

NEREUS

Núcleo de Economia Regional e Urbana
da Universidade de São Paulo

The University of São Paulo
Regional and Urban Economics Lab

Lecture 6: Economic Base

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Key concept

Economic base multipliers

Outline

- ✓ Introduction

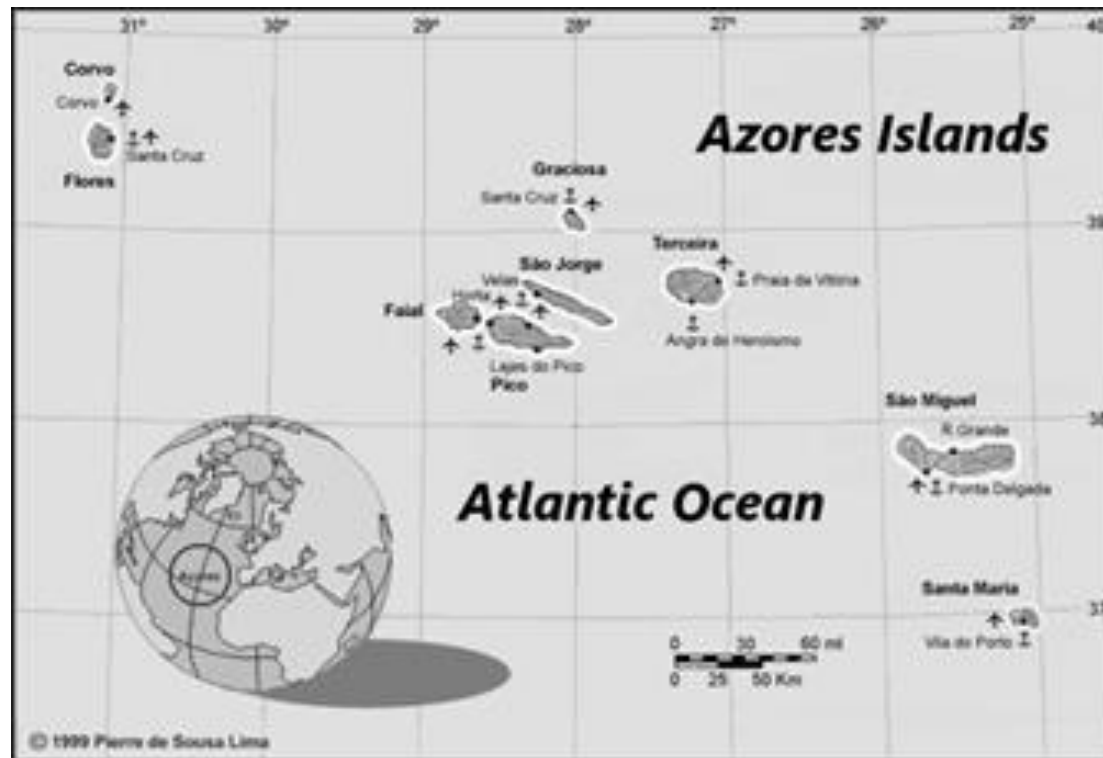
 - Interisland input-output model for the Azores

 - 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 **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 – **RSAl 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 represents 25.1% of the final demand (43.1% of GRP),...

Structure of the Economic Base of the Islands

	<i>Santa Maria</i>	<i>São Miguel</i>	<i>Tercena</i>	<i>Graciosa</i>	<i>São Jorge</i>	<i>Pico</i>	<i>Faial</i>	<i>Flores</i>	<i>Corvo</i>	<i>Total</i>
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

	<i>Santa Maria</i>	<i>São Miguel</i>	<i>Terceira</i>	<i>Graciosa</i>	<i>São Jorge</i>	<i>Pico</i>	<i>Faial</i>	<i>Flores</i>	<i>Corvo</i>	<i>Total</i>
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%
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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.

