

POLICY BRIEF
EFFECTS OF AN INCREASE IN THE EXCISE DUTY
ON PETROL AND DIESEL BY SHS 100

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March 17, 2020

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Executive Summary

- Econometric analysis suggest that the import volume elasticity of petrol in response to past duties is -0.5, and the import elasticity of diesel to past duties is between -0.5 and -1, with most estimates around -1. Regressions of changes in petroleum revenue on both duties further suggest that higher duties on petrol resulted in significant revenue gains in the year following implementation, while higher diesel duties did not yield significant revenue gains in the year following implementation.
- The estimates imply that increasing the duty on petrol by Shs. 100 per liter will yield an direct increase in revenue of about Shs. 50 billion in the following fiscal year, at an inelastic import volume reduction of about 45 million liters as a consequence of the higher duty. If this revenue is reinvested in the economy and not used to service debt, the equilibrium revenue gain from the new petrol duty could be close to Shs. 100 billion.
- Since most estimates suggest a diesel elasticity of -1, the import volume response to higher diesel duties is likely to be elastic and will not yield additional revenue in the first year of implementation of the measure. Computations show that increasing the diesel duty by Shs. 100 per liter can yield a likely reduction in diesel import volumes of up to 130 million liters, and even a slight reduction in diesel revenue collected compared to the current regime.
- Therefore placing new duties on diesel may not generate large revenue gains and could affect economic activity. An explanation for the different price elasticities of demand of petrol and diesel duties could be that diesel is primarily used to generate energy in industry, with other sources of energy (electricity, coal) readily available if diesel becomes too expensive. Petrol on the other hand is primary used for motor vehicles and transportation, with few substitution possibilities.
- Simulations investigating the sectoral effects of the policy show that the most affected sector is transport services with a contraction in output of 0.08%, and agro-processing and other agriculture with a contractions of 0.02% each. Other industrial activities and cash crops are also adversely affected by the policy but less than the above 3. Assuming that the government reinvests the revenue, some sectors not so reliant on petroleum benefit: Cement, Lime, Ceramics, Plaster Concrete and Iron and steel. In these sectors output is projected to rise by 0.06% on average.
- Regarding adjustment dynamics: Importers react immediately to changes in duties, thus if the duties are placed, import volumes will have adjusted within one or two month after imposing the duty. Because importers do not sell all the petroleum immediately, the price response can take up to half a year. We estimate that prices will rise by about Shs. 30 in the month following the new duty, and will have risen by Shs. 100 after at most 6 month.

1 Introduction

The total public debt stock has increased in recent years due to a deliberate effort by Government to bridge the infrastructure gap in a bid to achieve the development goals of the National Development Plan. As a response, the Domestic Revenue Mobilization Strategy (DRMS) emphasizes government's commitment to have tax revenue grow at a rate in excess of the rate of growth in GDP. The Government has over the past years increased the excise duties charged per liter of petrol and diesel imported, and for FY2020/21 plans to increase both duties again by Shs. 100. The two products are of high importance for the country's economic productivity as they are crucial inputs in many productive sectors like manufacturing and transport services. This therefore brief seeks to

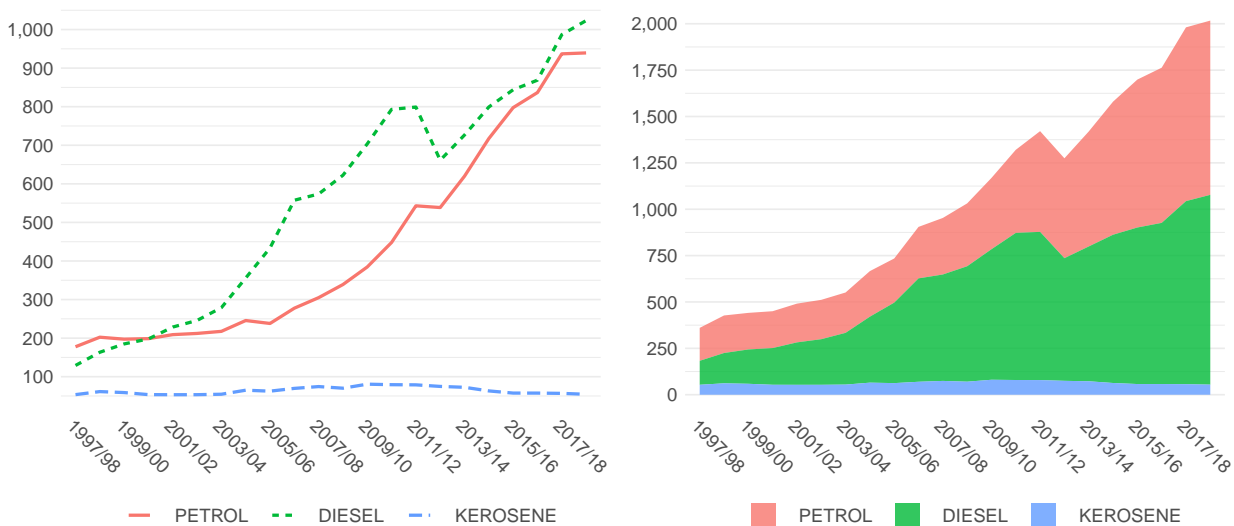
analyze whether this is an economically sound policy that enhances revenue mobilization without incurring high costs to growth and economic stability.

