

## 4th AIEEA Conference

**“Innovation, productivity and growth:  
towards sustainable agri-food  
production”**

*The socioeconomic impact derived from  
the oil royalty allocation on regional  
development*



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# USE A NEW NATURAL RESOURCE

## BIG PUSH THEORY

the new source of income should lead to:

- increase public investments
- promote growth
- result in long-term economic development.

OR

## NATURAL RESOURCE CURSE

negative correlation between the abundance of resources and economic growth due to:

1. the implementation of non-sustainable macroeconomic policies by governments, due to the abundance of resources
2. the intrinsic volatility of the international market of non-renewable resources

Resource curse for:

- **Developing countries:** typical examples are Chad and Brazil where, despite the huge financial resources derived from oil royalties, the living standard of populations has not improved accordingly.
- **Regions lagging behind in developed economies** that start to exploit a new natural resource, such as, for example, oil fields.

The negative impact in these cases seems to be mostly due to the following:

- I. the opening of the regional economy would result in the loss of most effects derived from the expenditure of royalties out of the regional boundaries;
- II. the sudden increase in the export base may conceal the lack of competitiveness of the regional non-oil exporting sectors in relation to the rest of the country, reducing the investments required to improve their competitiveness;
- III. part of oil royalties are used in short-term local redistribution policies aimed at reducing the negative effect of the regional economic gap (including unemployment and poverty), but are ineffective in improving the competitiveness of the regional system in the long run.

Lastly, if the allocation of these financial resources is not implemented with due appropriateness and transparency, the entailed risks are bribery or rent-seeking behaviours.

# CASE STUDY: BASILICATA REGION

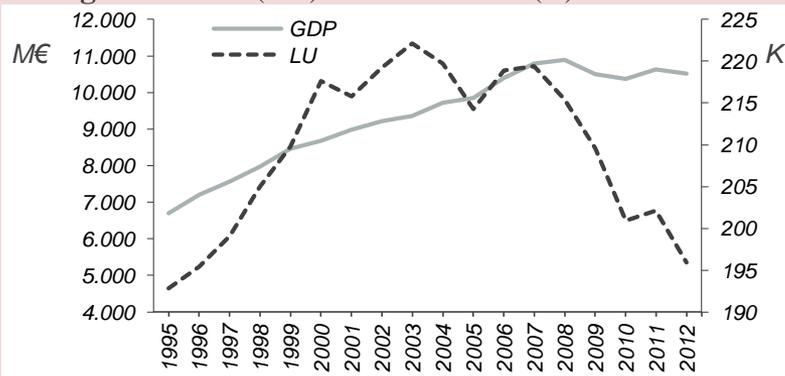
**Presence** - in its territory - of the **largest onshore oil field** in Europe:

- the oil regional industry currently produces about **16,137 ton/d** of crude oil
- **in 2013** the production was about **5.48 million tons**
  - ✓ 9.3% of the gross national domestic consumption
  - ✓ about 71.7% of Italy's total crude oil production
- **Royalties:** over **990 million euro** (from 1997 to the end of 2013)

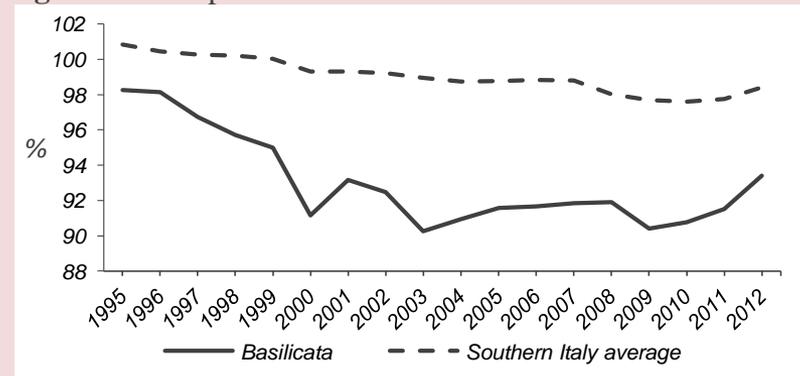


## Basilicata's economy shows strong difficulties compared with the rest of the country

**Figure 1: GDP (M€) and labour unit (K)**



**Figure 2: GDP per labour unit - ratio between different areas**



- **unemployment rate:** 16% in 2013
- **poverty index:** more than double the national average

**NO** ~~'BIG PUSH'~~



**'NATURAL RESOURCE CURSE'**



# SOCIO-ECONOMIC IMPACT: A SAM MODEL

## **Social Accounting Matrix: Why?**

- The most suitable statistical tool, in terms of information bases and economic model
- Possibility to follow the formation of value-added and its distribution and redistribution in the form of income to the institutions.
- Possibility to calculate the impact that variables have on the economic system: implementation of a linear model based on the calculation of multipliers

## **A two-region model**

The SAM used in this study is a two-regions matrix referred to 2010, in which the existing flows between Basilicata region and the rest of Italy are represented with a high level of detail.

