Projecting Revenues that Fund Transportation Infrastructure

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All views and estimates presented here are solely those of the author

Budgetary Pressures

- Vehicle miles traveled have plateaued and are below their pre-recession peak
- Fuel economy will continue to improve
- Per unit tax rates generally dampen revenue elasticity
  - Stagnant rates since 1991 in TN
- Political opposition to tax increases of any kind including road user fees
- Federal highway trust fund
  - Uncertainty
  - Likely increased state/local financing obligations
- Costs of construction and maintenance above overall inflation rate
- States still grappling with aftermath of recession

Recent Policy Responses (egs)

- Increase per unit rates on gasoline and/or diesel
  - Wyoming increased gasoline and diesel tax rates from 14 to 24 cents per gallon, first increase since 1998
- General sales tax on consumer fuel purchases
  - Generally combined with per unit levies
- Wholesale ad valorem levies
  - Virginia replaced per unit levies with wholesale rates of 3.5% on gas and 6.0% on diesel. Price floors based on prices on 2/20/13.
- Indexed tax rates
  - Rhode Island will index its 32 cent rate effective July 1, 2015 with a floor of 32 cents

Policy Responses (cont.)

- Broadened base
  - Indiana now includes LNG & CNG in the base using a rate equivalent to its 16 cent diesel rate
- Fees/registrations
  - Pennsylvania doubled license and title fees and enabled a $5 local county option registration fee
- Alternative revenue sources
  - Virginia raised the sales tax and increased the allocation of revenues to transportation funding
- Mixed policy changes
  - Indiana combined its per unit levies with 7% levy based on *previous month*'s avg price (included in posted price of fuel); ad valorem levy collected at wholesale

Transportation Infrastructure Funding Mechanisms in Tennessee, 2012

- Gasoline tax
  - 47.7 percent of trust fund revenues
- Petroleum special products tax
  - 4.3 percent of revenues
- Motor fuel/diesel
  - 14.8 percent of revenues
- Motor vehicle registration fees
  - 25.7 percent of revenues
- Other
  - 7.5 percent of trust fund revenues

Building Models & Capturing Behavioral Effects: Gasoline and Diesel Taxes

- New policies not embedded in historical data
  - Indexing and tax increases, for example
    - Good news, we *do* know that price elasticities approach zero
  - New CAFÉ standards
    - Affect light vehicle stock and overall efficiency and fuel economy
- Potential consequences of federal tax increase
  - Vertical pressures on state revenues
  - Small price elasticities will minimize behavioral responses
  - Affect political will at the state level?
- Accounting for state and national influences on own-state revenues
  - In-state activity
  - Pass-thru freight and interstate traffic
  - In-state production and transportation for national markets
- To what extent do trends capture regime changes?
  - For example, millennials & movement to cities
  - Incremental changes embedded in history v. shocks

Model Building (cont)

- Must account for policy levers as possible
  - Gas and diesel prices accommodate tax scenarios
  - A VMT tax?

- Need projected drivers to run forecast
  - IHS Global Insight for national projections
  - TN long-term econometric model extended to 2038
  - EIA projections to capture CAFÉ standards
  - EIA, other sources, Delphi method to validate

- Project total revenues by source
  - Allocation of revenues to various funds may change from baseline

Gasoline Tax Equation

- ARIMA with double exponential smoothing
- TN's gas consumption as a share of U.S.
- TN variables
  - Nominal personal income per capita
  - Nonfarm employment
  - Unemployment rate
  - Selected year and quarter dummies
- U.S. variables
  - Average miles per gallon, light vehicle stock
  - Nominal GDP
  - Average tax inclusive price
  - End use petroleum demand
- De-trend and remove seasonality; stationary data
- RMSE, AIC and BIC used to help with model selection

