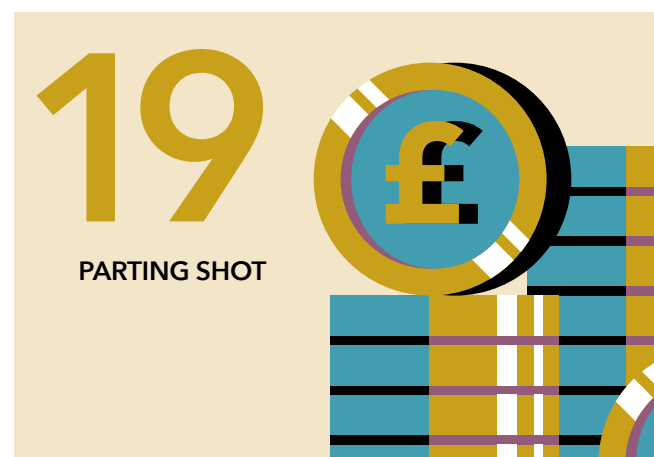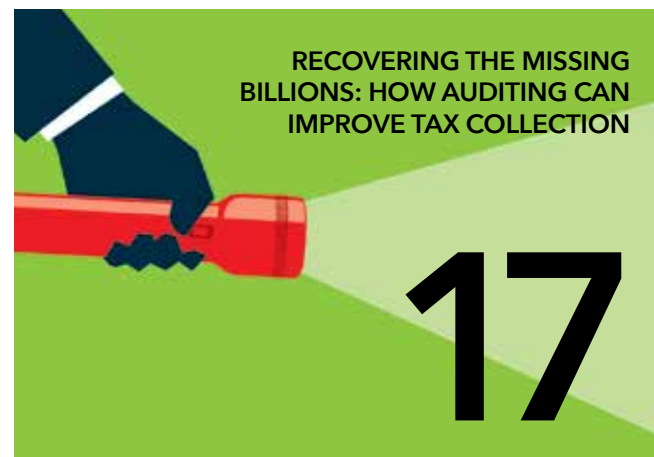# advantage

Anarchy in the UK
(and everywhere else)

The mother of all slowdowns

Understanding the relationship
between Protestantism and suicide

Are happy people more cooperative?

Recovering the missing billions

In this issue ...

Welcome to the autumn 2019 issue of *Advantage* ...

... the magazine of the Centre for Competitive Advantage in the Global Economy (CAGE).

This summer, CAGE celebrated 10 years of research at our policy conference, held at the University of Warwick in July. Our researchers were joined by international academics and policy experts to mark the Centre's success in producing innovative research on issues relating to improving living standards, raising productivity, maintaining international competitiveness and facilitating economic wellbeing. It was a chance to take stock of the significant and policy-relevant work we have done, but also to look to how our research might continue to contribute to society in the future. Indeed, as our 10 year research programme draws to a close early next year, we are pleased to announce that the ESRC will continue its support for the Centre for a further five years.

As we transition into a new research phase, we also say goodbye to some key figures who have been instrumental in CAGE's success. Our Director, Nicholas Crafts, steps down this autumn, to be succeeded by Mirko Draca, Associate Professor at the University of Warwick. We also say goodbye to Sascha Becker, our Research Director, who is replaced by Bishnupriya Gupta, Professor of Economics at University of Warwick.

We are delighted that Nick, Mirko and Sascha have all contributed to this issue. Mirko investigates the polarisation of political ideologies amongst citizens. He finds that the presence of anarchic ideologies-those which reject the authority of key institutions- is considerable, but uncovers surprising evidence about how these ideologies have developed; Nick assesses the reasons for the productivity slowdown in the UK, and considers what this might mean for the UK's future; while Sascha delves into history to examine the relationship between Protestantism and suicide in 19th Century Prussia.

Our final articles in this issue are also provided by key figures within the Centre. Daniel Sgroi, one of our Research Theme Leaders, describes his laboratory research, which analyses the effect of good mood on workplace productivity; while Arun Advani, CAGE's Impact Director, investigates why, in the UK, around 6% of tax revenue remains uncollected each year and what can be done to tackle this problem.

These articles showcase the fruitful research we have undertaken over the past 10 years and the exciting areas of study still open to explore. We hope you find this issue enjoyable, and encourage you to take a look at our website for more information on our evolving research programme.

