IRPET Regional Institute for Economic Planning of Tuscany

Foreign Exports and Regional Growth.

A preliminar analysis of Italian Regional growth through a Multiregional Input-Output model

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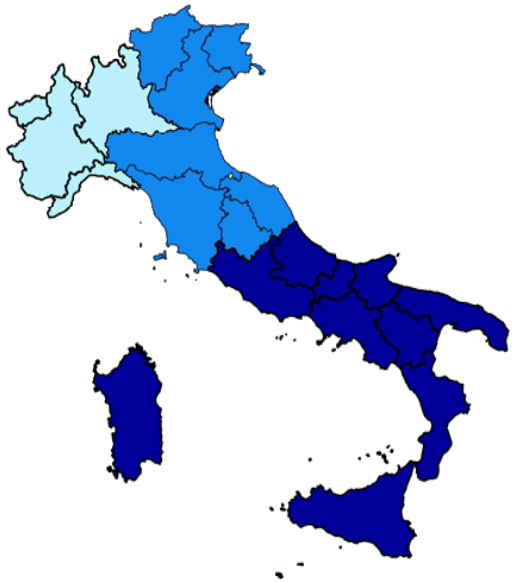
Introduction

Presentation outline:

- **Description of the IRPET Multiregional Input-Output Model for Italy (main focus)**
    1. The methodology used to build the multiregional table (Regional Supply and Use Tables, multiregional trade matrix)
    2. The structural model
- **The results of a very preliminary analysis of the role of foreign exports on the regional growth in Italy**
    1. Changes of the foreign exports regional multipliers during last years (1995 – 2003)
    2. Changes in the share of foreign exports in exogenous final demand during last decade?

Why did IRPET build a Multi-regional Model?



Two stylised facts have mainly characterized the italian economic growth:

1. the dualism between the two main macro-regions of the country (North-Centre and South)
2. the different kind of industrial economic growth experienced across the North-Central regions.

The different growth patterns experienced by the Italian regions imply a different set of structural parameters and so different responses to economic impulses.

……..therefore……..

Significant requirement of a multiregional analysis tool

Regional SUT Tables disaggregation (Eurostat Nace Rev. 1)

Prod	Description
01	Agriculture, hunting and related service activities
02	Forestry, logging and related service activities
05	Fishing, operation of fish hatcheries and fish farms; service activities incidental to
10	Mining of coal and lignite; extraction of peat
11	Extraction of crude petroleum and natural gas; service activities incidental to oil a
12	Mining of uranium and thorium ores
13	Mining of metal ores
14	Other mining and quarrying
15	Food products and beverages
16	Tobacco products
17	Textiles
18	Wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; luggage, handbags, saddlery, harness and footwe
20	Wood and of products of wood and cork, except furniture; articles of straw and plai
21	Pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Coke, refined petroleum products and nuclear fuel
24	Chemicals and chemical products
25	Rubber and plastic products
26	Other non-metallic mineral products
27	Basic metals
28	Fabricated metal products, except machinery and equipment
29	Machinery and equipment n.e.c.
30	Office machinery and computers
31	Electrical machinery and apparatus n.e.c.
32	Radio, television and communication equipment and apparatus
33	Medical, precision and optical instruments, watches and clocks
34	Motor vehicles, trailers and semi-trailers
35	Other transport equipment
36	Furniture; manufacturing n.e.c.
37	Recycling
40	Electricity, gas, steam and hot water supply
41	Collection, purification and distribution of water
45	Construction
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of auto
51	Wholesale trade and commission trade services, except of motor vehicles and moto
52	Retail trade services, except of motor vehicles and motorcycles; repair services of p
55	Hotel and restaurant services
60	Land transport and transport via pipeline services
61	Water transport services
62	Air transport services
63	Supporting and auxiliary transport services; travel agency services
64	Post and telecommunication services
65	Financial intermediation services, except insurance and pension funding services
66	Insurance and pension funding services, except compulsory social security service
67	Services auxiliary to financial intermediation
70	Real estate services
71	Renting services of machinery and equipment without operator and of personal an
72	Computer and related services
73	Research and development services
74	Other business services
75	Public administration and defence services; compulsory social security services
80	Education services
85	Health and social work services
90	Sewage and refuse disposal services, sanitation and similar services
91	Membership organisation services n.e.c.
92	Recreational, cultural and sporting services
93	Other services
95	Private households with employed persons

