A Multi-regional Structural Analysis of italian economy

L. Cherubini(*) - R. Paniccia'(**)

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(*) Bank of Italy, Florence Branch; (**) Regional Institute for Economic Planning of Tuscany (IRPET)

Describe the structural changes of the Italian dualistic economic system at a sub-national level in the long run by:

1- investigating the role of spatial interdependencies among regions;

2- operating a "taxonomy" of regions according to their backward/forward linkages;

3- improving the multi-regional trade flows estimate procedure.
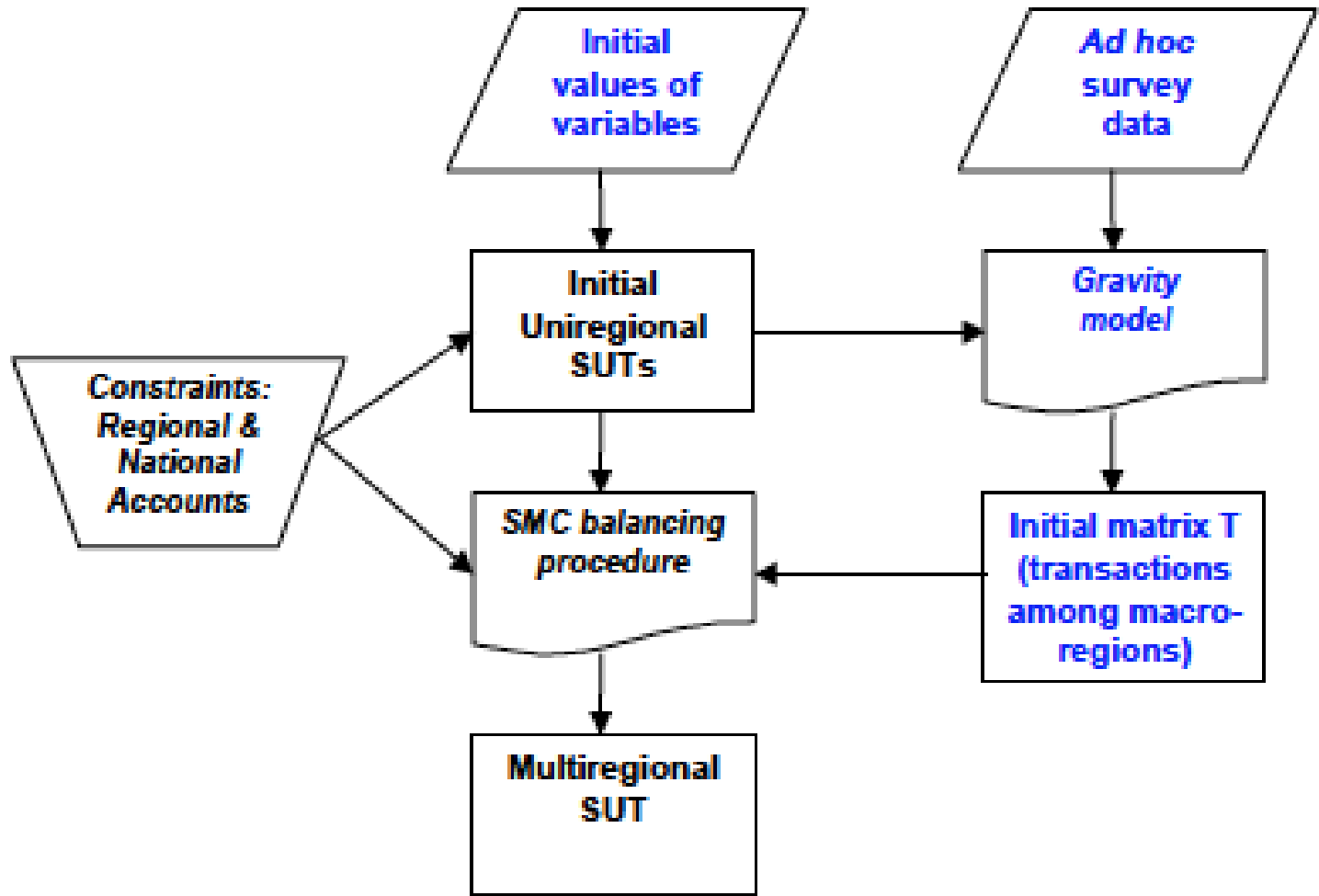
- The estimation of the trade flows among macro areas is a key for the building of the multi-regional SUT.

