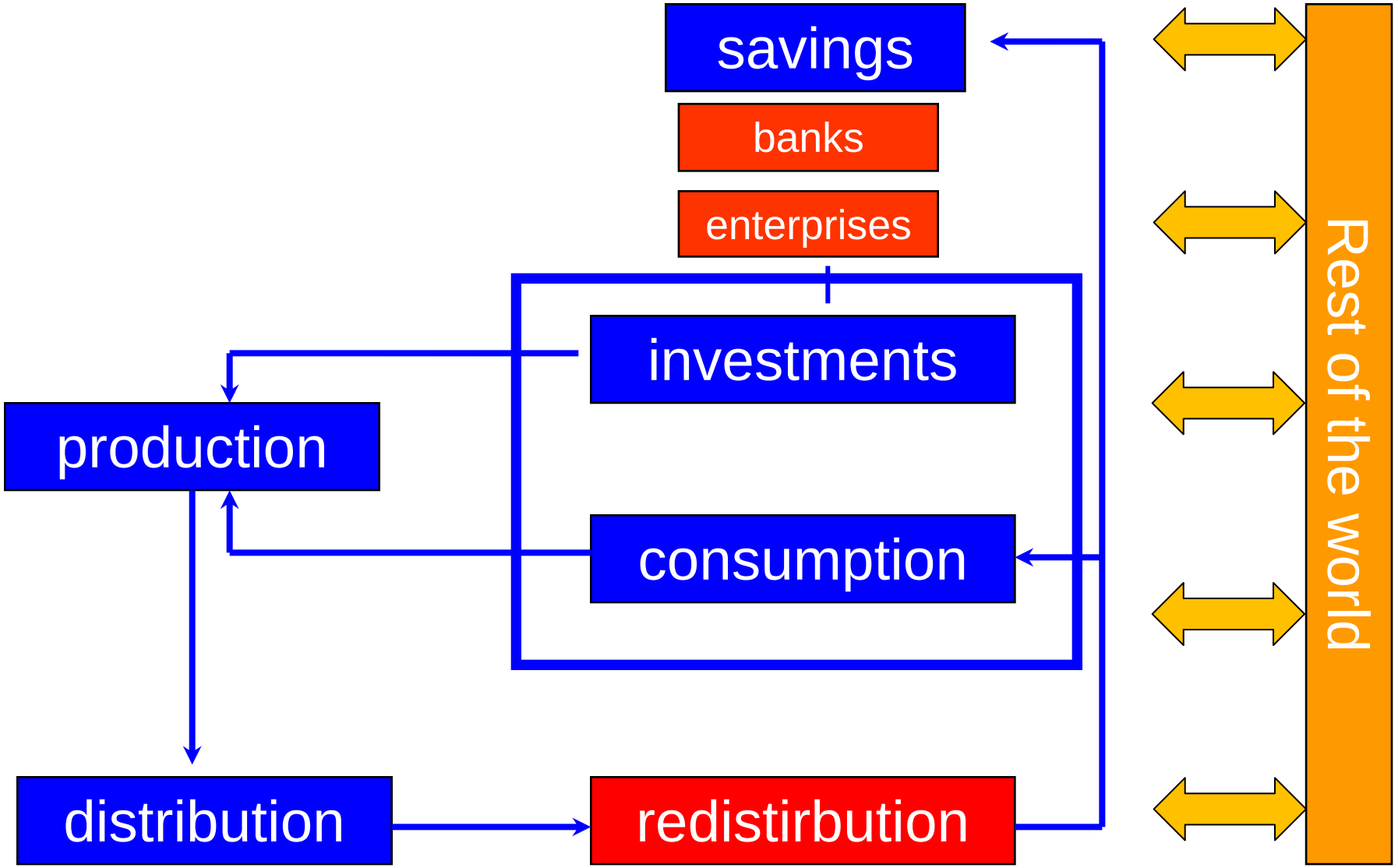
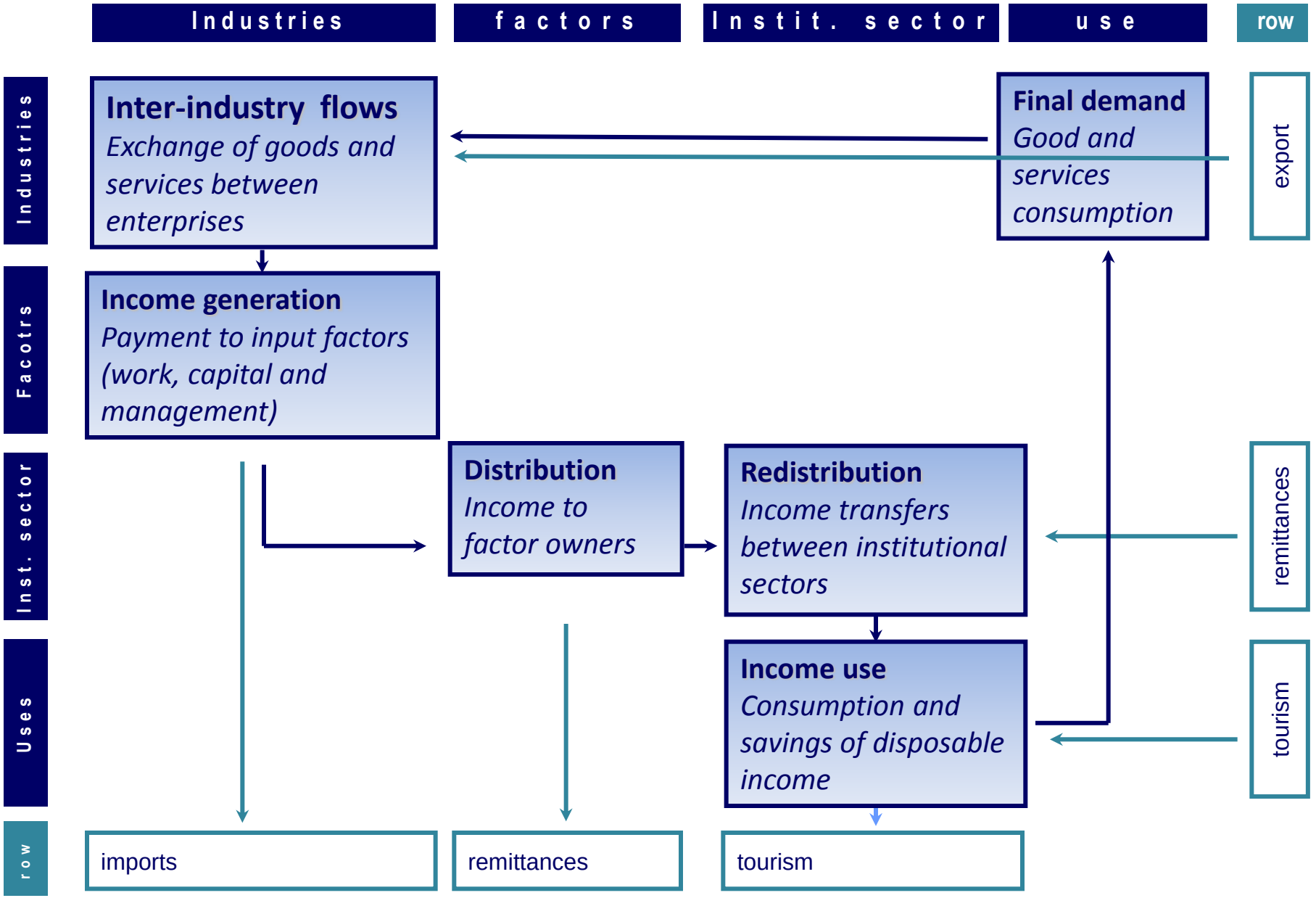
Regional SAM for policy analisys : the case of Tuscany

