COLORADOSCHOOLOFMINES
EARTH ENERGY ENVIRONMENT

Is Diesel Demand As Price And Income Elastic As Gasoline Demand?

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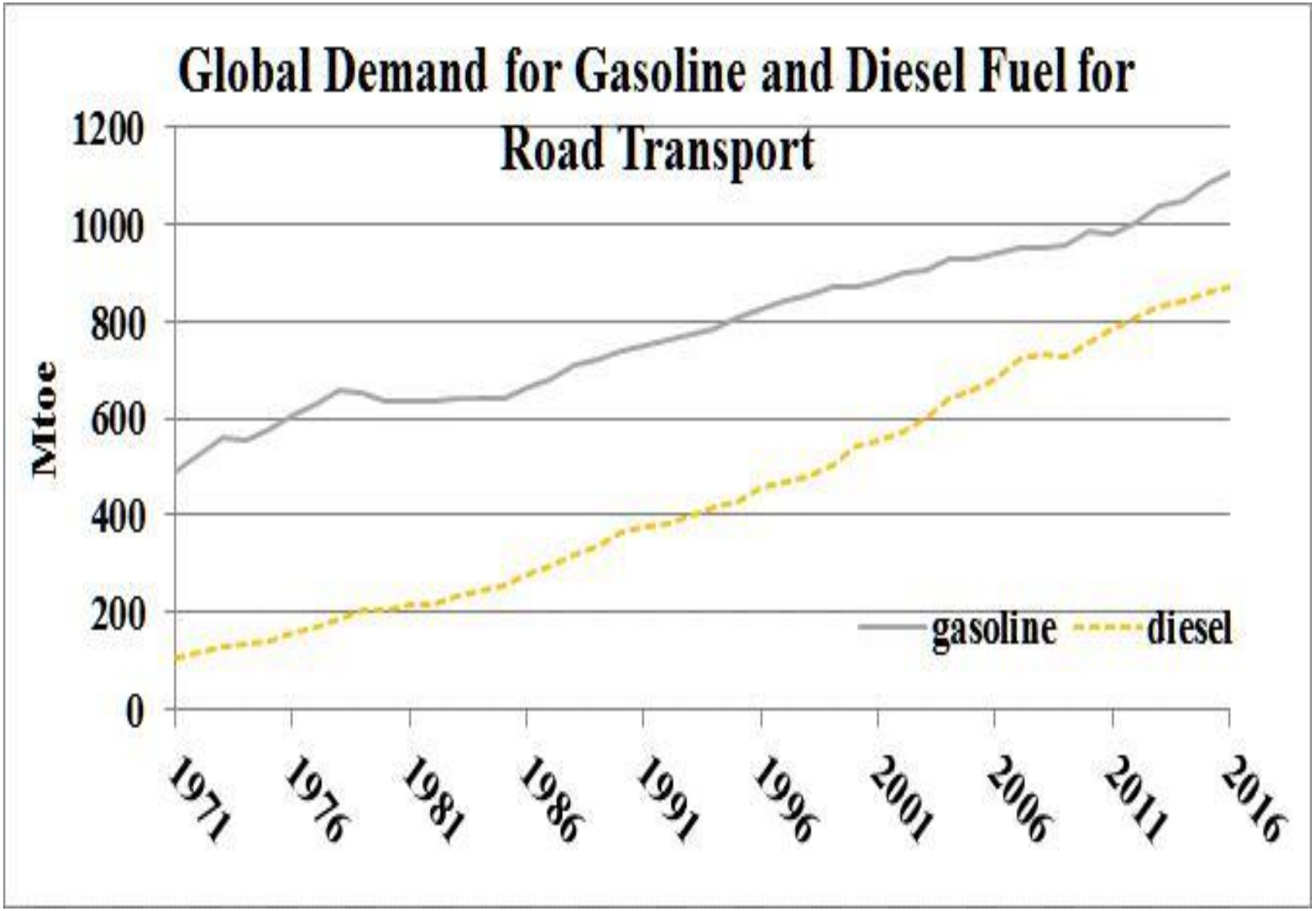
Introduction



Large Consumers (Share of World Consumption, 1970-2016 average)

	Gasoline		Diesel
United States	0.448	United States	0.200
Japan	0.043	Japan	0.057
China	0.040	Germany	0.051
Canada	0.038	France	0.046
Germany	0.034	Brazil	0.046
Mexico	0.027	India	0.040
United Kingdom	0.027	China	0.039
France	0.020	Italy	0.037
Brazil	0.018	U. Kingdom	0.031
Italy	0.017	Spain	0.027

