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Analysis

Assessment of Sustainable Well-being in the Italian Regions: An Activity Analysis Model

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ABSTRACT

Applying the theoretical framework of productive analysis, the paper proposes an evaluation of regional sustainable well-being (SWB) in terms of efficiency. By means of an Activity Analysis Model (AA) (Färe et al., 1996), desirable and undesirable outcomes of development have been simultaneously used to evaluate the sustainable well-being of Italian regions. Data on equal and sustainable well-being provided by the Italian Statistical Office for the year 2010 has been used. The analysis reveals that only four regions achieve sustainable well-being, balancing socio-economic and environmental outcomes and resources. Finally, the study points out the advantages of AA for policy purposes by comparing it to a composite indicator of SWB.

1. Introduction

According to the World Commission on Environment and Development (WCED), '*sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*' (WCED, 1987, p. 43). This statement epitomizes the combining of the benefits in GDP growth with the environmental and social costs of that growth. This leads to the conclusion that GDP per capita is actually a very limited measure of the level of a country's well-being, because it does not consider the consequences of economic development on the lives of people (e.g. air, sea and water pollution, increases in certain rare diseases, congestion, cost of urbanization, and so on); nor does it capture the real-life conditions of populations (UNDP, 1990; Hobijn and Franses, 2001; Neumayer, 2003; Marchante and Ortega, 2006). In other words, growth should be expanded to include both certain costs (i.e. pollution, urban concentration, commuting, etc.) and positive returns (i.e. better health, greater longevity, more leisure, less income inequality, etc.).

It is opportune, therefore to move away from the concept of (material) growth, measured by GDP, to that of development. As the World Bank has stated: '*the basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives. However, it is often confused in the immediate concern with the accumulation of commodities and financial wealth*' (World Bank, 2001).

From an operational point of view, these considerations have recently fostered the debate among researchers about how to evaluate sustainability by combining the economic, social and environmental aspects of human life (see e.g. Pulselli et al., 2006; Distaso, 2007; Floridi et al., 2011; Salvati and Carlucci, 2014).

From a theoretical point of view, empirical studies have been based on the basic hypothesis that economic systems contribute to the well-being of people by the production of outputs (e.g. GDP). GDP, among others, is a measure of the ability of a country to provide its inhabitants with the opportunity of enjoying good economic, social, and environmental conditions. An increase in per capita GDP is a basic prerequisite for improvements in living standards like better health services, more secure livelihoods, greater access to education, better working conditions, security against crime, more satisfying leisure time, a healthy and sustainable environment and so on. In turn, better living standards are a good basis for enhancing productivity with a corresponding effect on GDP. This process implies both the use of inputs, such as labour, capital and natural resources, and the production of negative effects like the increase of waste, air and water pollution, congestion and so forth. Thus, a more in depth framework of well-being should include both economic (material) and social (immaterial) aspects. As shown by Cuffaro et al. (2008), a high level of economic well-being may conflict with a high level of social well-being and while improved economic well-being is deemed necessary, it does not guarantee improvements in the standard of living in terms of a better quality of life.

Additionally, a wider approach to the analysis of well-being should also pay attention to the relation between the economic and environmental systems. As argued by ecological economists

> *…the economic system is a subsystem of the system which is the environment. The economy depends upon the environment, what happens in the economy affects the environment, and changes in the environment affect the economy. Regarded as two systems, the economy and*

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the environment are interdependent.

[(Common and Stagl, 2005, p. 87)]

In line with this, Cracolici et al. (2010) using a simultaneous equation model, proposed an integrated approach to the analysis of well-being of developed and developing countries taking into account the interdependence of the economic, social and environmental aspects of regional development. They found that GDP is a basic condition of good social performance: a high level of GDP contributes to a longer life expectancy and to higher levels of education. However, the downside is that high levels of GDP increase the level of pollution.

More recently, empirical literature has proposed different ways of managing the economic, social and environmental aspects of development in order to evaluate well-being at regional level.

For example, Bastianoni et al. (2014) and Regoli et al. (2014) used a simple input/state/output framework to describe and evaluate a sustainable economy. Both studies classify countries based on the relationship between the organization of society and environmental and economic resources. However, these studies only refer to the material aspect of a country's growth process and consider only the effects of this process on the environment and not its effects on the social aspects of life (i.e. well-being in a wider sense). Another and more aggregate approach, is that of Dietz et al. (2009, 2012) and Knight and Rosa (2011), which emphasizes the goal of sustainability: by this they mean the minimization of the environmental impact combined with the maximization of human well-being. These studies introduce the concept of 'efficient well-being' for measuring how efficient an economy is in producing well-being. Using a stochastic frontier production model, they measure how efficient a country is at producing well-being (i.e. output) considering physical, natural and human capital (i.e. inputs). Their results suggest that environmental efficiency in producing well-being increases with affluence at low to moderate levels of economic development but declines at high levels. An earlier empirical study measuring the efficiency of countries' well-being was also performed by Cuffaro and Vassallo (2004).

