Can recessions produce career criminals?
Editorial

Understanding the world requires the untangling of cause and effect in complex economic and social relationships. At the Centre for Economic Performance (CEP) and in much of modern applied economics, that effort typically relies on a set of powerful econometric tools. In a new book called Mastering Metrics, CEP’s Steve Pischke and his co-author Josh Angrist of MIT explain the benefits of these techniques—both in scholarly work and a wide range of applications in business and public policy.

One example of their use is in explorations of how the business cycle influences people’s lives. A series of studies, many by CEP economists, has demonstrated the scarring effects of recessions on individuals’ job prospects, earnings potential and overall life satisfaction. Our cover story in this CentrePiece detects a disturbing additional impact: young people who join the labour market in times of economic downturn are more likely to engage in crime and to end up as career criminals.

This issue also features research on key drivers of business performance. Alex Bryson and colleagues find that firms with happier staff enjoy improved profitability. Guy Michaels and Georg Graft show that although industrial robots boost productivity and demand for high skills, they may be a threat to low and middle skilled workers. And Raffaela Sadun and colleagues reveal that professional chief executives work considerably longer hours than the owner managers of family businesses and that this is associated with significant differences in corporate performance.

Elsewhere, CEP produced a series of background briefings on what we expected to be some of the key policy battlegrounds in May’s UK General Election campaign. As it turned out, the public debate was mainly concerned with the coalition partners that might form the next government. Only in the election’s aftermath are important substantive issues being discussed and our overviews provide the research evidence on many of them, including productivity, housing, regional policy, climate change and the country’s relationship with the European Union.

Finally, CEP is pleased to be involved in two new ventures: the Centre for Vocational Education Research and the What Works Centre for Wellbeing. And the Economic and Social Research Council, which has supported the Centre financially since its inception in 1990, has recently committed to another five years. As CEP’s director John Van Reenen responded to this good news, we will continue to pursue world class research with the aim of both understanding and changing the world.

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Crime scars: can recessions produce career criminals?

Recessions typically lead to an increase in youth unemployment rates, leaving young people to face more difficulties in finding jobs. Concerns about the long-term impact on young people arise when youth unemployment rates are very high. One prominent example is the current policy debate about the Great Recession’s ‘lost generation’ – single, jobless and often still living with their parents. We know, for example, that unemployment at young ages can have persistent negative effects on future wages (Oreopoulos et al, 2012) and career progression (Oyer, 2008).

Our research shows that recessions have a more disturbing and substantial impact in that they initiate and form a higher proportion of criminal careers: young people who leave school during recessions are significantly more likely to become involved in crime than those who leave school while labour markets are more buoyant.

So why is it that young people who join the labour market during recessions are more likely to engage in crime? Those who leave school during a recession, when youth unemployment rates are particularly high, struggle to find a job and do not yet have financial insurance. Hence, following the notion from Gary Becker’s seminal work on criminal choices (Becker, 1968), low expectations on returns to legitimate activity (in terms of both job quality and wages) may lead to initial involvement in crime and subsequently to a first encounter with the criminal justice system.

Knock-on effects can then lead to criminal careers for the young. On the one hand, those who initially get involved in criminal activity learn the ‘criminal know-how’ (Mocan et al, 2005). On the other hand, those who have criminal records early on in their career may reduce their
job opportunities and expected returns in the legitimate labour market (Baert and Verhofstadt, 2015).

There is a substantial body of criminological evidence that illustrates the importance of young people’s experiences for our understanding of crime. In particular, research has established a strong age-crime pattern with crime rates typically peaking during the late teenage years. Yet crime is not only a feature of the teenage years – crime rates decrease with age but do not disappear subsequently. This suggests that there is an initial effect but criminal activity is somewhat persistent over the lifecycle.

Can that persistence be explained by the long-term impact of recessions? A typical recession leads to an unemployment rate that is five percentage points higher than normal. What is the long-term impact of leaving school in such economic conditions? Our empirical analysis of the link between crime and unemployment at labour market entry is based on a variety of US and UK cohort and individual-level data sources.

We analyse cohort-level data for both countries to estimate the average effect of initial labour market conditions on the criminal activity of cohorts that enter the labour market at different points in time, taking account of differences in cohort composition.

For the United States, we use data on arrest rates from the FBI Uniform Crime Reports and the Current Population Survey. We find that the average arrest rate for a cohort entering the labour market during a recession is 10.2% higher than for an otherwise similar cohort entering a more buoyant labour market.

For the UK, we use data on conviction rates from the Offenders Index Database and the Police National Computer. We find that the average conviction rate for a cohort entering the labour market during a recession is 4% higher than for an otherwise similar cohort.

Moreover, when we add subsequent unemployment rates over the cohort’s lifecycle to the analysis, we find that what matters is indeed the unemployment rate at the time of labour market entry. This finding contributes to understanding a puzzle thrown up by previous research where the overall link between crime and unemployment appears to be relatively weak. Our findings suggest that the key impact of unemployment on crime is the early experience of unemployment rather than the average unemployment experienced over the cohort’s lifecycle.

**Knock-on effects of early unemployment can lead to criminal careers for the young**

**Figure 1:**
Entry unemployment effects by experience, United States

![Graph showing entry unemployment effects by experience in the United States.](image)

**Note:** The chart shows the estimated coefficients and 95% confidence intervals when we allow the coefficient on initial unemployment to vary by years of potential experience. Years of potential experience are years since labour market entry.

How should we understand these results? Our results refer to the effect on the average cohort arrest and conviction rates. Presumably, a large share of individuals in a cohort never get involved in crime, independent of initial labour market conditions. A much smaller share is actually at the margin of becoming criminal, and in that respect, there are the individuals affected by economic conditions when first entering the labour market. The average effect is a combination of the effects for both groups, which implies that the effect on young people at the threshold of criminal activity may be even more substantial than the average effect suggests.

Studying individual-level data adds to that picture. Using data from the US Decennial Census and the American Community Survey, we find that entering the labour market during a recession increases the probability of being incarcerated at some point over the next two decades by 5.5% in the United States.
Using data on self-reported arrests from the British Crime Survey and taking account of an extensive set of individual characteristics such as family background, education and geographical location, we find that entering the labour market during a recession is associated with a 5.7% increase in the probability of ever being arrested in life.

In both cases, the effects are even stronger for young people who leave education early and are less qualified for the labour market. This confirms the notion of the average effect being a conservative estimate.

What about the persistence of the effect of recessions and the forming of criminal careers? Figures 1 and 2 show the estimated effects by year since labour market entry for the United States and the UK. Albeit slightly decreasing, the effect of entering the labour market during a recession is indeed persistent, with the initial unemployment effect pushing some young people towards a criminal career, implying sizeable and long-lasting effects.

