Assessing the TRAIN's coal and petroleum excise taxes: macroeconomic, environmental and welfare effects

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Outline

- Context
- Methodology
- Results
- Conclusion

Context

- The Philippine government has been undertaking a program on tax reform to cover several packages
- Under the Tax Reform for Acceleration and Inclusion (TRAIN), government has proposed (and legislated) the following:
  - Package 1a: Personal income tax, value added tax and excise taxes
  - Package 1b: Tax amnesty; motor vehicle user charge
  - Package 2: Corporate income tax reform and fiscal incentives
  - Package 2+: Alcohol and tobacco excise tax, mining taxes
  - Package 3:Property valuation taxation
  - Package 4: Passive income and financial taxes
- Government estimates to be able to collect around Php 600- 800 billion over the next several years in additional tax revenues to fund critical infrastructure and social service projects

Source: DOF CTRP v.2http://www.dof.gov.ph/taxreform

Context

- Under TRAIN 1a under RA 10963, which was passed last December 2017, the following are covered:
  - Changes in personal income taxation
  - Changes in excise taxes on oil, coal, motor vehicles, mining and tobacco
  - Broadening the value added tax
  - Lowering of estate and donor's taxes
  - Taxation of cosmetic procedures
  - Changes in taxes on income on foreign currency and long-term deposits, and other financial taxes
  - Changes in excise tax reporting
  - Earmarking of incremental revenues to infrastructure and social protection

Source: RA 10963

Context

- In RA 10963, under changes in personal income taxation:
  - Reduction in income tax brackets from seven to six, with marginal tax rates from 0% to 35% (paid by highest income bracket with income > Php 8 million)
  - Removal of personal and additional exemption
  - Self employed and professionals given choice to pay graduated income tax or flat 8% of gross receipts below the VAT threshold

Source: RA 10963

Context

- Under broadening the value added tax:
  - TRAIN 1 repeals 54 out of 61 special laws deemed “non-essential VAT exemptions”; goods that remain VAT exempt are those purchased by senior citizens and persons with disabilities.
  - Housing with costs amounting to only below Php 2 million will be exempt from VAT beginning 2021.
  - On the other hand, medicines for diabetes, high cholesterol, and hypertension will be exempt beginning 2019.
  - Those entities that are exempted from paying VAT under RA 10963 are firms with annual gross sales of Php 3 million or lower, GOCCs, SUCs, and government agencies, and personal and household effects of those coming from abroad under certain conditions.

Source: RA 10963

Context

- Under changes in the excise taxes: there are upward adjustments on the excise taxes on the following:
  - Petroleum products, including gasoline, kerosene and diesel
  - Coal and coke products
  - Automobiles
  - Sugar-sweetened beverages

Source: RA 10963

Purpose

- Objective of the study was to initially study the effects of changes in coal and petroleum excise taxes, especially on energy generation and environment
- But given additional inputs, additional scenarios for whole TRAIN 1a package was undertaken, especially to examine impacts on sectoral output and household welfare

Methodology

- Utilized a numerical model of the Philippine economy, i.e., computable general equilibrium (CGE) analysis, linked to micro-accounting household and emissions models
- Dataset assembled from the following sources:
  - Social accounting matrix: 2012 Input-Output Table; national income accounts; balance of payments; fiscal accounts data
  - Household model: 2015 Family Income and Expenditure Survey
  - Emission multipliers: Global Trade Analysis Project- Emissions Database;
  - Tax data: National Tax Research Center; Department of Finance
- Reference year for CGE model data, household and tax data is 2015; GTAP CO2 emissions data is 2011

Methodology

- Assessment of changes in tax rates are undertaken "economy-wide"; this is due to the fact that there are not only direct, but also indirect, effects of changes in any taxes on industrial output and household incomes
  - An increase in taxes on consumer goods, for example, raises the prices of goods for households and reduces the demand for these goods.
  - This would then have effects on firm production and then on the demand for firm factors, including labor, affecting therefore affecting employment and household incomes, which further affects the demand of goods.
  - Capital is then also affected as decisions to postpone investment may result from the decline in terms of firm production.

Methodology

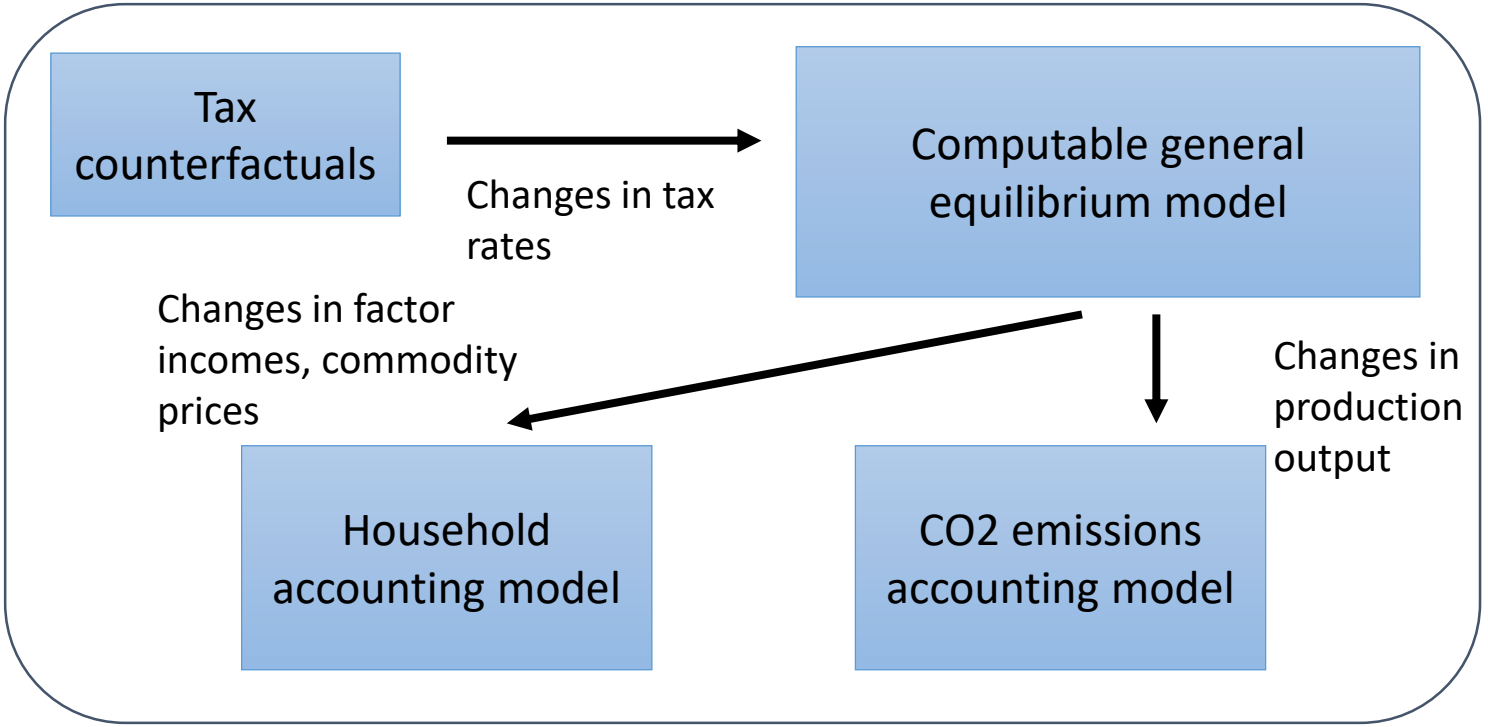
- The advantage of the modelling procedure ability to measure the ultimate impact of these policies in a theoretically consistent way.
- The tax reforms are introduced “shocks” to the balance and a counterfactual equilibrium is computed reflecting them.
- Differences in the values of economic variables between the two general economic equilibria are regarded as the impacts of the reforms.
- The methodology is basically an ex-ante simulation of the effects of the tax reforms, and therefore is not a statistical projection.