- The estimation is carried out for each productive sector j through a (deterministic) gravity model, whose masses are the output and the demand of the macro areas r and s; a *Deterrence Function (DF)* acts as a proxy of the 'transaction costs':

$$_{rs}t_j =_{rs} DF_j \frac{(_{r.}t_{j.s}t_j)}{t_j}$$

- Improvements in the estimate of the *DF* have been made possible by the availability of *ad hoc* survey data on the spatial distribution among macro areas of both the turnover and the number of employees of a representative sample of Italian firms

- The adopted (log-log) model is:

$$\ell(_{rs}DF_j') = a + b\ell(_{rs}DIST) + c\ell(\frac{_rPCGDP}{_sPCGDP}) + d\ell(_{rs}NEMP_j) + e\ell(_{rs}SETDIST_j) + \epsilon$$

- regressors are time averages of annual data
- intraregional (r=s) data are not included in the estimation (only interregional data are relevant)
- different model specifications for industry and service sectors
- OLS estimates are robust for heteroskedasticity and clustering
- robustness checks for alternative models have been performed

Regressors (in log)	Manufacturing industry	Services Sector
Distance reciprocal ("closeness")	0,268437 *	0,600327 **
Per capita GDP ratio	-0,090194	0,415392 ***
Number of "intra-industry employees"	0,115050 ***	
Interaction dummies:		
dist.recip.*DB	-0,010306	
dist.recip.*DC	-0,176002	
dist.recip.*DD	-0,133252	
dist.recip.*DE	0,043095	
dist.recip.*DF	0,578275	
dist.recip.*DG	0,193916 *	
dist.recip.*DH	-0,127741	
dist.recip.*DI	0,094702 *	
dist.recip.*DJ	0,034911	
dist.recip.*DK	0,051716	
dist.recip.*DL	0,182701 **	
dist.recip.*DM	0,094904	
dist.recip.*DN	-0,096694	
dist.recip.*H		-0,041849
dist.recip.*I		-0,175760
dist.recip.*K(1)		-0,222338
Constant	-0,254120	-0,350288
N	157	48
R²	0,294	0,281

