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BOOK REVIEW PERSPECTIVES

Horace Herring & Steve Sorrell (Eds.), *Energy Efficiency and Sustainable Consumption: The Rebound Effect*

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Most so-called lists of "ten easy things" that one can do to reduce greenhouse-gas emissions usually start with changing a light bulb from incandescent to compact fluorescent, an adjustment that saves both energy and money. A no-brainer, right? Well, not necessarily. Studies indicate that people tend to increase their energy use when they switch to more efficient lighting, thus partially attenuating the energy-efficiency gains. The same reaction applies to other activities: fuel efficiency in cars promotes more driving or shifting to heavier models and fuel efficiency in home-heating systems induces people to raise the indoor temperature.

A similar phenomenon takes place in the industrial sector, and economists have known about it since the early days of the Industrial Revolution. In 1865, the British economist William Stanley Jevons articulated what has since come to be known as "Jevons' Paradox" originally based on a study of the impact of the steam engine and electricity use in industry on the demand for coal. The phenomenon was restated by contemporary economists Khazzoom and Brooks, and others, based mostly on modeling. The explanation goes something like this: improvements in energy efficiency of so-called general purpose technologies (technologies with many potential applications, such as steam engines, electric lighting, or computers) lead to proportionally greater economic growth and then to subsequent increases in the overall demand for energy. This perverse outcome is attributable to the fact that technological changes reduce the energy cost of producing useful work and lead to changes in industrial processes in multiple sectors, methods of industrial organization, further technological innovations, and more affordable industrial and consumer products. Extrapolating Jevons' observations to today's consumer society, these productivity increases tend to lead to greater energy demand and, over time, emergence of expectations of greater comfort and luxury in everyday life, as well as to the invention and marketing of increasingly sophisticated (and energy intensive), yet affordable, consumer products.

If Jevons' Paradox, better known as the rebound effect (RE)—the partial negation of energy-efficiency gains—or the backfire effect (absolute increase in energy consumption) are indeed significant, their implications for current policy making with respect to energy and climate-change mitigation are profound. The ongoing debate is framed by four general approaches: a shift to renewable energy sources, an emphasis on conservation through energy efficiency, an effort to reduce demand, and an embrace of end-of-pipe technological fixes such as carbon capture and storage. Of these alternatives, energy efficiency appears to offer the easiest and least risky way forward and is therefore of great interest to politicians and policy makers. A significant rebound effect could weaken the efficacy of this option.

Given the importance of understanding the rebound effect within the context of the energy and climate debate, there has been a remarkable paucity of research to elucidate the mechanism by which it occurs in the present economy, and its magnitude. I therefore welcomed the new book on the subject entitled *Energy Efficiency and Sustainable Consumption: The Rebound Effect* co-edited by Horace Herring & Steve Sorrell. This brief volume, despite the multiplicity of contributors, is written with consistent clarity and provides a logical evolution of ideas from specific to more abstract. It defines and clarifies concepts, and provides both raw empirical data and useful interpretation. All of the "economic" chapters can be read at two levels. Economists and econometricians doing quantitative research in this area can delve into the details of the studies described here and form their own opinions about the methods, data sources, and analytic tools. For non-economist readers like me, these chapters provide the essentials: a literature review, explanation of the nature of the argument, quantitative data, and a critical commentary on the uncertainties.

Part I of the book covers direct rebound effects among consumers, focusing largely on fuel efficiency

in cars and home-heating units. A review of several studies carried out in the United States estimates the RE to be relatively small—between 10 and 30%—and declining inversely to household income. This finding provides support for policies that encourage energy-efficiency improvements in dedicated consumer technologies (although one very recent German study that is included in the book comes up with about 60% RE for automobile-fuel efficiency). It was at this juncture that I wish that the authors had included another type of indirect rebound effect—one that in the book is relegated to Part III: the case when consumers save time (not money) by outsourcing certain activities to more efficient agents (for instance lawn-mowing services that can afford to use more energy-efficient equipment than individual home owners). But the energy savings would be attenuated (or wiped out altogether) if the leisure time so created were spent on energy-intensive activities (e.g., air travel). This is an important point because it could undermine the enthusiasm that exists in some circles for a product-to-service shift as ecologically desirable.

