



**NEREUS**

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da Universidade de São Paulo

The University of São Paulo  
Regional and Urban Economics Lab

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## Lecture 4: Regional Impact Analysis

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# Why do we need to undertake impact analysis?

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Allocate resources among competing projects

Assess the potential for an investment policy

- Retaining an existing industry
- Attracting a new industry

Putting “hard numbers” on political strategies to test their veracity

# Why do impacts vary from region to region?

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Economic structure of regions vary

- Composition of industry (i.e. allocation among between agriculture, manufacturing, services, government)
- Growth rates of industries
- Age of industries (and thus the technology used in production)
- Markets for inputs and products
- Composition and skills of the labor force

# Why do impacts vary from region to region?

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## Role of infrastructure

- Is the region well-connected with the rest of the country
- Are there agglomeration economies in physical and human capital senses (presence of universities, institutes of technology)

## Role of business and community leaders

- Pro-development
- Promotion of incentives to industry (TIFs, empowerment zones, tax abatements)

# Regional economic analysis attempts to explain...

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... why regions grow

... why some regions grow more rapidly than others

... why some regions decline

# Economic base model

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A simple two-sector model of a regional economy

“Oldest” regional economic model

Ideas within this model found in many other regional models

Demand-led model, although some supply-side features have been added

# Antecedents: Geographers

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Interest in why cities/regions evolved

Developed a two-fold categorization of economic activities

- **City/region forming:** activities that provided the Raison d'être for the existence of the region e.g. presence of a mine, port on lowest bridging point of a river
- **City/region filling:** complementary activities, supporting the city/region forming; found in every region (e.g. grocery stores, restaurants)

# Antecedents: Geographers

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Developed notion into categories referred to as:

- Basic (city/region forming)
- Non-basic (city/region fillings)

Cities/regions described and differentiated by their:

**BASIC/NON-BASIC ratio**



# Antecedents: Economists

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Interest in staple theory of growth – idea that a small range of products (agricultural or resource base) generate export demand

Export demand further generates a domestic multiplier or ripple effect – the foreign trade multiplier

If this process worked at the national level, could the same principles not be applied to explain the growth of regions?

# Antecedents: Economists

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Regional activities divided into:

- Export (serving markets outside the region)
- Local (serving only the region itself)

Assumed that:

$$\mathbf{Local = f(Export)}$$

Two-sector model developed

# Synthesis

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## Geographers

Basic

=

Non-basic

=

## Economists

Export

Local

Instead of working with the basic/non-basic ratio, economists developed an alternative ratio (local/total) that enabled the creation of an economic model

# The model

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Assume a region with total employment,  $E^T$

By definition we have:

$$E^T \equiv E^B + E^L \quad (1)$$

Where  $E^B$  is basic (export) employment and  $E^L$  is local (non-basic) employment

Now define  $r$  as the ratio of local to total employment:

$$r = E^L / E^T \quad (2)$$

Or we can write:

$$E^L = rE^T \quad (3)$$

# The model

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Substituting (3) into (1), we have:

$$E^T = E^B + rE^T$$

Collecting terms in  $E^T$  on the left side, we have:

$$E^T - rE^T = E^B$$

Factoring:

$$(1 - r)E^T = E^B$$

# The model

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Yielding the solution:

$$E^T = \frac{1}{[1-r]} E^B$$

In words: total employment in the region is equal to basic employment multiplied (hence, the term multiplier) by some factor

$$\frac{1}{[1-r]}$$

# The model

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Since  $0 < r < 1$ , this means that:

$$\frac{1}{[1-r]} \text{ must be greater than 1.}$$

In other words, basic or export employment has the capacity to generate additional employment in the region.

An additional export job (*direct effect of the exports*) may result in a further 0.5, 0.75 or even 1.25 additional jobs (*indirect and induced effects*) being created.

# How does this work?

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Is it economic magic, a sleight of hand, mathematical nonsense?

Multiplier sometimes referred to as the *ripple effect* analogous to the impact of a stone thrown into a pond.

