

TRAINING: TRANSIGHT

Transportation and the Economy



- Transportation and economic development are linked
- Networks enable the flow of workers, goods and services within regions and between regions



Overview

- Background of TranSight
- Theoretical explanation of modelling
- Two types of simulation:
 - ▣ 1.) Direct policy variable cost change
 - ▣ 2.) Importing TDM data

Technological Revolution



- Cutting edge technologies and disruptive business models are changing transportation
 - Ride-hailing apps
 - Low-emission and electric vehicles
 - Driverless vehicles
- Changes in technology raise questions about future policies
 - Is it time to charge motorists by mileage?
 - Are new regulations required to govern ride-share businesses and driverless vehicles?

What is TranSight?

- **TranSight** – *the next generation platform for estimating the total economic effects of changes to transportation systems.*
- TranSight allows users to understand how transportation networks increase economic competitiveness.

TranSight is also constructed with extensive data on:

Safety Valuation Factors



Fuel Efficiency



Emissions Factors



Static vs. Dynamic Analysis



Static Analysis

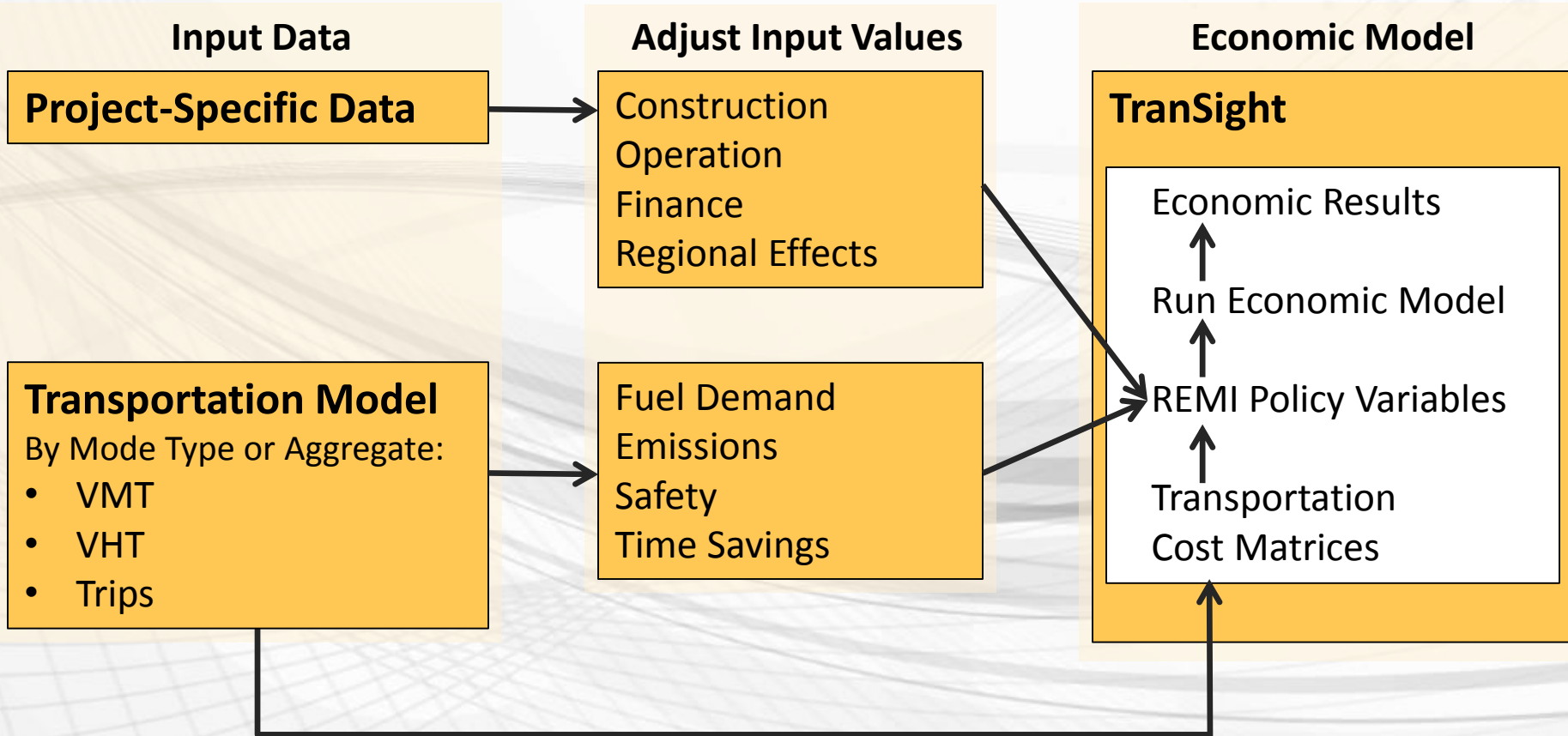
- Construction spending
- O&M spending

Dynamic Analysis

- Construction spending
- O&M spending
- Travel time savings
- Emissions savings
- Safety improvements
- Fuel expenditures
- Non-fuel VOCs
- Network speed improvements
- Access to labor
- Access to intermediate inputs

FHWA: TranSight is among the “best equipped to estimate *productivity* impacts”*

TranSight Structure



*Reminder: VMT, VHT, and Trips are used to create policy variables (such as commuting costs)

what does **REMI** say? sm

Transportation and Economic Development

Labor Accessibility



Commuting; Labor productivity



Intermediates Accessibility



Materials to factories



Final Goods Accessibility



Goods and services to consumers



Commuting Costs

$$\Delta CC_{ij} = 1 + \frac{1}{8} * \sum_k \%H_k * \left[\frac{VHT_i^{alt}}{trips_i^{alt}} - \frac{VHT_i^{base}}{trips_i^{base}} \right]$$

- VHT/Trips = average length of trip
 - H_k adjusts for the transportation mode (TranSight segments them)
 - 1/8 adjusts for the hours in the day
- Determines the proportional change

Accessibility Cost

$$\Delta AC_{ij} = \frac{(Trip_{ij}^{base} / VHT_{ij}^{base})}{(Trip_{ij}^{alt} / VHT_{ij}^{alt})}$$

