

CENTREPIECE



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The rise of EVs

Tariff confusion

Replication games

Subsidising great design

Women leaving academia



**AI or remote
working:
which broke the
career ladder?**

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CENTREPIECE

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YUCHTMAN MADE FELLOW

Noam Yuchtman, Hayek Professor of Political Economy at LSE and research associate in CEP's growth programme, has been elected as a fellow of the British Academy. His research has focused on topics in the fields of political economy, economic history, development economics and labour economics.

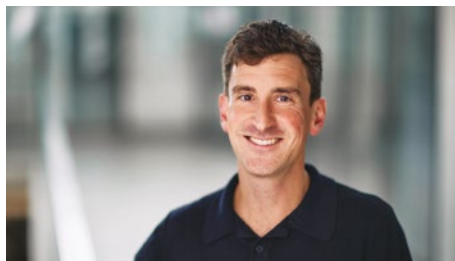


HASKEL BECOMES OBR CHAIR

Jonathan Haskel, a professor of economics at Imperial College and research associate in CEP's growth programme is the new chair of the Office for Budget Responsibility. Professor Haskel, who has previously been an external member of the Bank of England's monetary policy committee, was nominated by former chancellor Rachel Reeves and confirmed by the Commons' Treasury Committee.

WINNING CARBON OFFSET RESEARCH

Do carbon offsets offset carbon? by Raphael Calel, Matthieu Glachant, Jonathan Colmer and Antoine Dechezleprêtre has been awarded a 2026 *American Economic Journal* Best Paper Award. In the paper, earlier published in the CEP Discussion Paper series, the authors examine Indian wind farms under the Clean Development Mechanism. They find that 52% of offset approvals went to projects that would be completed regardless of the subsidy, resulting in up to 28 million additional carbon emissions, and ultimately undermining the environmental purpose behind the offset initiative.



CEP PODCAST LAUNCHED

Listen to academics recommend the research that they'd take to a desert island on the new podcast *Inspiring Economics* from CEP. Hosted by Romesh Vaitilingam, the podcast gives listeners a chance to hear top economists discussing the work that inspired them, as recommended in the *CentrePiece* column "My must-read paper". The first episode features trade economist Swati Dhingra talking about papers that help us understand what trade actually means for people and places.



METCALF MEMORIAL CONFERENCE

A *British Journal of Industrial Relations* conference in memory of Professor Sir David Metcalf is being held at LSE on 3 and 4 December 2026. Sir David was a widely admired economist and held a number of high-profile public roles. He co-founded the Centre for Labour Economics, which later became CEP.



Asking the less obvious questions

Not everything in our rapidly changing world is about artificial intelligence (AI), but it does sometimes feel that way. Our cover story nicely illustrates how a kneejerk reaction to blame AI can blind us to the impact of actions far closer to home. Peter Lambert and Yannick Schindler explore why recruitment of graduates into entry-level office jobs has fallen, and find that while the general release of large language models is undoubtedly having a negative effect, the shift to working from home is also a factor – and currently the one with the bigger impact. Employers, suggest the authors, are looking for staff already versed in the ways of office life, who are easier to manage remotely.

Elsewhere in *CentrePiece*, we share work on the recent upheavals in global trade. First, Kalina Manova, Dennis Novy, Thomas Sampson and Aaron Tang explore the impact of the frequency, complexity and volatility of US tariff announcements in 2025. They find that not only did the tariffs reduce imports, but the confusion over what was being imposed doubled that reduction without, of course, doubling the amount of tax collected. In a second piece on trade, Stephan Maurer, Luke Heath Milsom and Ferdinand Rauch demonstrate the economic value of opening new ways between oceans in a geopolitically volatile world. The work was completed before Chinese company Sea Legend launched the first regular container shipping service through the Arctic – an "ice silk road" which provides an alternative to one chokepoint problem but creates further environmental and political concerns.

If we are fated to create future problems by solving a present dilemma, are we at least aiming to improve human happiness? CEP founder-director Richard Layard has long campaigned for policy decisions to be rooted in wellbeing science – he shares his story of deciding on this route on page 28.

Helen Ward, editor
H.Ward1@lse.ac.uk

AI or remote working: which broke the career ladder?

Disentangling the reasons for the sharp fall in entry-level hiring

Over the past three years, an explanation has emerged for why landing a first white-collar job has become so much harder – the arrival of generative artificial intelligence (AI). The argument is that fewer junior staff members are needed for tasks such as routine drafting, data processing and the initial stages of research – and so early-career hiring has begun to decline.

In our research, we suggest that another important driver of the decline in junior hiring is the increase in working from home (WFH) following the Covid-19 pandemic.

The decline in junior hiring itself is not in doubt, and a growing body of research concludes that generative AI is the cause, substituting directly for the routine analytical tasks firms once assigned to early-career workers. One influential study, drawing on payroll records, reports a 16% relative employment fall for the most AI-exposed workers aged 22–25 (Brynjolfsson et al, 2025). Another tracks individual firms and finds junior hiring slowing once companies adopt AI (Hosseini Maasoum and Lichtinger, 2025).

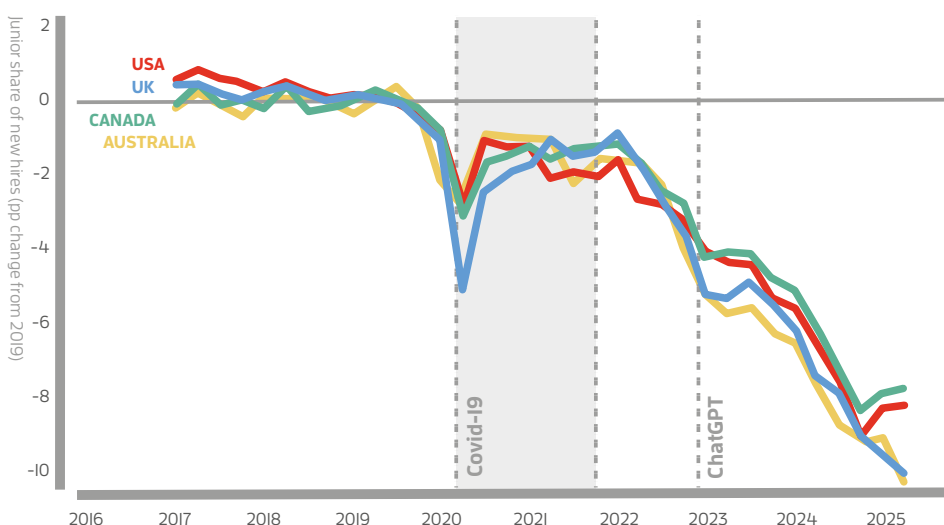
In our study, we use data from workers' CVs to revisit this question. First, we measure the share of all new hires going to junior workers. Our data, which span four countries, reveal that the share of junior hiring (relative to all hiring) fell by around 10 percentage points between 2017–25 (see Figure 1).

The AI narrative resonates because, at a task level, the functions of the technology mirror the duties that once fell to a firm's newest recruits: such as writing routine press releases or answering customer service calls. These are exactly the tasks that a language model now does in seconds.

Two shocks that arrived at the same time

We revisit this question because another large post-pandemic shift has hit the very same

Figure 1: Junior share of hiring has declined sharply across four Anglophone economies, 2017–2025



Notes: The chart depicts the junior share of new hires for Australia, Canada, the UK and the United States, expressed as a percentage point change from each country's 2019 mean.

Source: Lambert and Schindler (2026).



Young people face a double whammy: remote working has made them less desirable to hire and AI has made them less necessary



occupations that are most exposed to AI: the rapid and persistent rise of WFH (Barrero et al, 2021). Our hypothesis is that part of the effect being attributed to AI may be a case of what economists call “omitted variable bias”, allowing the effects of WFH to masquerade as a shift brought on by AI.

The jobs most exposed to generative AI are also those most likely to have gone remote: white-collar, desk-based and routine-cognitive work. Software developers, accountants and management consultants sit at the top of both rankings, and the standard measure of AI exposure (Eloundou et al, 2024) and the standard measure of working-from-home exposure as shown at wfhmap.com are correlated at 0.77 (see Figure 2).

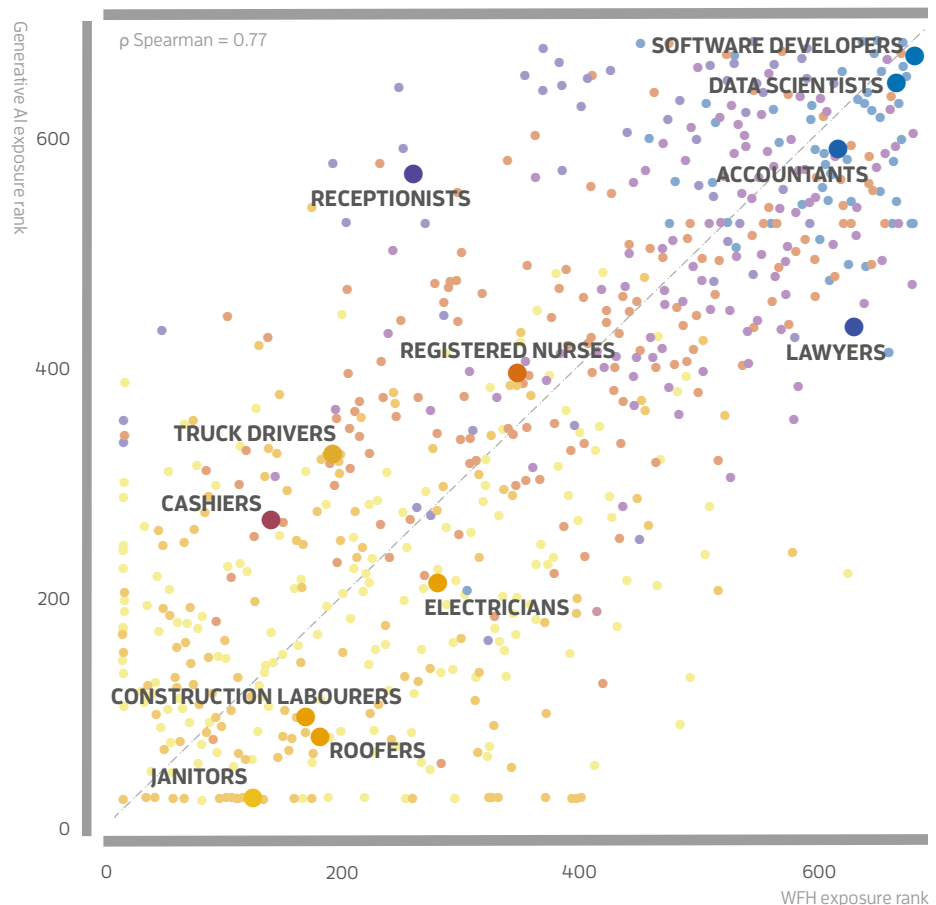
To pull the two apart, we analyse data on 243 million records on new hires and 407 million online job postings across Australia,

Canada, the UK and the United States covering 2017 to 2025.

The evidence that we find most convincing comes from firms’ actual adoption of remote work, based on explicit mentions of offering remote work for a particular role in the firm’s job postings. Companies that offered remote or hybrid roles in 2021 or 2022 went on to cut the junior share of their hiring relative to firms that did not offer remote work but were otherwise similar. This result holds even when we match firms on their exposure to AI and WFH exposure, based on their occupation mix.

When considering only one exposure measure at a time (either an occupation’s generative AI exposure or its WFH exposure), a two standard deviation increase in either measure predicts roughly a 5 percentage point fall in the junior share of new hires and a 3 percentage point drop in the share of adverts

Figure 2: **Working from home and generative AI exposure are highly correlated across occupations**



Notes: Each dot is one of 683 6-digit O*NET-SOC occupations, ranked on the two exposure measures.

Source: Lambert and Schindler (2026).

for inexperienced workers. But when accounting for both exposure measures in the analysis, the AI effect shrinks while the remote work effect remains significant (see Figure 3).

To put the WFH effect into context, compare construction carpenters, whose work is hard to do from home, with financial analysts, where working a few days from home has become commonplace. By 2025, relative to carpenters, roughly one in 20 new financial analyst hires switched from junior to senior roles, and one in 33 analyst job adverts has raised its experience requirement above three years.

Why remote work can be problematic for juniors

Junior employees need supervision, feedback and on-the-job learning to become productive (Aksoy et al, 2025). This process is helped by working alongside senior colleagues: a quick question across a desk, a manager overhearing a mistake or the informal apprenticeship of watching experienced employees. A study of software engineers at a Fortune 500 firm

finds that sitting near to colleagues raises the feedback received by 18%, with gains concentrated among the youngest (Emanuel et al, 2023).

