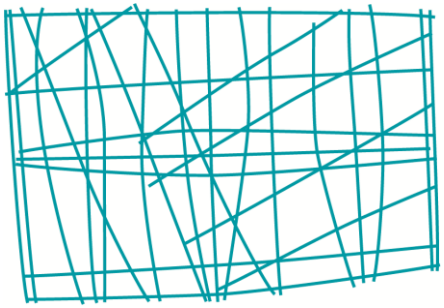


NEREUS

Núcleo de Economia Regional e Urbana
da Universidade de São Paulo

The University of São Paulo
Regional and Urban Economics Lab

Aula 3: Análise de setores-chave e decomposição do produto

Key concept

Key sector analysis: basics

Outline

- ✓ Rasmussen-Hirschman
- ✓ Matriz do Produto dos Multiplicadores (MPM)
- ✓ Campo de Influência
- ✓ Índice Puro de Ligações

Sectoral Share in Gross Output

	Sector	*1953*	*1980*	*1995*
1	Agriculture	28.73	8.89	11.00
2	Mining	0.95	3.33	2.37
3	Nonmetallic Minerals	0.96	3.00	1.50
4	Metal Products	2.88	13.00	11.21
5	Machinery	0.11	2.05	1.85
6	Electrical Equipment	0.06	0.75	0.86
7	Transportation Equipment	0.08	2.12	5.37
8	Wood and Furniture	0.73	0.64	0.88
9	Paper and Publishing	0.45	1.04	0.83
10	Rubber	0.00	0.13	0.12
11	Chemicals and Pharmaceuticals	0.42	4.05	5.06
12	Textiles	3.42	2.22	0.92
13	Clothing and Footwear	0.95	0.88	0.48
14	Food Products	7.28	8.58	7.82
15	Other Manufacturing	0.08	0.19	0.39
16	Services	52.89	49.13	49.35

Distribution of Projects Contemplated by Law 5261/69, by Sector: 1970-1975

Sector	*# Projects*	*Investment (%)*
Nonmetallic Minerals	37	9.27
Metal Products	64	62.45
Machinery	18	3.65
Electrical Equipment	12	1.04
Transportation Equipment	7	9.53
Wood and Furniture	10	0.08
Paper and Publishing	13	1.66
Rubber	5	0.08
Chemicals and Pharmaceuticals	19	3.94
Textiles	22	2.48
Clothing and Footwear	17	1.01
Food Products	40	3.99
Other Manufacturing	14	0.82

Multiplicadores: MG, 53/80/95

		Multiplicadores			
	1953	1980	1995	1980/1953	1995/1980
Agropecuária	1.145	1.247	1.595	1.089	1.279
Extrativa	1.081	1.345	1.674	1.245	1.244
Transf. Min. não metálicos	1.241	1.786	1.813	1.439	1.015
Metalúrgicas	1.396	2.454	2.157	1.758	0.879
Mecânicas	1.392	1.726	1.626	1.240	0.942
Material elétrico	1.397	1.686	1.627	1.207	0.965
Material de transporte	1.684	1.640	1.996	0.973	1.217
Madeira e mobiliário	1.535	1.436	1.771	0.936	1.233
Papel e gráfica	1.184	1.338	1.668	1.130	1.246
Borracha	1.000	1.150	1.508	1.150	1.311
Química e farmacêutica	1.470	1.311	1.537	0.892	1.172
Têxteis	1.699	1.833	1.688	1.079	0.921
Vestuário e calçados	1.957	1.649	1.601	0.843	0.971
Produtos alimentares	1.920	1.955	2.107	1.018	1.078
Diversas	1.390	1.428	1.650	1.027	1.156
Serviços	1.324	1.469	1.365	1.109	0.929

Setores-chave

Setores que contribuem acima da média para a economia

Pressuposto: o processo de transformação econômica é frequentemente estimulado por um número relativamente pequeno de setores, mesmo que a economia como um todo sofra mudanças

Técnicas complementares

Índice de Rasmussen-Hirschmann

Metodologia “estabelecida”

$$B = \left(I - A\right)^{-1} = \left(\alpha_{ij}\right)$$

$$B^{*} = \sum_{i}\sum_{j}\frac{\alpha_{ij}}{n^{2}}$$

$$B_{\bullet j} = \sum_{i=1}^{n}\alpha_{ij}$$

$$B_{i\bullet} = \sum_{j=1}^{n}\alpha_{ij}$$

Índice de Rasmussen-Hirschmann (cont.)

Índice de ligações para trás:

$$U_j = \frac{\left(B_{\bullet j} / n\right)}{B^*}$$

$U_j > 1$: aumento do nível de atividade de j gera aumento na demanda por insumos de outros setores acima da média

Índice de ligações para frente:

$$U_i = \frac{\left(B_{i\bullet} / n\right)}{B^*}$$

$U_i > 1$: teria que aumentar sua produção mais que proporcionalmente se se verificasse um aumento na demanda dos outros setores

Críticas

Efeito multiplicador acima da média não implica alto número de ligações

Solução: combinar com coeficiente de variação (mostra como as ligações se espalham pelos setores):

$$V_{\bullet j} = \frac{\sqrt{\frac{1}{n-1}\sum_{i}\left[\alpha_{ij} - \left(B_{\bullet j}/n\right)\right]^2}}{B_{\bullet j}/n}, \quad V_{i\bullet} = \frac{\sqrt{\frac{1}{n-1}\sum_{j}\left[\alpha_{ij} - \left(B_{i\bullet}/n\right)\right]^2}}{B_{i\bullet}/n}$$

Não leva em consideração os diferentes níveis de produção em cada setor da economia

Não há garantia de que o estímulo potencial seja traduzido em crescimento

Matriz do Produto dos Multiplicadores

Alternativa ao Índice de R-H

Visualização

$$B_{\bullet\bullet} = \sum_i \sum_j \alpha_{ij}$$

$$M = \frac{1}{B_{\bullet\bullet}} \left\| B_{i\bullet} B_{\bullet j} \right\| = \frac{1}{B_{\bullet\bullet}} \begin{pmatrix} B_{1\bullet} \\ \vdots \\ B_{n\bullet} \end{pmatrix} \left(B_{\bullet 1} \cdots B_{\bullet n} \right)$$

Matriz do Produto dos Multiplicadores (cont.)

