

# REMI RESEARCH & DEVELOPMENT

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# Agenda

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Introduction

New features and changes

Looking in 2022

*what does **REMI** say?<sup>sm</sup>*

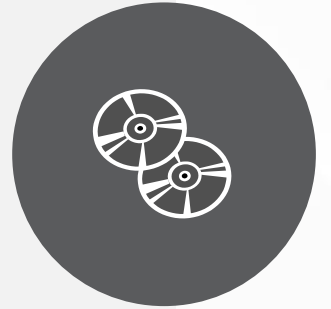


## Model Development

- Annual data updates
- Estimating coefficients
- Research

## Model Fulfillment

- Building
- Testing
- Shipping



## Software Development

- New features
- Software improvements
- New products

## More

- Macroeconomic updates
- Model support
- Internal projects



# Agenda

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Introduction

New features and changes

Looking in 2022

*what does **REMI** say?<sup>sm</sup>*

- Incorporated BLS 2019-2029 employment projections
- Incorporated BEA's comprehensive update to Local Area Personal Income 2001-2019
- Incorporated BEA's annual update of GDP by county to 2019 GDP
- Revised the detailed occupation list according to the BLS Occupational Employment Statistics (OES) 2019 estimates

# Consumption equation re-estimation

- Re-estimated consumption equation parameters
  - Income elasticities
  - Price elasticities
  - Regional effects
- Previously estimated for last history year 2012

$$C_{j,t}^k = \left\{ \begin{array}{l} \text{(1). Calibration Effect} \\ \left[ \frac{YD_T^k}{N_T^k} \right] \\ \frac{\left[ \frac{YD_T^k}{N_T^k} \right]}{\left[ \frac{YD_T^u}{N_T^u} \right]} * \left[ \frac{\sum_{l=1}^7 (\%DG_{l,t}^k * PC_{l,j}^u)}{\sum_{l=1}^7 (\%DG_{l,t}^u * PC_{l,j}^u)} \right] \\ \text{(2). Age Composition Effect} \\ * \left[ \frac{c_{j,2012}^R}{c_{j,2012}^u} \right] \\ \text{(3). Regional Effect} \\ * \left[ \frac{\left( \frac{RYD_t^k + FDPVR_t^k}{N_t^k} \right)}{\left( \frac{RYD_T^k}{N_T^k} \right)} \right]^{\beta_j} \\ \text{(4). Marginal Income Effect} \\ * \left[ \frac{\left( \frac{RYD_t^u}{N_t^u} \right)}{\left( \frac{RYD_T^u}{N_T^u} \right)} \right] \\ \text{(5). Region-Specific Marginal Price Effect} \\ * \left[ \frac{\left( \frac{CIFP_{j,t}^k * CPPV_{j,t}^k}{P_t^{-k}} \right)}{\left( \frac{P_{j,T}^k}{P_T^{-k}} \right)} \right]^{\gamma_j} \\ \text{(6). U.S. Forecast Effect} \\ * \left( \frac{C_{j,t}^u}{N_t^u} \right) * N_t^k \\ \text{(7). Local Population Effect} \end{array} \right\} + FDPVC_{j,t}^k$$

\* More information can be found in the Consumption Equation Estimation document in the model.

# New results categories

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- Direct, Indirect, Induced, and Dynamic Effects
  - Output
  - Employment
- Type I, Type II, and Dynamic Multipliers
  - Output
  - Employment

# List of variables that work with Induced and Direct variables



## Employment

- Industry Employment
- State and Local Government Employment
- Federal Civilian Government Employment
- Federal Military Government Employment
- Farm Employment



## Sales

- Industry Sales
- State and Local Government Output
- Federal Civilian Government Output
- Federal Military Government Output
- Farm Output





- Scenario: 5 million increase in construction production
- Policy Variable: Industry Sales
- Period: 2020 – 2024
- Region: Urban Counties
- Model: v2.5 PI+ demo model

# Direct Output



- Sum of the output policy variables entered by the user
- Example: 5 million output increase

Category	Units	2020	2021	2022	2023	2024
Direct Output	Millions of Fixed Local (2020) Dollars	5	5	5	5	5

# Indirect Output

- Locally supplied output used to satisfy the intermediate demand generated by the direct output.
- Calculated using the input-output column, RPC for each of the input industries, and the direct effects

Category	Units	2020	2021	2022	2023	2024
Indirect Output	Millions of Fixed Local (2020) Dollars	0.91	0.91	0.91	0.91	0.91

# Induced Output

- Locally supplied output used to satisfy the local consumption demand generated by the direct and indirect employment
- Calculated using local consumption demand and RPC
- Each year the induced impact will accumulate some dynamic effects

Category	Units	2020	2021	2022	2023	2024
Induced Output	Millions of Fixed Local (2020) Dollars	2.37	2.19	2.39	2.51	2.6

# Dynamic Output



- Sum of the output changes that are caused by the dynamic model effects
- Calculated as: Total Output – Sum (Direct + Indirect + Induced Outputs)

Category	Units	2020	2021	2022	2023	2024
Total Output	Millions of Fixed Local (2020) Dollars	10.33	10.44	10.7	10.67	10.55
Sum of Direct, Indirect, and Induced Outputs	Millions of Fixed Local (2020) Dollars	8.28	8.1	8.3	8.42	8.51
Dynamic Output	Millions of Fixed Local (2020) Dollars	2.05	2.34	2.4	2.25	2.04

# Multipliers (Output and Employment)

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- Type I : 
$$\frac{\textit{Direct} + \textit{Indirect}}{\textit{Direct}}$$

- Type II : 
$$\frac{\textit{Direct} + \textit{Indirect} + \textit{Induced}}{\textit{Direct}}$$

- Dynamic: 
$$\frac{\textit{Direct} + \textit{Indirect} + \textit{Induced} + \textit{Dynamic}}{\textit{Direct}}$$

# Multipliers Example



Category	Units	2020	2021	2022	2023	2024
Type I Output Multiplier	Proportion	1.21	1.21	1.21	1.21	1.21
Type II Output Multiplier	Proportion	1.66	1.63	1.67	1.69	1.7
Dynamic Output Multiplier	Proportion	2.16	2.18	2.24	2.23	2.21

what does **REMI** say?<sup>sm</sup>

- Released a new macroeconomic update for creating new national control in May
- Better measure of the rapidly changing economy
- Used update information from:
  - U.S. Economic Outlook for 2021-2023 from the University of Michigan's Research Seminar in Quantitative Economics (RSQE) release on May 21, 2021
  - The Long-Term Economic Projections from CBO
  - Updated BEA data for 2020 (revised on May 27, 2021)
- The updates can be downloaded from <https://www.remi.com/forecast-updates/>



# Model Shipping

Using SharePoint  
for shipping the  
models



File Organization - All your models are stored at one place



Data Security - Models are only available to specified person



Archiving – Models will be available for a longer time

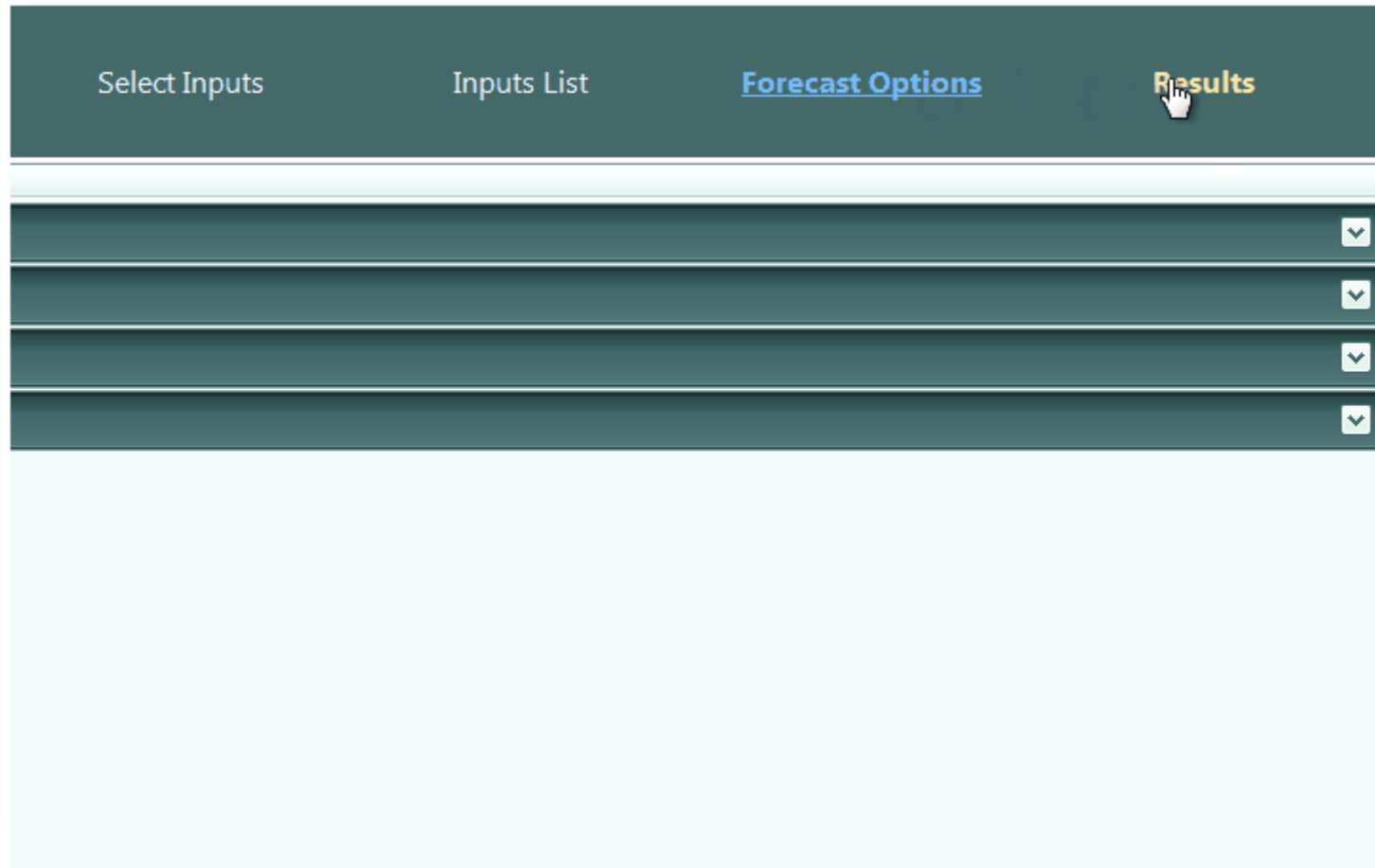
# New features demo

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- A quick model demonstration to show off the new features and software interface changes
- Part 1: Create new national and regional control
- Part 2: Create new regional simulation
- Part 3: View simulation Results
- Part 4: Use import/export tools

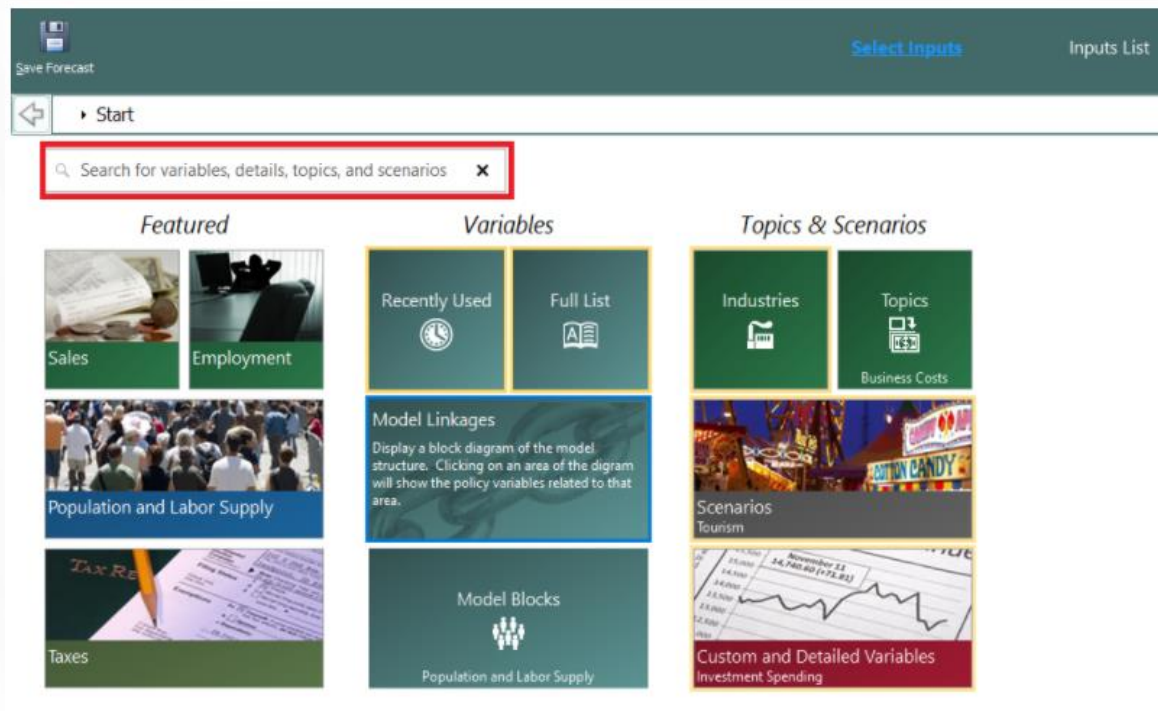
# Highlighting and underling of forecast tabs