Methodology

- Social accounting matrix represents the following components of the economy:
  - 44 production activities, including eight agricultural, 20 industrial (including crude oil, coal and natural gas) and six services sectors; one energy composite with power transmission and seven sources of power generation
  - Ten household groups, representing different income deciles
  - Three factors of production, skilled, unskilled, capital
  - Institutions including the government, financial intermediaries, business enterprises, and rest of the world
  - Economy is modeled as a small, open economy, i.e., domestic sector prices can not influence world prices

Methodology

- Results from the CGE model are then transmitted to the household and emission accounting (microsimulation) models



Methodology

- Assessment of the effects on household welfare and CO2 emissions are undertaken through
  - Introducing sectoral price changes and changes in factor incomes which affect real income across households in the Family Income and Expenditure Survey; then calculating for poverty and welfare indices
  - Utilization of CO2 multipliers using the 2011 Global Trade Analysis Project- Emissions database

Methodology

- Three counterfactual scenarios/ changes in tax rates are undertaken:
  - Scenario 1 (PCEX): Changes in excise taxes in petroleum and coal
    - Shock calculations based on weighted changes in the excise tax rates by type of petroleum product, i.e., diesel fuel oil, liquid petroleum gasoline, and the weighted change in mining product, i.e., coal and mineral products

Sector	Estimated Shock (%)
Mining	100.00
Coal	1400.00
Crude oil	100.00
Petroleum	281.01

Source: Authors' calculations.

Methodology

- Three counterfactual scenarios are undertaken:
  - Scenario 2 (TRAIN 1): Changes in personal income tax, broadening of the VAT and changes in all excise taxes (including motor vehicle, beverages and tobacco); shock calculations based on:
    - Change in personal income tax: change in effective tax rates by income decile
    - Change in excise tax structure: scenario 1 plus weighted change in excise tax rates for different types of commodities with tax change in the beverage and tobacco, automobile and transport equipment
    - Broadening of value added tax system: calculation of VAT rate per industry after changes in zero-rated and VAT exempt transactions

Sectors with Excise Taxes	Estimated % Change in Tax Rate
Beverages and Tobacco	37.17
Transport Equipment	146.578
Automobile	400.00

Source: Authors' calculations.

Methodology

Calculated change in personal income tax, by income decile

Decile	Tax Revenue (millions PHP)		Estimated Total Income per Decile (millions PHP)	Effective rates (%)		
	NIRC	TRAIN 1 (by 2023)		NIRC	TRAIN	Percent change
1	139.72	2.54	126,145.29	0.111	0.002	-0.982
2	732.89	2.09	199,650.12	0.367	0.001	-0.997
3	1,543.97	9.17	254,135.44	0.608	0.004	-0.994
4	3,213.58	5.63	308,565.23	1.041	0.002	-0.998
5	5,600.35	7.15	371,437.86	1.508	0.002	-0.999
6	11,218.40	25.93	452,633.09	2.478	0.006	-0.998
7	20,917.56	371.96	565,353.17	3.700	0.066	-0.982
8	41,836.66	4,744.44	725,575.49	5.766	0.654	-0.887
9	92,268.40	18,353.80	999,842.85	9.228	1.836	-0.801
10	339,198.26	117,897.06	2,064,823.94	16.427	5.710	-0.652
Total	516,669.78	141,419.78	6,068,162.49			

Source: Authors' calculations using 2015 LFS-FIES merged file.

Methodology

- Three counterfactual scenarios are undertaken:
  - Scenario 3 (TRAIN 1+ UCT): TRAIN 1 package (scenario 2) + P 3,600 subsidy to lowest five income deciles