Sector	Description
A	Agriculture, hunting and forestry
B	Fishing
CA	Mining and quarrying of energy producing materials
CB	Mining and quarrying, non energy producing material
DA	Food products, beverages and tobacco
DB	Textiles and textile products
DC	Leather and leather products
DD	Wood and wood products
DE	Pulp, paper and paper products
DF	Coke, refined petroleum products and nuclear fuel
DG	Chemicals, chemical products and man-made fibres
DH	Rubber and plastic products
DI	Other non-metallic mineral products
DJ	Basic metals and fabricated metal products
DK	Machinery and equipment n.e.c.
DL	Electrical and optical equipment
DM	Transport equipment
DN	Manufacturing n.e.c.
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
72 - 73 - 7	Business activities, R&D and IT
L	Public administration
M	Education
N	Health and social work
O-P-Q	Other community, social and personal service activitie
70 - 71	Real estate and renting

COICOP 12											
Food and non-alcoholic beverages	Alcoholic beverages, tobacco	Clothing and footwear	Housing, water, electricity, gas, other fuels, actual	Furnishings, household equipment and routine maintenance	Health	Transport	Communication	Recreation and culture	Education	Restaurants and hotels	Miscellaneous goods and services

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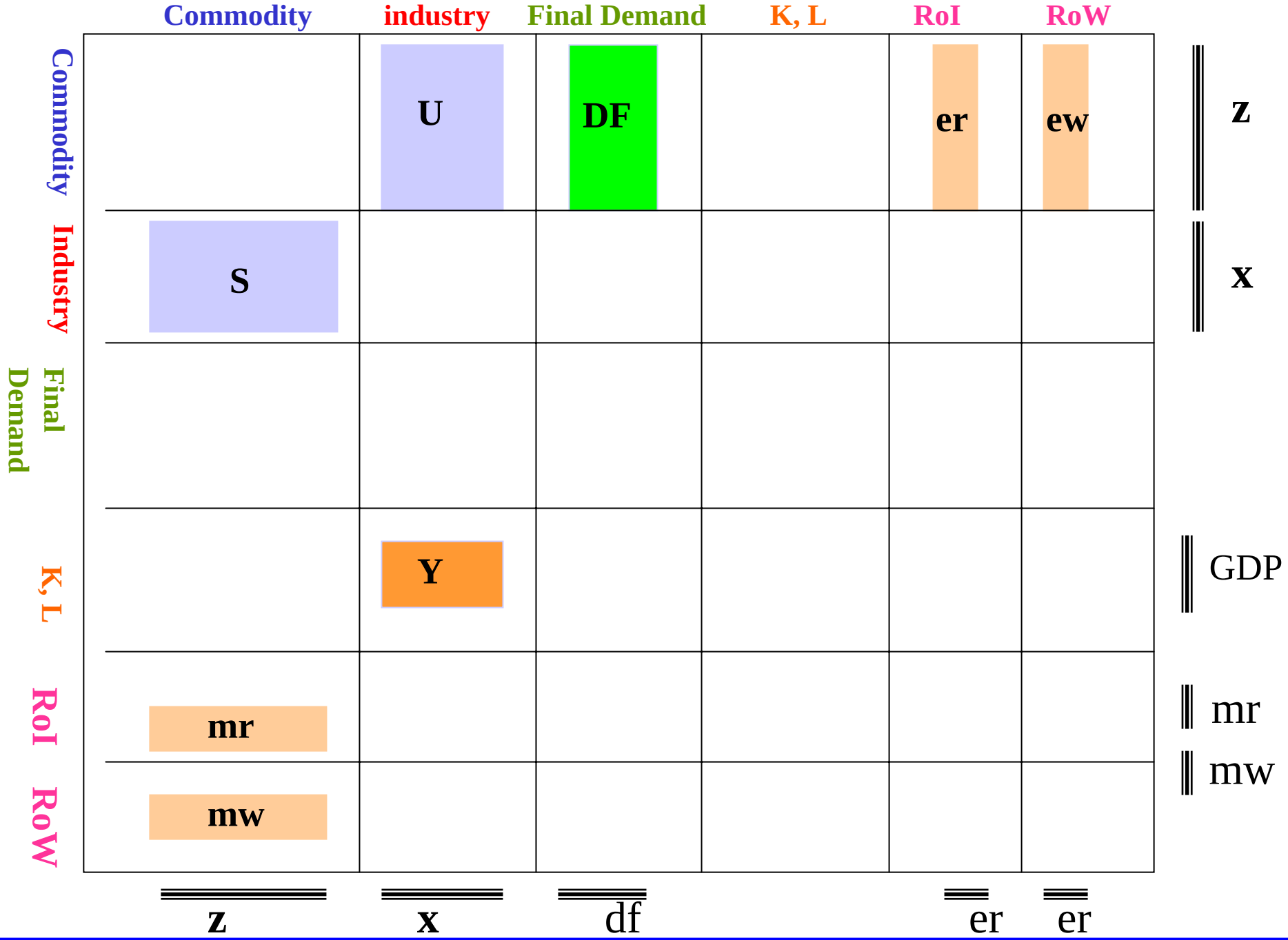
General public services	Defence	Public order and safety	Economic affairs	Environmental protection	Housing and community amenities	Health	Recreation, culture and religion	Education	Social protection