The analytic approach followed combines a time-series econometric analysis with a Computable General Equilibrium (CGE) simulation analysis to study the potential aggregate and sectoral effects of the policy.

1.1 Petroleum Import Volumes, Duties and Contribution to Revenue

In FY 2018/19, petrol and diesel were the key imported excisable products constituting 97.3% of total imports of petroleum products. The Ugandan economy currently imports about 1 million liters of Diesel and 0.9 million liters of Petrol.

Figure 1: FUEL IMPORT VOLUMES IN MILLION LITERS BY CATEGORY

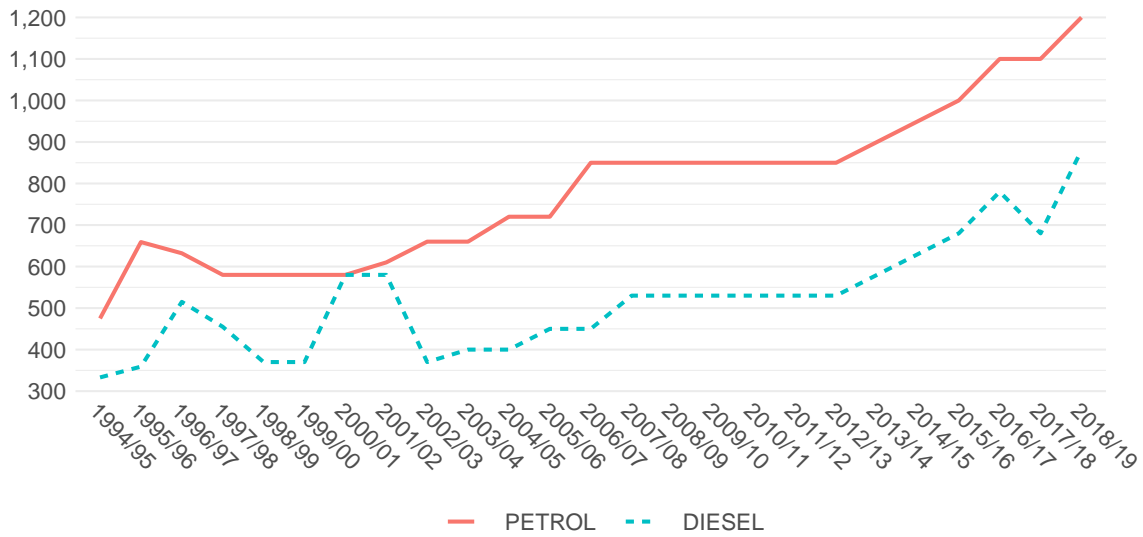


Source: Uganda Revenue Authority (URA)

Figure 2 shows the historical levels of duties applied per liter of petrol and diesel

imported.

Figure 2: EXCISE DUTIES ON PETROL AND DIESEL (SHS PER LITER)

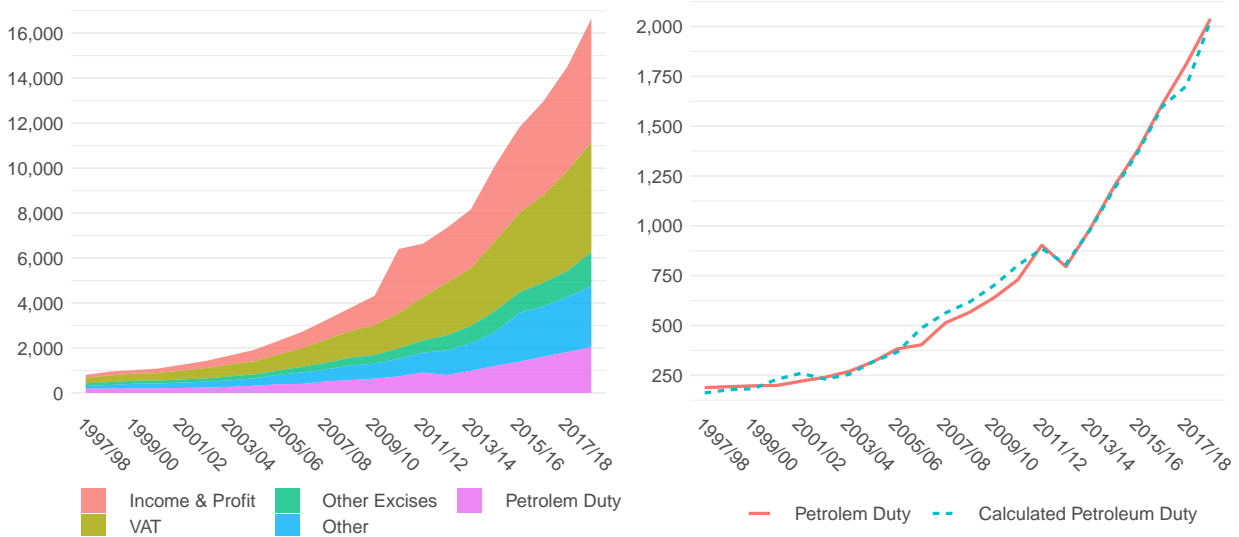


Source: Uganda Revenue Authority (URA)

