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ANALYSIS

The World Bank's 'genuine savings' measure and sustainability

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Abstract

In order to consider the depletion of natural capital in national income accounting, the World Bank has developed a composite indicator known as 'genuine savings' incorporating several environmental indicators. This paper examines the conceptual and empirical characteristics and policy implications of the measure. Analysis shows that the measure is conceptually and empirically imperfect. The policy implications based on this measure are erroneous. The paper suggests that a global approach is needed to appropriately address sustainability issues and to incorporate natural capital in national accounting.

Keywords: Genuine savings; Adjusted net savings; Environment; High-income countries; Low-income countries; Sustainability; Ecological debt

JEL classification: O1; O13; Q01; Q28; F0

1. Introduction

Traditional measures of saving and investment are based on income-based measures. The natural environment is excluded from the accounting algorithm. Thus depreciation of physical capital is included but depletion of environmental resources is not. The World Bank has made an attempt to include natural and human capital into the saving measurement. It has developed a measure known as 'genuine saving', which encompasses physical, human and natural capital. The purpose of this paper is to critically appraise this measure. The paper is organized as follows. Section 2 explains the genuine savings measure. Section 3 undertakes a conceptual critique of the measure. Section 4 gives an empirical critique of the measure. Policy relevance of the measure is discussed in Section 5. Section 6 contains concluding remarks.

2. Genuine savings

In conventional national income accounts, net saving is obtained by deducting only depreciation of physical capital from gross saving. The genuine

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savings measure proposed by the World Bank (1999) takes a broader view and includes natural and human capital. The genuine savings rate is calculated as

$$\text{GENSAV} = \frac{\text{GDS} - D_{\text{p}} + \text{EDU} - \sum R_{\text{n},i} - \text{CO}_2\text{Damage}}{\text{GDP}}$$

where GENSAV is genuine domestic savings rate, GDS is gross domestic savings, D_{p} is depreciation of physical capital, EDU is current expenditure on education, $R_{\text{n},i}$ is the rent from depletion of i-th natural capital (energy, mineral and forest depletion are included), CO_2 damage is damage from carbon dioxide emissions (currently estimated at US$20 per ton of carbon times the number of tons of carbon emitted), and GDP is gross domestic product at market prices. The World Development Indicators 1999 for the first time gave data on 'genuine savings' for over 100 countries (World Bank, 1999). The conceptual issues and data limitations are also discussed by the World Bank. Several researchers explain details of calculations of the natural capital components, data limitations and theoretical motivation (see, e.g., Friend, 2000; Hamilton and Clemens, 1999; World Bank, 1997, 1999) and a few have criticized the method of calculating the resource depletion rates (see, e.g., Neumayer, 2000).

3. Conceptual critique of the genuine savings measure

The genuine savings measure is conceptually based on 'weak sustainability', which is premised on perfect substitutability between different types of capital including physical, natural and human capital. A weakly sustainable measure such as the genuine savings measure can be derived from a dynamic optimization model where a planner attempts to maximize the present value of social welfare given a set of constraints. Empirically, weak sustainability is based on the savings rule and substitutability. Following Pearce and Atkinson (1993), an operationalized version of weak sustainability, also known as Hicks–Hartwick–Solow weak sustainability can be given as

$$Z > 0 \text{ iff } s > (\delta + \eta),$$

where Z is the sustainability indicator, s is the rate of savings, δ and η are the rates of depreciation of physical and natural capital, respectively. A weak sustainability indicator can be given as,

$$Z_1 = s - (\delta + \eta)$$

By contrast, strong sustainability suggests maintaining 'ecological capital intact over time' such that the overall integrity of the ecosystem is sustained (see, Hediger, 2000). In connection with weak versus strong sustainability, Pearce (2000) notes that the domain over which substitution takes place should be taken into account. Even in the 'weak' version, substitution in an economic sense means substitution at the 'margin' and not 'total' substitution, as most ecological and life-supporting services of natural resources are simply not substitutable. Development theory has usually considered it as axiomatic that economic growth is good for poor countries, as environmental degradation in the early stages of growth are reversed at later stages such that environmental quality will improve, a la 'environmental Kuznets curve'. This relationship is most likely to hold for environmental quality variables such as purity of drinking water, sanitation and others but less likely to hold for factors like carbon emissions, loss of forest cover and other, such that it is unable to provide insights on system-wide consequences of growth (Arrow et al., 1995).

If environmental limits have been exceeded, weak sustainability is untenable (see, also Arrow et al., 1995 and Mayumi, 2001). Considering a much larger set of natural assets, Wackernagel et al. (2002a) have shown that production in the world exceeds the Earth's capacity resulting in an ecological overshoot. They found that overshooting has occurred around the 1980s and currently amounts to 1.2 times the Earth's capacity as illustrated in Fig. 1 (see also, World-wide Fund for Nature International et al., 2002). While difference of opinion exists among scientists regarding estimates of climate change and environmental damage, there is a majority held view that at the global level all economies together are operating beyond the ecological footprint determined by the Earth's capacity. Under the assumption of ecological overshoot, weak sustainability should no longer be relied upon as the criterion. The Ecological Economics paradigm argues that natural capital should be viewed separately in terms of strong sustainability, which suggests that