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no problem – homosexuality, immigration, claiming benefits

no confidence – churches, parliament, civil services

confidence – justice system, police

confidence – armed forces, civil services

not justifiable – suicide, abortion

not justifiable – bribes, claiming benefits, avoiding a fare

no confidence – justice system, the press

no confidence – major companies, unions

Anarchy in the UK (and everywhere else)
By Mirko Draca and Carlo Schwarz

In political terms, we are living in the midst of the proverbial 'interesting times'. The election of Donald Trump and the UK's Brexit referendum in 2016 are being seen as turning points in modern democratic politics. As further evidence, new political forces seem to be at play, with fresh citizen movements – ranging from France's 'Yellow Vests' to the UK's 'Extinction Rebellion' – emerging quickly and decisively. Politics appears to be dramatically more polarised, with movements based on populist messages being seen as key agents of this polarisation.

But is this perception of increased polarisation supported by the data, and is it actually a *new* pattern? While research has shown that political elites have become more polarised (e.g. Poole and Rosenthal 1985; Gentzkow et al., 2019) the evidence on polarisation amongst the general public is less clear. We tackle this question from the perspective of polarisation in the *political ideologies* of citizens (Draca and Schwarz, 2018).

We define 'ideologies' as clusters of political opinions, for example, the tendency for positions (such as pro-immigrant views, low trust in major companies and preferences

… while there is a clear 'Left-Right' dimension to the structure of the ideologies in the data, there is also another critical dimension at play.

for more government intervention) to co-occur amongst particular groups of people. Our analysis uses a set of consistently defined questions from the World Values Survey (WVS) across 17 countries in North America and Western Europe. We identify clusters of similar political opinions using unsupervised machine learning methods. The advantage of these particular methods is that they allow for the 'mixed membership' of ideologies among individuals. For example, we're able to characterise people as being 'mostly conservative but a bit liberal too', thereby providing a good reflection of how people think in practice. ▶

Two main findings stand out from our research. Firstly, while there is a clear 'Left-Right' dimension to the structure of the ideologies in the data, there is also another critical dimension at play. This is apparent in two ideological clusters that are defined by low confidence in societal institutions such as parliaments, major companies and the press. This can be seen in Table 1, where we report the top ten opinions or 'issue-positions' that define the ideologies in our main model (which consists of four ideological types).

Based on their low trust in institutions we label these types as 'anarchists'. Interestingly, they additionally split into Left Anarchist and Right Anarchist types that are differentiated by their positions on social issues. While these two types appear to be natural bases of

If we think of the anarchist ideologies as the natural support base for populist movements, then the important point to note is that this base has been latently present for decades.

support for different left and right wing populist movements, we prefer the label 'anarchist' as a descriptor. In part, this is because alternative terms such as 'populist' have been
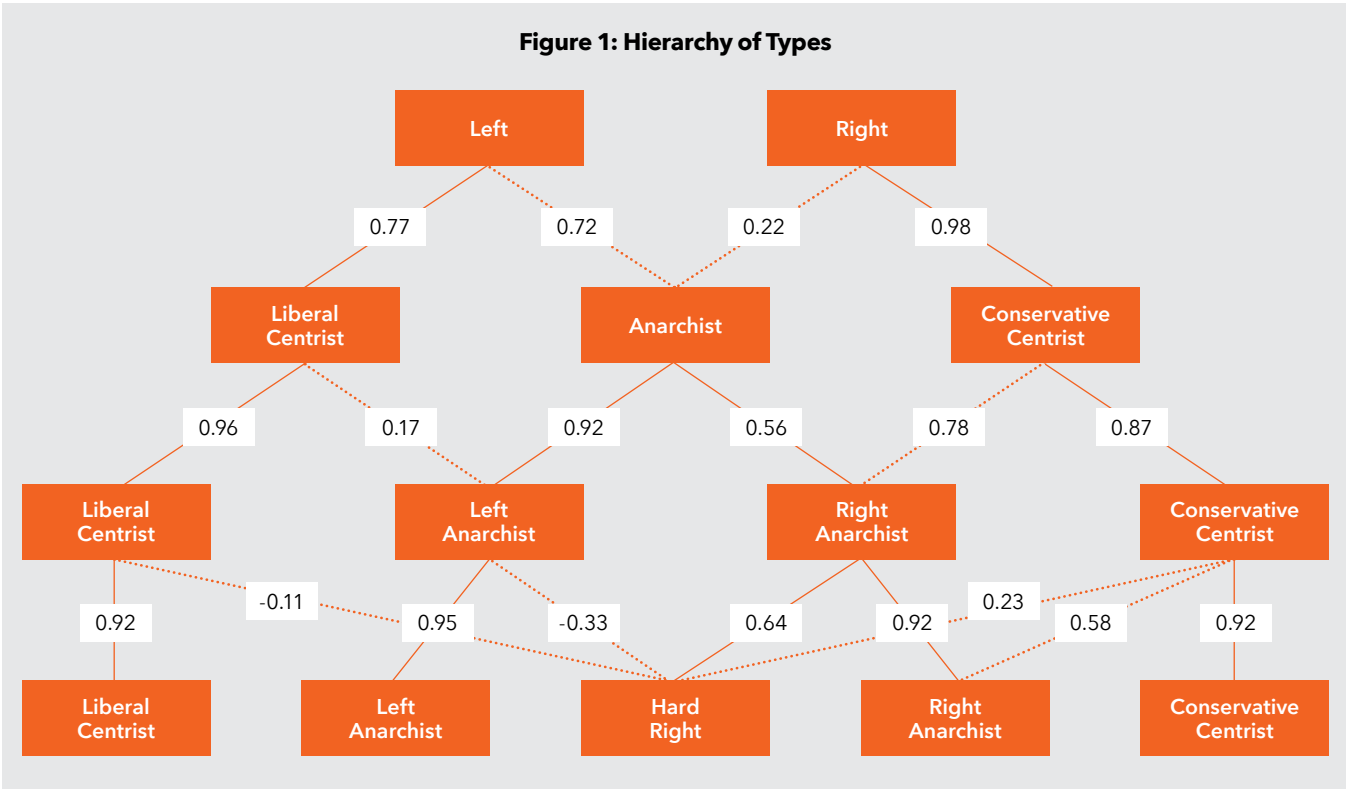
gaining pejorative connotations (e.g. Murray, 2016), or, in the case of 'anti-establishment', are over-used as part of polemical debates (Hume, 2017; and Jones 2014). But more specifically, while the term anarchist is often associated with a particular strand of syndicalist politics, we argue that, in our context, it accurately conveys the questioning of existing institutions that is characteristic of current populist politics.

