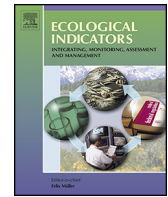




ELSEVIER

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

Original articles

A comparison between GDP and ISEW in decoupling analysis

Pedro Beça^{*}, Rui Santos

CENSE–Center for Environmental and Sustainability Research, Department of Environmental Sciences and Engineering, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal

ARTICLE INFO

Article history:

Received 23 September 2013

Received in revised form 4 June 2014

Accepted 9 June 2014

Keywords:

Decoupling
Resource use intensity
ISEW
GDP
EKC

ABSTRACT

The assessment of decoupling between development and resource use is a central issue in current debates on sustainability. Traditionally, resource use intensity has been measured in terms of resource use units per economic growth unit using the Gross Domestic Product (GDP). This paper explores the use of the Index of Sustainable Economic Welfare (ISEW) to complement the analysis of resource use intensity and the decoupling assessment, comparing the results obtained for two countries. The ISEW values for Portugal and the United States are computed for the period between 1960 and 2010, as well as estimates of the intensity of the use of several resources. We compare the empirical results of resource use intensity using the GDP and the ISEW, and also test the Environmental Kuznets Curve (EKC). The results show that the ISEW has greater sensitivity in assessing resource use intensity and can provide additional and important information about countries' decoupling patterns.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

The use of biological resources, energy and materials is one of the most important issues on the European and the United Nations environmental agendas (UNEP, 2010; EEA, 2011). The rate at which resources have been used in recent decades is a hindering factor for sustainable development. Specifically, it threatens the chance that future generations will have access to a fair share of scarce resources. Moreover, intense resource use can have impacts on the environment, causing damages that go beyond the ecosystem's thresholds (e.g. Rockstrom et al., 2009).

Considering the importance of resource use evaluation, developing comprehensive measurement systems and appropriate indicators is fundamental. Internationally standardised methods to assess the use of resources, such as material flow accounting (OECD, 2008), are still at an early stage of development. On the other hand, there are several other relevant issues that require additional research such as energy use intensity, the change in quality of the resources, the effect of pollutant emissions on ecosystems, the way soil is used, and many others (e.g. UNEP, 2010).

One of the focuses of the studies on resource use intensity is the evaluation of the decoupling between economic growth and resources use or between welfare and the latter. In view of the global economic slowdown of the last few years, there has been a

reduction on the demand for material resources particularly in Europe and the United States (EEA, 2012; USGS, 2013). This presents the opportunity to evaluate whether the reduced consumption has been also associated with a decrease in welfare, as well as if the contraction of economic growth is also associated with a reduction of welfare.

The objective of this work is to examine the possibility of a decoupling between welfare and resource use. We assess how an indicator of welfare such as the Index of Sustainable Economic Welfare (ISEW) contributes to this analysis, namely, whether it brings new insights to the traditional decoupling analysis between the Gross Domestic Product (GDP) and resources use. The main categories of resources considered in the analysis are: biotic and abiotic materials, energy, water, land use and air (UNEP, 2010). Two countries with different patterns of economic growth and resource use, Portugal and the United States, are chosen for a 50 year analysis. The analysis focus is in the per capita values and the trends over time of the selected indicators; therefore we use indexed values, which also avoid the introduction of biases from currency conversions.

The ISEW for Portugal and the United States is estimated for the period 1960–2010, following the approach proposed by Beça and Santos (2010). Resource use intensity is evaluated in relation to the ISEW and the GDP. The Environmental Kuznets Curve (EKC), a particular case of the decoupling effect, is also investigated from a similar perspective.

The adopted structure of the paper combines methods and results in several sections. The next section presents the results obtained for the ISEW in the two case studies. Section 3 reviews the

^{*} Corresponding author.

E-mail addresses: pedro@gmail.com, pmfb@fct.unl.pt (P. Beça).

main existing measurement systems and indicators employed to assess resources use, as well as the results obtained. Section 4 presents the methods and results for the decoupling analysis and the EKC test. Finally, Section 5 discusses the main results and conclusions.

2. Welfare assessment

The assessment of resources use intensity has traditionally been done using GDP as a measure of economic performance. GDP remains a very widely used indicator, but several authors have noted its limitations as an indicator of development and sustainability (e.g. Eisner, 1988; Daly and Cobb, 1989; Ayres, 1996; England, 1998; Lawn, 2003). Assessing development and sustainability requires a different approach, namely considering the changes in welfare generated by the economic activity (e.g. Daly and Cobb, 1989; Costanza et al., 2004; Niccolucci et al., 2007; Cobb and Cobb, 1994).

Among the different alternatives to GDP as an economic welfare indicator is the ISEW. The indicator was initially developed by Daly and Cobb (1989), and later improved conceptually, in its methods and in the number of components by several other authors. For reviews of the ISEW, including the main findings of previous literature and a discussion about methods and components, the reader is referred to, e.g. Daly and Cobb (1989); Anielski and Rowe (1999); Lawn (2005); Beça and Santos (2010).

