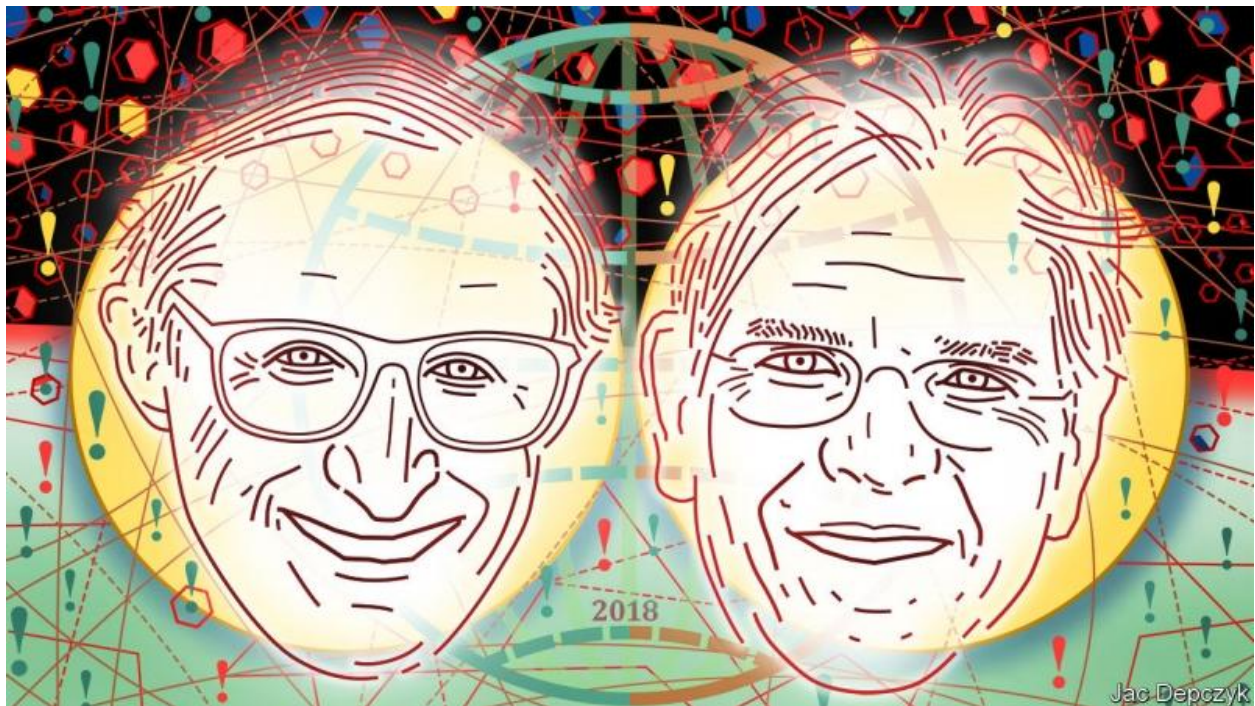


**The Economist**

## **Paul Romer and William Nordhaus win the economics Nobel**

*Both have studied the causes and consequences of growth*



WHY do economies grow, and why might growth outstrip the natural world's capacity to sustain it? There are few more important questions in economics. The answers require a working grasp of the mechanisms underlying growth. For the progress that the profession has made towards that understanding, it owes a particular debt to Paul Romer and William Nordhaus, this year's winners of the Nobel prize in economic sciences.

Although both scholars have long been talked of as potential winners, they are not an obvious pairing for the prize. Mr Romer tends to be described as a growth theorist; Mr Nordhaus's work is in the field of environmental economics. The Sveriges Riksbank, which awards the economics Nobel, found a common thread in their work incorporating two crucial processes—knowledge creation and climate change, respectively—into models of economic growth. But what most links their work is that they have improved the way the profession thinks about impossibly complex systems, while also revealing the extent of its ignorance.

The influence of both men extends beyond their most noted scholarly achievements. Mr Romer's career has been especially varied. He left academia in the early 2000s to found an educational-software company. More recently he served as the World Bank's chief economist (his tenure ended abruptly when staffers bridled at his management style, which included an insistence on more crisply written reports). But it is his analysis of economic growth that has had the greatest impact.

Economists used to think that sustained long-run growth depended on technological progress, which in turn relied on the creation of new ideas. They struggled, however, to explain convincingly how markets generated and propagated those ideas. When Mr Romer came into economics, most prominent models of growth relied on “exogenous” technological progress: it was simply assumed, rather than generated by the models’ equations.

Dissatisfied by this state of affairs, he sought answers by probing the non-rivalrous nature of knowledge: the fact that ideas, once created, can be endlessly exploited. The firms or individuals that come up with new ideas can only ever capture a small share of the benefits arising from them; before long, competitors copy the original brainwave and whittle away innovators’ profits. In Mr Romer’s work, markets are capable of generating new ideas. But the pace at which they are generated, and the way in which they are translated into growth, depends on other factors—such as state support for research and development, or the protection of intellectual property.

The “endogenous” growth models produced by Mr Romer, and by others influenced by him, were once hailed as a critical step towards understanding patterns of economic growth across the globe. They have not quite fulfilled that promise: knowledge may be necessary for growth, but it is clearly not sufficient. But their shortcomings have themselves raised important questions about the stubborn disparities in growth rates. Why are some countries able to exploit existing ideas and grow, while others are not? Should policymakers who want to boost growth focus on policies that support the creation of knowledge or on those that break down barriers to the exploitation of existing knowledge? Or does it make most sense to shift people and resources from the parts of the world that struggle to grow to those that do not? By provoking such questions, Mr Romer’s work identified a rich vein for other researchers to mine.

Mr Nordhaus, for his part, has been a towering figure in the debate about how to respond to one of the biggest challenges that humanity faces. When he was beginning his career in the early 1970s, awareness of the dangers of environmental damage and the threat posed by climate change was just starting to grow. Understanding the economic costs such damage imposes is essential to answering the question of how much society should be willing to pay to avert it.

Mr Nordhaus applied himself to solving this problem. That meant working out the complex interactions between carbon emissions, global temperature and economic growth. He combined mathematical descriptions of both climate and economic activity into “integrated assessment models”. This allowed him to project how different trajectories for the world’s carbon emissions would produce different global temperatures. That, in turn, allowed him to estimate the likely costs of these different scenarios—and thus what level of reduction in emissions would be economically optimal. He was the first to suggest that warming should be limited to no more than 2°C higher than the world’s pre-industrial temperature. Models like his have become the linchpin of most analysis of the cost of climate change.

### **The known world**

As with Mr Romer’s work, Mr Nordhaus’s contributions are also notable for the lessons imparted by their shortcomings. Four decades after he began publishing research on climate change, the limits to scholars’ predictive abilities have become abundantly clear. Indeed, his work has prompted vigorous debate about how best to think through the huge uncertainties associated with global warming—from how emissions translate into higher temperatures to how well society can adapt to rapid changes in climate.

Policymakers prefer the comfort of hard numbers. But the often-unfathomable complexity of human society and natural processes may mean that other guides are sometimes needed to set policy, from the precautionary principle to moral reasoning. Ironically, Mr Nordhaus’s computations, like those of Mr Romer, made that awareness possible.

Above all, both of this year's prize-winners tackled problems that the field both could not understand and could not afford not to understand. They blazed trails that scholars continue to follow—to the benefit of economics and humanity.

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