In the FY 2018/19, the Government collected total domestic revenue of Shs. 16,637.8 billion, of which 33% was income and profit tax, 29% was VAT and 21.5% were excises. The excise duty on petroleum (i.e. combining petrol, diesel and kerosene) amounted to Shs. 2,038.7

billion and constituted 57% of excise revenue and 12.3% of total domestic revenue. The collection of petroleum duties has been effective: Figure 3 shows that the calculated revenue obtained by multiplying the import volumes of petrol and diesel from Figure 1 with the duties in

Figure 3: BREAKDOWN OF DOMESTIC REVENUES (BILLION SHS)



Source: Uganda Revenue Authority (URA)

Figure 2 (thus excluding kerosene which is a minor component) very closely

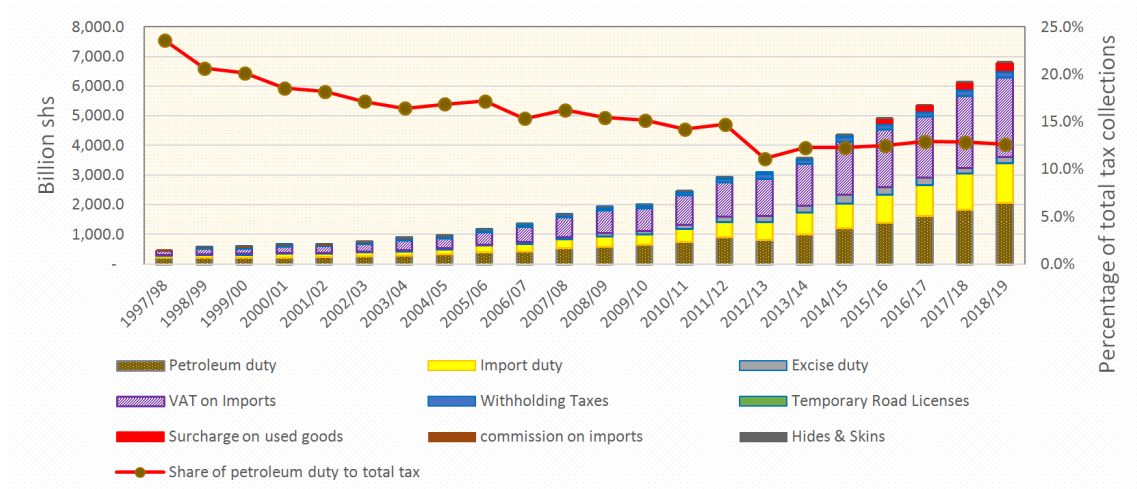
matches the recorded revenue from the petroleum duty. The petroleum duty also

constitutes 30% of international tax collection, as shown in Figure 4 below.

Figure 4 shows that tax collection on international trade has been increasing over years with petroleum duty accounting for

the second largest; the largest being VAT on imports. Despite of this, the share of petroleum duty to total tax collected has been reducing over the last two decades though stabilized around 12.4 percent between 2012/13 and 2018/19.

Figure 4: CONTRIBUTION OF PETROLEUM DUTY IN TOTAL INTERNATIONAL TAX COLLECTIONS



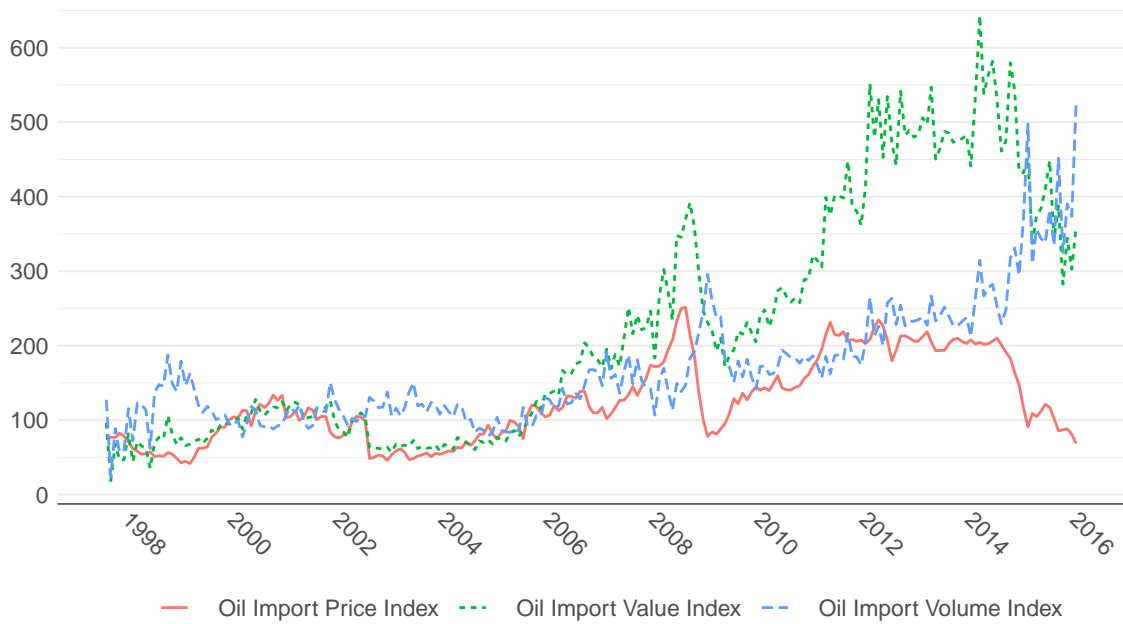
2 Time-Series Analysis

This section summarizes key results from a time-series analysis employing Distributed Lag Models (DLM's) and Structural Vector Autoregressions (SVAR's) to study the effects of changes in duties on changes in petroleum prices and import volumes, and presents revenue calculations based on these findings. Next to the import and duty data from the URA shown

in the figures above, we used the following data series to complement our analysis:

Figure 5 shows indices of import prices, values and volumes, supplied by the Bank of Uganda. The oil import price index shown in Figure 5 is a dollar price index and not correlated with domestic retail prices or the CPI (nor with the exchange rate).

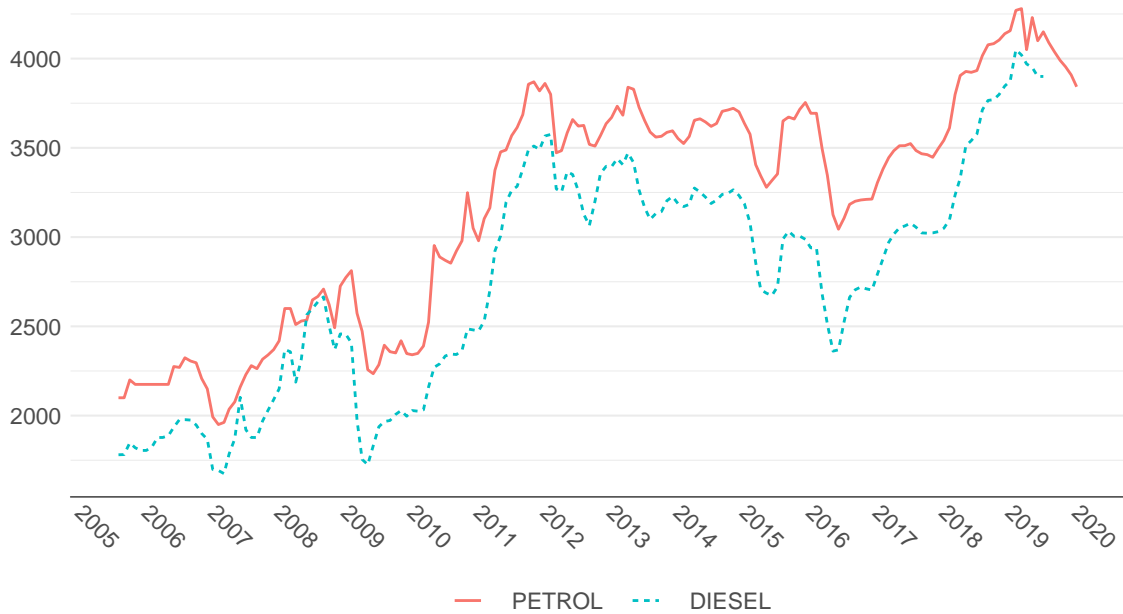
Figure 5: OIL IMPORT INDICES



Source: Bank of Uganda (BoU)

Figure 6 shows the historical retail prices of petrol and diesel, taken as an average over gas stations in Kampala. This serves as a direct measure of the consumer price of petrol and diesel.

Figure 6: RETAIL PRICE OF PETROL (SHS PER LITER)

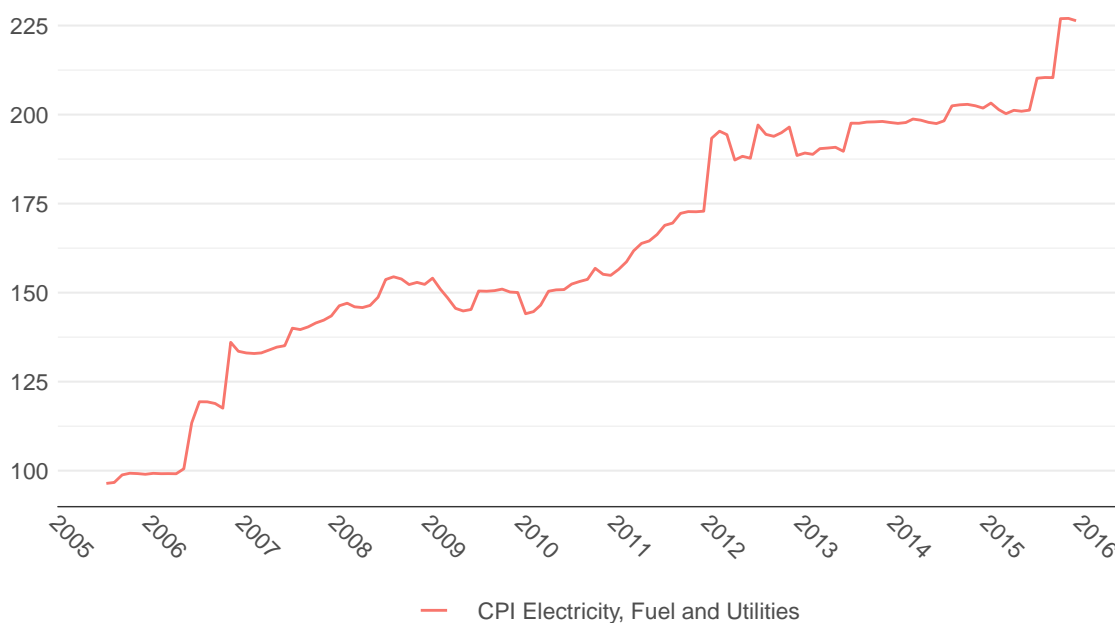


Source: Uganda Bureau of Statistics (UBOS)

Figure 7 shows the the CPI for electricity, fuel and utilities, calculated by the Uganda Bureau of Statistics. This serves as a

indirect measure of the consumer price of petrol and diesel, and related products and services.