Diesel Tax Equation

- Same general approach to estimation
- TN variables
  - Population
  - Mfg employment
  - Wholesale trade employment
  - Selected year and quarter dummies
- U.S. variables
  - Avg tax inclusive price
  - Gross business purchases of new vehicles
  - Nominal GDP
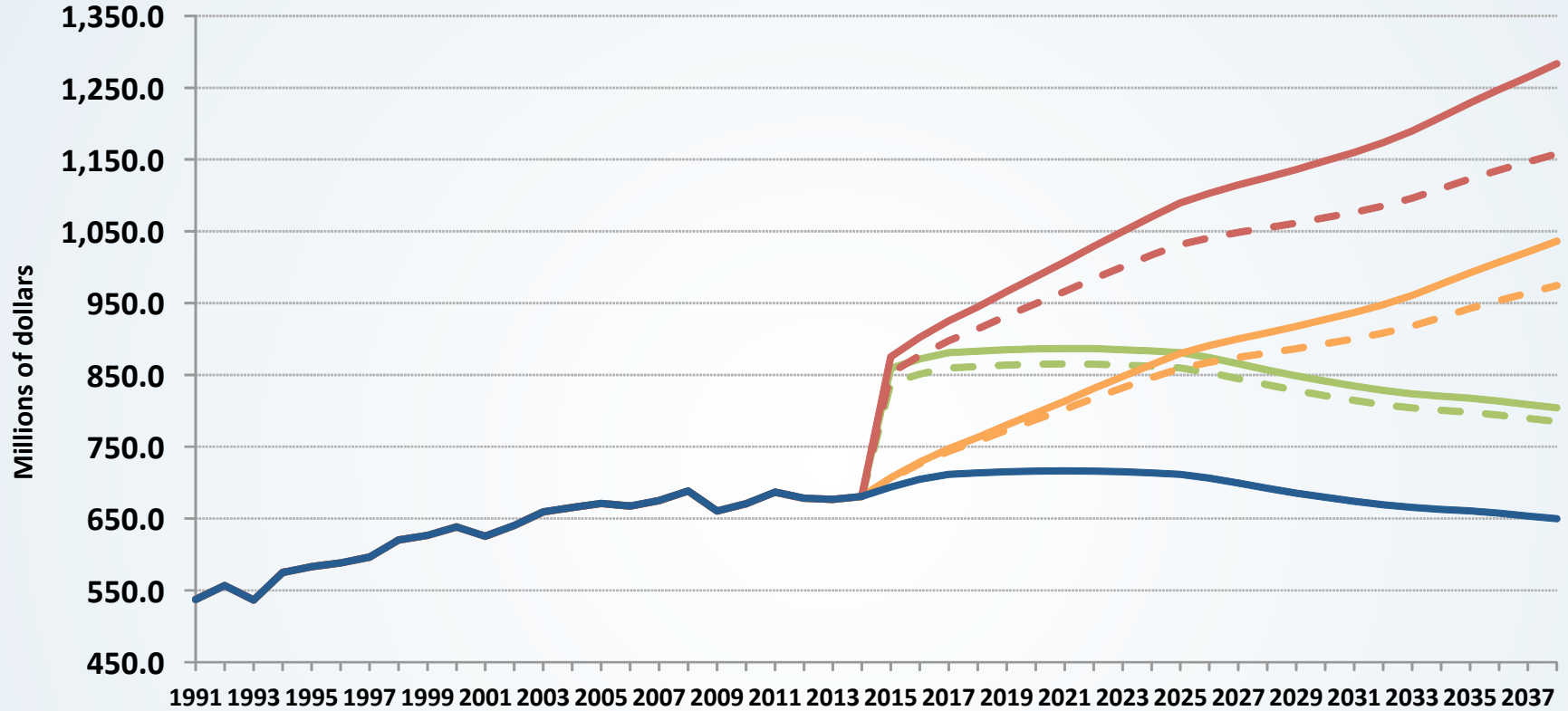 - End use petroleum demand

Motor Vehicle Registrations

- Same general approach

- We do not have detail on registrations for all vehicle types; messy history

- TN Variables
  - Nominal income per capita
  - Nonfarm employment
  - Unemployment rate
  - Selected year and quarter dummies

