Traffic and Revenue Forecasting for the Ohio Turnpike Asset Evaluation

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Available at: https://works.bepress.com/gregory-erhardt/23/
TRAFFIC AND REVENUE FORECASTING FOR THE OHIO TURNPIKE ASSET EVALUATION

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GREETINGS FROM THE
OHIO TURNPIKE
“WORLD’S MOST MODERN SUPERHIGHWAY”
OHIO TURNPIKE

- 241 mile toll facility across northern Ohio
- Largely inter-city route listed as I-80/I-90
- ~$250 million in revenue in 2012
- Trucks are 20% of VMT, but half of revenue
- Long history of historic data, including toll increases and decreases
- Operated by the Ohio Turnpike Commission (OTC)
- Statewide shortfall of transportation funds
OPTIONS

- **Status Quo with Increased Bonding Capacity**
  - OTC retains governance
  - But allowed to borrow against future revenue growth

- **Public Option**
  - Closely align OTC with Ohio DOT
  - Potential operating cost savings
  - Option to issue new bonds to fund highway projects elsewhere

- **Public Private Option**
  - Up to 50 year lease to concessionaire
  - Toll rates and maintenance investments written into contract
  - State gets up-front cash or share of revenue

Source: Ohio Turnpike Opportunity Analysis: Final Report
ASSUMED TOLL RATES

Forecasted ETC rate per mile

Source: Ohio Turnpike Opportunity Analysis: Final Report
Part 1: Methods and Data
- Statewide model
- Rapid response model
- Backcast validation

Part 2: Planning Questions
- How much revenue can be generated?
- How much diversion will occur onto state highways?
- What about local residents paying the toll on a daily basis?
- What risks are associated with these forecasts?
METHODS

Let’s get started!
FORECASTING APPROACH

Statewide Model
- Baseline traffic growth in 5-year increments
- Average weekday conditions
- Composition of traffic
- Origins and destinations
- Diversion to parallel routes

Rapid Response Model
- Initial diversion curves

Calibration
- Annual revenue stream
- CPI adjustment
- ETC vs. cash
- Local exclusions
- Tests of many small changes
DIVERSION CURVES

Initial Diversion Curves

- Auto Model Runs
- Auto Diversion Curve
- Truck Model Runs
- Truck Diversion Curve

VMT / VMT at 0 Tolls vs. Toll Rate per Mile

Toll Rate per Mile:
- $0.00
- $0.100
- $0.200
- $0.300
- $0.400
- $0.500
- $0.600

VMT / VMT at 0 Tolls:
- 1.00
- 0.90
- 0.80
- 0.70
- 0.60
- 0.50
- 0.40
- 0.30
- 0.20
- 0.10
- 0.00
BACKCAST VALIDATION

Value of Time too low:
$17/hr for autos
$30/hr trucks (class 5)

Value of Time just right:
$22/hr for autos
$40/hr trucks (class 5)

1997-2012 Backcast of Ohio Turnpike VMT
## Calibrated Values of Time

<table>
<thead>
<tr>
<th>Vehicle Class</th>
<th>Value of Time ($/hr)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>$22.00</td>
</tr>
<tr>
<td>2</td>
<td>$25.00</td>
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<td>3</td>
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<td>5</td>
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</tr>
<tr>
<td>6</td>
<td>$45.00</td>
</tr>
<tr>
<td>7</td>
<td>$50.00</td>
</tr>
</tbody>
</table>

ETC value of time 10% higher

Source: Ohio Turnpike Opportunity Analysis: Final Report
HOW MUCH REVENUE CAN BE GENERATED?

It depends on the toll rates...
RESULTING REVENUE

Present value of upfront proceeds and operating cash flow:

- Status Quo: $1.4 billion
- Public Option: $2.1-$2.5 billion
- Public-Private Option: $3.3-4.0 billion

Source: Ohio Turnpike Opportunity Analysis: Final Report
HOW MUCH DIVERSION WILL OCCUR ONTO STATE HIGHWAYS?