We contrast our Left and Right Anarchist types with alternative Liberal Centrist and Conservative Centrist types that are more supportive of societal institutions. In figure 1, we illustrate how the hierarchy of ideologies evolves as we allow the algorithm to identify more clusters in the data. The anarchist type emerges as soon as three clusters are allowed to be identified. The share

Figure 1: Hierarchy of Types

Notes: This figure shows the hierarchy of types as created by Latent Dirichlet Allocation (LDA) for different numbers of ideological types. The values reported amongst the lines connecting the boxes record the similarity of types based on the correlation in the issue-position probability vectors across types.

Table 1: 4 Type Model	
Liberal Centrist	**Left Anarchist**
Confidence: Police	No confidence: Churches
No problem neighbours: Homosexuals	Justifiable: Divorce
No problem neighbours: People different race	No problem neighbours: Homosexuals
Justifiable: Divorce	No problem neighbours: People AIDS
Proud of nationality	No problem neighbours: People different race
No problem neighbours: People AIDS	No problem neighbours: Immigrants/foreign workers
Not justifiable: Someone accepting a bribe	No confidence: Parliament
No problem neighbours: Immigrants/foreign workers	Justifiable: Homosexuality
Not justifiable: Claiming government benefits	No confidence: Armed Forces
Confidence: Justice System/Courts	No confidence: Major companies
Conservative Centrist	**Right Anarchist**
Confidence: Police	No confidence: Parliament
Confidence: Churches	No confidence: Civil Services
Confidence: Armed Forces	No confidence: Justice System/Courts
Not justifiable: Suicide	No confidence: The Press
Not justifiable: Prostitution	No confidence: Labour Unions
Not justifiable: Abortion	No confidence: Major companies
Proud of nationality	Not justifiable: Someone accepting a bribe
Confidence: Justice System/Courts	Not justifiable: Claiming government benefits
Not justifiable: Someone accepting a bribe	Not justifiable: Avoiding a fare on public transport
Confidence: The Civil Services	Not justifiable: Cheating on taxes

Notes: This table lists, in order, the 10 most important issue positions for the 4 main ideological types identified in the World Value Survey Data. Highlighted text draws out those issue positions that distinguish anarchist from centrist types.

of anarchist views in the population is considerable, with cross-national averages of 17% for the Left Anarchist type and 27% for the Right.

This leads to our second finding, namely that there is limited evidence of strong trends in the *growth* of anarchist ideologies. The Left and Right Anarchist types of are strongly present in our data from its beginning in the late 1980s. While there is some notable growth in both anarchist types in the US from the mid-2000s, the trend is muted for most countries. If we think of the anarchist ideologies as the natural support base for populist movements, then the important point to note is that this base has been latently present for decades.

