

From economic productivity to productive well-being

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Economic growth is usually regarded as a measure of progress and well-being. Recent studies, however, provided a nuanced view about the role of economic growth for well-being, and suggested that the quality of growth matters: if economic growth is compatible with a cohesive and inclusive society, it is reasonable to expect that well-being will improve (Easterlin, 2013; Oishi and Kesebir, 2015; Mikucka et al., 2017). In contrast, if economic growth leads to loneliness and inequality, well-being may arguably decline. In the present work we contribute to this literature by exploring whether and to what extent it is possible to extend the inputs and outputs of a traditional productivity framework to include well-being and sustainability measures. Specifically, we use Data Envelopment Analysis and data from 23 European Countries (2005-2018) to compute productivity-like indicators accounting for life satisfaction and adjusted net savings.

Economic productivity is the ratio of goods and services produced (outputs) divided by resources used in the production process (inputs). Productivity provides a measure of how efficiently a production process uses scarce resources. Enhancing productivity means making better use of available resources, and creating new technological abilities to provide goods and services to the society. Productivity is often regarded as the ultimate engine of growth, and a proxy for technical progress. However, the efficient mobilization of resources for economic output does not imply societal well-being, nor environmental sustainability. These aspects are important and, in case of sustainability, urgent for modern societies.

Many authors have already proposed frameworks for efficiency/productivity indicators to account, for instance, for pollution as an undesirable by-product of production (an early attempt in this regard is Pittman (1983)). Conversely, studies proposing ways to account for both well-being and sustainability in productivity measurement are scarce. A recent example is DiMaria (2019), who introduced adjusted net savings (ANS)¹, an indicator of weak sustainability and welfare, in the set of desirable outputs. For what concerns productivity and well-being, few studies have tried to merge the two concepts in one composite indicator. For instance, DiMaria et al. (2020) evaluated whether well-being (as an input or an output) contributed to efficiency following a procedure proposed by Pastor et al. (2002), and four waves of the European Social Survey (2004, 2006, 2008, and 2010). Results indicate that for some countries, mainly Western European economies, well-being should be regarded as an

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¹ANS is calculated by the World Bank as net national savings plus education expenditure, and minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide and particulate matter (PM) emissions.

input, and therefore it belongs to the denominator of productivity computations. For Eastern European countries well-being is more likely to be an output, and therefore it belongs to the numerator of productivity indexes.

Our starting point is that it is important to evaluate how well economies deliver goods and services given the resources they use. At the same time we seek to go “beyond GDP”, and to include well-being and environmental quality among economic measures of performance for “inclusive growth”. In the framework of productivity measurement this means classifying well-being either as an input, an output or both; it also implies checking whether sustainability is a desirable by-product of economic production.

We retrieve measures of output (GDP) and inputs (capital and labor) from the Penn World Tables, version 10 (Feenstra et al., 2015). The sample includes 23 European countries². We draw data on subjective well-being, namely life satisfaction, from the Eurobarometer (2004 - 2018).³ Specifically, our measure of well-being input is the share of people that are very satisfied with their life multiplied by hours worked. This amounts to treating well-being as a multiplier on work force: the higher the share of people satisfied with their lives, the larger the positive effect on labor. This modelling approach is similar to the one adopted by Barro and Lee (1994) regarding educational attainment. As for the well-being output, we assume that countries maximise the share of the population that is very satisfied with their life. From this point of view we are consistent with the idea of the benevolent social planner in theories of optimal growth model. Finally, we use data on adjusted net savings from the World Bank. Our dataset covers the period 2005 - 2018 because of well-being data availability. For the sake of simplicity, we select countries for which adjusted net saving is positive.

We use data envelopment analysis, a linear programming technique, that allows us to compute optimal weights to aggregate inputs and outputs to derive productivity indicators. In particular, we adopt the framework proposed by Toloo et al. (2021) to select the optimal set of inputs and outputs. This framework allows us to evaluate whether “productivity” changes when well-being (or ANS) changes for given values of other inputs and outputs. This is empirically assessed by computing dummy variables that optimally take value 0 if well-being (or ANS) does not add to productivity measurement. If the dummy variables take value 1, productivity is tied with changes in well-being (or ANS). Our working hypotheses are:

- H1: A more satisfied working force is more productive, thus we expect well-being to be an input.
- H2: Government organises its economic system to generate well-being, thus well-being should be a desirable output.
- H3: Sustainability matters and shapes economic decisions, thus adjusted net saving is an output.

We find that well-being should be regarded as an input for some countries, and as an output for others, whereas ANS does not appear to be a relevant output to benchmark countries. These results suggest that including life satisfaction among the inputs and the outputs

²Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden, Turkey, and United Kingdom

³Eurobarometer is the polling instrument of the European Union to regularly assess the state of public opinion in Europe (<https://europa.eu/eurobarometer/about>)

of productivity could significantly contribute to the definition of a measure of economic performance that accounts for the quality of growth.

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