Impact of Increases in the Levy on the Economy

The goal of commercializing road financing and management implies that the cost of maintenance and rehabilitation will be funded by consumers, who will also be the beneficiaries of improved road conditions. The following analyzes the impact of the proposed increases in the fuel levy on consumers notably through increases in the price level and through higher vehicle operating costs. This impact is shown to be reasonable for most road users, with the exception of truckers. Given the substantial savings that are expected from improved road conditions, the net impact on all classes of users should be positive.

- **Impact of increases in the levy on the price of fuel:**

Given the pricing formula used for petrol and diesel a K 10 increase in the levy will raise the price of fuel through an additional K2.32 for VAT, K 0.75 for the oil company margin and K 0.85 for the dealer margin[1]. Thus the total increase in the price of fuel from a K 10 in the levy, is K 14. The impact of an increase in the levy is then also an increase in general government revenue from VAT. Table 1 below shows that increasing the levy to K100/l over the next five years rather than maintaining it at K40/l will raise a total of $58.45 million dollars in additional revenues for the road fund, $14.03 million for Government through VAT, and $4.38 million and $4.98 million respectively for the oil company and the dealers.

Table 1: Increase in revenues relative to the levy remaining at K40/l

		Increase in revenues relative to levy remaining at K40/l (in US$ million)			
	levy	Road Fund	VAT	oil	Dealer
1997	50	3.08	0.74	0.23	0.26
1998	60	6.34	1.52	0.48	0.54
1999	75	11.43	2.74	0.86	0.97
2000	90	16.82	4.04	1.26	1.43
2001	100	20.79	4.99	1.56	1.77
total		**58.45**	**14.03**	**4.38**	**4.98**

[1] Note that the oil company margin is 7.5%, the dealer margin is 6.6%, but since it is levied on the oil company margin inclusive price it has a cumulative effect. Thus the ***effective*** dealer margin on the levy is 8.51%. A similar argument applies to VAT: the rate is 20%, but it is applied on the oil company margin and dealer margin inclusive price. The ***effective*** VAT rate on the levy is 23.2%.

Table 2. below shows the increase that the road fund, Government, the oil company and the dealers should expect annually if the levy is to rise as proposed.

	Kwacha per liter		induced increase in fuel prices/1	Annual increase in revenues generated by fuel price increase/1 (in US$ million)				
	levy	increase in levy		Total	Road Fund	G'mt	oil cy	dealers
1996	40							
1997	50	10	14	4.31	3.08	0.74	0.23	0.26
1998	60	10	14	4.44	3.17	0.76	0.24	0.27
1999	75	15	21	6.73	4.90	1.05	0.37	0.42
2000	90	15	21	6.86	5.05	1.01	0.38	0.43
2001	100	10	14	4.85	3.46	0.83	0.26	0.29

- **Impact on the price level**:

The impact on the CPI can be calculated separately for the rural population, as well as low and high income urban population. The weights for petrol include the weight for petrol itself as well as for taxi fares. The weight for diesel includes the weight for diesel, as well as the weights for coach and main bus.

Table 1: Diesel and petrol shares of the consumer basket

Weights	rural	low income	high income
Diesel	1.26	0.67	12.78
Main bus	12.83	17.59	13.81
coach fare	12.83	17.59	13.81
Total weight Diesel	26.92	35.9	40.4
Diesel as % of consumer basket	**2.69**	**3.59**	**4.04**
Petrol	1.26	0.67	12.78
taxi fare	1.07	1.59	3.3
Total weight Petrol	2.33	2.26	16.1
Petrol as % of consumer basket	**0.23**	**0.23**	**1.61**

Multiplying the percentage increase in the price of fuel (induced by levy increases) by these weights yields the net impact on these groups of consumers.

However, since the CPI may not capture all of the impact of a fuel price increase, an upper bound measure of the inflation caused by increases in the price of fuel is calculated as well. This measures the increased costs of maintaining the same level of consumption at the new price level[2].

[2] This is measured as $\frac{\left[(P_1^p - P_0^p)* Q_1^p + (P_1^d - P_0^d)* Q_1^d\right]}{C_1}$ where the superscripts "p" and "d" refer to diesel and petroleum, P is price, Q is quantity and C is total national consumption. This measures then the increase in the cost of national consumption that is attributable to the increase in the price of petroleum. The consumption projections were taken from "Zambia: Prospects for sustainable growth".

