Regional SAM for policy analysis: the case of Tuscany

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IRPET

INFORUM CONFERENCE
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Flows of the economic system

- production
- distribution
- consumption
- redistribution
- investments
- savings
- banks
- enterprises

Rest of the world
Sam as framework for economic accounts

**Industries**
- **Inter-industry flows**
  - Exchange of goods and services between enterprises

**Factors**
- **Income generation**
  - Payment to input factors (work, capital and management)

**Instit. sector**
- **Distribution**
  - Income to factor owners

**Use**
- **Redistribution**
  - Income transfers between institutional sectors

**Income use**
- Consumption and savings of disposable income

**Final demand**
- Good and services consumption

**Imports**
- Remittances
- Tourism

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SAM is a matrix of economic flows, where columns represent payments and rows represent receipts.
Activites/Commodities ➔ 37 Industries and 54 commodities

Institutional sectors ➔
- Consumer families
- Producer families
- Enterprises
- No profits institutions
- Governments
- 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

Income deciles ➔
- Non financial
- Financial
- Central
- Local
- Provident institution

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Steps to build a regional SAM

**SAM structure**

Definition of the regional SAM structure

**Initial estimates**

Estimation of the matrix of initial values

**Choose balancing method**

Balancing matrix of initial values

**Final balanced estimates**

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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  
   \[ T(1) = f(T(0)| \text{constraints}) \]

   \[ T(1) = f(T(0), \sigma(0)| \text{constraints}) \]
## What can we do with a SAM?

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<tr>
<th>Resource</th>
<th>Value added</th>
<th>Net production</th>
<th>Household consumption</th>
<th>Householder expenses</th>
<th>NPI expenditures</th>
<th>Accr or Indeb</th>
<th>Householder</th>
<th>Enterprises</th>
<th>NPI</th>
<th>Government</th>
<th>Tourists</th>
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**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
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% Gross income by deciles

Propensity to consume by deciles

Personal income tax rates by deciles

Financial on gross income by deciles
SAM for descriptive analysis

Final demand on GDP

- **net foreign exports**: 1%
- **net regional exports**: 19%
- **Investment**: 19%
- **Public expenditures**: 19%
- **Household expenditure**: 55%
- **Tourist expenditure**: 6%

Components share of GDP

- **Wages and salaries**: 39.3%
- **Self-employed income**: 13.5%
- **Net surplus**: 20.4%
- **Depreciation**: 15.7%
- **Indirect taxes**: 11.1%

Balance of payments on GDP

- **Regional touristic balance**: 1.4%
- **Regional trade balance**: -0.2%
- **Regional income balance**: 1.2%
- **Total regional balance**: 2.4%
- **Foreign touristic balance**: 2.8%
- **Foreign trade balance**: 1.0%
- **Foreign income balance**: 1.5%
- **Total foreign balance**: 2.3%

Surplus/Deficit on GDP by sectors

- **Households**: 7.0%
- **Non financial enterprises**: 1.2%
- **Financial enterprises**: 0.2%
- **Non profit institutions**: 0.3%
- **Central government**: 0.3%
- **Local government**: -2.3%
- **Provident institutions**: -0.8%
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)
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 yield

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/lending

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

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Tourism expenditures rise of 2%
Interest rate of public debt rise to 5.6%
Example of comparative static analysis

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%
Regional SAM for policy analysis: the case of Tuscany

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

We specify a reliability 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)