implemented in some countries in the region[21]. Although this would increase the retail price in the short term, its impact on price stability would reduce longer term average retail prices.

Likely outcome of the five measures: Our preliminary estimates are that taking action of the first five measures to reduce transport fuel prices would bring about approximate reductions of between 7 to 12 percent in retail prices. The largest reductions would be for land locked countries with reductions of about U$12 cents per liter for diesel and rather less, about U$11.6 cents per liter for gasoline. For coastal countries the reductions would be about U$8 cents per liter for diesel and about U$7 cents per liter for gasoline.

In all four instances (diesel and gasoline, land-locked and coastal) more than half of the retail price reduction would come from the changes in FOB costs, and about one third from the reduction margins for distributors. Reductions in maritime insurance costs would contribute about 5 percent, with the balance of about 10 percent coming from reduced distribution costs. The distribution cost contribution to the reduction in retail prices would be higher for land locked countries and the reduction in distribution costs a little less for them.

All these estimates are to be treated with caution as they need to be substantiated with country-specific analyses.

4.6 Restructure taxes on transport fuels

Although restructuring transport fuel taxes is one of the six areas in which retail prices could be reduced, we consider it separately as it introduces at least two issues than just reducing fuel prices.

- First, fuel taxes make a small but significant contribution to overall government revenues. So any policy to restructure fuel taxes would preferably be tax neutral to have a reasonable prospect of being implemented.
- Second, taxes can be used as a proxy for the many negative externalities of transport fuel consumption, and this can indicate a minimum level of taxation on transport fuel.

Both issues, when taken with the objective of reducing the impact on high fuel costs on export competitiveness, indicate the diesel taxes could be reduced and gasoline taxes increased, so as to retain a tax neutral outcome.

[21] World Bank (2010)

4.6.1 Importance of revenue from transport taxes[22]

For many, though not all SSA countries, the revenues from taxes on gasoline and diesel for transport use are only a small share (less than 4 percent) of total government revenue. But this average hides a wide variation, from zero or close to zero in Chad, Ethiopia, Niger and Nigeria, to more than 10 percent in Sierra Leone and Tanzania. When the countries are grouped by per capita income, colonial tradition, geography and whether they are producers or importers, some important differences are highlighted.

Table12: Fuel tax percentage of Government revenue

By per capita income	Diesel	Gasoline	Total
Low	2.2%	1.9%	4.1%
Lower middle	0.9%	1.0%	1.9%
Upper middle	1.7%	3.3%	5.0%
By colonial tradition	**Diesel**	**Gasoline**	**Total**
English	1.9%	2.0%	3.9%
French	0.8%	0.9%	1.6%
Portuguese	2.4%	1.0%	3.4%
By geography	**Diesel**	**Gasoline**	**Total**
Landlocked	1.3%	2.3%	3.6%
Coastal	1.5%	2.3%	3.8%
By production	**Diesel**	**Gasoline**	**Total**
Producers	0.1%	0.0%	0.2%
Importers	1.9%	2.9%	4.8%
Total	1.8%	2.8%	3.6%

Source: Own analysis based on data from World Bank survey

For countries with a low or upper middle per capita income, fuel tax revenue contributes a much higher share of government revenue than for lower middle income countries; countries with a French tradition the contribution is much lower than for countries with an English or Portuguese tradition; for coastal countries the contribution is much higher than for land-locked countries, and; for oil producing countries the contribution is negligible.

There are also significant differences between the contributions from diesel and gasoline taxes. Gasoline tax on average contributes about 50 percent more than diesel tax. For low income countries, diesel contributes more than gasoline, for lower middle income countries the shares are similar, while for upper middle income countries gasoline contributes twice as much as diesel. These differences could be attributable to a higher car ownership rate in higher income countries. Coastal countries rely more on gasoline taxes than land-

[22] As in Part A, the definition of transport fuel tax does not include user charges such road maintenance charges, which are not general revenue taxes.

locked countries, and this could be related to the higher per capita incomes of coastal countries and their higher car ownership rates.

4.6.2 Fuel taxes and Externalities

The main negative externalities of road vehicles are local pollution, traffic congestion, climate change and noise. By far the greatest is traffic congestion, and the vehicles that contribute most to congestion costs are private cars used during peak traffic periods, mostly for commuting to and from work. A recent IMF study of road transport externalities in Mauritius[23] found that congestion costs were more than twenty times greater on a vehicle km basis than local pollution and accident costs, with global warming externalities being only about two thirds of local pollution and accident externalities.

An assessment by the European Union of the externalities of heavy goods roads vehicles[24] found that for these vehicles the relative importance of externalities was rather different to those for cars. Accidents accounted for about 40% of the total, followed by local air pollution with about 25% of the total, then downstream production effects, global warming (only about 15% of the total) then noise and finally congestion with less than 5% of the total externalities cost.

Table13: Estimated costs of transport externalities

	Cars	Heavy trucks
Externality	Cost (U$ cents) per vehicle km	Cost (U$ cents) per vehicle km
Traffic congestion	8.40	21.00
Local pollution	0.01	0.03
Accidents	3.56	8.90
Global warming	0.01	0.02
Total	11.98	29.96

Source: World Bank estimates based on IMF Working Paper WP/11/124, June 2011 and EU, 2003

The unit of measure was also different, being Euro per TEU. Converting Euros to U$ at the 2003 exchange rate, adjusting for inflation to 2008 prices and converting TEU to vehicles, the total EU externalities cost for heavy goods vehicles is about U$0.125 per vehicle km. This is only about 17% of the IMF estimate for private cars, with the difference being largely attributable to the lower congestion charges for heavy goods vehicles as a higher share of their use is outside of congested urban areas.

[23] *Reforming the Tax system to promote Environmental Objectives: An Application to Mauritius*, IMF Working Paper WP/11/124

[24] External Costs; Research results on socio-environmental damages due to electricity and transport, European Union, Directorate-General for Research, 2003

The large difference between the externalities of cars and trucks has important consequences for taxation policy, since one of the easiest ways to charge for vehicle externalities is to impose a fuel surcharge[25]. Taking account of these differences in externalities, and of the different fuel consumption rates of diesel engine trucks and gasoline powered cars, fuel surcharges that would cover the full external costs would be equivalent to about U$12 cents per liter for diesel and between more thsn double this for gasoline. While current taxes on diesel are on average above this indicative charge for externalities, the large difference in tax rates between countries (for example, diesel taxes in land locked countries are on average more than U$21 cents per liter) needs to be taken into account. Fourteen of the 22 countries in the survey have diesel tax rates higher than U$12 cents per liter. Gasoline taxes in land-locked countries are on average about U$3 cents per liter higher than diesel taxes while in coastal countries they average about U$7 cents per liter less. Fourteen of the survey countries have gasoline taxes lower than the indicative U$30 cents per liter to cover externalities costs.