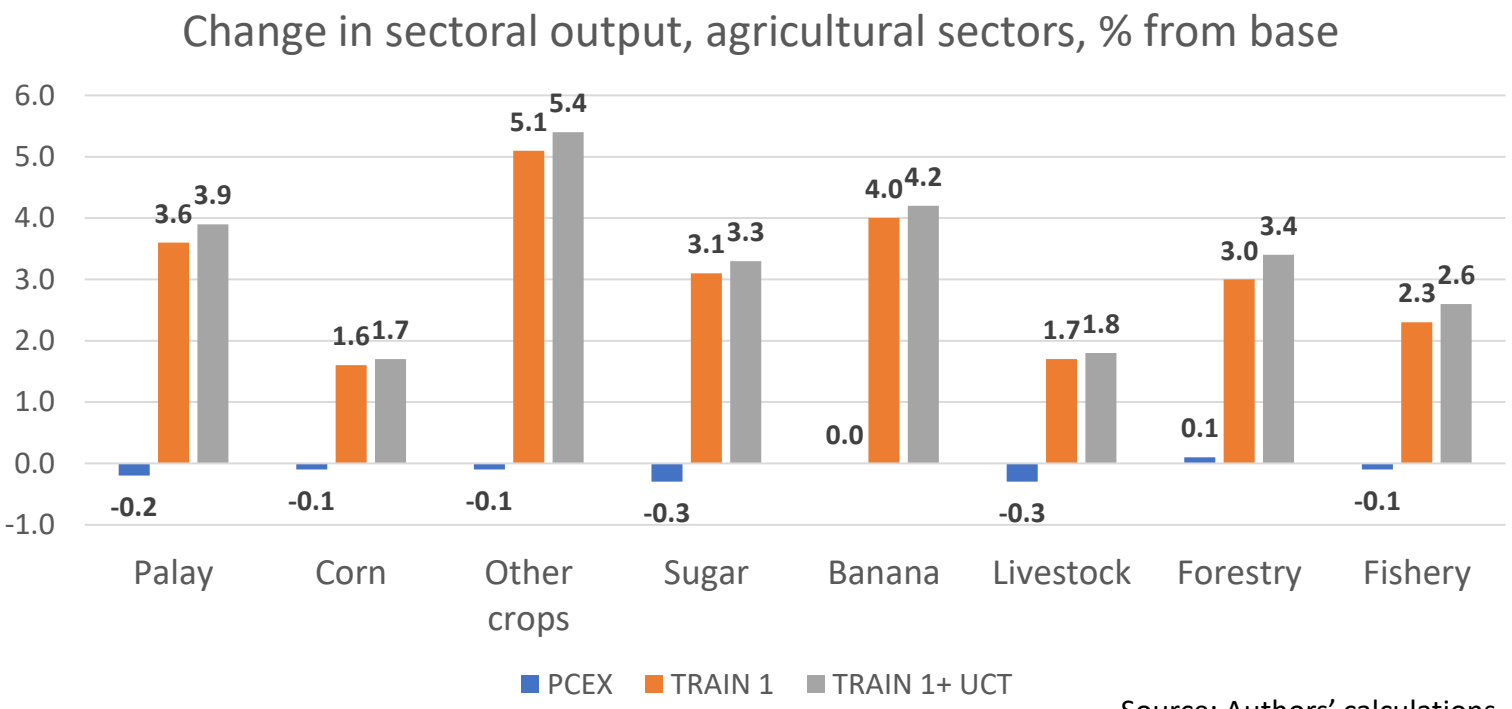
Results

- Examination of impacts in terms of the following changes in the following:
  - sectoral output
  - Armington (domestic + imported) supply
  - sectoral prices
  - factor returns
  - household welfare (in terms of equivalent variation)
  - poverty headcount index
  - emissions

Results-sectoral output

- In terms of sectoral output, there is a slight decline in agricultural output under the PCEX scenario; but output rises under the TRAIN 1 scenario most likely from increased consumer demand due to higher disposable income (under lower personal taxes)
- Coal and petroleum suffers from only slight decline in sectoral output; but large decline in beverages, chemicals and manufacture of engines under the TRAIN 1 scenario
- Under TRAIN 1 + subsidy, output further increases due to increased household income
- Fossil fuel generating plants decline under PCEX scenario but recovers in TRAIN 1 and TRAIN 1+ UCT scenario; electricity generation further rises in latter scenarios but in favor of fossil-fuel generating plants
- The increase in aggregate output is around -1.0 percent in the PCEX scenario, + 2.3 percent in the TRAIN 1 scenario and + 2.6 percent in the TRAIN 1 + UCT scenario