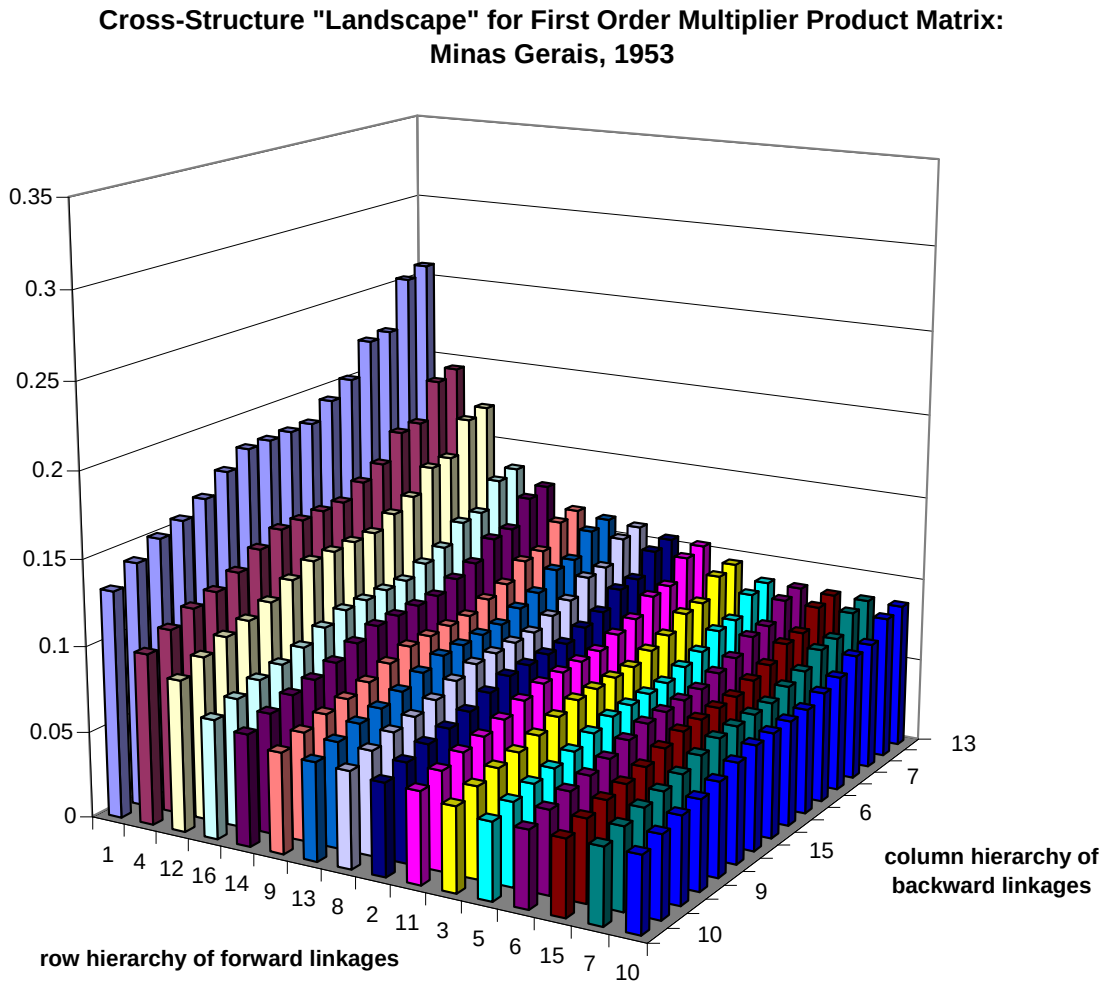
Pode-se demonstrar que a MPM possui uma estrutura cruzada que revela a hierarquia dos índices de ligações para frente e para trás de R-H