Stefano Rosignoli
IRPET

INFORUM CONFERENCE
Florence, 4 September 2012


savings
banks
enterprises
investments
production
consumption
distribution
redistirbution
Rest of the world

Sam as framework for economic accounts



	Resources	Value added	Net production taxes	Capital income	Household consumption	Household expenditures	Npi expenditures	Accrued or Indeb	Household	Enterprises	NPI	Government	Tourism	Export	Household	Enterprises	Npi	Government	Roi	Row	TOT
Resources	101,989	0	0	0	54,423	18,233	357	0	0	0	0	0	42,642	27,021	5,862	10,650	117	1,835	0	0	263,128
Value added	89,087	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	375	1	89,463
Net production taxes	2,979	0	0	0	6,877	55	0	0	0	0	0	0		194	237	633	9	156	0	0	11,139
Capital income	0	0	0	0	0	0	0	0	1,576	22,808	21	4,436	0	0	0	0	0	0	5,775	4,512	39,130
Household consumption	0	0	0	0	0	0	0	0	54,809	0	0	0	2,933	3,558	0	0	0	0	0	0	61,300
Household expenditures	0	0	0	0	0	0	0	0	10,628	0	0	7,660	0	0	0	0	0	0	0	0	18,288
Npi expenditures	0	0	0	0	0	0	0	0	357	0	0	0	0	0	0	0	0	0	0	0	357
net surplus/deficit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,464	112	93	2,993	0	0	3,842
Household	0	61,578	0	16,950	0	0	0	0	266	2,718	196	28,680	0	0	0	0	0	0	315	313	111,016
Enterprises	0	22,013	0	11,720	0	0	0	0	4,281	1,169	0	195	0	0	0	0	0	0	100	15	39,537
NPI	0	177	0	70	0	0	0	0	214	105	0	275	0	0	0	0	0	0	1	0	842
Government	0	5,059	10,746	652	0	0	0	0	23,212	2,439	365	19,775	0	0	0	0	0	0	781	453	63,481
Tourism	42,643	0	0	0	0	0	0	1,163	1,549	0	0	0	0	0	0	0	0	0	0	0	45,575
Import	26,230	0	0	0	0	0	0	3,743	750	0	0	0	0	0	0	0	0	0	0	0	30,773
Household	0	0	0	0	0	0	0	0	12,420	0	0	0	0	0	10	0	0	194	0	0	12,624
Enterprises	0	0	0	0	0	0	0	0	9,836	0	0	0	0	0	0	0	0	1,610	0	40	11,476
Npi	0	0	0	0	0	0	0	0	0	256	0	0	0	0	49	0	0	0	0	0	305
Government	0	0	0	0	0	0	0	0	0	0	0	829	0	0	2	0	0	139	0	43	1,014
Roi	0	446	158	5,137	0	0	0	1,163	340	75	0	0	0	0	0	0	0	0	0	0	7,346
Row	0	191	235	4,600	0	0	0	2,316	499	467	0	1,628	0	0	1	0	0	72	0	0	5,377
TOT	263,128	89,463	11,139	39,130	61,300	18,288	357	3,842	111,016	39,537	842	63,481	45,575	30,773	12,624	11,476	305	1,014	7,346	5,377	