- Underline the current section and highlight the section being hovered over



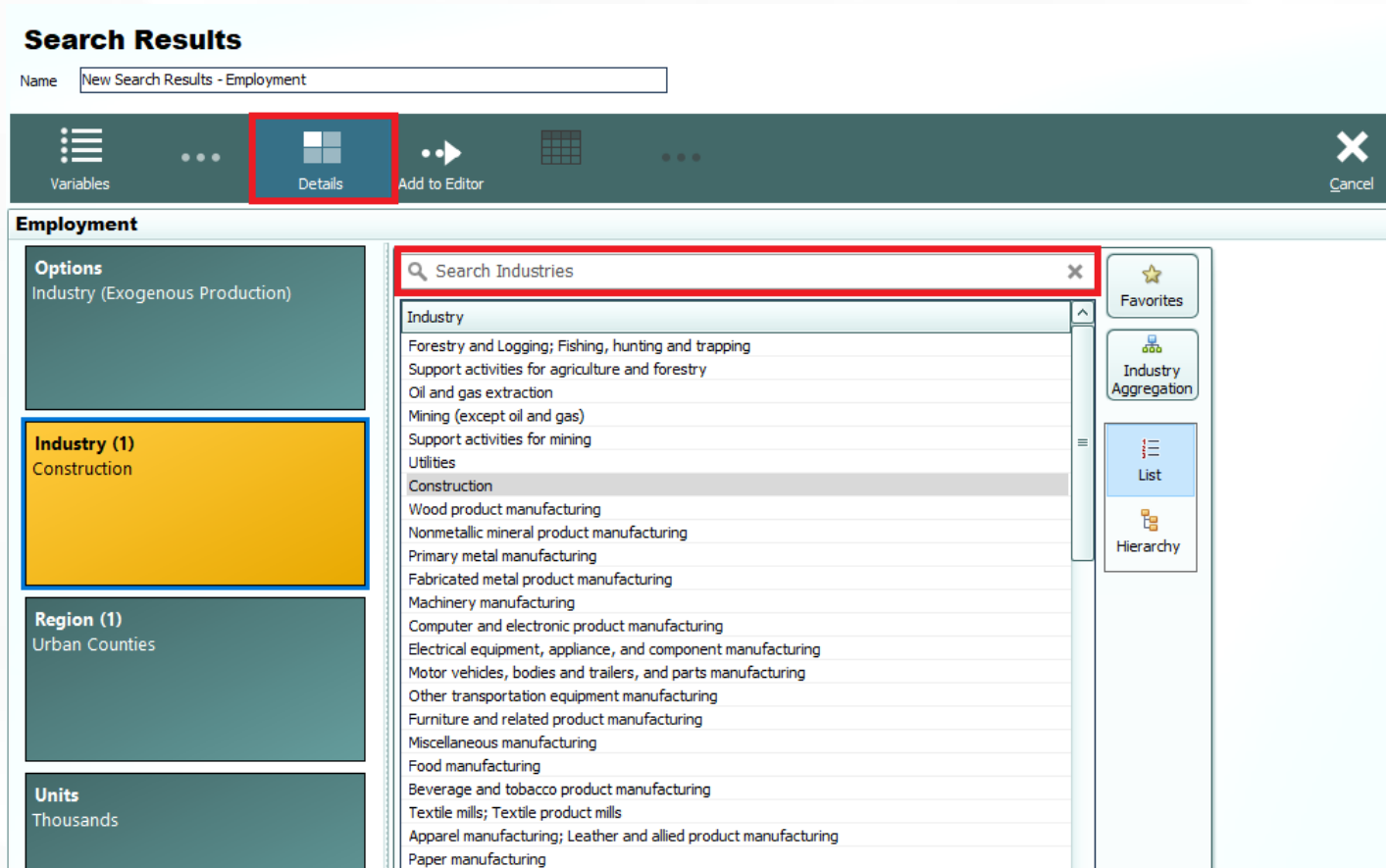
# Redesigned inputs layout

- Removed some tiles to help focus on most important tiles
- Added Inputs Search feature
- Added 'Recently Used' tile



# Policy variables detail search

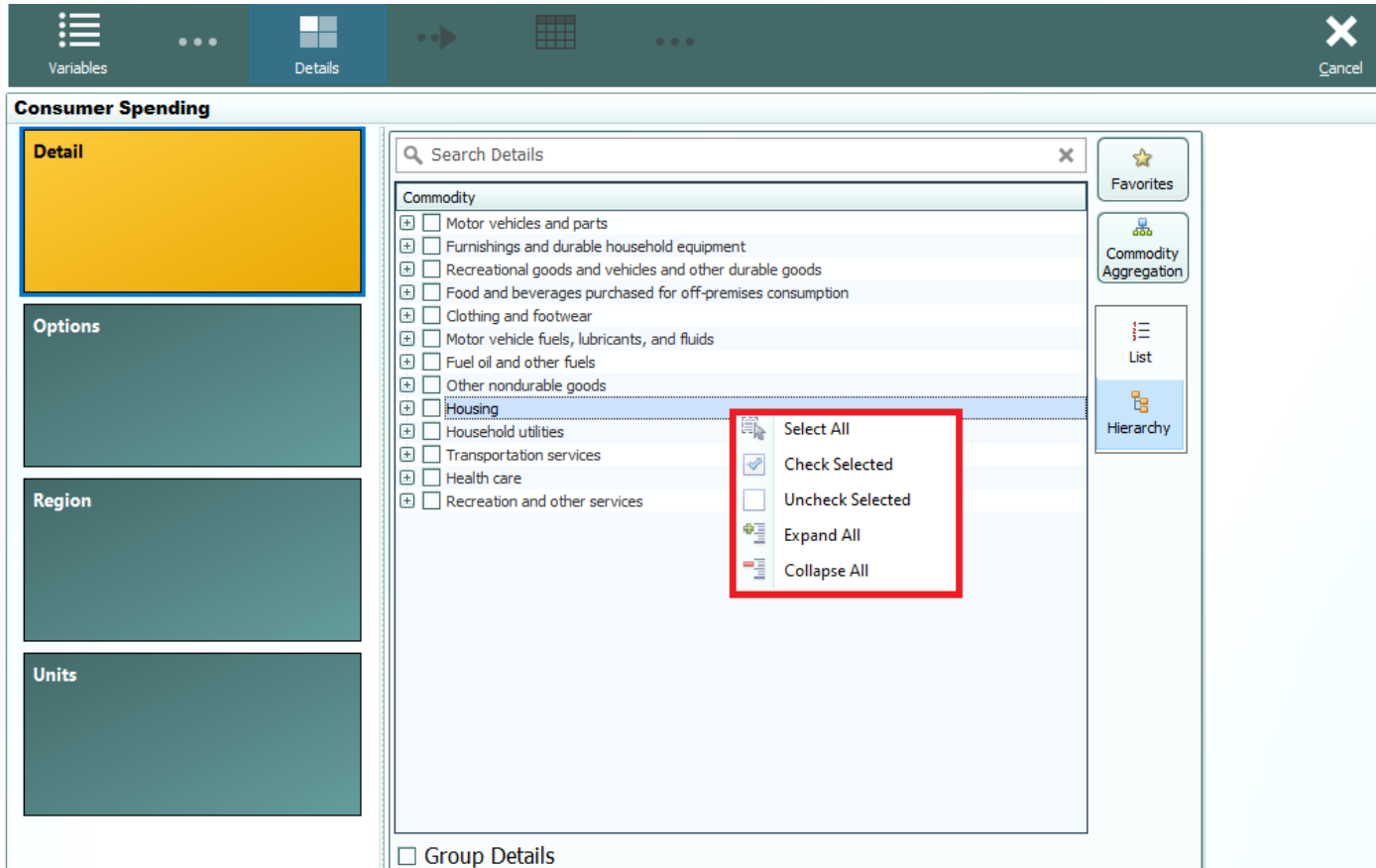
- Search box added to policy variable detail lists to help find specific details when specifying policy variables



The screenshot displays the 'Search Results' interface for 'New Search Results - Employment'. The interface includes a top navigation bar with 'Variables', 'Details' (highlighted with a red box), 'Add to Editor', and 'Cancel' buttons. Below this, the 'Employment' section is visible, containing several panels: 'Options' (Industry (Exogenous Production)), 'Industry (1)' (Construction, highlighted with a blue box), 'Region (1)' (Urban Counties), and 'Units' (Thousands). A search box labeled 'Search Industries' (highlighted with a red box) is positioned above a list of industries. The list includes: Forestry and Logging; Fishing, hunting and trapping; Support activities for agriculture and forestry; Oil and gas extraction; Mining (except oil and gas); Support activities for mining; Utilities; Construction (highlighted with a grey background); Wood product manufacturing; Nonmetallic mineral product manufacturing; Primary metal manufacturing; Fabricated metal product manufacturing; Machinery manufacturing; Computer and electronic product manufacturing; Electrical equipment, appliance, and component manufacturing; Motor vehicles, bodies and trailers, and parts manufacturing; Other transportation equipment manufacturing; Furniture and related product manufacturing; Miscellaneous manufacturing; Food manufacturing; Beverage and tobacco product manufacturing; Textile mills; Textile product mills; Apparel manufacturing; Leather and allied product manufacturing; Paper manufacturing. On the right side of the industry list, there are buttons for 'Favorites', 'Industry Aggregation', 'List', and 'Hierarchy'.

# Policy variable menus

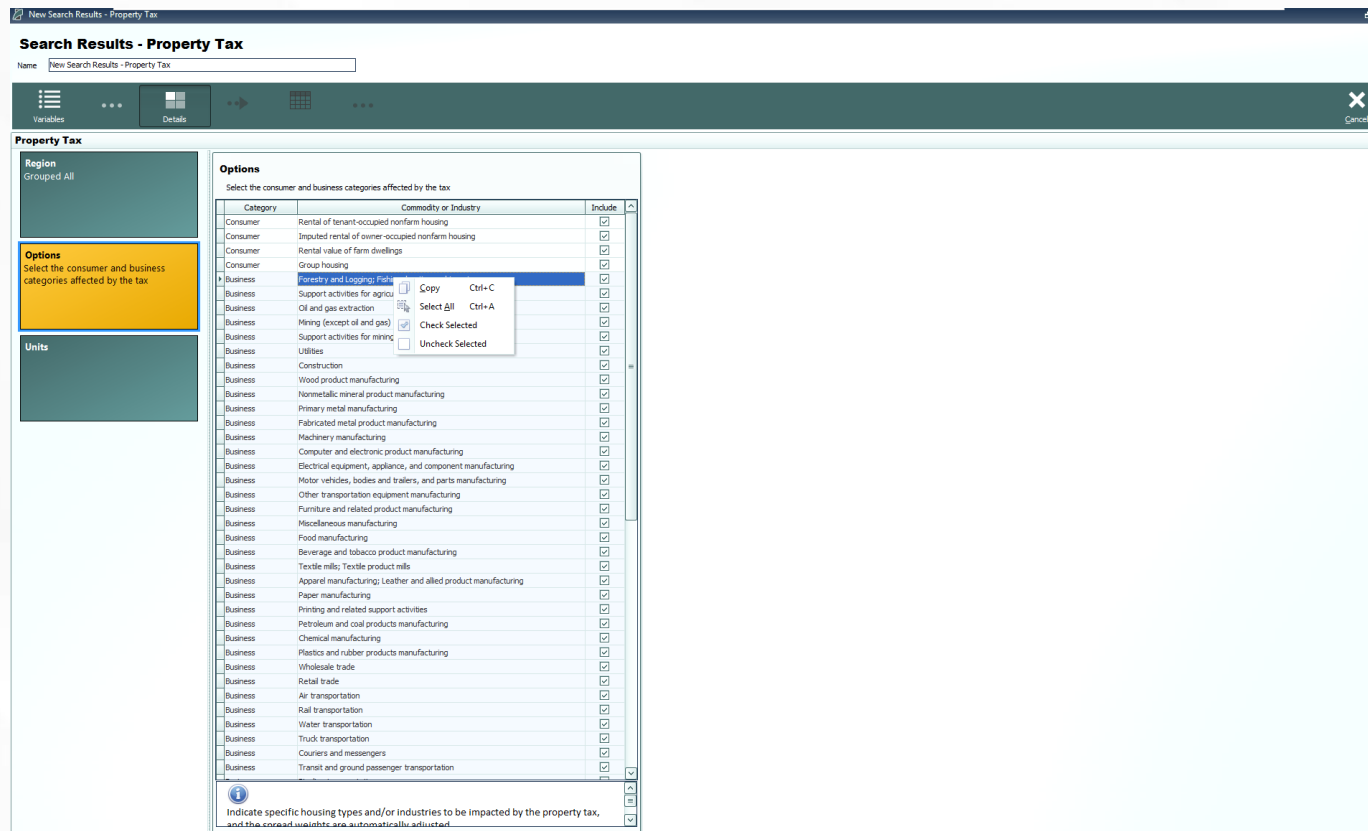
- Right-click menu added to more easily make changes to hierarchical list



The screenshot displays the 'Consumer Spending' section of the REMI software. The interface includes a top navigation bar with 'Variables' and 'Details' tabs, and a 'Cancel' button. The main content area is divided into several panels: 'Detail' (highlighted in orange), 'Options', 'Region', and 'Units'. The 'Detail' panel contains a search bar and a list of commodity categories with checkboxes. A right-click context menu is open over the 'Housing' category, listing actions: 'Select All', 'Check Selected', 'Uncheck Selected', 'Expand All', and 'Collapse All'. The 'Housing' category is expanded, showing sub-items like 'Household utilities', 'Transportation services', 'Health care', and 'Recreation and other services'. A 'Group Details' checkbox is visible at the bottom of the list.