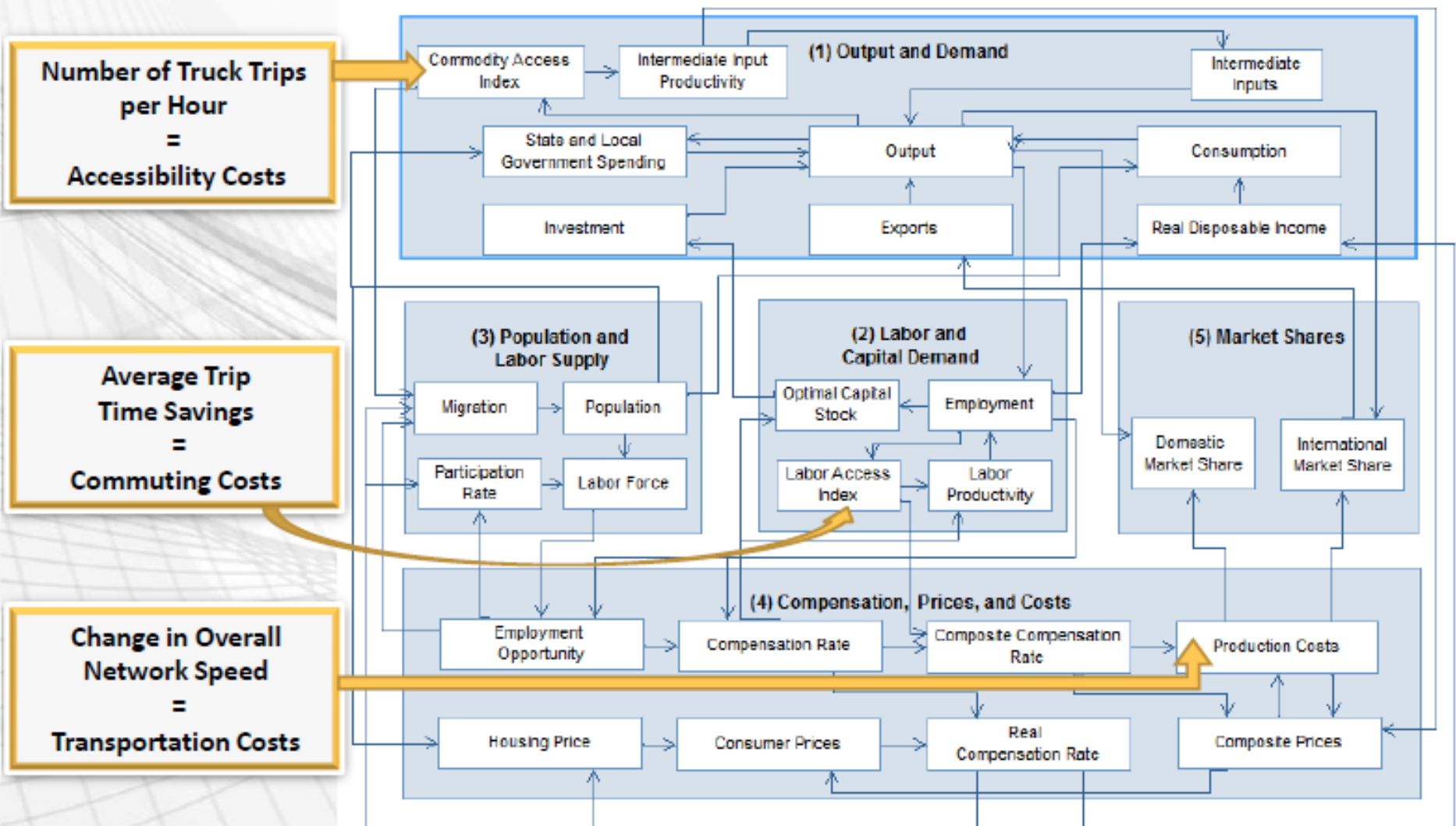
- Trips/VHT = “deliveries” per hour
 - Compares the ratio under different scenarios and calculates the marginal change
 - Assumes this increases access
- Adjusts for different transportation modes

Transportation Cost

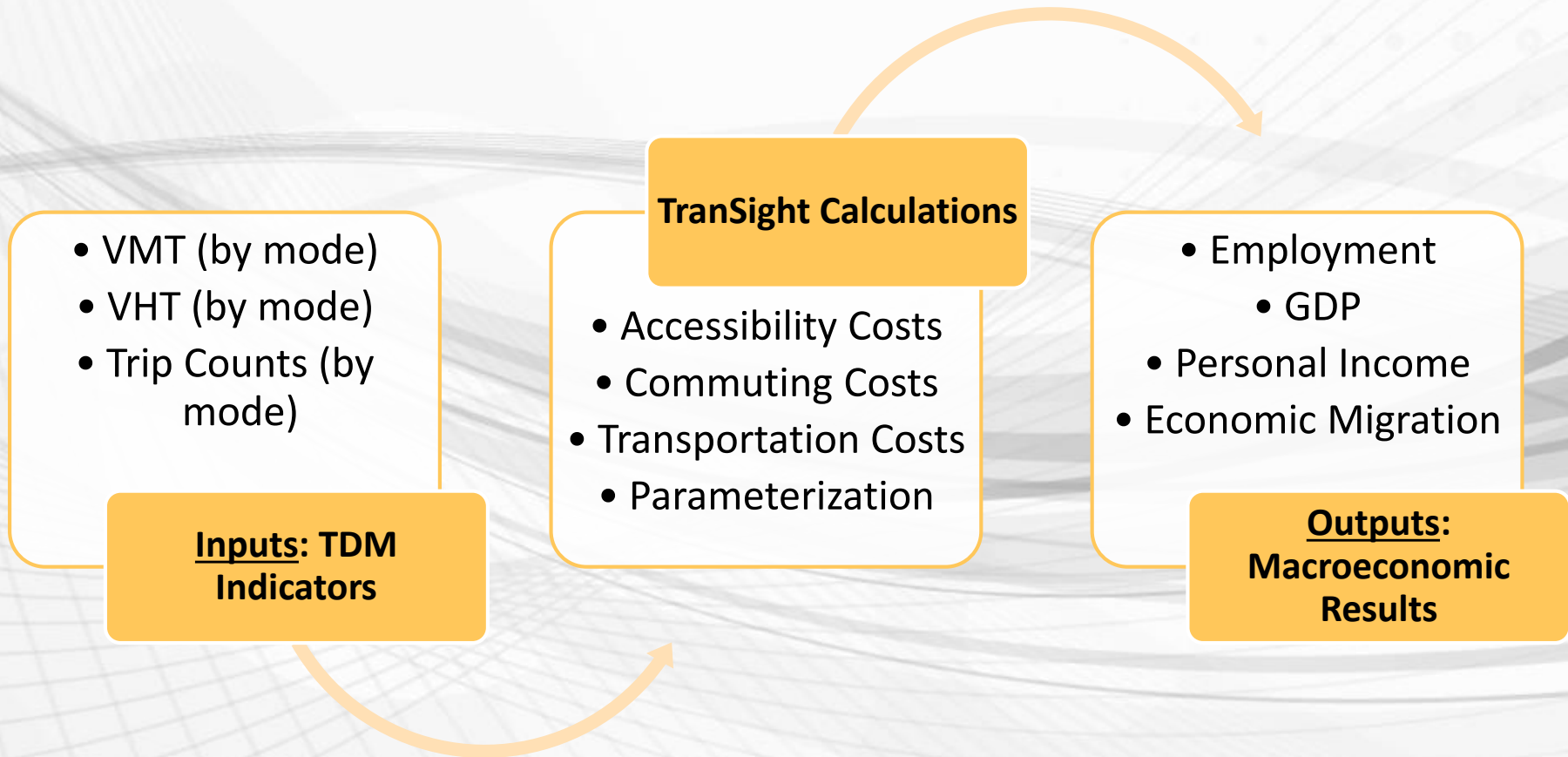
$$\Delta TC_{ij} = \frac{(VMT_{ij}^{base} / VHT_{ij}^{base})}{(VMT_{ij}^{alt} / VHT_{ij}^{alt})}$$

- VMT/VHT = average system speed
 - Compares the ratio of system speeds between regions under the baseline and the alternative scenarios to make the change
- Adjusts for wages and operations