Remote work makes that harder and more costly (Yang et al, 2021). Mentoring becomes a scheduled video call rather than a passing conversation, and the “out of sight, out of mind” effect falls hardest on those who most need to be seen – junior staff members.

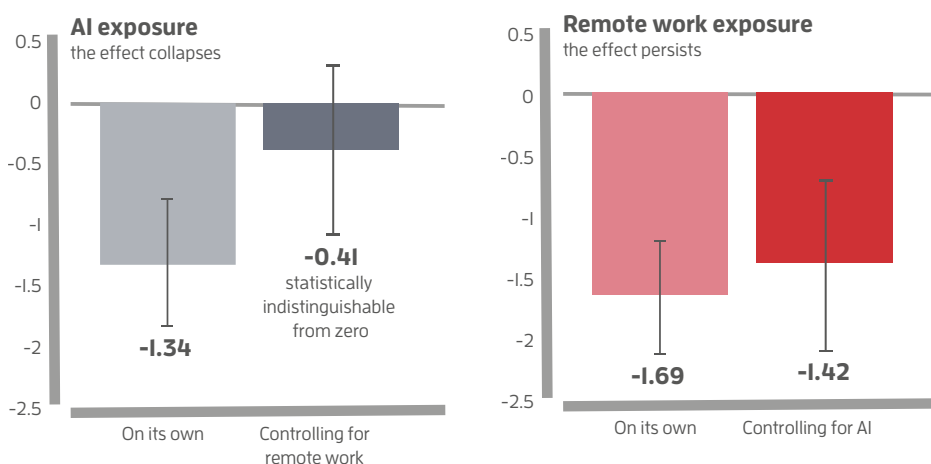
When the speed at which junior workers become experienced workers slows down, firms place less value on hiring workers who still need to be trained. As a result, firms pull back from hiring inexperienced workers.

We are careful not to rule out the role of generative AI, but rather highlight the challenge of separating the two effects. Other work using payroll data emphasises that generative AI effects survive controlling for WFH intensity (Brynjolfsson et al, 2025).

What we may be looking at is a double whammy: two shocks that have made junior staff both less desirable to hire, due to

Companies that offered remote or hybrid roles went on to cut the junior share of their hiring

Figure 3: The AI effect attenuates once remote work is taken into account



Notes: Y-axes show estimated change in the junior share of new hires (percentage points), 2023 to 2025 average, per one standard deviation increase in exposure.

Source: Lambert and Schindler (2026).



Part of the decline in junior hiring is due to remote work – but workplace reorganisation can address this



The jobs most exposed to AI are also those most likely to have gone remote: white-collar, desk-based, routine cognitive work

supervision and monitoring frictions, and less necessary, due to AI tools augmenting senior staff and automating junior roles.

David Deming of Harvard University calls this the “containerization” of work – an apt description of how the pandemic broke white-collar jobs into self-contained, well-specified chunks that can be handed over remotely – and just as easily to machines. Market signals cut both ways too: IBM plans to triple its US entry-level hiring around AI-redesigned roles and Dropbox is expanding graduate intake by a quarter.

Addressing the costs of remote working while retaining the benefits

To the extent that the slowdown in junior hiring is attributable to WFH, the implication is encouraging: organisational frictions are a more tractable challenge than technological displacement. Management practices can be changed, mentorship practices updated and training to prepare today’s juniors for future leadership roles can be prioritised. As a last resort, an extra day per month in the office can also help (Aksoy et al, 2026) – something that’s already happening as firms in finance, technology and media bring staff back to the office.

We stress that our findings are not an argument in favour of a blanket return to five days per week in the office. Remote work has wide-ranging benefits (Bloom et al, 2024) and full reversion to in-person work is both unlikely and undesirable. The fix is more likely to be better use of time spent onsite, ensuring that in-person days are loaded with opportunities for feedback, mentoring and learning.

Two significant disruptions arrived in workplaces at almost the same time, and they need to be studied together. Our findings complement the existing AI evidence rather than overturning it: at least a part of the decline in junior hiring appears to be due to the adoption of remote work.

Fortunately, that part can be, and should be, mended by workplace reorganisation that both keeps the many benefits of remote work while also ensuring that onsite days deliver the type of training and tacit knowledge transfer required to create the next generation of senior workers.

This article is based on Lambert, P.J. and Schindler, Y. (2026) *The Broken Ladder: AI, Remote Work, and Early-Career Hiring*, CEP Discussion Paper No. 2193. An earlier version first appeared on LSE Business Review (<https://blogs.lse.ac.uk/businessreview/2026/08/17/chatgpt-or-zoom-which-broke-the-career-ladder/>).

Peter John Lambert, an economist with positions at LSE and the University of Warwick, is a research associate in CEP’s growth programme. **Yannick Schindler** is a senior research economist at the Ellison Institute of Technology and a senior research fellow in the department of economics, University of Oxford.

Further reading

Aksoy, C.G., Bloom, N., Davis, S.J., Marino, V. and Özgüzel, C. (2025) *Remote work, employee mix, and performance*. NBER Working Paper No. 33851.

Aksoy, C.G., Bloom, N., Davis, S.J., Marino, V. and Özgüzel, C. (2026) *The value of one office day a month*. CEPR Discussion Paper 21597.

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Tariff confusion

The way that US tariffs were announced doubled their negative impact



In 2025, there was a series of major changes in US trade policy. From new steel and aluminium duties to “fentanyl” tariffs on China and “Liberation Day” tariffs covering almost all trade partners, the year was unprecedented in the frequency, complexity and volatility of policy interventions. Between February and December 2025, 53 announcements introduced, delayed, reinstated or changed tariffs.

Overall, these announcements led to higher tariffs, and it is well established that tariff increases reduce trade. But did the capriciousness with which policy changes were announced and implemented lead to additional trade disruption? Our new research provides evidence that it did.

Frequent, complex revisions make it harder to keep track of tariff levels. We find that tariff confusion about the current state of US tariff policy led to significant declines in US imports during 2025.

Strikingly, we estimate that the fall in US imports due to tariff confusion was similar in size to the reduction caused by tariff increases alone, meaning that confusion doubled the negative impact of tariffs. These results

illustrate previously unexplored consequences of the manner in which trade policy changes are introduced.

What is tariff confusion?

Periods of frequent and complex policy announcements require firms continuously to monitor and process the arrival of new information. This information problem becomes more difficult as announcements accrue over time.

Tariff confusion then arises if firms miss an announcement; are unsure which origins and products it affects; or struggle to determine how it changes the prevailing tariff rate. While distinct from uncertainty about hypothetical future tariffs, confusion can be seen as a manifestation of trade policy uncertainty in real time.

The reactions of business to policy announcements during 2025 revealed rising confusion as firms struggled to keep abreast of the latest changes. “Tariffs mean an economic hit for US firms – but also confusion”, reported *Fortune* magazine in April. “Confused and concerned, CEOs get to grips with [the] new tariff regime [and] a new era of tariff

complexity”, flagged *CNBC* in August, quoting Oliver Bate, CEO of German insurance giant Allianz: “If you are not confused, I don’t know what confuses a human being.”

Measuring tariff confusion

To study confusion formally, we construct a new US Tariff Announcement Database (USTAD). The database tracks all US trade policy announcements made via presidential executive orders and proclamations in 2025. The 53 announcements in USTAD led to 1.45 million changes to tariffs on origin-product pairs with positive US imports in 2025. Of these changes, 1.05 million were tariff increases, while 0.39 million were decreases.

We use USTAD to calculate the statutory import tariff and four indicators of potential tariff confusion for each origin country, product, and month. Our four indicators of tariff confusion are: the cumulative number of policy announcements that affect a given origin-product pair; the number of possible announcement combinations firms need to track (tariff mess); the highest tariff across all relevant announcements (tariff max); and the gap between this highest tariff and actual tariffs (tariff miss).

The consequences of trade policy changes depend on how they are implemented

In 2025, 53 US tariff announcements led to 1.45 million changes to tariffs on origin-product pairs

The statutory tariff and all our tariff confusion measures increased sharply during 2025 with considerable variation across origin country-product pairs. Figure I shows the tariff rate and three of these indicators.

How tariff confusion affected US imports

We make use of the variation in statutory tariff changes and tariff confusion across products, origin countries and months during 2024/25 to analyse the trade effects of US policy changes. Our analysis disentangles the impact of tariff confusion from the consequences of higher statutory tariffs.

We find that both higher tariffs and greater tariff confusion significantly disrupted US imports in 2025. A 10% higher tariff reduced monthly imports by 3.3%–4.9% on average across countries and products. Conditional on the tariff, each additional tariff announcement lowered imports by another 3.0%.

Our estimates imply that higher US tariffs reduced US imports in December 2025 relative to December 2024 by 4%–6% for the average origin country-product pair. Cumulative tariff

confusion caused an additional 7%–12% fall in imports. This additional fall would not have occurred if tariffs had been raised once and for all in a clear policy statement.

The reductions in US imports caused by higher tariffs and tariff confusion both occurred primarily through lower import quantities, with little or no effect on pre-tariff import prices. We also find that the impact of tariff confusion was persistent throughout 2025 and was more damaging at higher tariff levels.

Notably, the reduction in US imports due to tariff confusion was smaller for products that tend to be more customised or have stickier buyer-supplier relationships. Imports from countries with greater trust in foreigners were also less affected. These findings are consistent with product customisation, relationship trust and partner reputation enabling firms to maintain trade activity during information shocks.

The paper's findings show that the consequences of trade policy changes depend on how the changes are implemented. A single, unambiguous policy statement is less disruptive

This article summarises Manova, K., Novy, D., Sampson, T. and Tang, A. (2026) *Tariff confusion*. CEP Discussion Paper No. 2195. An earlier version first appeared on LSE United States Politics and Policy (<https://blogs.lse.ac.uk/usappblog/2026/09/14/confusing-tariff-announcements-trade-decline/>).

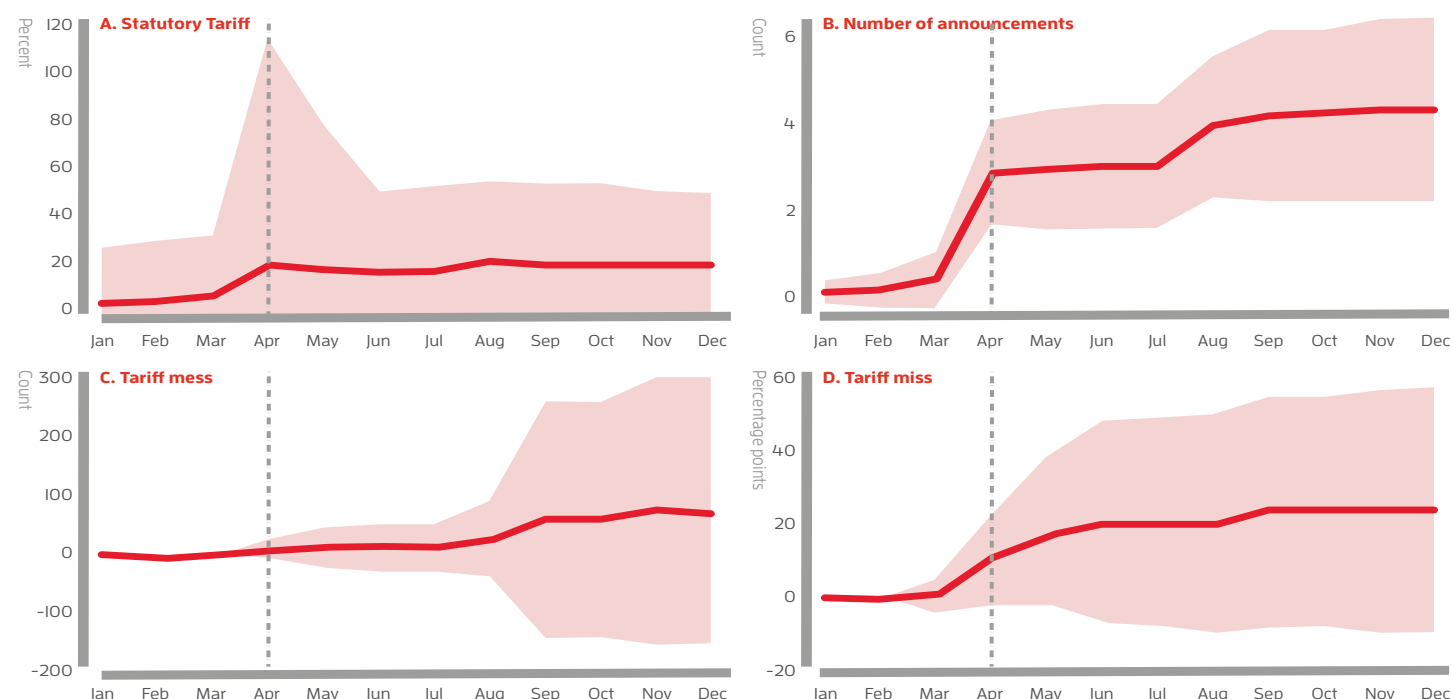
Kalina Manova is a professor of economics at University College London and a research associate in CEP's trade programme.