Commodity
industry
Final Demand
K, L
RoI
RoW
Commodity
Industry
Final Demand
K, L
RoI
RoW
U
DF
er
ew
S
Y
mr
mw
z
x
GDP
mr
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z
x
df
er
er

Methodology used for estimating regional SUT

- **Balancing methodology used**

Stone-Champernowne-Meade (SCM)

$$w^{*}_{(1)} = w_{(0)} - V \cdot G' \cdot (G \cdot V \cdot G')^{-1} \cdot (G \cdot w_{(0)} - k)$$

- **Initial estimates**

$$w_{(0)}$$

- **constraints**

$$G \cdot w = k$$

- **Variance-Covariance matrix**

$$V = f^{-1}(relative\_reliabity)$$

Initial Estimates

1. Use Tables (**U**)
   a. Regionalized Use Tables through industry-mix
   b. For some sectors (machinery, electronic, and transport equipment: regional survey on EEC (Istat))
   c. Other *ad hoc* information
2. Supply Tables (**S**)
   a. Regionalized Supply Tables through industry-mix
   b. Informations on output mix
3. Inter-regional trade flows Matrix (**R**)
   a. Estimation of a gravity model for EMU:

$$ {}_{rs}t_i = ({}_rX_i \cdot {}_sD_i) / Q_i \cdot f({}_{rs}\delta_i) $$

$$ {}_rX_i = ({}_{r.}q_i - {}_{r.}e_i) $$

$$ {}_sD_i = ({}_{.s}dt_i - {}_{.s}m_i) $$

$$ f({}_{rs}\delta_i) = f({}_{rs}d, IIT_i, TRADE_i, {}_rSIZE) $$

   b. Extrapolation to italian regions (note on effective distance)

- Constraints for commodity and industry

$$\mathbf{q} + i' \cdot \mathbf{R} + \mathbf{mw} \equiv \mathbf{U} \cdot i + \mathbf{DF} \cdot i + \mathbf{R} \cdot i + \mathbf{ew}$$

$$\mathbf{x} \equiv i' \cdot \mathbf{U} + i' \cdot \mathbf{Y}$$

- Regional Economic Accounts Constraints

$$\overline{\mathbf{Y}} \equiv \mathbf{Y} \cdot \mathbf{G}_{Y}$$

$$\overline{\mathbf{DF}} \equiv \mathbf{G}_{DF} \cdot \mathbf{DF}$$

$$\overline{\mathbf{ew}} \equiv \mathbf{G}_{ew} \cdot \mathbf{ew}$$

- Constraints for Inter-regional trade at National Level

$$\mathbf{i} \cdot \mathbf{R}^{*} \equiv \mathbf{R}^{*} \cdot \mathbf{i}' \quad \text{where} \quad \mathbf{R}^{*} \equiv \Theta \cdot vec(\mathbf{R})$$