# Tax policy variables

- Sales Tax, Gas Tax, and Property Tax policy variables can now be created with grouped regions
- Right-click menu has been added to more easily adjust selected industries and commodities



**Property Tax**

Region: Grouped All

**Options**  
Select the consumer and business categories affected by the tax

Category	Commodity or Industry	Include
Consumer	Rental of tenant-occupied nonfarm housing	<input checked="" type="checkbox"/>
Consumer	Imputed rental of owner-occupied nonfarm housing	<input checked="" type="checkbox"/>
Consumer	Rental value of farm dwellings	<input checked="" type="checkbox"/>
Consumer	Gross housing	<input checked="" type="checkbox"/>
Business	Forestry and Logging; Fish	<input checked="" type="checkbox"/>
Business	Support activities for agriculture	<input checked="" type="checkbox"/>
Business	Oil and gas extraction	<input checked="" type="checkbox"/>
Business	Mining (except oil and gas)	<input checked="" type="checkbox"/>
Business	Support activities for mining	<input checked="" type="checkbox"/>
Business	Utilities	<input checked="" type="checkbox"/>
Business	Construction	<input checked="" type="checkbox"/>
Business	Wood product manufacturing	<input checked="" type="checkbox"/>
Business	Nonmetallic mineral product manufacturing	<input checked="" type="checkbox"/>
Business	Primary metal manufacturing	<input checked="" type="checkbox"/>
Business	Fabricated metal product manufacturing	<input checked="" type="checkbox"/>
Business	Machinery manufacturing	<input checked="" type="checkbox"/>
Business	Computer and electronic product manufacturing	<input checked="" type="checkbox"/>
Business	Electrical equipment, appliance, and component manufacturing	<input checked="" type="checkbox"/>
Business	Motor vehicles, bodies and trailers, and parts manufacturing	<input checked="" type="checkbox"/>
Business	Other transportation equipment manufacturing	<input checked="" type="checkbox"/>
Business	Furniture and related product manufacturing	<input checked="" type="checkbox"/>
Business	Miscellaneous manufacturing	<input checked="" type="checkbox"/>
Business	Food manufacturing	<input checked="" type="checkbox"/>
Business	Beverage and tobacco product manufacturing	<input checked="" type="checkbox"/>
Business	Textile mills; Textile product mills	<input checked="" type="checkbox"/>
Business	Apparel manufacturing; Leather and allied product manufacturing	<input checked="" type="checkbox"/>
Business	Paper manufacturing	<input checked="" type="checkbox"/>
Business	Printing and related support activities	<input checked="" type="checkbox"/>
Business	Petroleum and coal products manufacturing	<input checked="" type="checkbox"/>
Business	Chemical manufacturing	<input checked="" type="checkbox"/>
Business	Plastics and rubber products manufacturing	<input checked="" type="checkbox"/>
Business	Wholesale trade	<input checked="" type="checkbox"/>
Business	Retail trade	<input checked="" type="checkbox"/>
Business	Air transportation	<input checked="" type="checkbox"/>
Business	Rail transportation	<input checked="" type="checkbox"/>
Business	Water transportation	<input checked="" type="checkbox"/>
Business	Truck transportation	<input checked="" type="checkbox"/>
Business	Couriers and messengers	<input checked="" type="checkbox"/>
Business	Transit and ground passenger transportation	<input checked="" type="checkbox"/>

Indicate specific housing types and/or industries to be impacted by the property tax, and the extent to which the tax automatically adjusts.

# Right-click menus

**Variable List**

Name:

Variables   Details   **Edit Values**   Add to Inputs

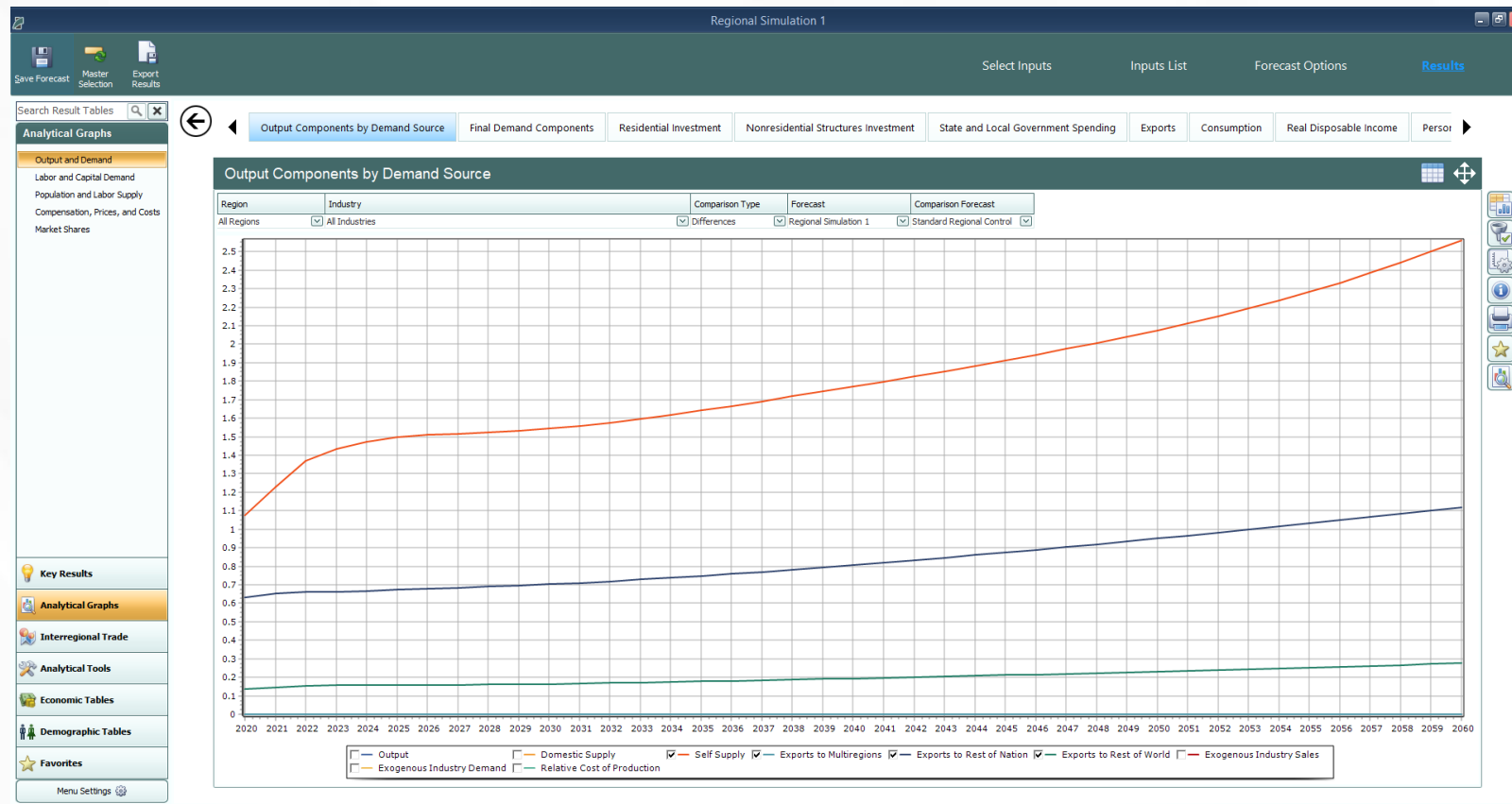
	Category	Detail	Region	Units	2019	2020	2021	2022	2023	2024	2025
← X	Employment	Industry (Exogenous Production): Retail...	Urban Counties	Thousands	0	10					1000
← X	Farm Employment	Total	Rural Counties	Thousands	0	5					500

- Cut      Ctrl+X
- Copy     Ctrl+C
- Paste    Ctrl+V
- Delete   Del
- Calculator   Shift+Ctrl+C
- Spreader   Shift+Ctrl+S
- Move Up    Alt+Up
- Move Down   Alt+Down



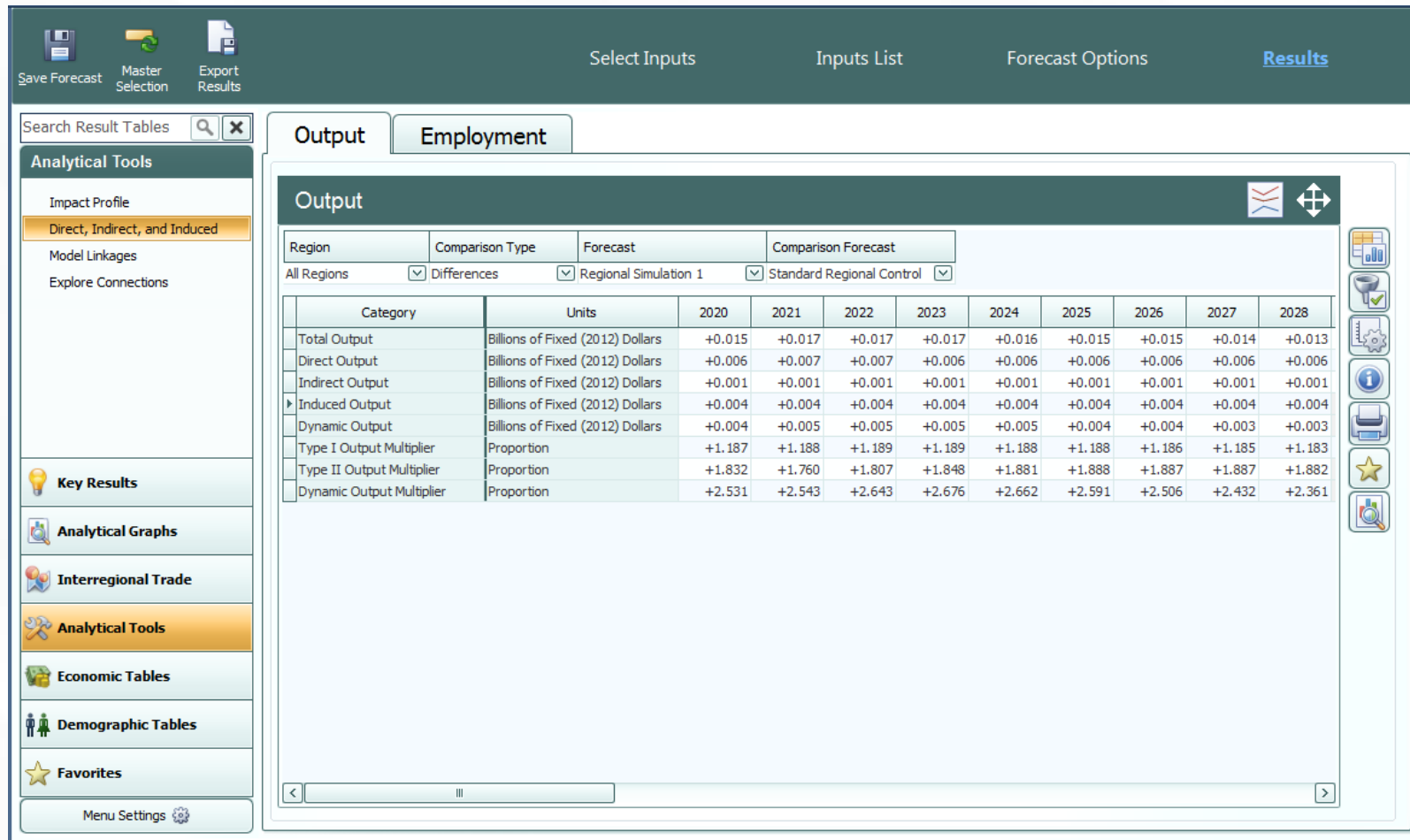
# Redesigned results layout

- 'Snapshots' and 'Profile' tables replaced with 'Key Results'
- 'Analytical Graphs' displayed by model block
- Other Changes