Production

Consumption

Investments

Distribution

Uses

Trade and turistic inward flows

Sector Surplus/ Deficit

Redistribution

Income inward flows

Trade and turistic outward flows

Savings

Capital transfers

Income outward flows

SAM is matrix of economic flows : by column are payments and by row receipts

Sector/Activity categories in regional sam

Activites/Commodities → **37 Industries and 54 commodities**

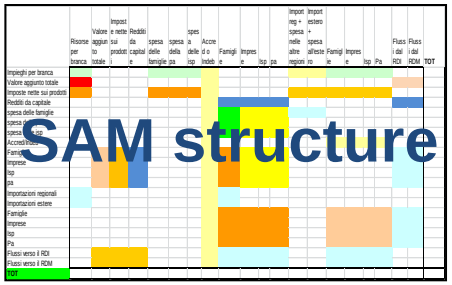
Institutional sectors →

- **Consumer families** → **Income deciles**
- **Producer families**
- **Enterprises** → **Non financial**
- **No profits institutions** → **Financial**
- **Governments** → **Central**, **Local**, **Provident institution**
- **Rest of Italy**
- **Rest of the world**

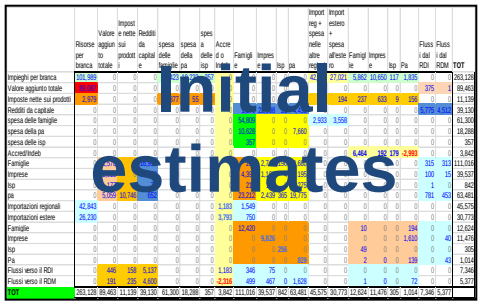
Household consumption → **12 expenditure functions (ESA95 coicop)**

Government consumption → **10 expenditure functions (ESA95 cofog)**

Capital income → **4 types: public and private interests, dividends, other income**



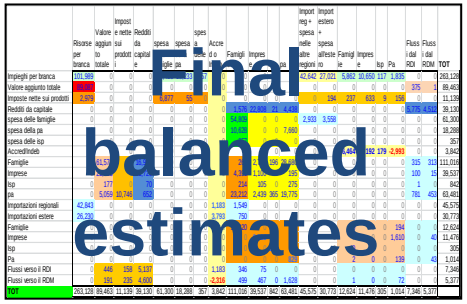
Definition of the regional SAM structure



Estimation of the matrix of initial values

Choose balancing method

Balancing matrix of initial values



SAM Balancing is a method used to change initial values of the matrix to reach account consistency that means same values for rows and columns sum. There are several balancing methods:

1. Residuals sink: changes a column of the matrix (often change in inventories) to reach account consistency (rows sum=columns sum)
   $T(1) = T(0)+\varepsilon(0)$

2. rAs: adjusts the initial values so that the row and column sums of the matrix equate to user-supplied row and column vectors
   $T(1) = r \cdot T(0) \cdot s$

3. Cross entropy: Bayes theorem and information theory applied to column of the initial matrix under account constraints
   $T(1) = f(T(0)|$ constraints$)$

4. Stone-Champernowne-Meade (SCM) Method
   $T(1) = f(T(0) , \sigma(0)|$constraints$)$

What can we do with a SAM?

	Resources	Value added	Net production taxes	Capital income	Household consumption	Household expenditures	Npi expenditures	Accred or Indeb	Household	Enterprises	NPI	Government	Tourism	Export	House hold	Enterprises	Npi	Government	Roi	Row	TOT
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Household expenditures	0	0	0	0	0	0	0	0	10,628	0	0	7,660	0	0	0	0	0	0	0	0	18,288
Npi expenditures	0	0	0	0	0	0	0	0	357	0	0	0	0	0	0	0	0	0	0	0	357
Accred or Indeb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6,464**	**192**	**179**	**-2,993**	0	0	3,842
Household	0	61,578	0	16,950	0	0	0	0	266	2,718	196	28,680	0	0	0	0	0	0	315	313	111,016
Enterprises	0	22,013	0	11,720	0	0	0	0	4,391	1,100	4	195	0	0	0	0	0	0	100	15	39,537
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Import	26,230	0	0	0	0	0	0	3,793	750	0	0	0	0	0	0	0	0	0	0	0	30,773
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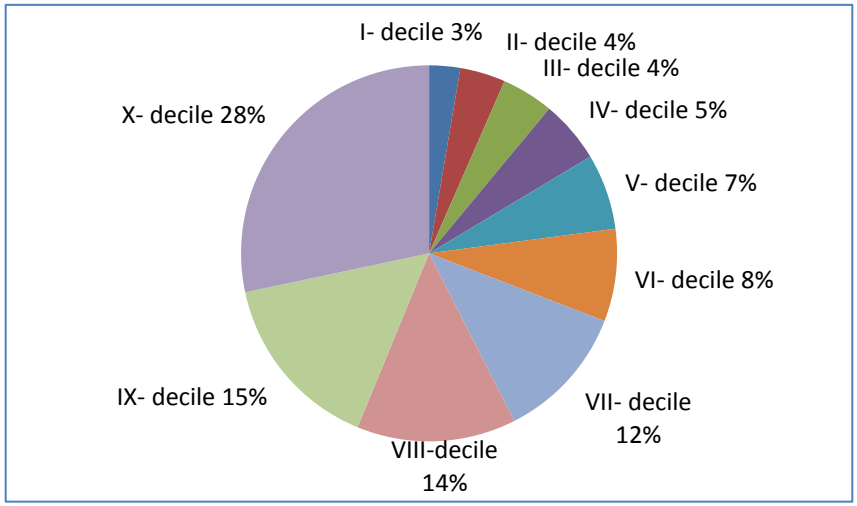
Government	0	0	0	0	0	0	0	0	0	0	0	829	0	0	2	0	0	139	0	43	1,014
Roi	0	446	158	5,137	0	0	0	1,183	346	75	0	0	0	0	0	0	0	0	0	0	7,346
Row	0	191	235	4,600	0	0	0	-2,316	499	467	0	1,628	0	0	1	0	0	72	0	0	5,377
TOT	263,128	89,463	11,139	39,130	61,300	18,288	357	3,842	111,016	39,537	842	63,481	45,575	30,773	12,624	11,476	305	1,014	7,346	5,377	