Dennis Novy is a professor of economics at the University of Warwick and a research associate in CEP's trade programme. **Thomas Sampson** is an associate professor of economics at LSE and a research associate in CEP's trade programme. **Aaron Tang** is a PhD student at University College London.

than repeated, complex announcements. Our results imply that the drop in US imports caused by the 2025 tariffs would have been around 50% smaller if there had been no confusion about US tariff policy.

The value of information transparency highlights the importance of the design of the trade policy process. Monetary authorities have long recognised the value of transparency and predictability. Perhaps these values should also guide trade policy institutions.

Figure I: US statutory tariffs and tariff confusion: January – December 2025



Notes: This figure shows statutory US import tariffs, the number of relevant tariff announcements, the number of possible announcement combinations divided by 1,000 (tariff mess), and the gap between announced and implemented tariffs (tariff miss) by month in 2025. The solid line plots the average across origin country-HTSIO product pairs, while the shaded area represents the inter-quartile range in panel (a) and one-standard-deviation bands in panels (b)-(d).

Source: Manova et al (2026).



Maritime chokepoints

World trade remains dangerously dependent on a handful of shipping lanes

Despite the digitisation of the global economy, world trade is still only as resilient as the physical routes it depends on. Around 90% of freight still travels by sea and the shipping network does not always run smoothly (Kaluza et al, 2010). Traffic between regions is often forced through a small number of “chokepoints”, including straits and canals. When these are disrupted, the consequences can be significant.

After the container ship *Ever Given* ran aground and blocked the Suez Canal for six days in March 2021, the World Trade Organisation estimated that the stoppage knocked somewhere between \$6bn and \$10bn off global trade volumes. The disruption made headlines, rattling stock markets and inspiring countless memes.

Many of the arteries that carry the bulk of world trade are vulnerable in other ways. Attacks by Houthi rebels on shipping in the Red Sea regularly disrupt that route. Drought has led to reduced water levels and restrictions on the

size of ships that can pass through the Panama Canal. And the closure of the Strait of Hormuz during the current war between Iran and the United States has contributed to both an energy crisis and increased inflation in much of the world (Hosein and Saridakis, 2026).

In a new study, we compare quantitatively, for the first time, just how exposed world trade is to several key waterways.

Modelling a world without its shortcuts

We measure sea routes between 455 ports with a statistical model of trade that lets us simulate what would happen if a major route closed or if a new one opened.

We simulate shutting three shipping lanes: the Panama Canal (which connects the Caribbean Sea with the Pacific Ocean), the Suez Canal (between the Red Sea and the Mediterranean Sea) and the Strait of Malacca (between the Indian Ocean and the South China Sea).

We also look at opening two new routes:

a year-round Northwest Passage (connecting the Atlantic and Pacific oceans through the Arctic north of Canada) and a proposed canal across Thailand’s Kra Isthmus (see box). The latter scheme would lower the distance for many shipment routes between China or Japan and Europe, although the Thai government has also considered a land-bridge project instead of a canal.

Our numbers show a similar disruption potential for all three major waterways that we examine. A permanent closure of Panama would cut global trade by about 2.9%; closing Suez would cost the world 2.5%; and closing Malacca would cost 1.7% (Table I).

Each is important enough, on its own, to inflict damage to global trade of roughly the same order of magnitude. But substitutability is also relevant. If Suez closed, ships could still reach Asia from Europe by sailing around the South Africa’s Cape of Good Hope. This route is longer and costlier, but also well established.

Countries that border key routes are hit hardest by disruptions: if the Suez Canal closed, Egypt would lose roughly 8% of its GDP

Losing Panama is somewhat more damaging in relative terms: it severs the link between the Atlantic and Pacific coasts of the United States, requiring a very lengthy detour around the southern tip of South America.

From trade to living standards

Lost trade is not an abstract number. It also leads to lower overall GDP. Our model translates the Panama scenario into an immediate 0.6% hit to world GDP, with Suez costing 0.5% and Malacca 0.3%. These figures capture the moment just after a closure, before firms and shippers have had time to adjust. Over the longer term, the losses are likely to reduce as the system will find workarounds.

The global averages disguise substantial variation across countries. For the United States, the Panama Canal is critical for connecting its east and west coasts: a closure would cut US trade by more than 10%. China, by contrast, would barely notice, with a marginal trade drop of 0.1%.

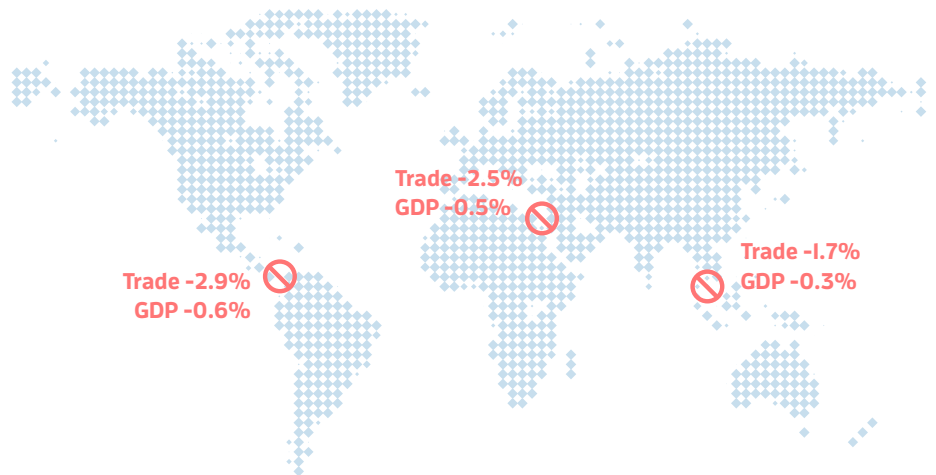
Perhaps unsurprisingly, China's vulnerability lies in the Strait of Malacca. This is the chokepoint through which much of its energy imports and manufactured exports must pass. Our model has Chinese trade falling by 2.3% if that closed.

For Europe, Suez is the binding constraint. A closure would cut Greek trade by more than 8% and Romanian trade by over 7%, with Italy losing around 5%.

Table I: **Simulated global effects of closing the three major maritime chokepoints**

Scenario	Global trade	Global GDP
Panama Canal closure	-2.9%	-0.6%
Suez Canal closure	-2.5%	-0.5%
Strait of Malacca closure	-1.7%	-0.3%

Source: Maurer et al (2026).



The Kra Plan: A short cut across Thailand

The Kra Plan, a canal cutting through the Kra Isthmus in Thailand, has endured many iterations – and obstacles – since its conception. The idea dates back to 1677 but was abandoned due to the technological limitations of the era. Renewed French interest in the project during the 19th century was curtailed by a wary Siamese government, seeking to preserve good relations with Britain.

Contemporary ambitions for a 100-kilometre waterway connecting the Gulf of Thailand with the Andaman Sea saw Thai and Japanese investors conducting a feasibility study in the 1980s before political tensions in the region undermined the project.

If constructed, the Kra Canal would be an alternative to the Strait of Malacca – shortening transit routes around Singapore and Malaysia by 1,200 to 1,400 nautical miles, and sailing time by up to four days. The route, linking the Indian and Pacific Oceans, would also ease the “Malacca dilemma” of China, which is critically dependent on the chokepoint for its oil imports and manufacturing trade. The US has defence-cooperation partnerships with Indonesia, Malaysia, Singapore and Thailand, enabling it to

have oversight of critical shipping lanes for Beijing's energy supply chains. While Beijing has not openly endorsed any plans, an alternative shipping route would lessen the geoeconomic risk of the Strait of Malacca for China, as well as provide another door to the Indian Ocean.

For Thailand, even as the Kra Plan offers immense economic trading power, it would geographically split the nation in two, potentially reinforcing tensions with separatist movements in the south. Further, low-end costs for the project are estimated at around \$18bn, posing a financial hurdle for the Thai government along with concerns over an influx of foreign investment necessary for the project. As an alternative, the government recently considered a “land-bridge” as a way to connect upgraded deep-water ports in the Ranong and Chumphon provinces – but plans have been put on hold due to the high economic costs and environmental risks associated with construction.

By Lia Bergin

The costs of maritime disruptions come less from the direct loss of trade than from damage to production chains



But it is the countries that border these routes that are hit hardest of all. If Suez closed, Egypt would lose over 40% of its trade and roughly 8% of its entire GDP. When we use a model-driven measure of national wellbeing, which is broader than mere GDP and trade flows, Mexico and Panama each lose around 4% in the Panama scenario, Qatar loses almost 3% in the Suez scenario, and Malaysia loses nearly 4% if Malacca closes.

Does the model match reality?

Trade statistics are published with a lag, which makes it hard to test a model like ours against real world events as they happen. But financial markets react in real time. We compare our model's predictions with how stock markets in 15 countries actually moved while the Ever Given blocked Suez.

We find that countries more exposed to the Suez route according to our model did tend to see sharper market falls during the blockage. But with only 15 countries in the comparison, and India exerting an outsized pull on the result, we would flag this as suggestive rather than conclusive evidence.

Our headline estimates do not reflect the full impact of closures. When we extend the model to account for the way in which disruptions ripple through global supply chains – drawing on a methodology developed for solving gravity models (Campos et al, 2025) – the estimated losses from a chokepoint closure are 50% higher than in our simple baseline. That's because much of the true cost of these disruptions comes not from the direct loss of trade itself, but from the subsequent damage to production chains upstream. This finding

New shipping routes could matter far more as insurance against future disruptions than as growth engines in their own right

is particularly important for those industries that have built their supply chains around the assumption that goods will always get through.

New routes are a slow burn, not a quick win

If closures are costly, do new waterways boost trade? According to our results, the answer is not by much, at least not immediately. Opening a Kra Canal would raise global trade by only 0.7%; a fully navigable Northwest Passage would add just 0.6%.

The modest figures reflect how deeply path-dependent shipping networks are. Ports, fleets and supply chains have spent decades organising themselves around the routes that already exist, so a new shortcut starts out serving only a narrow slice of traffic.

But while a closure does its damage immediately and the cost fades over time as the system adapts, opening works the other way round – gains are small on day one and grow over decades, as industrial clusters and trading relationships gradually adjust and new

This article summarises Maurer, S., Milson, L. and Rauch, F. (2026) *The fragility of the global trading system*. CEP Discussion Paper No. 2186. An earlier version first appeared on LSE Business Review (<https://blogs.lse.ac.uk/businessreview/2026/07/09/world-trade-remains-dangerously-dependent-on-a-handful-of-shipping-lanes/>).

Stephan Maurer is a Ramón y Cajal Researcher at the UPF Barcelona School of Management and a research associate in CEP's labour programme. **Luke Heath Milsom** is an assistant professor of economics at KU Leuven and an associate at the Institute for Fiscal Studies. **Ferdinand Rauch** is a professor of economics at the University of St Gallen in Switzerland and a research associate in CEP's urban programme.

trade infrastructure sets up along the route. So new routes could end up mattering far more as insurance against future disruption elsewhere than as growth engines in their own right.

What this means for policy

Our study finds not that one canal is more important than another, but that world trade remains highly dependent on a small number of locations. That matters for policy in four ways.

First, having a number attached to the risk lets governments and firms weigh the cost of securing a route against the cost of leaving it exposed. It quantifies for China and the United States why Malacca and Panama are so critical for their economic security.

Second, new routes through the Arctic or a Kra Canal are unlikely to transform global trade flows quickly, but they could offer welcome insurance against problems elsewhere.

Third, because the sharpest losses come in the immediate aftermath of a shock, before adjustment mechanisms can kick in, building resilience through diversified suppliers and flexible logistics matters more than waiting for alternative routes to appear as substitutions.

And finally, since a substantial share of the ultimate cost is transmitted through supply chains rather than trade volumes directly, resilience planning should look beyond the route itself to the production chains that depend on it.