Figure 7: CPI FOR ELECTRICITY, FUEL AND UTILITIES (2005/06 = 100)



Source: Uganda Bureau of Statistics (UBOS)

Using these different measures, the analysis proceeded by investigating the effects of petrol and diesel duties on fuel prices and import volumes using DLM's and SVAR's, while controlling for effects of the exchange rate, the oil import price and economic activity.

2.1 Brief Summary of the Results

The key results from these various empirical models can be summarized as follows:

- An increase in excise duties on petrol and diesel leads to a reduction in the import volumes of these fuels. When not controlling for the exchange rate, oil prices and economic activity, most of the estimated elasticities for the impact of either duty range between -0.4 and -0.7,

and on average -0.5. The adjustment takes place pretty immediately (1-2 month).

- When the exchange rate, the oil import price and economic activity are included as covariates, the elasticity to the diesel duty increases to range between -0.9 and -1.6, on average -1.
- Volume elasticities to the oil import price estimates range between -0.8 and -1, and most of the effect is absorbed in the same period. Changes in the exchange rate have similarly large and immediate effects.
- Increases in petrol and diesel duties raise pump prices of petrol and diesel, and also the CPI for electricity, fuel and utilities. The estimates

suggest that a 1% increase in the duty will have a direct price impact of up to 0.3% in the same month and keep increasing prices over the next 2-4 months (as new fuel gets imported at the higher duties), until eventually after around 6 months, prices have also increased by 1%.

- Exchange rate depreciation has a nearly 1:1 impact on petrol and diesel prices, but with a significant lag. The estimates show almost no direct impact in the same month's prices, then an elasticity of around 0.4 in the first month following the depreciation and elasticities of 0.25 and 0.15 in the second and third month following the depreciation. After about 4 months the depreciation is reflected 1:1 in the prices of petrol and diesel. Changes in the price of oil can also take up to 4-6 months, but the total adjustment elasticity is only around 0.4 (probably justified by the fact that it is a dollar price index).

It is interesting to note that the volume impacts of the duties take effect immediately (1-2 months after the duty was raised) whereas price impacts of the duties may take up to half a year to be fully reflected in the consumer price of petrol and diesel. This is the same behavior observed for changes in the exchange rate and the international price of oil. All of this suggests

that petroleum importers react immediately to price changes, and the petroleum is sold later, thus there may be petroleum of up to half a year's consumption volume in the country at any given point in time.

Regarding the volume impacts of new duties, the baseline elasticities of -0.5 for both petrol and diesel suggest inelastic demands, but the elasticity of -1 consistently measured for diesel when controlling for depreciation, economic activity and the price of oil means that this analysis suggests a more elastic demand for diesel than for petrol.

To gain more evidence about this, we also regressed the total changes in annual revenue from petrol and diesel on the annual changes in the duties on petrol and diesel, also controlling for the exchange rate. The result is shown in Table 1 below. Table 1 shows that only the lagged petroleum duty is significant (revenue data usually come with a lag so this is expected). The Elasticity close to 1 implies that in the past new duties on petroleum duties have immediately resulted in extra revenue for the government, whereas new duties on diesel have not immediately generated revenue, which increases the evidence that for diesel there might be a higher price elasticity of demand (possibly around -1) triggering large substitutions away from diesel when the price is increased.

Table 1: ELASTICITY REGRESSIONS OF ANNUAL COLLECTED REVENUE ON THE DUTIES

<i>Independent Variables</i>	<i>Dependent variable: Total Annual Petroleum Revenue</i>			
	Growth Rates		Log-Levels + Trend	
	(1)	(2)	(3)	(4)
Petrol Excise Duty	0.183 (0.409)	0.150 (0.476)	-0.335 (0.408)	-0.049 (0.445)
Petrol Excise Duty Lagged	0.849** (0.364)	0.712 (0.438)	1.137*** (0.362)	0.871* (0.443)
Diesel Excise Duty	0.023 (0.111)	0.036 (0.118)	0.087 (0.125)	0.085 (0.128)
Diesel Excise Duty Lagged	0.045 (0.118)	0.049 (0.124)	0.161 (0.122)	0.140 (0.126)
Exchange Rate (Annual Average)		-0.036 (0.295)		0.334 (0.287)
Exchange Rate Lagged		-0.202 (0.276)		-0.420 (0.261)
Linear Time Trend			0.092*** (0.012)	0.096*** (0.022)
Constant	9.106*** (2.700)	11.052** (4.578)	-2.752 (2.132)	-2.202 (3.481)
Observations	21	21	22	22
R ²	0.269	0.297	0.993	0.994
Adjusted R ²	0.086	-0.005	0.991	0.991
Residual Std. Error	8.798	9.223	0.077	0.075
F Statistic	1.470	0.984	452.825***	336.245***

Note: All coefficients are to be interpreted as elasticities, (Standard Errors in parentheses below the coefficient) *p<0.1; **p<0.05; ***p<0.01

Thus for both petrol and diesel we will do revenue calculations assuming a benchmark elasticity of -0.5, but we will also take into account an alternative scenario where the volume response to diesel duties is elastic with an elasticity of -1.

