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The Mexican Case: Carbon tax impacts

Mexican Team

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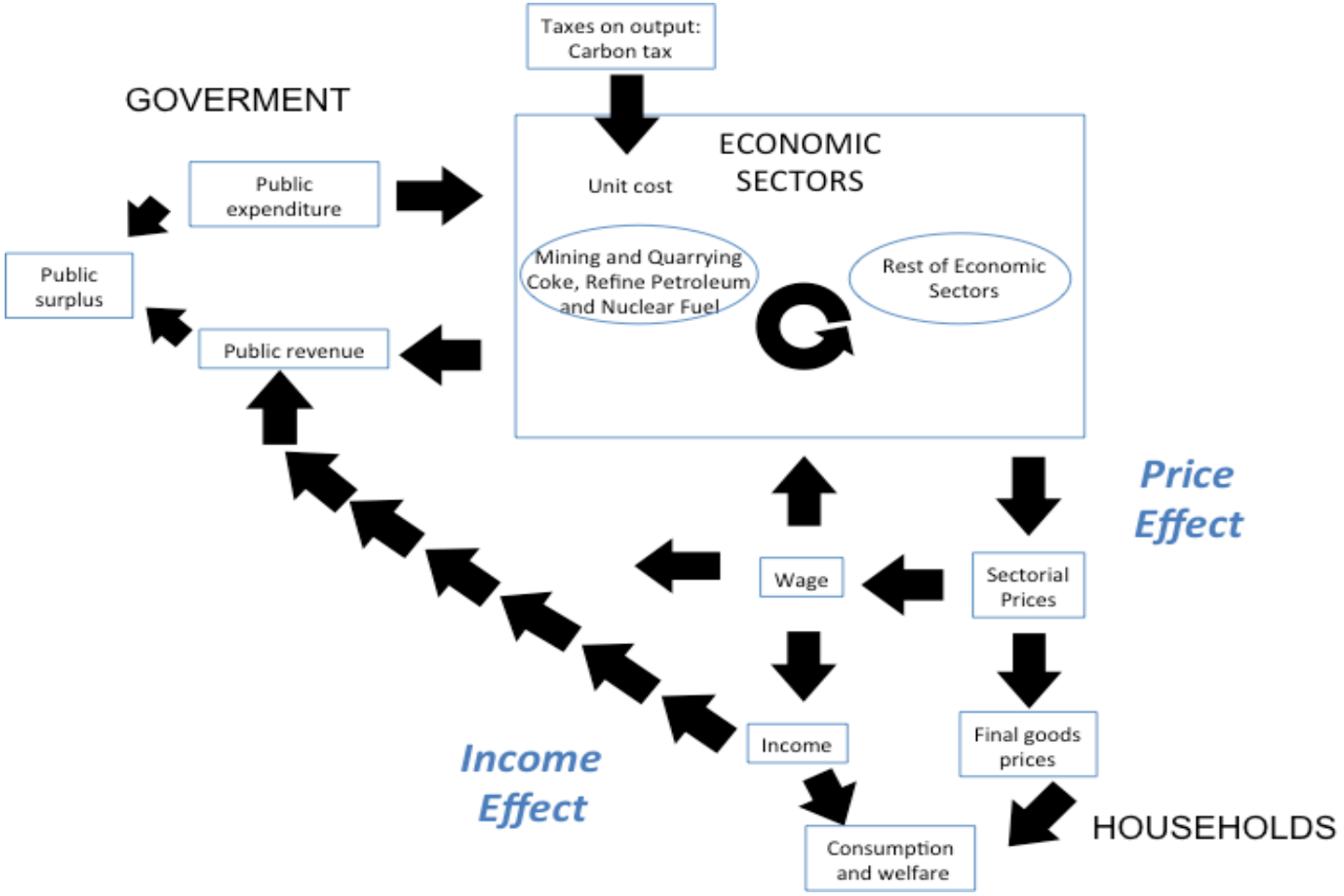
Carbon tax effects