*legend: * prob. < 0.050; ** prob. < 0.010; *** prob. < 0.001*

(1) Real estate and rental activities excluded.
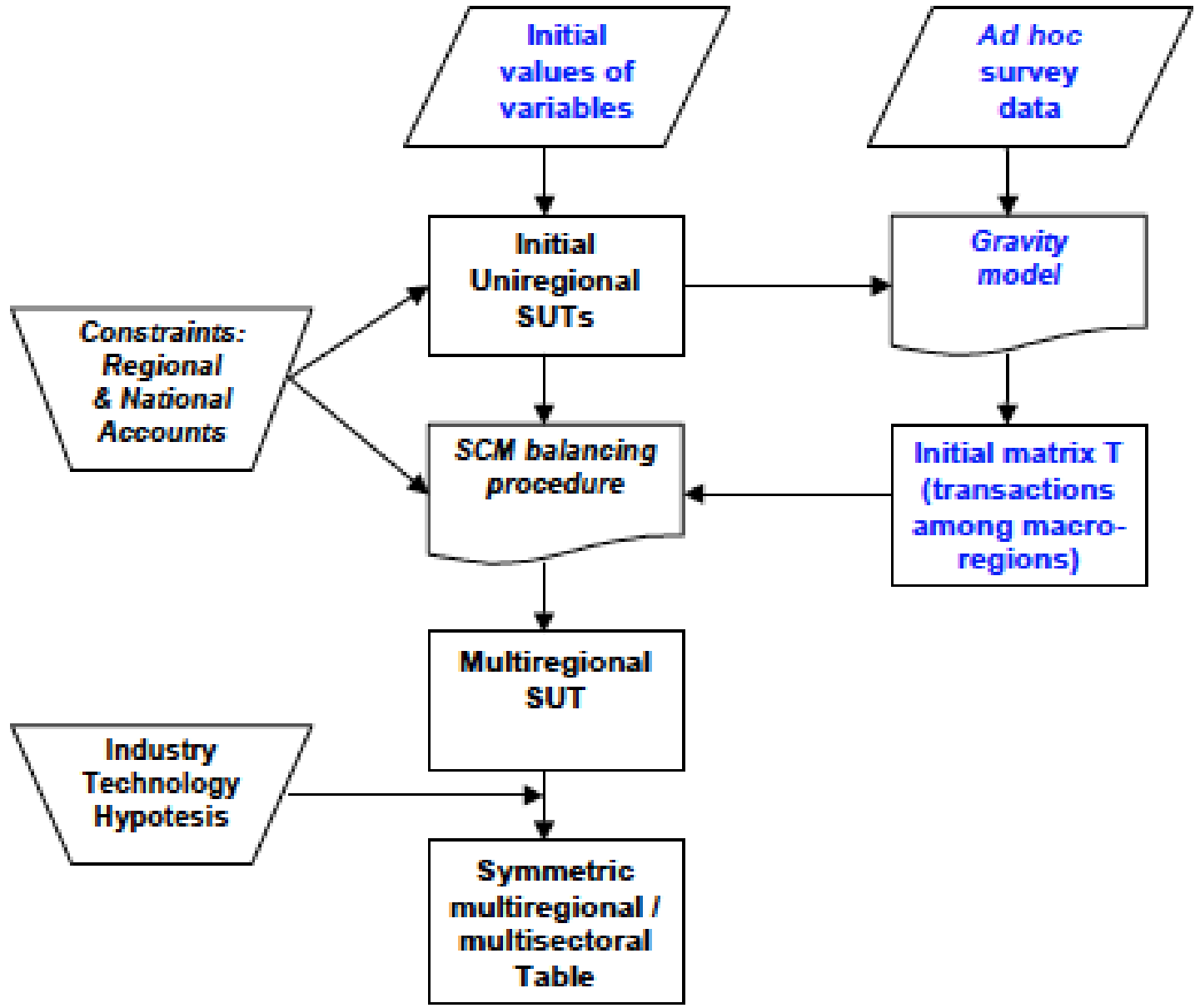
		Area of destination							
Area of origin	North-West		North-East		Centre		South & Islands		ITALY
1995									
North-West			-4.3	(-4.3)	0.4	(-1.7)	-4.8	(-4.9)	
North-East	2.9	(3.0)			0.5	(-0.5)	-2.8	(-2.8)	
Centre	-0.3	(1.1)	-0.5	(0.5)			-4.7	(-4.6)	
South & Islands	3.5	(3.6)	3.0	(3.0)	5.4	(5.3)			
Total Areas	6.1	(7.7)	-1.8	(-0.8)	6.3	(3.1)	-12.3	(-12.3)	
Rest of the World	7.2		7.6		-0.6		-7.0		2.2
2001									
North-West			-3.7	(-3.8)	0.4	(-1.3)	-4.1	(-4.2)	
North-East	2.6	(2.6)			0.7	(-0.3)	-2.9	(-3.0)	
Centre	-0.3	(0.8)	-0.6	(0.2)			-4.1	(-4.0)	
South & Islands	3.1	(3.2)	3.2	(3.2)	4.7	(4.6)			
Total Areas	5.4	(6.6)	-1.1	(-0.4)	5.8	(3.0)	-11.1	(-11.2)	
Rest of the World	4.2		5.4		-1.9		-8.8		0.0
2006									
North-West			-3.6	(-3.5)	0.7	(-1.1)	-3.5	(-3.4)	
North-East	2.6	(2.5)			0.9	(-0.4)	-2.3	(-2.3)	
Centre	-0.5	(0.8)	-0.9	(0.4)			-4.5	(-3.5)	
South & Islands	2.6	(2.5)	2.5	(2.4)	5.0	(3.9)			
Total Areas	4.7	(5.8)	-2.0	(-0.7)	6.6	(2.4)	-10.3	(-9.2)	
Rest of the World	2.4		3.7		-3.5		-11.6		-1.9

Note: in brackets the net balances of interregional flows excluding collective consumption services (CCS)