Our results have important implications that contribute to the current policy debate about the long-term impact of recessions on young people. We demonstrate a disconcerting long-run effect of economic downturns. Recessions not only lead to short-term negative outcomes in the labour market but can produce career criminals. This suggests the need for an increased focus on policies that help young people get a step on the employment ladder and keep them out of trouble.

We find robust evidence of an initially strong and eventually long-lasting detrimental effect of entering the labour market during a recession for individuals at the threshold of criminal activity. These effects are economically substantial and potentially more disturbing than short-run effects.


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Further reading


The key impact of unemployment on crime comes from being out of work early in life.

Figure 2:
Entry unemployment effects by experience, UK

Note: The chart shows the estimated coefficients and 95% confidence intervals when we allow the coefficient on initial unemployment to vary by years of potential experience. Years of potential experience are years since labour market entry.
Might family-owned, family-run firms be a serious obstacle to productivity growth in Europe? Oriana Bandiera, Andrea Prat and Raffaella Sadun have collected time use data on over 1,000 chief executive officers to explore differences in the hours worked by family and professional managers – and the impact on their firms’ performance.

Family business: management effort and firm performance

The exceptional economic success of many European countries in the post-war period was characterised by the dominant presence of family firms across the continent. In countries like Germany and Italy, family ownership came to be seen as the best guarantee of economic and social development. But the consensus that family firms are good for growth has come under scrutiny in recent years.

Indeed, an emerging body of evidence indicates that family management is actually detrimental for performance (Bloom and Van Reenen, 2007). One study estimates a 4% profitability loss for Danish firms due to having a family manager rather than a professional manager (Bennedsen et al, 2007). Another finds that family firms have worse executive selection because they prefer to hire a less qualified family manager rather than an external professional manager: this accounts for a 6% productivity loss relative to conglomerate-owned firms (Lippi and Schivardi, 2014).

So what does economic theory say about whether firms should be led by their owners or by professional managers? The argument in favour of owners is that they have more ‘skin in the game’: as the residual claimants of income generated by the business, they should be highly motivated to succeed, other things equal. The argument against is that other things are not equal. In particular, owners are typically wealthier because they own the firm, and might therefore demand or reward themselves more leisure than professional managers.

Given the ubiquity of family firms, understanding which of these effects prevails has important implications for aggregate income and growth. Our research investigates this issue by conducting a time use analysis of around 1,100 chief executive officers (CEOs) in six developed and developing economies: Brazil, France, Germany, India, the UK and the United States. About 41% of the CEOs in our sample are family CEOs; 16% are professional (non-family affiliated) CEOs working in family firms; and the rest are professional CEOs running non-family-owned businesses.

Our methodology builds on the ethnographic studies conducted by management guru Henry Mintzberg in the 1970s, which we extend to cover large and random samples of managers. Every day of a randomly selected week, we record every activity the CEOs undertake through daily interviews with them or their assistants. This allows us to estimate the total number of hours worked by the CEOs by adding up the duration of all the activities undertaken during the survey week.

Using this bottom-up measure of CEOs’ labour supply, we find that family CEOs dedicate systematically fewer hours to work activities compared with professional CEOs (see Figure 1). The difference – at least 9% of total hours worked – is due to two factors: family CEOs start work later in the day; and they are more likely to interrupt their day to devote time to personal activities.

Our results suggest that the fewer hours of work put in by family CEOs are driven by differences in their taste for
leisure versus work, rather than by systematic ‘technological’ differences between family- and non-family-owned firms. This conclusion is supported by two sets of findings.

First, observable differences in the characteristics of individuals and organisations explain very little of the difference in hours worked between family and professional CEOs. For example, it might be argued that the former can afford to work fewer hours because they can delegate their responsibilities to other family members more easily. But differences in the number of family members in management explain only a small part of the difference in hours worked. What’s more, professional CEOs in family-owned firms work just as hard as their colleagues in non-family-owned organisations, which rules out any suggestion that family firms simply require less work.

Second, we show that the difference between family and professional CEOs depends on the ‘opportunity cost’ of

The difference in CEOs’ hours in India is larger on rainy days or during a big cricket match
leisure. For example, family CEOs working in larger firms and more competitive industries – where the opportunity cost of CEO leisure is higher because slacking off would presumably have serious negative implications for the firm – work as many hours as professional managers.

Symmetrically, family CEOs respond more strongly to exogenous ‘shocks’ that increase the marginal cost of their work effort. We show this using data from India, the largest country in our sample, where we can use two proxies for shocks to the cost of providing effort common to all CEOs: instances of extreme monsoon rainfall; and the broadcasting of Indian Premier League (IPL) cricket matches.

During India’s monsoon season, severe rains and floods often cause traffic jams and make it particularly costly to go to work; while the IPL is a popular sporting event that draws superstar players and the eyes of an enthusiastic nation. Our results depict a consistent picture: the difference in hours worked between family and professional CEOs is significantly larger on days when torrential rains hit the region in which the CEO is located. It is also larger on days when IPL matches are broadcast.

The fact that family CEOs seem to value leisure more than professional managers is consistent with the idea that the former are typically wealthier. In support of this, we find that the difference between family and professional CEOs is larger in countries where more permissive hereditary laws favour a concentration of wealth in the hands of the individuals due to inherit control of the family business. But the difference between family and professional managers is unaffected by other country characteristics, such as the level of development, rule of law and trust, which may inhibit firms’ ability to nominate a hard-working non-family manager.

How do differences in hours worked between family and non-family CEOs relate to differences in firms’ performance and that of the aggregate economy? To address this question, we study the correlation between CEO hours worked and different metrics of firm performance measured in the years in which the CEOs in our sample were in office. We find that longer hours worked by CEOs correlate strongly with firm performance, across a wide range of metrics: productivity, profitability and sales growth.

This implies that systematic differences in hours worked between family and non-family CEOs may well have large economic implications (though unfortunately, the nature of our analysis does not allow us to estimate the causal effect of CEO hours worked on performance). For example, the difference in hours worked corresponds to a 2.6% productivity difference between family and professional CEOs. Given the ubiquity of family-run firms, differences in CEO hours worked may add up to a lot – in reduced profits, slower growth and lagging wages, all of which flow into the wider economy.

Overall, our findings provide novel evidence on a fundamental difference in behaviour between family and professional CEOs. This difference can be easily reconciled with the predictions of standard economic models of labour supply in the presence of wealth differentials across individuals.

Our findings also raise a question for public finance: would an increase in taxation that affects the owners of family firms bring about an increase in productive efficiency? Such taxation might include an inheritance tax, a wealth tax or a reduction in the various forms of exemptions that family firms enjoy in many parts of the world.

This article summarises ‘Managing the Family Firm: Evidence from CEOs at Work’ by Oriana Bandiera, Andrea Prat and Raffaella Sadun, CEP Discussion Paper No. 1250 (http://cep.lse.ac.uk/pubs/download/dp1250.pdf).

