

CentrePiece

The Magazine of The Centre for Economic Performance

Volume 26 Issue 3 Autumn 2021

Social mobility
NHS volunteers
Gender pay gaps

Coastal cities
Learning losses
Poland's economy

GREEN GROWTH



CentrePiece



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Editorial

Over the past 12 months, the Centre for Economic Performance (CEP) has been celebrating 30 years since its launch. In a series of anniversary lectures, the Centre's three successive directors have set out the evidence on some core themes in three decades of economic research. Richard Layard outlined the science of wellbeing; John Van Reenen focused on productivity, innovation and management practices; and Stephen Machin explored educational and labour market inequalities and their implications for social mobility – the extent to which young people's opportunities in life can transcend their background.

The text of the third lecture appears in this *CentrePiece*, alongside a summary of recent CEP work on how life chances in the UK are being further reduced by the significant amount of time in school that has been lost during the pandemic. Not only have there been unprecedented learning losses as a result of lockdown, but

they have also been unevenly spread by income groups and across the UK's four nations. Recovery programmes will need to be substantial and highly targeted to help disadvantaged youngsters who have missed out on more education than their more privileged peers.

Elsewhere in this issue, we report more positive news from Covid-19 times. One piece investigates why Poland has had a comparatively good economic performance in recent months, concluding that a policy of early and tight restrictions circumvented the painful trade-off between public health and the economy. Another looks at the NHS Volunteer Responders, a nationwide programme to support vulnerable people in the crisis: the authors find big increases in self-reported wellbeing among those who took part, with effects lasting long after the time spent volunteering had ended.

Finally, our cover story summarises one

of a series of publications to mark the 30th anniversary. Anna Valero reviews CEP insights on 'green growth' – the potential of innovation in 'clean' technologies to raise living standards while using fewer natural resources and cutting carbon emissions. Ahead of the United Nations climate change summit in Glasgow this autumn, the evidence indicates how environmental and industrial policies can deliver growth that is strong, sustainable and inclusive.

I have been editor of *CentrePiece* since 2004, a little over half of CEP's lifetime, and this is my 52nd and final issue. I am delighted to say that our communications manager, Helen Ward, will be taking over the role as the Centre heads into another promising decade of economic research and public engagement.

Romesh Vaitilingam, Editor
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Despite the higher susceptibility to floods and a growing climate crisis, more than 10% of the world's population lives in low-elevation coastal zones – and that share is increasing. **Guy Michaels** and colleagues present a detailed picture of housing in these areas – and how rising sea levels may reshape cities.

Rising sea levels and the future of coastal cities

Low-elevation coastal zones are home to more than 10% of the world's population – and that share is growing. But the attraction of these areas poses problems due to their susceptibility to floods, including from tropical storms, which affect many millions of people around the world every year.

The problem of flooding is acutely felt in the United States where expected annual losses from tropical storms alone are currently estimated at \$57 billion, of which a third is borne by taxpayers. To make matters worse, global sea levels are rising, with varying consequences for different coastal areas. The US Atlantic and Gulf coasts experienced some of the fastest local rates of sea level rise in the world during the 20th century. This trend is expected to

continue, increasing the frequency of flooding.

Against this backdrop, it is important to understand where housing construction in coastal areas is taking place. To investigate this, we have assembled a new dataset on the location of housing and flood risk across thousands of kilometres of coast, spanning major urban centres, small towns and rural areas on the US Atlantic and Gulf coasts.

The data, which cover two decades, are at a highly disaggregated spatial scale. They include information on housing from the census and land cover from satellite imagery, as well as measures of proneness to rising sea levels, flood damages and regulatory restrictions. These data allow us to explore construction in areas

Despite rising sea levels, US coasting housing was increasingly built in flood-prone locations during the 1990s and 2000s

where flood risks for residents and taxpayers are both high and rising, due to climate change.

We use these data to document how the existing housing stock and new construction vary by distance to the coast. The result is a novel and detailed picture of housing in coastal zones, and its relationship to the vulnerability of different locations to flooding and rising sea levels.

Our analysis also allows us to answer questions such as: Why does housing concentrate near, but not right at, the coast? Why are coastal cities asymmetric? Why is new housing increasingly built on flood-prone areas, which were previously avoided? And why does this happen especially on the urban fringes?

Finally, we study how rising sea levels may reshape cities, and consider implications for increasing costs of flooding and taxpayer subsidies, the economic decline of some neighbourhoods, and lengthening commutes.

We begin by documenting nine stylised facts, which we group into three broad take-away findings:

The shape of coastal locations in 1990

- First, housing unit density peaks near, but not right at the coast, and it declines more steeply on the coastal side.
- Second, coastal places are asymmetric:

their central business district (CBD) is closer to the coast side edge.

- Third, this asymmetry increases with city size.

What explains the shape of coastal locations?

- Fourth, census blocks that are prone to rising sea levels are much more sparsely built; but conditional on proneness, blocks closer to the coast are more densely built.
 - Fifth, proneness to rising sea levels rises steeply near the coast.
 - Sixth, damage from flooding also rises steeply as we approach the coast.
- Together, these stylised facts suggest a tension between the benefits of coastal proximity and the costs of proneness to flooding, which increases steeply near the coast.

Patterns of growth from 1990 to 2010

- Seventh, net new construction from 1990 to 2010 was more than twice as prevalent in locations prone to rising sea levels as in the 1990 stock of housing.
- Eighth, areas prone to rising sea levels were more likely to be developed in dense census tracts.
- Finally, in the densest census tracts, new construction focused on medium-risk areas prone to rising sea levels, while avoiding the riskiest ones.

We show that our nine stylised facts are robust to excluding census blocks that were mostly shielded from private residential construction because they are protected areas, military bases or parks. We also find evidence consistent with our stylised facts when we use data on built area, based on satellite imagery, that cover all construction rather than just housing data.

To account for the nine stylised facts, we develop a model of a monocentric coastal city. In the model, coastal areas are characterised by both an amenity, which declines linearly with the distance to the coast, and a 'disamenity' (flood-proneness), which declines convexly with the distance to the coast.

The city founder chooses a location that trades off these two factors – close to the coast, but not right at it. This location becomes the city's focal point – the CBD. Residents then choose where to live, and they prefer locations close to the CBD, both because of their high net amenity value and because of the shorter commute.

Housing density peaks around the CBD, but declines more steeply on the coast side, because of the convex flood-proneness. The city expands over time into previously empty areas on both sides. On the coast side, this expansion involves building on increasingly flood-prone land.

Taken together, our nine stylised facts and our model of a coastal city, which helps us to account for what we observe in the data, suggest that coastal cities face 'soft barriers' related to flood risk. Soft barriers are locations that are not used for housing development in most circumstances, but are nevertheless built on as cities expand. Construction on soft barriers – another example is construction in areas prone to wildfires – may involve risks not only to residents but also externalities (for example, for taxpayers or the environment), which may require policy intervention.

We extend our model in several ways, including to allow for sea level rise and government subsidies to flood-prone areas. We then simulate our model to explore challenges that low-elevation coastal cities may face in the coming decades. These simulations point to four potential concerns for low-elevation coastal cities.

New construction in flood-prone coastal areas has been concentrated around cities and not in rural areas



Climate change will make it expensive and difficult to sustain low-lying coastal communities



■ First, the problem of housing in flood-prone locations looks set to worsen. This could be because cities expand towards the coast, because of rising sea levels, or because both happen simultaneously. This development threatens to increase flooding costs for both residents and taxpayers.

■ Second, even if coastal cities grow on aggregate, some neighbourhoods within them may experience economic decline, as increased flood risk causes demand for housing to decline. This problem is exacerbated in the case of economically stagnant cities.

■ Third, rising sea levels further distort the shape of coastal cities, leading to them becoming increasingly 'misshapen' and significantly lengthening the time costs of commuting to work.

■ Finally, these cities face a potential crisis if their CBD comes under threat of being permanently submerged.

Various government policies could mitigate the problems we highlight, especially the rising exposure of taxpayers. First, governments could consider taxing new developments in flood-prone areas, if there are viable alternative uses to the land that are not taxed. The limiting case is an outright ban on extensive margin developments, although enacting and

enforcing such a ban might be difficult.

Second, governments could offer subsidies only to existing housing. One such policy is the UK government's Flood Re, which provides subsidised flood insurance only to 'grandfathered' housing, built before 2009.

Governments could also attach further conditions to their subsidies. These conditions could include stricter building standards, such as construction on stilts imposed by the US federal government when compensating the victims of Hurricane Sandy.

Alternatively, governments could restrict the number of times a given property is bailed out, or offer other incentives to move instead of rebuilding, as Canada has recently done.

With rising sea levels proceeding at pace, the costs to taxpayers of fixing neighbourhoods or even cities may at some point become prohibitive. An example of how far things have deteriorated in another part of the world can be seen in Indonesia, where the government is investing heavily in moving its capital from flood-prone Jakarta.

Ultimately, of course, slowing down climate change and rising sea levels could also reduce the costs, especially those associated with large-scale urban moves. This remains a central policy challenge.

This article summarises 'Cities and the Sea Level' by Yatang Lin, Thomas McDermott and Guy Michaels, CEP Discussion Paper No. 1758 (<https://cep.lse.ac.uk/pubs/download/dp1758.pdf>).

Yatang Lin is at the Hong Kong University of Science and Technology. **Thomas McDermott** is at the National University of Ireland Galway. **Guy Michaels** is an associate professor at LSE and director of CEP's research programme on labour markets.

In the third and final anniversary lecture marking 30 years since CEP began, director **Stephen Machin** focused on social mobility – the extent to which young people’s opportunities in life can transcend their family background. He sets out what can be done to address the multitude of economic and social problems that make it more difficult for disadvantaged younger generations to ‘move on up’.

Move on up

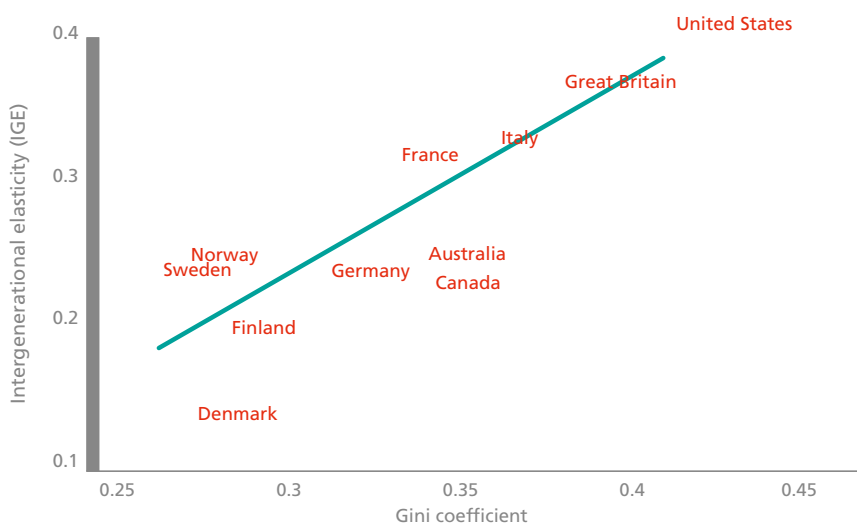


In international terms, social mobility is relatively low in Britain. People's earnings are more closely tied to their parents' earnings in Britain than they are in Scandinavia or countries like Australia, Canada and France. The same is true of an array of other economic and social outcomes, including education, social class, home ownership and wealth.