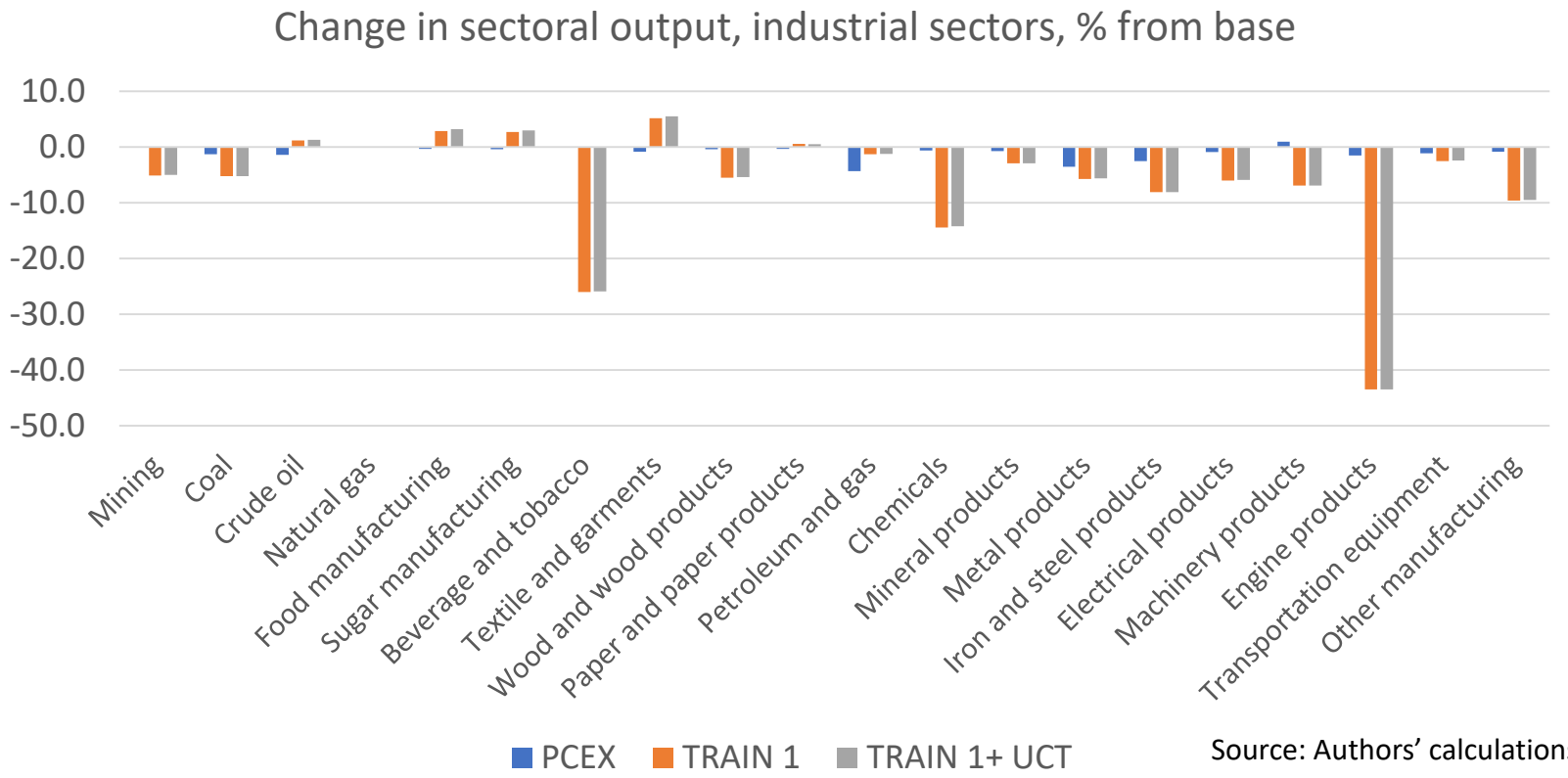
Results-sectoral output



Source: Authors' calculations.

- Agriculture sector fares relatively well under TRAIN 1
- Higher demand for crops due to higher income elasticity

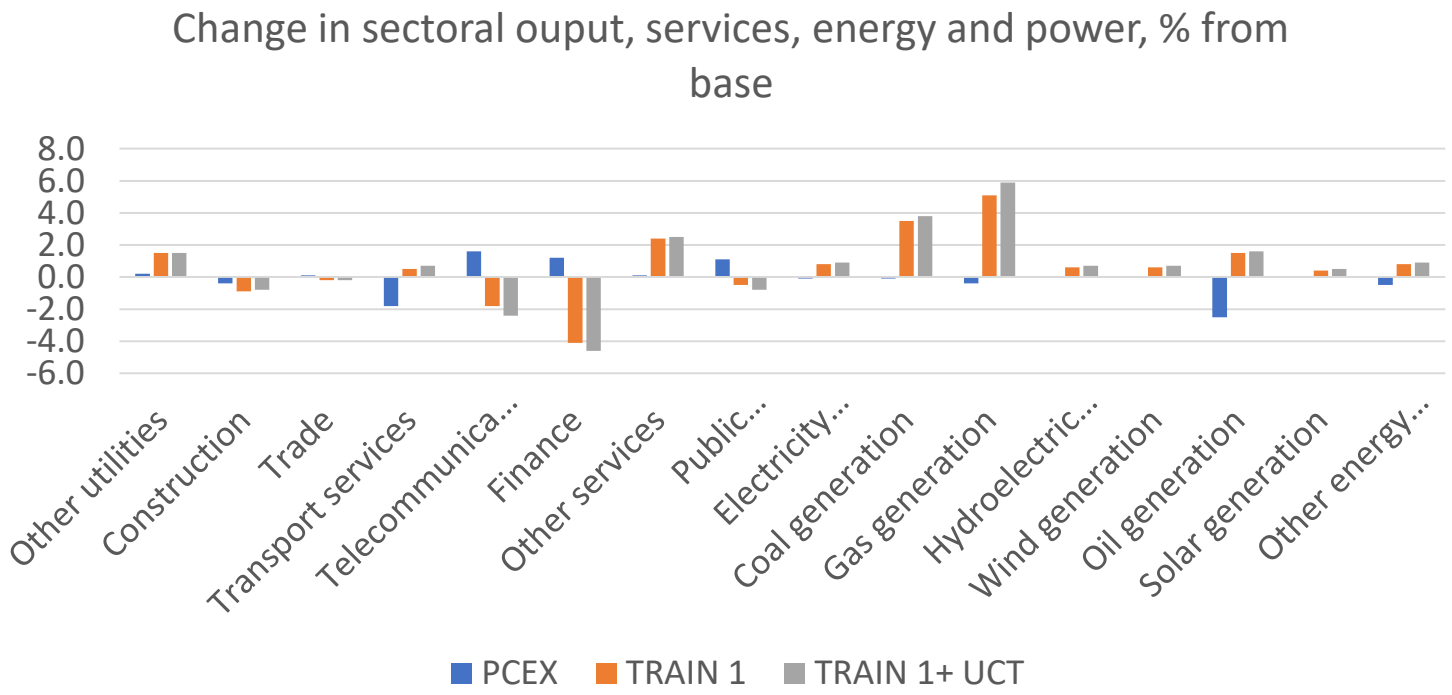
Results-sectoral output



Source: Authors' calculations.

- Beverages and tobacco suffer large decline due to excise taxes; chemicals and engine products are affected due to drop in mining and coal output also due to excise taxes
- Most industrial sectors show slight declines but there are sectors that still do relatively well, i.e., modest gains in food, sugar manufacturing. garments