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EV growth driven by batteries, not oil shocks

As the electric vehicle network reaches a tipping point, the economics changes and the link with oil prices breaks

When the Strait of Hormuz first closed in March and oil hit \$120 a barrel, a very old question came back: is this finally the moment electric vehicles take off for good – or just another false start?

EVs have been here before. They surged after the 1973 oil embargo, collapsed when oil fell, and surged again. Each wave died when the external pressure eased.

We think this time is different. Our research finds that the economic case for electric vehicles is now improving on its own terms. This is because of what has happened to batteries, not because of the oil price. The same evidence, though, shows the transition creates new problems as serious as the ones it solves.

Why this time is different

Battery costs have fallen 93% since 2010. That is the number that changes everything.

A pack that cost more than \$1,000 per kilowatt-hour in 2010 cost \$108 by late 2025, driven down by a decade of learning, investment and policy support.

Research on the global battery industry finds that every time cumulative production doubles, costs fall by around 9%. More buyers, more production, lower costs, more buyers (Barwick et al, 2025).

Unlike the 1970s, this loop does not need an oil crisis to keep spinning. Electric cars have crossed lifetime cost parity with petrol vehicles across much of Europe (Hargrove et al, 2024); in the used-car market they now have the lowest total cost of ownership (Woody et al, 2026). Newer models even match petrol cars in estimated lifespan – something early EVs could not claim (Nguyen-Tien et al, 2025).

Global sales surpassed 17 million in 2024, one of the fastest technology diffusion processes

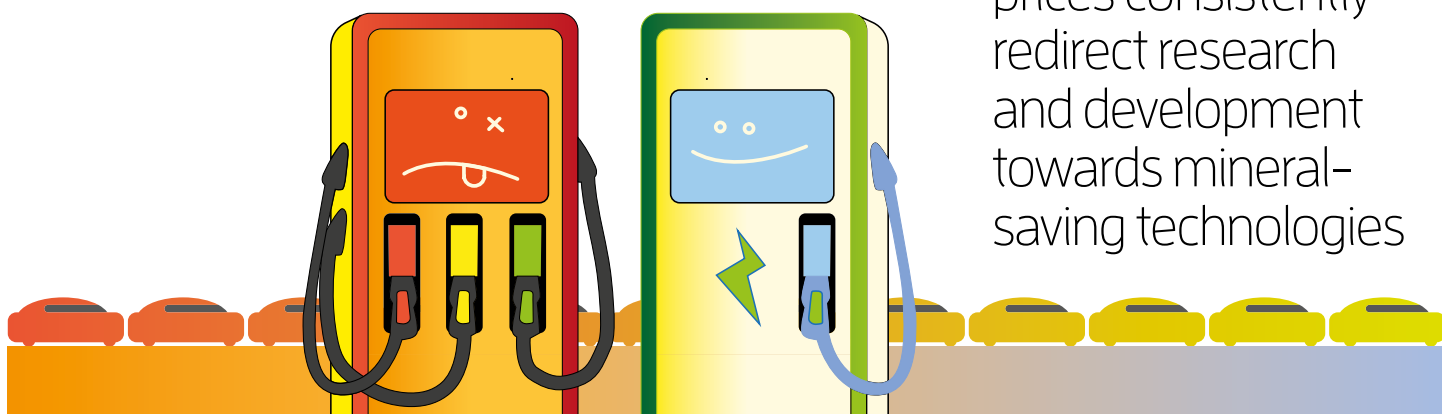
in the history of transport. Norway is near-fully electrified. And Ethiopia reached around 60% EV sales share in 2024, powered by cheap hydroelectricity – some way ahead of the US, for instance, which sits at around 8%.

An economic platform, not just a better engine

The deeper reason this wave will not fade is not technical – it is economic. An EV is a platform. Its value grows as the network around it grows, just as smartphones became indispensable not because of the hardware but because of everything connected to it.

Every charger built makes the next EV more attractive. Every software update raises the value of every car already on the road. Every recycled battery feeds back into the supply chain that makes the next one cheaper. It's part of the reason some other technologies like

Higher mineral prices consistently redirect research and development towards mineral-saving technologies



The transition to electric vehicles creates new problems as serious as the ones it solves

hydrogen fuel cell vehicles have struggled to get off the ground in numbers – the tech exists, but all the other elements aren't quite there.

One study of 8,000 drivers in Shanghai found that range anxiety – the fear of running out of charge – has a real economic cost due to unnecessarily avoided trips (Barwick et al, 2026). But that cost is falling sharply, not because batteries improved, but because charging networks expanded.

Making real-time charger availability visible could add 6 to 8 percentage points to market share by 2030 (Asensio et al, 2025). And because EV charging is far more flexible than other household electricity demand, drivers can shift away from peak hours remarkably easily when the price is right – turning the car into a grid asset, able to store and release electricity when needed (Bailey et al, 2025). These are economic network effects, not engineering features.

Swapping one dependency for another

Ending oil dependence does not end geopolitical exposure. It relocates it.

In late 2025, China introduced rules requiring government approval for exports containing more than 0.1% rare earths. The leverage that once came from control of oil flows now comes from control of processing capacity and component supply chains.

The minerals at stake – lithium, cobalt, nickel, graphite and neodymium to name but a handful – carry their own geopolitical risks and, as we have written elsewhere, serious human costs in the communities that mine them (Jones et al, 2022). This creates a predictable cycle of social contestation that threatens to stall the transition unless the industry commits to responsible, sustainable innovation.

The metal cobalt traditionally helped EVs travel further on the same charge. And when prices spiked, so did research into making batteries with less or even no cobalt. Today, more than half of all EV batteries sold globally are cobalt free (IEA, 2026).

Four decades of patent data show the same pattern: higher mineral prices consistently redirect research and development towards mineral-saving technologies.

Recovering lithium and cobalt from used batteries is becoming economically viable too, shifting part of the supply chain away from geopolitically exposed extraction sites (Harper et al, 2019). In addition, Norway and other countries are looking to exploit new critical mineral resources to diversify supplies.

The transition is real – but not risk-free

The Hormuz crisis is a reminder of what concentrated energy dependence costs. The EV transition does not need it. The learning curve

keeps falling, the platform keeps compounding, the economics keep improving. That is what makes this wave different.

What it does not do is eliminate geopolitical risk. Unlike oil, where leverage comes from control of energy flows, EV supply chains concentrate power at materials, processing capacity and technological bottlenecks – supply chains that are highly concentrated and carry their own serious risks. Fuel dependence becomes mineral dependence. That dependence is highly concentrated.

Traditional car making regions are already absorbing concentrated job losses (Celasun et al, 2023), and history shows such disruptions leave persistent scars even if the long-term aggregate effects are positive. Yet electric vehicle assembly is proving more labour-intensive in western countries than expected – requiring more workers on the shopfloor, not fewer, at least in the ramp-up phase (Weng et al, 2024). Contrast this with China, where massive automation has led to the creation of “dark factories” where there are so few humans, internal lighting isn't required.

The same regions facing losses could benefit. But the gains and losses do not fall on the same people. That is where the work remains.

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Read Viet Nguyen-Tien's article on why we need replication games on page 17.

Robert Elliott is a professor of economics at the University of Birmingham. **Gavin Harper** is a research fellow at the Birmingham Centre for Strategic Elements and Critical Minerals at the University of Birmingham.

Viet Nguyen-Tien is a research economist in CEP's growth programme.

Ending oil dependence does not end geopolitical exposure – it relocates it

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The childcare track

One in three women and one in six men leave academia after becoming a parent

Women are under-represented at the top of most professions (Bertrand, 2018), including in academia (Auriol et al, 2022). We study whether and to what extent having children explains the persistent glass ceiling in academia.

The career ladder in academia is of particular interest as it is a “greedy” occupation (Goldin, 2014) due to its lack of substitutability among workers, long hours with increasing returns to productivity, and the importance of establishing and maintaining personal contacts.

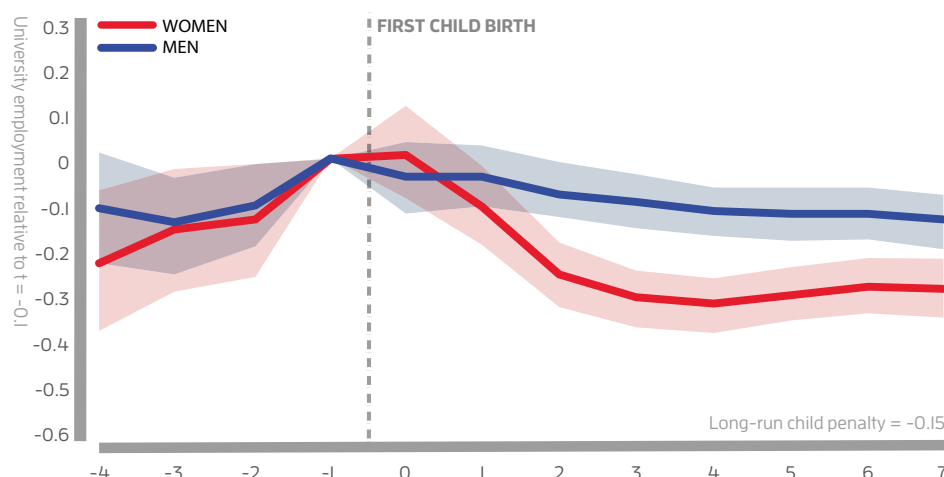
More generally, academia is important to study as it has spillovers onto wider society as barriers to women in research risk a substantial loss in the overall quality and productivity of science (Hsieh et al, 2019), and less work on topics relevant for women (Antman et al, 2024; Einiö et al, 2019). What’s more, a lack of role models might further discourage women’s participation in fields dominated by men (Porter and Serra, 2020).

To study how children affect academic trajectories, we combine population level data on all individuals who started a PhD over a 25-year period in Denmark. This results in detailed information on educational and labour market outcomes, as well as personal and family characteristics of more than 13,000 individuals that we track from the start of their academic journey. We combine this with data on the research output of each individual, and a unique survey that elicits the aspirations and family constraints of academics and PhD students.

The impact of becoming a parent

We find that career trajectories for women and men track closely until the arrival of their first child. At that point, a striking divergence emerges with one in three women leaving academia when they become a parent, compared with one in six men (see Figure 1). This disparity translates into a long-run child penalty of 15% in academic employment. This gap is not driven by women

Figure 1: Impact of children on university employment



Notes: The figure plots the gender-specific impact of children for men and women across time. Outcomes shown at event time t are relative to the year before the first childbirth $t = -1$. The figure includes 95% confidence intervals around the coefficients. The estimations include fixed effects for age, year and years since PhD start relative to the event.

Source: Cairo et al (2026).

While most Danish academics believe that work and childcare should be shared equally between partners, mothers do five times more caring than fathers



moving to the broader research sector, pursuing academic careers abroad or exiting the labour market altogether.

On average, these women still experience a substantive child penalty in earnings, while men's earnings are not affected. Women's likelihood of having a tenured position, defined as an associate or full professorship, drops after motherhood and remains 23% lower than men's eight years later. Fatherhood has no detectable effect on men's likelihood of tenure.

While research output drops and remains 31% lower for women, men's research output isn't affected by fatherhood. Nonetheless, we find that rather than the difference in the rate of output after becoming a mother, the most important determinant for under-representation of women in senior positions is their disproportionate exit from the profession following motherhood.