Higher income inequality corresponds to lower social mobility. So, in more unequal countries, there is reduced social mobility. The Great Gatsby curve, which displays a strongly negative association between inequality and intergenerational mobility, makes this very clear.

People's earnings are more closely tied to their parents' earnings in Britain than in many other countries

Figure 1:
The Great Gatsby curve



In Britain, relative social mobility has worsened over time. Using two well-known birth cohort studies, of individuals born in 1958 and 1970, it is possible to track people and their parents at various ages over time.

Evidence on how likely it is that people move between the different quintiles of the income distribution for cohort members and their parents shows that individuals from the 1970 cohort are less likely than those from the 1958 cohort to get to the top if they were born in the bottom fifth, and more likely to stay at the top if they were born in the top fifth.

In mainstream economics, the drivers of lower social mobility are higher earnings inequality, higher educational

inequality or both. The fall in mobility in Britain is a consequence of both.

The former arises due to rising inequality of earnings over the last 40 years. The latter arises because very rapid educational expansion – with increasing numbers of people staying on after the compulsory school leaving age, and many more going to university – was unequally distributed according to parents' incomes. People from richer backgrounds benefitted more in what we have referred to as an 'education arms race' (Elliot Major and Machin, 2018, 2020).

The last 15 years or so have seen these patterns compounded by very weak real wage growth in the labour market, so that

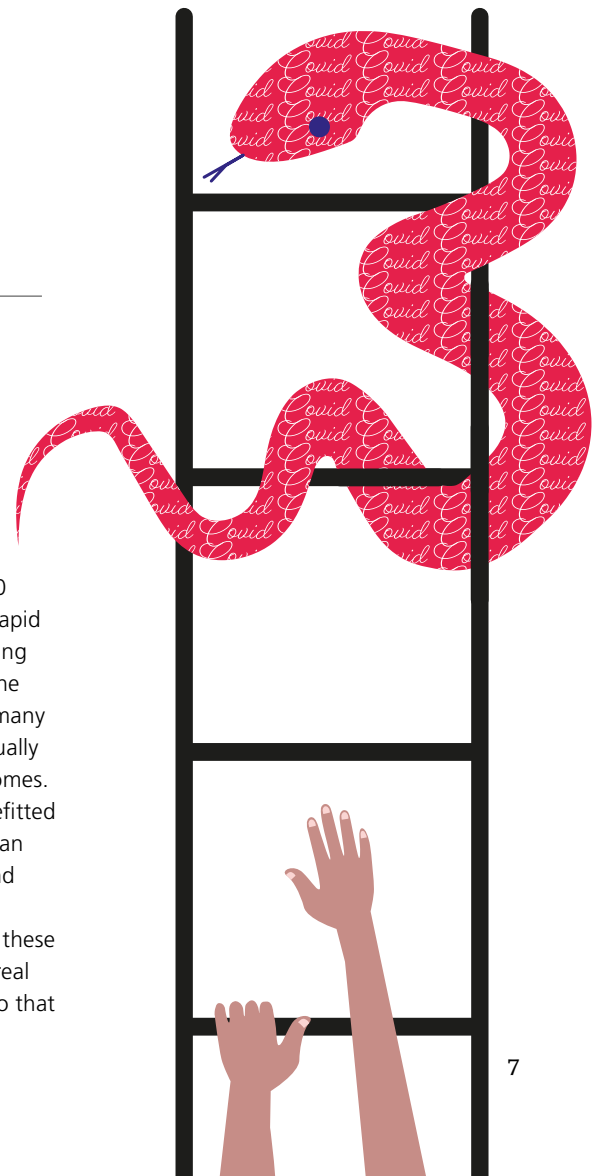
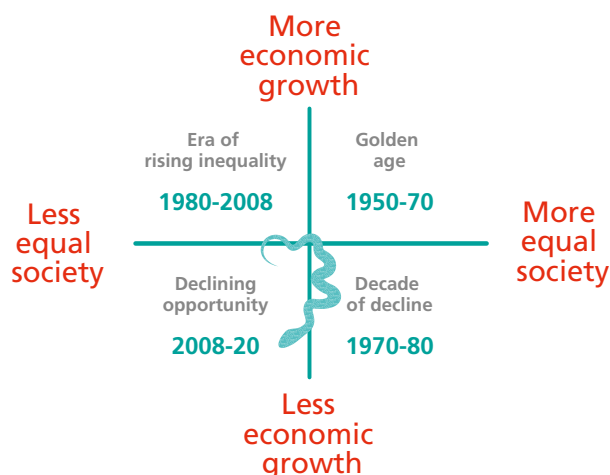


Figure 2:
The four ages of social mobility



it is not just relative social mobility that has fallen. Absolute social mobility has fallen too.

This is shown by benchmarking how people's labour market earnings have evolved compared to their parents at the same age. In 1995, around 60% of individuals were earning more than their parents at the same age (in real terms); by 2019, this had dropped to 45%. Absolute intergenerational mobility has therefore fallen as well as relative mobility because real wage growth has stagnated and fallen.

What can be done? More social mobility is possible – it exists in other places now, and it has been the case in Britain in the past. Countries that have got more egalitarian economic systems and more social mobility than Britain include Canada and Australia. Maybe we can learn some lessons from what goes on there?

The Scandinavian countries, even more so. They have much lower levels of inequality and consequently much higher levels of social mobility.

In Britain, since the Second World War, there have been four ages of social mobility. Back in the 1950s and 1960s, in the so-called golden age, social mobility did not fall and absolute mobility rose for everybody because real wage growth was rapid. Relative social mobility did not fall, if anything it probably improved from the limited evidence base we have. But since 1980, we have had both declining relative mobility and absolute mobility. This is shown in the four quadrants in Figure 2.

One of the things that the study of intergenerational persistence has taught us is that the failure to make change at relevant times stores up greater problems for the future. There are a multitude of relevant dimensions of this.

To begin with, social mobility is not only about education. It extends much further into aspects of economy and society. There are many ways a start can be made in trying to improve social mobility, if people are willing.

In our two books, Lee Elliot Major and I outline ABCD principles illustrating some aspects of what could be done:

- **Access:** Reforming education admissions and entry to work.
- **Behaviour:** Shifting away from a highly individualised 'winner-takes-all' culture and moving to more collective responsibility.
- **Community:** Not allowing places to be 'left behind' by restoring local prospects and pride.
- **Decent work:** With good jobs, career progression and an emphasis on key skills and vocational education.

Practical examples of the type of policies that could improve access include: lotteries for admission to oversubscribed schools and universities; rethinking the charitable status of private schools; and improving diversity and entry to elite professions.

To shift behaviour, we talk about things like the Law of Jante, which applies in Scandinavian countries, and that is about putting society before individualism. Wealth taxes, social responsibility, including issues to do with zero carbon and workers' rights in the workplace, are a few of the many relevant aspects here.

Higher income
inequality
corresponds
to lower social
mobility

Under community comes place-based policies and not being left behind as, for example, the coastal towns have been in Britain. We talk about opportunity areas that have been successful in some countries.

And then there is decent work, an important pillar of a progressive society. Issues here include higher minimum wages, vocational education and pathways, career progression, diversity in the workplace, tackling workplace discrimination, and the idea that having properly diverse workforces can actually raise productivity. We talk about lifelong learning, human capital tax credits, where government policy has been very skewed towards offering tax credits to physical capital and not to human capital, as it does in other countries.

Some of these very clear policy dimensions exist and already function well in other countries that have higher levels of social mobility. They either do not exist or do not function very well in Britain.

In the Covid-19 crisis, these issues have returned to the fore and become even more pressing. The twin drivers of low social mobility – labour market and educational inequalities – have increased during the crisis and, unless they can be mediated, they will reduce future social mobility for the affected generations of young people.

The crisis has featured labour market losses – through job loss, reduced hours or both – which have been unequally distributed. Labour market losses are bigger for young people, the self-employed who have taken a massive hit in terms of incomes under Covid-19, women, workers who were already on low wages and people from poorer families.

Unequal labour market losses that have reinforced already existing inequalities do not augur well for social mobility in future. Neither does the big inequality of learning losses for those in education that have occurred in the crisis.

The combination of not attending school, colleges and universities coupled with the provision of online education that is not as productive as education in 'usual' times has significantly affected learning. There have been very sizeable losses in learning time. These are unequally distributed by family background, being more pronounced for children from poorer families.

The combination of increased inequality from both labour market losses and

learning losses during the crisis has strong implications for social mobility. Scarring effects can arise from both of these. People losing their jobs will have a negative effect on their future income. Children's completed education when they leave the education system will be damaged by learning losses and may be compounded further by parental unemployment.

A commonly used metric of social mobility – the intergenerational elasticity – measures the correlation between parents' earnings and their children's earnings. In Britain, intergenerational elasticity was 0.377 from an estimate using the 1970 birth cohort in 2012. Lee Elliot Major, Andrew Eyles and I estimate that intergenerational elasticity will rise by around 11% to 0.420 because of labour market and education scarring effects of the pandemic. While some of the underlying assumptions can be debated in terms of the magnitude, this is an important result that generates real concerns about the social mobility prospects of the Covid generation.

More optimistically, it is worth remarking that the facts about social mobility need to be much better known and much more widely known than they currently are. Perhaps, if that could be facilitated, there would be an appetite to face up to and address the multitude of economic and social problems that have cumulatively built up, which make the social mobility prospects of future generations look bleak.

The incumbent economic and social model is simply not working to do this, and that has been true for a long time. Hence the reasons why inequality has gone up so massively in the last 40 years, hence the reasons why we have very dislocated situations in certain parts of the country, and government policy designs that have actually promoted and increased inequality and reduced mobility.