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The Mexican carbon tax and fuel prices before/after

- Carbon tax rate as enacted since 2014 (part of a fiscal reform)
- Objective: Internalize the social cost of the negative externalities of CO_2 emissions from fossil fuels and incentivize the use of clean renewable energies

Fossil fuels	2014	2015	Units
Propane	5.91	6.15	Cents per liter
Butane	7.66	7.97	Cents per liter
Gasoline and aviation gasoline	10.38	10.81	Cents per liter
Jetfuel and other kerosene	12.4	12.91	Cents per liter
Diesel	12.59	13.11	Cents per liter
Fuel oil	13.45	14	Cents per liter
Petroleum coke	15.6	16.24	Pesos per tons
Coking coal	36.57	38.09	Pesos per tons
Mineral coal	27.54	28.68	Pesos per tons
Other fossil fuels	39.8	41.45	Pesos per tons

Methodology and approach

- Methodology: SAM and (extended) input-output multiplier model
  - Data base: SAM for Mexico 2008 (Chapa and Ortega, 2016)
  - Energy use by sector comes from WIOD (2012).
- Step 1: Identification of main emitters of direct, indirect and induced carbon dioxide (CO2) emissions of the Mexican economy
- Step 2: Model analyses
  - Price effects
  - Welfare effects
  - Some macro results (tax intake)

Main emitters

Economic activity	Direct emitters* **	Economic activity	Indirect emittiers*** **	Economic activity	Direct, Indirect and induced emitters ****
Electricity, gas and water	28.8%	Construction	12.30%	Water transport	297
Coke, Refined Petroleum and Nuclear Fuel	8.9%	Electricity, gas and water	10.90%	Electricity, gas and water supply	274
Mining	8.0%	Land Transport	9.50%	Other non-metallic mineral	200
Other Non-Metallic Mineral	7.70%	Food, beverages and tobacco	8.30%	Air transport	153
Inland Transport	7.00%	Coke, Refined Petroleum and Nuclear Fuel	5.00%	Agriculture, hunting, forestry and fishing	97

* These economic activities are direct CO2-intensive sectors because their activities involve the burning of fossil fuels.

** Total emissions related to intermediate consumption: 353280 kilotons of CO2 emissions

*** Sectors are ordered by CO2 emissions embody to the final product (vertically integrated effects).

**** CO2 emissions multipliers. Units: Kilotons per a thousand million pesos

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The carbon tax in the model

- Extended input-output price model for Mexico is developed in order to assess the impact of the carbon tax

Fossil Fuel	Economic sector	Potential Tax collection*	Gross Output*	Tax rate (%)
Coal	Mining and Quarrying	406	1,238,359	0.03
Diesel	Coke, Refined Petroleum and Nuclear Fuel	3,837	772,412	0.50
Gasoline				
Jetfuel				
Coke				

Source: Own calculations.
Notes: *Constant prices, million 2008 pesos.

Price effects

- Highest impacts on prices are in the sectors coke, refined petroleum and nuclear fuel; air transport; and inland transport

Economic Sector	Price Effect (%)	Direct or indirect effect (fuel input)
Coke, Refined Petroleum and Nuclear Fuel	0.529	Direct
Air Transport	0.202	Indirect (Jetfuel)
Inland Transport	0.112	Indirect (Diesel, Gasoline)
Electricity	0.080	Indirect (Coke, Refined Petroleum and Nuclear Fuel)
Public Admin and Defense, Compulsory Social Security, and Extraterritorial and International Organizations	0.052	Indirect (Coke, Refined Petroleum and Nuclear Fuel)
Other Non-Metallic Minerals	0.046	Indirect (Coke, Refined Petroleum and Nuclear Fuel)

Source: Ortega & Chapa (2015)

Welfare effects of the carbon tax (in %)

- Rural are more affected than the urban households
- Tax is regressive in urban strata