The structure of the matrix includes 301 accounts:

- 37 production activities
- 54 production factors
- 3 institutions
  - ✓ Households (subdivided by income deciles)
  - ✓ Businesses
  - ✓ Government (distinguished as local and central)

## **The advantage of a two-region model:**

the possibility of considering the rest of Italy as being endogenous to the model makes possible to break down impacts and estimate not only the total but also the intraregional and interregional ones (spillovers and feedbacks).

# SOCIO-ECONOMIC IMPACT: A SAM MODEL

## Total impacts

The structure of the block matrix of accounting coefficients of the two-region model is shown below (Miller and Blair, 2009):

$$A = \begin{bmatrix} A^{rr} & A^{rs} \\ A^{sr} & A^{ss} \end{bmatrix}$$

where  $r$  = Basilicata region and  $s$  = rest of Italy.

By solving the linear system  $x = Ax + f$  (where  $x$  is the vector of totals of endogenous accounts and  $f$  is the vector of exogenous account flows) for  $x$  you have:

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

where  $M = (I - A)^{-1}$  is the matrix of SAM multipliers.

Each coefficient  $m_{ij}$  quantifies the total increase for each account  $i$  generated by a unit exogenous shock on the account  $j$ .

# SOCIO-ECONOMIC IMPACT: A SAM MODEL

## Intraregional and interregional impacts

While the matrix of multipliers  $M$  enables the estimate of the total impact, the breakdown of the matrix of accounting coefficients  $A$  into intraregional  $\begin{bmatrix} A^{rr} & 0 \\ 0 & A^{ss} \end{bmatrix}$  and interregional elements  $\begin{bmatrix} 0 & A^{rs} \\ A^{sr} & 0 \end{bmatrix}$  enables to estimate (Round, 1985, 2001; Dietzenbacher, 2002; Miller and Blair, 2009) the following:

- *Intraregional effects:*  $M_1 = (I - \tilde{A})^{-1}$

where  $\tilde{A} = \begin{bmatrix} A^{rr} & 0 \\ 0 & A^{ss} \end{bmatrix}$ ;

- *Interregional spillover effects:*  $M_2 = I + A^*$

where  $A^* = (I - \tilde{A})^{-1}(A - \tilde{A})$ ;

- *Interregional feedback effects:*  $M_3 = [I - (A^*)^2]^{-1}$

# SOCIO-ECONOMIC IMPACT: A SAM MODEL

## Regional impacts

Let us consider the intraregional sub-matrix  $A^{rr}$  and the blocks constituting it:

$$A^{rr} = \begin{bmatrix} B & 0 & C \\ V & 0 & 0 \\ 0 & Y & H \end{bmatrix}$$

where  $B$  is the matrix of inter-industry technical coefficients,  $C$  is the matrix of endogenous final expenditure coefficients,  $V$  is the matrix of endogenous value-added factors shares,  $Y$  is the matrix of endogenous coefficients distributing income to institutions and  $H$  is the matrix of endogenous coefficients for income re-distribution among institutions. The intraregional effect of impacts may in turn be broken down as follows (Miller and Blair 2009):

- *Regional direct effect:*  $M_1^{rr} = (I - Q)^{-1}$

where  $Q = \begin{bmatrix} B & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & H \end{bmatrix}$ ;

- *Regional indirect effect:*  $M_2^{rr} = I + T$

where  $T = (I - Q)^{-1}R$ ,  $R = \begin{bmatrix} 0 & 0 & C \\ V & 0 & 0 \\ 0 & Y & 0 \end{bmatrix}$ ;

- *Regional feedback effect:*  $M_3^{rr} = (I - T^2)^{-1}$

# The vectors of exogenous shocks: allocation of oil royalties

Once the multipliers required for the analysis are calculated and the **vector of shocks**  $df$  defined, it will be possible to define the vector of impacts  $dx$  as follows:

$$dx = Mdf$$

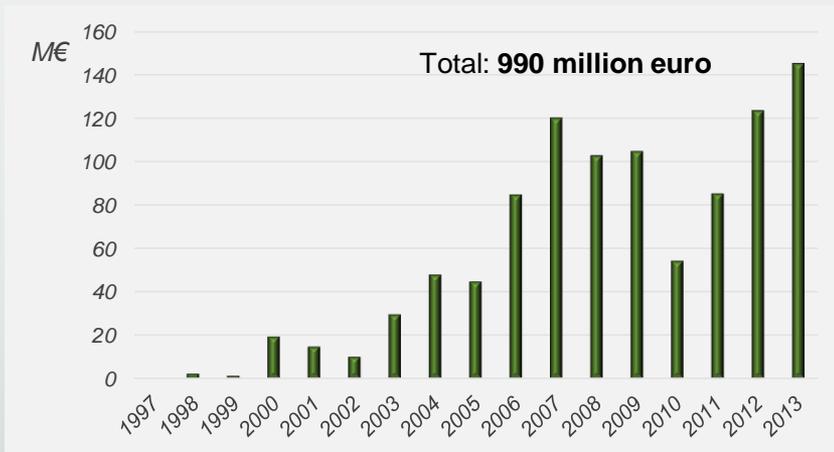
➤ the **vector of shocks** is made up of the **current and capital expenditures of the oil royalties** according to different scenarios.

Under the agreement between the State and oil drilling companies, above a given (small) output threshold, the companies must give:

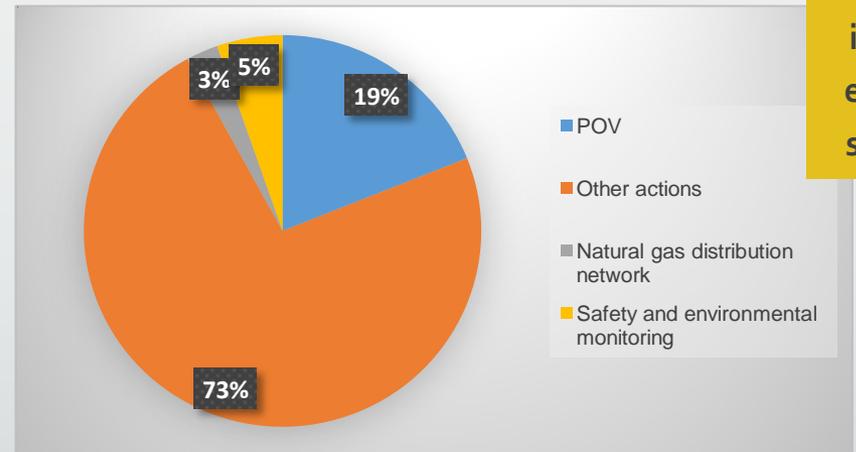
- ✓ 7% of their earnings to the regions in the form of royalties
- ✓ 3% for safety and environmental monitoring

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**Figure 3:** oil royalties by years (M€)



**Figure 4:** Allocation rate of royalties by action (%)



A recent national regulation (N° 99/2009) allocates an additional 3% of earnings the households living in Basilicata as vouchers to purchase fuel (fuel card).



Year	Amounts (M€)	n° beneficiaries
2009	32.22	320,000
2010	44.88	320,000

# ANALYSIS OF SOCIO-ECONOMIC IMPACTS

## 1 EX-POST ANALYSIS

the total impacts derived from the total expenditure of royalties till now, based on their actual use.

To calculate the **total impact of the use of royalties** in the time period under study, **all expenditure flows** have been considered as an exogenous shock directed towards the regional economy and **reclassified** based on the disaggregation of accounts in the SAM:

- **specific actions** : NACE classification
- **other actions**: distributed as inputs towards the endogenous accounts, based on the current expenditure coefficients of the regional administration included in the SAM.
- **fuel card**: exogenous increase in income of the households living in the region

## 4 SIMULATIONS

To provide helpful indications on the possible effects of **an alternative use of the financial resources** derived from mining, the four following simulations have been made that assume a different use of the shares allocated to **other actions**:

1. Increase in current consumption for public administration (scenario I);
2. Increase in the current consumption of public administration and in transfers to households (scenario II);
3. Funding of current activities of private enterprises (scenario III);
4. Funding of investments of private enterprises (scenario IV).

# RESULTS

Table 1. Impact of royalty uses by allocation type - 2013 Euro (M€)

	Allocation type		
	Total	Other actions	POV
Royalties receipts	1,166	786	203
Total impacts:			
Output	1,027	432	370
Value-added	593	274	194
Households' income	668	402	111
Labour unit (n)	10,258	4,422	3,634
Average impacts:			
Output	0.88	0.55	1.82
Value-added	0.51	0.35	0.95
Households' income	0.57	0.51	0.55
Labour unit (n)	9	6	18