TDM Integration with REMI

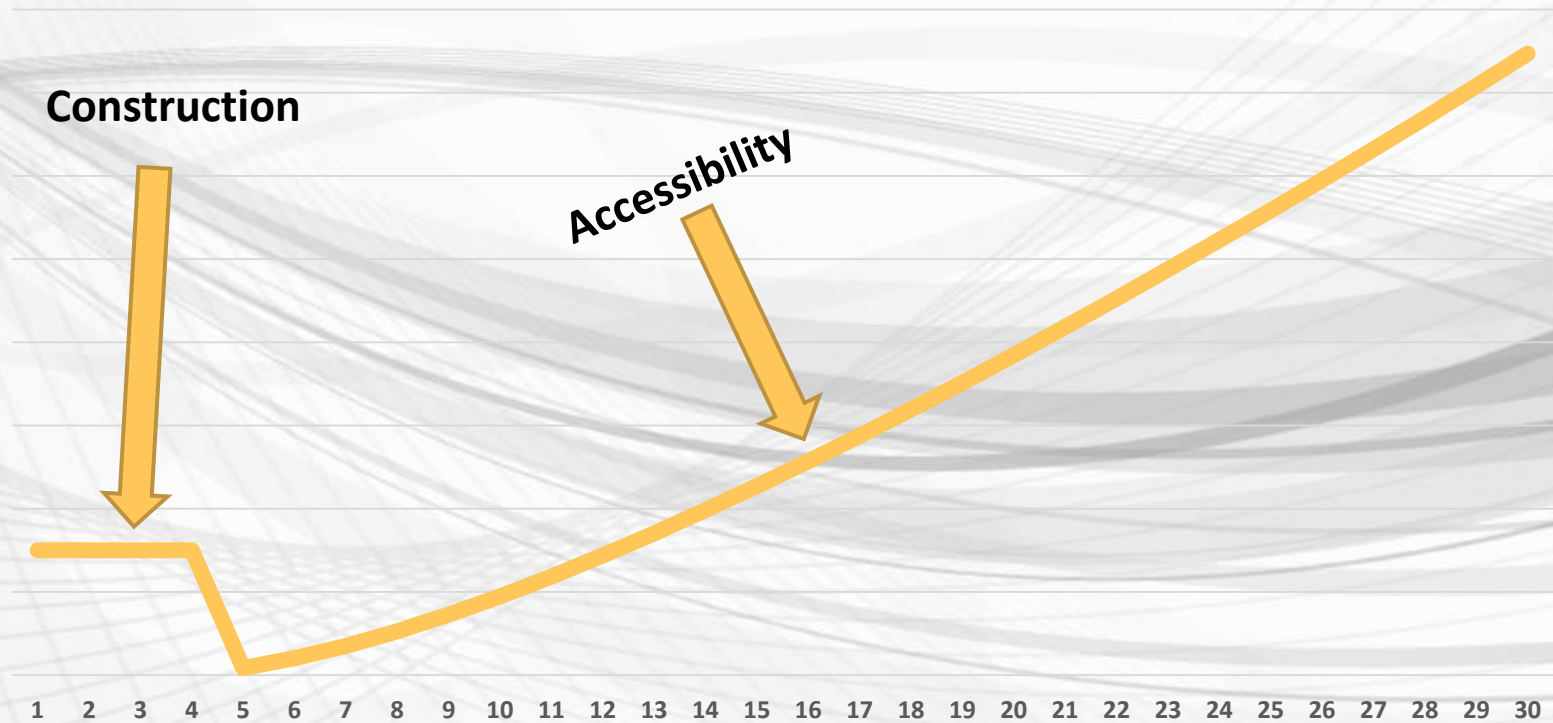


TranSight Process



Economic Impact Over a Project's Life Cycle

Sample Project

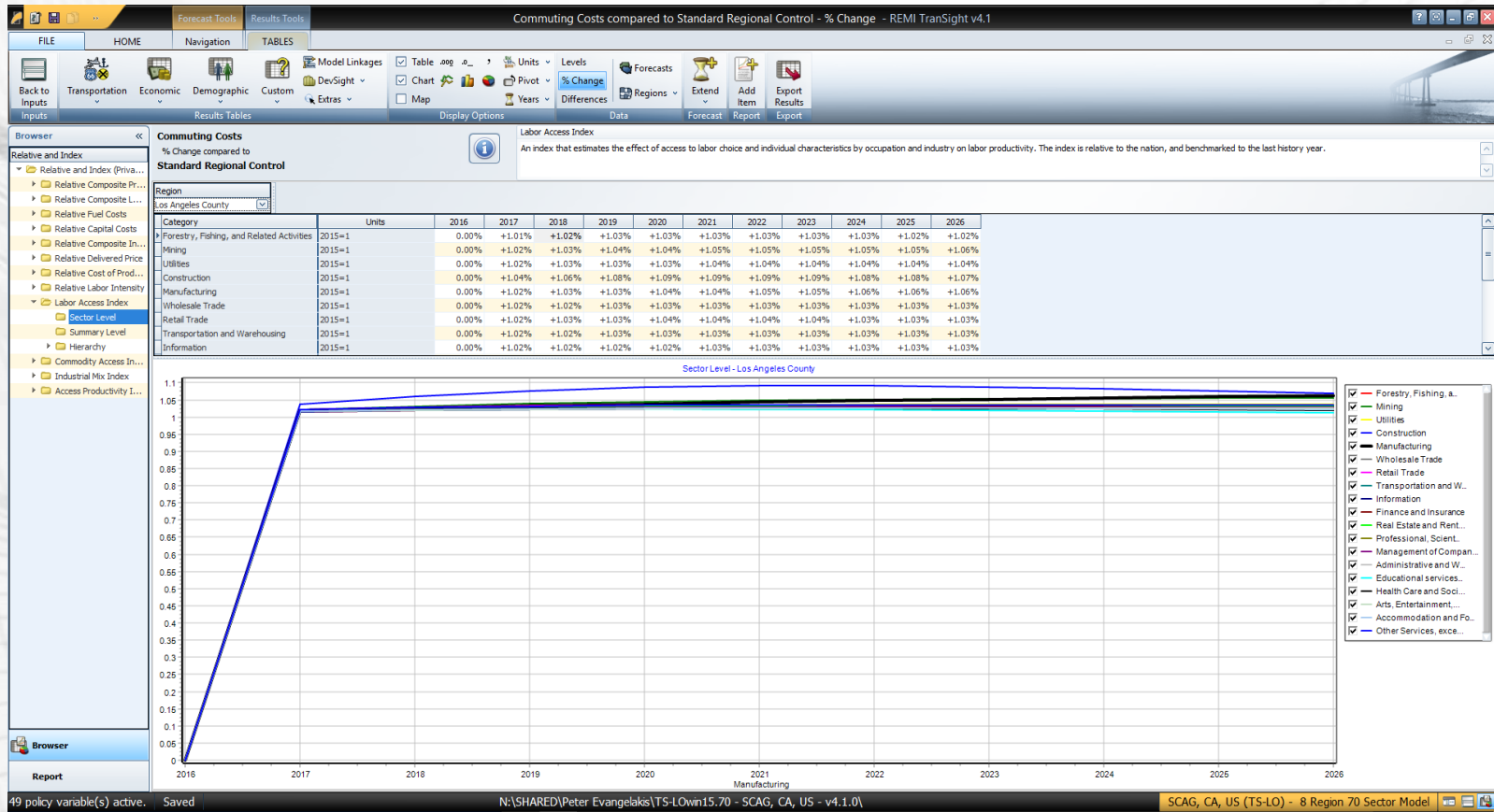


Commuting Costs

- 1% decrease in commuting costs among SoCal counties
- Increased access to labor lowers production costs, making business more competitive and raising output across the economy

Commuting Costs

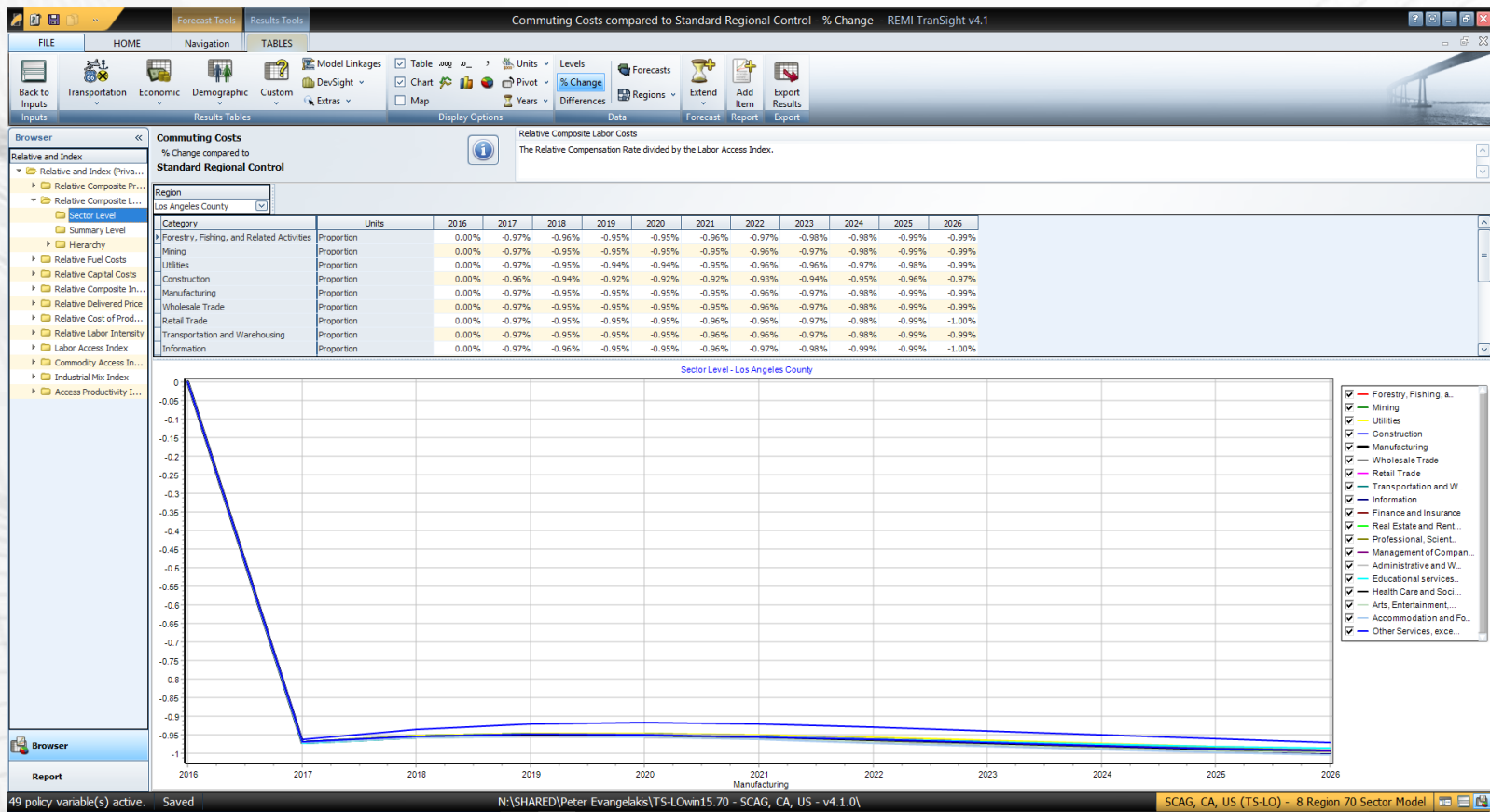
Lower commuting costs increase access to labor