Results-sectoral output

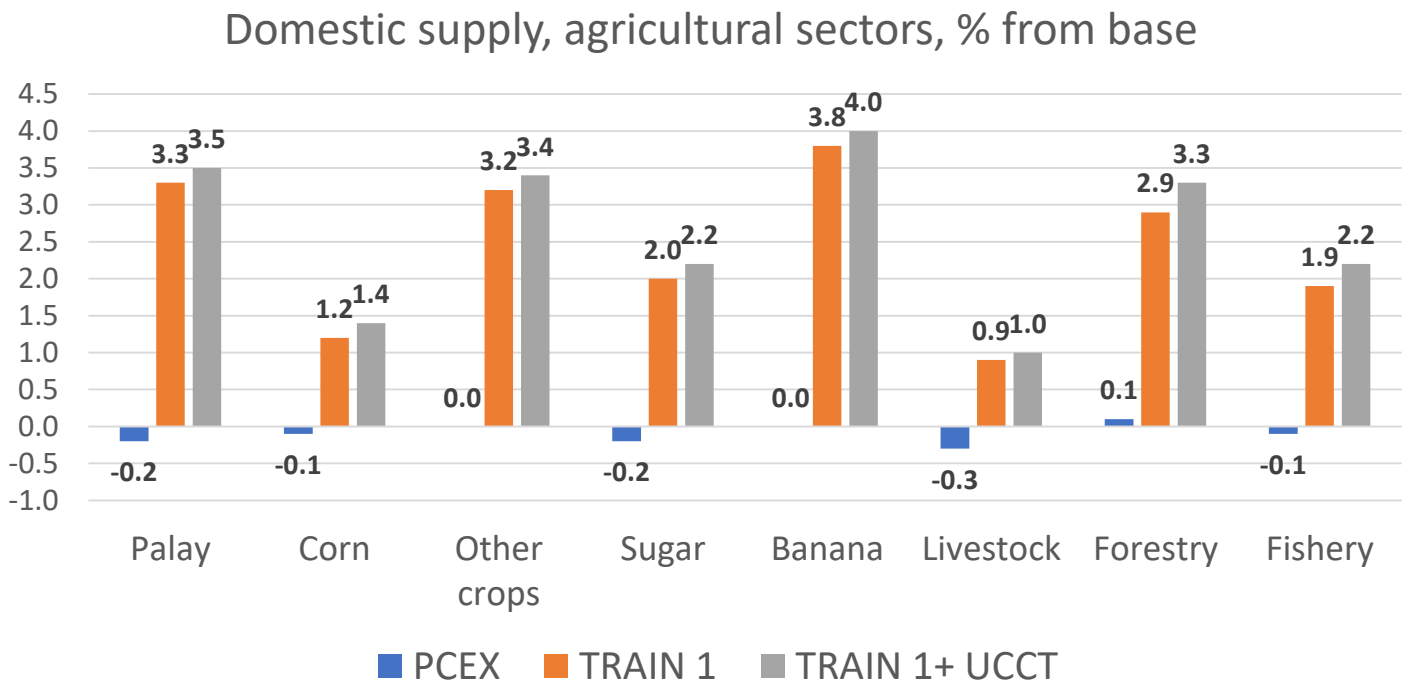


Source: Authors' calculations.

Results from services sectors is relatively mixed with some sectors such as other utilities and other services doing well

Under PCEX, coal, oil and gas electricity generation declines vis-à-vis non-fossil fuel generation but under TRAIN 1 and TRAIN 1+ UCT, fossil fuel generation further increases

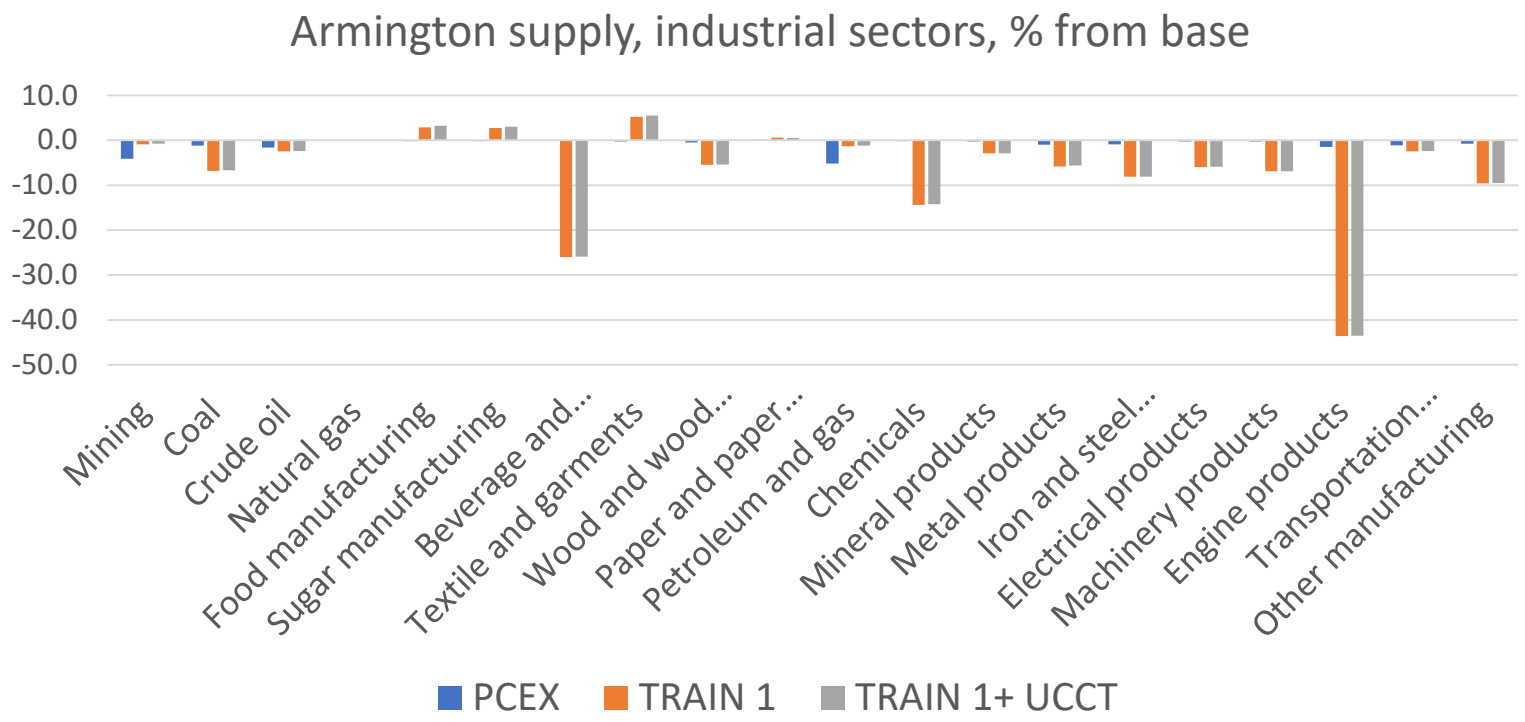
Results- domestic supply



Source: Authors' calculations.