Economic shocks that persist from the recession that was induced by the global financial crisis, and from the austerity cuts that took place in 2010s, plus the effects of choosing to leave the European Union under the Brexit referendum, and Covid-19, have all magnified this. It has become all the more pressing that society acts, so that future generations have a better chance to 'move on up'.

Stephen Machin is professor of economics at LSE and director of CEP. This article is a version of his CEP 30th anniversary lecture, 'Move On Up'.

Further reading

Lee Elliot Major, Andrew Eyles and Stephen Machin (2021) 'Unequal Learning and Labour Market Losses in the Crisis: Consequences for Social Mobility', CEP Discussion Paper No. 1748 (<https://cep.lse.ac.uk/pubs/download/dp1748.pdf>).

Lee Elliot Major and Stephen Machin (2020) *What Do We Know and What Should We Do About Social Mobility?*, Sage Publications.

Lee Elliot Major and Stephen Machin (2018) *Social Mobility and its Enemies*, Penguin Books.

Labour market and educational inequalities have increased during the Covid-19 crisis – and these look likely to reduce future social mobility

Many countries have plans for a 'green recovery' from the pandemic. **Anna Valero** reviews 30 years of CEP research into how environmental and industrial policies can be combined to achieve economic growth that is strong, sustainable and inclusive.

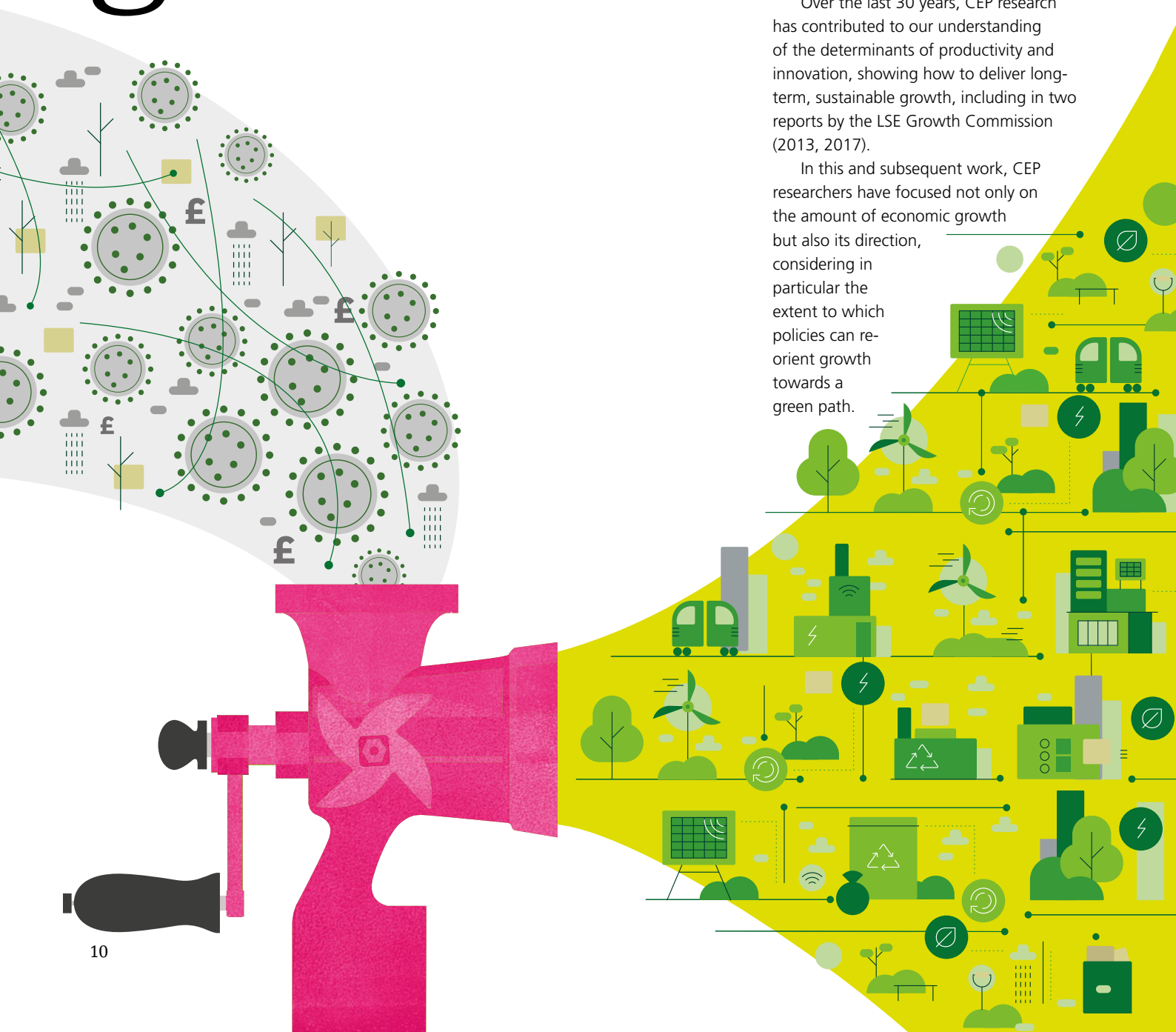
Green growth

Despite renewed international commitment, greenhouse gas emissions are reducing far too slowly to limit global warming to 'well below 2°C and preferably 1.5°C', as set out in the Paris Agreement. The Intergovernmental Panel on Climate Change has highlighted the immense dangers of going beyond 1.5°C and it is clear that action must now be accelerated to avoid catastrophic and irreversible damage.

This coming decade is critical, and choices made now on what investments to make in infrastructure, innovation and human, natural and social capital will decide whether the world is locked into systems that produce high carbon emissions or whether it re-orientates to follow a low-carbon growth path.

Over the last 30 years, CEP research has contributed to our understanding of the determinants of productivity and innovation, showing how to deliver long-term, sustainable growth, including in two reports by the LSE Growth Commission (2013, 2017).

In this and subsequent work, CEP researchers have focused not only on the amount of economic growth but also its direction, considering in particular the extent to which policies can re-orient growth towards a green path.



Net zero and the recovery from Covid-19

In 2019, the UK set itself a legal target of reaching net-zero greenhouse gas emissions by 2050, hoping that the economic opportunities of becoming a greener economy would also drive prosperity. Nine months later, Covid-19 struck, creating the biggest downturn for 300 years.

CEP researchers are helping to inform policies on a green recovery with a series of reports on sustainable growth produced with colleagues at the LSE's Grantham Research Institute, underpinned by a body of research on innovation and growth.

Early in the pandemic, a CEP report highlighted the strategy, investments and policies that would enable the UK to 'build back better' from Covid-19 (Stern et al, 2020). This was followed by a review of research on innovation, growth and the transition to net-zero emissions, which summarises the evidence on the opportunities, drivers and policies for innovation-led sustainable growth (Stern and Valero, 2021). A core message is that investment in 'clean' innovation and its diffusion will be key to tackling the climate crisis and to restoring inclusive and sustainable growth.

Creative destruction – with a purpose

Innovation is the key driver of long-run productivity growth. Innovative firms that introduce new products and processes drive growth via the Schumpeterian process of 'creative destruction', which propels economic change.

In a body of work stemming from the early 1990s, economists Philippe Aghion (a CEP associate) and Peter Howitt have built this concept into models of endogenous growth. In a recent book, Aghion and his co-authors set out the evolution of the related research, including that on the environment and 'directed technical change' – which considers how technical change can be oriented towards clean innovation (Aghion et al, 2021).

A key conclusion is that with the right type of clean innovation, we can improve living standards while using fewer natural resources and cutting emissions. But the right sort of innovation will not happen at the scale and pace required without incentives, regulation, government spending and pressure from civil society.

What's more, while some industries will be created and thrive, there will also be losers. Therefore, for growth to be inclusive, policies will be needed to support those people and places that suffer from the 'destruction' in the process.

CEP research has contributed to our understanding of how to raise the amount of innovation in the economy. This is summarised in a toolkit for policy-makers (Bloom et al, 2019), which rates the evidence and benefits for policy tools such as direct grants for research and development (R&D), skilled immigration and improving human capital.

Given the urgency of tackling the climate crisis, the presence of multiple market failures and path dependencies, there is also a strong case for 'mission-based' policies that influence the direction of innovation towards clean solutions.

When private markets fail to bring about the innovation needed to tackle the climate crisis, government intervention is needed. A key justification for government support for R&D in general is the existence of knowledge spillovers. These imply that even with an effective system of intellectual property rights, private firms may underinvest in R&D as they don't capture all the financial returns on their investments.

While individual firms may hesitate, those wider benefits support the case for government investment. In fact, CEP research has found that when it comes to clean technologies, knowledge spillovers tend to be higher than those generated by their 'dirty' counterparts (Dechezleprêtre et al, 2014).

Further market failures arise when innovative firms are unable to raise finance for their innovation. To date, investments

in early-stage clean technologies appear to have been generally viewed as more risky than the dirty alternatives that occupy established positions. On the diffusion side, analysis in emerging markets highlights how financial and managerial constraints hamper firms' ability to put in place clean technologies or practices (De Haas et al, 2021).

Path dependencies in how new technologies are produced, implemented and taken up also make it hard to shift from dirty to clean technologies and sustainable growth quickly without intervention from government.

This is a key insight from the research on endogenous and directed technical change (Acemoglu et al, 2012), including research providing empirical evidence from the car industry (Aghion et al, 2016), which demonstrates how policies can direct innovation towards clean technologies and production – the direction needed to avert environmental disaster and achieve sustainable growth.

That analysis concludes that the optimal policy consists of both a carbon tax to raise the costs of emissions and direct encouragement to develop clean technologies, such as subsidies for clean R&D.

Path dependency also implies that once clean technologies are sufficiently advanced, they will benefit from their own patterns of path dependence, and so policy incentives will no longer be required.

Another implication is that delay is costly: a longer transition phase means an extended period of slower growth.

Beyond government action on the 'supply side', other key forces shape the amount and direction of firm innovation – including on the 'demand side'. Firms are more likely to invest in innovation in areas where demand is large and growing; and product market competition also shapes firm innovation.

CEP research has also shown that firms invest in cleaner innovation when facing more environmentally motivated customers, and this effect is stronger when firms face tougher competition for their customers (Aghion et al, 2020). These findings suggest that public campaigns to promote citizens' environmental responsibility are likely to be an important policy lever for stimulating clean innovation in firms.

Choices made
now will decide
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a low-carbon
growth path

Informing innovation and industrial policy for a green recovery

The evidence suggests that clean growth is possible with the right policy frameworks. With global demand for clean products and technologies set to increase rapidly, countries that take early action in these areas may be able to reap significant growth benefits. A key question for policy-makers is how best to target investments and design policies to promote the development of a country or region's current and potential future competitive strengths.