Net total exports as a percentage of the national GDP

(authors' calculations on Istat data)
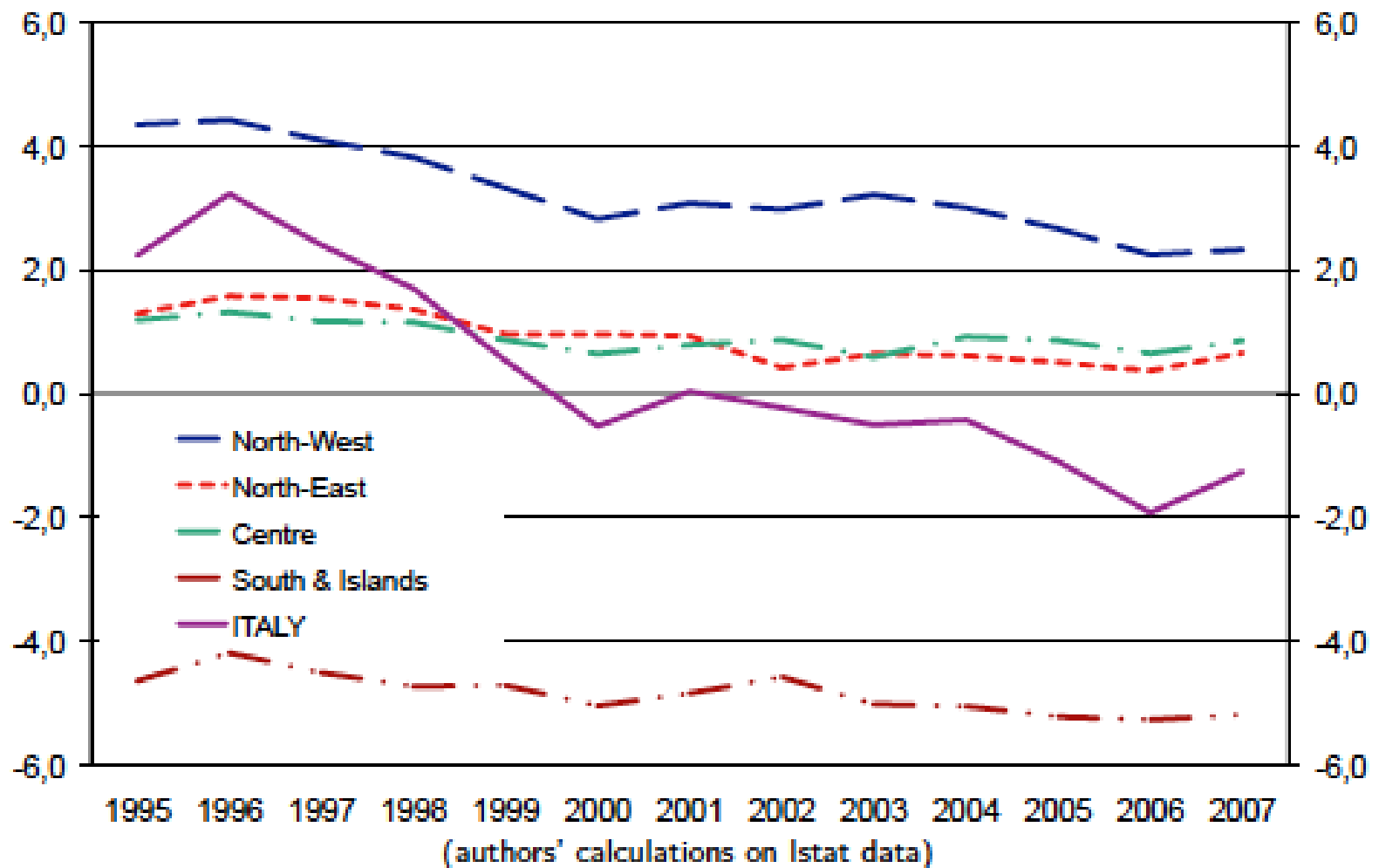
The main causal relations of the structural form of the model (according to the Chenery-Moses hypothesis) are the following:

1. **Technical relation**: $d = A\,x + f$ gives the total demand of each macro area