Impact is largest at the point of impact (in our case, the export sector) and then diminishes outward (through the various local sectors)

The size of the multiplier (height of the wave) tell us something about the structure of the economy



# Issues

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Does the multiplier vary by region?

Does the multiplier change over time?

Will the impacts of a change in manufacturing differ from those in services using this model?

Can we use this model for regions of all sizes?

How do we estimate the multiplier?

What is the role of industrial concentration?

# Does the multiplier vary by region?

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## **Yes, but why?**

- Function of the structure (economic composition of industry)
- Function of the size of the economy
- Function of the way in which the export and local sectors are linked to each other

# Does the multiplier change over time?

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## **Yes, but why?**

- Structure of the economy changes – some industries grow more rapidly, others decline or close
- Size of the region may change
- Relationship between export and local sectors may change (export buy more/less from local)

# Will the impacts of a change in manufacturing differ from those in services using this model?

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**No**, because we only have one multiplier to represent all industrial sectors

Input-output models extend ideas of the economic base model by disaggregating production into a set of sectors

- Produces multipliers by sector

# Can we use this model for regions of all sizes?

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To some extent (classic economist response – on the one hand, ... on the other hand)!

Works best for smaller regions and small metropolitan regions (<1 million population)

Larger regions have more complex structure and the role of export activity may not be as significant

# How do we estimate the multiplier?

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Three main methods:

- Assertion
- Survey
- Non-survey

# Assertion

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Assume that all resource and manufacturing is export and rest is local

Problem: export of services (such as insurance or banking) may be as extensive as that for manufacturing

Crude approximation, difficult to defend, use as the last resort!

# Survey

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Mail or telephone local firms

Request breakdown of their sales – within the region and outside the region

Aggregate over all sectors to generate export and local employment or sales and calculate  $r$  and thus the multiplier

Problem: firms inundated with surveys, expensive and often there is not enough time



# Non-survey

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Most popular and widely used

Method most often used is to apply location quotients

Compare the percentage allocation of each sector in the region's total in comparison with a similar ratio at the national level

# Non-survey

## Location quotient estimation using employment in a region in comparison to the nation

Sector	Region	% of total	Nation	% of total	Location quotient
1	10	10%	50	5%	2.00
2	20	20%	160	16%	1.25
3	20	20%	300	30%	0.33
4	30	30%	100	10%	3.00
5	5	5%	100	10%	0.50
6	15	15%	290	29%	0.52
Total	100	100%	1000	100%	

# Non-survey

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To estimate exports, we assume a location quotient of 1.0 implies “self-sufficiency”; any employment above this is export

For sector 1, self-sufficiency would be 5% of the region’s total (similar to national share)

Hence, of the region’s 10% of total employment in sector 1, 5% serves the regional market and 5% serves the export market

# Non-survey

**Export shares by sector**  
*(Note if the LQ < 1, there are no exports from that sector)*

Sector	Export share	Employment
1	5%	5
2	4%	4
3	0%	-
4	20%	20
5	0%	-
6	0%	-
Total		29

# How do we estimate the multiplier?

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Of the 100 jobs in the region, 29 are export-related

Hence  $(100-29) = 71$  are local

Hence:  $r = 71/100 = .71$

yielding a **multiplier of 3.45**

Each export job (*direct effect of the exports*) generates another 2.45 jobs (*indirect and induced effects*) for a total 3.45 jobs in the region

# What is the role of industrial concentration?

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Tension in regional development policy between:

- Promotion of a region's comparative (competitive) advantage
  - Problem – subject to cyclical demand
  - Generates larger multiplier effects but also greater disruption if this industry declines in importance
- Diversify a region's economy
  - More recession-proof but perhaps less competitive?
  - May generate less impact from expansion but gains are in terms of stability

# Summary

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Important model because it provides a useful mechanism to help understand how a region grows

Idea of export and local-oriented sectors is useful in considering development strategies

The aggregate nature of the model limits applications