CEP research identifies areas where UK innovation can generate growth while also tackling the major social challenges

of climate change and Covid-19 (Martin et al, 2020).

It first identifies areas where the UK has a 'revealed technological advantage' in innovation – that is, the UK's share of patents in a particular technology field is higher than the global share in that field.

Figure 1 shows that this is the case in clean energy, notably ocean and wind energy; in 'Covid core' technologies (vaccines and medical equipment); and in biotechnology and pharmaceuticals more broadly.

Understanding the potential economic effects of innovation support

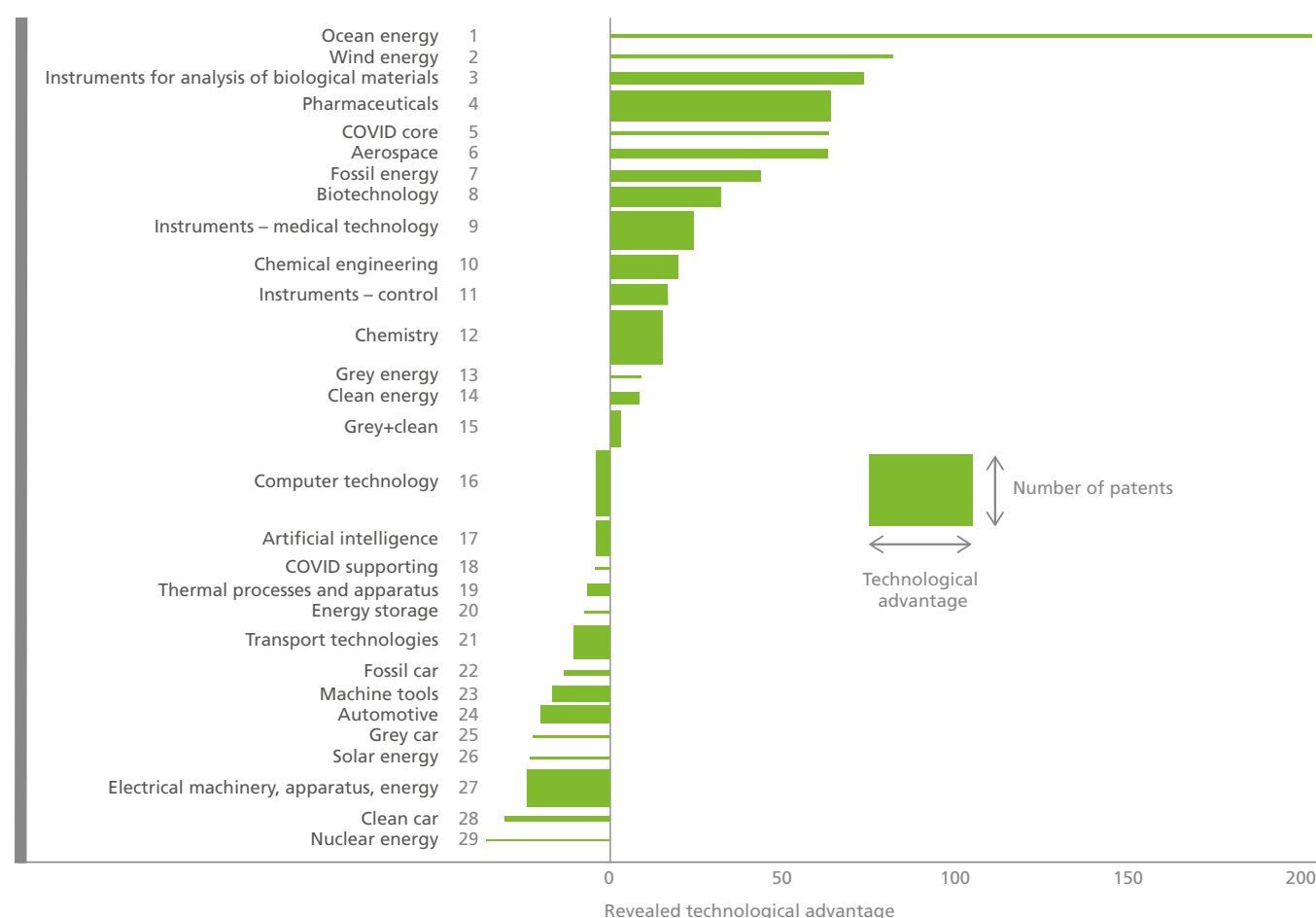
But while the UK might have relative

strengths in these areas, government support will not necessarily generate economic benefits. So the researchers set out a new methodology that estimates the national returns to public R&D subsidies for different types of technology.

This analysis demonstrates that public R&D investments in biotechnology, pharmaceuticals and 'Covid core' technologies can be expected to deliver among the highest returns of any technology area in the UK (see Figure 2). Ocean and wind energy technologies also generate relatively high returns.

Finally, the report shows that areas that specialise in Covid-related innovation tend also to be places where a large share of overall UK innovation occurs: including the

Figure 1:
UK 'revealed technological advantage' (RTA) in key areas of innovation



Note: The length of each bar on the horizontal axis shows the RTA; the width of each bar on the vertical axis reflects the number of patents in each category. RTA is defined as the share of UK's patents in a particular technology field relative to the global share of patents in that field. Analysis based on PATSTAT over the period 2005-2014.

Source: Martin et al (2020).

Delay is costly: a longer transition phase means an extended period of slower growth

'golden triangle' between London, Oxford and Cambridge, together with parts of Scotland. On the other hand, areas that specialise in clean technology are more spread out – and include the Midlands and the North of England.

Together, this evidence suggests that there could be a 'triple win' from support for clean innovations. A sustainable growth strategy could achieve net-zero emissions, improve productivity and contribute to levelling up.

What next?

Driving clean innovation in particular sectors is possible. A rich body of research identifies and analyses the key forces behind this. The challenge for researchers

is to build on these models to inform structural change across the economy in the face of large-scale uncertainty.

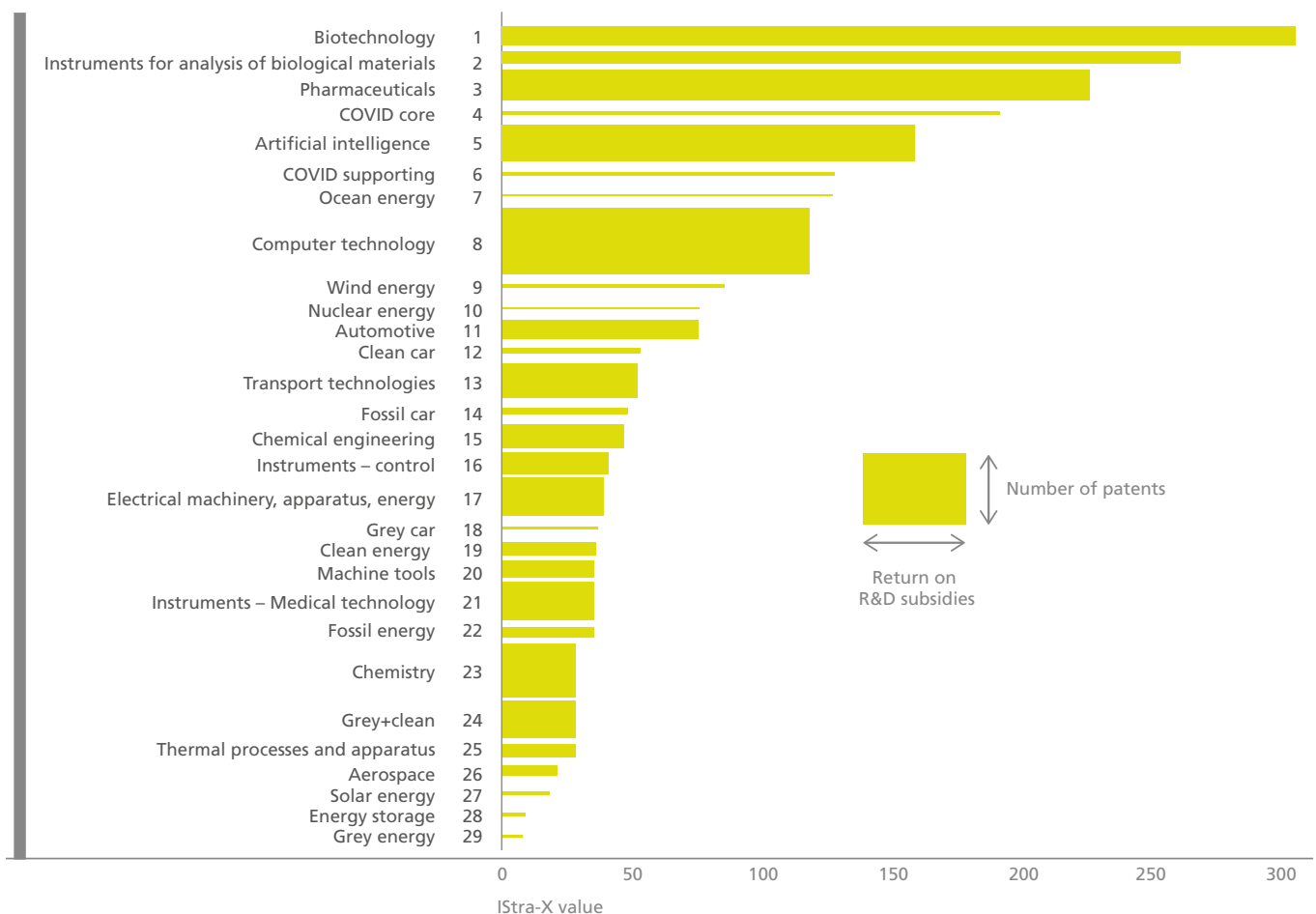
CEP research will continue to provide evidence of policies that support firms to make the transition to net zero, while also considering the impacts of this transition on people and places in terms of jobs created and lost – helping to inform policies for future growth that is stronger, cleaner and more equitable.

This is a shortened version of CEP Insight: Green Growth, one of a series of publications outlining the history of CEP research in key areas of economics to mark the Centre's 30th anniversary, linking to all the studies mentioned here (http://cep.lse.ac.uk/_new/publications/insights/green-growth/).

Anna Valero is a senior policy fellow at CEP, deputy director of the Programme on Innovation and Diffusion (POID) and an associate of the Grantham Research Institute.