Methodology/Sample

- **ARDL, general-to-specific modeling:**

  systematic testing variables, lags, stability

- **30 countries:**

  Algeria, Australia, Austria, Belgium, Brazil, Canada, China, Denmark, France, Germany, India, Indonesia, Iran, Japan, Mexico, Netherlands, New Zealand, Norway, Portugal, Romania, Russia, Saudi Arabia, South Africa, Spain, Sweden, Thailand, UK, USA, Venezuela

- **1970-2016**

Model

$$Q_t = \beta_0 + \sum_{i=0}^{n} \beta_{Gi} P_{G_{t-i}} + \sum_{j=0}^{m} \beta_{Dj} P_{D_{t-j}} + \sum_{k=0}^{p} \beta_{Yk} Y_{t-k} + \sum_{s=0}^{r} \beta_{Us} U_{t-s} + \sum_{v=0}^{w} \beta_{Iv} I_{t-v} + \sum_{x=0}^{z} \beta_{Fx} F_{t-x} + \sum_{l=1}^{q} \beta_{\lambda l} Q_{t-l} + \varepsilon_t$$

Where

Q = Road Gasoline/Diesel Per Capita

PG,PD = Real Price of Gasoline and Diesel

Y = GDP per capita

U = Urbanization rate

I = Industrial GDP level

F= Female labor force participation rate.