what does REMI say? *sm*

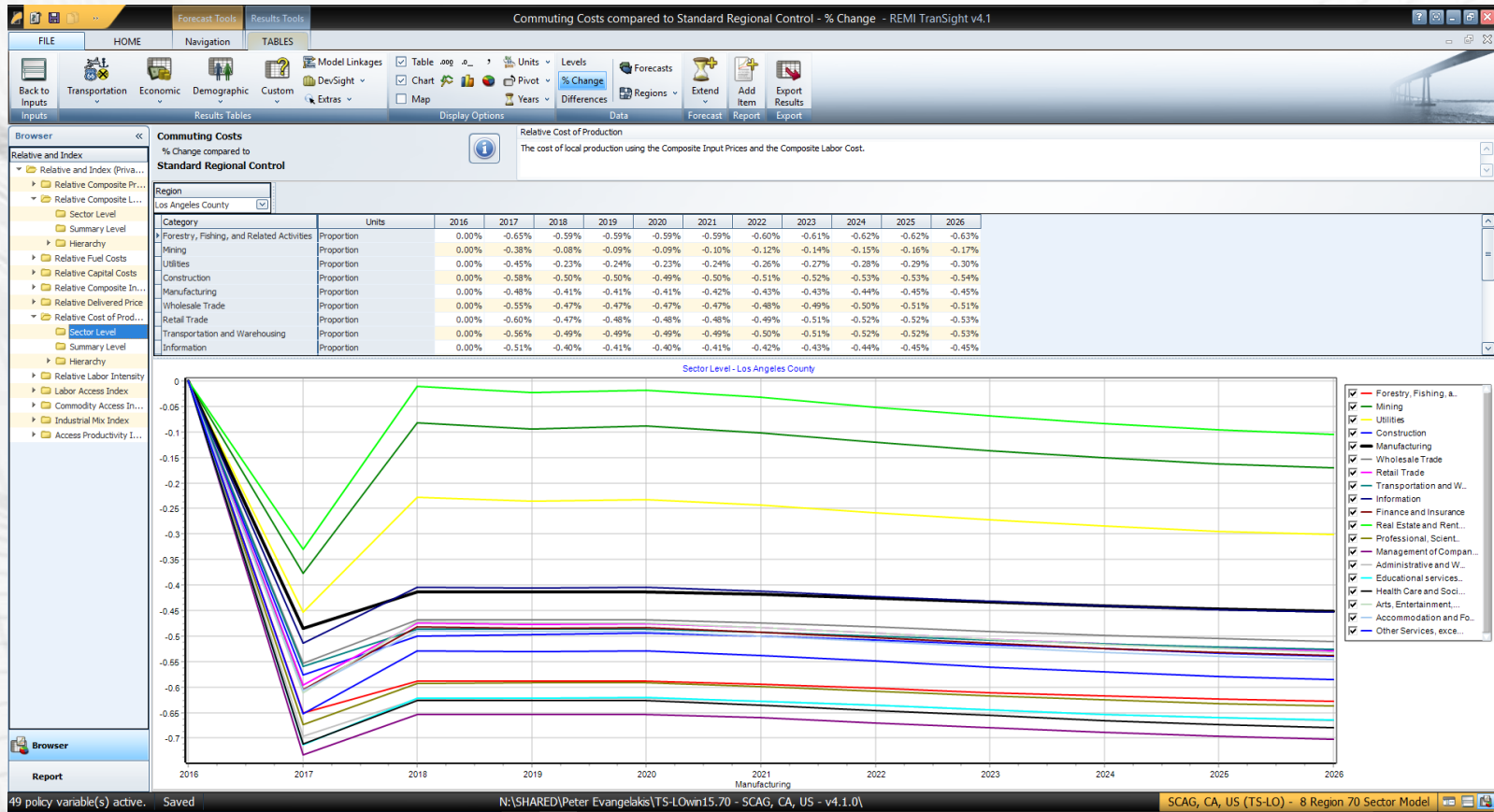
Commuting Costs

- Reduce labor costs by improving pool of potential employees



Commuting Costs

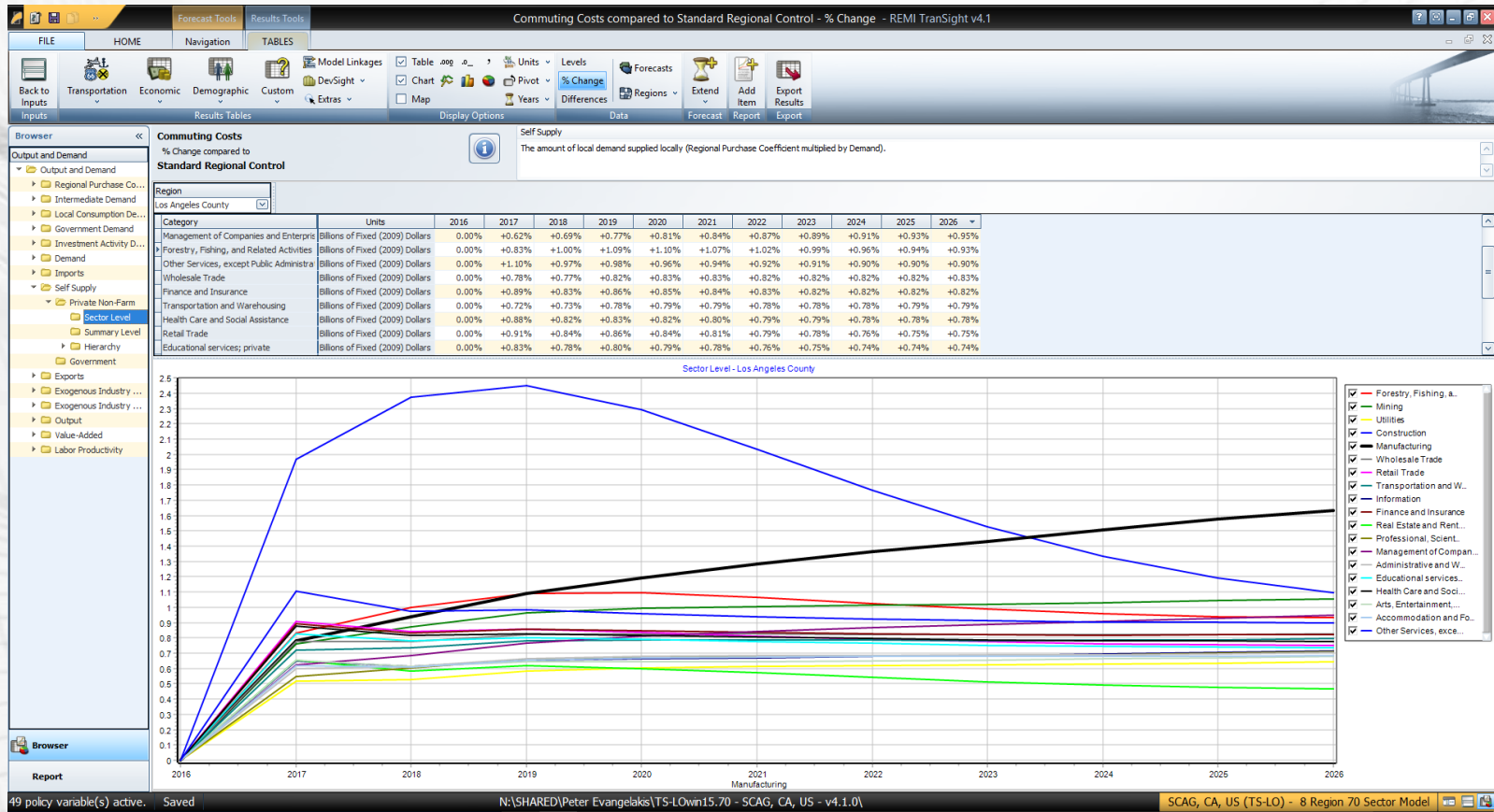
▣ This lowers production costs across all sectors