Oriana Bandiera is professor of economics at LSE. Andrea Prat is professor of economics at Columbia University. Raffaella Sadun is associate professor of business administration at Harvard Business School and a research associate in CEP’s productivity and innovation programme.

Further reading


in brief...

American Idol: 65 years of admiration

Every year for over half a century, the US opinion pollsters Gallup have asked Americans to say which person they most admire. Alan Manning and Amar Shanghavi consider what their answers reveal about how public attitudes have and have not changed since the late 1940s.

Almost every December since 1948, Gallup has conducted an opinion poll in which it puts this question to Americans: ‘what man/woman that you have heard or read about, living in any part of the world, do you admire most?’ The winner is very rarely a surprise: the male competition is almost always won by the US president and the female competition has been won by Hillary Rodham Clinton for 15 of the past 17 years.

But the winning share of the vote is often low. For example, in 2013, Barack Obama won with 16% of the vote and Hillary Rodham Clinton won with 15%. Not only are votes widely spread, but about a quarter of respondents say they don’t know or vote for no one.

It has not always been like this, as our analysis of 65 years of data reveals. Events cause large variations from year to year and most presidencies start with a high vote share and end with a low one. George W Bush won with 38% in 2001 after 9/11, while Barack Obama won with 30% in 2008. But through this ‘noise’, we can also observe long-term trends in the type of people admired. And because this is probably the longest consistently asked question in opinion polling, this gives us an insight into the ways that society is changing.

One very marked change is that women have grown in prominence in the eyes of respondents. Where the most admired woman once tended to be the wife of the president (think Jackie Kennedy), it is now someone who is famous in their own right. And the fraction of people saying that they don’t know which woman they admire or that they admire none has fallen over time, perhaps reflecting the fact that women have come to play more active roles in society.

But in the admiration of men, perhaps the most striking fact is that the 1950s and the 2000s are very similar in the types of responses given. In both periods, about 35% of respondents named a politician, 25% named no one or said that they did not know, 10% named a religious leader and 8% named a family member or friend. Business people and celebrities are rarely mentioned, which seems to suggest that, perhaps contrary to expectation, Americans have not become more obsessed with money and celebrities.

But between the 1950s and about 1980, there was a dramatic fall in the admiration of politicians and a rise in the proportion of people who said that they did not admire anyone. From 1980 to the early 2000s, there was a recovery in the admiration of politicians, but since 2000, we are again in a period when admiration of politicians is falling and the admiration of no one is rising.

What do we learn from this? We provide evidence that admiration of politicians is linked to trust in government, and admiration of no one is linked to distrust of people in general. It is probably not a surprise to learn that politicians are not greatly admired at the moment, but it is not so clear why given that today’s admiration levels are only slightly above those recorded in the dark days of the Vietnam War and Watergate.

The data also support concerns that the general level of trust in people is on a downward trend – a problem since other research suggests that both society and the economy work better when trust is high. All in all, a fascinating insight into how attitudes have and have not changed over 65 years.

This article summarises ‘American Idol – 65 Years of Admiration’ by Alan Manning and Amar Shanghavi, CEP Discussion Paper No 1320 (http://cep.lse.ac.uk/pubs/download/dp1320.pdf).

Alan Manning is professor of economics at LSE and director of CEP’s community research programme. Amar Shanghavi was a doctoral student at LSE and is now based in Tanzania.
in brief...
Phone home: should mobiles be banned in schools?

Should teenagers be allowed to use their mobile phones at school? Louis-Philippe Beland and Richard Murphy look at the impact of bans on pupils’ academic achievement in four cities in England.

Mobile phones can have a negative impact on pupils’ educational outcomes
Teenagers depend on their mobile phones for keeping in touch with friends and trends on social media, but should they be allowed to have them in school? Some advocate a complete ban because of the potential for distraction, while others promote the use of phones as a teaching tool in the classroom. While views remain divided, some schools are starting to allow restricted use of mobile phones. Earlier this year, for example, Bill de Blasio, the mayor of New York City, lifted a 10-year-ban on phones on school premises, arguing that revoking the ban would lead to reduced inequality.

Our research examines the impact of mobile phone bans on pupils’ academic achievement in subsequent years. We surveyed schools in Birmingham, Leicester, London and Manchester about their mobile phone policies since 2001 and combined it with results data from externally marked national exams.

Schools in England have complete autonomy regarding their mobile phone policy, which has resulted in large differences in timing of the introduction of bans. In 2001, none of the surveyed schools had a ban in place; by 2007, half of them had bans; and by 2012, 98% of schools did not allow phones on the premises (or required them to be handed in at the beginning of the day).

This variation facilitated our study. We used the differences in implementation dates across schools, comparing the changes in pupils’ test scores within and across schools before and after a ban. In addition, we drew on administrative data to give us information on pupil characteristics, such as gender, eligibility for free school meals, special education needs status and prior educational attainment. This allowed us to calculate the impact on pupils from each of these groups.

Our research shows that not only does pupil achievement improve as a result of a ban, but also that low-achieving and low-income pupils gain the most. The impact of banning phones for these pupils is equivalent to an additional hour a week in school or to increasing the school year by five days. This suggests that Mayor de Blasio’s stated intention of reducing inequalities by lifting the ban may have the exact opposite result, harming the lowest achieving and lowest income pupils the most.

We also find that the bans have a greater impact on special education needs pupils and those eligible for free school meals. But banning mobile phones has no discernible effect on high achievers. Examining the impact of the phone ban on the achievement of 14 year olds, we find no significant effect in either direction. This could be due to relatively low phone use among this age group.

Technological advancements are commonly viewed as increasing productivity. Modern technology is increasingly used in the classroom with the goal of engaging pupils and improving performance. But our review of previous research in this area suggests that the unstructured use of technology in the classroom has negligible to negative impacts on pupil achievement. Mobile phones are an example of the drawbacks of technological progress because they can lead to pupils becoming distracted by gaining access to texting, games, social media and the internet.

Our work on the positive effect of restricting mobile phones on school premises complements our review of existing research evaluating technological innovations in the classroom. We find that pupils in schools that ban mobile phones see an increase in test scores equivalent to extending the school week by one hour. In comparison with extending teaching time, the financial resources required to implement a phone ban would be substantially lower. Of course, our findings do not discount the possibility that mobile phones (and other forms of technology) could be useful in schools if their use is properly structured, but their presence should not be ignored.

This article summarises ‘Ill Communication: Technology, Distraction and Student Performance’ by Louis-Philippe Beland and Richard Murphy, CEP Discussion Paper No. 1350 (http://cep.lse.ac.uk/pubs/download/dpt1350.pdf).

