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THE ROYAL SWEDISH ACADEMY OF SCIENCES

The Royal Swedish Academy of Sciences has decided to award the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2021 with one half to **David Card** "for his empirical contributions to labour economics" and the other half jointly to **Joshua D. Angrist** and **Guido W. Imbens** "for their methodological contributions to the analysis of causal relationships".

# The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2021



## Finding ways to answer important questions

This year's Laureates have shown how natural experiments can be used to answer questions of societal importance, such as how minimum wages and immigration affect the labour market. They have also clarified exactly which conclusions about cause and effect can be drawn from such experiments. Together, they have revolutionised empirical research in the economic sciences.

Many important questions in the social sciences deal with cause and effect. How does immigration affect wages and employment? How does a longer education influence someone's future income? These questions are difficult to answer, because we do not have anything to compare with: we do not know what would have happened with lower levels of immigration or if that person had not gone to university.

The standard scientific method – conducting randomised controlled trials with test subjects – is not feasible here. For example, to find out how the length of education affects future income, we cannot conduct an experiment in which some young people are allowed to go to high school and others not. So how should we investigate issues of major importance to society?

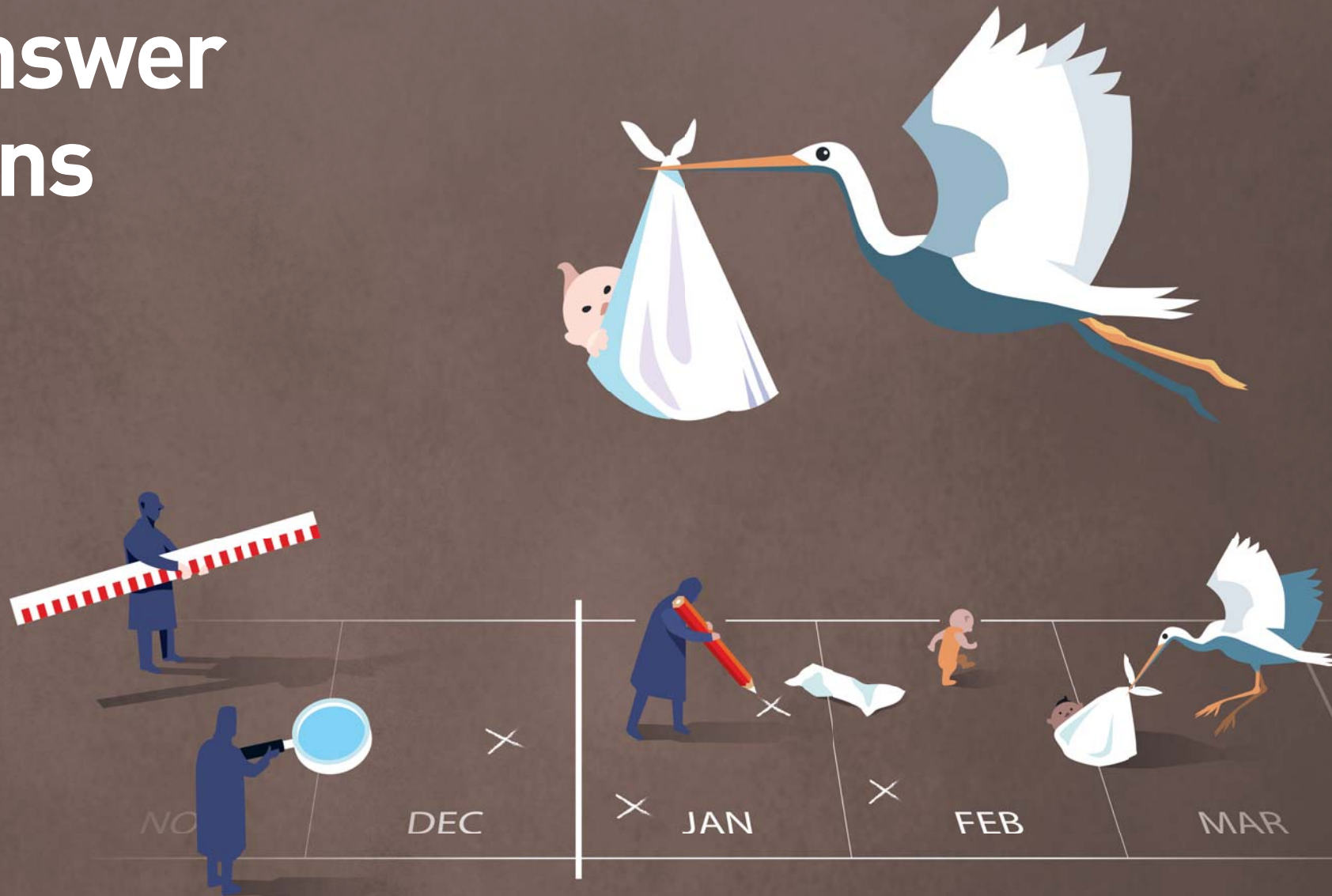
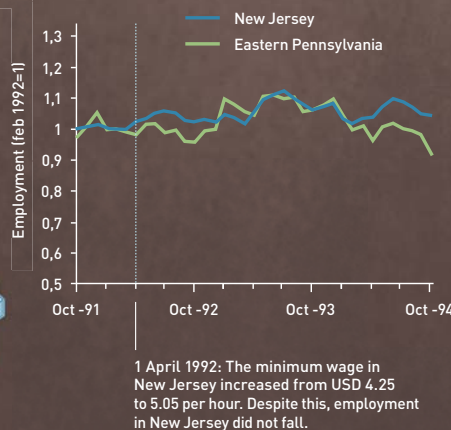
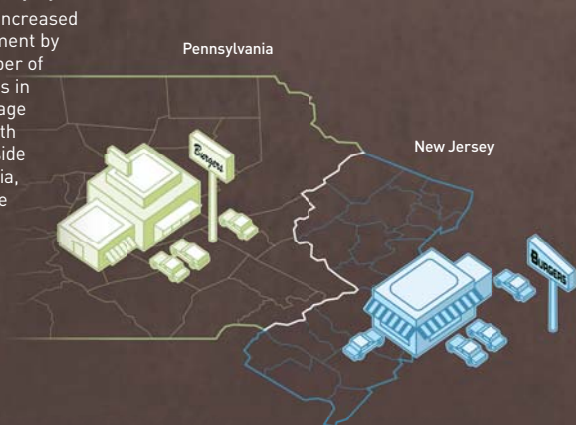
The Laureates' answer was to look for natural experiments – unintentional experiments that occur in the real world. It soon turned out that the world is full of natural experiments. In pioneering work from the early 1990s, **David Card** analysed how minimum wages, immigration and education affect wages and employment. The results challenged conventional wisdom – Card