what does REMI say? sm

Commuting Costs

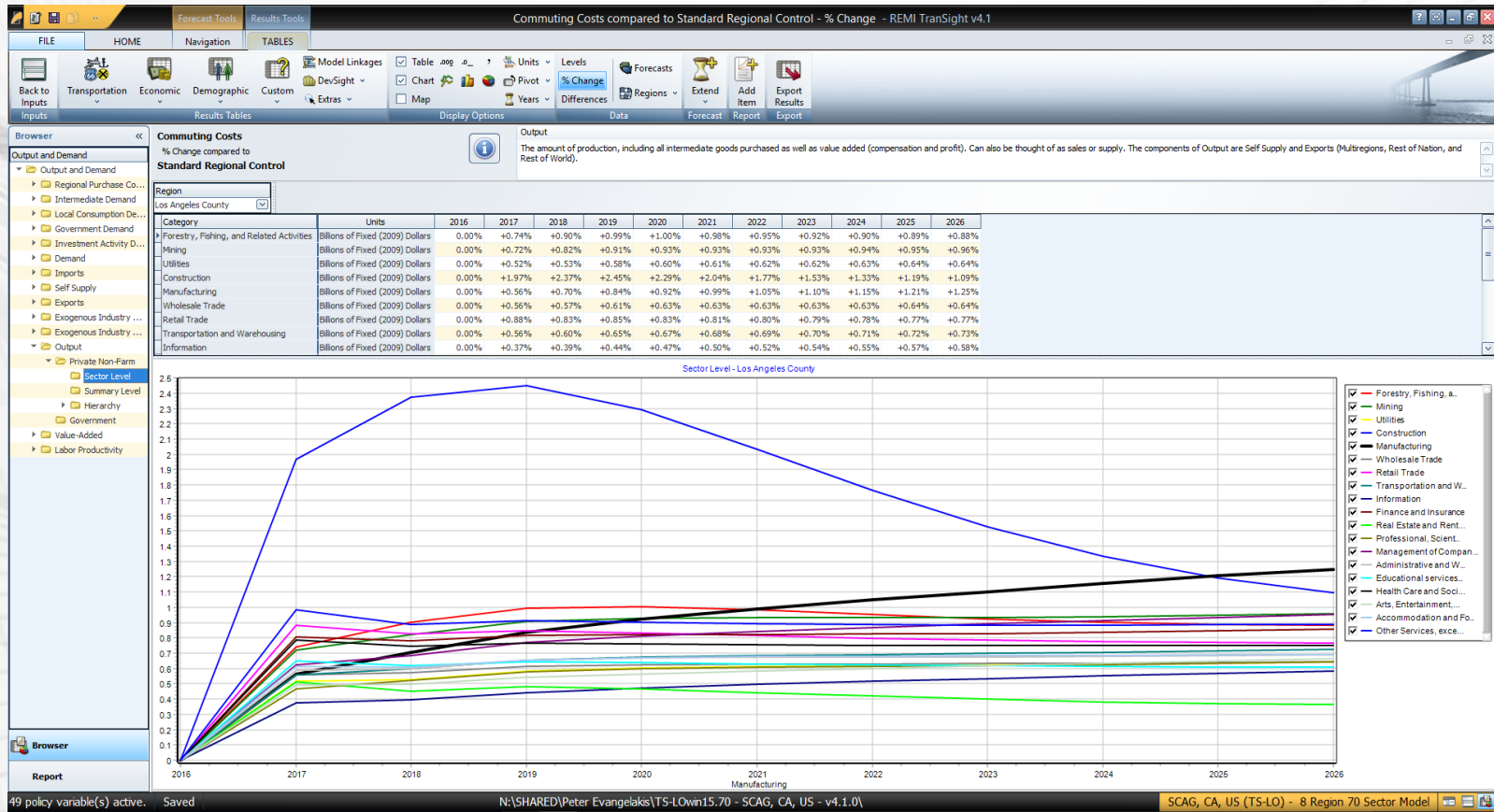
■ This makes businesses more competitive...



what does REMI say? sm

Commuting Costs

...which raises output




what does REMI say? sm

Demo Simulation



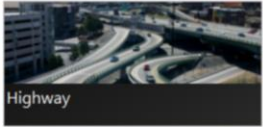
Start

Featured




Travel Demand

Create policy variables by importing data from a Travel Demand model.





Highway



Multi-Modal

Variables


Favorites 

Full List 


Model Linkages

Display a block diagram of the model structure. Clicking on an area of the diagram will show the policy variables related to that area.

Model Blocks


Labor and Capital Dem 

Featured




Travel Demand

Create policy variables by importing data from a Travel Demand model.



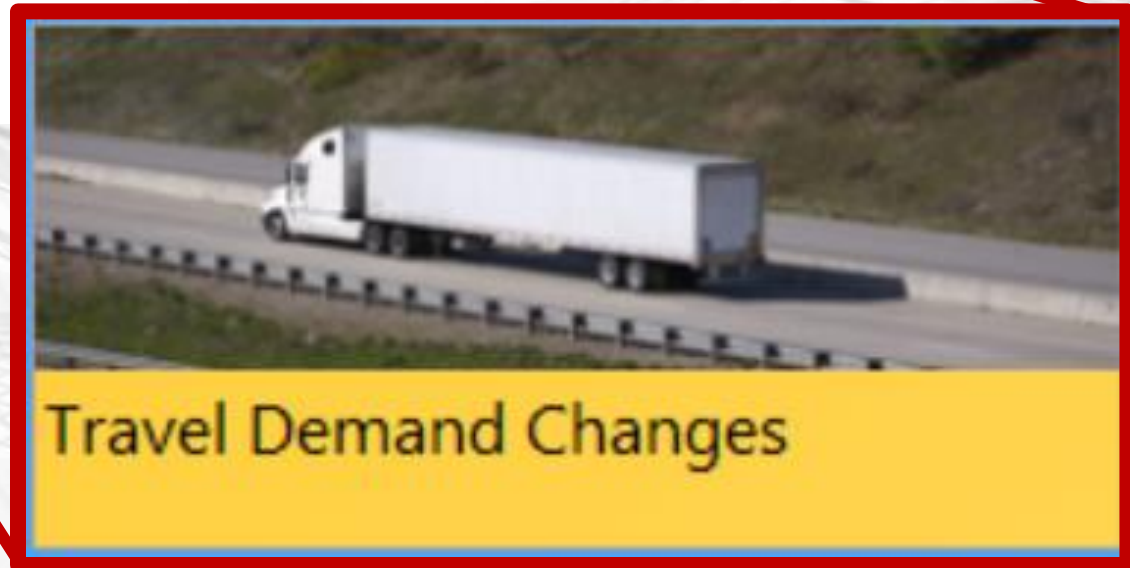
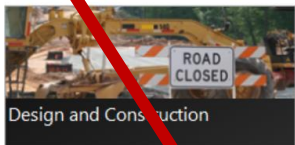
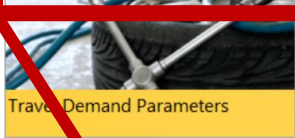
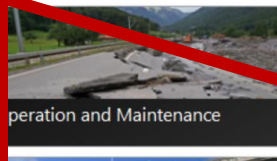
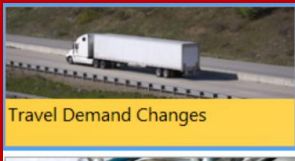
Highway