A suggested fuel tax strategy that would be revenue neutral, cover the costs of externalities while at the same time being supportive of export competitiveness would be to:

- Set diesel fuel tax at U$12 cents per liter, or whatever the externalities cost of trucks in each country would indicate;
- Set gasoline taxes to cover their externalities costs and
- Increase gasoline taxes to a level at least high enough to cover the revenue losses from reducing diesel taxes

Implementation of this strategy in countries with a diesel tax less than U$12 cents per liter would require an increase in diesel tax, and this would be contrary to the higher level strategy of increasing competitiveness of export industries by reducing diesel tax rates. We suggest that the export competitiveness is a more urgent short term strategy than covering the costs of externalities, so at least in the short term these countries would not be expected to increase their diesel tax rates.

Implementation in countries where the gasoline tax is currently much lower than U$30 cents per liter would encounter significant social and political problems if they attempted significant increases in gasoline taxes – the recent forces withdrawal of a proposed gasoline tax increase in Nigeria is just a recent instance of this difficulty. The few countries that have successfully implemented significant increases in gasoline taxes have achieved this by incremental additions to the tax rate implanted when fuel prices are volatile

[25] The most appropriate externality charge for congestion is a congestion charge based on GIS principles or cordon pricing. Neither of these is likely to be introduced in SSA countries within the next five years.

and the incidence of the tax increase is difficult to distinguish from other price increases.

TABLE14: CURRENT DIESEL AND GASOLINE TAX RATES

	Country	Diesel tax (US cents per liter)
-1	Tanzania	38.3
2	Malawi	36.9
3	Rwanda	32.0
4	Chad*	31.0
5	Uganda	26.9
6	Mali	25.8
7	CAR	25.4
8	Cape Verde	24.1
9	Zambia	21.4
10	Sierra Leone*	19.2
11	South Africa	18.9
12	Kenya	14.0
13	Congo DR	13.0
14	Lesotho*	12.4
15	Liberia	11.2
16	Swaziland*	10.1
17	Mozambique	9.3
18	Cameroon	7.6
19	Ghana	1.2
20	Ethiopia	0.6
21	Nigeria	0.0
22	Niger	0.0

	Country	Gasoline tax (US Cents per liter)
1	Cape Verde	71.8
2	Chad*	43.1
3	Uganda	43.1
4	Rwanda	41.9
5	Tanzania	40.2
6	Zambia	40.0
7	Malawi	35.1
8	CAR	33.4
9	Kenya	26.4
10	South Africa	20.7
11	Sierra	15.6
12	Congo DR	13.7
13	Liberia	13.3
14	Lesotho*	12.2
15	Swaziland*	9.9
16	Mali	9.6
17	Mozambique	7.9
18	Ghana	7.0
19	Ethiopia	0.6
20	Niger	0.0
21	Cameroon	0.0
22	Nigeria	0.0

Source: World Bank survey of transport fuel prices, 2010

The 14 countries that could reduce their diesel tax and the 14 countries that would need to increase their gasoline tax to comply with the externalities criteria are shown in Table 13. This first part of this Table also shows the eight countries (Liberia through Niger) that would need to increase their diesel tax to satisfy the externalities criterion for diesel trucks, while the second part also shows the eight countries that could reduce their gasoline tax and still comply with the externality criterion for cars.

Table 14 shows by how much each of the 14 countries that could reduce their diesel tax would need to increase their gasoline tax to retain revenue neutrality. For countries such as Tanzania and Chad that have very high diesel taxes, reducing them to US$12 cents per liter would require increases in their gasoline tax by more than 100%. In part this is because their gasoline

consumption is much less than their diesel consumption, to the same level of tax on gasoline raises much less revenue than on diesel.

TABLE15: INCREASE IN GASOLINE TAX TO COMPENSATE REVENUE FOR REDUCTION IN DIESEL TAX

	Country	Current diesel tax (US cents per liter)	Current gasoline tax (US cents per liter)	Needed increase in gasoline tax (US cents per liter)	% increase in gasoline tax
1	Tanzania	38.31	40.18	72.41	180%
2	Chad	30.95	43.10	56.85	132%
3	Sierra Leone	19.20	15.60	17.28	111%
4	Rwanda	32.02	41.92	43.76	104%
5	Cape Verde	24.10	71.80	53.90	75%
6	Mali	25.80	9.60	6.90	72%
7	Uganda	26.86	43.08	21.74	50%
8	Malawi	36.85	35.07	17.42	50%
9	CAR	25.38	33.42	10.41	31%
10	Zambia	21.40	40.01	8.10	20%
11	South Africa	18.85	20.67	3.84	19%
12	Kenya	13.96	26.43	3.19	12%
13	Lesotho	12.39	12.15	0.39	3%
14	Congo DR	12.99	13.73	0.07	2%

Source: World Bank analyses of survey results and World Bank Africa Development Indicators, 2010

Table 15 indicates the impact of adding the final suggestion, that gasoline taxes could be raised to compensate for the lost revenue from reduced diesel taxes. It shows how much gasoline taxes would need to be increased to achieve this result (the countries are ranked by their outcome gasoline tax). However, the effect of this outcome cannot be considered independently of the externalities criteria, so the last two columns of the Table show the impact of all three criteria considered together.

Three countries, Cape Verde, Chad and Tanzania would end up with gasoline taxes higher than U$100 cents per liter, probably an unacceptable level although lower than the tax rate in many EU countries. A mitigating factor against any social or political objection to the increase in gasoline taxes would be the corresponding reduction in diesel taxes and its impact on reducing food prices and stimulating export competitiveness. For these and other countries that would face high increases in gasoline taxes, a possible implementation strategy would be a gradual one, with taxes not changing by more than 10% per year.