## The POV seems much better in promoting growth and employment:

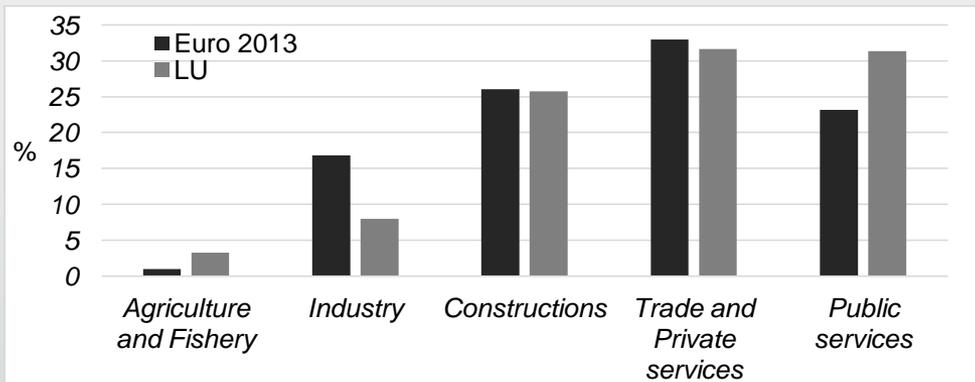
- the ratio of generated output to the expenditure allocated to the POV is more than three times the one recorded for the *other actions* €1.82 vs €0.55 of additional output for each additional € of expenditure.
- The POV has generated almost the same labour units using only 25% of the budget available for the *other actions*.

**These higher impacts** are mainly due to the fact that a considerable portion of the POV expenditure is directed towards *construction activities* (both to improve infrastructures and to preserve the cultural heritage), a sector mainly based on local businesses.

# RESULTS

- The POV results in a higher direct and indirect impact (through the production system) on the output
- “Other actions” aimed at supporting the public administration expenditure has actually a direct impact on households’ income leading to an induced impact on output and value-added (multiplier effect) only through the increase in consumption.

**Figure 5:** Percent distribution of impacts on output and employment



□ The sectors that most bear on the output and employment include constructions, trade, private and public services.

**Table 3.** Sector output multipliers

Sector	Output multipliers
Agriculture and Fishery	1.56
Industry	1.78
Constructions	2.04
Trade	1.82
Public services	1.84

□ Capacity of agriculture and fishery to generate more employment on the produced output is double compared to the other sectors.

# RESULTS

Most effects derived from the use of royalties have been lost by the regional economy.

- On average, only €0.88 of additional output has been produced at the regional level for each € spent (The typical opening of a regional economy)
- The mean incidence on the income is even smaller, with only 51% of expenditure converted into actual income earned by the households living in the region.

A specific program (like the POV) is a better solution in promoting economic growth in the short run

An alternative use of the resources allocated so far to the public administration expenditure

**Table 4.** Simulations on the alternative use of royalties allocated to *other actions* (M€)

	Allocation type				
	Current use	Scenario I	Scenario II	Scenario III	Scenario IV
Royalties receipts	786				
Total Impacts:					
Output	432	1,072	869	792	1,049
Value-added	274	704	559	395	521
Households' income	402	469	849	225	292
Labour unit (n)	4,422	11,012	8,982	7,344	9,454
Average impacts:					
Output	0.55	1.36	1.11	1.01	1.34
Value-added	0.35	0.90	0.71	0.50	0.66
Households' income	0.51	0.60	1.08	0.29	0.37
Labour unit (n)	6	14	11	9	12

## Best scenario?

- **Scenario I** (to support the public administration consumptions)
- **Scenario II** (Public administrations and Households' income)

**generate greater impacts, in terms of output, value-added, income and employment.**

*ineffective in improving the regional system competitiveness in the long run*

## Alternative scenario?

- **Scenario IV** (royalties are entirely spent to support the investments of private enterprises operating on the local scale)

*the strengthening of the regional production system competitiveness might lay the bases for sustainable economic development of the entire region in the long run.*

# CONCLUSIONS

- ❑ Results clearly show that in the past the allocation of oil royalties granted to the regional government (as a whole €990 million) generated a much lower impact than expected, in terms of economic growth and employment:
  - a large part of the impacts lost outside the regional boundaries (open regional economy)
  - ineffective use of part of the royalties to support the regional Government expenditure (compared to a targeted program like the POV, aimed at supporting the areas where oil fields are found).

## ROYALTIES

a role to mitigate the impacts of the overall macroeconomic crisis

absence of a clear strategy targeted to increase the regional economic system competitiveness  
=  
deterioration of the relative position of Basilicata within the national economy

- ✓ **Economic crisis**
- ✓ **Ineffective use of financial resources**

**Basilicata's economy is at risk for the natural resource curse**

- ❑ Simulations show that:
  - expenditure programs directed to implement investments could favour economic growth in the short run, without jeopardizing the regional system competitiveness prospects.
  - Better balancing in the allocation of royalties between social expenditure and production investments would probably constitute the first step towards a sustainable development strategy of the regional economy.

**THANKS FOR YOUR ATTENTION**

*'' The future  
belongs to those  
who believe in the  
beauty of their  
dreams''.*

Eleanor  
Roosevelt