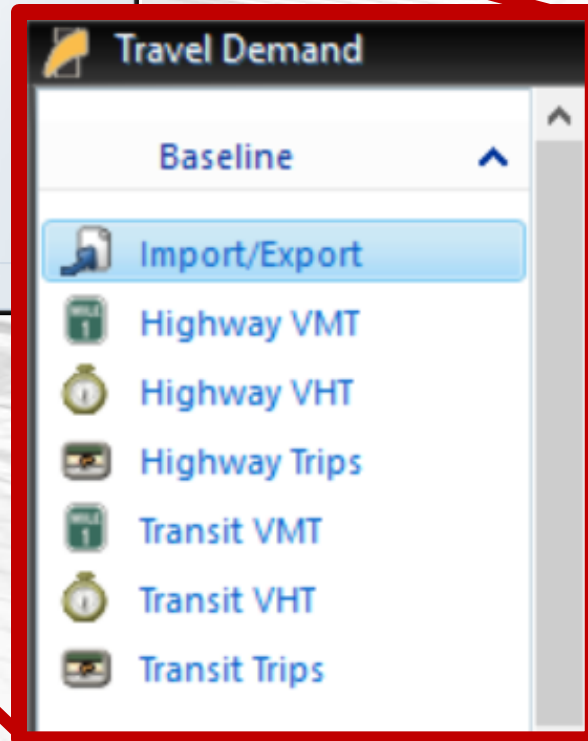
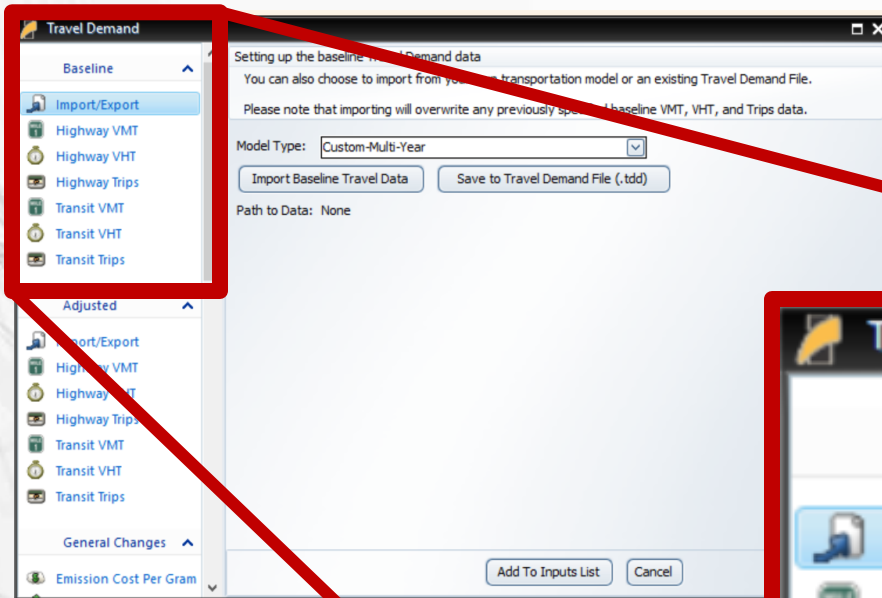
Multi-Modal

Demo Simulation

Travel Demand



Demo Simulation



Demo Simulation

Setting up the baseline Travel Demand data

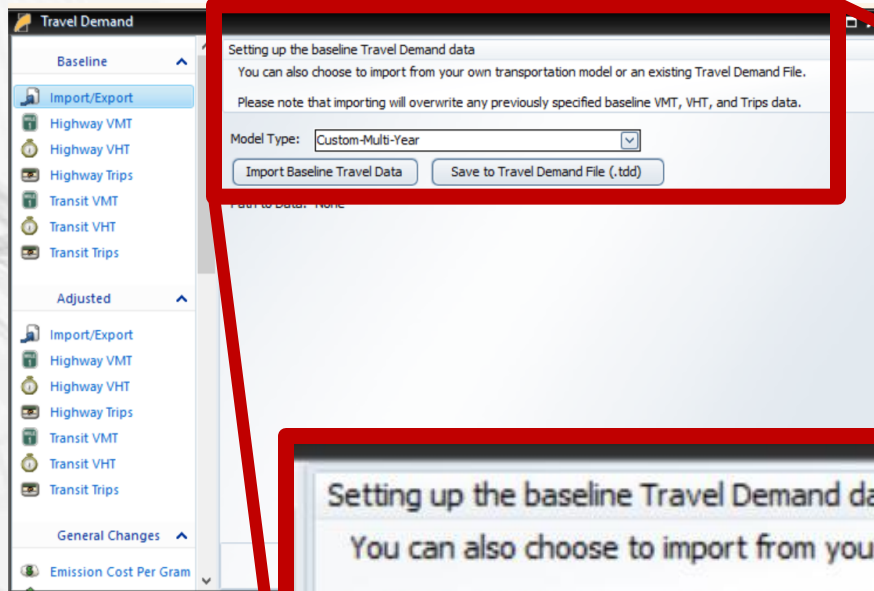
Here you can specify your baseline highway vehicle miles traveled (VMT). You can also choose to import from your own transportation model or an existing Travel Demand File.

Detail: Comparison:

Vehicle Miles Traveled (VMT)
(Miles)

Road Modes	Time Period	Destination	2015	2016	2017	2018	2019	2020
Auto	<input type="text" value="All Day"/>	<input type="text" value="Urban Counties"/>	0.000	0.000	0.000	0.000	0.000	0.000
Origin								
Urban Counties			0.000	0.000	0.000	0.000	0.000	0.000
Suburban Counties			0.000	0.000	0.000	0.000	0.000	0.000
Rural Counties			0.000	0.000	0.000	0.000	0.000	0.000

Demo Simulation



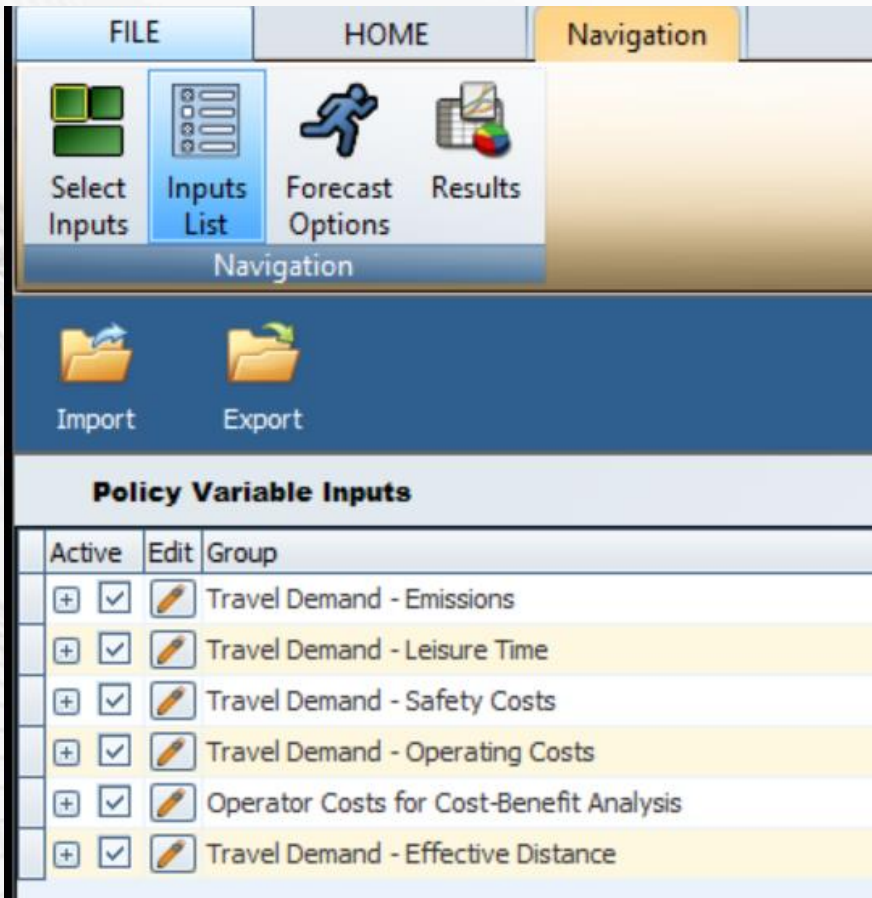
Setting up the baseline Travel Demand data