Our Contributions

Systematic testing across models

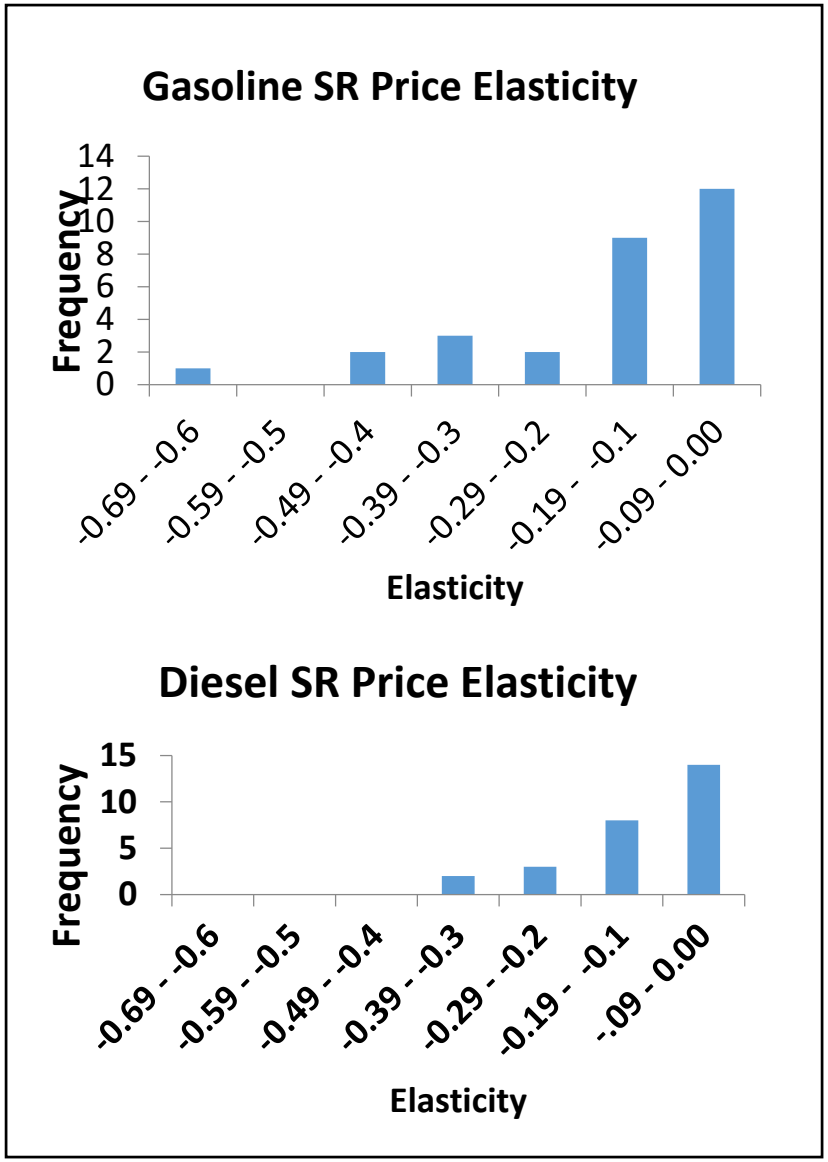
Data set spans many earlier studies

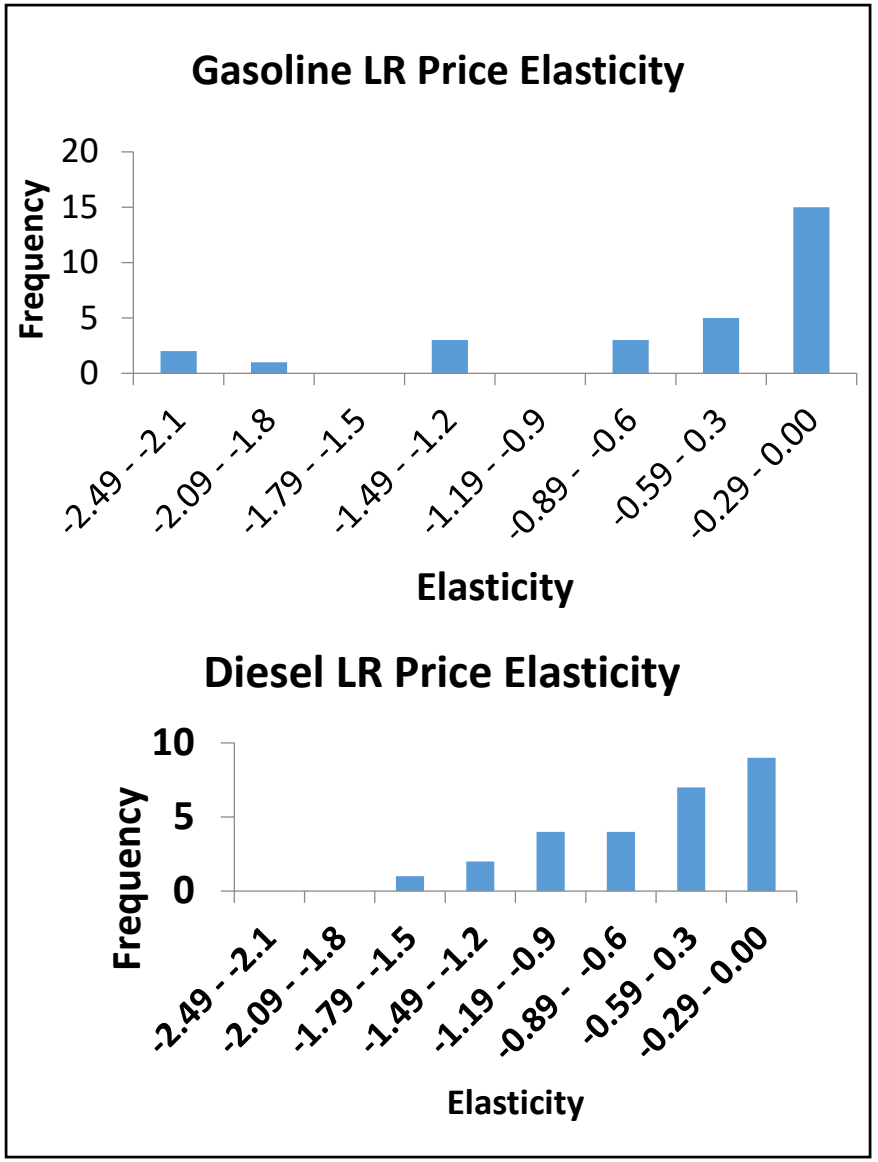
Structural variables:

- **urbanization**
- **industrial GDP**
- **female labor force**

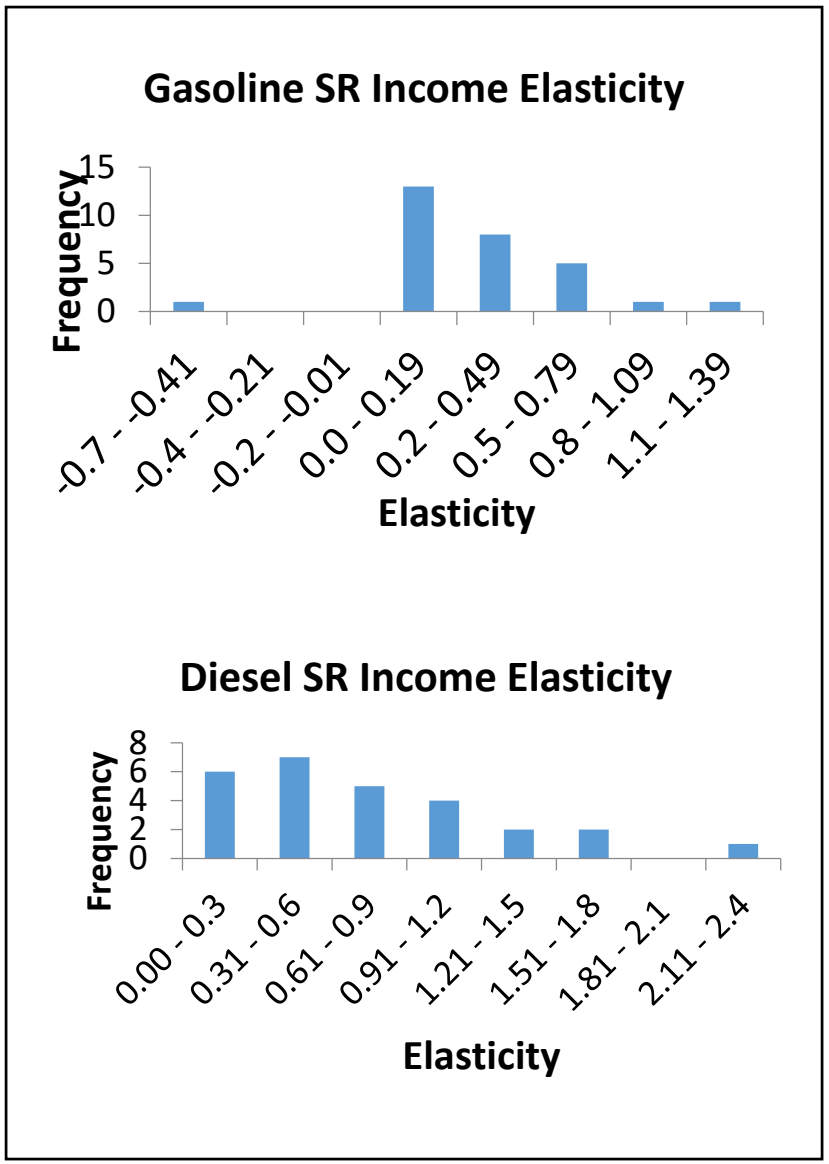
Non-stationarity (allowing structural break)

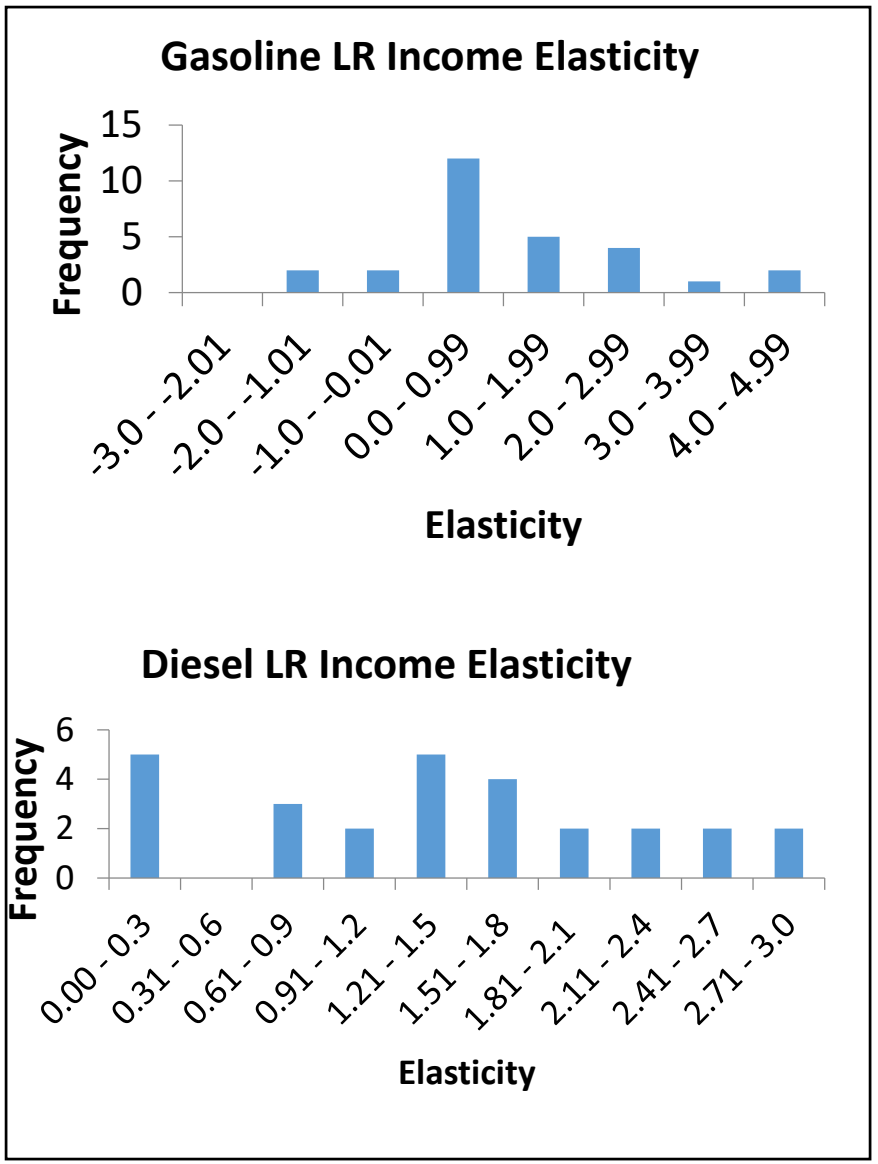
Results: Gasoline vs. Diesel Price Elasticity