Linhas: hierarquia do ILF

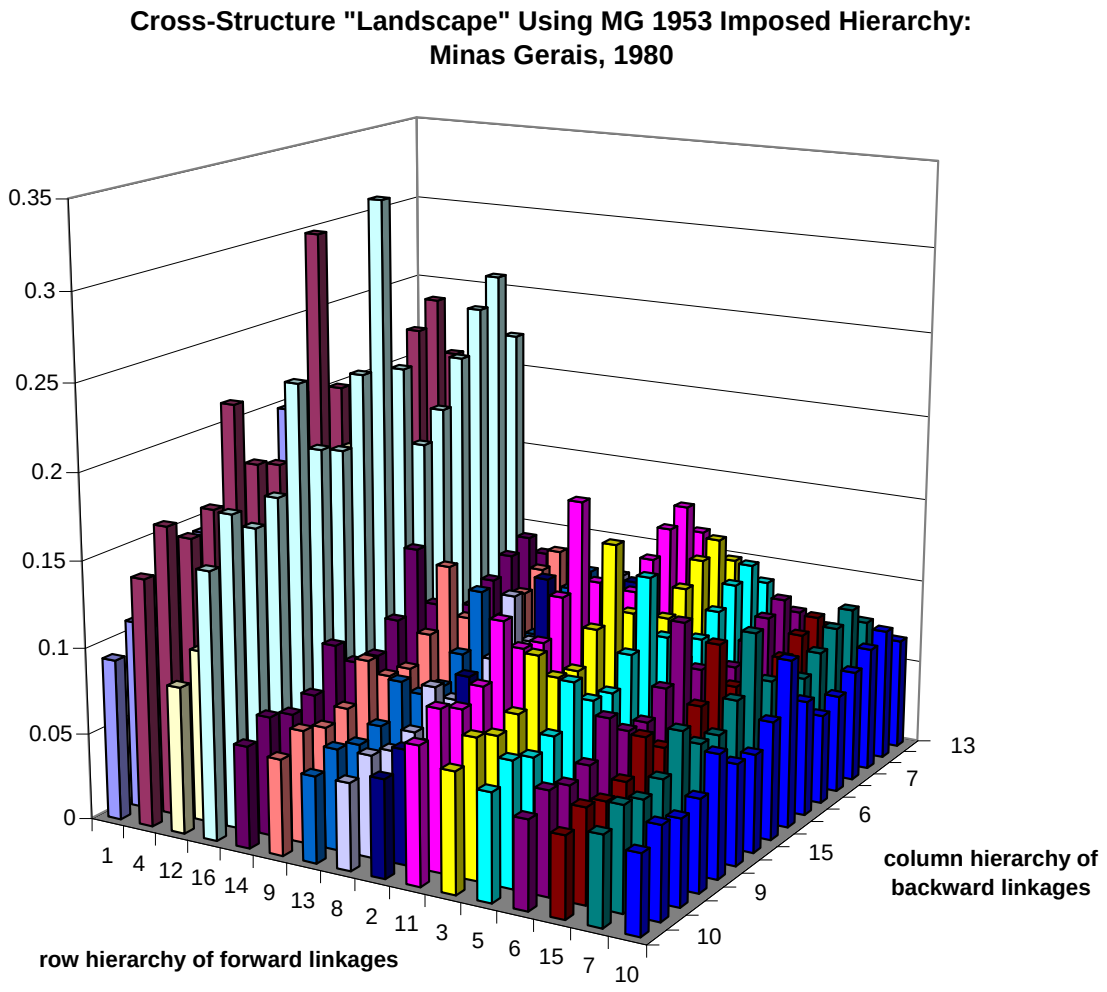
Coluna: hierarquia do ILT

Exemplo: MG – 53/80/95

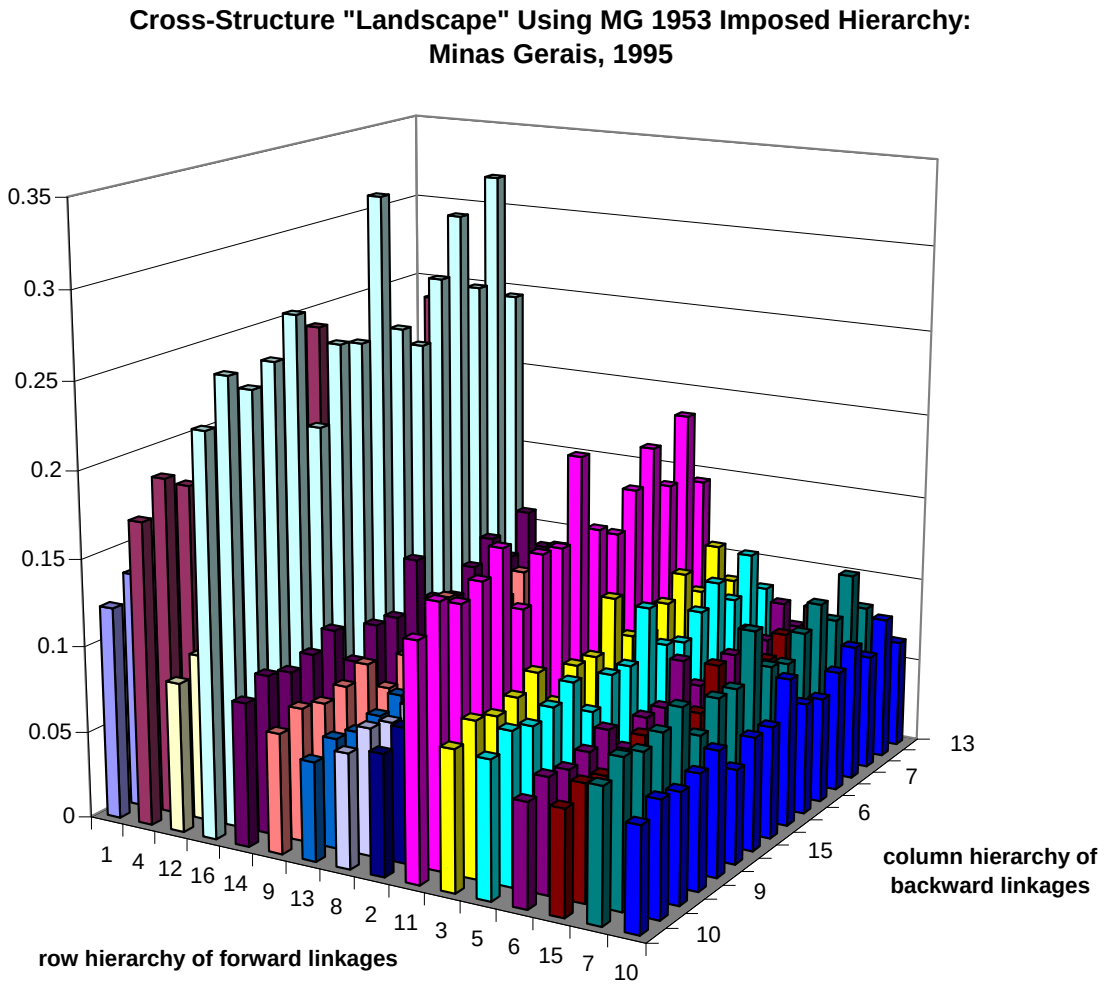
MPM, MG: 1953


Cross-Structure "Landscape" for First Order Multiplier Product Matrix:
Minas Gerais, 1953
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1 4 12 16 14 9 13 8 2 11 3 5 6 15 7 10
row hierarchy of forward linkages
13 7 6 15 9 10
column hierarchy of backward linkages

MPM, MG: 1980


Cross-Structure "Landscape" Using MG 1953 Imposed Hierarchy:
Minas Gerais, 1980
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1 4 12 16 14 9 13 8 2 11 3 5 6 15 7 10
row hierarchy of forward linkages
13 7 6 15 9 10
column hierarchy of backward linkages

MPM, MG: 1995


Cross-Structure "Landscape" Using MG 1953 Imposed Hierarchy:
Minas Gerais, 1995
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1 4 12 16 14 9 13 8 2 11 3 5 6 15 7 10
row hierarchy of forward linkages
13 7 6 15 9 10
column hierarchy of backward linkages

Campo de Influência

Problema de mudança de coeficiente, ou seja, a influência da mudança em um ou mais coeficientes diretos na matriz inversa de Leontief associada à matriz A

Coeficientes mais "influentes" que outros em um sistema econômico

R-H: importância de um dado setor em termos dos seus impactos no sistema como um todo

Mas quais são os principais elos dentro da economia?

Campo de Influência (cont.)

Caso mais simples: mudança em um coeficiente

$$A=\left(a_{ij}\right), E=\left(\varepsilon_{ij}\right), B=\left(I-A\right)^{-1}=\left(\alpha_{ij}\right)$$

$$B\left(\varepsilon\right)=\left(I-A-E\right)^{-1}=\left(\alpha_{ij}\left(\varepsilon\right)\right)$$

Suponha que a mudança ocorra em (i_1, j_1):

$$\varepsilon_{ij}=\begin{cases}\varepsilon & i=i_1, j=j_1\\ 0 & i\neq i_1, j\neq j_1\end{cases}$$

Campo de Influência (cont.)