Louis-Philippe Beland is at Louisiana State University. Richard Murphy is assistant professor of economics at the University of Texas at Austin and a research associate in CEP’s education and skills programme.
EMPLOYEE OF THE MONTH

JANUARY

FEBRUARY

MARCH

APRIL

MAY

JUNE

JULY

AUGUST

SEPTEMBER

OCTOBER

NOVEMBER

DECEMBER
Robots may seem dangerous not only to cinema action heroes but also to the average manufacturing worker. To assess whether such concerns are well founded, Guy Michaels and Georg Graetz analyse the labour market effects of industrial robots, which have been widely adopted in the past 25 years.

Robots at work: the impact on productivity and jobs

Robots’ capacity for autonomous movement and their ability to perform an expanding set of tasks have captured writers’ imaginations for almost a century. Recently, robots have emerged from the pages of science fiction novels into the real world, and discussions of their possible economic effects have become ubiquitous (see, for example, The Economist, 2014; and Brynjolfsson and McAfee, 2014). But a serious problem inhibits these discussions: to date, there has been no systematic empirical analysis of the economic effects that robots are already having.

Our research begins to remedy this problem. We have compiled a new dataset spanning 14 industries (mainly manufacturing industries, but also agriculture and utilities) in 17 developed countries (including Australia, European countries, South Korea and the United States). Uniquely, our dataset includes a measure of the industrial robots employed in each industry in each of these countries, and how it has changed between 1993 and 2007. We obtain information on workers’ hours and other economic indicators from the EU KLEMS database (Timmer et al, 2007).

We find that industrial robots increase labour productivity, total factor productivity and wages. At the same time, while industrial robots have no significant effect on total hours worked (as we explain below), there is some evidence that they reduce the employment of low-skilled workers and, to a lesser extent, middle-skilled workers.

What exactly are these industrial robots? Our data come from the International Federation of Robotics, which considers a machine as an industrial robot if it can be programmed to perform physical, production-related tasks without the need of a human controller. (The technical definition refers to a ‘manipulating industrial robot as defined by ISO 8373: An automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications’.)

Industrial robots dramatically increase the scope for replacing human labour compared with older types of machines, since they reduce the need for human intervention in automated processes. Typical applications of industrial robots include assembling, dispensing, handling, processing and welding – all of which are prevalent in manufacturing industries – as well as harvesting (in agriculture) and inspecting equipment and structures (common in power plants).
Rapid technological change reduced the prices of industrial robots (adjusted for changes in quality) by around 80% between 1993 and 2007. Unsurprisingly, the use of robots grew dramatically during this period: the ratio of the number of robots to hours worked increased on average by about 150%. The rise in robot use was particularly pronounced in Germany, Denmark and Italy; and the industries that increased robot use most rapidly were producers of transport equipment, chemicals and metals.

To estimate the impact of robots, we take advantage of variation across industries and countries and over time. A consistent picture emerges in which robots appear to raise productivity, without causing total hours to decline. This may seem surprising at first, but it is due to offsetting effects. Robots increase productivity, which means that fewer human hours are needed to produce a given output. But higher productivity also reduces production costs and output prices. This in turn increases the quantity demanded by consumers, and firms hire workers to meet this increased demand.

But could it be that higher productivity growth causes a larger increase in robot use, rather than the other way around? To address this and related concerns, and to shed further light on the effect of robots, we develop a novel measure of increased robot use – namely, workers’ ‘replaceability’ by robots. This is based on the tasks prevalent in industries before robots were widely employed.

Specifically, we match data on tasks performed by industrial robots today with data on similar tasks performed by US workers in 1980, before robots were used. We then compute the fraction of each industry’s working hours in 1980 accounted for by occupations that subsequently became prone to replacement. Our industry-level replaceability index strongly predicts increased robot use between 1993 and 2007.

When we use our index to capture differences in the increased use of robots, we again find that robots increased productivity, and we detect no significant effect on hours worked. As an important check on the validity of this exercise, we find no significant relationship between replaceability and productivity growth in the period before the adoption of robots.

We conservatively calculate that on average, the increased use of robots contributed about 0.37 percentage points to annual GDP growth, which accounts for more than one tenth of total GDP growth over this period. The contribution to labour productivity growth was about 0.36 percentage points, accounting for one sixth of productivity growth.

This makes robots’ contribution to the aggregate economy roughly on a par with previous important technologies, such as the railroads in the nineteenth century (Crafts, 2004) and the US highways in the twentieth century (Fernald, 1999). The effects are also comparable to the recent contributions of information and communication technologies (see, for example, O’Mahony and Timmer, 2009). But it is worth noting that robots make up just over 2% of capital, which is less than previous technological drivers of growth.

Our findings on the aggregate impact of robots are significant given recent concerns in macroeconomic research that the productivity gains from technology in general may have slowed down. Gordon (2012, 2014) expresses a particularly pessimistic view, and there are broader worries about ‘secular stagnation’ (Summers, 2014; and Krugman, 2014), although others remain more optimistic (Brynjolfsson and McAfee, 2014).

We expect that the beneficial effects of robots will extend into the future as new robot capabilities are developed, and service robots come of age. But our

While robots don’t significantly change total hours worked, they may be a threat to low- and middle-skilled workers...
findings do come with a note of caution: there is some evidence of diminishing marginal returns to robot use – ‘congestion effects’ – so they are not a panacea for growth.

Although we do not find evidence of a negative impact of robots on aggregate employment, we see a more nuanced picture when we break down employment (and the wage bill) by skill groups. Robots appear to reduce the hours and the wage bill shares of low-skilled workers and, to a lesser extent, those of middle-skilled workers.

At the same time, robots have no significant effect on the employment of high-skilled workers. This pattern differs from the effects that recent research finds for information and communication technologies, which seem to benefit high-skilled workers at the expense of middle-skilled workers (Autor, 2014; and Michaels et al, 2014).

In summary, we find that industrial robots make significant contributions to labour productivity and aggregate growth, and their use also increases wages and total factor productivity. While fears that robots destroy jobs at a large scale have not materialised, we find some evidence that robots reduce the employment of low- and middle-skilled workers.

Further reading


Georg Graetz is assistant professor of economics at Uppsala University
Guy Michaels is associate professor of economics at LSE. Both are research associates in CEP’s labour markets programme.


in brief...

Making a difference in education

Which policies and practices are working in UK schools – and which ones aren’t? A new book by Robert Cassen, Sandra McNally and Anna Vignoles surveys the research evidence, and argues that fewer policy initiatives should be introduced into the education system without proper evaluation.

David Cameron has said that the Conservatives will govern as a party of one nation. One way of achieving such an ambition would be to use schools as a means of closing the ‘social gap’ – the notable impact of family background on educational outcomes. If they really want to do that, research evidence indicates what the key priorities should be: better quality early years care; more support for reading and numeracy; and improved teaching.

Of course, these things cost money. But equally, there is little evidence that some of the programmes on which governments typically spend money are effective in narrowing the social gap. Governments of all persuasions tend to focus excessively on reforming the institutions of education, which can be costly and may not help the disadvantaged. For example, there is no good evidence that free schools will narrow the socio-economic gap in pupils’ academic achievement, and even Sweden’s experience (which inspired the policy) is not encouraging. One of the prime minister’s last pledges during the election campaign was to build 500 more free schools, but there is little evidence of the benefits.