Clean innovation can improve living standards while using fewer natural resources and cutting emissions

Figure 2:
UK returns to public R&D investments across technologies, 2005 to 2014



Note: This figure reports average returns to public R&D subsidies by technology area. The calculations account for direct and indirect knowledge spillovers occurring within the UK, variations in private R&D returns, variation in R&D costs and differences in the responsiveness to subsidies between different technology areas. This is based on the 'Istra-X' indicator: the length of each bar on the horizontal axis shows the Istra-X value; the depth of each bar on the vertical axis reflects the number of patents in each category.

Source: Martin et al (2020).

Young people in education have lost significant amounts of time in school during the pandemic – and this carries risks of lifetime scars.

Lee Elliot Major, Andrew Eyles and Stephen Machin reveal the scale of learning loss across the UK nations and assess what it means for future life opportunities.



Learning loss since lockdown

One of the most enduring generational impacts of the pandemic concerns the learning lost by children and young people. Missing out on education from which they would otherwise have benefited is likely to have profound effects on life outcomes for what we have called the Covid generation. There are genuine concerns that the pandemic will exacerbate existing inequalities and reduce future levels of social mobility – the capacity of young people to transcend their background.

In our latest research, we appraise how children's exposure to formal learning has evolved over the different periods of

lockdown and school closures during the pandemic. We consider the impacts on pupils in primary and secondary schools – and we compare and contrast the scale and range of losses across the UK nations.

The calculations are made by triangulating data from different sources to produce robust estimates of educational loss. Considering how these are likely to affect human capital formation in later life allows us to estimate the likely increase in intergenerational persistence for young generations growing up in the wake of the pandemic.

Our analysis is based on a number of separate sources of data. We document the different school opening and closure

The extent of schooling disruption during lockdown has been unprecedented in its scale

dates in the four nations during the pandemic. We use data from official attendance statistics published by each nation. Alongside these, we use data from parental responses gathered in successive waves from a nationally representative longitudinal study called Understanding Society.

School days missed

Reviewing the key school dates and school attendance data permits a calculation of the maximum total numbers of classroom days missed by pupils across the different nations. The extent of schooling disruption between March 2020 and April 2021 has

been unprecedented in its scale. It differed across the four nations because education is devolved across the UK with variation in national policies between England, Scotland, Wales and Northern Ireland. These include historic differences in term dates, and decisions about when to re-open schools.

Combining figures from 23 March 2020 to 23 March 2021, we find that the following days were lost due to school closures over the calendar year: 110 days (England); 119 days (Scotland); 124 days (Wales); and 119 days (Northern Ireland). These figures all compare to a full calendar year during normal times of 190 classroom

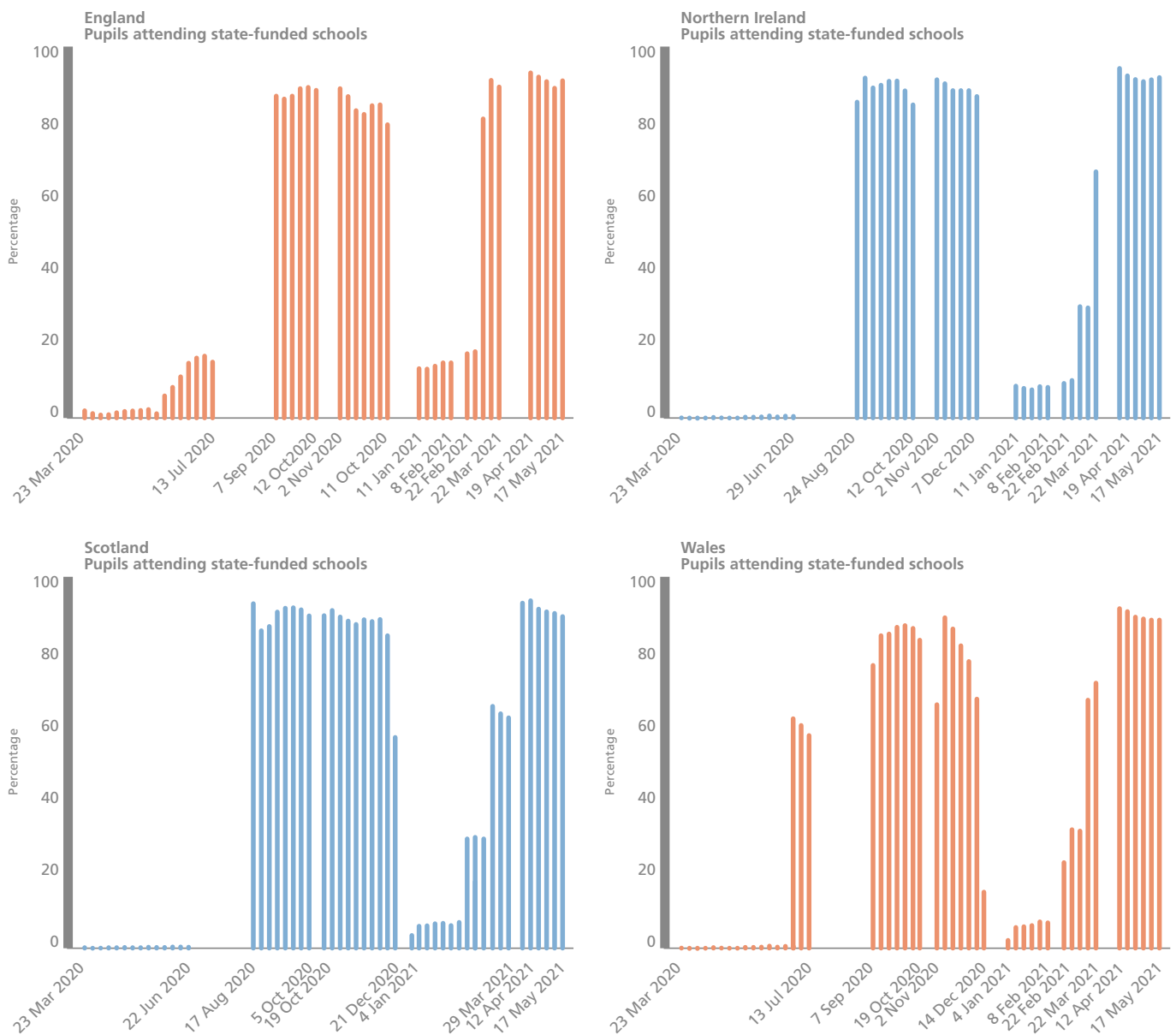
days (with a further five days for teacher development). This equates to more than half of school days being missed.

Figure 1 plots weekly attendance data separately for the four nations in each school week since 23 March 2020, taken from official published attendance figures.

The patterns in school attendance reflect the distinctive school closure and opening dates in the four nations, but also policies concerning attendance of vulnerable pupils and pupils of key workers during school closures.

Attendance was very low in the period stretching from 23 March 2020 until the summer break and in the spring term

Figure 1:
School attendance, four nations



of 2021. Attendance rates in England during school closures were around twice the level of attendance rates elsewhere in the UK, driven by the opening of all schools in England, and (to a lesser extent) government policy permitting vulnerable children and children of key workers to attend school. Different approaches were adopted across the four nations; for example, all schools in England remained open, whereas other parts of the UK opted for a hub model in which fewer schools were kept open. Attendance meanwhile was high in the autumn term, when all nations re-opened the school doors.

Rates of classroom and home learning

These data relate only to classroom learning, not learning occurring at home. With varying degrees of effectiveness, schools provided online lessons and expectations of what children should cover at home during school closures. Home learning experiences differed enormously depending on the availability of a quiet place to study, internet connectivity and resources provided by schools.

Differences in home learning can be assessed using microdata from the dedicated Covid waves released as part of Understanding Society, which asked parents a battery of questions about home schooling in the two closure periods. From these responses, we are able to estimate daily learning including online lessons during the pandemic.

Overall, learning capacity due to the closure of schools during the first lockdown in 2020 fell sharply for all four nations. Learning losses were particularly large for Scotland and Wales, where on average pupils missed out on around two-thirds of the lessons they would normally receive. In England and Northern Ireland, the learning loss was lower, but still of sizable magnitude, at 57% and 59% respectively.

The daily estimates of learning loss can be combined with the attendance numbers in Figure 1 to obtain estimates of lost days of schooling in each school term across the four nations. Multiplying the daily learning loss by the length of term in days produces estimates of losses for the summer term of 2019/20, the 2020/21 autumn term and the 2020/21 spring term. As the focus is on days lost since the first lockdown occurred on 23 March 2020, the extra ten days of the 2019/20 spring term are added to the length of the 2019/20 summer term.

This produces the following estimates for overall days lost, presented in Figure 2. We estimate the following overall losses:

61 days in England; 61 days in Northern Ireland; 64 days in Scotland; and 66 days in Wales.

Educational inequality

We find that children and young people from more affluent backgrounds – whether measured by parental income or type of schooling – received more instruction time during the first lockdown.

Figure 2 shows how learning losses differed across the family income distribution for the three periods under study. Due to relatively small sample sizes for Northern Ireland, Scotland and Wales, their data are pooled together so that the data contrast England with the rest of the UK.

Two findings are apparent. First, there were significant divides in learning loss across the year of the pandemic. Pupils from the bottom fifth of incomes experienced higher learning loss than those from the top fifth. In England, for example, during the 2021 school closures, the poorest pupils missed out on a third of their

Figure 2:
Learning losses, four nations

Average learning loss

	England	Northern Ireland	Scotland	Wales
Total days	61	61	64	66
of which:				
Summer term 2020	40	36	39	40
Autumn term 2020	8	5	7	8
Spring term 2021	13	21	18	18

Inequality of learning loss

	April 2020		November 2020		January 2021	
	England	Rest of UK	England	Rest of UK	England	Rest of UK
	1	2	3	4	5	6
Bottom 20%	60.9	71.4	13.4	8.3	34.9	47.4
Middle 60%	56.4	62.7	11.6	9.1	27	38.3
Top 20%	47.5	59.7	5.9	6.7	24.4	38.6
Sample size	2,952	651	1,973	402	1,910	386

Notes: Top panel shows average learning days lost during the first year of the pandemic. Panel above shows the percentage loss in learning experienced by pupils from the bottom fifth of incomes, the middle 60% of incomes and the top fifth of incomes.

Recovery programmes will need to be substantial to address significant learning loss

learning (34.9%) while the richest pupils missed out on a quarter of their learning (24.4%).

Second, the poor-rich gap in learning loss varied across nations. These differences are significant: during the 2021 school closures, the poorest pupils in England experienced lower learning loss than the most affluent pupils in Scotland, Wales and Northern Ireland (34.9% compared with 38.6%, respectively).

Several studies have confirmed that learning losses suffered during the pandemic are manifested in stark gaps in actual exam results between children from poorer backgrounds and their more privileged counterparts. Other research shows a robust positive relationship between hours of study and attainment.