O campo de influência desta variação pode ser aproximado pela expressão:

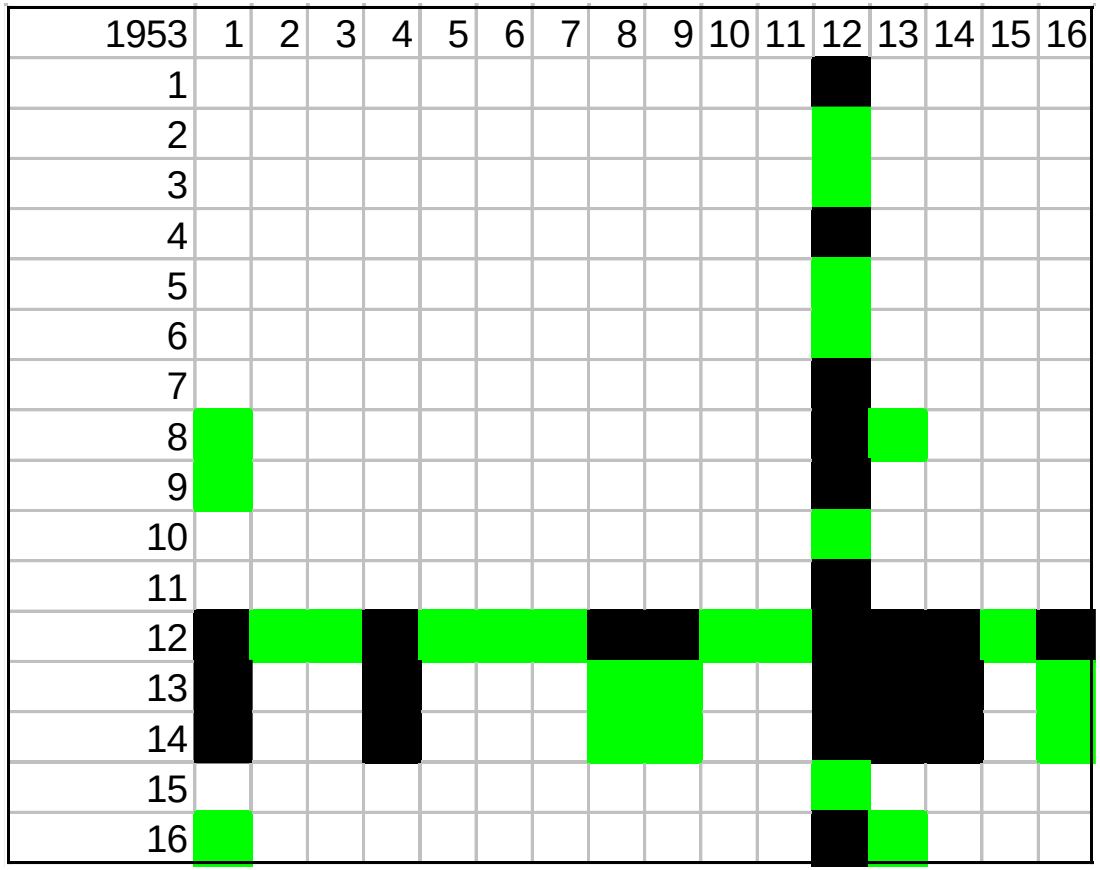
$$F\left(\varepsilon_{ij}\right) \cong \frac{\left[B(\varepsilon_{ij}) - B\right]}{\varepsilon_{ij}}$$

⟶ matriz do campo de influência do coeficiente *aij*

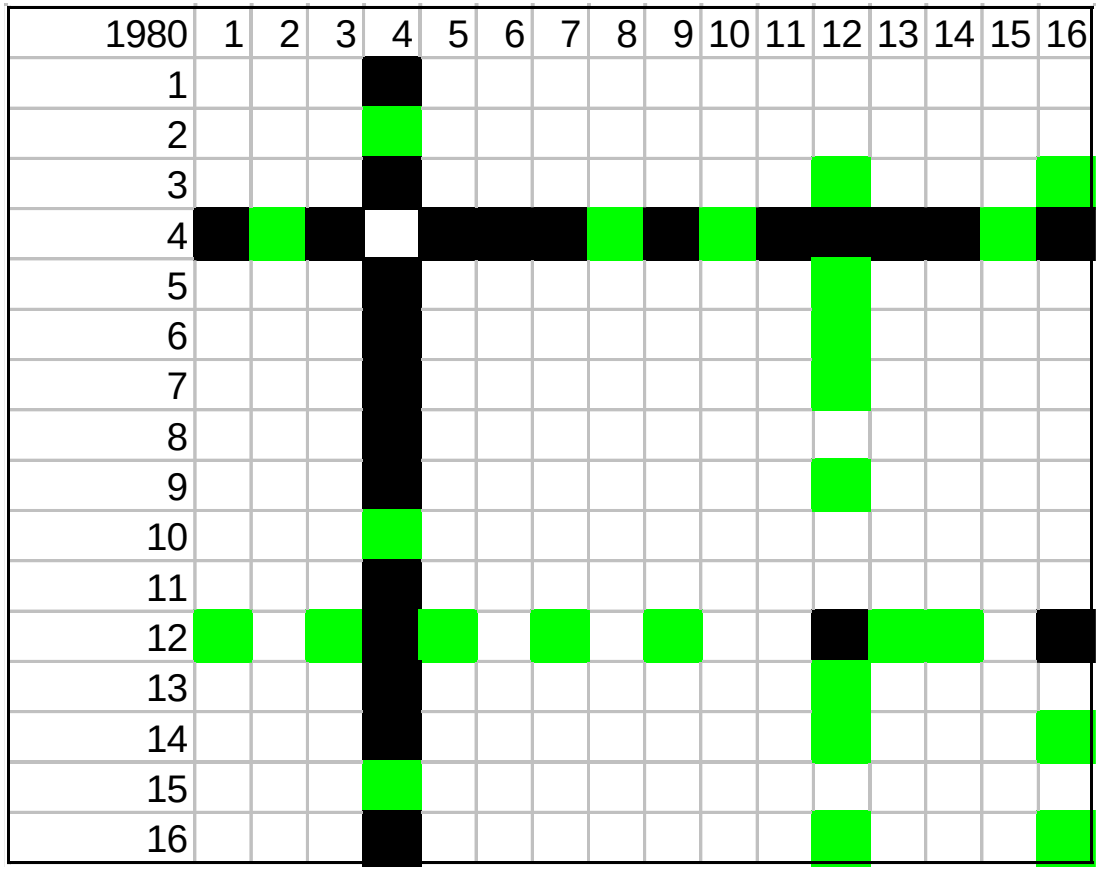
Valor para $F\left(\varepsilon_{ij}\right)$:

$$S_{ij} = \sum_{k=1}^{n}\sum_{l=1}^{n}\left[f_{kl}\left(\varepsilon_{ij}\right)\right]^2$$