Agricultural supply change shows the same trend as domestic output change

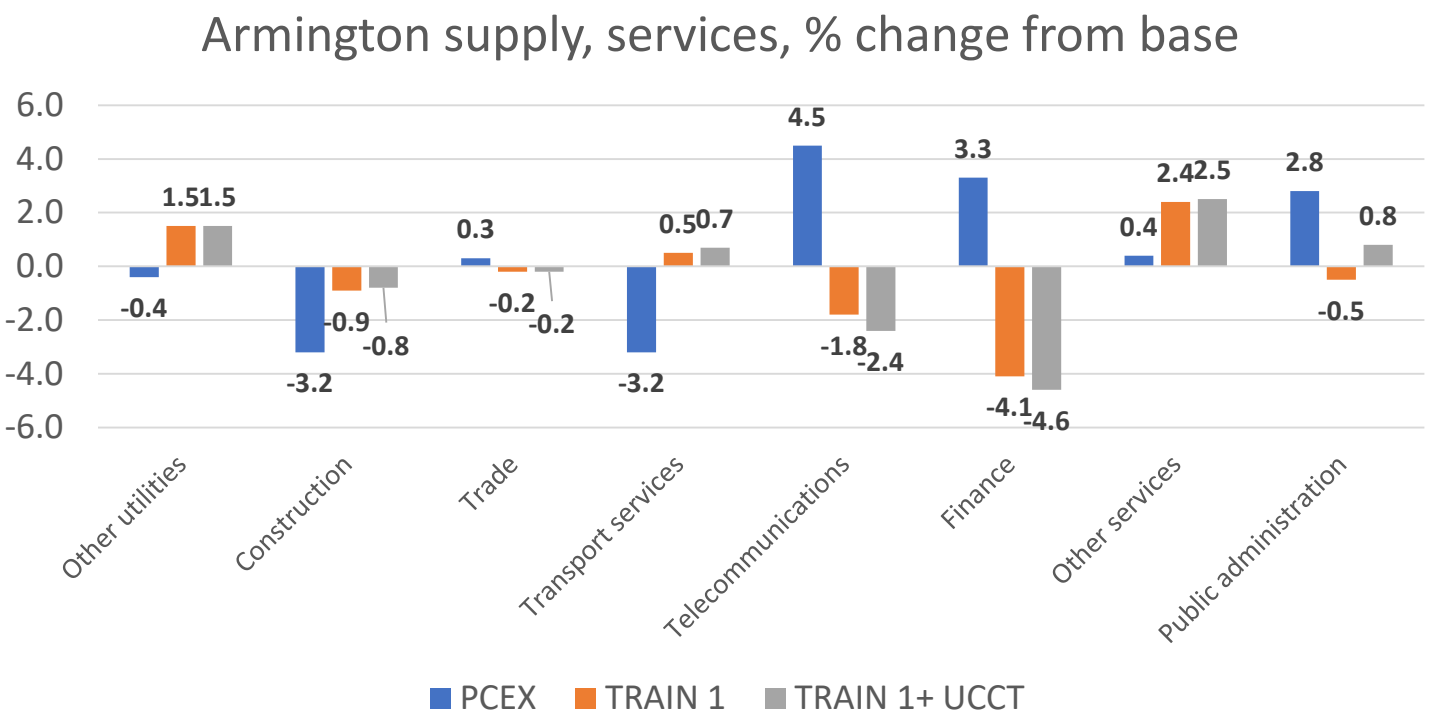
Results- domestic supply



Source: Authors' calculations.

Imports make up some of the production declines in beverages and tobacco

Results- domestic supply



Source: Authors' calculations.

Supply in the services sectors are generally mixed; gains for telecoms, finance, other services

Results-sectoral prices

- In terms of sectoral prices, there is a significant increase in petroleum prices and prices of gas generation plants under PCEX scenario; transport services also rises
- Beverage and tobacco have the largest rise in sectoral prices; crude oil and petroleum prices also further increase in the TRAIN 1 scenario
- Electricity prices rise to around 3- 4 percent under TRAIN 1 scenario and around 4-5 percent under TRAIN 1 + subsidy scenario
- In general, excise taxes on petroleum and coal increases prices on the average by around 1 percent, while TRAIN 1 impacts increases average prices by around 3 percent