TABLE16: FUEL PRICE IMPACTS OF PROPOSED PRICING POLICY

Country	Current gasoline tax (US Cents per liter)	Needed increase in gasoline tax (US cents per liter)	Current + needed increase (US cents per liter)	Overall new gasoline tax rate (U$ cents per liter)	Suggested new diesel tax rate (U$ cents per liter)
Cape Verde	71.8	53.9	125.7	125.7	12.0
Tanzania	40.2	72.4	112.6	112.6	12.0
Chad*	43.1	56.9	100.0	100.0	12.0
Rwanda	41.9	43.8	85.7	85.7	12.0
Uganda	43.1	21.7	64.8	64.8	12.0
Malawi	35.1	17.4	52.5	52.5	12.0
Zambia	40.0	8.1	48.1	48.1	12.0
CAR	33.4	10.4	43.8	43.8	12.0
Sierra Leone*	15.6	17.3	32.9	32.9	12.0
Cameroon	0.0	0.0	0.0	30.0	7.6
Congo DR	13.7	0.1	13.8	30.0	12.0
Ethiopia	0.6	0.0	0.6	30.0	0.6
Ghana	7.0	0.0	7.0	30.0	1.2
Kenya	26.4	3.2	29.6	30.0	12.0
Lesotho*	12.2	0.4	12.6	30.0	12.0
Liberia	13.3	0.0	13.3	30.0	11.2
Mali	9.6	6.9	16.5	30.0	12.0
Mozambique	7.9	0.0	7.9	30.0	9.3
Niger	0.0	0.0	0.0	30.0	0.0
Nigeria	0.0	0.0	0.0	30.0	0.0
South Africa	20.7	3.8	24.5	30.0	12.0
Swaziland*	9.9	0.0	9.9	30.0	10.1

Source: World Bank analyses of survey results and World Bank Africa Development Indicators, 2010

4.6.3 EU AND SSA APPROACHES TO DIESEL TAXATION

The proposal to reduce diesel taxes and increase gasoline taxes appears to conflict with recent proposed changes to EU energy taxes. But this appearance does not take account of the different circumstances of the SSA countries compared to that of the EU. The EU recently proposed a new Energy Tax Directive (ETD) that by 2018 minimum national taxes on diesel should be 10% higher than taxes on gasoline ((€0.396 per liter for diesel and €0.359 per liter for gasoline.

This mandate is aimed at addressing three issues

- First, the current lower tax on diesel than gasoline in most countries has led to a similar difference in retail prices, and these have in turn led to a growing popularity of diesel engine private cars. By 2008,

about 53% of new cars sold in the EU had diesel engines[26]. So one objective of the policy is to redress what is seen as taxation distorting the market for different types of car. By setting the fuel tax equivalent to the carbon content of the fuels, the EU hopes to redress this perceived distortion.

- Second, global warming has become a major concern for the countries of the EU, and making fuel taxes (not only for transport, but also for power generation) proportional to their energy context, the EU hopes to encourage fuel use that is less damaging to the environment.
- Third, that different fuel tax rates in different EU countries leads to some of the smaller and more central countries attracting "diesel tourism" by charging lower taxes and so attracting consumers from neighboring countries, depriving the latter of diesel tax revenue

The policy does not address the other externalities of transport, as in the EU they are being addressed by more direct means than through a fuel tax. Many cities have introduced some form of congestion pricing and this is seen as being more proportional to the congestion created by a particular vehicle than fuel taxation. The former is only charged on vehicles that contribute directly to congestion while the latter is charged on all vehicle use whether or not it contributes to congestion. Accident rates in EU countries are the lowest in the world, and are to a large extent addressed by insurance premiums that are more related to drivers' accident records and distance travelled than in other countries. Lesser externalities (such as noise) are dealt with by regulations that are better enforced than elsewhere.

The economic context of the EU countries is rather different to that of SSA.

4.6.4 SSA CONTEXT FOR TRANSPORT FUEL TAXES

So the EU context for considering taxation of transport fuels is very different to that of SSA countries.

- First, SSA countries have not had significantly lower diesel than gasoline prices, so there are few diesel engine cars in use, so there is not the same priority on addressing perceived tax incentives that might encourage use of diesel cars. For SSA countries that might want to reduce or limit the proportion of diesel cars, it would be easier and more productive to limit their importation by regulation or by a differential excise duty (this is not practical in the EU where most diesel cars and used in their country of manufacture, and there are no import excise duties on intra-EU trade)

[26] The diesel share dropped to 46% by 2010 largely due to car scrapping scheme that favored the scrapping of gasoline cars. This

- Second, there is little prospect of the introduction of congestion charging in other than a very few SSA cities, so fuel taxation remains the only feasible way of congestion charging for the foreseeable future.
- Third, implementation of regulations on vehicle use that affect externalities (such as testing for vehicle safety, emissions and noise) is less rigorous than in the EU.
- Fourth, EU countries account for about 30% of global diesel consumption for transport and about 17% of gasoline consumption, whereas SSA countries account for only about 2% of each fuel type. Also fuel costs account for a smaller share of freight transport costs than they do in SSA countries (In Table 6 we showed that fuel costs account for about 50% of road freight tariffs in SSA countries, compared to only 16% in EU countries).

So for the EU countries, putting the high share of diesel consumption and global warming considerations above those of export competitiveness in transport fuel policy is understandable. While for SSA countries, at least for the next few years, export competitiveness is a more pressing issue than global warming in relation for fuel tax policy.

4.7 Policies to increase efficiency of use of transport fuels

While policy options aimed at reducing transport diesel prices will go some way in increasing export competitiveness by reducing trade-related transactions costs, they will not sufficient for the sustained export competiveness of SSA countries in the coming years.[27] For sustained competitiveness, these measures need to be complemented with measures fuel efficiency aimed at reducing the fuel consumption of vehicles in general and of trucks in particular. This is particularly important for countries which are net importers of fuel.