‘It’s all political’ might be the rejoinder. It certainly is. There is a real political choice to be made: you can help disadvantaged children and families in ways that we know are effective; or you can bypass the evidence. Our book surveys the latest research findings about what is effective in UK education, and asks whether future policy will be guided by the evidence more than it often has been in the past.

One conclusion for which there is strong evidence is that early years interventions can be valuable in helping children to overcome the effects of a disadvantaged background – but these interventions have to be of high quality and they are likely to be expensive. The book also lists a number of effective parenting programmes that provide value for money and can help to improve educational outcomes. For example, parental involvement with schools can be effective, and is relatively inexpensive.

Research also shows that with appropriate programmes, the share of poor readers in a year group can be brought down to 1­1.5% from the current level of 10%. On average, each secondary school takes in around 18 11-year-olds who can’t read properly, half of them with a reading age of 7. Struggling readers commonly need individual support in primary school, which can be costly – but the costs later on of not learning to read considerably outweigh whatever needs to be spent to bring their reading up to standard. In this respect, the pupil premium, which provides additional funds for more disadvantaged pupils, may be helping some schools to do more. We know what to do, but overall we are still not doing it as consistently as we should.

Similarly with numeracy: mathematical ability can be improved with certain interventions, though more research would be helpful in consistently identifying which these are. In particular, we need long-run evaluations to assess the relative effectiveness of particular teaching approaches beyond their initial impact.

Perhaps the greatest mileage in educational investment, after the early years, lies in raising teacher quality, which empirical studies show to be very effective. This is partly a
Key priorities should be better quality early years care; more support for reading and numeracy; and improved teaching found that half of those inspected were ‘requiring improvement’ or ‘inadequate’. And to date, there has been little research on free schools or primary academies, although Department for Education data do not show them to be achieving more progress for pupils than local authority primaries. Research on their equivalents in Sweden finds only small positive effects.

If the government wants to reduce the social gap, then it would be wise to redirect educational spending initiatives towards changes that evidence suggests would bring about the greatest benefits. At the same time, our book argues that more benefits would be derived and fewer costs incurred (not least in terms of teachers’ time) if only properly evidenced and costed policy initiatives are undertaken.

Research suggests that who teaches you matters much more than the school that you attend. Yet a significant proportion of educational spending has gone on fostering academies and free schools. The academies formed up to 2008-09 have been evaluated and found to have had positive results, although improved outcomes were mostly confined to better-achieving pupils, with little or no benefit for lower achievers.

As yet, there is no comparable research on academies founded subsequently, but an Ofsted survey of 2012-13

Making a Difference in Education: What the Evidence Says by Robert Cassen, Sandra McNally and Anna Vignoles is published by Routledge.

Robert Cassen is emeritus professor at LSE’s Centre for Analysis of Social Exclusion. Sandra McNally is professor of economics at the University of Surrey, director of CEP’s education and skills programme and director of the new Centre for Vocational Education Research (CVER) at CEP. Anna Vignoles is professor of education at the University of Cambridge.
Does it pay for firms to invest in their staff’s wellbeing? In an analysis of data from the Workplace Employment Relations Survey, Alex Bryson, John Forth and Lucy Stokes find that UK employees’ job satisfaction is positively associated with workplace financial performance, labour productivity and the quality of output and service.

Happier workers, higher profits

Citizens’ wellbeing is rising to the top of the political agenda in many countries. The UK government, for example, recently announced a What Works Centre for Wellbeing (part of it based at the CEP) with initial funding of £3.5 million over three years to investigate the determinants of wellbeing and how to improve it. This follows government investments in wellbeing metrics developed and pioneered by the UK’s Office for National Statistics. Some argue that these metrics should be the basis for national accounts that provide an indication of how well the nation is doing, comparable to GDP estimates.

The idea that wellbeing should be a target for public policy has been promoted for some time by prominent economists, including CEP’s founder director Richard Layard (2011) and the Nobel laureates commissioned by the Sarkozy government in France (Stiglitz et al., 2009). Others are more sceptical and wonder whether it’s a good idea to try to measure wellbeing and, even if it is, whether it’s really appropriate or sensible for governments to try to intervene to improve wellbeing.

Psychologists, economists and others know a great deal about the determinants of individuals’ wellbeing, and a key element is what they do in their working lives. While one recent study finds that work is among the worst activities for people’s momentary happiness – just above being sick in bed, in fact (Bryson and MacKerron, 2013) – other studies indicate that much depends on what type of job a person does and how that job is designed by the employer.

Our review for the UK’s Department for Business, Innovation and Skills (BIS) shows that employers can improve staff wellbeing through improvements in job design. Employees’ wellbeing will rise where they have control over the pace and content of work tasks; where the demands placed on them are not excessive; where there is variety in their work; where there are opportunities for development; where supervisors are supportive; where pay and treatment is perceived as fair; and where the work environment is pleasant and safe.
But while one would expect all these to have beneficial effects on wellbeing, the key issue is not whether employers can improve employee wellbeing but why a lot of them don’t. This is where employers’ economic interests come into play. After all, if, as is commonly assumed in economics, firms are profit-maximisers, they will take account of the costs associated with any improvement in employee wellbeing.

Improving employee wellbeing may be a laudable goal for society as an end in itself. It may have welcome side effects too, including reductions in expenditure on health services. But employers are only likely to invest in employee wellbeing when there is a clear business case for doing so. That business case rests on the returns to the firm.

The economic theory linking improvements in employee wellbeing to improvements in firms’ bottom line is ambiguous as to the likely effects. Much depends on the firm’s production process, the types of workers it recruits, their ability to add value to the production process and the extent to which their productivity is affected by their wellbeing.

For example, a firm’s output may be highly dependent on talented senior executives whose performance can affect the strategic direction of the firm and the productivity of staff lower down the chain of command. It may therefore make sense to invest in employees’ wellbeing if this can be converted into motivation and effort.

It is less clear whether firms will want to invest in the wellbeing of employees who perform mundane routine tasks, perhaps add little value to the firm and are easily replaced by those recruited from the ranks of the unemployed. And even if a firm is willing to invest in staff wellbeing, there is no certainty that higher subjective wellbeing will translate into greater profitability at the level of the workplace or organisation. Why is this the case?

- First, it is essential to factor in the costs that an employer may have incurred to bring about the improvement in wellbeing.
- Second, many institutional and contextual factors may intervene, such that any improvements in performance dissipate, as may be the case where workers have little or no control over output, regardless of their wellbeing.
- Third, group dynamics come into play when considering relationships at a workplace or organisation level that are not considered when focusing on individual effects. For example, one set of workers’ wellbeing may be engineered at the expense of others’ thus nullifying any effect deriving from the ‘happier’ workers.