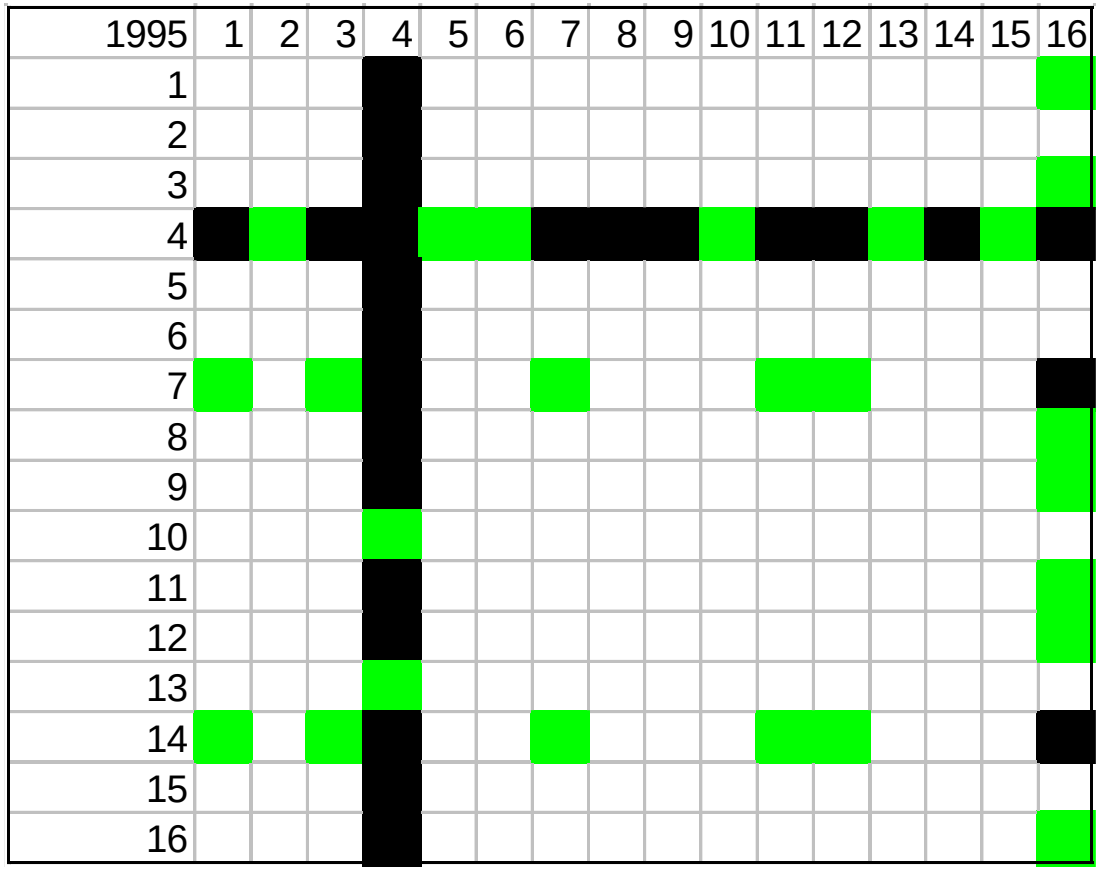
Campo de Influência: MG, 1953



Campo de Influência: MG, 1980



Campo de Influência: MG, 1995



Reference

The notes for this lecture were based on the following paper:

"Building-up Influence: Post-war Industrialization in the State of Minas Gerais, Brazil"
Haddad, E. A., Hewings, G,J. D., Leon, F. L. L. and Santos, R. C.. *Revista de Economia Política*, v. 27, p. 2, 2007.

Key concept

Economic base multipliers

Outline

- ✓ Introduction
- Interisland input-output model for the Azores
- Impacts of the economic base on the islands
- Final remarks

The Azores

The Azores Archipelago

This paper reports on the recent developments in the construction of an interregional IO matrix for Azores

As part of an ongoing project that aims to develop an interregional CGE (ICGE) model for the archipelago, a fully specified interregional input-output database was developed under **conditions of limited information**.

Lack of adequate data is a problem: but do you wait until the data have improved sufficiently, or do you start with existing data, no matter how imperfect, and improve the database gradually?

Such database is needed for **future calibration of the ICGE model**.

This research venture is part of a technical cooperation initiative involving researchers from the Regional and Urban Economics Lab at the University of São Paulo (NEREUS), the Institute of Economic Research Foundation (Fipe), both in Brazil, and the University of the Azores, in Portugal – **RSAI connections!**

Focus of the paper on the multiplier effects of the economic base of the archipelago

Describe the process by which the IIO system was constructed under the conditions of limited information that prevails in the Azores.

Exploratory analysis: structural characteristics of the economy of the Azores in the context of its 9 islands and 25 sectors:

(i) description of structural coefficients and the use of traditional input-output techniques;

(ii) decomposition of final demand components – economic base.

The economic base of the archipelago is 25.1% of the final demand (43.1% of GRP),…

Structure of the Economic Base of the Islands

	Santa Maria	*São Miguel*	*Terceira*	*Graciosa*	*São Jorge*	*Pico*	*Faial*	*Flores*	*Corvo*	*Total*
Exports Agro Portugal	13.8%	31.4%	33.7%	51.1%	41.5%	33.9%	30.8%	29.6%	21.8%	32.0%
Exports Agro Other	0.2%	0.4%	0.5%	1.6%	0.4%	0.3%	1.1%	0.3%	0.1%	0.5%
Exports Fishery Portugal	1.8%	2.5%	1.8%	1.7%	3.9%	12.6%	3.4%	1.0%	3.1%	3.0%
Exports Fishery Other	1.0%	1.3%	0.9%	0.6%	2.3%	7.5%	1.9%	0.4%	1.2%	1.6%
Exports Other Portugal	44.6%	22.5%	9.6%	5.5%	12.8%	5.4%	17.1%	18.9%	4.9%	18.6%
Exports Other Other	14.5%	6.6%	3.6%	2.2%	2.5%	2.3%	5.7%	6.5%	2.6%	5.8%
Tourism Portugal	2.8%	3.9%	4.6%	4.7%	3.3%	5.2%	7.4%	6.0%	1.5%	4.4%
Tourism Other	2.8%	7.0%	3.9%	2.3%	3.2%	6.5%	7.1%	6.9%	1.0%	6.0%
Government (dependent)*	18.5%	24.3%	41.4%	30.4%	30.2%	26.0%	25.6%	30.4%	64.0%	28.1%
Economic Base	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The economic base of the archipelago is mainly constituted by dairy and beef exports (32.5%), unilateral transfers (28.1%), other exports – mainly from transport, financial services and other agricultural products (24.4%), tourism (10.4%), and fishery (4.6%). Concerning exports, 98.4% of dairy and beef, 64.7% of fishery, 42.5% of tourism, and 76.3% of other exports go to Mainland Portugal.

