DYNAMIC I/O AND NAMEA MATRICES: A TOOL TO ASSESS THE OVERALL EFFECTS OF EUROPEAN PROGRAMMES

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Overview

To estimate the impact that a financial programme can have on the economic system of a country is an ambitious and very interesting target for every policy-maker, especially because the public intervention thinks to repair the market failures and to go toward a wellbeing path.
In this context, it is very important to have a valid instrument to measure the overall effects of policies, as for example the UE target to 2020, called *Climate Change Package.*
There is the need to develop an estimate methodology to consider the impacts of policies both on the economic and on emission aspects. In particular, the simultaneous evaluation of the effects of the investment programme is studied to consider the impact of the retroactivity of an expenditure in the economic system on the productive system, on growth and on employment, together with the impact on emissions. All that causes a variation of productive levels also in the sectors non-directly involved and, consequently, the environmental impact induced.
We have developed and implemented integrated tools for assessing the potential impacts of plans, programmes, policies and measures on GHG emissions, considering the interrelation between the economic and the environmental system.
The simultaneous assessment of these effects is possible through an integrated use of two accounting systems: Input/Output Matrix for the economic aspects and NAMEA (National Accounting Matrix with Environmental Accounts) matrix for the environmental and emission data related to each economic sector. The integration of these tools allows the assessment of the effects of European Regional Development Fund (ERDF) investments in Italy for the period 2007-2013.
In this paper, we show the results obtained through a projection of 2020 and 2030 of the Italian IO and NAMEA matrix, in order to assess the systemic effects on the economy and GHG emissions of ERDF investments.

Methods

The model developed is qualified for the interrelation among several approaches, and it is composed of three modules:

1. Module 1: permits to estimate the Value Added and the employment sectorial growth coherent with the Input/Output Matrix to supply a forecasting I/O matrix;
2. Module 2: permits to rebuild the NAMEA matrix for the emission to the future requested year, through the estimate of the sectorial emission intensities;
3. Module 3: permits to create the t quantifications of the effect of the public intervention on production, Value Added, employment, and GHG emissions.

The basis of the model is a reference scenario or business as usual (BAU) scenario, in which the evolution of all its components, both economic and environmental, are coherent among them. The essential elements to start the simulation are:
- Input/Output Matrix to a base year;
- NAMEA Matrix to a base year;
- the forecast of GHG emissions linked to the economic aspect so to describe a coherent framework of the economic system and the related environmental pressures.

These three elements determine the possibility to obtain a full reference scenario that we stress with the impact of an economic shock due to the introduction of the expenditure linked to the programme examined. In this way we obtain the effect framework of the policy to a fix future year.

Results

The model allows to estimate impact scenario of public policies through the integration of different approaches and instruments (econometric models, matrix Input-Output, matrix NAMEA). The integration permits to consider all mechanisms of the interrelation existing between the economic and the environmental systems.

We have applied the model to the ERDF investment to study the economic and carbonic effects on Italian economic structure through a projection of 2020 and 2030 of the Italian IO and NAMEA matrix, in order to assess the systemic effects on the economy and GHG emissions of ERDF investments.
The model can estimate the direct, indirect and induced effects of a given investment on emissions and/or economic growth and employment. From our study, we can examine the effects also in the two phases: the construction phase and the operation phase, which represents the permanent effect on the system.
Moreover, the methodology permits to consider the trend of sectorial emission intensity, which is the key to make the matrix dynamic. In fact, the emission intensity is influenced by two elements: the cost of energy and the improvements of technology.
Our methodology, using the Sylos- Labini model, permits to measure the emission savings thanks to the technological progress due to the increasing demand.
The effect of policies and measures is then introduced so it is possible to evaluate the potential reduction of emissions up to 2020. This may highlight as the structure of GHG emission for economic sectors can be modified up to 2020.

Conclusions

The methodology and the relative model represent an innovative approach to a whole analysis of a programme/plan with the possibility to assess simultaneously the impact of planned measures on the levels of economic activity (production and employment) and on GHG emissions profile. Furthermore this innovative and integrate approach of instrument might be useful as a tool to fulfil the Strategic Environmental Assessment of programmes and to compare different investment scenario options.
The innovation is not limited to the integration of instruments but it is oriented to build a mid-term horizon and it can be considered as one of the first experiment to make dynamic a I/O matrix and its analysis.
The tool is a flexible and useful instrument capable to support the decisional choices of policy-makers and to evaluate the importance of the effect linked to the public expenditure in terms of economic growth, employment and GHG emissions. The next steps will be to standardize and to make it easy-friendly and possibly to replicate both with different programmes and with different geographical contexts for example on regional levels.

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