Fuel efficiency of trucks in SSA countries is among the lowest in the world. There are many inter-related reasons for this, and we propose measures for dealing with many of them. First of the two most significant reasons for the low fuel efficiency are the trucks themselves, their being on the whole relatively small and old, both factors contributing to high fuel consumption per unit of freight. Second is the structure of the trucking industry, in many countries encourages the continued use of more trucks than are needed to

[27]Teravaninthorn and Raballand (2009). There is variation in the impact of reduction in fuel prices on trade-related transaction in the region. Reduction in fuel prices is expected to reduce the trade-related transaction costs and
transport prices in East Africa. In Southern Africa the impact is limited, as the trucking industry in the region is already competitive. The reduction in fuel prices in itself is expected to have a rather limited impact in Central and West Africa because of the regulatory constraints. (Teravaninthorn and Raballand 2009).

cope with the demand, which results in low utilization of trucks (that is, few kms per year per truck) and in turn makes it difficult for owners to earn enough revenue to finance the purchase of more modern and fuel efficient trucks. In addition, the operators tend to overload their trucks in an attempt to increase profitability, but in doing so increase their fuel consumption. Third is driver behavior and poor maintenance of the trucks. Drivers, have no training on how to drive to minimize fuel consumption, and have few incentives other than the high price of fuel, to do so (particularly when they are also the truck owners as is the case in many SSA countries). The high proportion of driver owned trucks receive less than optimal maintenance and poorly maintained trucks have poor fuel consumption.

Improved fuel efficiency can be achieved by measures aimed at:

- introducing more fuel efficiency trucks into the truck fleet;
- revising regulation of the trucking industry to create incentives for more efficient operation;
- Giving incentives to truck drivers to operate their trucks to minimize fuel consumption.

4.7.1 Introduce more fuel efficient trucks

There has been significant improvement in the truck manufacturing technology over the last fifteen years or so, and as a result of these improvements, the new medium and heavy-duty vehicles that are now used worldwide for moving cross-border and high level national road freight are more fuel-efficient than ever before.[28] These improvements are due to a combination of factors- both technological (such as engine design improvements, more efficient transmission of the power to the driver wheels, aerodynamic design of trucks, computerized control of the engine and so on), and national regulatory requirements (such as conforming to the fuel efficiency and greenhouse gas emission standards). These changes have resulted in a dramatic reduction in the fuel consumption of new medium and heavy-duty vehicles *vis-à-vis* that of older trucks.

Even though a truck has optimal design fuel consumption, it cannot come close to achieving this if it is not properly maintained. The main maintenance factors that affect fuel consumption are engine and transmission, tire pressure and wheel alignment.

One commonly used metric to judge fuel efficiency improvements is to measure fuel consumption by vehicles for distance travelled (such as liters per 100 kms).[29] A fully laden five axle truck manufactured in 1995 could at best

[28] Light weight trucks are defined as trucks of less than 5 tons, medium-sized trucks are over 5 but less than 7 tons and large –scale trucks are in excess of seven tons.

[29] *Technologies and Approaches to reducing the fuel consumption of Medium and Heavy-Duty Vehicles*. http://www.nap.edu/catalog

achieve about 45 liters per 100km, whereas a similar truck manufactured in 2010 could achieve about 35 liters per 100km, and those currently being designed are expected to do even better.[30]

Results based on trucking surveys in SSA show three factors:

- First, a much higher fuel consumption compared with other regions of the world (Table 6) . As an example, the fuel consumption for a 5-axle semi trailer in France was about half (34 liters per 100 km) about the same as a 2003 18-wheel truck in the US,;
- Second, a high variation in fuel consumption between countries in West, Central, East and Southern Africa. In 2007, the fuel consumption for Central and West Africa was 65 liters per 100 kms, the fuel consumption for East Africa was 60 liters per 100km. [31]and;
- third, a large difference between truck operations on some of the higher density corridors where large and fuel efficient trucks are used (such as between Durban and Dar es Salaam) and in corridors and regions where there is less demand and less well organized trucking operations and older and smaller trucks are used.

One reason for the low fuel efficiency of trucks is due to the prevalence of old imported trucks.[32] The average fleet age is 11 years in Central and West Africa, and 7 years in East Africa. Assembling of light weight trucks is common in a few SSA countries. However barring few exceptions, SSA countries do not have the indigenous capacity to manufacture the medium or heavy-duty trucks that are now used worldwide for moving cross-border and high level domestic freight.

South Africa has a substantial motor vehicle industry- including the building and assembly of trucks. And some SSA countries (Nigeria, Kenya) have the capacity for assembling trucks. A significant portion of the truck fleet of SSA countries is imported. The average (35 percent) is moreover is heavily influenced by South Africa's imports which accounts for more than 90 percent of total imports of the countries.

[30] Source: ibid A new five-axle truck as seen in US in expected to achieve 12 litres per 100 km. Source: ibid

[31] The results for Central and East Africa are based on the Douala-N'Djamena and the Mombasa-Kampala Corridors respectively: Source: Teravaninthorn and Raballand) 2009.

[32] Most trucks in SSA are 2 or 3 axle rigid trucks, with few 4 or 5 axle semi-trailers.

TABLE17: IMPORTS OF VEHICLES/TRUCKS (2005)

Country	Imported Vehicles	Imported Trucks	Trucks as % of total imported
Algeria	97,814	53,186	54
Burkina Faso	469	374	80
Egypt	133,577	29,356	22
Ghana	5,598	3,988	71
Cote d'Ivoire	2,519	1,263	50
Kenya	9,598	8,734	91
Madagascar	2,058	1,927	94
Morocco	6,837	3,635	53
South Africa	564,800	187,955	33
Tunisia	29,139	13,541	46
Zimbabwe	4,202	3,221	77
Total	583,646	203474	35

Source: websites of the respective countries. Trucks includes pick-up vehicles that are mostly gasoline powered and not used to transport export products

If South Africa is excluded, more than three-quarters of trucks of the SSA countries are imported (Table One). With the exception of South Africa which prohibits the importation of old second-hand trucks for safety and domestic production considerations, most of the imports of trucks in the other SSA countries are old, bought second hand after several years of service from Europe, North America and increasingly, Asia.

TABLE18: AVERAGE TRUCK FLEET (IN YEARS) AND ANNUAL YEARLY MILEAGE (IN KMS)

Region	Average Age (years)	Annual Yearly Mileage
Southern Africa	5	100,000-144,000
West Africa	Over 12	40,000-50,000
East Africa	7	100,000-144,000
Central Africa	12	60,000-70,000

Source: World Bank (2008)

Fuel consumption is much higher for older trucks compared with newer. The Department of Transportation in the US has estimated that since 2000 the fuel consumption of a new 5-axle semi-trailer truck has improved by more than 10 percent and that the prospects for further improvement promise similar improvements in the next decade. One reason for the low fuel efficiency of trucks is due to the prevalence of old imported trucks in SSA. The average fleet age is 11, although there is regional variation (Table 15).