2. **Allocative relation**: $x = T\,d$ gives the total output of each macro area determined by the total demand
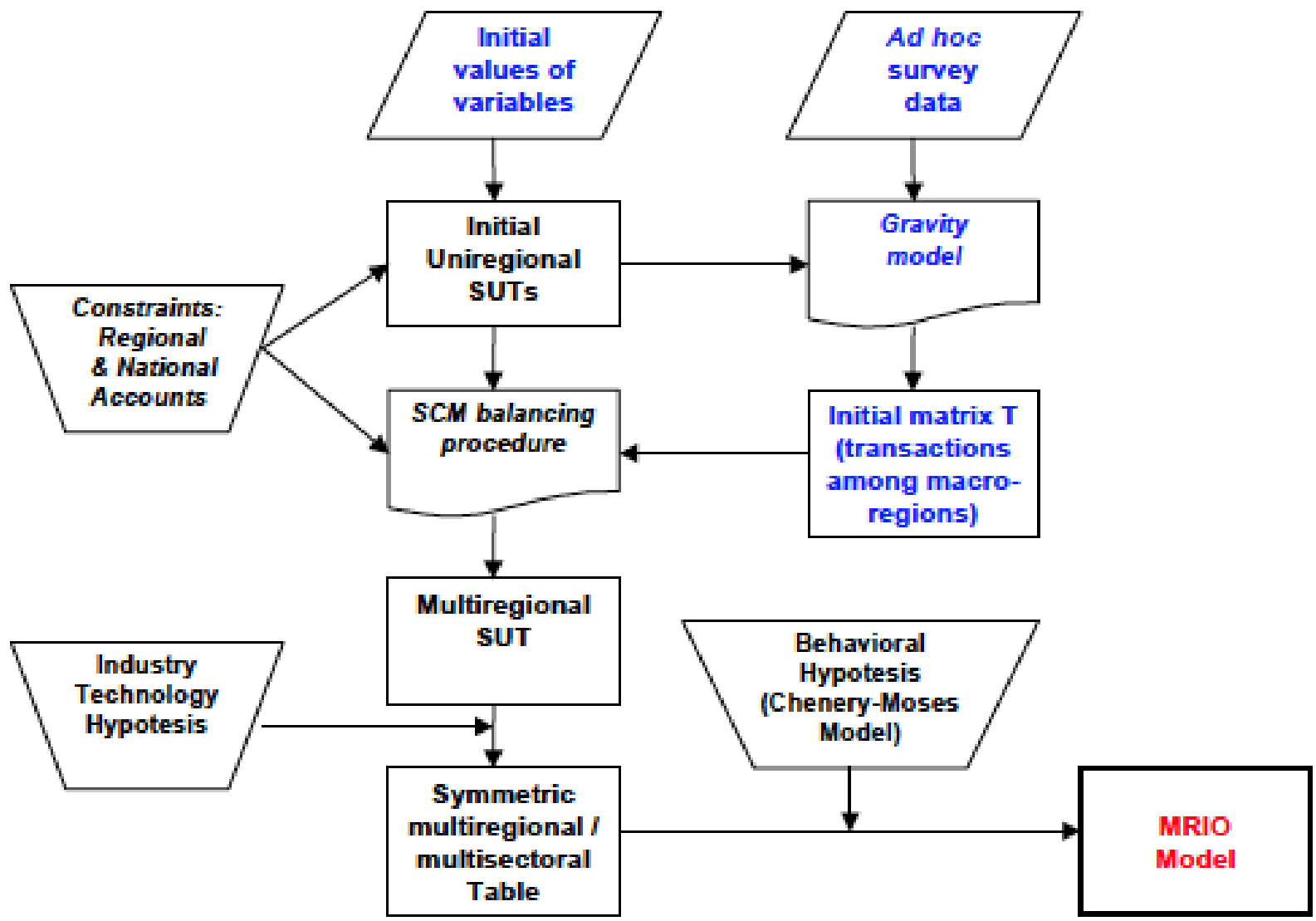
The Marginal Interregional Trade Balances (MITB)
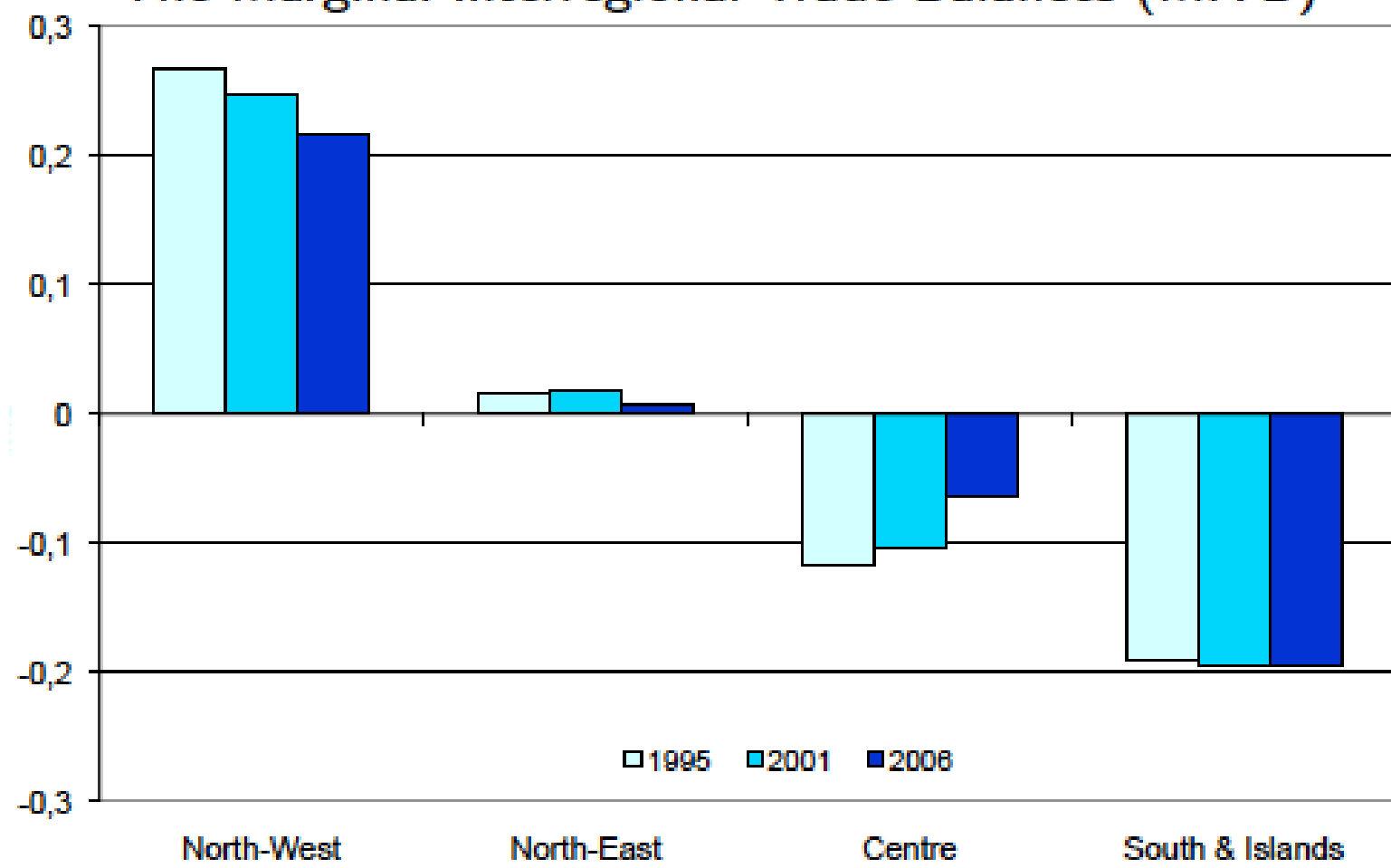
(authors' calculations on Istat and MRIO-IRPET data)