There is empirical evidence linking employees’ wellbeing to their individual performance. For example, greater subjective wellbeing feeds through to individuals’ performance in the labour market (Judge et al, 2001; Lyubminsky et al, 2005). There is also evidence of a causal link between increased wellbeing and improved worker productivity, at least in the setting of a laboratory experiment (Oswald et al, 2014). But the empirical evidence at the level of the workplace or organisation is more limited.

Perhaps the most compelling evidence of a link between performance and wellbeing that might convince employers comes from a survey of manufacturing in Finland, which finds that average workplace job satisfaction is independently associated with subsequent value-added per employee. A one point increase (on a six-point scale) in the average level of job satisfaction among workers at the plant increases the level of value-added per hour worked two years later by 3.6 percentage points. This estimate rises to nine percentage points when taking account of differences between establishments (Böcker and Ilmakunnas, 2012).

Our BIS report is the first study of the link between employee wellbeing and firm performance in the UK. Analysing the
Workplaces with rising employee job satisfaction also experience improvements in workplace performance

nationally representative 2004 and 2011 Workplace Employment Relations Surveys (WERS), we find that workplaces with rising employee job satisfaction also experience improvements in workplace performance, while deteriorating employee job satisfaction is detrimental to workplace performance. Employee job satisfaction is positively associated with workplace financial performance, labour productivity, the quality of output and service and an additive scale combining all three aspects of performance. And workplaces that see an improvement in non-pecuniary job satisfaction – whether measured in terms of the average level of employee satisfaction, an increase in the share who are ‘very satisfied’ or a reduction in the share who are ‘very dissatisfied’ – experience an improvement in performance.

Although we cannot state definitively that the link between increasing job satisfaction and improved workplace performance is causal, our findings are robust to tests for reverse causation – that is to say, we can demonstrate that better work performance does not lead to higher levels of wellbeing. They also persist within workplaces over time, so that we can discount the possibility that the results are driven by unobservable differences between workplaces. There is therefore a prima facie case for employers to consider investing in the wellbeing of their employees on the basis of the likely performance benefits.

The link that we find is specifically that between job satisfaction and workplace performance. It is not apparent for job-related affect (measured in terms of the amount of time feeling tense, depressed, worried, gloomy, uneasy or miserable), which is something of a puzzle deserving of further research. What we can say is that our analysis suggests no clear case for employers investing in improvements in these other aspects of employee wellbeing – although equally we find no clear disadvantage to doing so.

These are encouraging findings but the scope of the analysis has not allowed us to explore the processes that could be instrumental in forging the link between employee wellbeing and workplace performance. Further work is required to develop insights into how employers can facilitate the positive outcomes revealed in this study.


Alex Bryson of the National Institute of Economic and Social Research (NIESR) is a visiting research fellow in CEP's labour markets programme. John Forth and Lucy Stokes are at NIESR.

Further reading


in brief...

A Global Apollo Programme to tackle climate change

Leading thinkers across the worlds of science, public service and academia have launched a new global programme to combat climate change. Richard Layard outlines their proposal for big public investment in research that will dramatically reduce the costs of clean energy.

In the past, governments faced with existential threats to their country have called on their scientists and engineers to provide solutions. The same should be happening now with climate change. But incredibly, only 2% of the world’s budget for public research and development (R&D) goes on such efforts. Instead, we need a hugely expanded and internationally coordinated R&D effort – a Global Apollo Programme.

The objective is simple and its economic logic blindingly obvious. If clean energy can be made less costly to produce than energy from fossil fuel, then fossil fuel will simply stay in the ground. And the need is urgent. On present policies, the world’s temperature will reach 2°C above the pre-industrial level soon after 2035 and stay above that level for a few centuries. Eventually the whole Greenland ice cap will have melted, and the sea level will have risen by six metres.

Fortunately, governments around the world are beginning to realise the case for publicly funded research to stop this happening. After the June 2015 G7 meeting in Bavaria, the leaders declared:

‘We will work together and with other interested countries to raise the overall coordination and transparency of clean energy research, development and demonstration, highlighting the importance of renewable energy and other low-carbon technologies. We ask our Energy Ministers to take forward this initiative and report back to us in 2016.’

The Global Apollo Programme proposed by seven authors including myself is the obvious way to proceed. Like the Apollo moonshot programme, it is a 10-year programme with one clear goal.

Target

The target for the Programme is to reduce the costs of clean energy and to do so fast. Within 10 years, baseload electricity from wind or sun has to become less costly than electricity from coal throughout the world.

Is it feasible to achieve such a quick reduction in costs? There is an almost exact precedent in the history of semiconductors, the price of which has fallen steadily for 40 years. This is called Moore’s Law, but it did not happen by magic. It happened largely through a major pre-competitive programme of R&D, financed chiefly by governments. The whole effort has been coordinated by an International Technology Roadmap Committee consisting of the world’s leading countries and companies. Year by year, this committee has identified the bottlenecks to further price reduction, and commissioned research to unblock those obstacles.

Leading scientists including Martin Rees and business people including John Browne believe that the same could be done with energy from sun and wind. The price of silicon photovoltaic solar modules (which are semiconductors of a kind) is already falling rapidly (see Figure 1). But it needs to fall even further and faster, as do the costs of the remaining ‘balance of systems’.

Targets for reducing carbon emissions will be extremely difficult to deliver without low-cost clean energy
Figure 1:
How the price of silicon photovoltaic solar modules has fallen as installed capacity has risen.
Collective action can bring down the price of clean energy just as it brought down the price of semi-conductors.

Although solar power in many sunny areas and wind power in many windy areas are now competitive when they are in use, these energy sources are intermittent. They cannot currently provide a baseload 24-hour service. For sun and wind to be able to provide baseload 24-hour electricity, we need cheap methods of storing electricity and better ways of feeding intermittent electricity into the grid (using smart grids and better interconnectors). And to cut carbon emissions further, we need to be able to electrolyse all land transport, which means cheaper mobile storage of electricity.

These are scientific challenges. They will not be solved by doing more of the same. But they are problems – just like putting a man on the moon – that can be cracked if the effort is properly organised and financed. Hence the proposal for a 10-year Global Apollo Programme involving as many countries as possible.

Scale
At current prices, the Apollo moonshot cost $15 billion a year for 10 years. That amounts to 0.02% of today’s world GDP and provides an appropriate minimum scale for the Global Apollo Programme. It requires a more than doubling of the present level of effort.

So any government joining the consortium will pledge to spend an annual average of 0.02% of GDP as public expenditure on the Programme from 2016 to 2025. The money will be spent according to the country’s own discretion. The Programme has been discussed with governments worldwide over the past years and many of the world’s leading countries have expressed interest.