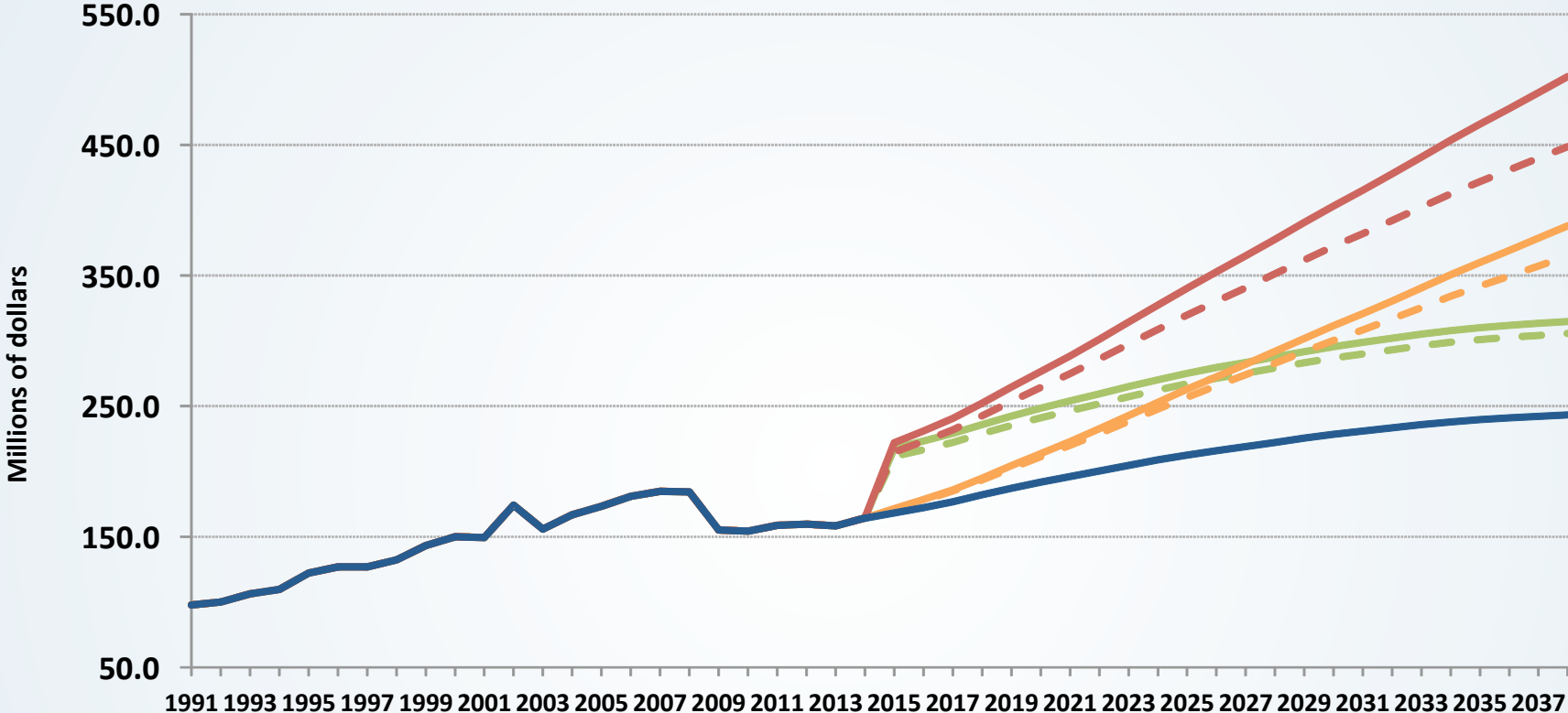**Motor Vehicle Registration Revenues**