… and its composition varies from island to island

Structure of the Economic Base of the Islands

	Santa Maria	*São Miguel*	*Terceira*	*Graciosa*	*São Jorge*	*Pico*	*Faial*	*Flores*	*Corvo*	*Total*
Exports Agro Portugal	13.8%	31.4%	33.7%	51.1%	41.5%	33.9%	30.8%	29.6%	21.8%	32.0%
Exports Agro Other	0.2%	0.4%	0.5%	1.6%	0.4%	0.3%	1.1%	0.3%	0.1%	0.5%
Exports Fishery Portugal	1.8%	2.5%	1.8%	1.7%	3.9%	12.6%	3.4%	1.0%	3.1%	3.0%
Exports Fishery Other	1.0%	1.3%	0.9%	0.6%	2.3%	7.5%	1.9%	0.4%	1.2%	1.6%
Exports Other Portugal	44.6%	22.5%	9.6%	5.5%	12.8%	5.4%	17.1%	18.9%	4.9%	18.6%
Exports Other Other	14.5%	6.6%	3.6%	2.2%	2.5%	2.3%	5.7%	6.5%	2.6%	5.8%
Tourism Portugal	2.8%	3.9%	4.6%	4.7%	3.3%	5.2%	7.4%	6.0%	1.5%	4.4%
Tourism Other	2.8%	7.0%	3.9%	2.3%	3.2%	6.5%	7.1%	6.9%	1.0%	6.0%
Government (dependent)*	18.5%	24.3%	41.4%	30.4%	30.2%	26.0%	25.6%	30.4%	64.0%	28.1%
Economic Base	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Dairy and beef is more relevant for Graciosa and São Jorge; unilateral transfers are more important for Corvo and Terceira due respectively to the smallness of Corvo and the existence of an American military base in Terceira; fishery plays an important relative role in Faial and Pico; tourism is relatively more relevant for São Miguel, Pico, Faial and Flores; and other exports are more significant for the more diversified island of São Miguel and for the special case of Santa Maria, where the Air Control of the North Atlantic is located.

Outline

Introduction

✓ Interisland input-output model for the Azores

Impacts of the economic base on the islands

Final remarks

Interregional input-output analysis

$$x = (I - A)^{-1} f = Bf$$

$$x = \begin{bmatrix} x^1 \\ \vdots \\ x^R \end{bmatrix}; A = \begin{bmatrix} A^{11} & \cdots & A^{1R} \\ \vdots & \ddots & \vdots \\ A^{R1} & \cdots & A^{RR} \end{bmatrix}; f = \begin{bmatrix} f^1 \\ \vdots \\ f^R \end{bmatrix}; \text{ and } B = \begin{bmatrix} B^{11} & \cdots & B^{1R} \\ \vdots & \ddots & \vdots \\ B^{R1} & \cdots & B^{RR} \end{bmatrix}$$

$$x^1 = B^{11} f^1 + \cdots + B^{1R} f^R$$
$$\vdots$$
$$x^R = B^{R1} f^1 + \cdots + B^{RR} f^R$$

$$t = \begin{bmatrix} t^1 \\ \vdots \\ t^R \end{bmatrix}; i = \begin{bmatrix} i^1 \\ \vdots \\ i^R \end{bmatrix}; p = \begin{bmatrix} p^1 \\ \vdots \\ p^R \end{bmatrix}; e = \begin{bmatrix} s^1 \\ \vdots \\ s^R \end{bmatrix} c = \begin{bmatrix} c^1 \\ \vdots \\ c^R \end{bmatrix}; e = \begin{bmatrix} e^1 \\ \vdots \\ e^R \end{bmatrix}$$

Tourist expenditures (Portugal and foreign)

Exports (Portugal and foreign)

Government expenditures financed by external unilateral transfers

Other final demand expenditures

Interregional input-output analysis

$$x^1 = B^{11}(t^1+i^1 + p^1 + s^1 + c^1 + e^1) + \cdots + B^{1R}(t^R+i^R + p^R + s^R + c^R + e^R)$$
$$\vdots$$
$$x^R = B^{R1}(t^1+i^1 + p^1 + s^1 + c^1 + e^1) + \cdots + B^{RR}(t^R+i^R + p^R + s^R + c^R + e^R)$$

We can then compute the contribution of the components of the economic base to the islands output

It is clear that an island output depends, among others, on direct money injections in the island itself and, depending on the degree of interregional integration among the islands in the Azores, also on injections in other islands.

Outline

Introduction

Interisland input-output model for the Azores

✓ Impacts of the economic base on the islands

Final remarks

Multiplier effects on the Archipelago are different

Economic-Base Total Output Multipliers in the Azores, by Component

Exports Agro Portugal	1,96
Exports Agro Other	2,12
Exports Fishery Portugal	1,61
Exports Fishery Other	1,66
Exports Other Portugal	1,57
Exports Other Other	1,48
Tourism Portugal	1,83
Tourism Other	1,83
Government (dependent)*	1,31
Economic Base	**1,65**

Lower island multiplier effects are associated with smallness and remoteness

Island-Economic-Base Output Multipliers in the Azores

Santa Maria	1,78
São Miguel	1,65
Terceira	1,69
Graciosa	1,57
São Jorge	1,83
Pico	1,68
Faial	1,49
Flores	1,56
Corvo	1,53
Total	**1,65**

There is a spatial hierarchy in the context of the nine islands in the Azores; moreover, specialization matters

Spatial Decomposition of the Archipelago Multipliers of the Islands' Economic Bases

	Origin of the economic base									
	Santa Maria	*São Miguel*	*Terceira*	*Graciosa*	*São Jorge*	*Pico*	*Faial*	*Flores*	*Corvo*	*Total*
Santa Maria	84,1%	1,4%	0,5%	0,5%	0,4%	0,5%	0,6%	0,6%	0,4%	3,8%
São Miguel	12,1%	87,6%	15,4%	15,4%	13,8%	14,3%	13,3%	10,5%	10,7%	55,5%
Terceira	2,2%	0,4%	79,8%	0,2%	1,1%	3,4%	3,5%	3,8%	3,9%	19,7%
Graciosa	0,1%	0,4%	0,3%	72,2%	0,4%	0,5%	0,5%	0,3%	0,2%	1,7%
São Jorge	0,4%	1,3%	1,2%	1,8%	76,2%	1,9%	1,7%	1,1%	1,1%	3,9%
Pico	0,5%	1,6%	1,4%	2,0%	2,1%	74,8%	2,6%	1,3%	1,3%	5,7%
Faial	0,4%	1,1%	1,1%	1,6%	1,7%	2,3%	75,5%	1,2%	1,3%	7,7%
Flores	0,1%	0,3%	0,3%	0,4%	0,3%	0,4%	0,4%	80,9%	1,2%	1,7%
Corvo	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	80,1%	0,1%
Multiplier	1,57	1,67	1,61	1,72	1,63	1,65	1,69	1,59	1,40	1,65
Intra-regional	*1,32*	*1,46*	*1,28*	*1,24*	*1,24*	*1,23*	*1,28*	*1,29*	*1,12*	-
Interregional	*0,25*	*0,21*	*0,32*	*0,48*	*0,39*	*0,41*	*0,41*	*0,30*	*0,28*	-

Specialized in agro exports

More dependent on external public transfers

Outline

Introduction

Interisland input-output model for the Azores

Impacts of the economic base on the islands

✓ Final remarks

Final remarks

Validation by experts (internal OK)

The analysis suggests that there are some important differences in the internal structure of the island economies in the Azores and the external interactions among their different agents.