# Direct, Indirect, and Induced effects

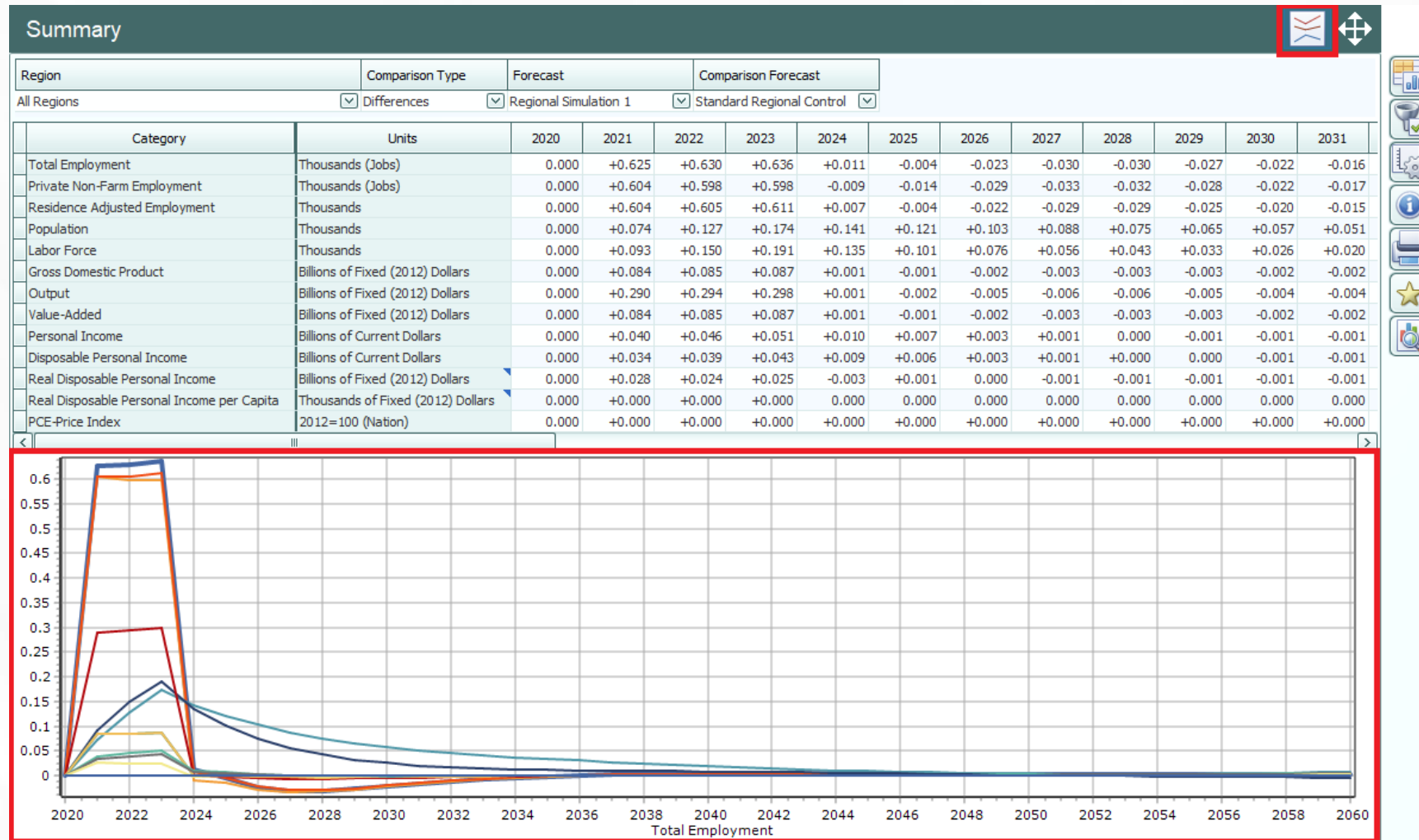
- New results appear in the Analytical Tools section



The screenshot displays the REMI software interface. At the top, there are navigation tabs: 'Save Forecast', 'Master Selection', 'Export Results', 'Select Inputs', 'Inputs List', 'Forecast Options', and 'Results'. Below these, a search bar for 'Search Result Tables' is visible. The left sidebar contains a menu for 'Analytical Tools' with options: 'Impact Profile', 'Direct, Indirect, and Induced' (highlighted), 'Model Linkages', and 'Explore Connections'. Below this are sections for 'Key Results', 'Analytical Graphs', 'Interregional Trade', 'Analytical Tools' (highlighted), 'Economic Tables', 'Demographic Tables', and 'Favorites'. The main area shows the 'Output' table for 'Employment'. The table has columns for 'Region', 'Comparison Type', 'Forecast', and 'Comparison Forecast'. The data is presented in a table with columns for 'Category', 'Units', and years from 2020 to 2028.

Region	Comparison Type	Forecast	Comparison Forecast							
All Regions	<input checked="" type="checkbox"/> Differences	<input checked="" type="checkbox"/> Regional Simulation 1	<input checked="" type="checkbox"/> Standard Regional Control							
Category	Units	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Output	Billions of Fixed (2012) Dollars	+0.015	+0.017	+0.017	+0.017	+0.016	+0.015	+0.015	+0.014	+0.013
Direct Output	Billions of Fixed (2012) Dollars	+0.006	+0.007	+0.007	+0.006	+0.006	+0.006	+0.006	+0.006	+0.006
Indirect Output	Billions of Fixed (2012) Dollars	+0.001	+0.001	+0.001	+0.001	+0.001	+0.001	+0.001	+0.001	+0.001
Induced Output	Billions of Fixed (2012) Dollars	+0.004	+0.004	+0.004	+0.004	+0.004	+0.004	+0.004	+0.004	+0.004
Dynamic Output	Billions of Fixed (2012) Dollars	+0.004	+0.005	+0.005	+0.005	+0.005	+0.004	+0.004	+0.003	+0.003
Type I Output Multiplier	Proportion	+1.187	+1.188	+1.189	+1.189	+1.188	+1.188	+1.186	+1.185	+1.183
Type II Output Multiplier	Proportion	+1.832	+1.760	+1.807	+1.848	+1.881	+1.888	+1.887	+1.887	+1.882
Dynamic Output Multiplier	Proportion	+2.531	+2.543	+2.643	+2.676	+2.662	+2.591	+2.506	+2.432	+2.361

# 'Show Line Chart' button



what does **REMI** say? <sup>sm</sup>

# Field configuration settings

Economic Summary

Edit Regions



Region: All Regions



Select Region Aggregation: None



Forecast: Control 1

Filter Regions

- All Regions
- Adams County
- Alamosa County
- Arapahoe County
- Archuleta County
- Baca County
- Bent County
- Boulder County
- Broomfield County
- Chaffee County
- Cheyenne County
- Clear Creek County
- Conejos County
- Costilla County
- Crowley County

Regional Total:  

National Total:  

Aggregation Display Mode:  

Show Region Images

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Employment	0.000	+4.313	+7.947	+11.043	+13.714	+15.985	+13.639	+11.732	+10.184	+8.958	+8.032	+7.336
Private Non-Farm Emplo	0.000	+3.228	+6.047	+8.492	+10.618	+12.416	+10.765	+9.323	+8.109	+7.137	+6.409	+5.872
Residence Adjusted Emp	0.000	+4.316	+7.959	+11.073	+13.766	+16.062	+13.732	+11.836	+10.290	+9.060	+8.124	+7.422
Population	0.000	+18.631	+34.675	+48.754	+61.323	+72.738	+63.323	+55.760	+49.578	+44.424	+40.102	+36.447
Labor Force	0.000	+10.145	+18.145	+24.589	+29.824	+34.175	+27.584	+22.744	+19.069	+16.219	+13.923	+12.145
Gross Domestic Product	0.000	+0.346	+0.648	+0.914	+1.151	+1.359	+1.176	+1.023	+0.896	+0.795	+0.720	+0.665
Output	0.000	+0.588	+1.103	+1.555	+1.958	+2.309	+1.996	+1.731	+1.511	+1.336	+1.204	+1.107
Value-Added	0.000	+0.346	+0.648	+0.914	+1.151	+1.359	+1.176	+1.023	+0.896	+0.795	+0.720	+0.665
Personal Income	0.000	+0.481	+0.906	+1.291	+1.658	+2.005	+1.753	+1.561	+1.419	+1.317	+1.251	+1.210
Disposable Personal Inc	0.000	+0.431	+0.813	+1.162	+1.494	+1.810	+1.589	+1.420	+1.296	+1.205	+1.145	+1.109
Real Disposable Persona	0.000	+0.379	+0.689	+0.965	+1.222	+1.460	+1.257	+1.119	+1.013	+0.931	+0.872	+0.828
Real Disposable Persona	0.000	-0.086	-0.164	-0.233	-0.295	-0.352	-0.313	-0.279	-0.250	-0.225	-0.203	-0.183
PCE-Price Index	0.000	-0.004	-0.002	-0.002	-0.004	-0.006	-0.004	-0.009	-0.011	-0.012	-0.012	-0.010

what does **REMI** say?<sup>sm</sup>

# 'Fixed Local' currency type

Economic Summary

Region	Comparison Type	Forecast	Comparison Forecast											
All Regions	Differences	Regional Simulation 1	Regional Control 1											
Category	Units	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	
Total Employment	Thousands (Jobs)	+0.195	+0.256	+0.288	+0.298	+0.296	+0.287	+0.						
Private Non-Farm Employment	Thousands (Jobs)	+0.190	+0.246	+0.274	+0.282	+0.278	+0.269	+0.						
Residence Adjusted Employment	Thousands	+0.192	+0.251	+0.282	+0.292	+0.291	+0.282	+0.						
Population	Thousands	+0.061	+0.124	+0.181	+0.229	+0.267	+0.294	+0.						
Labor Force	Thousands	+0.055	+0.102	+0.141	+0.168	+0.187	+0.199	+0.						
Gross Domestic Product	Billions of Fixed Local (2012) Dollars	+0.018	+0.023	+0.026	+0.028	+0.028	+0.028	+0.						
Output	Billions of Fixed Local (2012) Dollars	+0.029	+0.038	+0.043	+0.045	+0.045	+0.045	+0.						
Value-Added	Billions of Fixed Local (2012) Dollars	+0.017	+0.022	+0.025	+0.026	+0.026	+0.026	+0.						
Personal Income	Billions of Fixed Local (2012) Dollars	+0.013	+0.017	+0.019	+0.021	+0.022	+0.022	+0.						
Disposable Personal Income	Billions of Fixed Local (2012) Dollars	+0.012	+0.015	+0.017	+0.018	+0.019	+0.019	+0.						
Real Disposable Personal Income	Billions of Fixed (2012) Dollars	+0.012	+0.015	+0.018	+0.019	+0.020	+0.020	+0.						
Real Disposable Personal Income per Capita	Thousands of Fixed (2012) Dollars	+0.003	+0.003	+0.003	+0.003	+0.002	+0.002	+0.						
PCE-Price Index	2012=100 (Nation)	+0.000	+0.001	+0.002	+0.002	+0.002	+0.002	+0.						

Options

Table

Pivot

Units

Display People and Jobs In:

- <Default>
- Individuals
- Thousands
- Millions

Display Currency In:

- <Default>
- Thousands
- Millions
- Billions

Convert Currency To:

- <Default>
- Fixed National
- Fixed Local
- Nominal

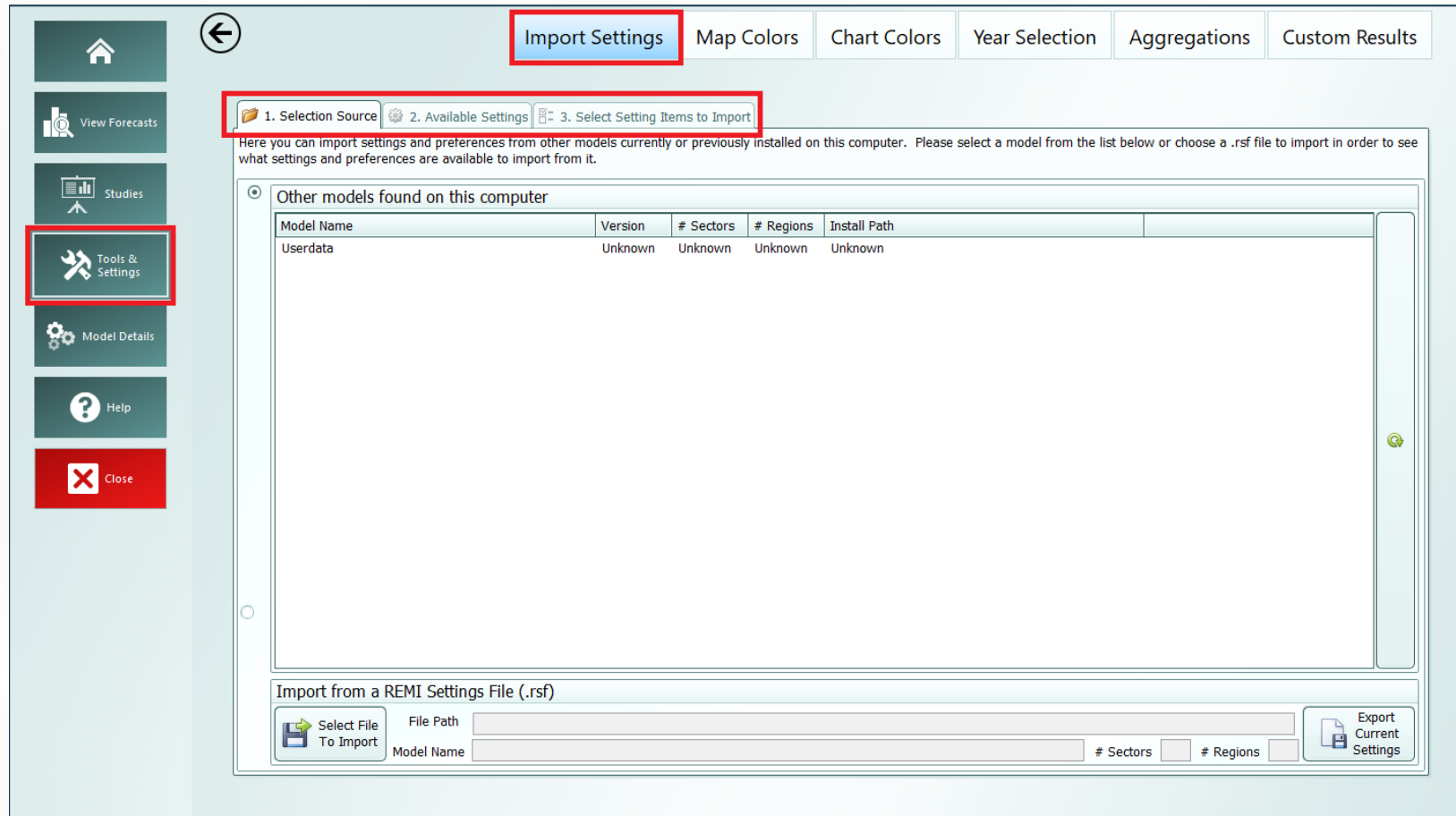
Fixed Year: 2012

Method

- Convert Using Prices from Baseline Forecast
- Convert Using Prices from Current Forecast