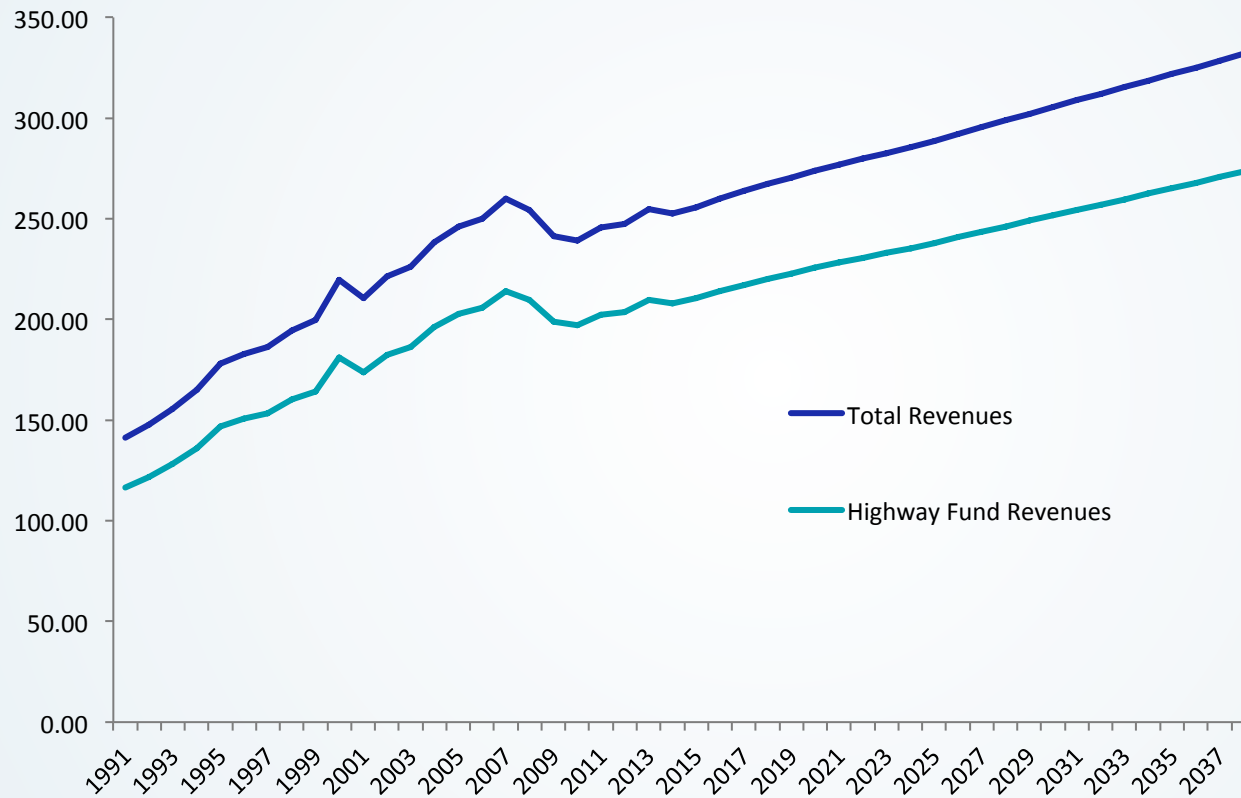
Gas and Petroleum Special Products Revenues