It is clear from the preceding analysis that the role of exports to continental Portugal in generating domestic output in the Azores is very relevant.

Even in this context, the role of interinsular trade to the island economies should not be relegated to a secondary place, especially between the two main islands (São Miguel and Terceira).

Reference

The notes for this lecture were based on the following paper:

"Multipliers in an Island Economy: The Case of the Azores"
Haddad, E. A., Silva, V., Porsse, A. A., and Dentinho, T. In: A. Batabyal and P. Nijkamp (Eds.), *The Region and Trade: New Analytical Directions*, World Scientific, p. 205-226, 2015 (forthcoming)

Key concept

Spatial pattern of household consumption

Outline

- ✓ Introduction
- Methodology
- Expenditures patterns
- Simulation design and results
- Final remarks

How does the observed pattern of domestic tourist expenditures contribute to regional inequality in Brazil?

This paper analyzes the consumption patterns of tourists coming from different domestic origins and choosing other domestic destinations in Brazil, in terms of **expenditure level and composition**.

We also look at the different alternatives of **financing tourist expenditures** and their implications for the net multipliers in an integrated framework.

We use **survey data** for domestic tourism in Brazil to consolidate an interregional matrix of expenditures by tourists and then use **an interregional input-output system** for Brazil to compute the tourism multiplier effects based on alternative hypotheses for the sources of financing of expenditures by tourists.

The results are analyzed, and their implications for regional inequality in the country are discussed.

Results suggest domestic tourism acts in favor of reducing regional inequality in the country

Main issues:

1) Domestic versus international tourists

2) Financing tourist expenditures – potential crowding-out effects

3) Single-region versus interregional systems

4) National and regional effects

5) Budget constraints

6) Domestic tourism as a (more efficient) mechanism of interregional transfers

Regional indicators in Brazil

	GDP share	Per capita GDP	HDI
North	5.1	63.9	0.722
Northeast	13.1	46.8	0.681
Southeast	56.0	132.5	0.803
South	16.6	114.2	0.805
Center-west	9.2	127.4	0.788
BRAZIL	**100.0**	**100.0**	**0.766**

Regional indicators in Brazil

	GDP share	Per capita GDP	HDI
North	5.1	63.9	0.722
Northeast	13.1	46.8	0.681
Southeast	56.0	132.5	0.803
South	16.6	114.2	0.805
Center-west	9.2	127.4	0.788
BRAZIL	**100.0**	**100.0**	**0.766**

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Methodological approach

Interregional input-output accounting-based approach incorporating data from a comprehensive national survey on domestic tourism in Brazil

Look at different alternatives of financing tourist expenditures and their implications for the net multipliers in an integrated framework

The use of a national survey integrated to an interregional input-output system eliminates the often encountered problem in local and regional studies associated with the absence of any control total data for tourist expenditure figures in an integrated system (Archer, 1984, 1995)

Interregional input-output analysis

$$x = (I - A)^{-1} f = Bf$$

$$x = \begin{bmatrix} x^1 \\ \vdots \\ x^R \end{bmatrix};\ A = \begin{bmatrix} A^{11} & \cdots & A^{1R} \\ \vdots & \ddots & \vdots \\ A^{R1} & \cdots & A^{RR} \end{bmatrix};\ f = \begin{bmatrix} f^1 \\ \vdots \\ f^R \end{bmatrix};\ \text{and}\ B = \begin{bmatrix} B^{11} & \cdots & B^{1R} \\ \vdots & \ddots & \vdots \\ B^{R1} & \cdots & B^{RR} \end{bmatrix}$$

$$x^1 = B^{11} f^1 + \cdots + B^{1R} f^R$$
$$\vdots$$
$$x^R = B^{R1} f^1 + \cdots + B^{RR} f^R$$

$$v = \begin{bmatrix} v^{11} & \cdots & v^{1R} \\ \vdots & \ddots & \vdots \\ v^{R1} & \cdots & v^{RR} \end{bmatrix};\ c = \begin{bmatrix} c^1 \\ \vdots \\ c^R \end{bmatrix};\ e = \begin{bmatrix} e^1 \\ \vdots \\ e^R \end{bmatrix}$$

household expenditures with domestic tourism

Other household expenditures

Other final demand expenditures

Interregional input-output analysis

$$x^1 = B^{11}(v^{11} + \cdots + v^{R1} + c^1 + e^1) + \cdots + B^{1R}(v^{1R} + \cdots + v^{RR} + c^R + e^R)$$
$$\vdots$$
$$x^R = B^{R1}(v^{11} + \cdots + v^{R1} + c^1 + e^1) + \cdots + B^{RR}(v^{1R} + \cdots + v^{RR} + c^R + e^R)$$

We obtain information of domestic tourist expenditures from the domestic tourism module, allowing us to treat *v* as a matrix which provides the monetary values of expenditures of tourists coming to domestic region *r* from domestic region *s*

We can then compute the contribution of expenditures with domestic tourism on regional output

We will concentrate our analysis on the contribution of *v* to *x*

Financing schemes

Given regional household budget constraints, resources allocated to tourism activities crowd out other types of consumption (present or future)

(i) **reductions in personal savings**, considering only the systemic effects of *v*, which gives the upper bound for the multiplier effects of expenditures in the short run in this modeling context

(ii) **simultaneous monetary-equivalent reductions in consumption in the respective origin regions**, representing an induced substitution effect in the consumption basket of travelers according to household consumption patterns provided in *c*

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The survey

Based on a series of over 37,000 interviews with urban households using a randomized sampling design focusing on potential travelling households

It includes detailed regional information on the social status of the travellers, on their motives to travel, on their **origins and destinations**, the length of stays, and on **the distribution of their spending on different items** such as accommodation, restaurants, transportation, entertainment, etc.

The survey was commissioned by the Ministry of Tourism in Brazil and was conducted by the Institute of Economic Research Foundation – FIPE – from the University of Sao Paulo.

Definitions

From the existing types of households trips considered in the survey – routine trips, excursion/one-day trips, international trips, and domestic trips – only the latter was considered in our calculations.

Therefore, the concept of domestic tourism in our study relates only to **domestic trips reported by households with at least one overnight in the destination** (39.4% of the interviewed households engaged in this type of travel).