Considering the likely consequences of increasing educational inequalities for earnings and employment in the labour market, a likely consequence for this generation will be a significant decline in social mobility levels (Elliot Major et al, 2021).

Policy matters

Finally, we explore the extent to which government policies affected nation-specific gaps in learning loss. We do this by asking what would have happened under counterfactual scenarios where nations had the same policies and/or learning losses. The counterfactuals reveal that both education policy decisions enacted under the pandemic and historical differences in term dates explain differential degrees of learning loss across the home nations.

England, for example, benefitted from higher attendance rates during the pandemic, both during normal term time and during partial school closures by urging vulnerable pupils and children of key workers to attend. Ministers also decided to open the country's schools to all pupils at an earlier date during the 2020/21 spring term. Scotland, on the other hand, benefitted from earlier scheduled school summer holidays during the summer term of 2019/20.

Conclusions

Our research indicates that any recovery programmes rolled out by the respective UK governments will need to be substantial to address significant learning losses suffered by pupils across the four nations. They will also need to be highly targeted to help disadvantaged children and young people who, on average, missed out on more education than their more privileged peers.

We have previously advocated extra targeted one-to-one or small group tutoring as one credible policy response, which has been subsequently taken up by the government in England.

Another suggestion is to extend school time or at least ensure minimum school days across all schools. We find that a narrow majority – 53% – of our survey participants believe that extending school time would be an appropriate policy response to the learning losses. But we did not detail how this extended school day would be used. The level of agreement is largely invariant to the hypothetical learning losses that we present to participants.

It remains unclear what level of Covid-induced absences will continue with schools now back for the autumn term of 2021/22. Governments across the four nations should be aware that policy interventions – encouraging key pupils to attend schools during closures, reorganising school term dates or opening schools early – can all have a significant impact in reducing learning losses. These are important considerations given the lifetime scarring likely to occur for the Covid generation.

This article summarises 'Learning Loss since Lockdown: Variation across the Home Nations' by Lee Elliot Major, Andrew Eyles and Stephen Machin, CEP Covid-19 Analysis No. 23 (<https://cep.lse.ac.uk/pubs/download/cepcovid-19-023.pdf>).

Lee Elliot Major is professor of social mobility at the University of Exeter and a CEP research associate. **Andrew Eyles** is a research economist in CEP's education and skills programme. **Stephen Machin** is professor of economics at LSE and director of CEP.

Further reading

Lee Elliot Major, Andrew Eyles and Stephen Machin (2021) 'Unequal Learning and Labour Market Losses in the Crisis: Consequences for Social Mobility', CEP Discussion Paper No. 1748 (<https://cep.lse.ac.uk/pubs/download/dp1748.pdf>).





The Polish economy has largely managed to avoid the pandemic-induced troubles experienced in Western Europe. But as **Paweł Bukowski** and **Wojtek Paczos** argue, contrary to government claims of able stewardship, what has got the country through relatively unscathed is a combination of good fortune, making GDP a priority over health and restrictions centred more on personal freedoms than economic freedoms.

Poland's economy in the pandemic

In 2020, Poland's GDP contracted by 'only' 3.5%, significantly less than the OECD average of 5.5%. In the UK, the comparable figure stood at a staggering 9.9%. While unemployment rates have soared across Europe, the official Polish figures have hardly budged, and are the lowest in the European Union (EU), according to the latest Eurostat figures.

We should keep in mind that the Polish economy was also performing very well before the pandemic. It had been forecast to grow by 3.1% in 2020, according to the International Monetary Fund's (IMF) *World Economic Outlook* from October 2019.

But the Polish economy's drop to 6.6 percentage points below the expected growth figure is still a milder slowdown than in many other countries. For example,

in the case of the Czech Republic, it was 8.1 percentage points (from +2.6% to -5.5%), Hungary 8.3 percentage points (from +3.3% to -5%), the UK 11.4 percentage points (from +1.4% to -10%) and Spain almost 13 percentage points (from +1.8% to -11%).

While the Polish economy has clearly managed to navigate the pandemic relatively well thus far, the reasons for this are less clear. The country's government has been quick to claim the success of its various anti-crisis measures.

The reality, however, is that the Polish response to the economic fallout was neither more innovative nor more generous than those of other countries. According to Eurostat, public spending rose by 9.1% of GDP in Poland between the first and third

quarters of 2020, while the EU average in that period was 10.1%.

Contrary to government claims, we think that a relatively lax approach to economic lockdown and a bit of sheer luck are the main reasons for the relatively good performance of the Polish economy.

Getting lucky in the first wave

By 'sheer luck' we mean all the factors that are beyond the direct control of policies but affect the transmission of the pandemic and the country's economic fortunes nevertheless.

Poland was 'lucky' in three important respects: its semi-peripheral location and its geographical as well as economic structures. As we will argue, those factors

markedly affect the trade-off between the economy and public health.

Due to its semi-peripheral location, the first coronavirus case appeared in Poland relatively late, giving the government more time to prepare and implement a lockdown strategy. The first restrictions were introduced when the seven-day average of daily cases stood at just nine – rather than 674, as was the case in the UK.

New research by the IMF suggests that early but tight lockdowns are most effective in containing the spread of the virus. They are also (potentially) the least harmful to the economy because, if successful, they can be lifted more quickly.

Second, Poland's geographical structure meant that the 'natural' speed of transmission in Poland was slower than in more densely populated West European countries.

In Poland, 40% of the population lives in the countryside, which greatly limits the number of daily contacts. The 'lived density' of the population in Poland equals only 196 per populated square kilometre, compared with 531 in the UK.

Restrictions: when, what and how?

During the first, spring 2020 wave of the coronavirus, there was no statistically significant increase in the number of excess deaths (above the five-year average) in Poland and the economy was doing well. The policy of early and tight restrictions circumvented the painful trade-off between public health and the economy.

This changed dramatically during the second, autumn wave of the pandemic, which reached its peak in November. The government then implemented a 'wait-and-see' approach, introducing belated measures that ultimately proved less adequate. This can be interpreted as favouring the economy over public health.

In Figure 1, we modify the Oxford Covid-19 stringency index to show the composite measures that are most harmful to the economy. The original index is based on nine indicators rescaled to a value from 0 to 100, where 0 is the pre-pandemic situation and 100 stands for the most stringent measures implemented in all categories.

Our modification includes six categories that we believe are most harmful to the immediate economic situation. We exclude school closures and bans on international

travel and include the remaining six categories: workplace closures, cancellation of public events, restrictions on gatherings, limits on public transport, stay-at-home orders and internal movement restrictions.

The economic severity index

Figure 1 shows that the Polish restrictions were strict during the first wave and then almost non-existent in the summer. The increase in restrictions in the autumn, when compared against the number of cases, is, in our opinion, much belated.

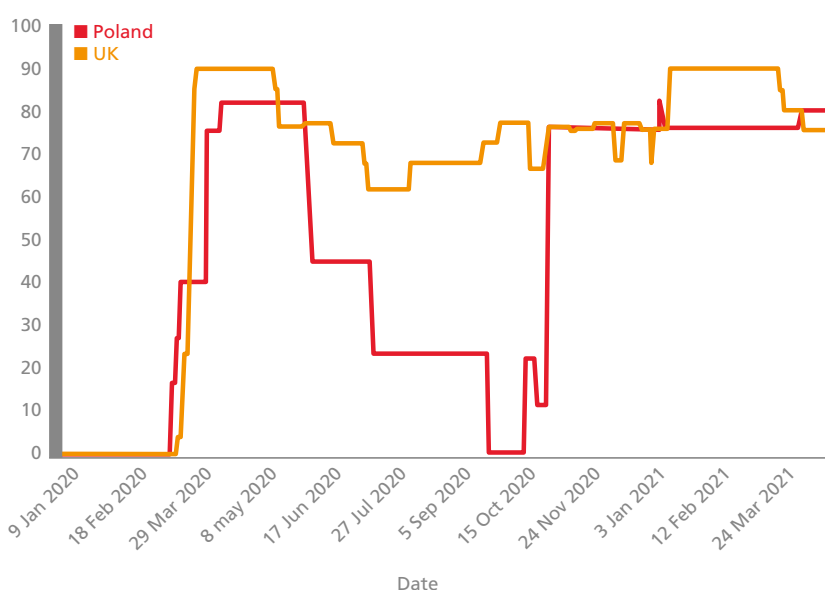
By contrast, in the UK the restrictions were kept high during the summer and the increases in restrictions in the autumn were much better timed. This may have hurt the economy more, but also resulted in the much slower transmission during that second, autumn wave.

The difference, in some part, may also be explained by a different approach to restricting economic and personal freedoms in each country.

In the UK, for example, there have been few limits on individuals: masks were never made compulsory outdoors; schools remained open for several months; and – from the authors' own experience – quarantine enforcement has been relatively lax.

But home-working was recommended for almost the entire year. During the lockdowns, Britons could only buy non-essential products online and had no access to any form of indoor services.

Figure 1:
The economic severity index in Poland and the UK



A relatively lax approach to lockdown and some luck are the main reasons for the relatively good performance of the Polish economy



By contrast, in Poland masks were made compulsory even on empty streets, schools were fully opened for only six weeks, and those in quarantine were checked on regularly by police officers.

But remote work was only strongly pushed for a few scattered weeks. For most of the past year, Poles could still go to a shopping mall or even visit a sauna.

Our intuition is that the Polish approach put less burden on the economy, while the British one is probably more effective in limiting virus transmission. This is supported by the data relating to the total death toll of the pandemic.

We use a measure of 'excess mortality' (number of deaths above the five-year average) as these data are free from potential differences in (mis)reporting and classification. During the first wave in spring 2020, early and tight lockdown in Poland resulted in virtually no excess deaths, while in the UK delayed restrictions led to excess mortality of over 100%.

But then the situation was almost the reverse during the second, autumn wave. In the year between March 2020 and March 2021, the UK lost almost 121,000 additional lives, while Poland lost more than 95,400. In relation to the country's

respective populations – with the UK being 80% more populous – Poland had 42% higher excess mortality per capita. Virtually all of the difference falls on the second wave.

Services suffer, manufacturing booms

Moreover, the composition of the Polish economy also makes it more resilient to lockdown measures. In 2019, 27% of workers were employed in sectors that were later directly affected by the lockdown (such as hospitality or tourism), compared with 34% in the UK and 37% in Spain, according to Eurostat. Since a smaller part of the economy had to hibernate, the direct effect on GDP was less negative.

But there was also a second, indirect, channel. Poland is the only big EU country that has a growing share of manufacturing

in both employment and production.