Imports of used trucks result in savings in the initial purchase price and the subsequent financing and depreciation costs. However, besides being fuel-inefficient, old trucks are difficult to maintain, subject to frequent breakdowns and in frequent need of maintenance, and create concerns on road safety and pollution. Because of their high downtime for maintenance and frequent

breakdowns in service, they usually put on less annual mileage than newer trucks. Given the large improvement in vehicle fuel economy, it is surprising that so many older trucks are still imported to SSA countries. Part of the reason is that there is little demand for older used fuel-inefficient trucks in Europe, the US and East Asia, so the price difference between an old and a new trucks on the world market is quite high (internet searches reveal many 5-axle 5-year old semi trailer trucks for about U$40,000 compared to U$120,000 or more for a new truck of comparable size).

Table 16: Import Tariffs for Imported Trucks (percentage of value of imports)

TABLE19: IMPORT TARIFFS FOR IMPORTED TRUCKS (PERCENTAGE OF VALUE OF IMPORTS)

Country	MFN Tariff	Year
Rwanda	5.00	2005
Ghana	5.00	2009
Cameroon	10.00	2005
Central African Republic	10.00	2005
Chad	10.00	2005
Niger	10.00	2005
Togo	10.00	2005
Burkina Faso	10.00	2005
Zambia	15.00	2009
Tanzania	15.00	2009
Senegal	20.00	2009
Nigeria	30.00	2009
South Africa	33.00	2009
Zimbabwe	60.00	2009

Source: TRAINS, UNCTAD

Imported trucks in SSA countries, as in many other developing countries worldwide, are subject to various tariffs.[33] The three types of tax instruments on imports of trucks that are found in most SSA countries are: The Most Favored Nation (MFN) import duty, an excise tax, and the VAT.

- MFN Import duty: The MFN import duty charged before the trucks leave the entry port into the country and/or bonded warehouse. MFN tariffs for imported heavy trucks are not particularly high in SSA countries compared to those in other regions. [34] For new trucks, the tax base is the percentage of the CIF value. For old trucks, the tax base depends on the on the manufactured date and the condition of

[33] Customs duties are an important source of fiscal revenue in many low-income developing countries with a narrow tax base and limited menu of direct tax instruments.

[34] Bangladesh the MFN tariff rate is 30%. For France it is 10-20%. Italy it is 10%. However, some SSA countries in reality continue to impose tariffs that diverge from the regional harmonized tariff schedule

the vehicle. This means, the older the truck, the lower the import duty compared to a new truck. So a new truck will attract import tariffs three or four times higher than an equivalent size used truck.[35]

- Excise duties: Usually, specified in percentage terms. The tax base is CIF value +MFN import duty
- VAT: charged on imported commercial vehicles that land at the countries ports.. This is usually a single rate. The tax base is CIF+Excise duty.

In an environment where truck utilization rate is low as is the case in Central and West Africa (40,000-60,000 kilometers) and transport tariffs are not very high, a trucker or trucking company cannot afford to purchase a new truck.

4.7.2 Reorganize import duty structure

Fiscal policies interact with efficient transport service delivery in several ways, but from the point of fuel efficiency and lowering fuel consumption of truck, one is especially important, and this has to do with importing new versus old trucks. The policy experiences of countries worldwide present several options for modernizing the trucking fleet and these range from outright prohibition of imports of old trucks to discouraging the import of old trucks through progressive increase of imports duties of old trucks. .

a. One extreme measure and this may be difficult to implement in most SSA countries is outright prohibition of imports of old second hand vehicles as in Argentina, Brazil and Colombia in Latin America and South Africa.[36]
b. Prohibiting imports of trucks of specified age. Nigeria prohibits imports of over 15 years old, and both Kenya and Nigeria prohibit the imports of vehicles that are over eight years.
c. Discouraging the import of old trucks through progressive increase of import duties that increase with the age of the trucks or impose a penalty on CIF tax base that increases with the age of the trucks. Ghana has an overage vehicle penalty on imports of old trucks. For new and trucks less than 10 years old, the MFN import rate is 5 percent of the value of the truck; for trucks of over 10 years but less than 12 years, the rate is 5 percent of the CIF value (that is, a higher tax base than for a newer truck); for trucks over 12 years but less than 15 years, the rate rises to 10 percent of the CIF price and for trucks over 15 years old, the rate rises to 30 percent of the CIF price.
d. At present, the MFN import duty structure is ad valorem, that is proportional to the price of the truck. One option would be replacing

[35] World Bank (2007)

[36] South Arica prohibits the importation of old, second-hand vehicles in most cases. Imports of old vehicles, require an import permit, which is very rarely granted.

the ad valorem based tax structure with a fixed charge the same for all trucks, to eliminate the lower tax on older trucks.

Our proposal in respect of import duties and other taxation related to fuel consumption is to change their structure to give preference to newer rather than older vehicles without significantly changing the total revenue they generate, as in policy (iii) above. If vehicle age is used a proxy for fuel efficiency, excise duties that increase in absolute amounts as the age of the vehicle increases could achieve this objective (but simply increasing the excise rate might not be enough, the rate has to increase sufficiently to offset the age reduction in vehicle value. The taxes that can be used to influence the fleet age are import excise and VAT, and vehicle ownership duties.

For import excise duties, schemes similar to those implemented in Ghana are recommended, so that the difference in import duties between older and newer vehicles is reduced. For vehicle ownership duties, mainly annual license fees, these can also be graded according to the age of the vehicle as a proxy for its fuel consumption.

4.7.3 Revise the regulatory framework of the trucking industry

Trucking –particularly long haul trucking- is a financially viable industry for most trucking companies in Africa, where demand for transport services is booming as a result of economic growth.[37] Given the limited competition from railways in most SSA countries, trucking business should be a seller's market.[38] Profits in the trucking industry are a function of market rate and the number of truck participants, and this in turn depends on the regulatory framework of the trucking industry. In much of SSA, this framework encourages the participation of many small operators, which while successful in generating employment at the same time produces an over-supply of trucking capacity and transforms what should be a profitable industry into one in which many of the smaller operators cannot cover even their marginal costs from revenues.