- **Structural form** (Chenery-Moses theorethical approach)

$$[i] \quad x + s_x + mw + mr = A \cdot x + d + c_x + ew + er$$

$$[ii] \quad d = (c_k + g + i + div) \cdot (I - S_d)$$

$$[iii] \quad c_x = (H \cdot x) \cdot (I - S_c)$$

$$[iv] \quad ew = ewt \cdot (I - S_{ew})$$

$$[v] \quad s_x = S_x \cdot x$$

$$[vi] \quad mw = \hat{M} \cdot (A \cdot x + d + c_x)$$

$$[vii] \quad mr = \widehat{B} \cdot (I - M) \cdot [(A \cdot x + d + c_x)]$$

$$[viii] \quad er = \breve{B} \cdot (I - M) \cdot [(A \cdot x + d + c_x)]$$

Where $R = I - \widehat{B} + \breve{B}$

Where we use the industry by industry Matrices and Industry technology hp

The Reduced Form Model

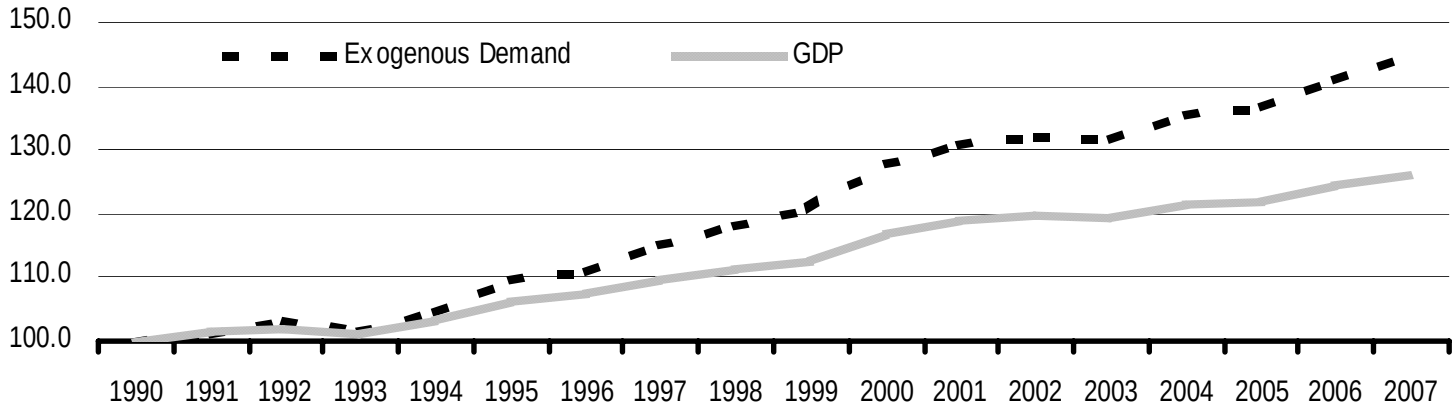
- **Reduced form**

$$x = \underbrace{\left\{\left(I + S_x\right) - T \cdot \left[A + H\left(I - S_c\right)\right]\right\}^{-1}}_{INV} \cdot \left\{T \cdot fd\right\}$$

Where $T = R \cdot (I - M)$

Role of Exports for Italy/1

- **From a National Point of View**

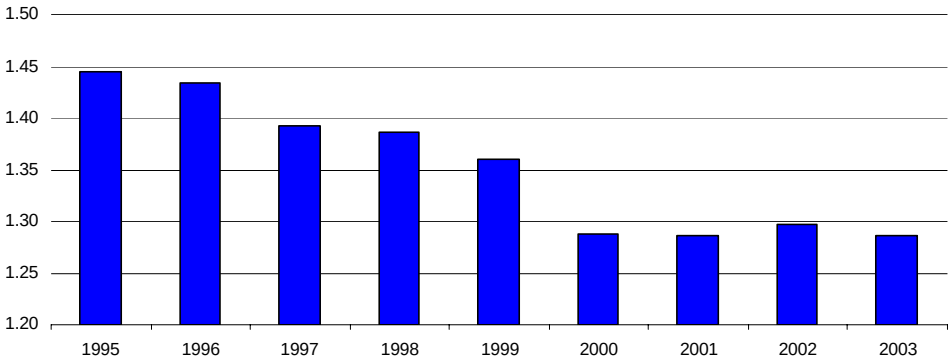


1. an acceleration in the mid of the 1990s until new millennium
2. The GDP dynamic is also characterized by growth during the period of analysis (1990-2007) but at a lower rate than the exogenous final demand one