You can also choose to import from your own transportation model or an existing Travel Demand File.

Please note that importing will overwrite any previously specified baseline VMT, VHT, and Trips data.

Model Type:

Demo Simulation



The screenshot shows the software interface with the following elements:

- Navigation Ribbon:** Contains buttons for 'Select Inputs', 'Inputs List' (highlighted), 'Forecast Options', and 'Results'.
- Import/Export:** Buttons for 'Import' and 'Export'.
- Policy Variable Inputs Table:**

Active	Edit	Group
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Travel Demand - Emissions
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Travel Demand - Leisure Time
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Travel Demand - Safety Costs
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Travel Demand - Operating Costs
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Operator Costs for Cost-Benefit Analysis
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Travel Demand - Effective Distance

- Model Inputs
 - Emissions (\$)
 - Leisure Amenity (\$)
 - Safety Costs (\$)
- Effective Distance (proportion)

Demo Simulation



Travel Demand - Operating Costs									
Active	View	Category	Detail	Region	Units	2015	2016	2017	2018
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumer Spending (amount)	Motor vehicle fuels, lubricants, and fluids	Urban Counties	2009 Chained National \$ (M)	-3.9125702	-5.8691458	-7.7813332	-9.7225746
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumer Spending (amount)	Motor vehicle maintenance and repair	Urban Counties	2009 Chained National \$ (M)	-1.3988521	-1.5595834	-1.7226564	-1.8880964
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumption Reallocation (amount)	All Consumption Categories	Urban Counties	2009 Chained National \$ (M)	5.3114224	7.4287293	9.5039896	11.610671
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumer Spending (amount)	Motor vehicle fuels, lubricants, and fluids	Suburban Counties	2009 Chained National \$ (M)	-1.9160366	-2.4103972	-3.0425621	-3.6832292
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumer Spending (amount)	Motor vehicle maintenance and repair	Suburban Counties	2009 Chained National \$ (M)	-0.2486382	-0.3044537	-0.3613273	-0.4192742
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumption Reallocation (amount)	All Consumption Categories	Suburban Counties	2009 Chained National \$ (M)	2.1646749	2.7148510	3.4038895	4.1025034
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumer Spending (amount)	Motor vehicle fuels, lubricants, and fluids	Rural Counties	2009 Chained National \$ (M)	0.9730131	0.9220419	0.8669707	0.8106829
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumer Spending (amount)	Motor vehicle maintenance and repair	Rural Counties	2009 Chained National \$ (M)	0.3184674	0.2905658	0.2621390	0.2331799
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Consumption Reallocation (amount)	All Consumption Categories	Rural Counties	2009 Chained National \$ (M)	-1.2943806	-1.2106078	-1.1291098	-1.0438628

Motor vehicle fuels, lubricants, and fluids	Urban Counties
Motor vehicle maintenance and repair	Urban Counties
All Consumption Categories	Urban Counties