Equal ambitions but different realities

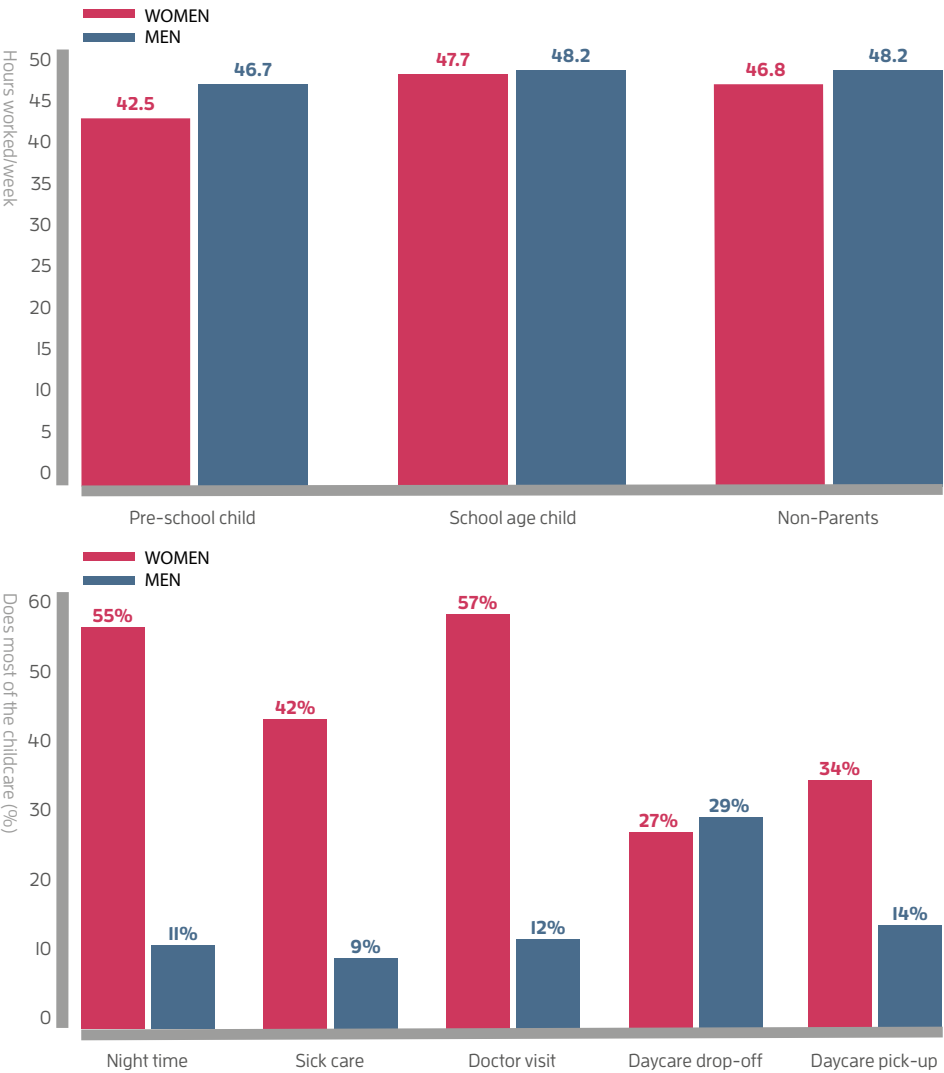
What explains this divergence? A common explanation is that women may have lower career ambitions, but our findings suggest that the observed gaps are not driven by differences in ambition or preferences at the outset of academic careers.

Using novel survey evidence collected among PhD students, we find that men and women report strikingly similar aspirations for academic careers. Both groups express equal interest in research and teaching, and place comparable importance on key job attributes such as career advancement, intellectual challenge, independence and job security.

But after becoming parents, women in academia adjust their behaviour substantially more than men (Figure 2). Both men and women academics report on average working seven hours longer than the average working Dane, yet women academics with preschool-aged children work four hours less per week than men with children of the same age, corresponding to a 10% shorter work week.

While the vast majority of both men and

Figure 2: Working hours and childcare split



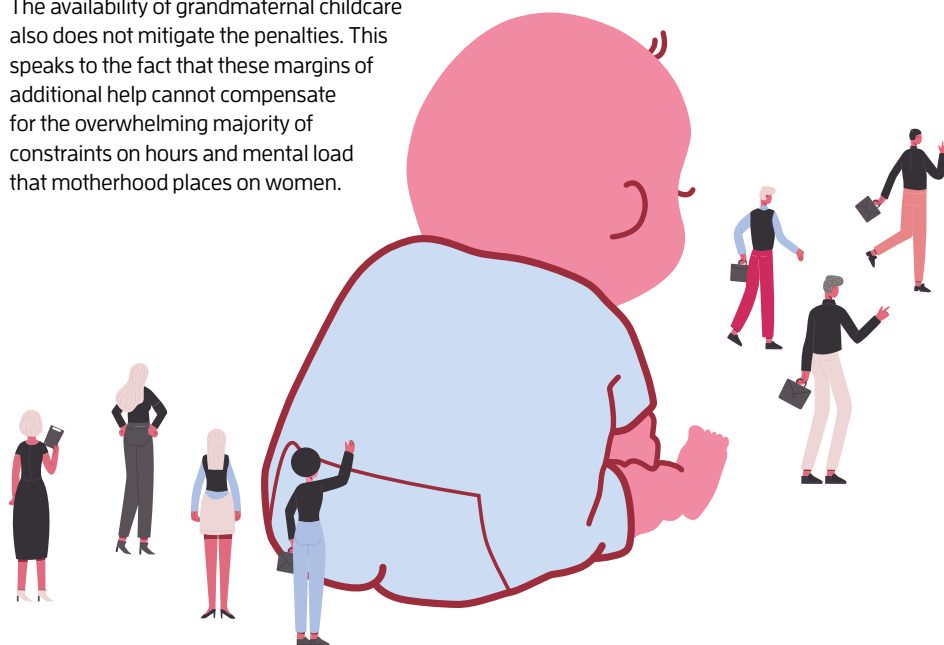
Notes: Panel A reports the answers to the question “How many hours do you work in a typical week?” split across individuals who reported having a pre-school child (aged 6 or younger) versus school-age child(ren) versus individuals without a child. It is based on 1500 responses of parents and 900 responses of non-parents. Panel B reports the share of individuals who replied “Always me” or “Mostly me” to the question “In your household, when your youngest child was not yet of school age, who performed the following tasks?” across the following categories: getting up at night to take care of the child, taking care of the child when they were sick, taking the child to the doctor, taking the child to paid care and picking up the child from paid care. It is based on 1100 responses.

Source: Cairo et al (2026).

women academics believe that work and childcare should be shared equally among partners, they also report that mothers assume five times as many childcare responsibilities than fathers. The gender differences in childcare are particularly pronounced for care with unpredictable timing that constrains working ability, such as doctor's visits, sick days and night-time childcare.

We also find that mothers are less likely to move for their academic job than fathers or academics without children. This vastly reduces their employability options.

We show that child penalties are not reduced if the woman's partner has an academic background himself or takes up paternity leave. The availability of grandmaternal childcare also does not mitigate the penalties. This speaks to the fact that these margins of additional help cannot compensate for the overwhelming majority of constraints on hours and mental load that motherhood places on women.



Flexibility can only stretch so far

Finally, we document how different work environments affect the size of penalties. We find that different scientific fields, despite varying workplace flexibilities, yield the same child penalties.

This implies that flexibility doesn't compensate for the demand on hours. Consistent with previous findings on women role models (Porter and Serra, 2020; Kjelsrud and Parsa, 2024), we find that women trained in departments without senior women and in highly productive, competitive departments face larger child penalties. This speaks to a barrier that contributes to the leaky pipeline of women – a lack of role models and a competitive work environment that interacts negatively with childcare responsibilities.

In sum, we find that around 70% of the observed gender gap in academic employment

and around 40% of the gender gap in tenure can be attributed to child penalties (Kleven et al, 2024).

Even in one of the most progressive societies with generous parental leave policies, universal childcare coverage and among the highly-educated people saying that they believe childcare should be shared, a strongly gendered pattern of domestic division of labour plus differences in who takes up and moves for "greedy" jobs leads to the under-representation of women in science and academia.

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A strongly gendered pattern of domestic division of labour plus differences in who takes up and moves for 'greedy' jobs leads to the under-representation of women in academia

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The robustness of doubt

Why replication games are a public good

As a graduate student of economics, one of the best ways to learn your trade is to download the replication package (files containing the information needed to allow others to reproduce the work) of a paper you admire and try to make the numbers come out. You see how a research question became a research design, and how a causal claim became a defensible comparison. You begin to understand the judgment calls that every paper contains.

This replication work matters beyond the seminar room – economic research is used to set interest rates and to allocate public funds. Knowing the strength of the research foundations of such decisions is a public good, not a private reckoning. The spread of mandatory replication packages across journals has now made it possible to check published work at scale – and researchers have started doing it together rather than alone.

Reproducible, robust and replicable

There are three terms worth keeping straight. A result is computationally reproducible if the original code on the original data returns the published numbers; robust if it survives reasonable alternative choices on that data; and replicable if it holds when new data are used. Most of what we call “the replication crisis” is about robustness, and it is the hardest to see from outside, because the sturdy result and the fragile one look identical on the page.

In 2023, I joined a replication games event in Norwich, run by the Institute for Replication, to pressure-test a published paper's data and code. I was paired with two colleagues I had not collaborated with before. The organisers gave us a list of articles from the top economic journals, and the three of us settled on one whose central finding we all found striking: that in response to power shortages an energy-saving campaign, by discouraging use of air conditioning, had raised mortality on the hottest days. It matched our interests and we felt equipped to interrogate it.

The code ran and the numbers matched: the result was computationally reproducible. But robustness checks are redesigns. We asked whether the finding described the average person or the average region, and how much rode on that distinction. We tested alternative assumptions to see which comparison was doing the causal work. And where a key variable had been constructed from search data, we rebuilt it from the ground up. What we found was a distribution: reassuringly, the claim held under most plausible designs.

Throughout, this was a collaborative process: our team worked together to draft the report

and, in the end, heard back from the original authors, who confirmed the results and thanked us for the care we had taken. None of us had a stake in whether the paper survived, and that professional disinterest is exactly what an author cannot supply about their own work. Checking a result is a contribution to the profession, not a case against its author.

Our exercise was one of 110 reproductions across 12 leading journals that contributed to a study published in *Nature* (Brodeur et al, 2026). The results were reassuring but showed why the profession cannot be complacent: more than 85% of claims were computationally reproducible; and 72% of significant results stayed significant under alternative specifications.

In contrast, another study, which sampled 600 social and behavioural science papers at random, found that only a quarter had shared data (Miske et al, 2026). In this case where data and code were open, the findings mostly held (74% were approximately reproducible). The larger danger lies in just how much research remains closed to scrutiny.

Building trust

Earlier this year, I went back for a stricter version: a King's College London event where reproduction itself had turned from a craft into an object of study, with artificial intelligence as the treatment. Does a language model help you to reproduce a paper faster, to catch more of its errors and to judge its robustness as well as a human would? Those are exactly the questions the field should be asking about its own tools before leaning on them.

Verification has long been thankless and lonely, seldom published and occasionally career-poisoning. The replication games turn it into something else: a professional service, closer in spirit to being asked to review a paper. On the day, you look around the room and see people at every career stage, a first-year PhD student next to a full professor, all doing the same unglamorous but essential work.

The credibility of published research is not something that we inherit; it is something that we build, measure and repair. For me, replication began as the small pleasure of poking around in someone else's data. The replication games left me with a clearer sense of what it takes to trust a number, and to deserve the trust that the public places in economics.

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Why don't we have nicer buildings?

Distinctive urban architecture is a benefit, but few want to pay for it



One reason that cities often lack distinctive architecture is that markets do not fully reward good design. Economic research shows that buildings with distinctive architecture sell for around 15% more than comparable buildings. Architectural quality also spills over to neighbouring properties, which gain roughly 9% in value from being near to well-designed new buildings.

But developers capture only part of these gains while bearing the full cost of better design. As a result, cities may end up with too few distinctive buildings.

To understand what policies might address this problem, we built an economic model of how developers choose designs and how residents value them, grounding the analysis in the evidence on price premiums and design spillovers.

By using this to compare ways of encouraging more distinctive designs, we find that the policy offering the most benefits to society would be a subsidy of roughly 10% of construction costs for distinctive buildings.

What does economic research say about architecture?

A growing body of economic research examines how the design of buildings affects property markets, neighbourhoods and planning decisions. Perhaps unsurprisingly, buildings with distinctive designs sell for more (Vandell and Lane, 1989). But distinctive architecture also shapes the character of streets and neighbourhoods, making surrounding locations more attractive.

In London, for example, properties with a view of buildings rated as more beautiful command higher prices, indicating that people value architectural quality even when they do not occupy the building itself (Ahlfeldt and Holman, 2018). Similarly, a study of the Netherlands finds that protecting distinctive buildings can also raise the value of neighbouring properties (Koster et al, 2016). Together, these findings suggest that architectural design generates local spillovers.

Other studies focus on how planning systems interact with architectural design to encourage distinctive buildings by offering incentives or regulatory flexibility. For example, in London, buildings designed by well-known architects are often allowed to be significantly taller than comparable developments (Cheshire and Dericks, 2020). Together, these findings suggest that architecture generates economic value – but they also raise questions about whether markets alone will deliver the level of design quality that people value.

Why markets produce too few distinctive buildings

The evidence that architecture affects property values raises an obvious question: if people value distinctive design, why do cities produce so many ordinary buildings? Economic research points to a simple explanation: the benefits to the developers – who are stumping up the money – are not enough to justify paying the extra cost.