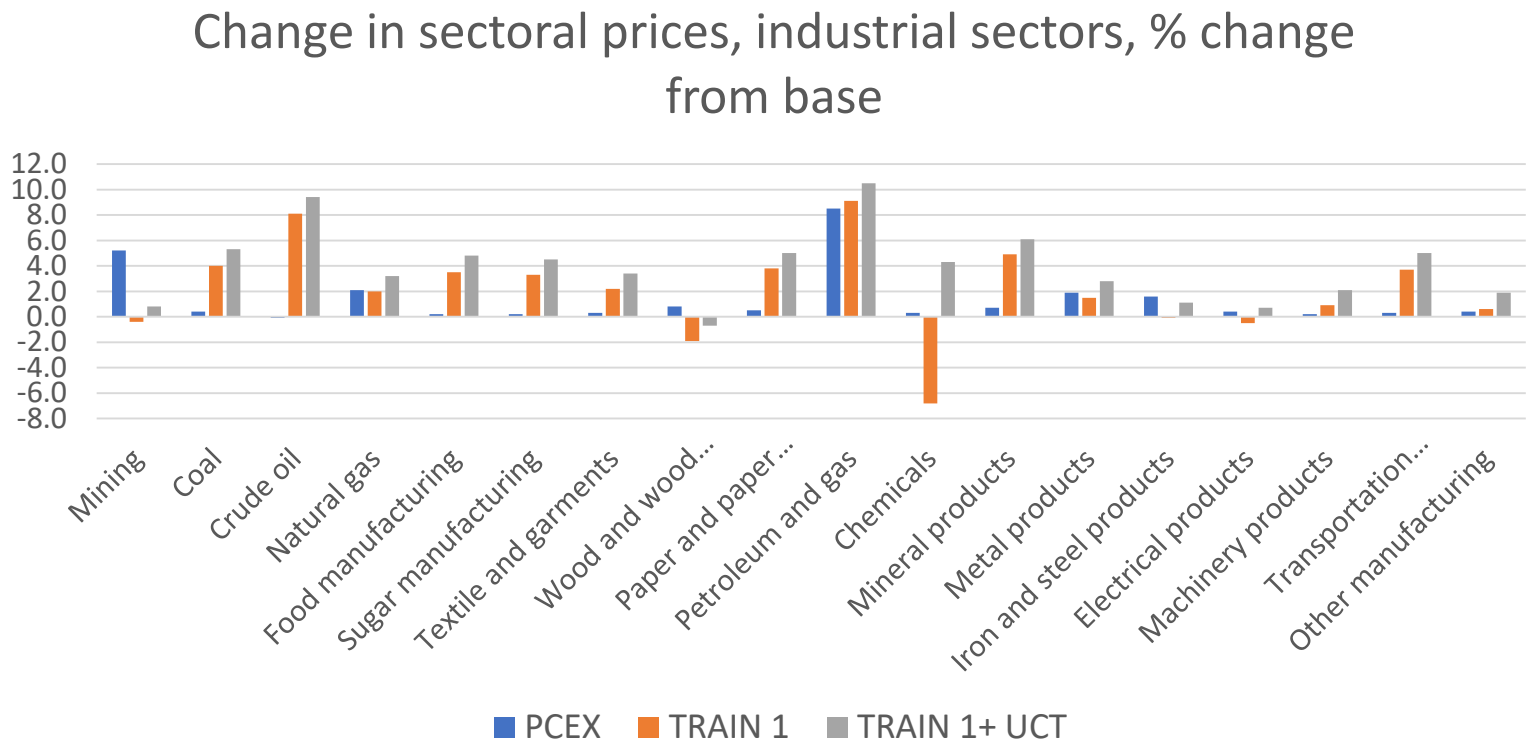
Results- sectoral prices

	Palay	Corn	Other crops	Sugar	Banana	Livestock	Forestry	Fishery
PCEX	0.2	0.2	0.1	0.3	0.1	0.2	0.0	0.1
TRAIN 1	1.9	2.2	2.1	2.4	1.7	2.6	1.5	2.6
TRAIN 1+ UCT	3.2	3.4	3.4	3.7	2.9	3.8	2.8	3.8

Source: Authors' calculations.

Prices in agricultural sector increase in all three scenarios

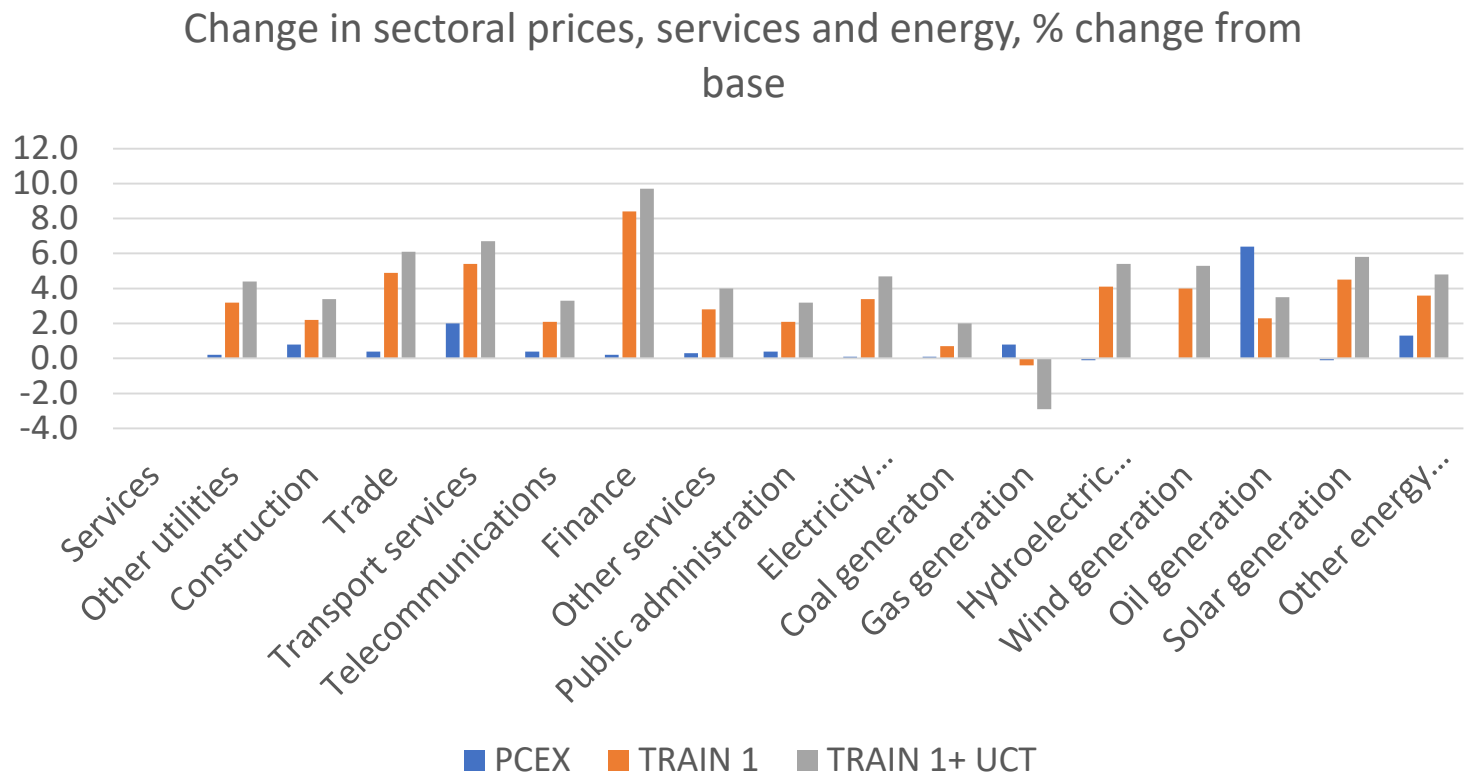
Results- sectoral prices



Source: Authors' calculations.

Prices of industrial goods mostly increase; highest increase in the beverages sectors which increase by more than 50 percent; decline in prices of goods in the manufacturing of engines sector

Results- sectoral prices



Source: Authors' calculations.

