

Economic analysis of commercial vehicle road user charges

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CTC Presentation

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Introduction

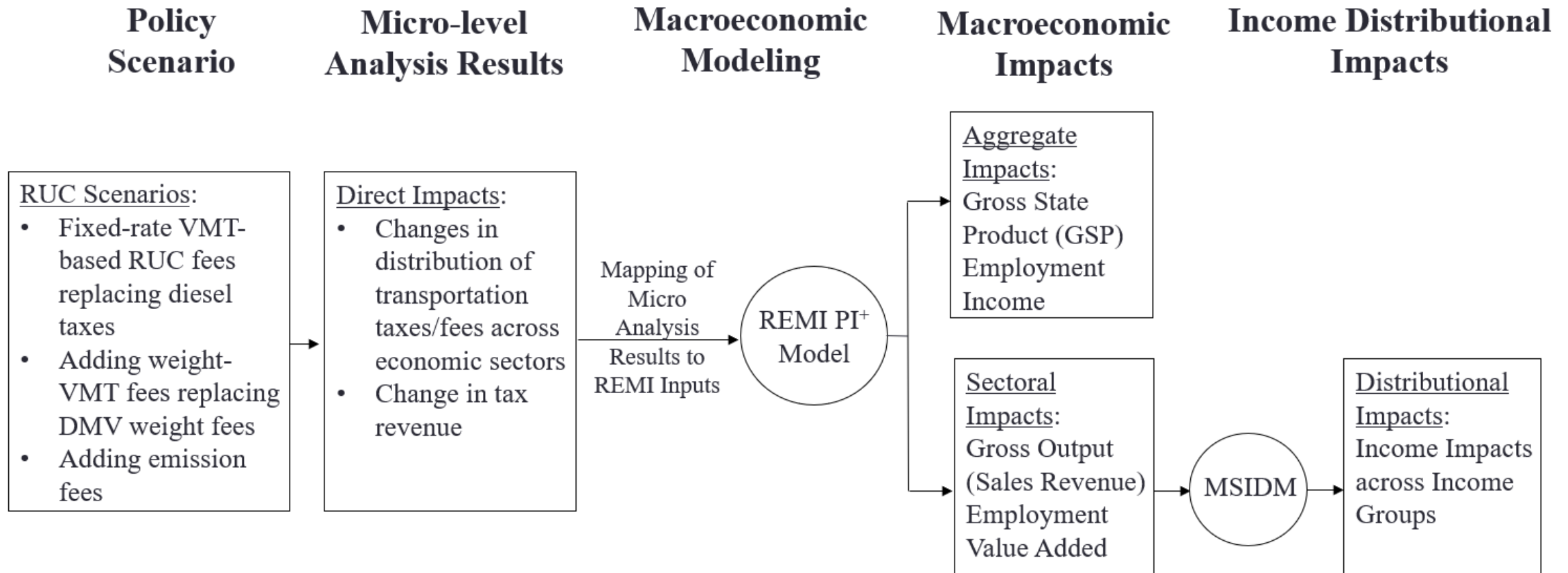
- Potential to use road user charges (RUC) as alternative tax instrument to fuel tax
- Importance of maintaining sustained revenue sources for maintenance and repair of state road system
- Many states have implemented or conducted studies of RUC
 - RUC pilot projects in California
 - RUC has both benefits and potential challenges

Objectives

- Explore the differences in RUC for commercial vehicles relative to current state fuel taxes and weight fees
 - Changes in total revenues generated
 - Changes in burden sharing in terms of distribution of total charges/fees among truck classes and commodity categories
 - Implications for the state economy as a whole
 - Implications for households from different income groups

Methodology

Analytical Framework of the Socioeconomic Impact Analysis of RUC



Scenarios

- Scenario 1 Fixed-rate RUC fees replacing diesel taxes, revenue neutral with respect to diesel taxes
 - Scenario 1a: Fixed per mile fee to all trucks (agriculture and non-agriculture) while obtaining the revenue-neutral goal
 - Scenario 1b: Extend current discount to Ag product transportation to the RUC
- Scenario 2 Add weight fees, revenue neutral with respect to diesel taxes + DMV weight fees
 - Scenario 2a: Fixed per mile fee to all trucks + weight fee
 - Scenario 2b: Discounted per mile fee for ag + weight fee
- Scenario 3 Add emission fees, fixed-rate revenue neutral RUC + emissions fee

Data sources

- California Vehicle Inventory and Use Study (CA-VIUS)
 - census of trucks by GVW class, their in-state miles, the commodities they transported, and the payload of each commodity transported
- Federal Highway Administration and National Research Council
 - unladen weights of straight trucks by class and number of axles
- Department of Energy
 - unladen weights of tractor/trailer trucks
- EMFAC dataset
 - fuel economy and PM2.5 emission factors
- Wolfe et al. (2019) and Cui and Levinson (2020)
 - social cost of PM 2.5 emissions

Changes in fee distributions – Scenario 1

GVW Class	Baseline	Scenario 1a		Scenario 1b	
	Total Diesel Tax Payment (T\$)	Fixed Rate RUC Fees (T\$)	% Change	Fixed Rate RUC Fees with Ag discount (T\$)	% Change
Class 3	27,232	63,982	134.9%	66,451	144.0%
Class 4	44,121	58,239	32.0%	59,977	35.9%
Class 5	59,703	77,833	30.4%	81,212	36.0%
Class 6	100,387	130,540	30.0%	134,936	34.4%
Class 7	71,585	101,995	42.5%	98,711	37.9%
Class 8	1,148,656	1,019,095	-11.3%	1,010,399	-12.0%
Total	1,451,687	1,451,687	0%	1,451,687	0%