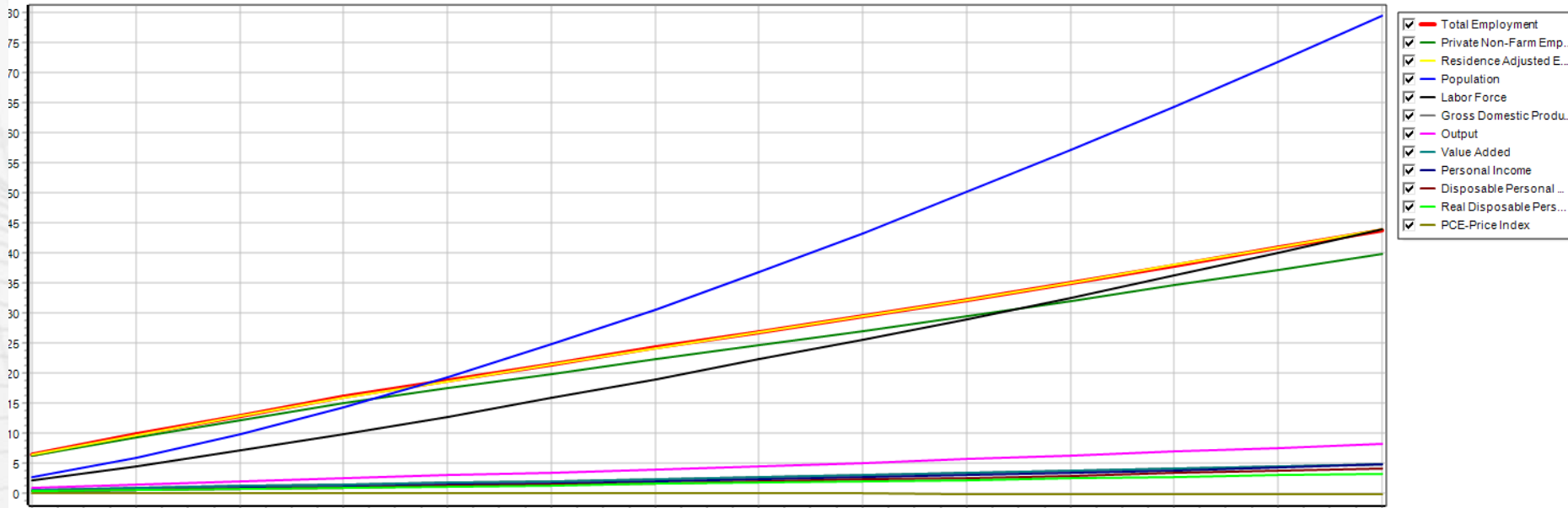
Demo Simulation



Region
All Regions

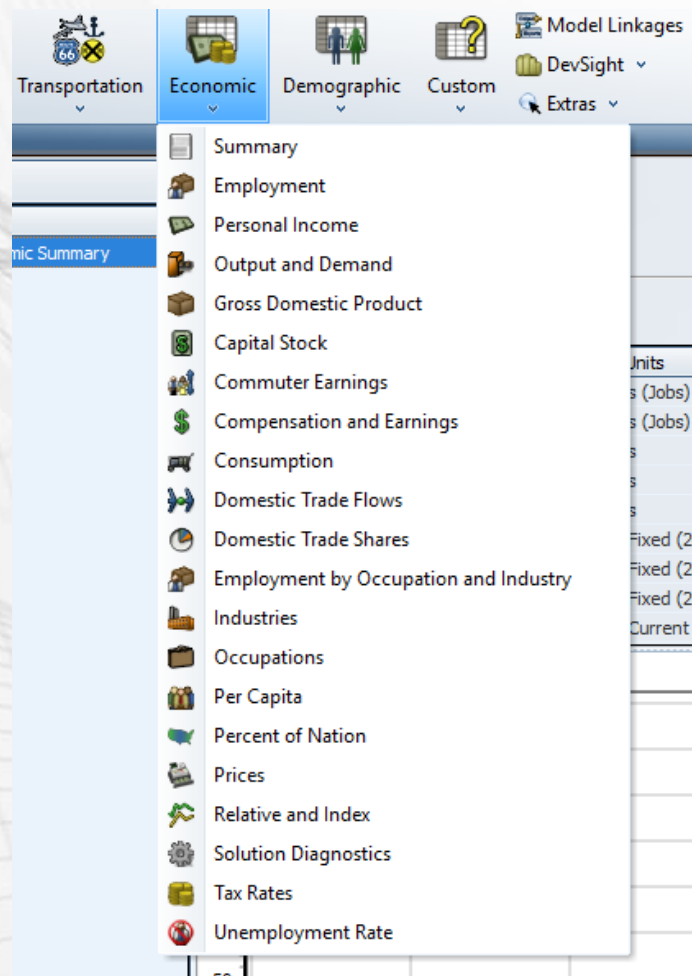
Category	Units	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Employment	Thousands (Jobs)	+6.403	+9.696	+12.883	+15.945	+18.731	+21.456	+24.163	+26.746	+29.433	+32.160	+34.978	+37.883	+40.778	+43.733
Private Non-Farm Employment	Thousands (Jobs)	+6.156	+9.188	+12.107	+14.892	+17.409	+19.861	+22.295	+24.605	+27.005	+29.438	+31.958	+34.555	+37.138	+39.776
Residence Adjusted Employment	Thousands	+6.310	+9.572	+12.745	+15.802	+18.595	+21.335	+24.063	+26.671	+29.387	+32.144	+34.996	+37.940	+40.874	+43.868
Population	Thousands	+2.548	+5.803	+9.706	+14.216	+19.236	+24.697	+30.549	+36.752	+43.268	+50.062	+57.094	+64.334	+71.782	+79.444
Labor Force	Thousands	+2.097	+4.416	+7.018	+9.725	+12.675	+15.784	+18.978	+22.222	+25.574	+28.981	+32.538	+36.251	+40.045	+43.888
Gross Domestic Product	Billions of Fixed (2009) \$	+0.530	+0.819	+1.119	+1.421	+1.714	+2.011	+2.316	+2.631	+2.961	+3.305	+3.666	+4.043	+4.431	+4.841
Output	Billions of Fixed (2009) \$	+0.906	+1.395	+1.904	+2.416	+2.912	+3.414	+3.930	+4.462	+5.016	+5.595	+6.211	+6.855	+7.523	+8.230
Value Added	Billions of Fixed (2009) \$	+0.530	+0.819	+1.119	+1.421	+1.714	+2.011	+2.316	+2.631	+2.961	+3.305	+3.666	+4.043	+4.431	+4.841
Personal Income	Billions of Current Dollars	+0.322	+0.539	+0.774	+1.033	+1.299	+1.580	+1.879	+2.205	+2.551	+2.922	+3.331	+3.762	+4.226	+4.728

Economic Summary - All Regions



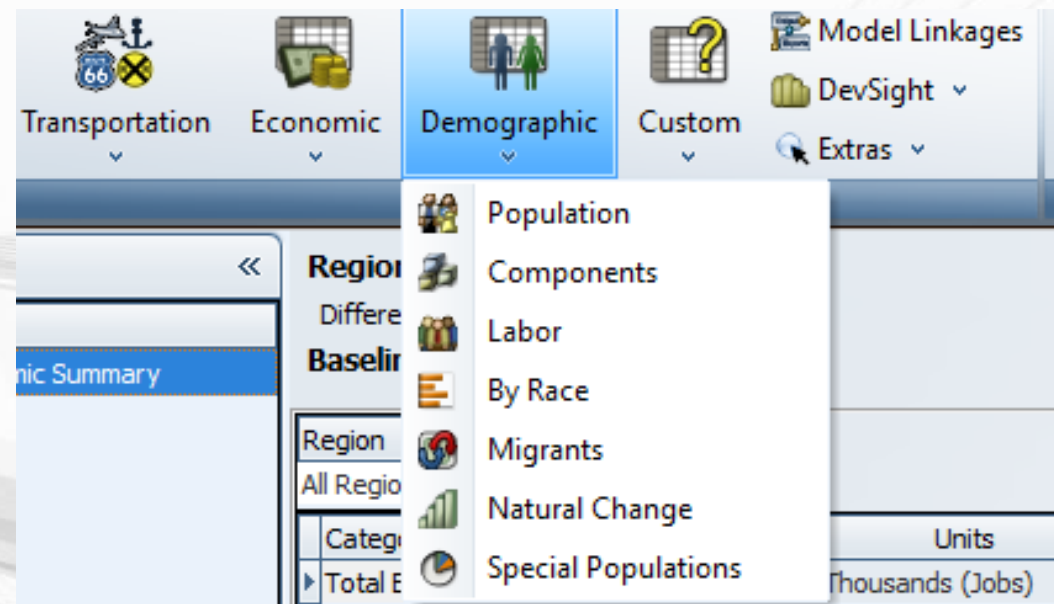
what does REMI say? sm

Demo Simulation



The screenshot shows the 'Economic' menu open in the REMI software. The menu items are:

- Summary
- Employment
- Personal Income
- Output and Demand
- Gross Domestic Product
- Capital Stock
- Commuter Earnings
- Compensation and Earnings
- Consumption
- Domestic Trade Flows
- Domestic Trade Shares
- Employment by Occupation and Industry
- Industries
- Occupations
- Per Capita
- Percent of Nation
- Prices
- Relative and Index
- Solution Diagnostics
- Tax Rates
- Unemployment Rate



The screenshot shows the 'Demographic' menu open in the REMI software. The menu items are:

- Population
- Components
- Labor
- By Race
- Migrants
- Natural Change
- Special Populations

Below the menu, there is a table with the following columns and rows:

Region	Differe
Baselir	
Region	
All Regio	
Categ	
Total E	

Units
Thousands (Jobs)

what does **REMI** say? sm

Demo Simulation

Transportation
 Economic
 Demographic
 Custom

- Benefit-Cost Analysis**
- Transportation Summary
- Domestic Trade Flows
- Domestic Trade Shares

Inputs

2015 Fixed National \$ (M)

Cost	Benefit	Cost / Benefit	Variables	Detail	Region	2015	2k
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Emissions	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Urban Counties	-0.943	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Emissions	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Suburban Counties	-0.030	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Emissions	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Rural Counties	-0.903	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Travel Time Savings	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Urban Counties	33.340	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Travel Time Savings	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Suburban Counties	41.213	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Travel Time Savings	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Rural Counties	7.533	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safety Benefits	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Urban Counties	6.014	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safety Benefits	Non-Pecuniary (Amenity) Aspects (relative to comp Total		Suburban Counties	1.071	

Custom Benefits/Costs [Edit...](#)

Results

Parameters	
Discount Rate	7%
Analysis Period	14
Evaluation Year	2015
Evaluation from 2015 to 2028	
Total Benefits, Mil PV\$	3617.68
Emissions Benefits, Mil PV\$	-1.27
Safety Benefits, Mil PV\$	115.87
Vehicle Operating Cost Savings, Mil PV\$	270.33
Maintenance Costs, Mil PV\$	0.00
Travel Time Savings, Mil PV\$	3232.74
Other Benefits, Mil PV\$	0.00
Total Costs, Mil PV\$	0.00
Design & Construction Costs, Mil PV\$	0.00
Land Acquisition Costs, Mil PV\$	0.00
Custom Costs, Mil PV\$	0.00
Benefit-Cost Ratio	0.00

Benefit-Cost Analysis

Benefit-Cost Analysis is an economic tool for evaluating possible projects by comparing their total benefits with their total cost over a period of time. This analysis considers only the direct benefits and direct costs associated with a project, according to the FWHG guidelines. A discount rate is used to calculate the total present value of the benefits of a project to society and the total present value of the costs of designing and constructing the project. Benefits may include changes to the environment due to changes in emissions, vehicle operating cost savings, safety benefits, travel time savings, and maintenance costs/savings. A Benefit-Cost Ratio can be calculated using the net present value of the benefits divided by the net present value of the costs which can be used to evaluate a project's economic merit.

OK Cancel

Conclusion & Model Demo

Any questions or areas of the model people are curious about?