The trucking industry can be divided into at least two parts. The first is dominated by the multitude of small operators, many individually or family owned and operating one or at best a few vehicles, mostly small, rigid trucks and providing low-cost no frills services that meet a substantial demand.[39] The second part also includes many of the small operators but also includes small and medium-sized trucking companies with some full time employees, as well

[37] Rail services are either non-existent in many SSA countries, and even in countries where they exist, are in most cases not able to provide comparable services for moving freight.

[38] *Ibid.* Results of trucking surveys indicated that managers of trucking companies acknowledge that paying back the cost of a new or trucks less than 3 years old does not take more than three years less than ervic

[39] World Bank 2009

as large companies which typically combine trucking with integrated logistics services. [40]

The larger operators (with 50 or more trucks) have a clear advantage over smaller operators in terms of the quality of service they can offer, and have a broader customer profile and more flexible operating conditions. They can provide reliable, high quality operations that have sufficient physical and managerial capacity to enter into long-term contracts. Moreover, they are better able to secure back hauls which enhances the trucking companies which enhances the trucking sectors profitability and competitiveness, and besides and such companies also have the means to provide for training of truck drivers, that is crucial for fuel efficiency (see below). However, despite their higher operating efficiency, they tend to have higher unit costs than the small operators and hence cater to a different market. This market itself comprises small, medium and large traders who themselves have sales contracts that need to be observed, and so they need reliable transport and logistics suppliers.

Some large trucking companies may also sub-contract freight to individual truck owners at rates lower than they charge their own clients. Consequently, sub-contractors earn lower unit revenues reducing their profitability. Sub-contracting, together with the market for low cost services, also explains the existence of fuel-inefficient old and new trucks along the same routes. Despite the plethora of anecdotal evidence of this description of the trucking industry in SSA, there are few reliable statistics on the structure of road freight industries with which it can be confirmed.

SSA countries show wide regional variation in their approach to regulating their trucking industries. In Southern Africa, and to a lesser extent in East Africa, the industries are highly competitive due to a deregulated market structure. Unlike in West and Central Africa, international trucking operations are governed not by quotas but by bilateral agreements and direct contracting between shippers and transporters. This provides incentives for transporters to be more efficient. Likewise in East Africa, the largest professionalized trucking companies account for approximately 20 percent of the total market share, comparable to the mature trucking markets in Europe and North America. [41]

In contrast, trucking industries in Central and West Africa are regulated, governed by quotas, and are far less efficient. Rent-seeking behavior and poor

[40] Such services would include other aspects of the logistics supply chain such as freight forwarders, warehousing, trans loading, storage and distribution.

[41] There are about 20 large companies that operate more than 100 trucks each. The largest Kenyan company owns a fleet of 600 trucks. These large companies obtain loads from long term direct contracting ((from one to three years).

governance of the trucking industry is central to many of the issues of low income countries in Central and West Africa.

Policy recommendation need to distinguish between deregulated and the regulated market environment for the trucking sector. The main regulatory concerns include whether there are market entry barriers to the trucking business (such as regulatory mechanisms for acquiring trucking permits and licenses) -or market access restrictions (such as freight allocation schemes which in turn encourage the formation of cartels).[42]

The trucking companies in virtually all SSA countries require a license/permit to operate a vehicle, but not all countries require a license to own a vehicle (for example in Ghana). However, market entry to the trucking business through the permit/ licensing process is relatively easy across the region, and permits and licenses for the trucking business freely available, especially for nationals. With few exceptions (Kenya and Uganda), expenses for acquiring licenses/ permits to operate internationally are also, at best, marginal.[43] Oversupply of trucking services in many countries indicates that market entry barriers are not a major constraint in SSA countries.

Market access restrictions to the trucking business may include restrictions that may specify where a carrier may operate (defined as regions or routes), what truck types may be operated, and the kind of commodities that may be carried. And they may rigidly separate "for hire" (that is contracted for independent operators) services from "own account" (that is, operators operating their own services). In place of the freedom to contract that allows competition to determine the most beneficial arrangements for both parties- both in terms of price and in terms of quality, the regulation of domestic and international road freight in West and Central Africa are based on different systems:

- For international road freight, formal and informal bilateral quota systems establish quotas for the fleets of the respective countries by the freight bureaus. While bilateral freight allocation is, in principle, intended to protect the domestic trucking industry, they creates de facto cartels.
- A formal/informal system queuing system (or "order of loading" or "tour de role"). This alternative to freedom to contract requires clients to use the next truck available in a queue of trucks that are waiting for business. When there is an excess of trucks or a large

[42] Cartels are composed of industrial organizations or companies which either explicitly or implicitly to limit competition by controlling the production and distribution of a good or service. They can set a monopoly price which in turn induces abnormal mark ups.

[43] Impediments like waiting periods (the number of days it takes to get the license) and whether gifts or informal payments are expected or requested in order to obtain the license vary widely across the region.

> directional imbalance of demand, trucks can queue for very long periods, waiting for the next load. One outcome of this arrangement is that trucks return empty to their original location rather than tolerate the long wait for the return load. The system in effect leads to low truck utilization, oversupply of trucking services, and provides incentives for formation of cartels.[44]

The large difference in productivity between Southern Africa on the one hand and Central and West Africa on the other is clearly correlated with the level of truck utilization and the oversupply level. Trucking companies in Southern Africa are able to utilize their vehicles at levels similar to European counterparts (10,000-12,000 kilometers per month) in contrast to operators in West and Central Africa where utilization is very low (sometimes as low as 2,000 kilometers per month).[45]

The low truck utilization in West and Central Africa implies that the profits of the truck opertors come from other sources. First is the low capital investment from the purchase old, fuel-inefficient trucks. The cost of a new truck- more so than financing cost and the MFN import duty truck on new trucks- may explain why truckers buy low-cost, and old fuel-ineffient vehicles. Another critical variable is the profitability of trucking is the load per truck. To maximize loads and revenues from limited trips and low vehicle utilization, operators need to overload their vehicles.

A main justification for the queuing system is fairness and the possibility of sharing the market between many operators. Deregulating the trucking industry in Central and West Africa is less a technical than a political and social issue. The main concern is that under a liberalized, competitive market, the demand for trucking services would be well-served efficiently by a smaller truck fleet. This would lead to a drop in trucking employment, since some companies (or owner-operated enterprises) may be out of business. This highlights the importance of mitigating the social impact of a more efficient but smaller trucking industry.