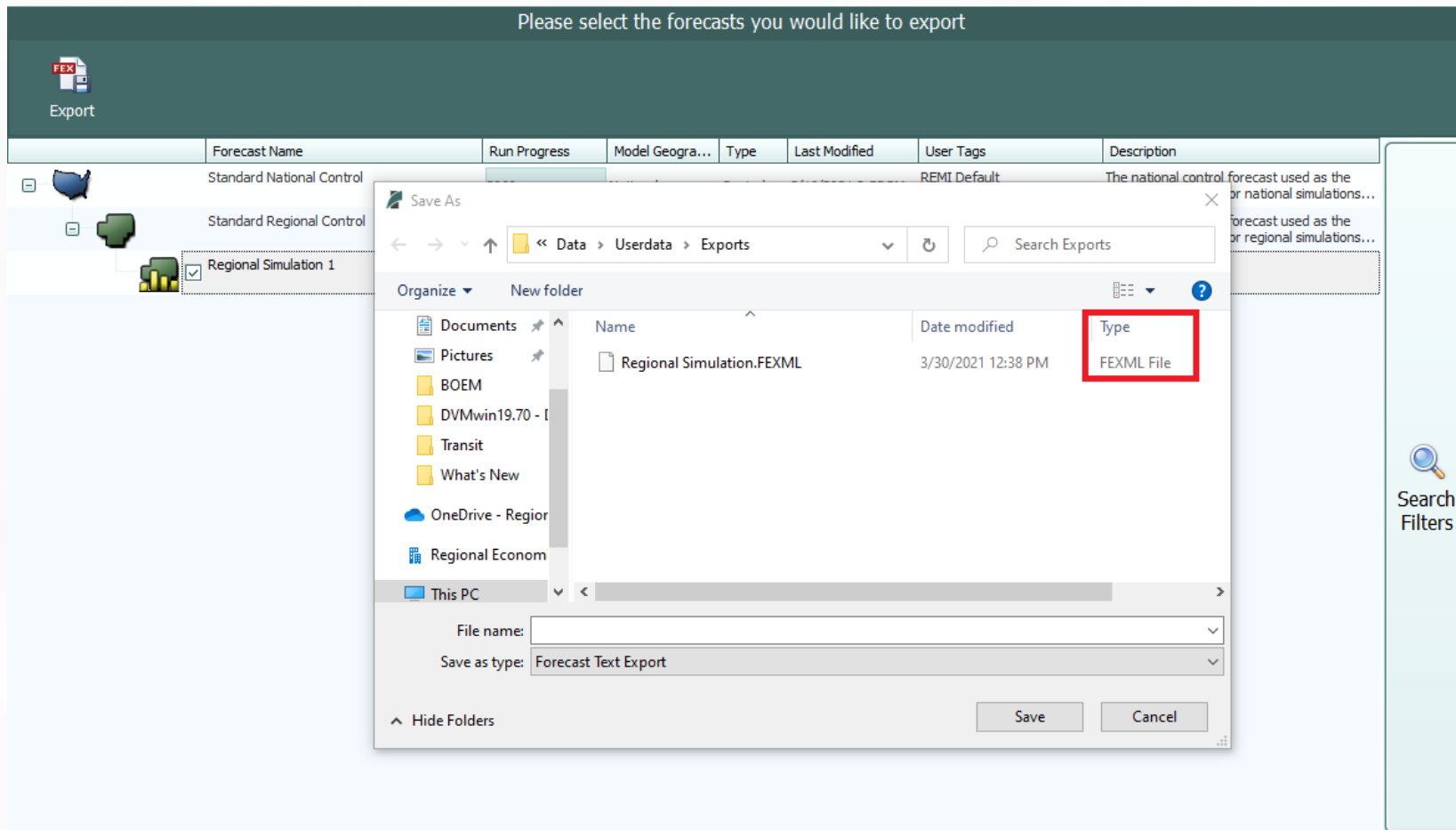
# Importing settings

- Import Settings dialog has been redesigned to be less cluttered and more intuitive



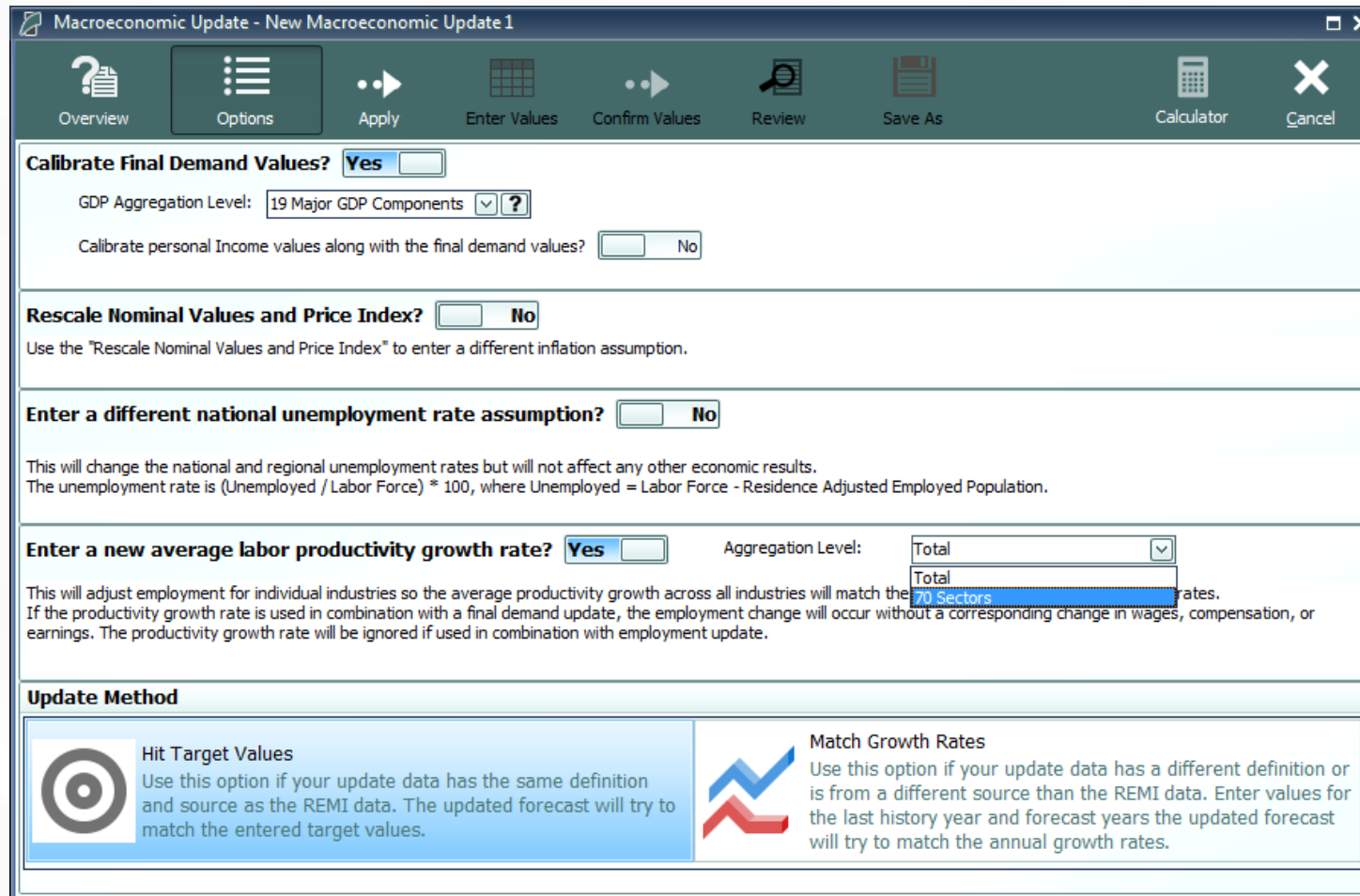
# Importing and exporting forecasts

- A new .xml format has been added for importing and exporting forecast data



# Macroeconomic update

- Can now apply sector-specific labor productivity growth rates instead of total growth rates



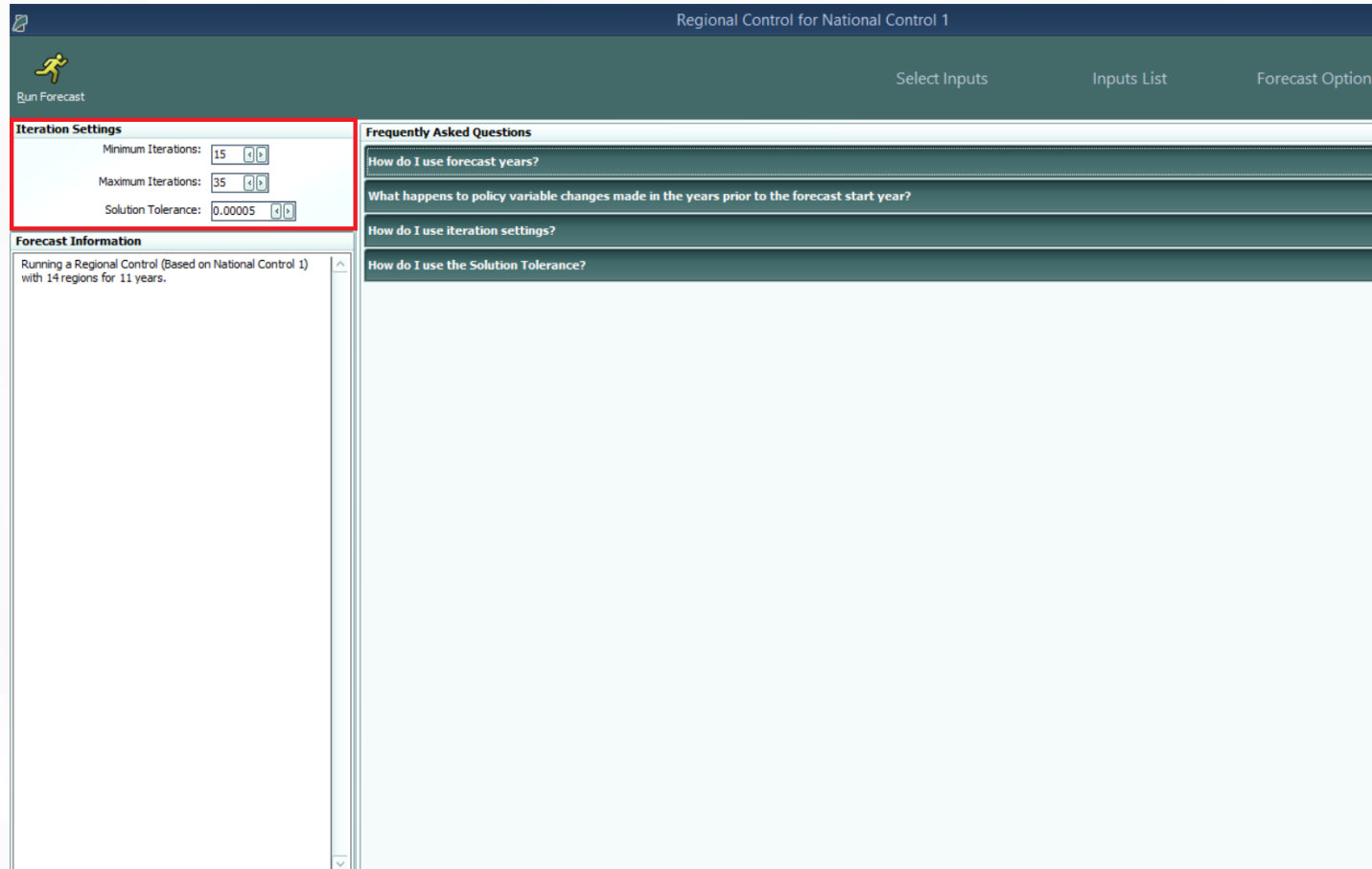
The screenshot shows the 'Macroeconomic Update - New Macroeconomic Update 1' window. The interface includes a toolbar with icons for Overview, Options, Apply, Enter Values, Confirm Values, Review, Save As, Calculator, and Cancel. The main area contains several sections:

- Calibrate Final Demand Values?**  Yes  No  
GDP Aggregation Level: 19 Major GDP Components [v] [?]  
Calibrate personal Income values along with the final demand values?  No
- Rescale Nominal Values and Price Index?**  Yes  No  
Use the "Rescale Nominal Values and Price Index" to enter a different inflation assumption.
- Enter a different national unemployment rate assumption?**  Yes  No  
This will change the national and regional unemployment rates but will not affect any other economic results.  
The unemployment rate is  $(\text{Unemployed} / \text{Labor Force}) * 100$ , where  $\text{Unemployed} = \text{Labor Force} - \text{Residence Adjusted Employed Population}$ .
- Enter a new average labor productivity growth rate?**  Yes  No  
Aggregation Level: Total [v]  
This will adjust employment for individual industries so the average productivity growth across all industries will match the [70 Sectors] rates.  
If the productivity growth rate is used in combination with a final demand update, the employment change will occur without a corresponding change in wages, compensation, or earnings. The productivity growth rate will be ignored if used in combination with employment update.
- Update Method**
  - Hit Target Values**  
Use this option if your update data has the same definition and source as the REMI data. The updated forecast will try to match the entered target values.
  - Match Growth Rates**  
Use this option if your update data has a different definition or is from a different source than the REMI data. Enter values for the last history year and forecast years the updated forecast will try to match the annual growth rates.



# Default regional control options

- Iteration settings and convergence criteria can now be edited for the default regional control forecasts



The screenshot displays the 'Regional Control for National Control 1' interface. The top navigation bar includes 'Run Forecast', 'Select Inputs', 'Inputs List', and 'Forecast Options'. The 'Iteration Settings' section, highlighted with a red border, contains three input fields: 'Minimum Iterations' (set to 15), 'Maximum Iterations' (set to 35), and 'Solution Tolerance' (set to 0.00005). Below this is the 'Forecast Information' section, which shows the text: 'Running a Regional Control (Based on National Control 1) with 14 regions for 11 years.' To the right, the 'Frequently Asked Questions' section lists several questions, such as 'How do I use forecast years?' and 'What happens to policy variable changes made in the years prior to the forecast start year?'

# 'Weighted Detail Spreading' custom result



Custom Result Builder

### Weighted Detail Spreading

**Base Variable** Employment

**Spreading Dimension**  Total  Region  Industry  Year

**Dimension Label** Dimension Label (Optional)

**Spreading Tools**

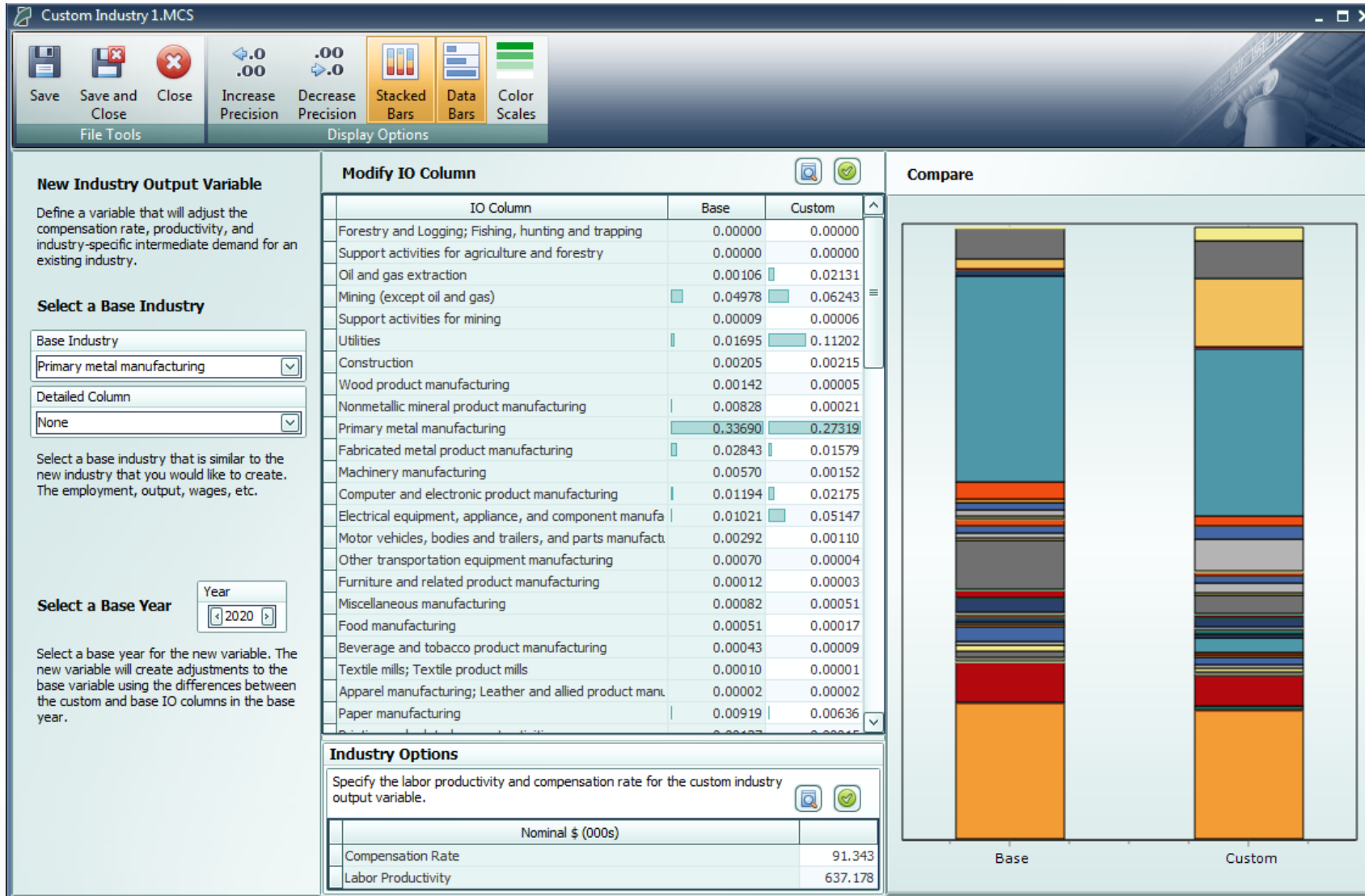
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**Spreading Categories and Weights**

Detail Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Employment	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

what does **REMI** say?<sup>sm</sup>

# Custom variable editor



The screenshot displays the 'Custom Industry 1.MCS' software interface. The window title is 'Custom Industry 1.MCS'. The interface is divided into several sections:

- File Tools:** Save, Save and Close, Close.
- Display Options:** Increase Precision, Decrease Precision, Stacked Bars, Data Bars, Color Scales.
- New Industry Output Variable:** Define a variable that will adjust the compensation rate, productivity, and industry-specific intermediate demand for an existing industry.
- Select a Base Industry:** Base Industry: Primary metal manufacturing; Detailed Column: None.
- Select a Base Year:** Year: 2020.
- Modify IO Column:** A table comparing Base and Custom values for various IO columns.
- Industry Options:** Specify the labor productivity and compensation rate for the custom industry output variable.
- Compare:** A bar chart comparing the Base and Custom scenarios.

**Modify IO Column Table:**

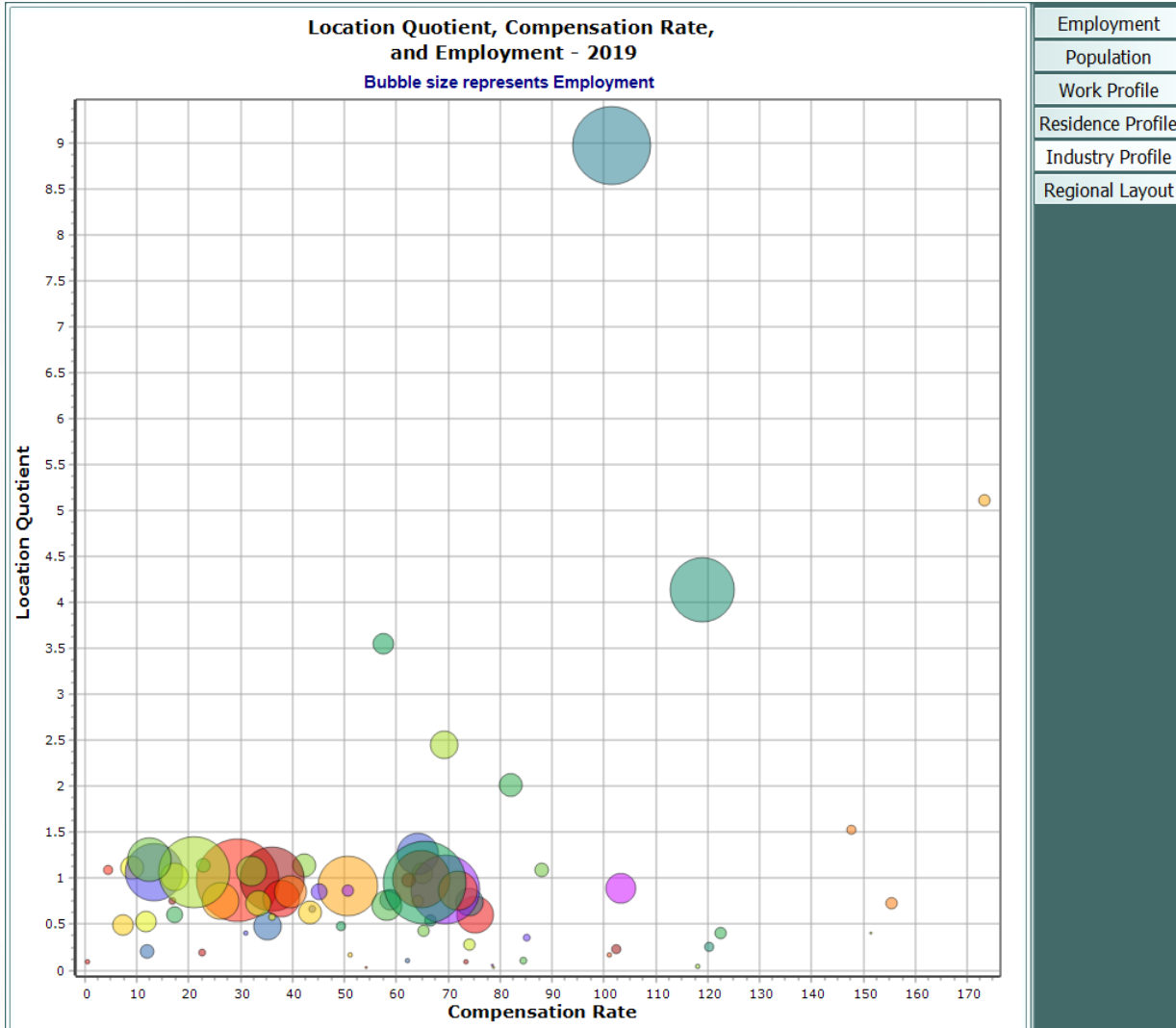
IO Column	Base	Custom
Forestry and Logging; Fishing, hunting and trapping	0.00000	0.00000
Support activities for agriculture and forestry	0.00000	0.00000
Oil and gas extraction	0.00106	0.02131
Mining (except oil and gas)	0.04978	0.06243
Support activities for mining	0.00009	0.00006
Utilities	0.01695	0.11202
Construction	0.00205	0.00215
Wood product manufacturing	0.00142	0.00005
Nonmetallic mineral product manufacturing	0.00828	0.00021
Primary metal manufacturing	0.33690	0.27319
Fabricated metal product manufacturing	0.02843	0.01579
Machinery manufacturing	0.00570	0.00152
Computer and electronic product manufacturing	0.01194	0.02175
Electrical equipment, appliance, and component manufa	0.01021	0.05147
Motor vehicles, bodies and trailers, and parts manufact	0.00292	0.00110
Other transportation equipment manufacturing	0.00070	0.00004
Furniture and related product manufacturing	0.00012	0.00003
Miscellaneous manufacturing	0.00082	0.00051
Food manufacturing	0.00051	0.00017
Beverage and tobacco product manufacturing	0.00043	0.00009
Textile mills; Textile product mills	0.00010	0.00001
Apparel manufacturing; Leather and allied product man.	0.00002	0.00002
Paper manufacturing	0.00919	0.00636

**Industry Options Table:**

Nominal \$ (000s)	
Compensation Rate	91.343
Labor Productivity	637.178

**Compare:** A bar chart comparing the Base and Custom scenarios. The Base scenario shows a significantly larger total value than the Custom scenario, primarily due to the 'Primary metal manufacturing' sector.