In line with this branch of the literature, here we apply the Activity Analysis Model (AA), a technique usually used at micro level, to measure the 'sustainable well-being' (SWB) of Italian regions in terms of efficiency. The AA model enables us to consider economic, social and environmental aspects simultaneously; and also to distinguish between desirable and undesirable output of sustainable development. The empirical analysis has been performed on data for the year 2010 from the 'Equal and Sustainable Well-Being' (ESW) dataset (*Benessere Equo e Sostenibile*, *BES*) published by the Italian Office of Statistics. The paper is organized as follows: Section 2 elucidates our theoretical and operational framework. In Sections 3 and 4, the AA model and data are presented. Finally, Section 5 contains the empirical results and some concluding comments.

2. Our Theoretical Framework

According to Lélé (1991), development is a process of directed change, which implies identifying the main objects of this process and the means of achieving them. This definition of development fits well with the paradigm of production function. Specifically, as sketched in Fig. 1, the objects of development represent the outputs of a production process which are feasible by means of some inputs.

As far as objects are concerned, sustainable development or well-being should imply an improvement in the economic and non-economic aspects of human life without them being a burden on the environment. SWB involves different aspects of human life like a decent standard of living, a healthy life, an adequate level of education and so on. Additionally, since SWB also means paying attention to '*the environmental responses to human activities and human's ability to use the environment*' (Lélé, 1991, p. 609), the impact of human activities on the environment needs to be taken into account.

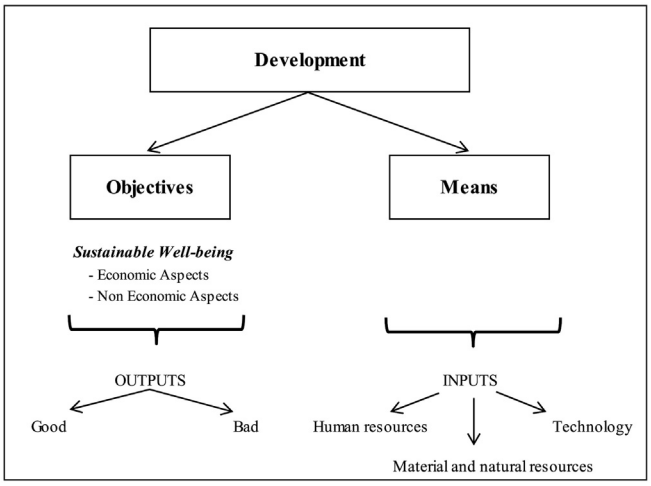

Fig. 1. Theoretical scheme of sustainable well-being.

As a consequence, the production of SWB has to be seen as a multi-output and multi-input production process. Specifically, the production of SWB entails bad outputs as well as good ones. In fact, the process of growth to satisfy essential needs may occur at the same time as a deterioration of the social and environmental quality of life. Outputs are related to inputs, essentially human and physical capital. Therefore, SWB can be represented by the following production function:

$$\text{SWB} = f(\text{human resources},\ \text{material and natural resources},\ \text{technology}) \quad (1)$$

Human and physical resources, if managed in an efficient way, increase growth and consequently SWB. What does efficient management mean? It involves the carrying capacity of the eco-system; i.e. if the carrying capacity of the eco-system is overloaded, this could have negative effects on people's lives. Therefore, the production of SWB may imply serious social costs and ecological decay.

If we apply this to a regional context, income or value added cannot be expanded infinitely without some negative external effects on the social and environmental equilibrium of the region (e.g. crime, pollution, traffic congestion, overuse of water resources, increase of garbage, etc.). Thus, there are two kinds of outputs: good (desirable) and bad (undesirable). The situation where desirable and undesirable outputs are jointly produced is called null-jointness (Shephard and Färe, 1974). This means that no good output can be produced without the production of a bad output and in line with this, some measures of good and bad outputs need to be introduced on the left- hand side of Eq. (1).

Given that the production process function of Eq. (1), as the functional form of the SWB is not known, an Activity Analysis (AA) Model (Färe et al., 1996) is adopted using multiple inputs and outputs in order to obtain an efficiency measure of it. It also enables us to consider good and bad outputs jointly. An AA model has been preferred to alternative linear programming methods used to compute efficiency scores because we are able to decompose the overall productivity of a region into a sustainability index (i.e. immaterial well-being) and a productive efficiency index (material well-being) (Färe et al., 1994b). For more details on the differences between the AA model and traditional (non-) linear programming models see Färe et al. (1996). In the next Section, the AA model is presented.

3. The Activity Analysis Model and Data

Given the set of inputs and good and bad outputs, the technology set S consists of feasible triples $S = \{(x,y,w) : x \text{ can produce } y \text{ and } w\}$; and consequently, the output set is defined as $P(x) = \{(y,w) : (x,y,w) \in S\}$.