2.2 Increase in Revenue from Petrol and Diesel Duties

Now assuming that the volume elasticity to duties is -0.5 for both petrol and diesel, we can calculate the revenue effect that

increasing each duty by Shs.100 per liter imported would have. The excise duties on petrol and diesel are currently at Shs. 1200 and Shs. 880 respectively per liter of imported. An increase by Shs. 100 of both duties would imply a 8.33% increase in the petroleum duty and a 11.36% increase in the diesel duty. The elasticity of -0.5 thus implies a 4.17% reduction in the volume of petrol and a 5.68% reduction in the volume of diesel imported and sold, respectively. Table 2 shows the revenue calculation based on our forecast of the imports/sales volumes for FY2020/21.

Table 2: REVENUE IMPACT OF 100 SHS INCREASE IN DUTIES AT -0.5 ELASTICITY

<i>Fuel</i>	<i>Measure</i>	<i>Old Duty</i>	<i>New Duty</i>	<i>Difference</i>
Petrol	Projected Volume (Mn Liters)	1,056	1,012	-44
	Projected Revenue (Mn Shs)	1,266,664	1,315,039	48,379
Diesel	Projected Volume (Mn Liters)	1,150	1,084	-65
	Projected Revenue (Mn Shs)	1,011,743	1,062,698	50,953
Total	Projected Volume (Mn Liters)	2,205	2,096	-109
	Projected Revenue (Mn Shs)	2,278,407	2,377,737	99,332

As Table 2 shows, the proposed increases in the duties could yield a total extra revenue of around Shs. 99 billion with a reduction in petrol and diesel imports/sales by around 109 million litres.

We noted before that for the diesel duty

we have evidence of a larger than 0.5 elasticity, with the bulk of estimates in covariate (non-baseline) regressions and SVAR's around -1. If the elasticity of diesel imports to the duty is -1, the projections change as follows:

Table 3: REVENUE IMPACT OF 100 SHS INCREASE WITH DIESEL ELASTICITY OF -1

<i>Fuel</i>	<i>Measure</i>	<i>Old Duty</i>	<i>New Duty</i>	<i>Difference</i>
Diesel	Projected Volume (Mn Liters)	1,150	1,019	-131
	Projected Revenue (Mn Shs)	1,011,743	998,680	-13,065
Total	Projected Volume (Mn Liters)	2,205	2,031	-175
	Projected Revenue (Mn Shs)	2,278,407	2,313,719	35,314

Table 3 shows that if the volume elasticity to duties placed on diesel is indeed

around -1, placing a higher duty on diesel would result in a strong reduction in the

imports/sales of diesel and actually result in a small revenue loss of shs. 13 billion on diesel when compared to the old duty. The total revenue gain from implementing both duties would then only be around shs. 35 billion and come fully from petrol. For this reason we urge caution in placing a new duty on diesel, although we regard this as a worst-case scenario.

3 Computable General Equilibrium Analysis

Complementary to the time-series analysis, CGE simulations provide an assessment of the potential impacts of the policy on the whole economy. The Uganda Integrated Macroeconomic Model (IMEM) was used to conduct this analysis.

3.1 Assumptions

The assumptions below were used to estimate the impact of the petroleum levy on the economy.

1. An additional levy of 100 shillings is imposed on each liter of petrol and

diesel imported

2. The tax measure is maintained in the medium term (5 years)

In the following three sub-sections we present the simulation results including; (a) additional revenue collected; (b) impact on the economy and (c) sectoral impacts.

3.2 Additional Tax Collection due to the Measure

Implementation of the tax measure would generate additional tax revenues especially from petroleum products. Petroleum products are largely used as source of energy for transport and/or running a significant portion of industries. However, on a macroeconomic net-basis, this additional tax revenue benefit would be discounted by tax losses across other tax heads like income and consumption taxes. These would contract largely because of the escalation of production costs through backward and forward linkages. The tax gains are shown in Figure 8 below.

