

Understanding the Evolution of Global Energy Use

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Overview

We examine the evolution and drivers of global energy use in the past four decades. We apply a new methodology of the relationship between per capita energy use and income using long-run growth rates, which allows us to test multiple hypotheses about the dynamics and drivers of per capita energy use in a single framework and avoid several of the econometric issues that have plagued previous approaches.

Methods

We work with a panel data set of 99 countries from 1971 to 2010. Our GDP data uses PPP adjusted exchange rates and our energy data includes traditional use of biomass. We examine the drivers and dynamics of energy use per capita, by working with the long-run growth rates of the variables over the forty year period. This allows a simple econometric approach that avoids many of the econometric issues including unit roots and the identification of time effects that affect previous work in this area. We test in a single framework for convergence effects, and for the main drivers of energy use including the impact of economic growth, income levels, the interaction of growth and income, climate, centrally planned status, and resource endowments. The interaction between income growth and its level allows us to test the hypothesis that energy use per capita and growth decouple at higher income levels.

Results

Our key results are that over the last 40 years the growth of energy use has been primarily driven by economic growth and convergence effects. Once convergence is taken into account there is no sign of decoupling of growth in income and energy use with higher incomes. We find that resource endowments, as well as climate and centrally planned status are all also significant in shaping the dynamics of per capita energy use.

Conclusions

Apparent decoupling between economic growth and energy use in some developed countries may instead be due to convergence effects. This needs to be taken into account in projections and forecasts of future energy use.