This evidence seems to suggest that Italy has experienced a **decreasing multiplier** during that period

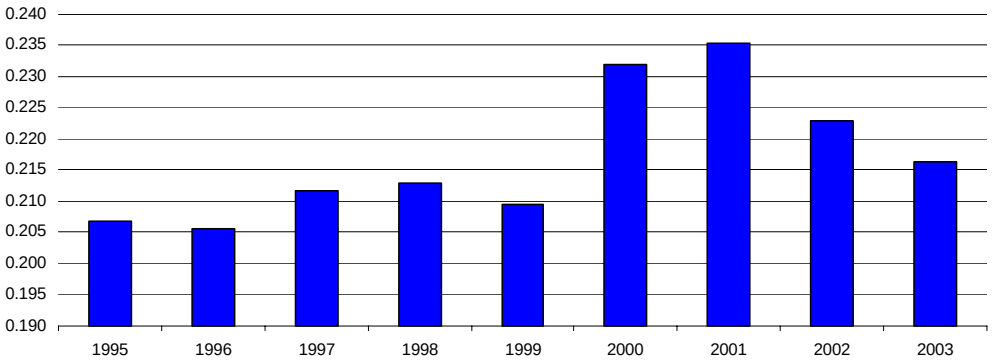
Role of Exports for Italy/2

- **But how much is the exogenous final demand multipliers really decreased over that period?**



We can call it "multiplier effect"

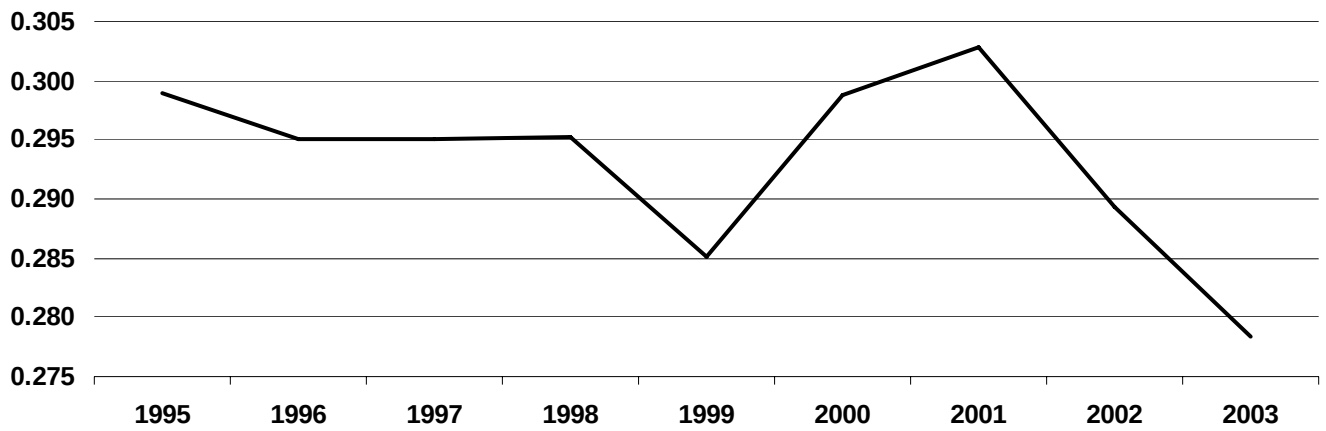
- **There is another important element we should take into consideration in assessing the role of foreign exports for Italy: the increase in the related share (over EFD and GDP)**



We can call it "share effect"

Role of Exports for Italy/3

- **the mixed effects of "multiplier" and "share" have determined an important variation of the impact of exports in the short-run growth**

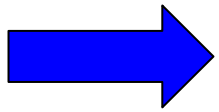


while in 1995 a 2.7 percent of growth of exports was necessary to get a 1% of growth of real GDP, currently this rate is 3%

What are the reasons of a diminishing elasticity?