Results: Gasoline vs. Diesel Income Elasticity





Our Contributions Compared to Al Dossary's

Longer time series and capturing the 2008 recession impacts (1970-2005 vs. 1970-2016)

The structural variables:

- **urbanization**
- **industrial GDP**
- **female labor force**

Non-stationarity (allowing structural break)

Results Comparison (Gasoline Price Elasticity of Demand)

	Short Run	Long Run
This study (30 countries)	Ranges (-0.61 to 0.00) Median (-0.11)	Ranges (-2.49 to 0.00) Median (-0. 31)
Al Dossary's (23 countries)	Ranges (-0.42 to -0.02) Median (-0.13)	Ranges (-1.60 to -0.02) Median (-0.65)

Results Comparison (Gasoline Income Elasticity of Demand)

	Short Run	Long Run
This study (30 countries)	Ranges (-0.61 to 1.20) Median (0.21)	Ranges (-2.41 to 4.03) Median (0.48)
Al Dossary's (23 countries)	Ranges (0.08 to 0.93) Median (0.25)	Ranges (0.23 to 2.62) Median (1.20)

Results Comparison (Diesel Price Elasticity of Demand)

	Short Run	Long Run
This study (30 countries)	Ranges (-0.38 to 0.00) Median (-0.09)	Ranges (-1.29 to 0.00) Median (-0. 31)
Al Dossary's (23 countries)	Ranges (-0.94 to -0.02) Median (-0.19)	Ranges (-0.91 to -0.02) Median (-0.39)

Results Comparison (Diesel Income Elasticity of Demand)

	Short Run	Long Run
This study (30 countries)	Ranges (0.00 to 2.32) Median (0.61)	Ranges 0.00 to 2.89) Median (1.34)
Al Dossary's (23 countries)	Ranges (0.10 to 1.75) Median (0.75)	Ranges (0.10 to 3.00) Median (1.00)

Cross Price Elasticities

	Pd-SR	Pd-LR		Pg-SR	Pg-LR
Canada	-0.058	1.01**	**Brazil**	0.056**	0.11**
			Netherlands	0.17**	0.26*
Netherlands	0.06***	0.46**	**Norway**	0.84***	3.01**
Portugal	0.20***	0.88***	**Portugal**	0.31***	0.71**
Romania	0.74***	0.58***	**South Africa**	0.39**	0.7**
Spain	0.09**	0.58*	**Sweden**	0.11	0.83**

*** p<0.01, ** p<0.05, * p<0.1

Sum Up

- **Model stability:**

  13 countries have structural breaks (Austria, Brazil, Canada, Czech Republic, Denmark, France, Germany, India, Iran, Saudi Arabia, South Africa, Thailand, Venezuela)

- **Endogeneity:**
  - **There is only concern regarding US. gasoline demand (40% of the world)**
  - **World excluded GDP and world excluded consumption were used as instruments for price variable**

Extensions

Adding more countries (Qatar, Turkey, UAE, Switzerland,…)

Using stronger instruments for US gasoline demand estimation

More robustness checks

Thank you,

Q/A