Roadmap Committee
Year by year, the Programme will produce a clear roadmap of the scientific breakthroughs required at each stage to maintain the pace of cost reduction. There will be a Commission consisting of one representative of each member country and a Roadmap Committee of around 20 senior technologists and business leaders who will construct and revise the roadmap year by year.

From that will emerge a set of coordinated plans to tackle the roadblocks. The programme will be co-located with the International Energy Agency (IEA) in Paris, but it will of course include many countries that do not belong to the IEA. All results discovered through the Programme will be made publicly available (though patentable intellectual property will be protected and will remain with those who made the discoveries).

Conclusion
This Programme is not the only thing that is needed: we need more energy efficiency, more nuclear power and taxes on carbon until fossil fuels finally disappear from use. But in terms of value for money, a Global Apollo Programme is an essential component of any serious attempt to manage the risks of climate change. Without it, targets of emissions reduction will be extremely difficult to deliver.

The Global Apollo Programme will contribute powerfully to a safer and better world at relatively low cost. It will reduce global warming, add to energy security and reduce the polluting effects of fossil fuels, which now kill millions of people. It may even generate sufficient savings in energy costs to cover its own costs completely. We hope that by the end of this year, all major countries will have decided to join.

This article summarises A Global Apollo Programme to Tackle Climate Change by David King, John Browne, Richard Layard, Gus O’Donnell, Martin Rees, Nicholas Stern and Adair Turner (http://cep.lse.ac.uk/pubs/download/special/Global_Apollo_Programme_Report.pdf).

Professor Lord Richard Layard is director of CEP’s research programme on wellbeing.
in brief...

Oil: the impact on women’s work

Are economies in which extractive industries are dominant naturally biased against women’s participation in the labour force? Not according to research by Stephan Maurer and Andrei Potlogea, which analyses data from the early twentieth century oil boom in the American South.

Across the world, there are big differences in the extent to which women are involved in the labour force compared with men. In 2005, for example, female labour force participation rates stood at 68% in the United States, 53% in Indonesia and less than 20% in Saudi Arabia (Olivetti, 2013). These differences have serious consequences: women enjoy substantial benefits when gainfully employed; and having more women in the labour force could have substantial growth implications. Understanding what influences different rates of female labour force participation is thus very important.

One potential explanation for the big differences is the presence of mineral resources (in particular oil) and the resulting economic structures that prevail in some countries. There are good reasons why the presence of a large oil sector might depress women’s labour market prospects. Labour markets often display some disparities by gender, with activities that involve sustained physical effort or risk (or are simply affected by gender prejudices) being heavily dominated by men (Ngai and Petrongolo, 2013; Alesina et al, 2013).

Oil extraction is one such sector, employing considerably more men than women, and the same is true for many closely linked industries. As a result, growth in the oil sector may lead to greater demand and thus more jobs and higher wages available for men.

In addition, higher male wages might discourage female partners from entering the labour market as a couple can more easily ‘make do’ with just one salary. Indeed, previous empirical research has uncovered a significant negative correlation between oil production and female labour market involvement (Ross, 2008). But is this relationship causal – and what are the mechanisms at play?

Oil-rich economies do not necessarily drive women out of the labour market

To address these questions, we have analysed the effects of local oil booms in the South-western United States between 1900 and 1940, using data collected by our CEP colleague Guy Michaels (2011). During this time, large oilfields were discovered in many counties in Texas, Louisiana, Oklahoma and adjacent states.

To estimate the effect of the resulting local oil booms on women’s labour market outcomes, we compare their evolution in counties with major oil deposits before and after these deposits were discovered with what happened in counties without oilfields. This ‘differences-in-differences’ strategy allows us to identify cleanly the effect of oil discoveries on our variables of interest. By focusing only on counties from one US region, we have the additional advantage of only comparing geographical units with similar legal frameworks and institutions, removing further sources of bias.

Perhaps surprisingly, we find no evidence of a negative effect of oil per se on women’s labour market prospects. Neither the female labour force participation rate nor the female employment rate change significantly in a county after the discovery of oil, and the same is true for the average numbers of hours that women work. What might explain this absence of an effect in spite of a boom in a male-biased industry? Our study finds two potential mechanisms.

First, the local boom that follows an oil discovery does not stop with oil extraction. The whole county starts to develop: as more workers are attracted, the population grows, becomes younger on average and increasingly moves to urban areas and out of agriculture. The oil industry supplies cheap oil and demands goods and services, which leads to growth in the manufacturing and service sectors.

The growth of services seems to be particularly consequential in this case, as the sector turns out to be an important employer of women. Thus, as men move from agriculture to work in oilfields and factories, women do not exit the labour force, but instead increasingly flock to newly created service jobs.
In fact, we find that the importance of the service sector for female workers grows by nearly as much as the importance of the oil sector grows for male workers. Thus, the initial growth induced by oil discoveries leads to further demand-side changes that are, if anything, female-biased and balance out, at least in part, the initial male-biased labour demand shock.

The second mechanism is that some of the absence of a labour force participation effect might be explained by wage adjustments. While women do not lose ground in terms of labour force participation, we do find that the gender pay gap widens substantially in oil-rich counties. Average wages for both men and women increase, but much more for the former. So while oil does not crowd women out of the labour market, it does seem to have a negative impact on their position in the earnings distribution.

Overall, our study shows that oil abundance by itself is unlikely to be an explanation for the big cross-country differences in female labour force participation. Even if the initial shock brought about by mineral resource discoveries is male-biased, if other sectors expand as a reaction to oil booms, women might not be driven out of the labour market at all.

The presence of sectors that indirectly benefit from oil discoveries and are open to women is thus a crucial determinant of whether the initial male-biased shock associated with an oil boom actually ends up hurting women's job prospects. But as our findings on wages show, this does not guarantee that women's relative position in the labour market will be left unchanged in the wake of major oil discoveries.

This article summarises ‘Fueling the Gender Gap? Oil and Women’s Labor and Marriage Market Outcomes’ by Stephan Maurer and Andrei Potlogea, CEP Discussion Paper No. 1280 (http://cep.lse.ac.uk/pubs/download/dp1280.pdf).

Stephan Maurer is a research assistant in CEP’s productivity and innovation programme. Andrei Potlogea is at the Universitat Pompeu Fabra in Barcelona.

Further reading


How should researchers interested in social and economic policy untangle cause and effect? A new book by Joshua Angrist and Jörn- Steffen Pischke shows how the five core econometric tools – randomised trials, regression, instrumental variables, regression discontinuity designs and differences-in-differences – accomplish this. These tools lie at the heart of CEP research.

The path from cause to effect: mastering ‘metrics
The most interesting economic and social research asks big questions about cause and effect. Does access to free health insurance (as with the UK’s NHS) make people healthier? Does going to a school or college with high achieving peers really make the kids who go there smarter? Should abusive domestic partners be referred to social services or simply arrested? Can loose monetary policy save shaky banks in a financial crisis?