- **Outsorcing of production processes, which has increased the intermediate import requirement per unit of export**

Year	Outgoing FDI - n. of enterprises	Employees
1986	282	244,188
1991	475	517,796
1996	124	655,039
2001	2,664	833,740
2002	2,734	888,375
2003	2,752	877,355
2004	2,792	873,763

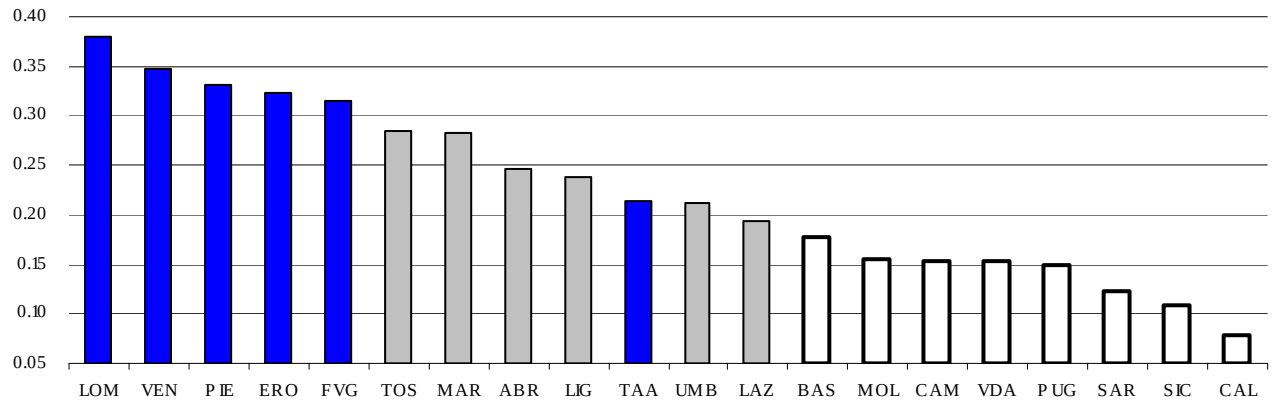


But this is a physiological process in a period of increasing globalisation

- **Another relevant aspect which influences the "multiplier effect" is the change in exports mix.**
  1. Sectors with small-value-added-multiplier increase their share (Chemicals, Machinery and equip.)
  2. Sector with higher-value-added-multiplier reduce their share (Agriculture, Basic Metals, Textiles)

Role of foreign exports at Regional level

The different growth patterns followed by Italian regions imply a different set of structural parameters and so different responses to exogenous stimuli (according to the multiregional I-O model)



Obtained using the multi-regional model

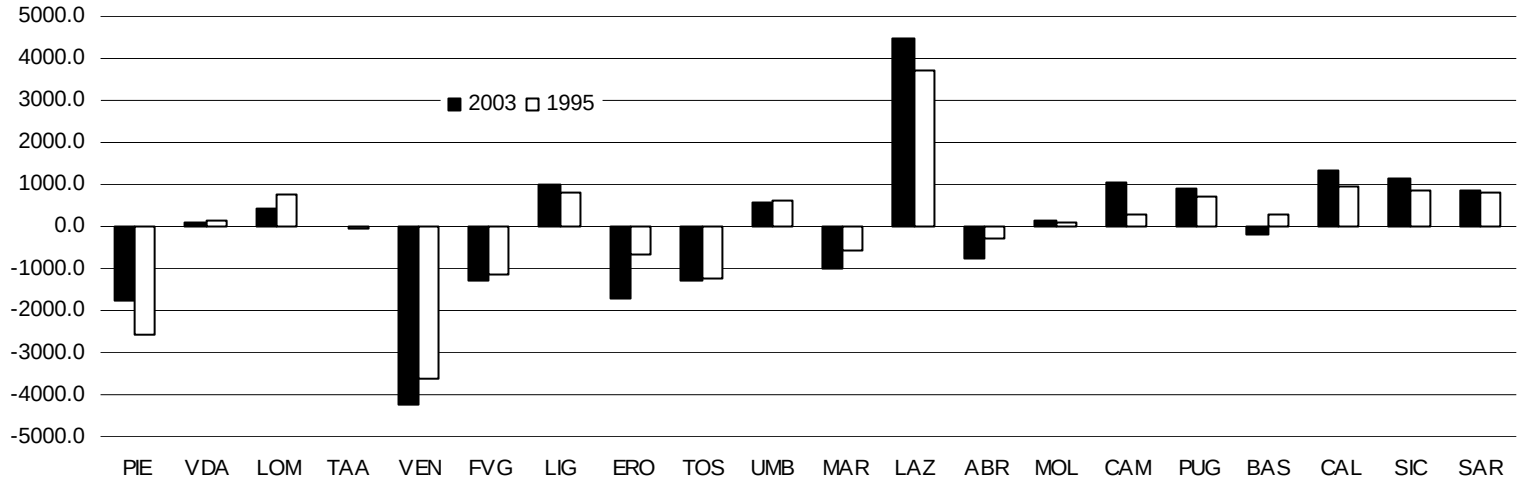
1. foreign exports are a very important driver of growth in the most developed regions (blue bar and grey bar)
2. regions of Southern Italy (white bar) are lagging behind and the increase in foreign exports does not affect regional growth significantly