Manufacturing industry

		Standard				Normalised			
		North-West	North-East	Centre	South & Islands	North-West	North-East	Centre	South & Islands
1995	North-West	90,0	40,7	37,0	38,8	49,5	22,5	20,9	21,1
	North-East	25,7	71,9	31,6	30,5	14,1	39,7	17,8	16,6
	Centre	16,6	20,0	60,8	23,1	9,1	11,0	34,3	12,6
	South & Islands	14,4	16,2	16,6	63,1	7,9	8,9	9,4	34,3
	ITALY	142,7	146,2	143,9	150,3	80,7	82,2	82,4	84,5
	Rest of the World	35,1	32,3	31,1	28,5	19,3	17,8	17,6	15,5
2001	North-West	88,5	35,5	33,4	37,5	49,0	19,8	18,9	20,1
	North-East	23,2	69,9	29,6	29,9	12,9	39,1	16,7	16,1
	Centre	15,7	18,6	63,0	23,3	8,7	10,4	35,5	12,5
	South & Islands	13,9	16,7	17,1	64,8	7,7	9,3	9,6	34,8
	ITALY	137,3	137,5	141,9	151,0	78,3	78,6	80,7	83,5
	Rest of the World	39,2	38,2	34,2	30,8	21,7	21,4	19,3	16,5
2006	North-West	91,1	30,8	31,8	34,7	50,7	17,9	18,2	19,3
	North-East	21,5	71,0	26,7	26,8	12,0	41,1	15,2	14,9
	Centre	15,0	16,4	63,8	22,6	8,3	9,5	36,4	12,5
	South & Islands	13,1	13,0	15,8	61,3	7,3	7,5	9,0	34,1
	ITALY	137,3	131,1	138,9	144,4	78,3	76,0	78,9	80,8
	Rest of the World	39,0	41,4	37,0	34,6	21,7	24,0	21,1	19,2