When a developer invests in distinctive design, tenants and buyers inside the building may be willing to pay more. And while neighbours may also benefit from better surroundings, improved views and a more attractive street environment, it is unlikely that a developer would find these wider benefits enough of an incentive to invest in better design.

Economists describe this situation as a positive externality: the social value of architectural quality exceeds the private return to the developer who pays for it. This logic helps to explain why markets may produce too few distinctive buildings, even when residents value better architecture. Developers make rational decisions based on the incentives that they face, but those incentives do not reflect the full value that good design creates for the wider neighbourhood.

Policy ideas for better buildings

Our research synthesises dozens of empirical estimates of the value of architectural design and combines them with new evidence on how people value different styles of buildings. These empirical patterns are then used to build a quantitative model of neighbourhood development that captures how developers choose between ordinary and distinctive designs, and how residents respond to those choices. This model can then be used to explore how different policies would affect real-world cities.

If markets produce too few distinctive buildings, the next question is whether policy can help to correct this imbalance. In principle, the solution is straightforward. When private incentives do not reflect the full social benefits of an activity, economists often recommend policies that encourage the activity until private and social returns are better aligned. One direct approach would be to subsidise distinctive architectural design. A subsidy would reward developers for the broader benefits that their buildings create for neighbours and the surrounding area.

Cities sometimes use other tools to encourage better design. For example, planning authorities may grant additional development rights to projects with distinctive architecture. In London, buildings designed by well-known architects are often allowed to be substantially taller than comparable developments. Such policies attempt to provide incentives for architectural quality indirectly by offering regulatory advantages.

Another approach is to designate areas where distinctive design is required or strongly encouraged. One example is the LSE campus, which lies within Westminster's Strand Conservation Area. The conservation area aims not only to preserve but also to

Architectural design, much like other urban amenities, creates benefits that extend beyond individual buildings

In London, buildings designed by well-known architects are often allowed to be substantially taller than comparable developments

enhance the character and appearance of the neighbourhood, with new development expected to respond positively to its architectural context. Recent additions to the LSE campus – including the Saw Swee Hock Student Centre, the Centre Building and the Marshall Building – illustrate how such a setting can accommodate striking contemporary architecture rather than simply reproducing historic styles.

While these policies can help to preserve architectural quality in certain locations, they can also have unintended consequences if applied too broadly. For example, if too many distinctive buildings are mandated in a particular district, developers may respond by opting for more ordinary designs in other parts of the city because demand for distinctive architecture has already been met. This could happen even where those other locations might be better suited to high-quality design.

Evaluating these different approaches requires understanding how developers respond to incentives and how architectural spillovers affect surrounding neighbourhoods.

Quantitative models of urban development make it possible to compare these policies and assess which ones are most likely to improve the overall quality of the built environment.

Finding peak subsidies

The simulations from the quantitative model suggest a clear policy implication. Because developers capture only part of the benefits that are created by distinctive architecture, encouraging better design can increase overall social wellbeing.

The policy that performs best resembles a subsidy for distinctive architectural design. Specifically, the welfare-maximising subsidy is around 10% of construction costs for buildings with distinctive design (see Figure I).

When subsidies are small, encouraging better design improves welfare because the additional architectural spillovers outweigh the costs. But the benefits do not increase indefinitely.

One reason is that tastes for architecture differ across residents. Distinctive buildings command a price premium partly because

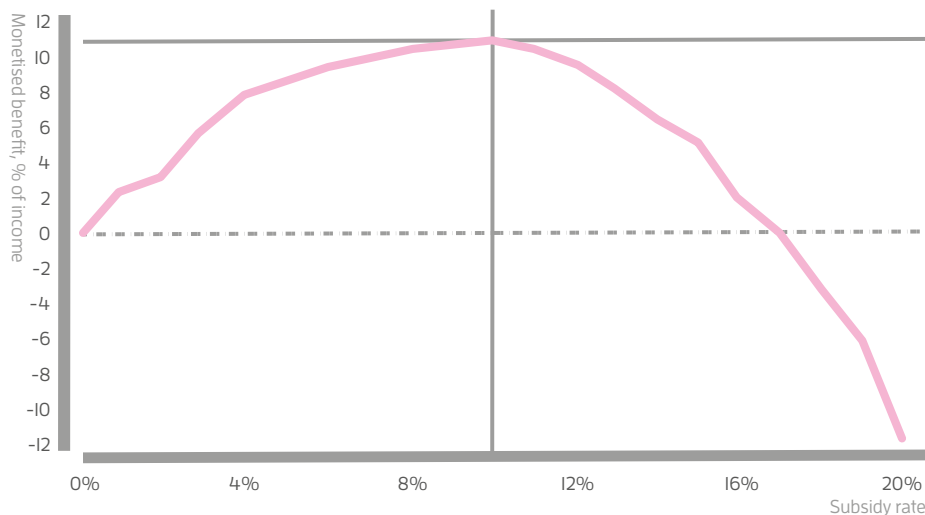
they are scarce and because some people strongly value living in them. As distinctive buildings become more common, the premium declines. More and more people end up living in buildings with distinctive design even though they do not particularly value it.

A second reason is that developers differ in their ability to deliver distinctive architecture efficiently. Some developers work closely with architects, and they can create distinctive designs at relatively low cost. Others find it more expensive to do so. As subsidies increase, more developers are encouraged to adopt distinctive designs, including those who are less efficient at delivering them.

Because the subsidy must be financed, these additional costs matter. At low subsidy levels, the value created by better architecture exceeds the public resources spent. But as subsidies grow larger, the additional buildings encouraged by the policy generate less value while the fiscal cost continues to rise. In the simulations, welfare reaches its maximum when subsidies are around 10% of construction costs and begins to fall if subsidies increase further.

The broader lesson is that architectural design, much like other urban amenities, creates benefits that extend beyond individual buildings. Because these benefits are shared, markets alone may produce too little distinctive architecture. But policies designed to encourage better design also need to be carefully calibrated so that the public resources spent do not exceed the value that they create.

Figure I: Welfare effects of a distinctive design subsidy



Notes: The subsidy rate refers to the percentage of construction cost (excluding land) covered by the subsidy. The welfare effect is expressed in household-income-equivalent terms.

Source: Ahlfeldt et al (2026).



Take the taste survey

One person's distinctive design may be another's eyesore. So in order to assess how tastes in architecture vary, Gabriel Ahlfeldt, Ailin Zhang and Elisabetta Pietrostefani ran an internet survey based on 20 selected buildings: 10 iconic buildings (see below) and 10 nearby "ordinary" buildings. Each participant scored the design quality of 10 buildings – one from each iconic-ordinary pair – on a scale from 0 to 100. The 3,140 ratings from 314 respondents found that the mean building rating across all 20 buildings was 53, while ratings within each building had an average standard deviation (a measure of variation around the mean) of 22. The distinctive buildings had higher than average scores, but the survey revealed a wide variation in taste.

What do you think?
Take the survey here:
<https://bit.ly/4hamJ9j>



Ten distinctive buildings

BUILDING	LOCATION	MEAN (ON A SCALE FROM 0-100)
Bosco Verticale (Vertical Forest)	Milan	76
Casa Milà	Barcelona	75
Flatiron Building	New York	73
Royal Crescent	Bath	72
Mira Tower	San Francisco	66
Museu de Arte do Rio	Rio de Janeiro	62
The Barbican	London	61
Dancing House	Prague	58
The Shard	London	57
Habitat 67	Montreal	55



This article summarises Ahlfeldt, G.M., Pietrostefani, E. and Zhang, A. (2026) *The economics of architecture*. CEP Discussion Paper No. 2150. An earlier version appeared on the *Economics Observatory* (<https://www.economicsobservatory.com/why-dont-we-have-nicer-buildings>).

Gabriel Ahlfeldt holds the Chair of Econometrics at Humboldt University in Berlin and is a research associate in CEP's urban programme. **Elisabetta Pietrostefani** is an assistant professor in geographic data science at Liverpool University. **Ailin Zhang** is a PhD student at LSE.

Neighbouring properties gain roughly 9% in value from being near to well-designed new buildings

Further reading

Ahlfeldt, G. and Holman, N. (2018) 'Distinctively different: a new approach to valuing architectural amenities', *Economic Journal*, 128(608), pp. 1-33.

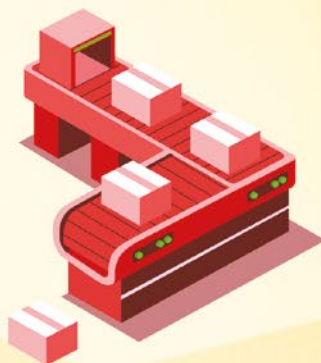
Cheshire, P. and Dericks, G. (2020) 'Trophy architects' and design as rent-seeking: quantifying deadweight losses in a tightly regulated office market', *Economica*, 87(348), pp. 1078-1104.

Koster, H., van Ommeren, J. and Rietveld, P. (2016) 'Historic amenities, income and sorting of households', *Journal of Economic Geography*, 16(1), pp. 203-236.

Vandell, K.D. and Lane, J.S. (1989) 'The economics of architecture and urban design: some preliminary findings', *Real Estate Economics*, 17(2), pp. 235-260.

Firms are leaving major energy savings on the table

Some use 20 times more energy than
their peers to produce the same output



The latest disruption to oil and gas flows is a reminder of a vulnerability that never fully went away. Global energy prices had already tripled between 2020 and 2022, prompting Organisation for Economic Co-operation and Development (OECD) economies to spend around 0.7% of their GDP shielding households and firms from the shock. Now, with supply routes under pressure again, the question of how firms use energy has become urgent in a new way.

The answer is: very unevenly. Our research shows that the gap between the most and least energy-efficient firms within the same industry is vast, and that closing even part of it could more than halve industrial energy use and emissions without sacrificing output or waiting for new technologies. In a world of volatile energy markets, that gap is not just an environmental problem, but also one of competitiveness and economic security.

How do we measure firms' energy productivity?

Our research draws on official firm-level data for manufacturing firms with at least 20 employees across nine countries, including the UK, covering the period 1995–2021. For each firm, we observe energy use alongside economic variables such as value added, employment, labour productivity and capital investment, and compute energy productivity as value added per unit of energy used – measured in physical terms (joules) rather than expenditure. This allows for direct comparison of how efficiently firms convert energy into output, independent of price fluctuations.

The variation in energy productivity is striking. Across all nine countries, firms at the 90th percentile of energy productivity generate roughly 20 times more value added per unit of energy than those at the 10th percentile (Figure 1). Put simply, where two firms consume identical amounts of energy, the frontier firm could produce 20 times more output. These gaps are four times larger than those observed in labour productivity. UK dispersion in energy productivity is slightly below the average but still large, at 16 times.

This spread signals a large and largely untapped opportunity to reduce energy use and emissions by helping lagging firms to improve.

What would happen if laggards caught up?

We estimate a conservative scenario: raising the quarter of firms with the lowest energy productivity in each industry up to the level of the 25th percentile – a realistic improvement that is still far from the frontier. The result, across all nine countries, is a 42% reduction in manufacturing energy use with no loss of output (39% for the UK). Lifting all firms in the bottom half of the distribution to the median would cut energy use by 61% on average across countries and in the UK, with comparable reductions in energy-related emissions.

These gains are possible across all manufacturing sectors, but they are largest in high-emitting industries such as chemicals, paper products and non-metallic minerals including cement (Figure 2).

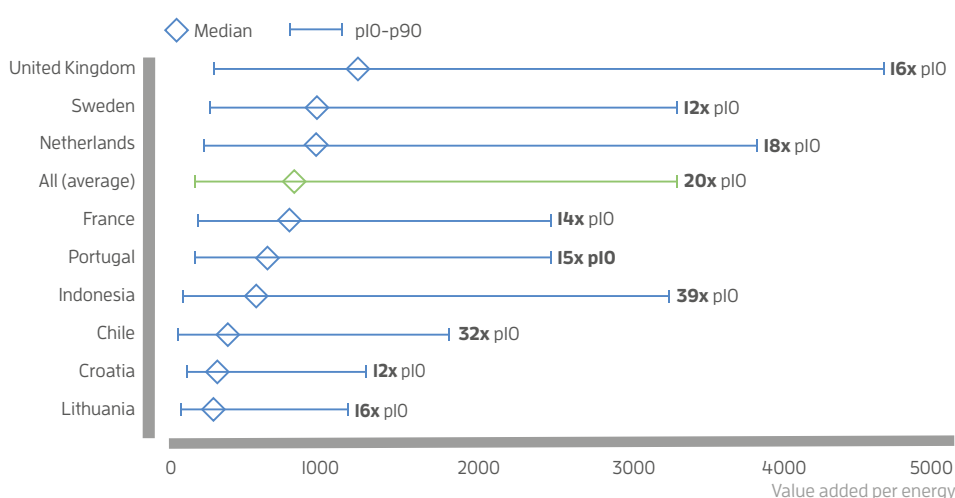
The implication is important: reducing industrial energy use and emissions does not depend on speculative technology breakthroughs. The production technologies and practices already exist, and they are in use by firms operating in the same countries and industries as the laggards.