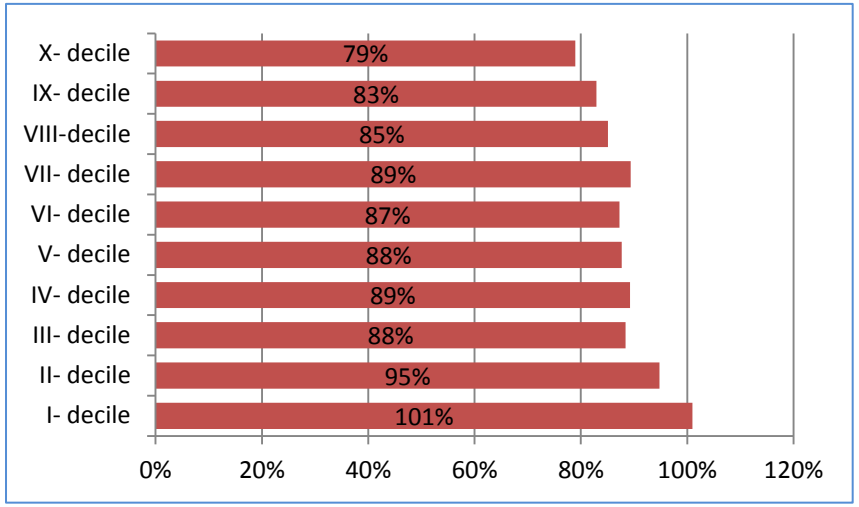
We can use it for descriptive purposes

We can use it to build analytical tools

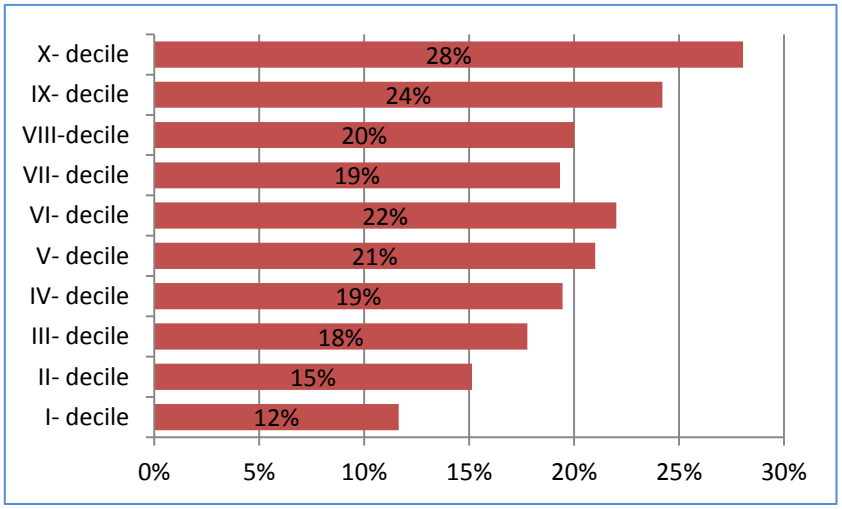
% Gross income by deciles



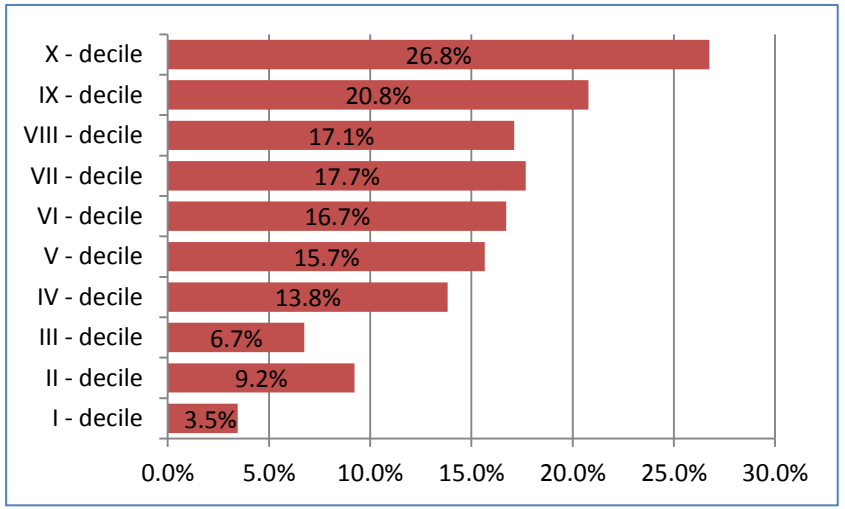
Propensity to consume by deciles



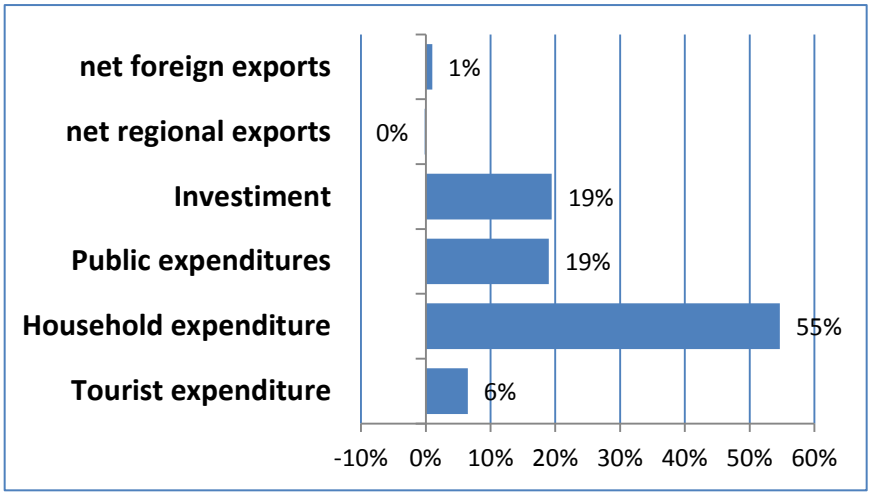
Personal income tax rates by deciles



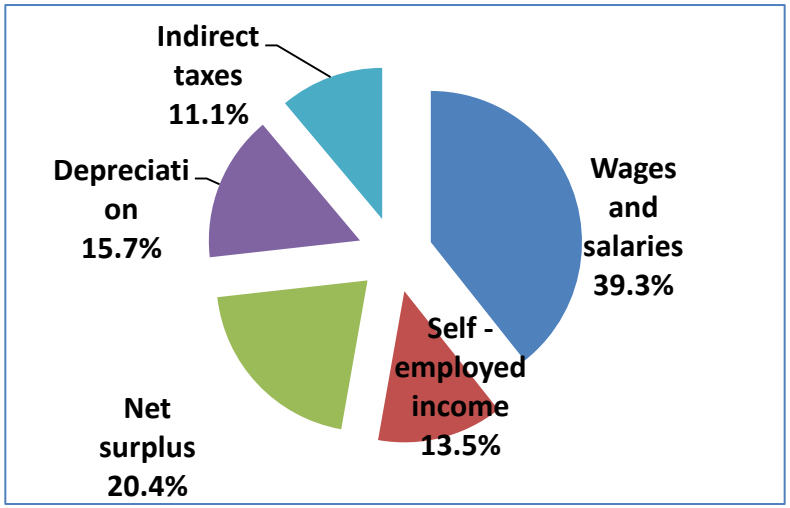
Financial on gross income by deciles



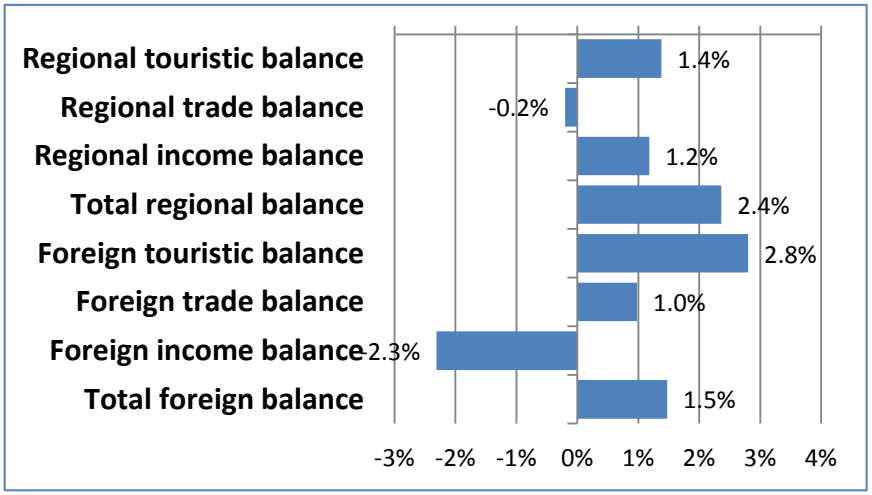
Final demand on GDP



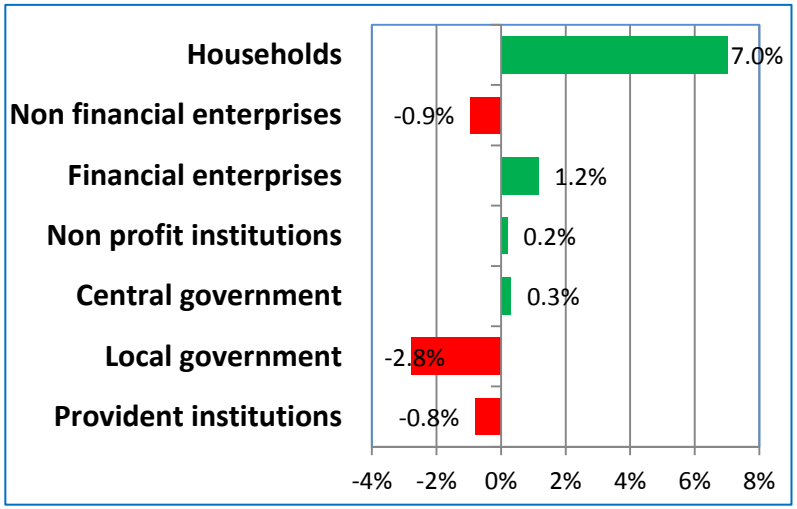
Components share of GDP



Balance of payments on GDP



Surplus/Deficit on GDP by sectors



How can we use a SAM as analytical tool

Input-Output evaluation with distribution income effects

Final demand impact evaluations (as for input-output models) but with a focus on distributive effects (done in IRPET).

Scenarios building and forecast estimation

Building regional scenarios or forecasts with consistent accountancy variables GDP, income, consumption, savings, capital accumulation. SAM could be base or support for these purposes.

Comparative statics analysis and "what if" simulation

Modify one or more exogenous parameters/variables and see what append to endogenous aggregates (done in IRPET).

Linear programming

Constrained optimization methods to find the best value of exogenous variable to reach a particular target on the endogenous (for example how to modify tax rate to minimize inequality under the constraint of GDP growth rate and government indebtedness).

micro/macro approach

Link the sam-based model to a microsimulation model (done in IRPET)

Example of comparative static simulation model

A recently tool built using regional SAM is a comparative static simulation model: we change some policy variable/parameter and see the effect on other endogenous variables (respect to their values took from balanced SAM).

POLICY VARIABLES AND PARAMETER

1) Internal final demand and inward transfers

2) Social contribution rate on income

3) Average interest rate and equity yeald

4) Average tax rate on income and wealth

5) Social security benefits and pensions

6) Propensity to consumption

7) Stock of debit/credits and financial capital at the start of simulation

ENDOGENOUS VARIABLES

1) Production, income, depreciation, net surplus

2) Primary income balance (gross income)