Insofar that the survey's focus is on domestic tourism, especially the **demand side**, we were able to organize the micro data and **expand the sample** in such a way to generate the necessary information to consolidate a matrix of origin-destination expenditure profiles at the macro-regional level for the year 2007, and, thus, calibrate the matrix *v*

The *v* matrix

Domestic Tourists Expenditures in Brazil, by Origin-Destination Flows (in BRL millions)

		Destination					Total
		North	Northeast	Southeast	South	Center-West	
Origin	North	316,77	212,51	263,59	63,62	136,57	993,07
	Northeast	61,51	1.438,24	751,57	110,59	110,60	2.472,51
	Southeast	163,07	3.124,31	4.947,93	814,07	517,31	9.566,69
	South	20,93	349,62	397,42	2.163,94	113,16	3.045,07
	Center-West	81,53	579,21	360,34	266,72	384,24	1.672,05
	Total	643,81	5.703,89	6.720,86	3.418,95	1.261,88	17.749,39

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Strategy

We used equation (5) to evaluate the role played by each origin-destination tourist flow in generating the model's results.

$$x^1 = B^{11}(v^{11} + \cdots + v^{R1} + c^1 + e^1) + \cdots + B^{1R}(v^{1R} + \cdots + v^{RR} + c^R + e^R)$$
$$\vdots$$
$$x^R = B^{R1}(v^{11} + \cdots + v^{R1} + c^1 + e^1) + \cdots + B^{RR}(v^{1R} + \cdots + v^{RR} + c^R + e^R) \quad (5)$$

For each regional interaction, we calculated its contribution to the total outcome in terms of national and regional gross output.

We first examined the national effects. We then looked at the effects on regional inequality, through the differential impacts on gross regional output for the five Brazilian macro regions (North, Northeast, Southeast, South, and Center-West).

National results: “a zero-sum game”

(1) Impacts of tourism expenditures considering the typical input-output total effects based on the information of matrix *v* and the Leontief inverse

(-)

(2) Total impacts of the hypothetical foregone home consumption

(=)

(3) Net multiplier effects, which include short-run resources constraints in the system

National results (1)

Gross Total Effects of Tourist Expenditures on National Output, by Origin-Destination Flows (in BRL millions)

		Destination					Total
		North	Northeast	Southeast	South	Center-West	
Origin	North	502,57	342,13	420,72	104,08	220,64	1.590,14
	Northeast	99,73	2.314,97	1.232,59	181,28	181,29	4.009,85
	Southeast	267,88	5.088,38	8.269,18	1.352,49	856,17	15.834,10
	South	34,28	562,09	637,82	3.577,41	187,18	4.998,78
	Center-West	132,71	940,87	594,80	438,77	629,49	2.736,64
	Total	1.037,17	9.248,44	11.155,11	5.654,02	2.074,76	29.169,50

National results (2)

Total Effects of Foregone Home Consumption on National Output, by Origin-Destination Flows (in BRL millions)

		Destination					Total
		North	Northeast	Southeast	South	Center-West	
Origin	North	-507,33	-340,36	-422,16	-101,90	-218,73	-1.590,47
	Northeast	-97,84	-2.287,70	-1.195,47	-175,91	-175,93	-3.932,86
	Southeast	-262,46	-5.028,37	-7.963,37	-1.310,20	-832,57	-15.396,97
	South	-33,91	-566,55	-644,01	-3.506,61	-183,38	-4.934,46
	Center-West	-132,91	-944,20	-587,41	-434,79	-626,37	-2.725,68
	Total	-1.034,44	-9.167,18	-10.812,43	-5.529,41	-2.036,97	-28.580,44

National results (3)

Net Total Effects of Tourist Expenditures on National Output , by Origin-Destination Flows (in BRL millions)

		Destination					Total
		North	Northeast	Southeast	South	Center-West	
Origin	North	-4,75	1,77	-1,44	2,18	1,91	-0,34
	Northeast	1,88	27,27	37,12	5,37	5,36	76,99
	Southeast	5,42	60,01	305,81	42,29	23,60	437,13
	South	0,37	-4,47	-6,19	70,80	3,80	64,32
	Center-West	-0,20	-3,32	7,39	3,98	3,12	10,96
	Total	2,73	81,26	342,68	124,61	37,79	589,07

Regional results (3)

Net Total Effects of Tourist Expenditures on Regional Output of the Southeast, by Origin-Destination Flows (in BRL millions)

		Destination					Total
		North	Northeast	Southeast	South	Center-West	
Origin	North	-105,72	-79,52	260,43	-21,89	-40,76	12,54
	Northeast	-11,63	-365,25	862,34	-23,59	-14,61	447,26
	Southeast	-180,56	-3.623,75	1.063,87	-928,95	-551,45	-4.220,84
	South	-3,39	-81,55	447,50	-455,06	-14,26	-106,77
	Center-West	-29,61	-240,86	349,66	-105,07	-129,60	-155,48
	Total	-330,92	-4.390,93	2.983,81	-1.534,55	-750,69	-4.023,29

Regional results (3)

Net Total Effects of Tourist Expenditures on Regional Output of the Northeast, by Origin-Destination Flows (in BRL millions)

		Destination					Total
		North	Northeast	Southeast	South	Center-West	
Origin	North	-35,71	254,28	-41,66	-10,10	-19,40	147,41
	Northeast	-53,20	641,43	-684,75	-101,04	-99,20	-296,78
	Southeast	2,71	4.147,47	-111,15	-25,97	-7,81	4.005,26
	South	0,68	467,28	-5,52	-27,08	0,41	435,76
	Center-West	-1,16	752,70	-20,84	-16,78	-17,21	696,72
	Total	-86,68	6.263,16	-863,92	-180,96	-143,22	4.988,37

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Summary

Total net multiplier effects of domestic tourism at national level lead to a zero-sum game, but regional distributive effects are significant

Domestic tourism can be considered as an important channel to produce a more efficient allocation of resources and reduce inequality among regions in Brazil

From a policy perspective, supporting interregional tourism in Brazil would produce a general redistributive effect

- More investments in tourism infrastructure in the Northeast would still be needed to increase the region's attractiveness (behavior of domestic tourists using a choice model of touristic destination).

Reference

The notes for this lecture were based on the following paper:

"Domestic Tourism and Regional Inequality in Brazil"
Haddad, E. A., Porsse, A. A., and Rabahy, W. A..
Tourism Economics, v. 19, p. 173-186, 2013

Atividade

Dados: Matrizes de Insumo-Produto dos Arranjos Populacionais do Brasil, 2015

Escolha um dos arranjos populacionais do banco de dados e preencha a tabela a partir da decomposição do produto de cada região do modelo considerando as origens da demanda final.

Preparar **três tabelas** com os valores totais em R$, e as participações regionais nas linhas e nas colunas.

Interprete os resultados!

Atividade (cont.)

Decomposição da Produção Regional baseada na Origem da Demanda Final

	R1	R2	R3	R4	EXP	Total
R1						
R2						
R3						
R4						
TOTAL						

Acesso aos dados:

https://ideas.repec.org/p/ris/nereus/2020_008.html