Many obstacles litter the path from cause to effect, and the raw data often refuse to reveal the way to causal enlightenment. In a new book written primarily for undergraduate economics students (but also, we hope, for policymakers and an economically literate citizenry), we explain how masters of the ‘metrics trade uncover reliable evidence of causal connections.

We explain by example, with applications and case studies ripped from the headlines, and, in some cases, from our students’ lives. We first consider the causal effects of health insurance. Obamacare extended subsidised health insurance coverage to many low-income workers who would otherwise have been uninsured. This is costly but seems justified by a health dividend: a simple comparison of the insured and the uninsured reveals the insured to be much healthier than the uninsured.

Does the relative health of the insured indeed mean that policies like Obamacare improve health? Not necessarily. The case for causality gets weaker when we notice that Americans who have health insurance are richer and more educated than the uninsured. Maybe it’s those attributes, and not insurance itself, that are responsible for better health among the insured. Comparisons between the health of the insured and uninsured are not ceteris paribus – Latin for ‘other things equal’. Rather, such simple comparisons are contaminated by other differences, a problem known to social scientists as ‘selection bias’.

Scientists can engineer ceteris paribus conditions by running an experiment – called a randomised trial – where they vary only one thing at a time, like giving health insurance to some individuals but not to others. These experiments are much like the clinical trials that doctors have used to evaluate drugs and medical interventions since the middle of the twentieth century.

Although randomised trials are expensive and time-consuming, they have become an increasingly important tool in social science research. The power of an experiment comes from the fact that it separates the variable whose effects we’re interested in (say, insurance status) from the selection bias that plagues naïve comparisons of insured and uninsured (the fact that the insured are richer, more educated, etc.).

In this spirit, we explain and interpret results from two remarkable social experiments that randomised access to healthcare coverage in the United States: the RAND Health Insurance Experiment from the 1970s; and the recent Oregon Health Insurance Lottery, which extended state sponsored healthcare coverage to a random subset of low-income applicants. Both experiments reveal that those covered by more generous insurance use more costly healthcare. Yet the extra healthcare consumed by those randomly assigned to the insured group generates few dividends in terms of better health! Insurance helps the insured avoid financial catastrophe when they fall sick – but it doesn’t appear to make them healthier.

Experiments like these are expensive and slow to bear their research fruit. We therefore teach our readers to look to the experimental method as a benchmark while also explaining how masters of ‘metrics extract causal evidence from the data generated in the course of everyday life. Our book demonstrates the four most important ‘metrics tools employed in this effort: regression analysis; instrumental variables; regression discontinuity designs; and differences-in-differences.

Regression analysis attempts to eliminate selection bias by making like-for-like comparisons. Our regression example asks whether there’s an earnings payoff to spending upwards of $50,000 a year on private university tuition, as many young Americans do, rather than going to a cheaper state subsidised university (a choice that surely will become relevant for more and more Europeans in due course).

Students who attend relatively selective private universities are likely to have higher earnings for many reasons – they come from richer families, for example. This is the selection bias that plagues a simple comparison of students attending cheap and expensive universities. We use regression to show that the most important sources of selection bias here are the universities to which applicants are admitted. Conditional on where you could have gone, where you actually go (U Penn versus Penn State, say) matters little, at least as far as their subsequent wages go.

We next explore the use of instrumental variables, a remarkably flexible and powerful tool that is closely connected with randomised trials, but cheaper and more accessible! In research on questions where the variable of interest can’t be manipulated directly, we can instead randomise incentives to choose a particular treatment. In the Oregon Health Insurance Lottery, for example, the lucky winners were only 25 percentage points more likely to receive state sponsored insurance. Instrumental variables readily fix the problems in analysing data from such an experiment.

The real power of the instrumental variables method lies in its ability to harness many useful sources of naturally...
Modern econometrics offers powerful tools for analysing the relationships hidden in large and complex data sets

occurring variation. We use instrumental variables, for example, to ask whether kids who grow up in a larger family get less education as a result. Instrumental variables for family size can be constructed from randomly occurring twin births (sometimes the birth lottery generates a bonus!) and sibling sex composition (mothers of two boys or two girls are substantially more likely to have a third child). Because twinning and sibling sex composition are essentially randomly assigned, they’re unrelated to family background and other sources of selection bias.

Our fourth tool – the regression discontinuity design – compares people who are narrowly on opposite sides of a fateful policy cut-off. To illustrate, children who took the entrance exam for a selective school (like the 11 plus in English grammar schools) but just missed being accepted should be a good control group for those who obtained the minimum mark for admission. Applying this to prestigious ‘exam schools’ in New York and Boston reveals that those who missed the cut-off for these selective schools seem to learn no less than those who just scraped into the exam schools. This is an example of the ceteris paribus principle in action: find two groups of people who are distinguished by one key feature – in this case the type of school they attended, with ‘other things equal’.

Our last tool – differences-in-differences – compares trajectories over time instead of contrasting differences in levels at a point in time. We apply this to explore the topical question of whether it’s worth saving a teetering bank. Walter Bagehot, the editorial father of The Economist magazine, famously commented: ‘The cardinal maxim is, that any aid to a present bad Bank is the surest mode of preventing the establishment of a future good Bank.’ Was he right? This question lay at the heart of macroeconomic policy responses to the financial crisis of 2008.

Our ‘diffs-in-diffs’ chapter recounts research showing how during the Great Depression, the Atlanta-based district of the US Federal Reserve instituted a policy of lending to troubled banks, while the Fed’s St. Louis-based district restricted credit. These districts shared a border that split the state of Mississippi, creating a natural experiment, since other economic and policy conditions across this arbitrary boundary were similar. The diffs-in-diffs analysis reveals that the Atlanta Fed’s liquidity injections saved banks and improved its district’s economic trajectory, while the St. Louis Fed’s district sank more deeply into depression.

Our five econometric tools – which we call the Furious Five, inspired by the Kung Fu theme woven through the book – are central to causal analysis. We reveal their awesome power through interesting and relevant examples. We hope our readers will learn to wield these tools skilfully – first by reading the book, but mostly, as with all sophisticated tools, by a regimen of personal experimentation and practice. Diligent ‘metrics apprentices will reap rewards not just in scholarly work but also through a wide range of applications in business and public policy.


Joshua Angrist is the Ford Professor of Economics at MIT. Jörn-Steffen Pischke is professor of economics at LSE and a research associate in CEP’s programmes on labour markets and wellbeing.
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NEW BOOK
MAKING A DIFFERENCE IN EDUCATION
Robert Cassen, Sandra McNally and Anna Vignoles

This book discusses whether UK education policy has really been guided by the evidence, and explores why the failings of the educational system have been so resistant to change, as well as the success stories that have emerged. As a comprehensive research review, Making a Difference in Education should be essential reading for faculty and students in education and social policy, and of great interest to teachers and indeed to anyone who wants to know about the effectiveness of UK education policy and practice, and where they should be going.

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