3) Disposable income

4) Gross and net saving

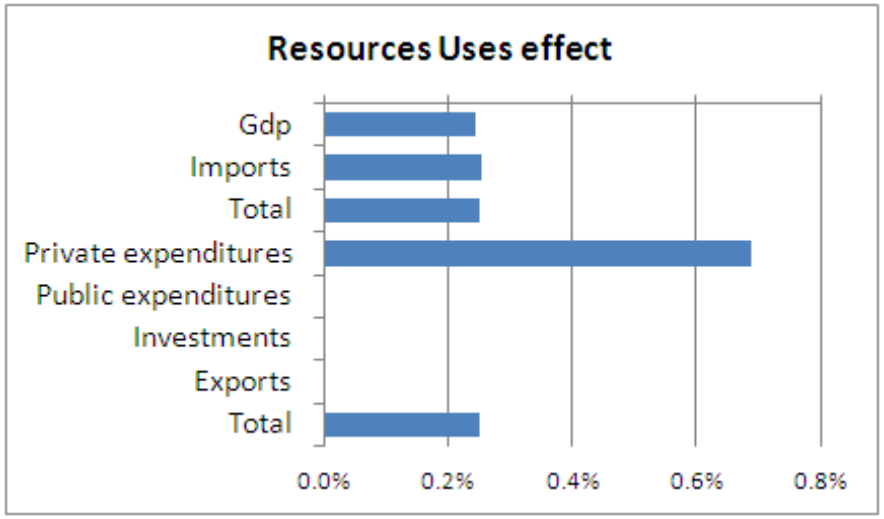
5) Change in stock capital

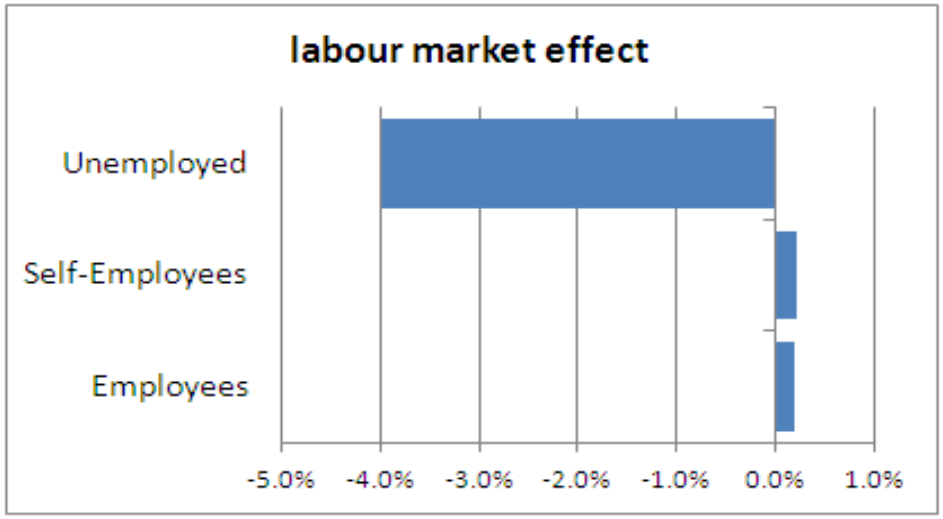
6) Net borrowing / lendig

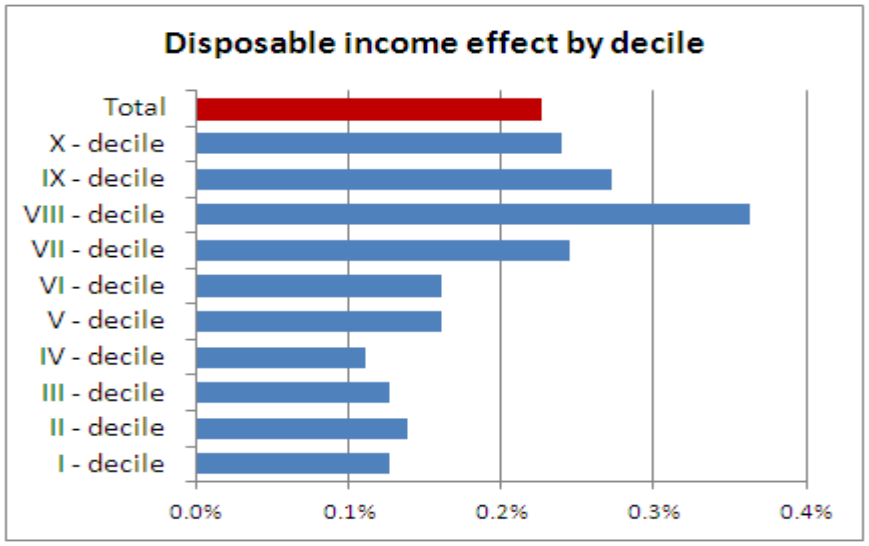
7) Stock of debits/credits and financial capital at the end of the simulation