The estimation of the ISEW for the USA and Portugal in the period 1960–2010 is based on the approach proposed by Beça and Santos (2010). The values for the USA are computed according to the latest statistical data available and studies used in the estimation of some components (e.g.: US EPA, 2011; for the social costs of air pollution; IEA, 2012, for the costs of non-renewable resources; USCB, 2011; for income distribution). In the Portuguese case there are a few minor methodological adjustments taking into account the availability of statistical data and studies (e.g. ETSC, 2007; for the costs of unintentional accidents; EC, 2004, for the social costs of tobacco consumption; EC, 2005 for the social costs of air pollution).

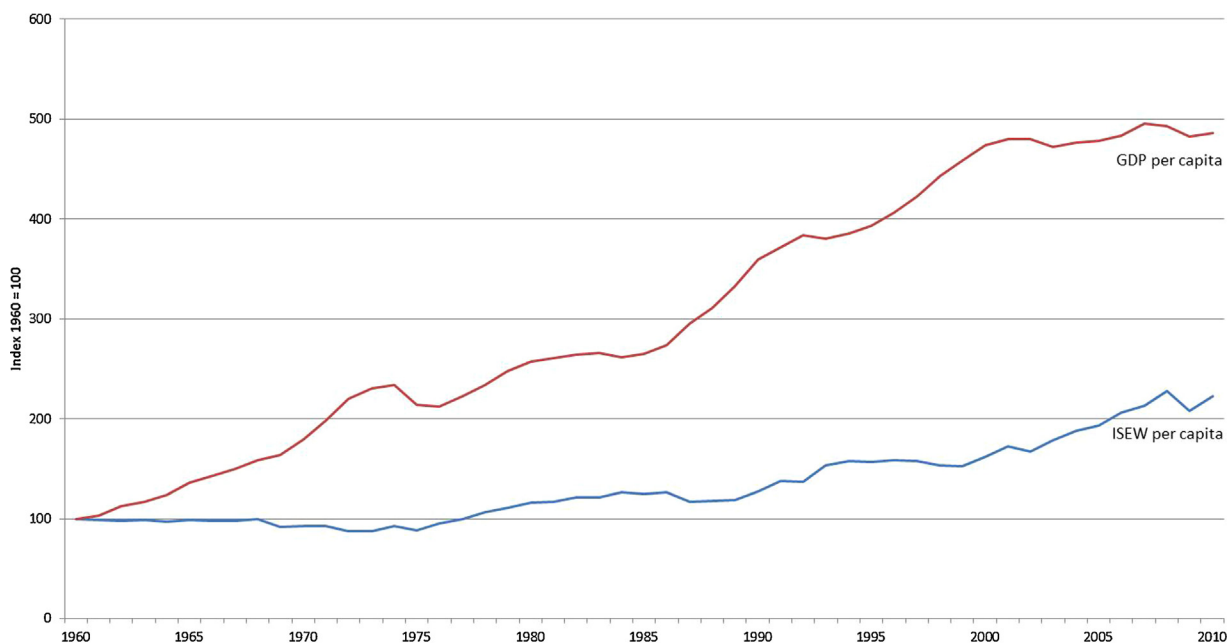
Figs. 1 and 2 present the trends in the ISEW compared to those of the GDP, both in per capita values. The values are indexed to a

value of 100 in the year 1960 for both indicators. In both countries, it is clear that the growth of the GDP is substantially higher than that of the ISEW for the period 1960–2010. For example, for Portugal the GDP increases by a factor of five while the ISEW increases by about two times, in the USA the GDP increases by about two and a half times while the ISEW achieves in 2010 a value very similar to the year 1960. Moreover, the behaviour of each of the indicators is significantly different. There are periods where the GDP that are not reflected in the ISEW, e.g. for Portugal the periods 1960–1992 and 1995–2000 and for the USA the periods 1968–1993 and 2000–2002. The GDP reflects the increases in economic activity, however if these are supported by activities that are prejudicial to the environment and the social conditions, this is reflected in a different behaviour of the ISEW.

On the other hand, there are periods where the increase in the ISEW is more significant than that of the GDP, such as 2002–2008 for Portugal and 2002–2007 for the USA. A common aspect valid for both countries is the fact that the effects on welfare, measured by the ISEW, are somewhat delayed in time (see Beça and Santos, 2010; for details about components and methods). Particularly the investments in social and environmental components of sustainability are reflected in the long term, instead of the behaviour of the GDP which is very sensitive to the yearly changes in investment. This is especially relevant in the Portuguese case that evidences a significant increase in the ISEW from 2000 to 2008 which reflects the positive influences on welfare, derived from the investment in environmental conditions and social welfare that started several years before.

Fig. 3 compares the behaviour of the ISEW between the two countries. Generally the ISEW indicates a greater increase in welfare for Portugal than for the USA, particularly in the last ten years of the study, and the trends are considerably different between the two countries. In some periods the ISEW increases significantly in one country and remains steady or even decreases in the other, such as in the periods between 1978–1993 and 1994–1999. We are not presenting a comparison of absolute values of the ISEW to avoid biases from currency conversions; however, the absolute value of the per capita ISEW is significantly higher for the USA for all years of the study by at least 20% in the year 2010 and more than 100% in 1960.

The fact that the value of the ISEW increases more for Portugal than for the United States in per capita terms can be explained by



Download English Version:

<https://daneshyari.com/en/article/6294851>

Download Persian Version:

<https://daneshyari.com/article/6294851>

[Daneshyari.com](https://daneshyari.com)