# Added transparency to bubble charts



what does **REMI** say?<sup>sm</sup>

# Agenda

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Introduction

New features and changes

Looking into 2022

## Annual updates

- Historical period 2001-2020
- BLS 2020-2030 employment projections, etc.

## Periodic updates

- Census 2020
- Tourism translator data

## Additional data

- Incorporate CBO demographic projections
- CAGDP9 provides county-level GDP data in chained dollars

## There will be some challenges

### Release Schedule

- The Vintage 2021 estimates are scheduled for release beginning in December 2021. This series will incorporate the results of the 2020 Census.
- However, the 2010 to 2020 Intercensal Estimates will be produced in 2022

### Data Changes

- Changes to questions on race and Hispanic origin may cause data to be inconsistent with previous datasets
- 2020 Census Data products will be protected using 'Differential Privacy'

# State and local government spending parameters

$$G_{j,t}^k = \left[ \left( \frac{TPNFVA\_PC\_A_t^k}{TPNFVA\_PC\_A_T^k} \right)^{\beta_j} * \frac{G_{j,t}^u}{N_t^u} * \frac{N_t^k}{N_T^k} * G_{j,T}^k \right] + FDPVSLG_{j,t}^k$$

$$G_{j,T}^k = \lambda_j^k * N_T^k * (TPNFVA\_PC\_A_T^k)^{\beta_j} * \left( \frac{G_{j,T}^u}{N_T^u} \right)$$

$$TPNFVA\_PC\_A_t^k = \lambda (TPNFVA\_PC\_A_{t-1}^k) + (1 - \lambda) \left( \frac{TPNFVA_t^k}{\frac{N_t^k}{TPNFVA_t^u}} \right)$$

Where;

$G_{j,t}^k$  = The demand for state or local government services ( $j$ ) in region  $k$ , time  $t$ .

$N_t^k$  = The total population in region  $k$ , time  $t$ .

$TPNFVA_t^k$  = The total private non-farm value added in region  $k$ , time  $t$ .

$TPNFVA\_PC\_A_t^k$  = The moving average of total private non-farm value added per capita in region  $k$  relative to the nation, time  $t$ .

$\lambda_j^k$  = The local calibration factor for state or local government demand.

$\beta_j$  = The elasticity of state or local government expenditures.

Superscript  $u$  indicates similar values for the nation.

Subscript  $T$  indicates similar values for the last history year.

$\lambda$  = speed of adjustment for moving average.

$FDPVSLG_{j,t}^k$  = The policy variable for state or local government spending.



# Housing Price elasticity re-estimation

$$PH_t = \left\{ \left( \varepsilon_1 \left( \frac{\frac{RYD_t}{RYD_t^u}}{\frac{RYD_{t-1}}{RYD_{t-1}^u}} - 1 \right) + \varepsilon_2 \left( \frac{\frac{N_t}{N_t^u}}{\frac{N_{t-1}}{N_{t-1}^u}} - 1 \right) \right) + 1 \right\} \times PH_{t-1}$$

where

$PH$  = relative housing price;

$RYD$  = real disposable income;

$N$  = population;

$u$  represents the U.S.;

$t$  is the time period;

$\varepsilon_1$  = income elasticity of housing price;

$\varepsilon_2$  = population elasticity of housing price.

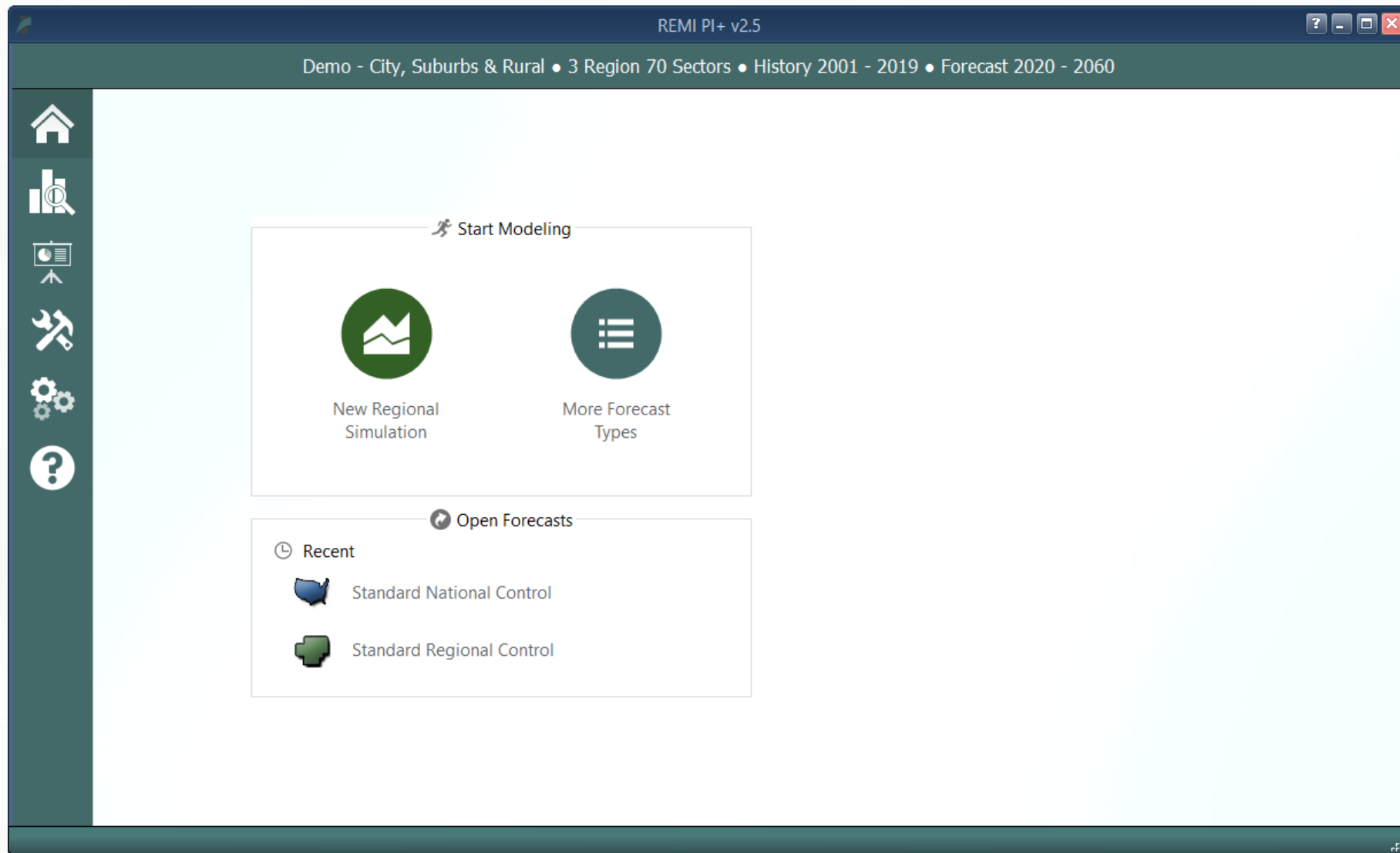
# Product Demo

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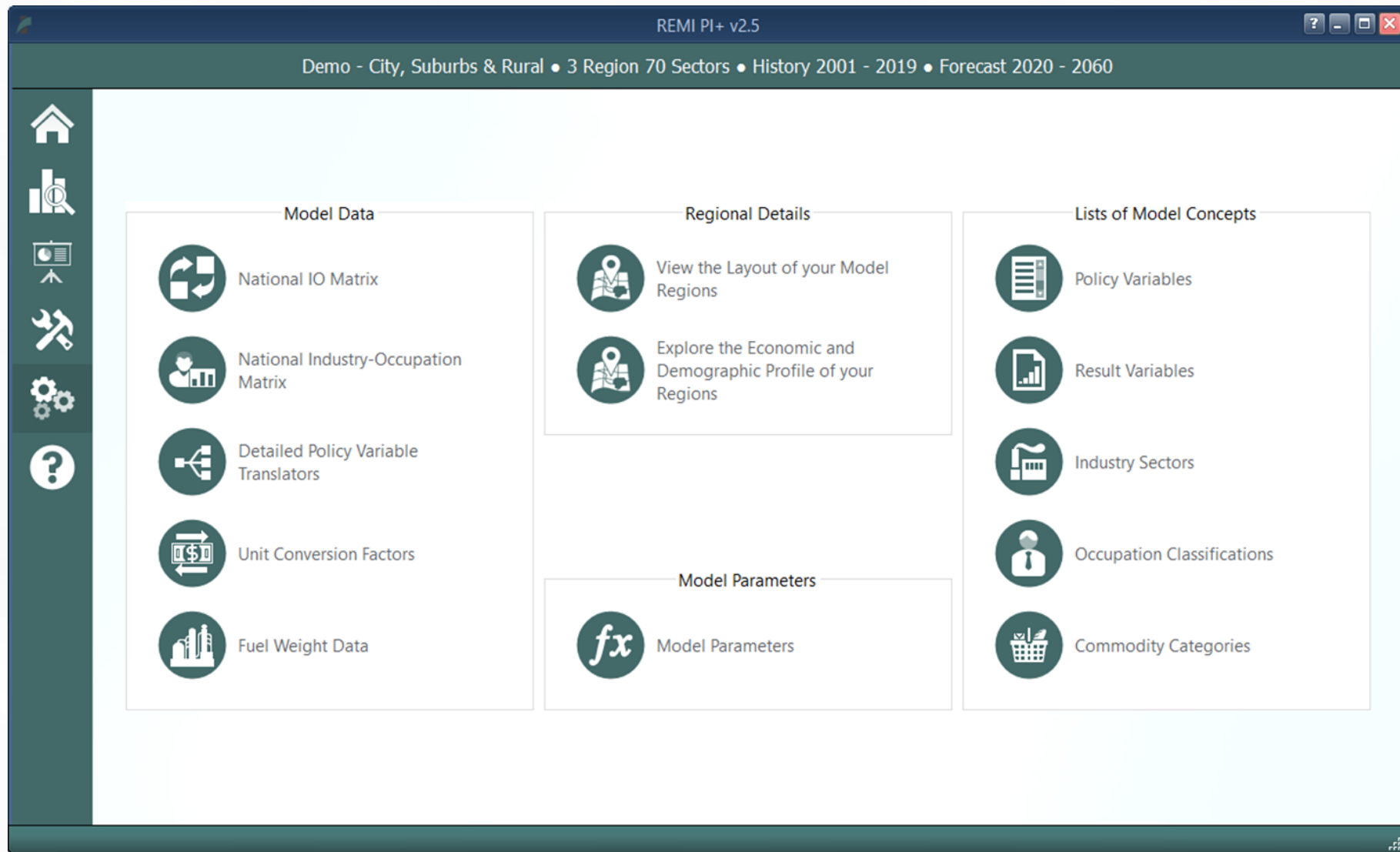
*what does **REMI** say?<sup>sm</sup>*