Prices of services industries also generally increase

Results- welfare

- Change in welfare measured by equivalent variation or the amount (in pesos) of the change in income that changes the consumer's utility equal to the level that would occur IF the event had happened
- In the PCEX scenario, highest income decile suffer the greatest due to relatively larger share of petroleum in their consumption
- In the TRAIN 1 scenario, however, higher income deciles gain due to the larger impact of reduced personal taxes on these groups
- Under the TRAIN 1+ UCT scenario, lower income deciles increase their EV but is still negative

Results- welfare

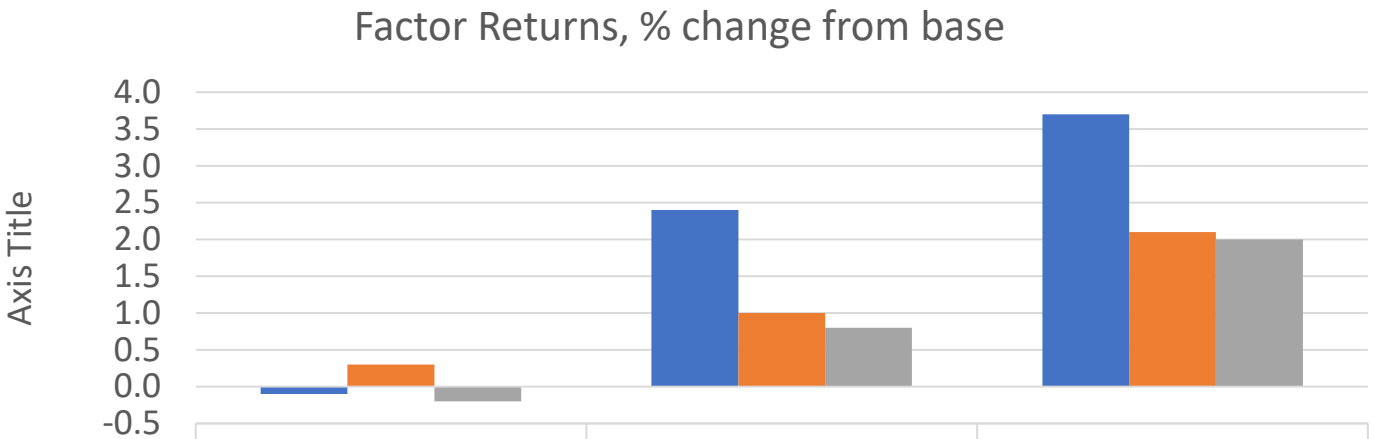
Change in EV and change in EV as % of compensation, by scenario

Sectors	Change in equivalent variation (in millions Php)			Change in EV as % of total compensation		
	PCEX	TRAIN 1	TRAIN 1+ UCT	PCEX	TRAIN 1	TRAIN 1+ UCT
H1	-1557.81	-8496.42	-442.94	-0.5%	-2.9%	-0.2%
H2	-2926.49	-15225.23	-7304.70	-0.5%	-2.8%	-1.4%
H3	-3678.50	-19629.53	-11812.71	-0.5%	-2.8%	-1.7%
H4	-4771.16	-22117.72	-14363.16	-0.6%	-2.6%	-1.7%
H5	-4956.40	-19570.35	-16715.22	-0.5%	-2.1%	-1.8%
H6	-6027.37	-17194.94	-17579.48	-0.6%	-1.7%	-1.8%
H7	-6781.71	-7717.37	-8035.41	-0.6%	-0.7%	-0.7%
H8	-8270.86	11198.55	11048.73	-0.7%	1.0%	0.9%
H9	-9684.91	53289.87	53464.08	-0.7%	4.1%	4.1%
H10	-16759.21	210171.29	211125.18	-0.8%	9.6%	9.7%

Source: Authors' calculations.

Results- welfare

Change in factor returns from base, in percent, by scenario



	PCEX	TRAIN 1	TRAIN 1+ UCCT
Unskilled	-0.1	2.4	3.7
Skilled	0.3	1.0	2.1
Capital	-0.2	0.8	2.0

Source: Authors' calculations.

- Most of labor endowments are in skilled labor.
- Return to unskilled labor and capital declines under the PCEX scenario.
- Under TRAIN 1, return to capital has the lowest increase.

Results- welfare

Poverty headcount (%), by scenario

Sector	Computed Baseline	Change from baseline		
		PCEX	TRAIN 1	TRAIN 1+ UCT
Households	16.48	+0.16	+1.72	+0.26
Individuals	21.59	+0.20	+2.03	+0.65
Women	21.24	+0.19	+1.87	+0.57
Fisherfolks	32.47	+0.17	+3.20	+1.35
Transport workers	8.29	+0.26	+2.06	-8.16
Farmers	34.51	+0.32	+2.33	+0.06

Source: Authors' calculations.

- Poverty incidence rises slightly under the PCEX scenario; rises substantially under TRAIN 1 due to increase in prices
- Significant decline in poverty incidence of transport workers under the TRAIN 1+ UCT ; implications on the *Pantawid Pasada* program
- UCT offsets increases in poverty incidence across all sectors

Results- emissions

CO_2 emissions and percent change (%), by scenario

Sector	Baseline	PCEX	TRAIN 1	TRAIN 1+ UCT
CO_2 emissions (000 mt)	97670.3	96904.5	98920.3	99147.3
Change from baseline	0.0	-0.78%	1.28%	1.51%

- CO_2 emissions decline slightly under the PCEX scenario due to lower petroleum
- However, it increases under the TRAIN 1 and TRAIN+ UCT scenario due to increased economic activity

Source: Authors' calculations.

Conclusion

- Excise tax on petroleum and coal have slightly adverse impacts on households and sectors by changing sectoral prices and factor compensation
- However, these taxes reduces slightly carbon emissions in the country
- But nevertheless, the whole TRAIN 1 package has a positive impact on aggregate output, especially on agricultural sectors
- TRAIN 1 shifts taxation to indirect taxes; greater collections from VAT and excise taxes but this may not offset decline in personal and corporate taxes

Conclusion

- Total TRAIN 1 package also may affect poor households, especially in terms of negative EV; the UCT partially reversed the negative EV and the increase in poverty headcount index with tax package, but additional assistance may be needed to totally reverse negative impact
- Government should ensure that the revenues generated are focused on programs that can alleviate poor and vulnerable households; not only those below poverty line but the seven lowest income deciles