(authors' calculations on MRIO-IRPET data)

Production triggered by interregional trade net of the effects of technology – results from the MRIO model
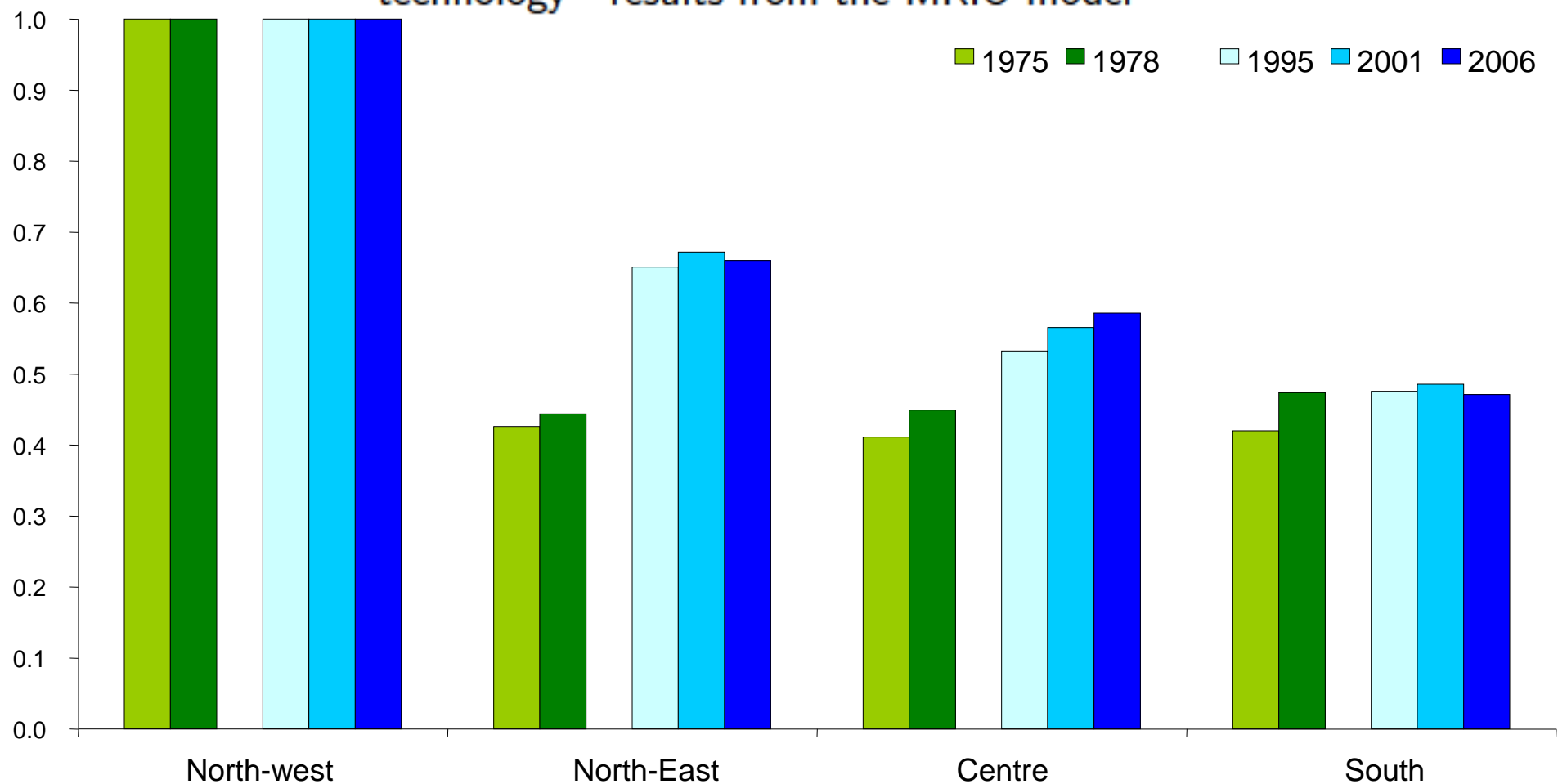
Fonte: **Costa e Martellato (1987) for 1975 e 1978**, MRIO-IRPET computation for 1995, 2001 e 2006