In other words, a large share of the potential reduction in industrial energy use and emissions could, in principle, be achieved simply by spreading current best practices more widely. The challenge is therefore not invention but diffusion.



Reducing the gap in energy productivity could cut industrial use by more than half using existing technologies

Figure 1: Firms' energy productivity near the bottom and top with the ratio between them



Notes: The chart plots the mean and 10th, 50th and 90th percentiles of energy productivity for each country, averaged across industries, in the latest year of available data for each country up to 2019. The units are thousands of dollars per tera joule of energy (or dollars per mega joule).

Source: De Lyon and Dechezleprêtre (2025).

Why are the gaps so large?

Several factors explain why less efficient firms are not being forced or incentivised to improve. Younger firms and those using newer production technologies tend to be more energy productive.

Larger firms often underperform on energy productivity – in part because their scale gives them market power to negotiate lower energy prices, but also because, in many countries, larger energy users benefit from reduced energy taxes or exemptions. In the UK, for example, energy-intensive firms can pay as little as 8% of the Climate Change Levy on electricity and can be exempted from renewables levies on their bills. But lower prices reduce the pressure to improve efficiency, while simultaneously disadvantaging smaller, more energy-productive competitors.

There is a strong relationship between energy productivity and broader economic performance. Firms with higher labour productivity tend

to have higher energy productivity, and improvements in one track closely with improvements in the other. This matters for policy design: investments in management, skills and technology adoption could deliver a “double dividend” with higher output per worker and more output per unit of energy.

Two key policy levers could drive improvements in energy productivity

The first way in which policymakers could drive improvements is through fair energy and carbon pricing to incentivise energy productivity improvements. Rising energy prices are associated with narrowing gaps in energy productivity between firms, suggesting that price signals work when they apply broadly.

Subsidising cheap energy as an industrial strategy for energy-intensive sectors may protect some firms in the short run, but it delays efficiency improvements, disadvantages smaller, more efficient competitors and adds

A version of this article first appeared as the OECD blog ‘While governments brace for another energy crisis, firms are leaving major energy savings on the table’ (<https://www.oecd.org/en/blogs/2026/03/while-governments-brace-for-another-energy-crisis-firms-are-leaving-major-energy-savings-on-the-table.html>). This is an adaptation of an original work by the OECD. The opinions expressed and arguments employed in this adaptation should not be reported as representing the official views of the OECD or of its member countries

Josh De Lyon is an economist at OECD and a research associate in CEP’s trade programme. **Antoine Dechezleprêtre** is a senior economist at OECD and a research associate in CEP’s green transition and growth programmes.

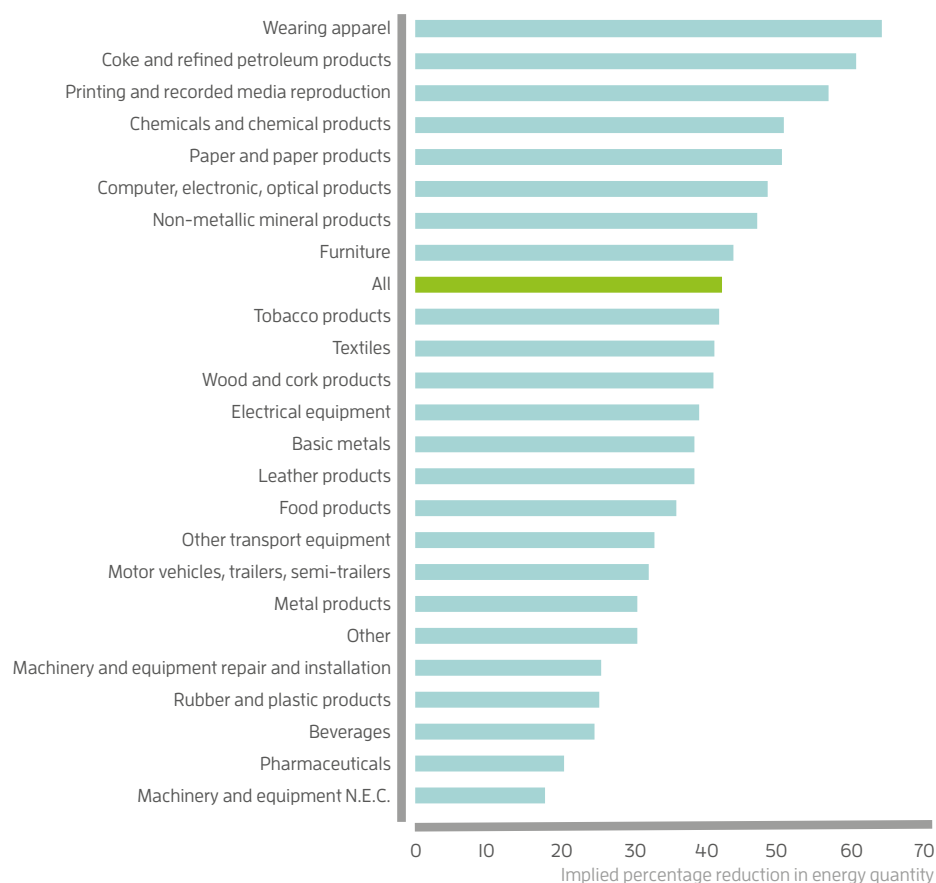
to fiscal costs. Broad-based carbon and energy pricing combined with targeted support for efficiency-improving investments is a more durable approach.

The second lever is fostering business dynamism and technology diffusion. Industries with stronger competition, better access to finance and more active innovation tend to show less dispersion in energy productivity.

When inefficient firms face genuine competition, they upgrade or contract; when productive firms can access capital and grow, best practices spread. Policies that lower barriers to entry, strengthen competition policy and support technology diffusion can support both growth and resilience.

The current situation makes the case for urgency. The technologies to close the energy productivity gap already exist. The firms that embody best practice are already operating. What is needed is the policy environment to ensure that their example is followed.

Figure 2: The percentage reduction in energy use by improving laggards



Notes: The chart shows the implied percentage reduction in energy that would be achieved if all firms had energy productivity at least equal to the 25th percentile firm in their 4-digit industry, with the results aggregated to the 2-digit industry-level. The data are for the latest year available in each country up to 2019.

Source: De Lyon and Dechezleprêtre (2025).

Subsidising cheap energy for energy-intensive firms and sectors may protect some firms – but it delays dynamic efficiency improvements

Further reading

De Lyon, J. and Dechezleprêtre, A. (2025) *The great dispersion in energy productivity between firms*, OECD Science, Technology and Industry Working Papers.

Romesh Vaitilingam

A version of this article was published on *LSE Impact* (<https://blogs.lse.ac.uk/impactofsocialsciences/2026/07/08/did-brexite-make-us-better-at-communicating-economics/>).

Romesh Vaitilingam is editor-in-chief of the *Economics Observatory* and former editor of *CentrePiece*.

Did Brexit make us better at communicating economics?

What happens when evidence meets lived experience

Ten years after the referendum on the UK's membership of the European Union, one question continues to nag at many economists. If there was such a broad professional consensus that Brexit would be bad news for the UK economy, why did a majority of voters opt to leave?

Before the vote, the UK's economists did something they rarely do: they reached virtual unanimity. Researchers in think tanks and universities produced analyses pointing in broadly the same direction. The Treasury and the Bank of England agreed the impact would be negative. Leading academic economists, including the then CEP director John Van Reenen, devoted countless hours to explaining this work.

Yet much of that evidence seemed to bounce off public debate.

Was this a failure of communication? Perhaps we needed to explain our research more clearly, avoid jargon, use better examples and engage more effectively with journalists and the public.

But the real lesson of 2016 is not simply that economists communicated badly: it is that the old rules of communications no longer applied.

The personalisation of expertise

One of the most striking features of the referendum campaign was how often economic arguments were met not with counter-evidence but with attacks on the people presenting them. Economists were portrayed as members of a self-interested metropolitan elite.

Michael Gove's much-quoted observation that "people in this country have had enough of experts" captured something real – not a rejection of knowledge

itself, but a deep scepticism about the institutions and people claiming authority.

From the perspective of political campaigning, this was highly effective. If you can persuade voters that the messenger is biased, the message hardly needs answering.

There was another mismatch too. Economists were answering the question: will Brexit make the country more or less prosperous?

But many voters were asking different questions: who should make UK laws? How should immigration be controlled? What kind of country do we want to be?

These are not questions that economics can settle. Looking back, it was a mistake to think that because the economic consequences were important, they would also be decisive.

The Leave campaign, by contrast, understood that politics is rarely just an exercise in cost-benefit analysis. It offered a simple, emotionally compelling story about "taking back control". Economists responded with discussions of productivity, trade barriers and foreign direct investment.

Both messages were sincere. Only one spoke directly to the values and identities that motivate many political decisions.

Learning the lessons of Brexit

So, what does this mean for those of us who care about communicating economic research?

The first lesson is that while better communication matters, it has limits. No amount of clearer explanation would, by itself, have resolved deep disagreements about sovereignty or identity.

The second is that researchers need to think much harder about trust. People rarely evaluate evidence in isolation. They ask

who is speaking, whose interests they represent and whether they share their values. Rebuilding that trust is likely to be a much bigger challenge than simplifying economic language.

Third, economists need to become better storytellers – not by sacrificing rigour, but by connecting evidence to people's lived experience. GDP matters because jobs matter. Productivity matters because wages matter. Trade matters because communities depend on it. Abstract statistics become meaningful only when they illuminate everyday life.

Finally, we need to recognise that public engagement is no longer an optional extra for academics. It is part of the job. Other disciplines have invested heavily in communicating evidence to wider audiences. Economics should be no different.

Professional bodies such as the

Royal Economic Society should be supporting economists in engaging with the media and wider public debate, perhaps by launching something akin to the Science Media Centre.

There is one final irony. The referendum is often presented as evidence that expertise no longer matters. I draw the opposite conclusion.

Expertise matters enormously. That is precisely why it became a target.

The lesson of Brexit is not that economists should become political campaigners or abandon their commitment to objectivity. It is that producing good evidence is only half the task. In an age when authority itself is contested, economists need to devote as much care to how evidence is communicated – and why it should be trusted – as they do to producing it in the first place.



In numbers

Teachers are at their strictest in middle age

Two teachers grading the same pupil can reach very different conclusions. Our study explores the extent of grading bias due to systematic differences in teachers' grading styles – their relative leniency. This relates to the "inner yardstick" that a teacher uses to map performance to grades.

To investigate how leniency varies between groups of teachers we use a large-scale online experiment in which more than 1,600 French secondary school teachers independently evaluate the same set of fictitious student transcripts, generating hundreds of ratings per transcript.

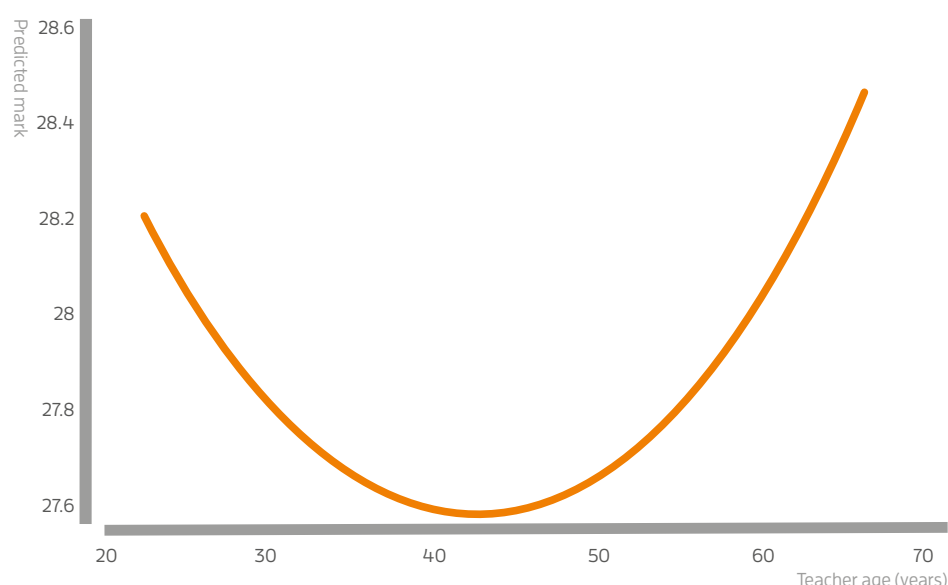
As there is no "correct" evaluation for these transcripts we use the mean of the many independent assessments as the relevant reference point and define leniency in terms of how teachers' grades differ from this point.