Part II of the book, focusing on industry, makes an argument that energy-efficiency improvements in general purpose technologies are an important driver (or, according to two contributors, the principal driver) of economic growth and thus increased demand. The effect *can* be studied, quantified, and modeled, although its value will always vary among studies, owing to the complexity of the phenomenon and the sensitivity of models to assumptions, data sources, metrics, analytic boundaries, and economic sectors under study. Unfortunately, most of the debate is based on modeling rather than on empirical data. A handful of modeling studies estimates the RE to be 40% or more, with half of these studies predicting a backfire, especially when energy efficiency also involves decreased capital and labor costs to industry.

It becomes quite clear at this point in the book that climate and ecological sustainability polices based primarily on pursuing energy efficiency in industrial processes and consumer products will not deliver the hoped-for reductions in overall energy use, while leading to increased consumption of materials, water, and other ecologically sensitive inputs. It may even backfire in the long run. So what would be a wise course of action by national governments and global institutions? This question is addressed in Part III. There are incremental steps that policy makers can take to counteract the direct RE among consumers, such as shifting fee structures (calculating insurance premiums based on miles traveled and allowing negative feedbacks (e.g., traffic jams and parking frustrations) to control unwanted behaviors such as the increased use of fuel-efficient cars).

But when it comes to addressing the economy-wide RE, the response must be more structural. We need to transition to an economic system that channels the energy-efficiency gains into increased prosperity and decreased ecological damage without promoting economic growth. One of the book's contributors, Jørgen Nørgard, articulates it best: "A more valid approach would be to give first priority to beginning the long-term economic, social and psychological transition towards a steady state [economy]," meaning "a steady state stock of material artifacts needs to be maintained with a minimal throughput of resources…and then along the way gradually implement more energy efficient technologies." In other words, it is time to acknowledge the elephant under the rug: the economic growth paradigm.

Nørgard, along with Donella and Denis Meadows, may have been one of the first to question the economic growth paradigm from an ecological perspective (the above quote comes from a 1974 publication by Nørgard), but it is only now that these ideas are gaining serious traction. Peter Victor's seminal 2008 book *Managing without Growth* and Tim Jackson's 2009 report and book *Prosperity Without Growth* (the works of these authors, to my surprise, are not cited in this volume), shows, based on Victor's conventional economic modeling for Canada, that it is possible to achieve a steady-state economy without causing major social dislocations.

But how do we get there from here? It is on this question that *Energy Efficiency and Sustainable Consumption* stumbles. It brings together some of the familiar ideas such as: replacing conventional measures of gross domestic product with broader measures of social progress, such as the Genuine Progress Indicator and the Happy Planet Index, as well as adopting social policies that encourage people to trade some working hours and income for more leisure time (of course, hoping that the additional leisure time is not spent on international travel or more car driving). Apparently, many Danes have embraced the income-for-time tradeoff. But much more fundamental structural changes will be needed to avoid potentially disastrous consequences of steady state-oriented policies, Herring warns, including major reforms in current monetary policies. And it is not clear from what direction the power for change will come. After dismissing voluntary simplicity and related social movements as being of minor significance, Herring leaves open the question of the role of collective bottom-up social action.

The major accomplishment of this book is to bring together in a single volume three threads of thinking, analysis, and activism that until now have

rarely crossed: macro and micro economic analysis, discussions of the economic growth paradigm, and work on consumption. Further analysis and debate is left for others to continue. The time is right. During the past half-dozen years, a small, but prolific, group of European and North American researchers has contributed greatly to our understanding of the cultural, political, and economic context and social practices associated with consumption, and these ideas are diffusing into contemporary policy debates. The growth paradigm is being questioned by mainstream thinkers.

Three things are clear to me after reading this book. First, a steady-state economy, combined with energy efficiency and renewable energy technologies, is necessary. Second, the change will be gradual and driven by multiple drivers: social movements that will reframe understanding of the good life, social polices oriented toward reduced working hours, policy-driven changes in economic structures and dominant technologies, a crisis or two, inspired leadership, and some good luck to boot. Third, some societies provide a more favorable climate for the shift than others. People will adopt the income-for-time tradeoffs only when they feel prosperous and secure. Perhaps the rich, safe, and very equitable Danish society will be the first one to seriously try the steady state-oriented policies. I have little hope for this happening any time soon in the United States, where members of the middle class increasingly scramble to earn enough to provide college education for their children, pay for healthcare costs not covered by insurance policies, and save money for possible unemployment and uncertain retirement.

About the Author

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