Table 2: Impact of fuel increases on consumer baskets and inflation:

		increase in price over previous year		Annual impact on consumer price index			Higher bound
	Levy	petrol	diesel	rural	urban low	urban high	inflation
1996	40	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1997	50	2.01%	2.15%	0.06%	0.08%	0.12%	0.10%
1998	60	1.97%	2.11%	0.06%	0.08%	0.12%	0.10%
1999	75	2.90%	3.09%	0.09%	0.12%	0.17%	0.16%
2000	90	2.82%	3.00%	0.09%	0.11%	0.17%	0.16%
2001	100	1.83%	1.94%	0.06%	0.07%	0.11%	0.10%

The impact on the consumers is indeed modest as it remains under 1/5 of a percentage point in any given year. Further it should not have any adverse social impact as the more affected group is the higher income consumers.

• **Impact on vehicle operating costs**:

As mentioned above, this does not measure the reduction in VOC that will occur as roads are rehabilitated and properly maintained. Thus this impact is only the negative one caused by increased fuel prices. Two types of measures are used: one set relies on data from Zambia's two associations of hauliers (Fedhaul and TAZA) and measure cost increases in trucks vehicle operating costs; the other measures increases in vehicle operating costs for cars, medium trucks and articulated trucks, and is based on the HDM model calibrated for Zambia.

Table 3: Impact of increase in fuel levy on vehicle operating costs

		Articulated trucks		HDM		
		TAZA	Fedhaul	Med. car	med.truck	art. truck
1996	40	n.a.	n.a.	n.a.	n.a.	n.a.
1997	50	0.12%	0.60%	0.49%	0.47%	0.60%
1998	60	0.12%	0.59%	0.49%	0.47%	0.59%
1999	75	0.17%	0.86%	0.74%	0.70%	0.89%
2000	90	0.17%	0.83%	0.73%	0.70%	0.88%
2001	100	0.11%	0.54%	0.48%	0.46%	0.58%

Judging from the Fedhaul data (which is more recent than TAZA's) and the HDM results, truckers will see their vehicle operating costs increase between 0.6% and 0.9% per annum over the next five years. This increase should however be offset by improved road conditions: a recent survey conducted by Fedhaul showed that potholes in road increased VOC by at least 17% per annum[3]. Thus, if revenues of the fuel levy are indeed used to improve road conditions, the net effect should be an improvement of the competitiveness of Zambian truckers.

[3] Heggie, I. "Management and Financing of Roads", World Bank technical paper No. 275.

Medium car and medium truck owners will also see their VOCs increase but by a more modest amount: 0.5 to 0.7% per annum, which should also be offset by reduced need for spare parts and repairs.

- **Conclusion:**

The impact on the economy of financing road maintenance and rehabilitation through the fuel levy is not negligible, particularly since any K10 increase in the levy results in a K14 increase in the price of fuel. However, no group of users is faced with an undue increase in their vehicle operating costs, and the induced inflation is negligible, particularly if improved roads reduce vehicle operating costs, hence overall transport costs.

Annex: Fuel Price Buildup Formula

	premium (k/m3)	Diesel (k/m3)
wholesale price (WP)	277,000	255,000
excise duty (45% of WP)	124,650	114,750
road levy	40,000	40,000
terminal fee	2,500	2,500
transport	43,105	43,105
sub total 1 (ST1)	**487,255**	**455,355**
oil comp. margin: 7.5% * (ST1 + 20% vat on WP)	40,699	37,977
sub total 2 (ST2)	527,954	493,331
Dealer margin: 6.6% * (ST2+ 20% VAT on ST2)	41,814	39,072
sub total 3 (ST3)	**569,768**	**532,403**
VAT inclusive pump price: (1.2 * ST3)	**683,721**	**638,884**
price per liter	**684**	**639**

The price formula is given by
$P = \{ (WP*1.45) + L+T+t+M_o + M_d \} *1.2$

where WP is wholesale price; L, T, t are the levy, the terminal fee and transport cost respectively; and M_o and M_d are the oil company and the dealer margin. 1.45 is 1+ 0.45, with 0.45 the excise duty; 1.2 is 1+ 0.2, with 0.2 the VAT

The oil company margin is given as:
$Mo = 0.075 * \{ 1.2\ WP + 0.45\ WP + L + T+t\}$
$= 0.075 * \{ 1.65\ WP + L+T+t\}$

The dealer margin is given as:
$Md = 0.066 * 1.2 * \{ 1.45\ Wp + 0.45\ WP + L + T + t + Mo\}$
$= 0.1238\ WP + 0.075\ (L+T+t)$

Thus the pricing formula can be rewritten as:
$P = 1.2 * \{ 1.699* WP + ((1+0.0851+0.075)* (L+T+t))\}$
$= 2.038* WP + 1.39212\ (L+T+t)$
from which the impact on the price of fuel of any increase in the levy can be deduced.