

**Regional Economic Analysis and Impact Models**  
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**April 4, 2005**

**Bottom line:**

The input output modeling approach:

- is static (one period of time)
- only accounts for economic variables (production, spending, employment)

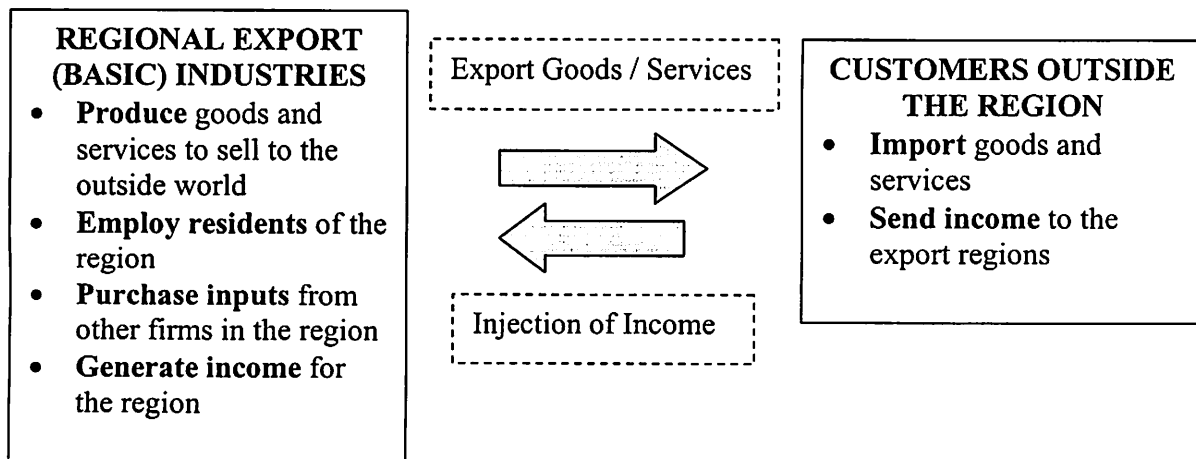
The REMI modeling approach:

- is a dynamic structural model (forecasting many periods into the future) that includes the input-output model as a sub-model
- accounts for economic, labor force, population (migration, births, deaths), and fiscal impacts across time.

**Economic Impact: Measures and Definitions**

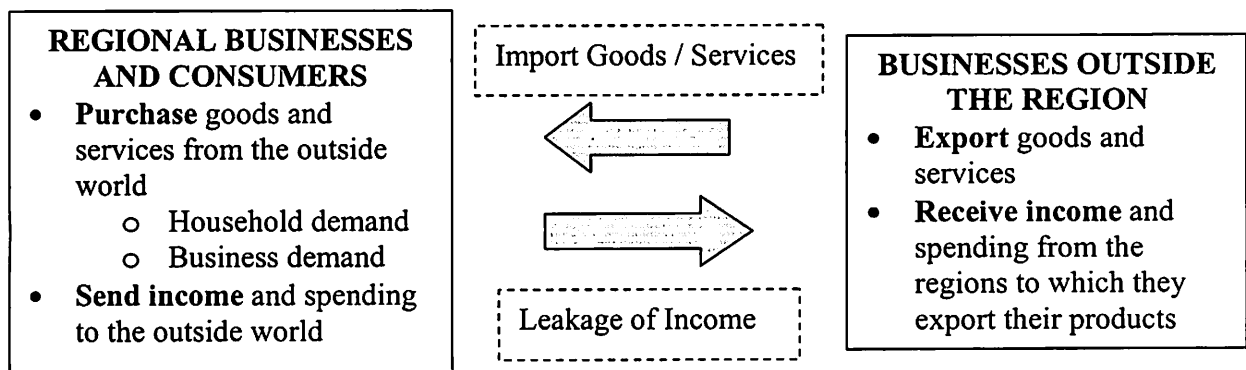
Regional exports provide external sources of income and are widely recognized as the engines of economic development and growth. These export base (or basic) industries can potentially lead to the development of backward-linked industries that provide necessary inputs and services to the primary export producer. Forward-linked industries produce additional value-added to the exports before the products are sold outside the region. These backward- and forward-linked industries create more jobs in the regional economy that are directly connected to the export industry. This amounts to an increase in the export base of the region. If the export industries purchase equipment, material, labor, or other inputs from outside the region, this is a leakage and reduces the economic impact of the industry on the host region.