Figure 8: ADDITIONAL TAX COLLECTIONS DUE TO THE MEASURE

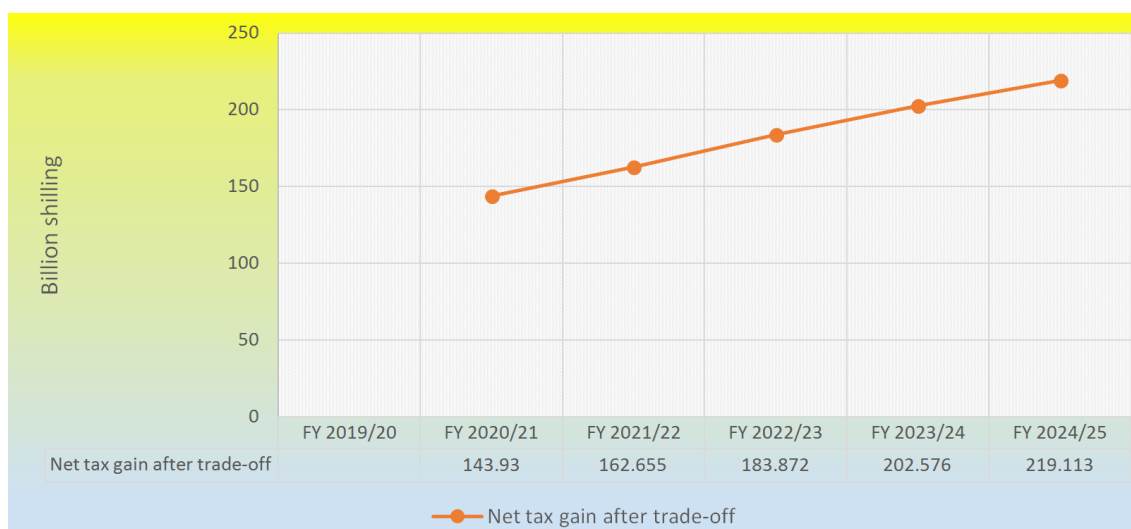


Figure 8 above shows that the next tax collections (equilibrium) is less than the face-value computed tax collection largely due to the indirect effects on the economy resulting from the tax measure. The indirect and induced effects stem from

changes in output and consumption which posts adjustments in income and indirect taxes collected on non-petroleum tax heads. The breakdown of the tax collection by tax head is shown in Table 4 below.

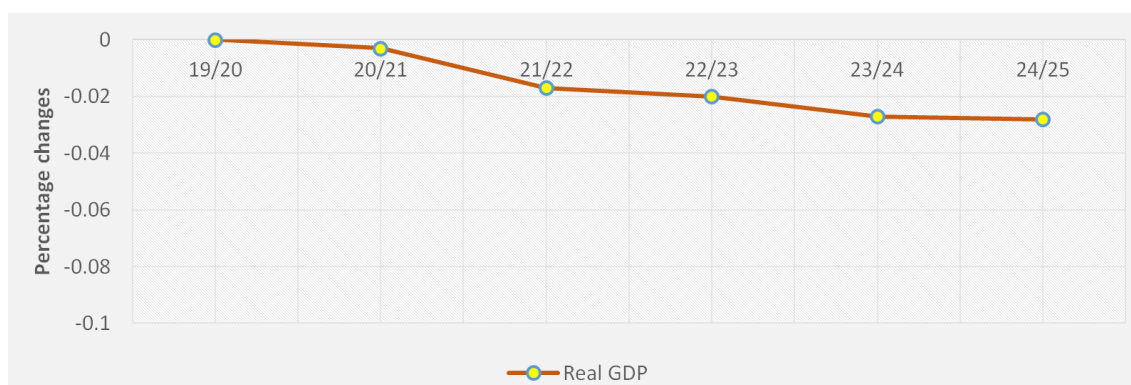
Table 4: TAX GAINS RESULTING FROM PETROLEUM LEVY (BILLION SHS)

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Indirect taxes (bn Shs)	149.84	174.79	204.78	233.66	263.76
Direct taxes (bn Shs)	-5.91	-12.13	-20.91	-31.08	-44.65
Net tax gains	143.93	162.66	183.87	202.58	219.11

Table 4 shows that the petroleum levy of 100 shillings per liter would raise a net of 143.9 billion shillings in FY 2020/21 and

this increases to 219.1 billion shillings by FY 2024/24 if the measure is maintained.

Figure 9: DEVIATIONS OF REAL GDP



3.3 Impact on Economic Growth

Despite the tax gains above, the tax measure generates mild impacts on economic growth. Real GDP contracts by 0.003 percentage points in FY 2020/21 and by 0.02 percentage points in FY 2024/25 assuming the tax measure is maintained in the

medium term.

Figure 9 shows that real GDP contracts at a mild rate at an annual average of 0.019 percentage points between FY 2020/21 and FY 2024/25. The breakdown of contributions of components of expenditure on GDP is shown in Table 5 below.

Table 5: CONTRIBUTIONS OF EXPENDITURE COMPONENTS ON GDP

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Consumption	-0.04	-0.05	-0.06	-0.06	-0.06
Investment	-0.03	-0.03	-0.02	-0.02	-0.02
Government	0.07	0.07	0.07	0.07	0.07
Stocks	0.00	0.00	0.00	0.00	0.00
Exports	-0.06	-0.07	-0.07	-0.07	-0.07
Imports	0.04	0.04	0.04	0.05	0.05
Real GDP	-0.003	-0.017	-0.020	-0.027	-0.028

Table 5 shows that consumption, investment and exports are the main transmission channels of negative impacts on economic growth. Government expenditure, and imports contribute positively largely because government receives extra revenue to spend and imports reduce due to declining incomes which also passes on positive effects on economic growth.

3.4 Sectoral Impacts

In this section we discuss the effects of the policy measure on the sectoral outputs. Majority of the sectors got a contraction of their outputs though some had net gains. Figure 10 below shows the impacts on sectoral outputs for FY 2020/21.