2-lane facilities are less able to accommodate heavy trucks.
DIVERSION ANALYSIS

Status Quo/Public Option: Percent of Trucks Diverted off Turnpike

Source: Ohio Turnpike Opportunity Analysis: Final Report
DIVERSION ANALYSIS

Public-Private Option: Percent of Trucks Diverted off Turnpike

Source: Ohio Turnpike Opportunity Analysis: Final Report
WHAT ABOUT LOCAL RESIDENTS PAYING THE TOLL ON A DAILY BASIS?

Including a local exclusion from tolls?

Should the money get spent in northern Ohio or throughout the state?
TRAFFIC BY ORIGIN AND DESTINATION

Trucks
- 69% through trips
- 17% with O or D north of US 30
- 7% travel just one segment

Autos
- 31% through trips
- 51% with O or D north of US 30
- 24% travel just one segment

Source: Ohio Turnpike Opportunity Analysis: Final Report
WHAT RISKS ARE ASSOCIATED WITH THESE FORECASTS?

How sure are we that we can cover the bonds?
TRAVEL MARKETS

Autos
- Short-Distance Resident Trips (SDT) 37% of traffic
- Long-Distance Resident Trips (LDT)
- Visitor Trips (VM) 10% of traffic
- Through Trips (EE) 20% of traffic

Trucks
- Short-Distance Trips (DCOM) 11% of traffic
- Long-Distance Trips (ACOM)
- Through Trips (ACOM) 22% of traffic

100%

Source: Ohio Turnpike Opportunity Analysis: Final Report
SENSITIVITY TESTS

- 0.5X and 2.0X employment growth in Ohio and surrounding counties
- 0.5X and 2.0X household growth in Ohio and surrounding counties
- 0.5X and 2.0X growth in auto through trips on the Turnpike
- 0.5X and 2.0X growth in commodity flows to/from locations outside Ohio (which drive the long-haul trucks)

Source: Ohio Turnpike Opportunity Analysis: Final Report
### SENSITIVITY TEST RESULTS

#### Public-Private option assumes a higher willingness to take on risk

<table>
<thead>
<tr>
<th></th>
<th>2010-2040 Turnpike VMT Growth Rate</th>
<th>2040 – 2063 Turnpike VMT Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Status Quo/ Public Option</td>
<td>Public-Private Option</td>
</tr>
<tr>
<td></td>
<td>1.0%</td>
<td>1.54%</td>
</tr>
<tr>
<td>Automobile</td>
<td>Extrapolated from 2010-2040 rate</td>
<td>Extrapolated from 2010-2040 rate</td>
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<tr>
<td></td>
<td>1.2%</td>
<td>2.05%</td>
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<tr>
<td>Truck</td>
<td>Extrapolated from 2010-2040 rate</td>
<td>Extrapolated from 2010-2040 rate</td>
</tr>
</tbody>
</table>

Source: Ohio Turnpike Opportunity Analysis: Final Report
CONCLUSIONS

What did we learn?
Statewide model and rapid response model complement each other.

Backcast validation allowed refinement of values of time and overall forecasting methodology.

Risk analysis confirms:
- Significance of long-distance flows
- Exposure to national economic and freight trends
CONCLUSIONS – PLANNING QUESTIONS

OHIO’S NEW JOBS & TRANSPORTATION PLAN GENERATES $1.5 BILLION FOR TRANSPORTATION PROJECTS

Long-term lease rejected in favor of plan that preserves existing Turnpike system

After more than 10 months of careful study and deliberation, the state has decided not to lease the Ohio Turnpike. Instead, the turnpike would issue bonds backed by future toll revenue and use that money to build critical transportation projects mostly in Northern Ohio.

Learn more here

Source: http://www.ohturnpikeanalysis.com/
ACKNOWLEDGEMENTS

Many thanks to:
- KPMG Team
- Ohio DOT
- Ohio Turnpike Commission

References
Questions?

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