**The Trade and Income Effects of Regional Export Industries**



Other businesses within the region provide the local population with consumer goods and services. These are referred to as non-basic or residentiary sectors. Although these activities do not generate income from the outside world, they do keep some of the income earned through exports in the community to create new jobs. This is the multiplier effect. Otherwise the residents of the area must import their consumer goods and this results in a leakage of spending from the regional economy and a very small multiplier. Most products consumed by residents of isolated rural areas must be imported from outside the region even though a local retailer may serve as the middleman. Large economically integrated metropolitan areas produce a much larger share of the goods and services purchased by households in the region. Consequently, these urban regions have much larger income and spending multipliers than do small, isolated communities.

### The Trade and Income Effects of Purchasing Imports



### Models and Methods

Various models have been built to evaluate regional economic impacts. These are generally custom built with data from the study region.

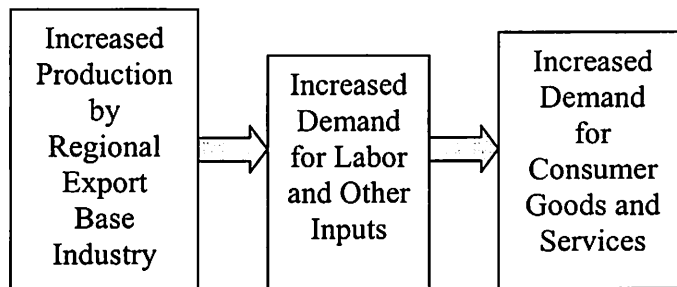
### Input-Output Models

Perhaps the simplest and most commonly used model for regional analysis the input-output model. Several vendors produce these under different names (RIMS, IMPLAN, etc.) Input-output models capture business-to-business purchases within the region. If an export base industry purchases raw materials, equipment, or other inputs from local producers, this effectively increases the size of the export base of the region. These inter-industry linkages are captured in input-output models. Importantly, if a completely new industry comes into the region, the input-output model (which has been calibrated to current industry structure and inter-industry purchases) will not automatically create the forward- and backward-linked industries. The analyst must exogenously model these. These models also account for induced spending created when households supported by

these industries purchase goods and services within the region. Importantly, these are static models measuring impact in only one year.

### **Key Impacts of an Increase in an Export Base Industry of a Region Structure of the Input Output Model**

**Note: This is a static model accounting for one time period**



### **REMI Model**

The REMI model is a dynamic simulation model that forecasts economic, population, and labor market impacts for many years into the future. Although they have many components and features, the essential logic of the REMI model derives from the cohort component, economic base, and input-output sub-models.

The cohort component model accounts for the changing size and age composition of the regional population over time. Births and in-migration contribute to population growth while deaths and out-migration contribute to population decline. The model also accounts for the numbers of males and females in each age group and ages the resident population year-by-year. Deaths occur disproportionately to older age groups and economic migrants tend to be in their twenties and thirties.

The input output model, a sub-model within REMI, has been described above. The economic base model has also been described above. Regional exports inject income while regional imports are leakages. Economic growth results from increases in basic industries (export base) and import substitution industries. To the extent that this residentiary demand can be satisfied internally by non-basic industries, the export-based dollars have additional economic impact in the community. If the goods and services are imported, those dollars leave the regional economy.

The REMI model connects these sub-models through labor, capital, and product markets. It simulates the size and composition of the population and economy over time. If there is an increase in the production of an export base industry in the region, the regional employment and income increase as well. There may not be adequate workers to meet this increased demand for labor, and net in-migration to the region could result. Economic migrants tend to be young, bringing children with them and having additional children once they become established. This increasing population adds to the local demand for housing, consumer goods and services, public schools, and so forth. Over

time, as this population ages, the children of the original migrants enter the labor force and form households of their own. The end result of an increase in regional export base industries is a larger and younger population, larger labor force, and higher levels of income and spending. The magnitude of these changes and other non-modeled costs and consequences depend on the specific situation and sequence of events.

**Key Impacts of an Increase in an Export Base Industry of a Region  
Selected Components of the REMI Model**

**Note: This is a dynamic model accounting for changes in many time periods**