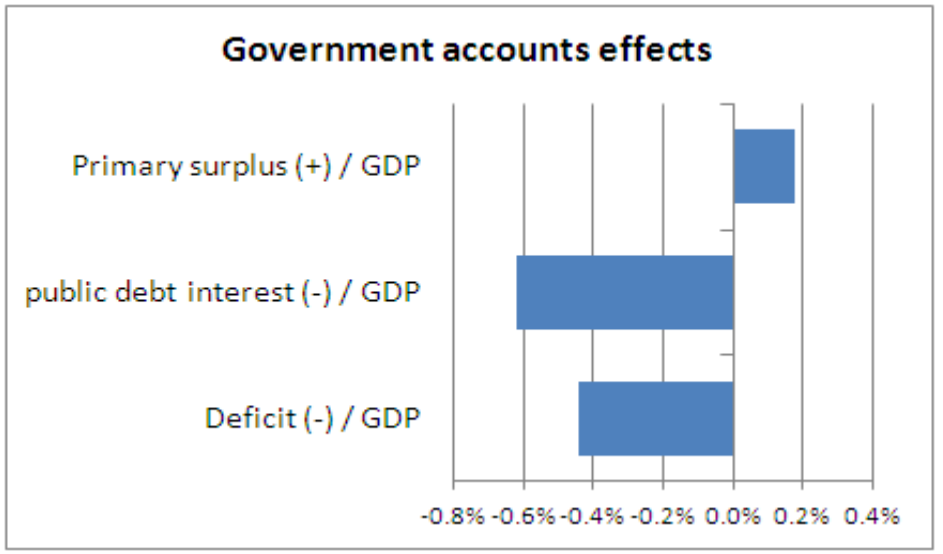
Tourism expenditures rise of 2%

Interest rate of public debt rise to 5.6%





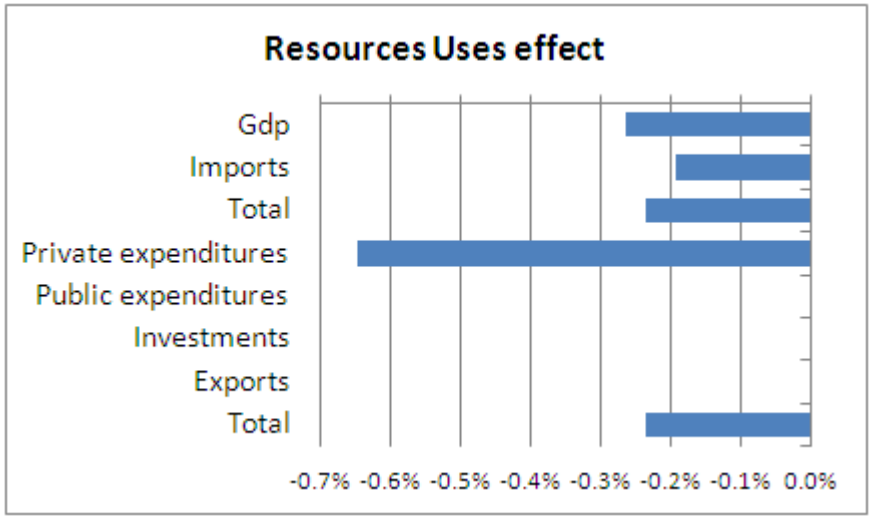


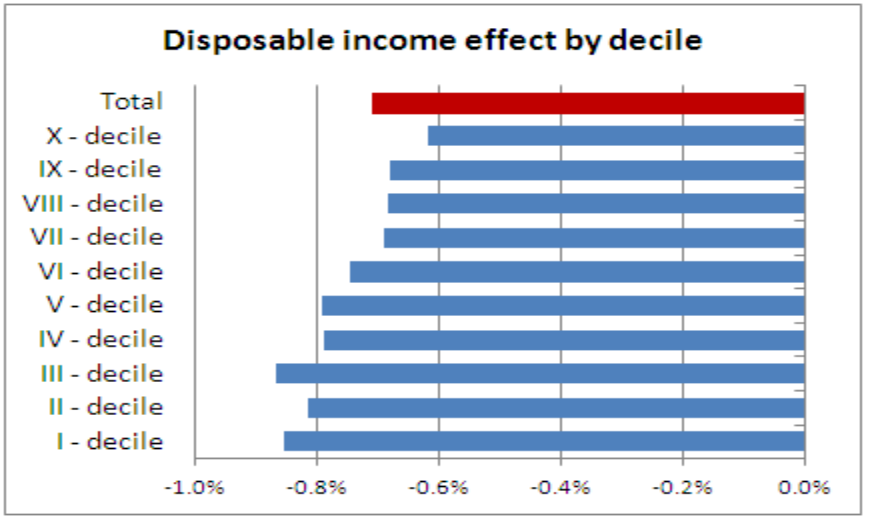


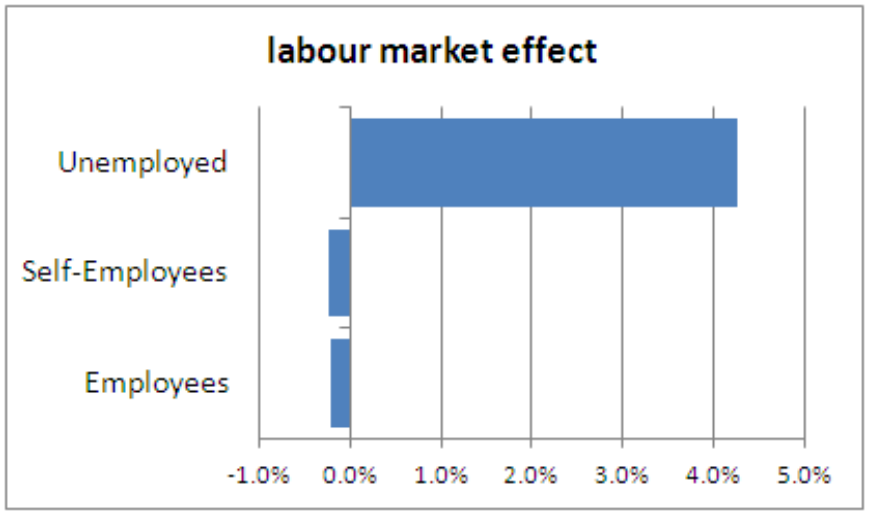
Regional share of IRE (Personal income tax) rise of 0.5%

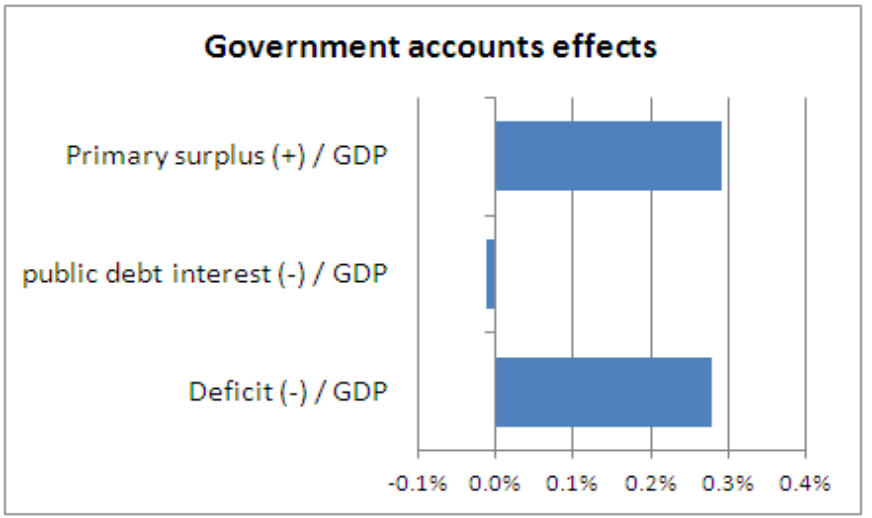
Import coefficient of Textile commodities rise from 30% to 35%

Pensions falls of 1.2%









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Florence, 4 September 2012

Description of SCM method

We estimate e matrix of not balanced initial values (row sum not equal to column sum)

We specifiy a realiability matrix that indicates the reliability of each cell of initial matrix

Balancing procedure modifies iteratively initial values until row and column total will be the same

They are as big as the initial matrices and for each cells indicate a reliability index from 0 (most reliable) to 10 (less reliable)

The reliability are linked to mean square error of the initial value estimate for the corresponding cell

Initial values will change as much as their reliability will be low (it means high mean square error)