We find two characteristics associated with leniency. First, teachers with a higher level of altruism tended to be more lenient. Second, grading styles follow a pronounced U-shaped pattern with age: middle-aged teachers are systematically less lenient than both their younger and older colleagues (Figure 1).

This suggests that a pupil evaluated by a 40-year-old teacher receives a lower grade than the same pupil evaluated by a 60-year-old teacher, and the effect is comparable in magnitude to documented gender biases in mathematics grading.

In an educational context, a natural policy response to this would be to rely on age-diverse committees, which combine mid-career teachers with junior and/or senior colleagues.

Figure 1: Grading style as a function of age



Notes: The y-axis shows the predicted mark on a 0–30 scale. The figure shows OLS estimates for the full sample. All estimates are based on full-regression models including professional and behavioural characteristics as covariates, with transcript fixed effects and response time controls. All control variables are held at their means. N=16,440.

Source: Parkes et al (2026).



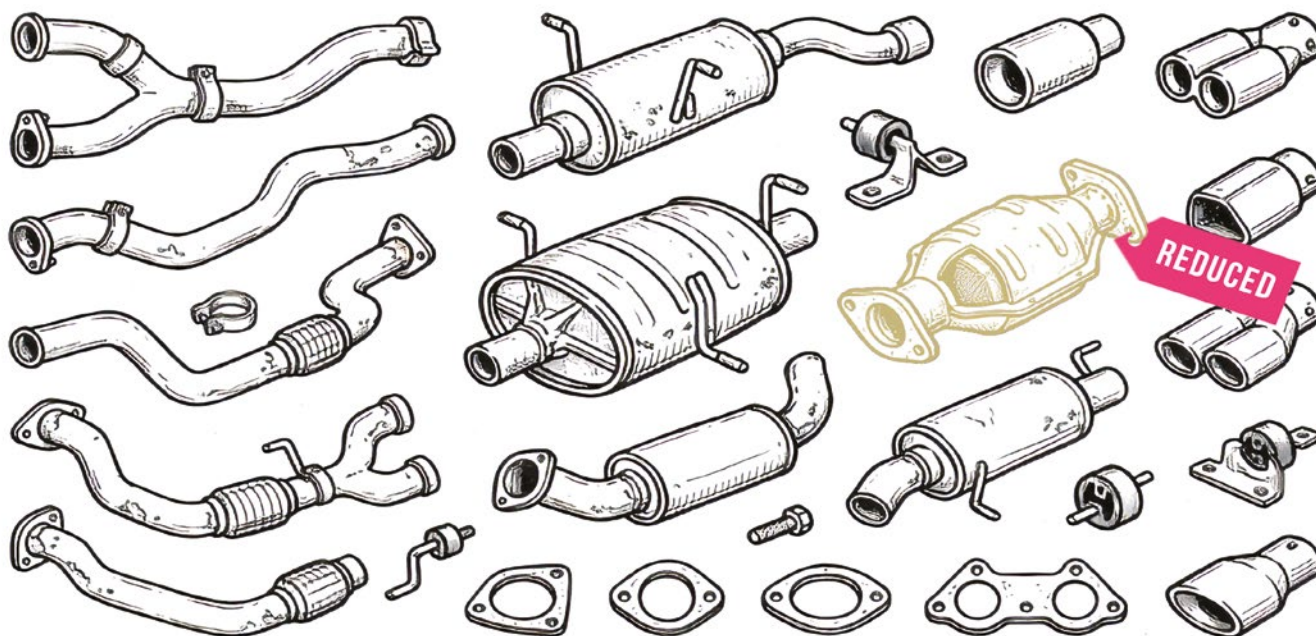
Read the full paper: Dagorn, E., Parkes, I. and Prati, A. (2026) *Teachers' leniency: experimental evidence*. CEP Discussion Paper No. 2204 (<https://cep.lse.ac.uk/pubs/download/dp2204.pdf>), (<https://cep.lse.ac.uk/pubs/download/dp2204.pdf>).

Etienne Dagorn is an assistant professor at the University of Lille. **Isaac Parkes** is a research assistant in CEP's wellbeing programme and a PhD candidate at King's College London.

Alberto Prati is an assistant professor of economics at University College London and a research associate in CEP's wellbeing programme.

Q&A

Can economics help to deter thefts of catalytic converters?



Catalytic converters reduce the harmful emissions produced by vehicles with internal combustion engines. These devices, which are fixed to the exhaust pipe underneath the vehicle, use precious metals to clean up the gases. When these metals – palladium, platinum and rhodium – increased in price, the converters became a target for thieves. The question is can understanding the economics of crime help to prevent such thefts?

What is the scale of catalytic converter theft?

The leader of a catalytic converter theft ring in the US admitted to receiving more than \$600mn by reselling stolen devices between May 2020 and October 2022.

Why did the devices become such a target?

The rise in these thefts was not random, but rather, a response to economic incentives. In 2019, China announced stricter vehicle emission standards, which meant that more of the precious metals were needed to be used in the catalytic converters. Not only did the catalytic converters contain more of the metals – making them more valuable – but the new standards also boosted manufacturers' demand for the metals. As metal prices rose, the payoff from stealing them increased, thus driving more thefts.

How did the price change?

Metal prices were relatively stable in the years from 2015 before increasing dramatically around 2019. The prices of palladium and rhodium, respectively doubled and quadrupled between the start of 2019 and 2021. Subsequently, prices tapered off around mid-2022.

What was the impact on crime rates?

We estimate that a 10% increase in the value of catalytic converters resulted in a 4.5% to 8.9% increase in the theft rate of autoparts.

How do you measure supply and demand in the market for stolen catalytic converters?

We measured local supply by looking at the share of hybrid vehicles within each county. This is because hybrid vehicles' catalytic converters contain higher amounts of platinum-group metals. We measured local demand using the presence of metal recycling businesses. In counties with recyclers, and counties with a higher share of hybrid vehicles, there was a disproportionate rise in autoparts theft during the precious metals price surge – and steeper declines when prices fell.

Both the demand and supply sides play similarly important roles. Areas with recyclers saw autoparts theft rate increase by 26% relative to the pre-2019 average in these areas, while areas with a higher share of hybrid vehicles saw a 27% rise.

How can economic knowledge be used to beat crime?

Policies enacted by some US states to reduce such crimes tend to focus on the resale market, such as requiring stricter record-keeping and documentation, or restricting purchase and payment modes for scrap metal transactions. After stricter regulations were introduced, thefts fell by 26% compared with the pre-2019 average in these areas. There was no difference in areas with a higher concentration of hybrid vehicles.

This article summarises Foong, G., Machin, S. and Sandi, M. (2026) *Crime and prices: evidence from thefts of expensive precious metal*. CEP Discussion Paper No. 2141. An earlier version appeared on *LSE USA Politics and Policy* (<https://blogs.lse.ac.uk/usappblog/2026/07/08/catalytic-converter-thefts-rise-and-fall-with-global-metal-prices/>).

Gerald Foong is an economist at the Intellectual Property Office of Singapore and was formerly a lecturer of economics at Singapore Management University. **Stephen Machin** is a professor of economics at LSE and director of CEP. **Matteo Sandi** is an associate professor of economics at the Cattolica University of Milan and a CEP visiting fellow.

My must-read paper

Richard Layard recommends the paper that pioneered wellbeing economics

I had already read Jeremy Bentham when I was a student – he is the greatest writer who said that what really matters is how happy people are. But I had never seen any numbers measuring that, because no numbers had been produced. Certainly economists hadn't seen any until Richard Easterlin wrote this paper in 1974 called "Does economic growth improve the human lot? Some empirical evidence". In it he publicised the numbers which pollsters had been collecting for about 25 years in the United States.

This had been a period of extraordinarily rapid growth in the United States at all levels of income. Yet the pollsters' answers were saying that people were getting no happier over that period. And that was the main bit of evidence that Easterlin used to raise this question. Are people actually getting happier as they're getting richer? And his answer was no. It's true that, of course, if you compare people who are rich with people who are poor at a point in time, richer people are on average happier than poorer people. But that doesn't then get reproduced over time as countries get richer. They don't, according to him, get happier. And he offered an explanation of this, which was that people are comparing their incomes with other people's incomes. So if everybody's getting richer, the average of relative income can't increase and therefore people can't feel better.

This struck me like a thunderbolt when I read it, as it did many other people. And, I thought, this is very relevant to policy. For, if people are comparing themselves to other people, that means that, if somebody else becomes richer, other people become less happy because they're comparing themselves with somebody who's become richer.

This is what we call in economics an "externality" – one person's income increase imposes an external disbenefit on the rest of the community. Therefore we should do the normal thing we do with external bads – we tax them. So the idea that taxing people is a bad thing is not completely correct because part of the tax performs a useful function. It's a corrective tax, stopping people from overworking and creating even more damage to other people.

So I wrote an article about this called "Human satisfactions and public policy" which came out in the *Economic Journal* in 1980. Richard Easterlin said it was the first article where anybody had looked at the policy implications of his paper. But I didn't do any more work on happiness for quite a long period after that, partly because I was working on unemployment, but partly because the evidence on what actually causes happiness and wellbeing didn't really take off until the late 1980s and 1990s. Then I got to know about it through Daniel Kahneman who was not the originator of it, but who then took it up and ran with it. It got a big boost when he won the Nobel Prize. I thought, why not look at this from different angles, philosophical, psychological and economic and see if one can make some overall sense of what's going on here.

So I wrote this book called *Happiness*. In it I tried to draw out there both the strands that Bentham discussed. First, how can we make the happiness or wellbeing of the people into the goal of public policy? And second, how can individuals lead the good life, which means the life which produces the greatest happiness in the world?

We should obviously be more interested in improving the happiness of people who are at the bottom end than in creating the same increase in happiness for people who are at the upper end. That means it's very important to be clear about what are the main causes of misery. In our work we find very clearly that the main causes of misery are one: health – especially mental health, two: human relationships – your family, at work and in the community, and only third, poverty.

This should be basic to any political debate. And I'm frustrated that we still haven't got the wellbeing evidence put at the centre of the debate of what kind of society we want and what are the real problems we face. If we could get a wellbeing-oriented politics, I think we'd be in a much better place.

Richard Layard was talking to Romesh Vaitilingam. Listen to the full conversation on the CEP podcast *Inspiring Economics*.



Recommended reading

Easterlin, R. (1974) 'Does economic growth improve the human lot? Some empirical evidence' in P.A. David and M.W. Reder (eds) *Nations and Households in Economic Growth*. Academic Press, 89-125.

Professor Lord Richard Layard is an emeritus professor of economics at LSE, the founder-director of CEP and the co-director of CEP's programme on wellbeing.

The science of second chances

Wednesday 9 December

Join us for this LSE public lecture. Described as *Freakonomics* for criminal justice, Jennifer Doleac's new book *The science of second chances*, presents a groundbreaking approach to criminal justice reform, revealing how small-scale interventions can reduce people's chances of reoffending and break the incarceration cycle.

About our speakers:

Jennifer Doleac is the executive vice president of criminal justice at Arnold Ventures. She studies the economics of crime and discrimination.

Tom Kirchmaier is director of CEP's policing and crime research group focusing on understanding the full spectrum of questions relating to policing and crime, with a special focus on police organisational efficiency, demand prediction, financial and organised crime, domestic abuse, and serious violence.

Chair:

Stephen Machin is a professor of economics at LSE and director of the Centre for Economic Performance. He is a fellow of the British Academy, has been president of the European Association of Labour Economists and is a fellow of the Society of Labor Economists.

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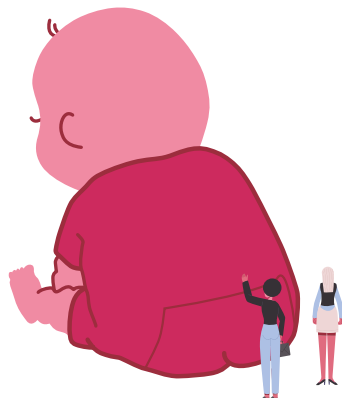
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track**



**Why don't we have
nicer buildings?**



**Economics of catalytic
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