Output destination (*forward*)

Input structure (*backward*)	Intermediate	Final
Intermediate	(I)	(III)
Primary	(II)	(IV)

Output destination (*forward*)

Input structure (*backward*)		Intermediate	Final National (local and interregional)	Foreign Export
Intermediate	National	(Ia)	(IIIa)	(IIIc)
Intermediate	Imported from abroad	(Ib)	(IIIb)	(IIId)
Primary		(II)	(IVa)	(IVb)

- Backward/Forward Linkages (BL/FL) are frequently used to evaluate the importance of a sector: sectors with both strong BL and strong FL are called 'nodal' or key sectors
- In the Dietzenbacher (1992) approach the different sectors are weighted proportionally to their BL and FL, defined by:

$$BL = n\frac{q'A}{q'Ai}$$

$$FL = n\frac{Bz}{z'Bi}$$

- In an economy closed to foreign trade values of BL and FL over 1 signal a 'nodal' sector, i.e. significant linkages with the other domestic sectors both on the side of formation (i.e. backward) and of destination (i.e. forward) of its output

- Since the focus of our analysis is the spatial differences at a sub-national level in an open economy, we tried to evaluate the BL/FL of the Italian regions (instead of sectors)
- This means that the Dietzenbacher (1992) approach needs some integrations in order to take into account:
  - imports from abroad;
  - foreign final demand.
- According to the origin of the intermediate output (national or not), the spatial BL are defined by:

$$_R BL = n \frac{q'R}{q'Ri}$$

- According to the destination of final output (national or not), the spatial FL are defined by:

$$_{EX} FL = n \frac{fi}{i'fi}$$

Output destination (forward)

Input structure (backward)		Intermediate	Final	
			National (local and interregional)	Foreign Export
Intermediate	National	**(Ia)** $(L_F >1$ and $L_B >1)$ and $(_RL_B >1)$	**(IIIa)** $(L_F <1$ and $L_B >1)$ and $(_RL_B >1)$ and $(_{EX}LF<1)$	**(IIIc)** $(L_F <1$ and $L_B >1)$ and $(_RL_B >1)$ and $(_{EX}LF >1)$
	Imported from abroad	**(Ib)** $(L_F >1$ and $L_B >1)$ and $(_RL_B <1)$	**(IIIb)** $(L_F <1$ and $L_B >1)$ and $(_RL_B <1)$ and $(_{EX}LF<1)$	**(IIId)** $(L_F <1$ and $L_B >1)$ and $(_RL_B <1)$ and $(_{EX}LF >1)$
Primary		**(II)** $[(L_F >1)$ and $(L_B <1)]$	**(IVa)** $[(L_F <1)$ and $(L_B <1)]$ and $(_{EX}LF <1)$	**(IVb)** $[(L_F <1)$ and $(L_B <1)]$ and $(_{EX}LF>1)$

**Output destination
(*forward*)**

Input structure (*backward*)			Intermediate	National (local and interregional)	Foreign Export
				Final	
Intermediate	National		Piedmont, Lombardy, Emilia Romagna		Veneto, Tuscany, Marches, Friuli-Venezia Giulia
	Imported from abroad		Sardinia		
Primary			Valle d'Aosta, Umbria, Lazio	Molise, Campania, Apulia, Calabria, Basilicata, Sicily	Trentino-Alto Adige, Liguria, Abruzzo

1- Economic analysis conclusions

2- Methodological conclusions

3- Further steps