Larger trucking comanpies tend to have higher fuel efficient operations than individual owner drivers and smaller companies. They can afford larger and newer fuel efficient vehicles, and these vehicles spend more of their time in profitble operations than waiting for business. They are also better placed to find return loads, so more of the distnace their trucks operates is revenue earning, contibuting further to the companies ability to afford more fuel efficiency trucks.

It is easier to change trucking industry regualtions that relate to international road freight than those for domesic road freight as fewer

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[44] In Africa, because of the thinness of the markets, cartels form more easily than in Asia or Europe.
[45] Teravaninthorn and Raballand (2009)

social implications are involved and large companies already dominate the business . One way of facilitating changes in international trucking is through the necessary conditions for collecting and delivering freight to ports. Some countries require that a transport contract be in force for a trucking company to do business in a port, and only companies that meet minimum criteria can enter into transport contracts. When this system was intrioduced in Jordan, the utlilization of trucks using the port increased 30% (by avoiding having to wait in a queue for port business). Similarly, preference can be given at international borders to trucks owned by established international operators (for example, trucks with TIR certification or owned by companies that have achieved AEO[46] status).

Once reforms have been introduced to international trucking companies, it might be feasible to introduce a two-tier structure for domestic trucking. Under this arrangement, there would be a continuation of the low cost, no frills services currently available, but they would not be protected to a stringent *tour de role* system. This market would be complemented by another offering a higher quality of service to larger clients which demand more reliable services. This is already happening in East Africa, where at least one supermarket chain is now contracing with trucking/logisics companies to provide guaranteed quality services[47].

4.7.4 Improve driver performance

Driver operating procedures are important factors in achieving maximum fuel economy. The potential benefits of technological changes to trucks can be offset or even negated by a driver running at high speed. General rules keep accurate records of fuel used, routes taken and loads carried for monitoring improvements. Alongside measures to improve the trucking environment and lower the fuel consumption of trucks, measures are needed to improve fuel efficiency influencing driver behavior (such as through certification schemes for truck drivers).

The International Road Transport Union (IRU) offers an internationally recognized certificate of professional competence (CPU) for trucking company managers, their drivers and mechanics that can be used in a quality licensing system. For companies engaged in international and transit freight, a higher level CPU can qualify for entry into the Transports Internationaux Routiers (International Road Transport (TIR) system, providing a significant competitive advantage.

As part of the implementation of the South East Europe Trade and Transport Facilitation project, the IRU and the World Bank initiated a training and

[46] Authorized Economic Operator (EU terminology)

[47] Freight transport for development toolkit:Integrated Logistics Services, World Bank, 2009

certification system for truck and bus drivers and managers. The certification process was modeled on the current requirements for drivers and managers of trucking companies in European Union (EU) countries. The training and certification are managed through a network of training institutes approved as IRU Accredited Training Institutes. The full list of training materials from the courses on passenger and goods transport is available from the website of the IRU academy.[48]

In January 2012, an IRU regional committee for Africa (CRIPA) was created with an initial 20 member countries, mostly from West and Central Africa. This could be a focus for implementation of an IRU "train the trainers' program and accreditation of training institutes, similar those being implemented in the Middle East and CIS countries

For more detailed information of the IRU driver training and certification schemed (see This is the IRU, 2012, http://www.platma.org/index.php/mod.publicaciones/mem.descargar/fichero.publicaciones_IRU_2012_a0b08d3b%232E%23pdf/chk.752bca23d5dbc41e948fb97603460458

In the US and EU it typically takes a few hundred hours of training before a driver has learned enough to take the certification examinations. It is difficult to implement driver training when the majority of truck drivers are owner-operators, they do not have the time to neglect their business on a planned basis to undertake the training. The problem can be reduced by starting implementation of driver training with a less demanding certification requirement, but for the training to bring about any tangible improvements n safety and fuel efficiency, the training would still be onerous for owner-drivers.

4.7.5 Driver training

So it is probable that any serious attempt to improve the quality of driver training would need to be preceded by a restructuring of the industry so that formal transport companies managed a larger part of the business and could afford the time for some of their drivers to be attending training courses. For the companies, the training should be highly cost-effective as the trained drivers would be better able to determine when their vehicles needed attention, achieve better fuel economy and be involved in fewer accidents.

Countries that are contemplating upgrading their training of truck drivers are recommended to contact the IRU for advice and technical assistance on how its system of certificates of professional competence for commercial drivers can be adapted to their circumstances and implemented.

[48] http://www.iru.org/index/en-academy-index).

4.8 Impact of fuel efficiency measures

Several US reports have assessed the fuel consumption impact of the measures to increase fuel efficiency mentioned in this Part of the report. We have relied on one of these sources in particular for estimating the impact of better vehicle performance and driver practices on fuel consumption. Adapting these estimates to the type, size and condition of trucks used in Sub-Saharan Africa, together with assessments of driver behavior, our tentative estimates are that fuel consumption could be reduced by about 50 percent (Table 17).

Most of the benefits come from a change in the size of truck and the engine and transmission characteristics of the trucks - and these can only come about through gradual changes in the structure of the truck fleet. The changes in the truck fleet would be accelerated if there were to be a parallel restructuring of the trucking industry. This is particularly so in Central and West Africa where the trucking sector is informally heavily regulated. The deregulation and liberalization of the trucking sector could bring about a 25 percent improvement in truck utilization (based on achievements of comparable deregulation in Jordan), which although not by itself affecting fuel consumption, would make the trucking industry more competitive and therefore more able to afford the more expensive but more fuel and load efficient trucks.

Table 20: Impact of measures to reduce fuel consumption of trucks in SSA countries

Measure	% reduction in fuel consumption
Truck design	
Engine and transmission	10%
Aerodynamics	5%
Wide tires	5%
Maintenance	15%
Vehicle size	10%
Driver behavior	5%
Total impact	50%

Source: World Bank application to SSA countries of "Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles" National Research Council; Transportation Research Board, 2010

5 Next Steps

The measures indicated in this report for reducing diesel fuel prices and improving the efficiency of use of diesel fuel in road freight transport are very general. They take little account of the specific circumstances of each country, other than their current fuel prices and whether they are land locked or coastal. In the section on fuel taxes we take some account of the particular colonial heritage of countries, and whether they are oil importers or exporters.