# Simplified home form



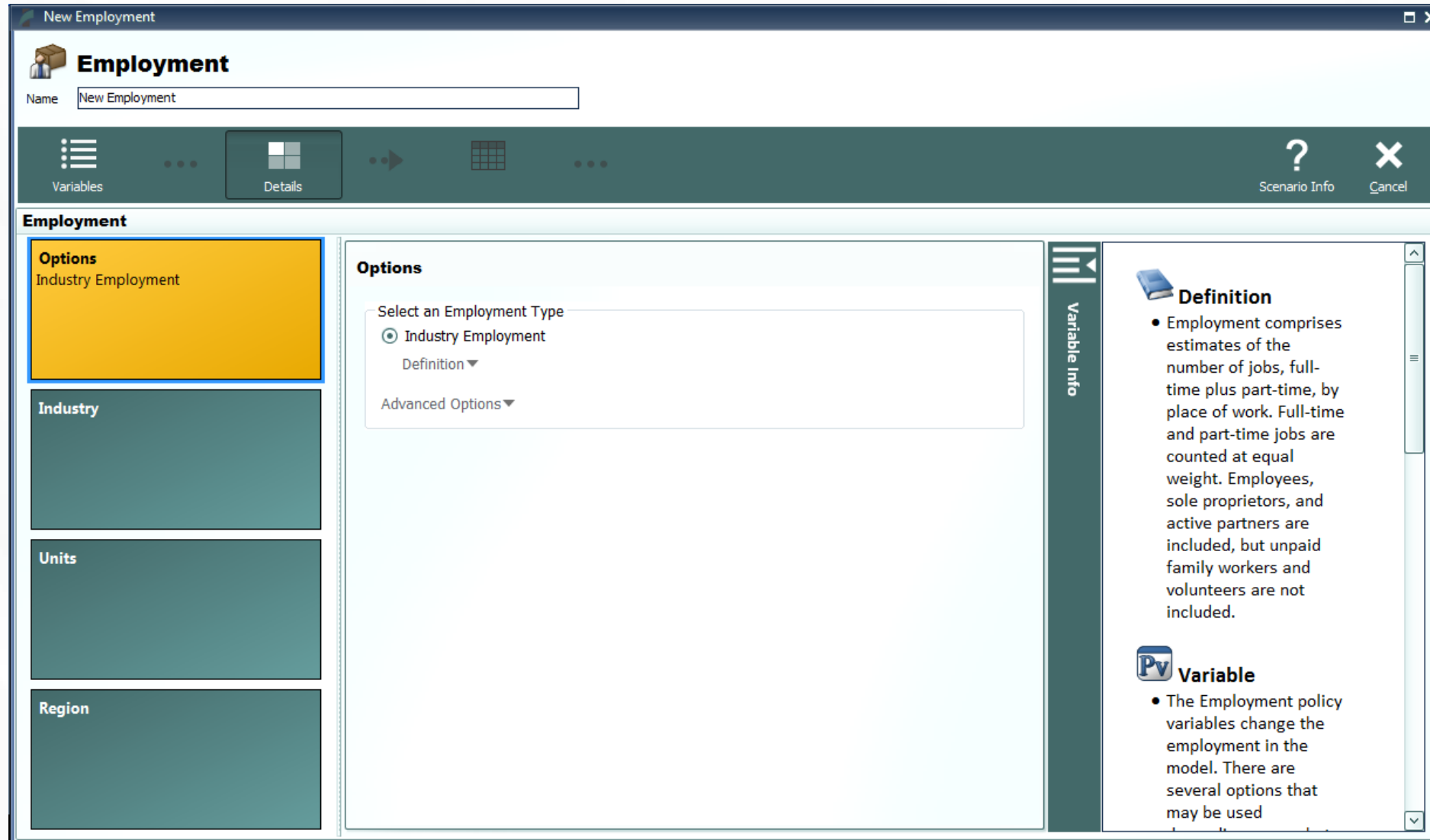
what does **REMI** say?<sup>sm</sup>

# Simplified home form



what does **REMI** say?<sup>sm</sup>

# Simplified policy variable options



The screenshot shows a software window titled "New Employment" with a sub-header "Employment". A text field contains "New Employment". Below this is a navigation bar with icons for "Variables", "Details", "Scenario Info", and "Cancel". The main content area is divided into three sections: "Options", "Variable Info", and "Definition".

**Options**

Select an Employment Type

- Industry Employment

Definition ▾

Advanced Options ▾

**Variable Info**

**Definition**

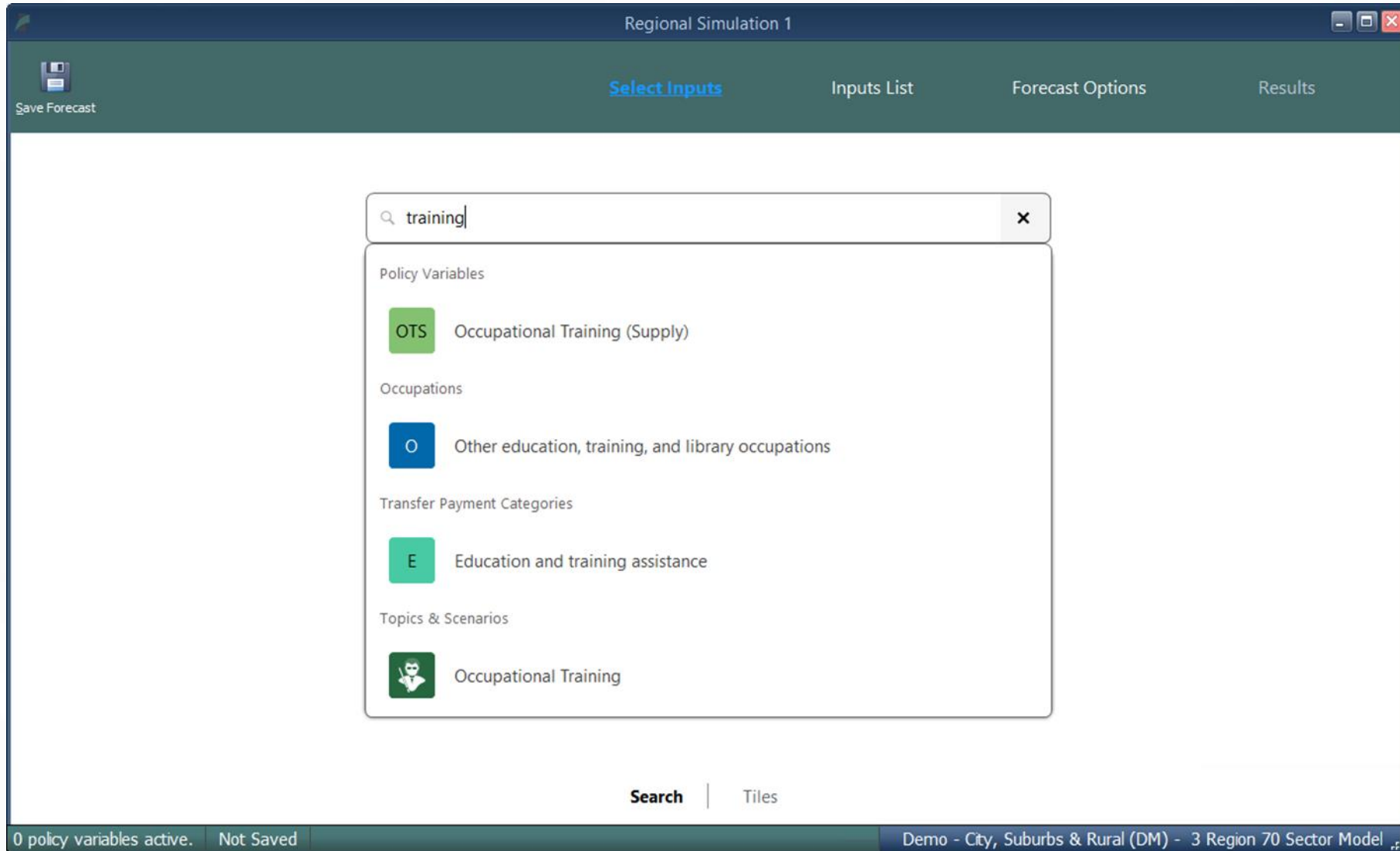
- Employment comprises estimates of the number of jobs, full-time plus part-time, by place of work. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included.

**Pv Variable**

- The Employment policy variables change the employment in the model. There are several options that may be used

what does **REMI** say?<sup>sm</sup>

# Select Inputs



Regional Simulation 1

Save Forecast | **Select Inputs** | Inputs List | Forecast Options | Results

training

Policy Variables

- OTS Occupational Training (Supply)

Occupations

- O Other education, training, and library occupations

Transfer Payment Categories

- E Education and training assistance

Topics & Scenarios

- Occupational Training

Search | Tiles

0 policy variables active. Not Saved Demo - City, Suburbs & Rural (DM) - 3 Region 70 Sector Model

what does **REMI** say?<sup>sm</sup>

# Results browsing history



Standard Regional Control

Master Selection | Export Results | [←](#) | [→](#) | Select Inputs | Inputs List | Forecast Options | **Results**

Search Result Tables | Population by Region | Employment by Region | Economic Summary | Show Full History

**Key Results**

- Economic Summary
- Employment
- Demographics
- Gross Domestic Product**
- Output
- Personal Income

**Key Results**

- Analytical Graphs
- Interregional Trade
- Analytical Tools
- Economic Tables
- Demographic Tables
- Favorites

Menu Settings

By Component

Region

Category: Gross Domestic Product (GDP) | Comparison Type: Levels

Region	Units	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
<b>All Regions</b>	<b>Billions of Fixed (2012) Dollars</b>	<b>152.298</b>	<b>163.043</b>	<b>170.788</b>	<b>174.143</b>	<b>177.427</b>	<b>181.294</b>	<b>184.874</b>	<b>188.079</b>	<b>191.255</b>	<b>194.571</b>
Urban Counties	Billions of Fixed (2012) Dollars	96.556	103.115	108.231	110.448	112.613	114.999	117.272	119.297	121.235	123.346
Suburban Counties	Billions of Fixed (2012) Dollars	53.255	57.309	59.881	61.000	62.091	63.525	64.792	65.935	67.127	68.285
Rural Counties	Billions of Fixed (2012) Dollars	2.487	2.618	2.676	2.696	2.723	2.769	2.810	2.848	2.893	2.934

Demo - City, Suburbs & Rural (DM) - 3 Region 70 Sector Model

what does **REMI** say?<sup>sm</sup>

# Full browsing history

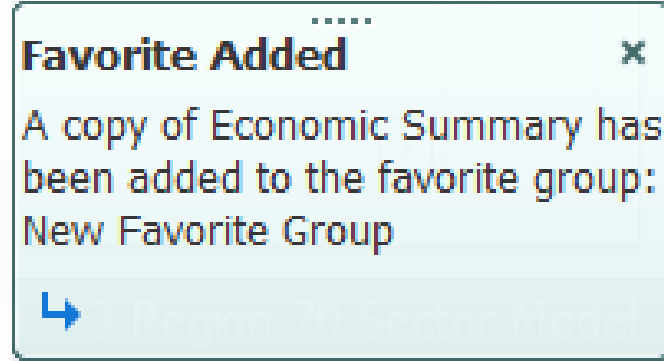




# Redesigned favorite save dialog



# 'Favorite Added' alert messages



# Hand cursor to signal pivoting

Standard Regional Control

Master Selection | Export Results | Select Inputs | Inputs List | Forecast Options | Results

Search Result Tables

**Key Results**

- Economic Summary
- Employment
- Demographics
- Gross Domestic Product
- Output
- Personal Income

**Economic Summary**

Region: All Regions | Comparison Type: Levels

Category	Units	2020	2021	2022	2023	2024	2025	2026	2027
Total Employment	Thousands (Jobs)	1669.342	1753.404	1806.345	1823.389	1838.182	1854.273	1868.196	1876.800
Private Non-Farm Employment	Thousands (Jobs)	1477.002	1560.778	1610.849	1628.079	1642.938	1659.629	1672.625	1680.527
Residence Adjusted Employment	Thousands	1647.529	1730.728	1783.054	1800.002	1814.743	1830.718	1844.532	1853.034
Population	Thousands	2826.572	2840.265	2858.693	2874.987	2888.834	2901.928	2915.974	2930.903
Labor Force	Thousands	1459.886	1466.527	1480.777	1492.297	1502.037	1510.944	1520.566	1529.783
Gross Domestic Product	Billions of Fixed (2012) Dollars	152.298	163.043	170.788	174.143	177.427	181.294	184.874	188.079
Output	Billions of Fixed (2012) Dollars	274.184	295.198	309.455	314.881	320.012	326.643	332.508	337.542
Value-Added	Billions of Fixed (2012) Dollars	152.298	163.043	170.788	174.143	177.427	181.294	184.874	188.079
Personal Income	Billions of Current Dollars	166.693	176.821	178.310	184.107	191.097	200.322	209.816	219.579
Disposable Personal Income	Billions of Current Dollars	149.765	158.663	158.382	163.741	170.224	178.578	185.578	193.153
Real Disposable Personal Income	Billions of Fixed (2012) Dollars	140.889	146.648	143.525	145.473	148.213	152.315	155.005	157.952
Real Disposable Personal Income per Capita	Thousands of Fixed (2012) Dollars	49.845	51.632	50.206	50.600	51.305	52.488	53.157	53.892
PCE-Price Index	2012=100 (Nation)	106.266	108.153	110.327	112.530	114.819	117.203	119.682	122.241

Z:\DMwin19.70 - Demo - City, Suburbs And Rural - v2.6 alpha | Demo - City, Suburbs & Rural (DM) - 3 Region 70 Sector Model

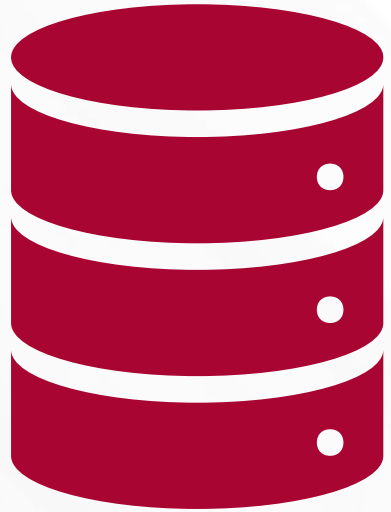
what does **REMI** say?<sup>sm</sup>

# End of live demo

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*what does **REMI** say?<sup>sm</sup>*



## Export results to various databases

- SQLite, SQL Server, MS Access, Interbase, and possibly more

## Designed for automation

- Can be run from command line to integrate with larger processes

## Customizable

- Choose which result categories and regions to export

## Self-contained

- Can create and maintain its own database environment

# Planned improvements

## Easier to customize results

- Default settings for the results visualizations
- Improvements to 'Master Selection' on Results
- More transparency about which Favorites settings are being saved

## Additional improvements

- Better results search feature
- Simplify forecast list
- Improve the display of various 'Model Details'

## Behind the scenes

- Redesign the building system to lay the groundwork for new developments that were not previously possible



**Thank you for attending!**