The result is influenced by four factors

- the share of exports over the total regional final demand
- the industry-mix of the foreign exports
- the technical structure of the regional production systems
- the multiregional allocative parameters of regional economic systems

The Inter-regional Transmissions of Stimulus

- **The region which export create GDP spillover in favour of other regions which don't export. By using a multi-regional input-output model we calculate the balance of spillover (outgoing – incoming).**



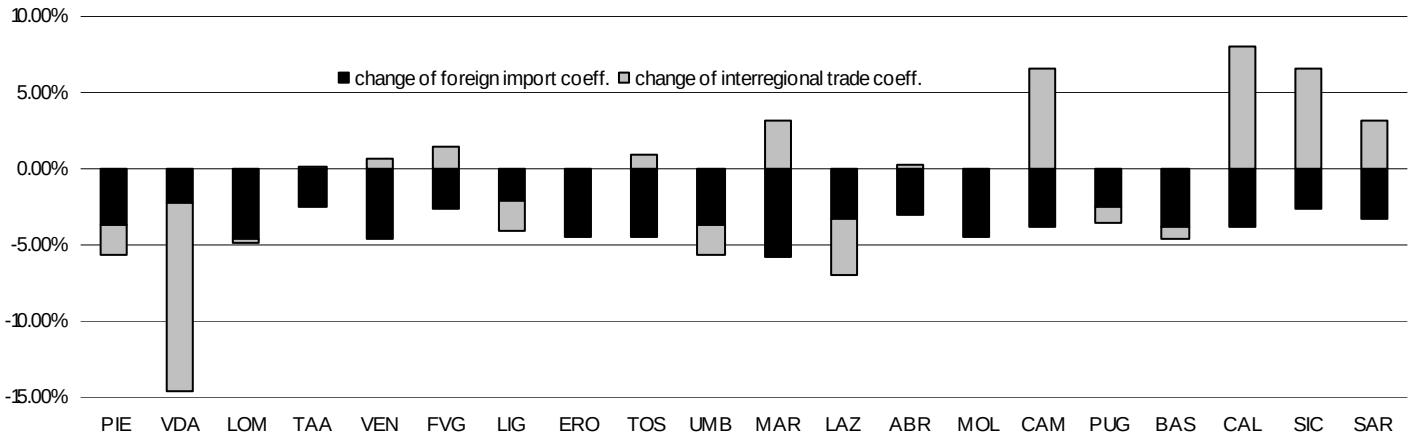
Some less export-oriented regions like Calabria, Sicilia, and Campania are characterized by a positive balance.

Obviously, this feature is not linked to the strength of economic structure. As a matter of fact, these regions are known to be fragile economy in the Italian context.

- **It is important to stress the role of inter-regional trade in the distribution of the positive effects of foreign exports among Italian regions**

Analysing the balance of value added spill-over in 2003 and in 1995 emerge that during this brief period the relative position of regions intensify

the inter-regional trade plays an increasing role



Summing-up

- **Importance of A multi-regional model in a context like Italy**
- **A Multi-Regional Input-Output model for Italy used by IRPET is built through the SCM methodology for balancing matrices**
- **A very preliminary analysis at regional level shows the significant different regional responses to foreign export**

Thank you …

Dampener and multiplier regions