This kept more of the economy humming when the services sector had to be locked down. Also, thanks to this, the country was able to benefit from the global shift in consumption from services to durable goods induced by the pandemic.

Size matters too. A big domestic market reinforces the positive effects of the business-friendly lockdown and a resilient economic make-up. Smaller countries in the region, such as Hungary or Slovakia, are more dependent on the economic situation in the rest of Europe. The larger economic fallout in Germany or the UK will thus drag down smaller economies more. Because of its size, Poland's domestic economy could in part compensate for the loss of external demand.

Poland and the UK pursued different paths during the first and second waves of Covid-19, providing a natural experiment on how the form and timing of lockdown policies can affect economic slowdown and virus containment. Moreover, the sectoral composition of the economy and geographical distribution of the population also play crucial roles.

Although the performance of the Polish economy during the pandemic appears surprisingly robust, we do not think it was the result of a thought-through strategy. On the contrary, percentage points in GDP figures can never justify the price of almost 100,000 excess deaths. As the first wave in Poland demonstrated, this is a price that was entirely avoidable.

Paweł Bukowski is a research fellow in CEP's labour markets programme. **Wojtek Paczos** is at Cardiff Business School.

The original version of this article was published on the *Notes from Poland* blog in April 2021 (<https://notesfrompoland.com/2021/04/27/why-is-polands-economy-emerging-so-strongly-from-the-pandemic-a-comparison-with-the-uk/>).

A policy of early and tight restrictions circumvented the painful trade-off between public health and the economy

in brief...

UK gender pay gap reporting: a crude but effective policy?

Forcing employers to reveal their gender pay gap has been effective in its main goal of narrowing the gap: according to research by **Jack Blundell**, the difference between women and men's pay has shrunk by just under a fifth at affected organisations. Women have a strong aversion to employers with wide pay gaps and some organisations have felt compelled to make changes to attract and retain them.

The size of a worker's pay packet depends on a vast number of factors – from family background to industry to the number of years they have been at their employer. But a single factor, fixed at birth for most, explains a strikingly high share of wage variation across workers. Before Covid-19, the latest data showed UK women earning on average almost a fifth (17.3%) less than men. Although the gap has narrowed over the last few decades, at the current rate of decline, it will take several decades more to close.

After years of delay and as part of a Europe-wide initiative on improving wage transparency, in 2017, the UK government introduced gender pay gap reporting. Since then, all private sector firms and public sector organisations with over 250 employees in England, Scotland and Wales have had to report a handful of statistics on the difference between men and women's wages. Recent Covid-19 disruption aside, new statistics have to be reported every year.

The idea behind the policy is that making individual employers publicly accountable for their gender pay gaps will force them to explain why gaps exist and, in many cases, to take pro-active steps to narrow them. This argument is not without scholarly grounding: there is a rich body of evidence showing that transparency can have big effects on top wages (Mas, 2017).

Part of the gender pay gap is driven by different approaches to salary negotiation, and increasing the information

available to workers can help to level the playing field. Practically speaking, transparency policies are a cheap way for governments to do something (or to be seen as doing something) about inequality.

The policy has not been without its critics. Unlike in some other European countries employing reporting policies, the statistics reported in the UK are remarkably crude. They make no adjustment for whether workers are full- or part-time, the type of job they are doing and their experience. We know that these factors can help to explain some (but not all) of the gender pay gap.

Furthermore, while employers are mandated to respond, there is to date little evidence of any serious enforcement in practice. Some pay gap reports are statistically unlikely and others downright impossible.

Statistician Nigel Marriott (2018) estimates that up to 17% of first-round reports contained errors. One interpretation of this is that some companies lack the statistical capabilities required to construct the measures correctly. A less generous interpretation is that a minority of companies are deliberately fiddling their figures.

The chance to 'name and shame' high-profile companies has been seized by tabloids and broadsheets alike. In the first round of reports, *The Independent* ran with 'Gender pay gap: worst offenders in each sector revealed as reporting deadline passes'; while the *Daily Mail* highlighted the wide



pay gap at low-cost airline Ryanair. Surveying 2,000 UK workers, my research finds that just under three-quarters (71%) had seen news stories on gender pay gap reports.

How can we rigorously assess the policy's impact on the gender pay gap? One simple approach would be to look at what has happened to the aggregate pay gap in the UK. This is unlikely to yield useful insights. Men and women are found in very different sectors, work in different occupations and hold different levels of seniority within employers. They also differ in their responses to aggregate economic shocks.

This implies that the wages of men and women will exhibit different trends over short time periods, independent of the pay gap legislation. In other words, even if the overall pay gap declined around the time the policy was introduced, it would be difficult to argue that this was due to the policy rather than some other factor.

Instead, I use the fact that only employers with over 250 employees had to report, comparing the pay gaps of employers either side of that threshold. The argument is that employers with say 251 employees, who therefore have to declare their pay gaps, are likely to be pretty similar to those with 249 employees, who do not. These smaller employers can then arguably provide a 'control group' against which we can compare the employers covered by the policy.

Applying this strategy to data on wages for the period 2012-19, I find that the policy led to a 1.6 percentage point increase in women's hourly wages relative to those of men. This is a large effect, corresponding to just under a fifth (19%) of the total gender gap in my sample. The effect is not driven by a reshuffling of highly paid women into affected employers, but rather due to changes in individual workers' wages.

Before declaring the policy a resounding success, it is worth noting that while women's wages have risen, the observed closing of the gender pay gap is due to men's wages rising by not quite so much. While women's wages increased at the same rate at both affected and control group employers, men's wages increased at a slower rate in affected employers than in control group employers.

This implies that when compared with the control group, average wages at affected employers actually fell as a result of the policy, which typically is not great news for workers. Furthermore, this effect is rather immediate. It remains to be seen whether the impact will be sustained in the long run.

So why did employers act to close their gender pay gaps? In my survey, I find that while men are insensitive to pay gap information, women exhibit a strong preference for employers with narrower pay gaps. This is particularly true for young women, for whom 'glass ceilings' at companies are likely to be most relevant. The survey evidence is

Pay transparency policies are an inexpensive way for governments to do something about inequality

consistent with employers feeling compelled to make changes in order to continue to attract and retain workers.

My core results on wages are echoed in a concurrent study by a different research team, who highlight that employers are adapting their online job ads in response to the policy (Duchini et al, 2020).

Internationally, the picture is mixed. Analysis of a pay gap reporting policy in Denmark finds results remarkably close to mine, but evidence from Austria finds their policy ineffective at closing the pay gap. Policy design details across countries differ in important ways, and there is likely to be value in rigorous cross-country comparisons.

The question of the policy's effectiveness has become particularly relevant during Covid-19. In late March 2020, when the crisis started escalating rapidly, the government announced that it was suspending reporting for that year. Reporting is back on in 2021, but with a six-month extension to give firms a little more time.

In light of mounting evidence of the disproportionate labour market effects of the crisis on women and a broader concern of gender equality reversing during the pandemic, there has never been a greater need for informed, evidence-based policies designed to ensure a fair and equitable society. My research suggests that transparency-based policies, even if somewhat crudely designed, can have a substantial impact.

This article summarises 'Wage Responses to Gender Pay Gap Reporting Requirements' by Jack Blundell, CEP Discussion Paper No. 1750 (<https://cep.lse.ac.uk/pubs/download/dp1750.pdf>).

Jack Blundell is a visiting fellow at the LSE and is affiliated with CEP's labour markets programme.

Further reading

Emma Duchini, Stefania Simon and Arthur Turrell (2020) 'Pay Transparency and Cracks in the Glass Ceiling', CAGE Working Paper No. 482.

Alexandre Mas (2017) 'Does Transparency Lead to Pay Compression?', *Journal of Political Economy* 125(5).

Nigel Marriott (2018) 'The Three Most Common Mistakes Made in Gender Pay Gap Reports', *Personnel Today*.



The Covid-19 crisis prompted thousands to register as NHS Volunteer Responders, helping vulnerable people with small daily tasks like shopping. **Christian Krekel** and colleagues find big increases in wellbeing among those who took part in the programme, with effects lasting long after the time spent volunteering had ended.

Happy to help: NHS volunteering in Covid-19 times

The Covid-19 crisis has had an enormous impact on lives and livelihoods around the world. People died, many fell sick, family and friends suffered – and millions were subject to lockdowns and other restrictions on their daily lives.

At the same time, the crisis has seen an enormous rise in pro-social activities such as charitable giving, acts of solidarity or kindness, and volunteering for charities or public services. In England, it led to the largest mobilisation of volunteers the country has seen since the Second World War.

On 24 March 2020, the then secretary of state for health Matt Hancock issued a mass call for volunteers to join the NHS

Volunteer Responders, a nationwide programme launched to support clinically high-risk people shielding in their homes during the lockdown and to ease pressure on regular NHS staff.

This was a novel volunteering programme based on a smartphone app. It allocated flexible, small volunteering tasks directly from those in need to those who wanted to help. These tasks included helping with daily chores such as dropping off groceries or delivering medical prescriptions, but also having friendly phone calls with those isolating and feeling lonely, or helping with logistics at local pharmacies or NHS sites.

Around 750,000 people (about 1.4% of England's population) registered their

willingness to help within four days of the call, surpassing the initial recruitment target of 250,000 volunteers in just 24 hours. From April 2020 to April 2021, about 1.8 million volunteering tasks were completed through the programme, helping an estimated 165,000 vulnerable people at the height of the pandemic.

Our research estimates the effect of participating in this NHS programme on volunteers' subjective wellbeing, making use of two unique features in the design and implementation of the programme:

■ The programme was heavily oversubscribed, by a factor of about 2.4: 250,000 people ended up volunteering out of the more than 590,000 people

Volunteering has positive, significant and strong impacts on volunteers' wellbeing

who registered and were approved. This gives us a large pool of people who chose to volunteer but only a subset who actually did.

■ The app allocated tasks randomly among this pool of recruits, either conditional on geographical proximity or completely at random in the case of phone calls with persons isolating.

Taken together, these features allow us to overcome a concern about previous research on volunteering, namely that those who volunteer might be systematically different from the general population. By comparing those who ended up volunteering with those who did not among the pool of recruits, we are able to estimate the effect of volunteering on wellbeing.

As we shall see, the returns to wellbeing from volunteering in the NHS Volunteer Responders during the Covid-19 pandemic are positive, significant and strong. Our findings suggest that volunteers generated substantial social value during the duration of the programme. The study also sheds light on many practical considerations when designing and implementing volunteering schemes.