Description	h1	h2	h3	h4	h5	h6	h7	h8
Household price index	0.057	0.060	0.066	0.060	0.053	0.055	0.053	0.046
Disposable income	0.013	0.017	0.018	0.013	0.017	0.020	0.021	0.015
Total consumption	-0.041	-0.039	-0.044	-0.043	-0.033	-0.032	-0.030	-0.029
Saving				-0.018				-0.016
Welfare	-0.041	-0.039	-0.044	-0.041	-0.033	-0.032	-0.030	-0.027

Source: Ortega & Chapa (2015)

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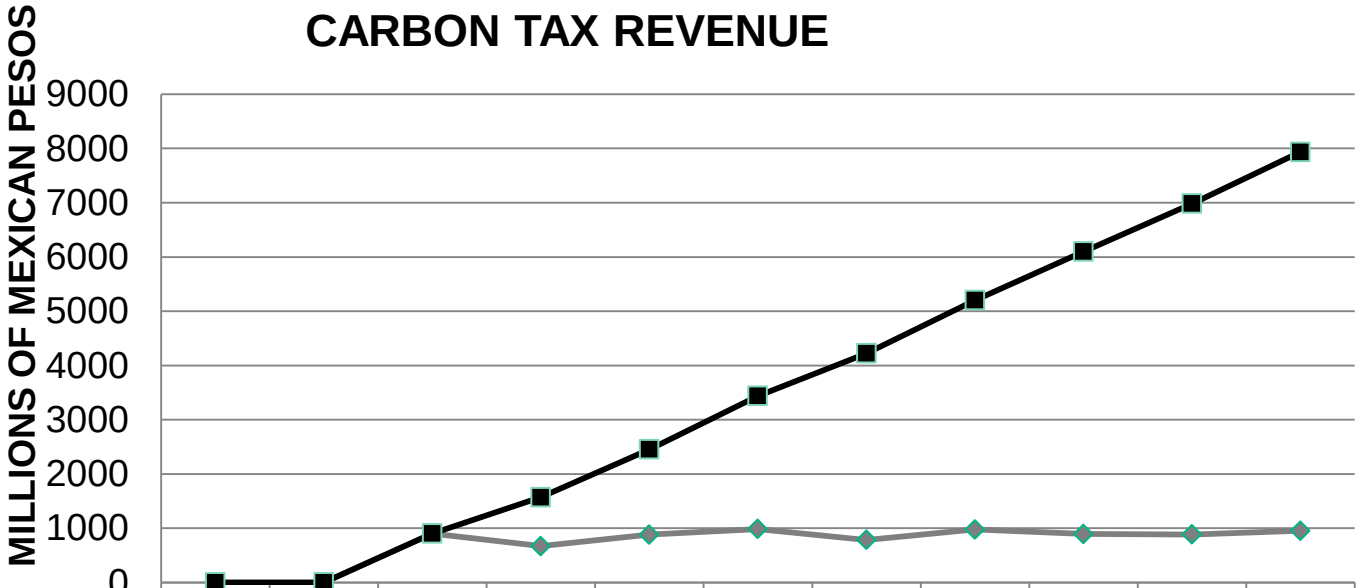
Carbon tax revenue

- Carbon tax collection is 4,212.5 million pesos, 0.7% lower than the potential tax collection because consumption of fossil fuels falls
- Government revenue increases by 0.33%



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Federal Revenue Participation	0	0	902.5	669.6	882.1	985.9	784.2	978.3	895.3	886.6	952.7
Cumulative (sum)	0	0	902.5	1572.1	2454.2	3440.1	4224.3	5202.6	6097.9	6984.5	7937.2

Source: Ortega, A. & Casamadrid, E (2015) using (SHCP, 2014)

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Conclusions

- Current tax rates fairly low, thus welfare effects (albeit partly regressive) are also small
- Macro effects and tax-intake accordingly small
- Effectiveness for energy sector transformation unclear