Legend:
- Revenues with 5 cent increase
- Revenues with indexed rate (CPI Growth)
- Revenues with indexed rate & 5 cent increase
- Gasoline & Petroleum Revenues
- Forecast with price elasticity of -0.1
- Forecast with price elasticity of -0.1
- Forecast with price elasticity of -0.1

Motor Vehicle Fuel (Diesel) Revenues

Legend:
- Revenues with 5 cent increase
- Revenues with indexed rate (CPI Growth)
- Revenues with indexed rate & 5 cent increase
- MV Fuel Revenues
- Forecast with price elasticity of -0.1
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Some Lessons

- Rate increases generally enhance yield but do nothing to improve elasticity

- Indexing to CPI produces gas tax revenue growth in excess of historical growth (depending on time period)

- Diesel tax revenues show decent historical growth (CAGR 2.3 %, 1991-2014)
  - Stronger mileage growth
  - Lower fuel economy gains

Lessons (cont.)

- Indexing to CPI produces diesel tax revenue CAGR of 4.4 %, 2015-2025, well above historical growth

- Funding policy run amok?
  - A simple, effective tax made less transparent and more costly to administer and comply with
    - A tax rate that changes monthly?

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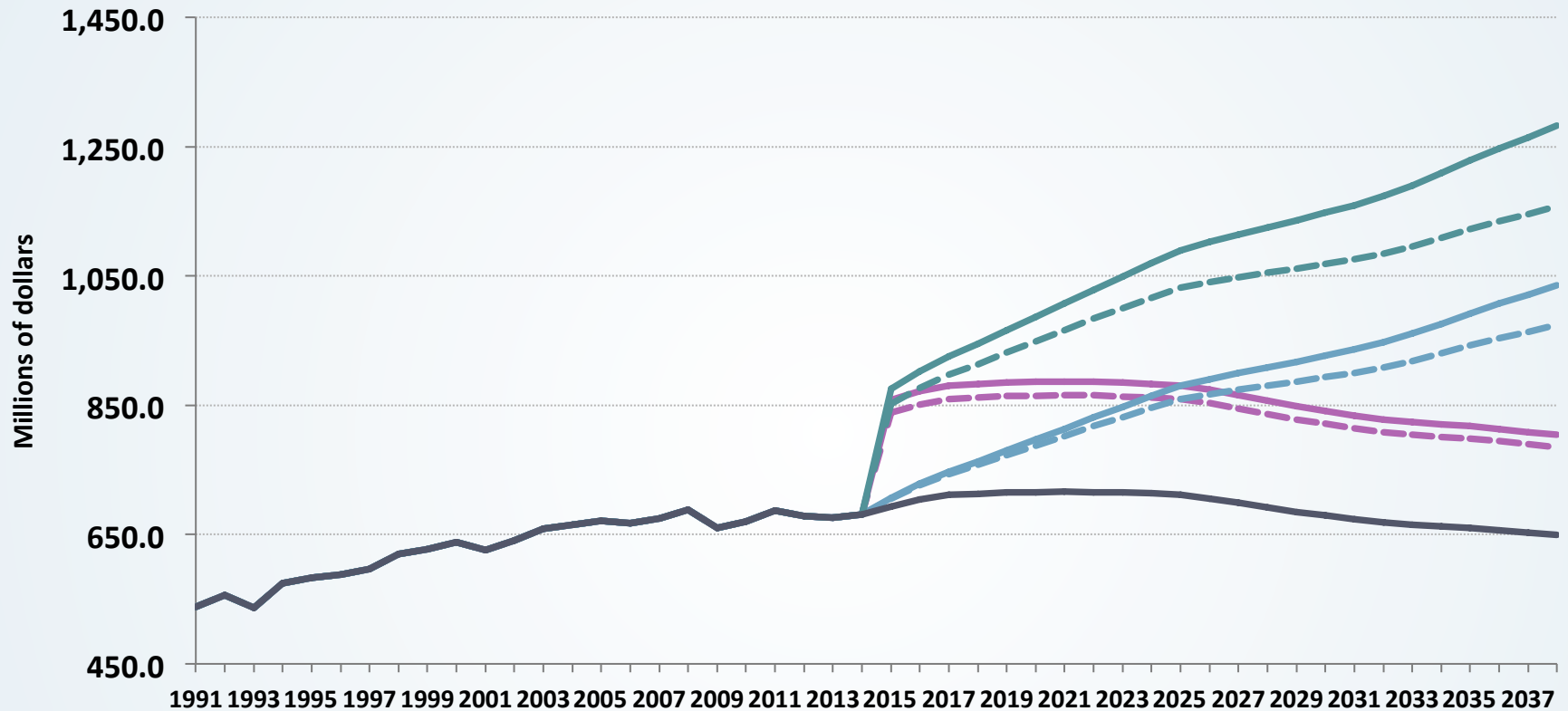**http://educationcrossroads.utk.edu**

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ACTUAL CHART; NO ANIMATION

Gas and Petroleum Special Products Revenues

Millions of dollars

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Y-axis: Millions of dollars