was able to show, among other things, that an increased minimum wage does not necessarily lead to fewer jobs. These studies were followed by new analyses, which led to additional insights. We now know that the incomes of people who were born in a country can benefit from new immigration, while people who immigrated at an earlier time risk being negatively affected. We have also realised that resources in schools are far more important in students' later labour market success than was previously thought.

Data from a natural experiment can be difficult to interpret. For example, extending compulsory schooling by one year for a group of students will not affect all of them in the same way. Some would have continued studying anyway, and the value of education for them is often not representative of the entire group. Is it even possible to estimate the effect of an extra year in school? In the mid-1990s, **Joshua Angrist** and **Guido Imbens** demonstrated that a well-defined causal effect can be estimated, even when you cannot control who is subject to a particular intervention. This effect is called the local average treatment effect, LATE.

### The effects of minimum wages on employment

The researchers investigated how increased minimum wages affected employment by comparing the change in the number of employees at fast-food restaurants in New Jersey, where the minimum wage was increased (treatment group), with the equivalent change on the other side of the border, in eastern Pennsylvania, where the minimum wage stayed the same (control group).



### A natural school experiment

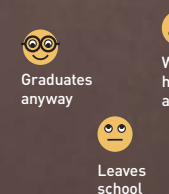
Chance decides whether a child is born just before or after midnight on New Year's Eve, but the person born on 31 December starts school a year earlier than the person born on 1 January. This could mean that some children went to school as normal, while others were taught from home due to the coronavirus pandemic. Random differences in birthdates can potentially be used to answer questions about children's learning and how education affects future outcomes.

### Cause and effect in natural experiments

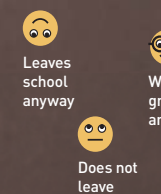
A researcher wants to investigate how graduating from high school affects future income. In the US, students have a legal right to leave school when they reach a certain age, so students who were born early in the year can drop out before graduating, while those who were born later in the year cannot. The problem is that the researcher does not know which individuals use their right to leave school before graduating.

The people who were affected by the natural experiment are those who left before graduating because of the rule, but who would have continued if that rule did not exist.

Born early in the year  
Has the right to leave  
before graduation



Born late in the year  
No right to leave  
before graduation



### David Card

Born 1956 in Canada.  
Professor at  
University of California,  
Berkeley, USA.

### Joshua D. Angrist

Born 1960 in the  
USA. Professor at  
Massachusetts  
Institute of Technology,  
Cambridge, USA.

### Guido W. Imbens

Born 1963 in the  
Netherlands.  
Professor at Stanford  
University, USA.



Photo: Portrait of David Card: Genevieve Shiffar; Portrait of Guido Imbens: Elena Zhukova; Portrait of Joshua Angrist: Lillie Paquette

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More information about the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2021 is available at [www.kva.se/prizeeconomicsscience2021](http://www.kva.se/prizeeconomicsscience2021) and [www.nobelprize.org](http://www.nobelprize.org), with video and detailed information about the Prize and the Laureates.

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