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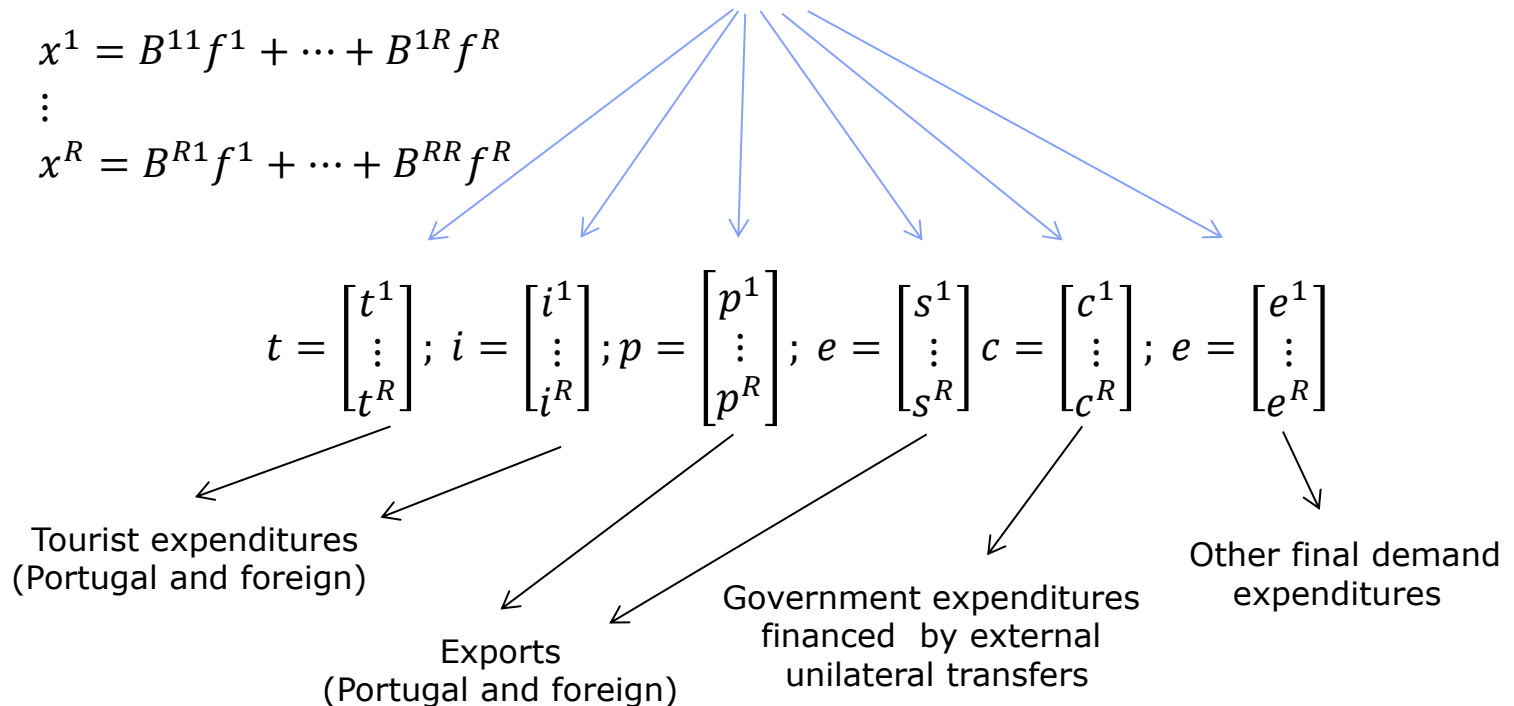
Final remarks

Interregional input-output analysis

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

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

$$\begin{aligned} x^1 &= B^{11}f^1 + \dots + B^{1R}f^R \\ &\vdots \\ x^R &= B^{R1}f^1 + \dots + B^{RR}f^R \end{aligned}$$



Interregional input-output analysis

$$\begin{aligned}x^1 &= B^{11}(t^1+i^1 + p^1 + s^1 + c^1 + e^1) + \dots + B^{1R}(t^R+i^R + p^R + s^R + c^R + e^R) \\ &\quad \vdots \\ x^R &= B^{R1}(t^1+i^1 + p^1 + s^1 + c^1 + e^1) + \dots + B^{RR}(t^R+i^R + p^R + s^R + c^R + e^R)\end{aligned}$$

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.

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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

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



Specialized in
agro exports



More dependent on
external public transfers

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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:

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