



Resource productivity as sustainability indicator may need developing

Resource productivity has become a popular indicator of environmental sustainability. However, new research has demonstrated that it is influenced by national income and its current use tends to support a simultaneous growth in economic productivity and resource consumption. In order to shape policy effectively, the study suggests that targets should directly emphasise resource consumption and emissions.

In order for environmental policy to set effective targets, representative indicators of sustainability are needed. 'Resource productivity' is the Gross Domestic Product (GDP) output per resource input (measured in tonnes). It is interpreted as a sign of efficient use of resources and is now used widely as an indicator of environmental sustainability. However, there are some concerns about how this measure is used and interpreted.

The researchers conducted an international study of resource productivity for a range of resources in the year 2000. They measured the income elasticities of resource consumption, i.e. the degree that resource consumption varies with national income. They divided resources into the categories of biomass, fossil fuels and 'other' (which includes hydraulic and nuclear energy, construction materials and ores and industrial minerals).

The results indicated that the consumption of fossil fuels has a high income elasticity, which means that as the national income increases, so too does fossil fuel consumption. However, biomass consumption is inelastic and does not vary with income. Consumption in the 'other' category has an intermediate income elasticity.

Further analysis indicated that if resource consumption varies with income, resource productivity does not. This is most likely because resource productivity is calculated by dividing income by consumption, so if consumption is proportional to income, there will be no variation in productivity. This is the case for fossil fuel productivity but, if a resource is inelastic, such as biomass, then its productivity will increase with income.

These findings have implications for the indicator of resource productivity. It suggests that international differences in productivity are related to income and that if productivity were simply interpreted as an indicator of sustainable economic performance, then all richer countries would appear more sustainable, despite their higher resource use. Higher productivity economies are benefitting from this apparent effect. Since fossil fuel productivity does not vary with income, then countries that consume large amounts of fossil fuels still have high productivity. However, as biomass productivity does vary, poorer countries tend to consume more biomass thus they appear to be less productive.

The research suggests that if resource productivity is to be used as an indicator of resource efficiency, it would be desirable to remove its systematic dependence on income. There are several ways that this could be achieved. Firstly, the study suggests that, instead of comparing national productivities to themselves, they should be compared to their position along the international income trend, i.e. comparing residual rather than absolute values. Secondly, an income range could be established, so comparisons are only made between countries within a narrow income range. Thirdly, the resources under consideration could be limited and comparisons only made between those with similar income elasticities, for example, fossil fuels or biomass.

The research concludes that, as a policy target, the use of resource productivity as an indicator tends to reward business-as-usual in terms of the simultaneous development of growth in the economy and growth in resource consumption. It suggests that, if the policy objective is to reduce resource use and emissions to achieve environmental sustainability, then productivity targets must be coupled with limits in economic growth and direct emphasis should be placed on resource inputs and emissions.

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