Measuring wellbeing

We arrive at these conclusions using a combination of survey and administrative data. The backbone of our analysis is a survey that was sent to all the individuals who signed up and were approved to become an NHS Volunteer Responder: over 590,000 individuals. Our analysis sample includes about 9,000 volunteers.

The survey asked respondents about their demographic characteristics, previous volunteering experience, personal Covid-19 situation, and their current status in the

programme. Most importantly, it asked them whether they had already completed a task, and if not, why not, including: not yet been given a task; unable to accept a task due to logistical constraints (such as time or distance); and issues with setting up the app.

We use these variables to construct our 'treatment' and 'control' groups for comparison: our treatment group includes those respondents who reported they had already volunteered; and our control group those who reported they had not yet been given a task. Making use of the oversubscription of the programme and the random allocation of tasks implies that comparing the wellbeing outcomes between the two groups should give us a causal estimate.

To ensure further comparability, we control for individual characteristics of respondents, regional Covid-19 cases from official UK government statistics, and data on volunteers collected by the Royal Voluntary Service via the app, including

volunteers' postcodes and the timestamps of their first and last tasks completed to control for their local areas and for the time they have been waiting for the next task.

Our wellbeing outcomes include items that are routinely collected by the Office for National Statistics (ONS) to measure personal wellbeing in the UK (Dolan and Metcalfe, 2012). The most important are life satisfaction ('Overall, how satisfied are you with your life nowadays?') and sense of purpose in life ('Overall, to what extent do you feel that the things you do in your life are worthwhile?').

But we also sample respondents' perceived belonging to their local community ('How strongly do you feel you belong to your immediate neighbourhood?') and connectedness to their neighbours ('Do you feel more or less connected to your immediate neighbourhood and your neighbours since the Coronavirus (Covid-19) outbreak?') to capture feelings of social belonging, an important determinant of wellbeing.



The returns to wellbeing from volunteering

Figure 1 shows our central result: it plots the wellbeing of individuals who signed up and volunteered at any point in time in the NHS Volunteer Responders (our treatment group, black dots) to those who signed up but did not get to volunteer because they had not been given a task yet (our control group, red line).

We find that volunteering has positive, significant and strong impacts on volunteers' wellbeing, raising their overall life satisfaction and sense of purpose in life by about 0.17 and 0.18 points on a zero-to-10 scale, respectively. This is about 25% of the size of being employed as opposed to being unemployed (Clark et al, 2018) or roughly 15% of the size of local community interventions aimed explicitly at raising the wellbeing of general adult populations (Krekel et al, 2021).

Moreover, apart from enhancing personal wellbeing, it raises volunteers' perceived belonging to their local community and their connectedness to their neighbours, by about four and seven percentage points, respectively.

We find diminishing returns to wellbeing from volunteering: the more people volunteer, the higher their



Wellbeing benefits are stronger if there is more social interaction with the direct recipients of volunteering

wellbeing, but these returns become relatively lower as they volunteer more. Yet wellbeing returns seem to be persistent, for at least three months after the last task has been finished. And volunteers who have more social contact with the direct recipients of their volunteering benefit the most, especially those who talk to and engage directly with people isolating and feeling lonely.

Generating social value

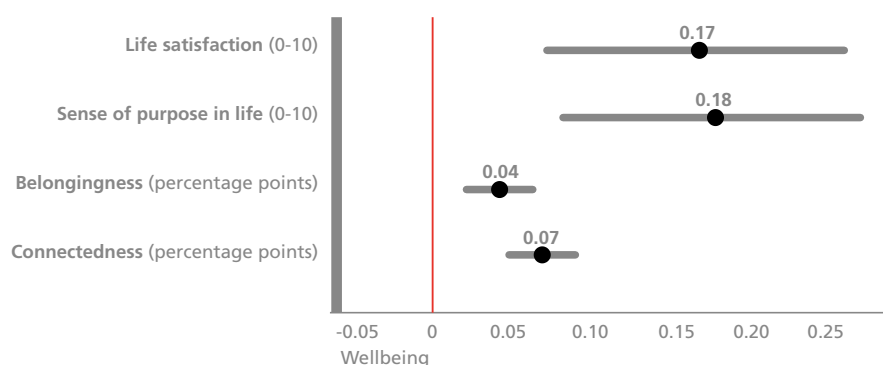
Running the NHS Volunteer Responders programme during our observation period from April to July 2020 cost about £3.1 million. Was it worth it? We can use our results based on wellbeing data to conduct a simple cost-benefit analysis of the programme. It involves three steps:

■ We note that a 1% change in household income has been shown to increase life satisfaction by about 0.007 points (Sacks et al, 2010).

■ We note that the median annual gross household income in England in 2019 was about £29,600 (ONS, 2020), or about £7,400 during our observation period (in which the wellbeing benefits accrued).

■ We trade off the impact of volunteering on life satisfaction with that of income, obtaining a value of about $\pounds(74 \times 0.17) / 0.007 = \pounds1,800$. In other words, each volunteer would have to be compensated with about £1,800 for his or her loss in wellbeing in the hypothetical case in which he or she had not volunteered.

Figure 1:
Impact of volunteering on wellbeing



Notes: N = 9,163, of which treated = 6,375 and controlled = 2,788. Coefficients obtained from multiple regression analysis controlling for individual controls, regional Covid-19 controls, region fixed effects, and interview day fixed effects. Confidence bands are 95%.

Source: NHS Volunteer Responders data, July 2020; authors' calculations.

Flexible, short pro-social actions benefit not only their recipients but also those who volunteer their time

With about 250,000 volunteers, this yields a total monetised wellbeing benefit of about £445 million. The net benefit of running the programme was, therefore, about £445 million - £3.1 million = £442 million. This is a substantial social value, and likely to be a lower bound: the benefits to the direct recipients of volunteering, which were not systematically measured, are not even included.

A model to replicate

The NHS Volunteer Responders programme shows how flexible, short pro-social actions benefit not only their recipients but also the volunteers themselves. Volunteers generate significant, positive wellbeing benefits for themselves. And these benefits seem to last, at least during our observation period three months later.

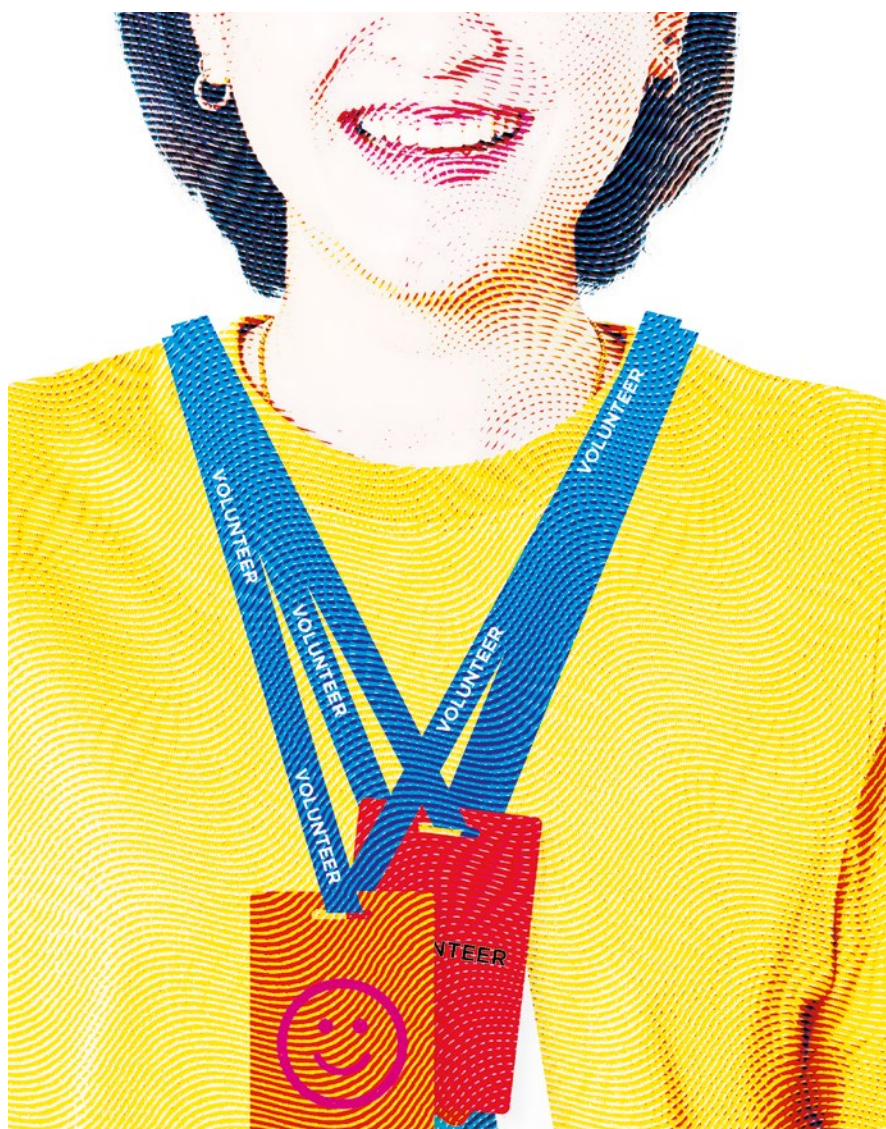
There are several take-aways from

our study: on a practical note, our finding that the wellbeing benefits are stronger if there is more social interaction with the direct recipients of volunteering suggests that volunteering opportunities should be designed to allow for more such interaction and ease of participation. To the extent that potential volunteers may not be aware of, or believe in, the benefits of volunteering, communication in recruitment and outreach should highlight these.

From a policy perspective, the traditional method of including voluntary work in national accounting systems – multiplying the number of volunteering hours by the hourly wages in complementary, paid work – may be underestimating the true value of volunteering to society, by neglecting an important component of its private returns: the wellbeing benefits to volunteers themselves. Using wellbeing data can improve on this.

As its benefits strongly outweigh its costs, the NHS Volunteer Responders as a nationwide volunteering programme could be seen as a model to replicate elsewhere during future crises. It could also be run in normal times (for example, in the form of a national volunteering service to help vulnerable people in their local communities), not only benefiting volunteers and their direct recipients but also indirectly contributing to higher social cohesion. This would be a triple win: for recipients, volunteers and society as a whole.

We may be underestimating the true value of volunteering to society



This article summarises 'Happy to Help: The Welfare Effects of a Nationwide Micro-Volunteering Programme' by Paul Dolan, Christian Krekel, Ganga Shreedhar, Helen Lee, Claire Marshall and Allison Smith, CEP Discussion Paper No. 1772 (<https://cep.lse.ac.uk/pubs/download/dp1772.pdf>).

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Further reading

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