FEES:

Scenario 1a: fixed
\$0.102/mile rate Scenario
1b: \$0.069 Ag Product;
\$0.108 Non-Ag

Lighter trucks pay
relatively more under RUC

Class 8 trucks pay
relatively less

Changes in fee distributions – Scenario 2

GVW Class	Baseline	Scenario 2a		Scenario 2b	
	Diesel Taxes +Weight Fees (T\$)	RUC Fees (T\$)	% Change	RUC Fees with Ag discount (T\$)	% Change
Class 3	45,418	64,027	41.0%	66,496	46.4%
Class 4	58,504	58,301	-0.3%	60,038	2.6%
Class 5	77,177	77,966	1.0%	81,344	5.4%
Class 6	145,907	131,334	-10.0%	135,731	-7.0%
Class 7	85,225	102,736	20.5%	99,452	16.7%
Class 8	1,522,302	1,500,170	-1.5%	1,491,473	-2.0%
Total	1,934,536	1,934,536	0.0%	1,934,536	0.0%

FEES:

Fixed portion: same as Scenarios 1a and 1b
 Weight: based on weight class, payload

Lighter trucks pay relatively more, but less than Scenario 1

Class 7 trucks pay relatively more

Changes in fee distributions – Scenario 3

GVW Class	Baseline	Scenario 3a		Scenario 3b	
	Total Diesel Tax Payment (T\$)	RUC Fees (T\$)	% Change	RUC Fees with Ag discount (T\$)	% Change
Class 3	27,232	101,318	272.0%	103,787	281.1%
Class 4	44,121	143,309	224.8%	145,047	228.7%
Class 5	59,703	155,156	159.9%	158,535	165.5%
Class 6	100,387	288,462	187.3%	292,858	191.7%
Class 7	71,586	157,026	119.4%	153,742	114.8%
Class 8	1,148,656	2,109,048	83.6%	2,100,352	82.9%
Total	1,451,687	2,954,322	103.5%	2,954,322	103.5%

FEES

Fixed fees: same as Scenario 1

Social cost fee: \$623,250/ton

Fees for all classes greatly increase

Class 8 pays largest share (73%) of total emission fees, but increase not as large as other classes

Macroeconomic results: aggregate macroeconomic impacts

- Revenue neutral scenarios have little impact
- Emissions scenario has small negative impacts, but doesn't account for social benefits

Variable	Units	1a	1b	2a	2b	3a	3b
Changes in Major Macroeconomic Indicators from Baseline							
Total Employment	Job-year	842	-528	1,477	108	-3,352	-4,715
GSP	M 2022\$	111.3	-75.8	217.8	17.5	-842.5	-1,028.5
Output	M 2022\$	213.3	-130.2	389.7	23.7	-2,039.9	-2,381.6
Disposable Personal Income	M 2022\$	123.8	-54.8	192.7	15.9	-1,369.1	-1,547.0
Percent Change from Baseline Level							
Total Employment	Job-year	0.003%	-0.002%	0.006%	0.000%	-0.014%	-0.019%
GSP	M 2022\$	0.003%	-0.002%	0.006%	0.001%	-0.023%	-0.028%
Output	M 2022\$	0.003%	-0.002%	0.006%	0.000%	-0.032%	-0.038%
Personal Income	M 2022\$	0.005%	-0.002%	0.007%	0.001%	-0.052%	-0.059%

Macroeconomic results – distributional impacts

- Labor income changes very small
- Few differences across income classes
- Scenario 3 generates greatest change and is slightly regressive

Scenario	1a	1b	2a	2b	3a	3b
	Income Changes relative to Baseline (%)					
<25k	0.0058%	-0.0030%	0.0079%	0.0003%	-0.1146%	-0.1234%
25-50k	0.0067%	-0.0030%	0.0103%	0.0008%	-0.0917%	-0.1014%
50-75k	0.0064%	-0.0029%	0.0105%	0.0010%	-0.0422%	-0.0515%
75-100k	0.0059%	-0.0028%	0.0095%	0.0008%	-0.0173%	-0.0259%
100-150k	0.0055%	-0.0027%	0.0090%	0.0008%	-0.0123%	-0.0204%
150k+	0.0053%	-0.0028%	0.0086%	0.0006%	-0.0771%	-0.0852%
Total	0.0059%	-0.0029%	0.0094%	0.0008%	-0.0538%	-0.0626%

Conclusions

- Distribution of costs across vehicle classes change
 - Lighter trucks pay more of fixed RUC due to difference in fuel economy
 - Heavier trucks pay more of the weight fee
 - Class 8 pays most of the emissions fee
- Very small economic and income distributional impacts for revenue neutral scenarios
- Slightly negative impacts for Scenario 3, likely offset by social benefits (health improvements)

Observations

- RUC a viable strategy for replacing fuel taxes as energy transition takes place
- Questions of implementation feasibility
 - Distributional impacts across vehicle classes and commodities
 - Technological requirements for implementation
 - Administrative costs and data requirements
 - Privacy considerations

For more information:

Wei, D., G. Giuliano, K. Moffa, Z. Mallett (2023) Economic analysis and review of commercial vehicle road user charges, Final Report SP81, Pacific Southwest University Transportation Center. Available at; https://www.metrans.org/assets/research/wei_psr-21-sp81_to%20043_final2.pdf.