More detailed analysis is needed for each country before serious consideration could be given to implementing any of the measures. These further analyses would look at the specifics make up of the costs of transport fuels, the fuel procurement and marketing procedures as well as how the fuels are transported from the port to the final retail distributor. In respect of the trucking industry, they would look at the composition of the current trucking fleet and how it is changing over time, and what factors influence the cost of importing of fuel efficient trucks. The methods of financing new or replacement trucks would be reviewed and some successful and innovative measures to reduce the finance charges (without creating subsidies) would be considered. A review of the structure of the trucking industry would also be greatly beneficial in assessing how to bring about a change in the vehicle fleet and the way that it is utilized. One of the easier initiatives to consider would be for driver training, as whatever other measures are implemented, improved driver behavior could reduce fuel consumption by more than 5% with very little investment. Driver training would also go a long way to reduce the high truck accident rates in most countries of Sub-Saharan Africa.

Of the countries that stand to gain most from reducing the retail price of their diesel fuel for transport – and therefore to gain most in increasing their export competitiveness, are in East Africa – more than half are in East or Southern Africa (based on GIZ data). However some Central and West African countries have high diesel fuel prices (Cape Verde, Chad and CAR are among the ten countries with highest diesel prices). A disproportionate number of countries with diesel taxes above the benchmark of US$12 cents per liter are landlocked countries (nine out of fourteen).

In contrast, those countries that stand to gain most from restructuring of their trucking industries to improve fuel efficiency are those in West and Central

Africa – in Transport Prices and Costs in Africa (Table 4.2) the corridors with the highest truck tariffs were in West and Central Africa).

The next actions are categorized into those related to diesel fuel price reduction and those related to improving truck fuel consumption. Both areas of action are principally aimed at increasing the export competitiveness of SSA countries.

A first step for all the proposed actions would be a workshop/seminar to present the results of this report and determine the level of private sector (mostly the trucking industry) and government (mostly Ministries of Transport and Energy) support for more detailed assessments at a national level.

5.1 Reduction of the retail price of diesel

In those countries where diesel fuel prices are high, a mode detailed assessment than had been possible for this report of the reasons for those high prices, and which of the seven possible spheres of action (described in Part B) could significantly reduce those prices while at the same time being socially and politically feasible. Not all the actions apply to all the countries (for example, reducing protection for small and inefficient refineries only applies to those countries that have them, reducing high taxes on diesel fuel only applies to those countries where the tax is above the benchmark). But for each country it is possible to see which of the sources of high fuel prices are applicable and which of the potential solutions are feasible in that countries particular context.

5.1.1 Improving diesel fuel consumption in trucks

Similar to policies to reduce diesel fuel prices, the selection and application of those to improve fuel consumption need to be specific to the circumstances of each country.

5.1.1.1 Restructure trucking industries

A possible next step would be to complete assessments of the national trucking sectors, particularly in those countries of West and Central Africa where they are highly regulated and where truck tariffs are significantly above international benchmarks.

Such assessments could start (and some are already under way in West Africa) with the structure of international trucking as this is the least difficult to restructure. It could also start with trucking of products to and from ports – this is where the trucking industry restructuring in Jordan started, as it was feasible to limit access to ports to registered trucking companies. The registration of trucking companies was based on simple criteria of number of trucks owned, availability of financial resources to maintain the trucks and drivers' certification.

5.1.1.2 More fuel efficient trucks

Once the trucking sector is restructured to include a significant number of companies or cooperatives, it would be feasible to consider how they could be supported to buy newer, larger and more fuel efficient trucks. A few schemes have been implemented with some success, that involve the use of an escrow account in commercial banks that provide loans to trucking companies for truck purchase, such that should one borrower default, the bank has access to the escrow account so as not to incur a financial loss. With this security, the commercial banks can avoid charging the very high interest rates usually applied to trucking companies because of their very high loan default rate. With lower interest charges, more companies would be able to finance the purchase of new trucks.

Independently of how the trucking industry is structured, a closer look at the duty incentives to import more fuel efficient trucks would merit consideration for those countries that have not already implemented them (and even where they are in place, some would merit review to see how effective they are).

5.1.1.3 Driver training and certification

More effective truck driver training and certification is now widely recognized as significantly improving road safety as well as reducing vehicle damage costs and improving fuel consumption. The International Road Union (IRU) has now established on-line certification schemes and has successfully implemented "train the trainer" courses in several developing countries. The recently created Regional IRU Committee for Africa could be used as a starting point for improvement of driver training and performance in SSA countries. A next step would be for the World Bank and Africa Development Bank to work with the IRU and national governments to introduce driver training and certification schemes in SSA countries. The Islamic Development Bank is already working with the IRU and the AULT (Association of Land Transport in Arab Countries) to encourage driver certification in Arab countries, and this scheme could serve as a model for the SSA countries.

ANNEX 1 – FUEL PRICE BUILD-UP QUESTIONNAIRE

Name of Country		**Local currency**	**Local to USD Exchange rate**
		Gasoline	**Diesel**
Origin of fuel import		For example Port of Rotterdam	
Is there any petroleum refinery in the country?			
If yes, what is the annual capacity (Barrel / day)			
FOB price of Petroleum product (per liter in local currency or USD)			
+ Freight cost			
+ Insurance cost			
= **CIF price at port (ex –port)**			
+ Technical and non technical losses			
+ Demurrage			
+ Other import cost such as cargo dues, lightering expenses, pipeline marine services, etc.			
+ Storage cost			
= **LANDING COST (total import Cost)**			
+ Federal Tax or excise duty			
+ Fuel User charges (list all of them)			
○ Road user charges (road funds, etc)			
○ Energy stabilization funds			
○			
○			
+ VAT			
= **TAXES and LEVIES**			
+ Transportation cost to storage			
+ Fuel storage for energy security purpose			
+ Wholesale margins			
= **WHOLESALE PRICE**			
+ Transportation cost to retail outlet			
+ Retail margin			
= **RETAIL PRICE** (per liter in local currency or USD)			
Total Import of fuel in the country - in 2008	**Crude import ?**		
- in 2009			
Number of oil companies involved in retail distribution in the country (i.e. Exxon, Shell, BP, etc)			

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