Figure 10: SECTORAL IMPACTS OF THE TAX MEASURE

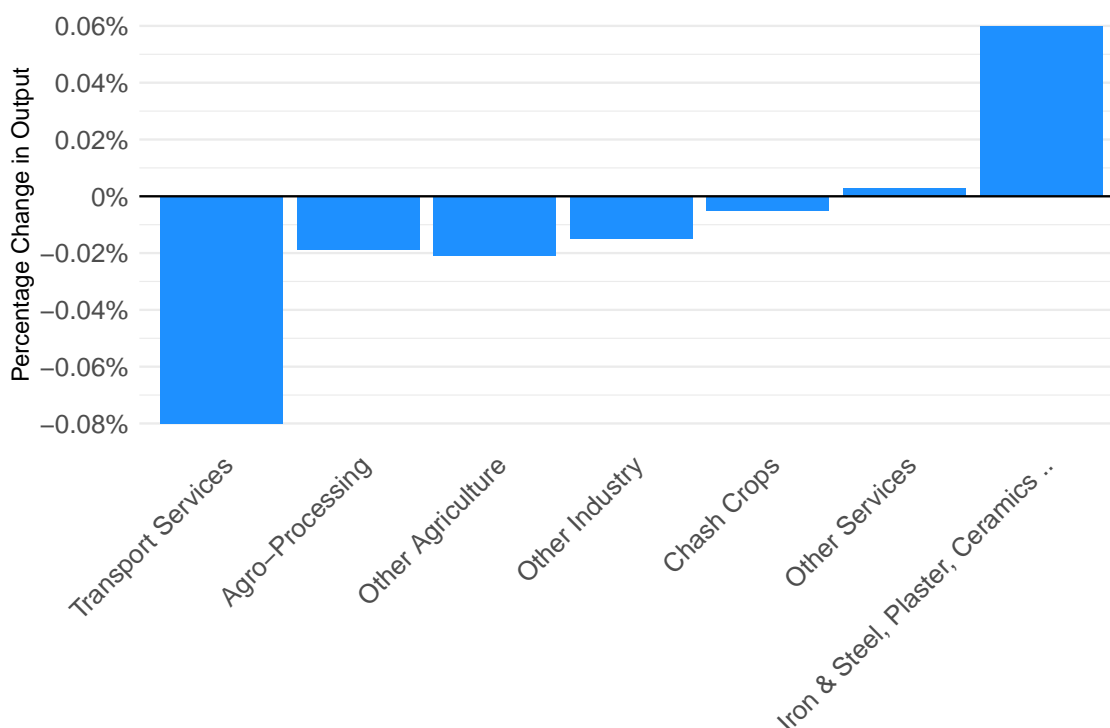


Figure 10 shows the most affected sector is transport services whose activity is constrained by about 0.08 percentage

points. This is largely because transport services have a strong backward linkage with petroleum. The second most affected

sector is the agro-processing. This is largely because of the cost push effects exhibited in the raw material transported from rural areas to agro-processing firms. In addition, some agro-processing firms also use thermal energy and also produce bulky outputs that attract significant transport costs. The rest of the affected sub-sectors are other agriculture and cash crops respectively.

Despite the negative effects discussed above, some sectors were impacted positively. These include Cement, Lime, Ceramics, Plaster Concrete and Iron and steel. The improvements in activity for these sectors is the result of government spending of the additional tax revenue.

4 Conclusion and Recommendations

Baseline results from both the time-series and CGE analysis show that increasing the duty on petrol and diesel by 100 Shs. each will result in revenue gains for the government. The time-series analysis (when using the baseline price elasticity of demand of -0.5 for both petrol and diesel) suggests that this revenue gain is around 100 billion Shs. in the first year following implementation, and comes at a decline in petrol and diesel sales of around 110 million liters. If this additional revenue is re-invested in the economy (i.e. not used to service debt), then CGE results suggest an equilibrium revenue gain of around 145 billion Shs. in the first year, at a negligible overall cost to economic growth (real GDP contracts by 0.003 percentage points). The sectors most negatively affected by

this policy are transport services (0.08% output loss), agro-processing, other agriculture and other industry (about 0.02% output loss each). If the revenue is reinvested in the economy, sectors not very dependent on fuel such as Cement, Lime, Ceramics, Plaster Concrete and Iron and steel gain (0.06% output gain on average).

However, both import volume regression and the revenue regression reported in Table 1 suggest that diesel demand could be elastic to changes in the price of diesel, with an elasticity close to -1. Calculations show that this would imply an immediate annual revenue gain of only 30-50 billion shillings coming solely from petroleum, at an immediate reduction on diesel imports of around 130 million liters in the year following the new duty. An explanation for the different effects of petrol and diesel duties could be that diesel is primarily used to generate energy in industry, with other sources of energy (electricity, coal) readily available if diesel becomes too expensive. Petrol on the other hand is primarily used for motor vehicles and transportation, with few substitution possibilities. Therefore, we urge caution in placing new duties on diesel. They are likely not to generate large revenue gains, and come at potential economic costs.

Regarding the dynamics of adjustment, our results imply that import volume responses, whether from duties or fluctuations in the price of oil or the exchange rate, are fast (1-2 month), but domestic sales price responses can take up to 6 months until fully absorbed into consumer prices.