How, then, have populist movements activated themselves so strongly now, even though the pre-conditions for their emergence have been in place for so long? One possibility is that technology has facilitated the entry of new political movements that tap into anarchist sentiment. Another is that economic

shocks – specifically, the financial crisis and associated austerity policies – triggered the populist mobilisation (Fetzer, 2019). Realistically, a combination of these two factors (and others) is likely to be at play. However, our analysis strongly suggests that declining trust in institutions is a crucial driver of the current turmoil in democratic politics, making reforms that rebuild trust a major priority across all types of political parties and movements. ◄

About the authors
Mirko Draca is the incoming Director of CAGE, Associate Professor at the University of Warwick and Research Associate at the Centre for Economic Performance. **Carlo Schwarz** is a doctoral student at CAGE.

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The mother of all slowdowns
By Nicholas Crafts

the worst effects of the financial crisis are now behind us

Brexit uncertainty could evaporate quite soon

AI could develop into a powerful general purpose technology

a no-deal Brexit could reduce the level of potential output by perhaps another 7 or 8%

UK ECONOMY
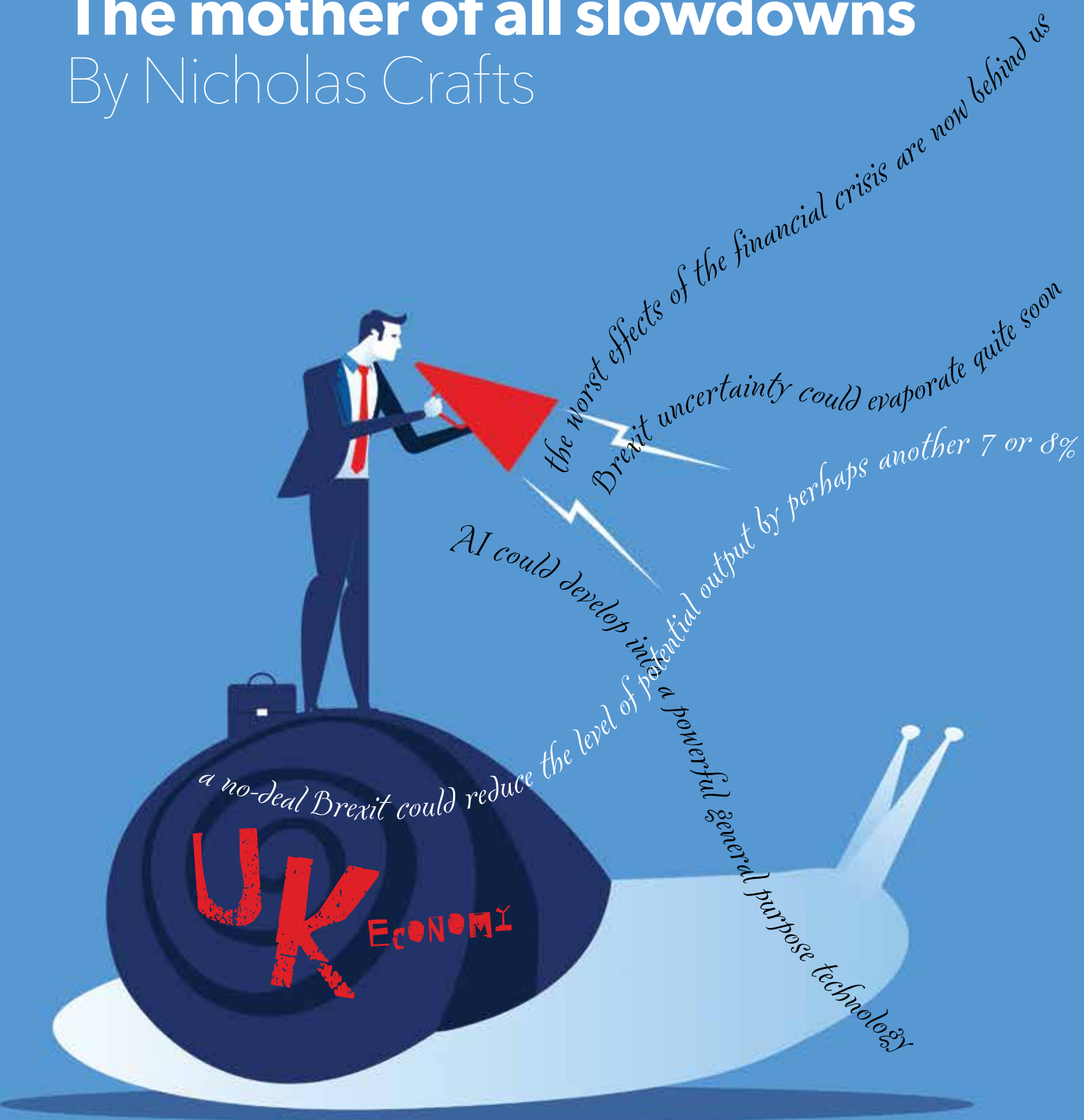
UK productivity growth has been hugely disappointing since the financial crisis began over ten years ago. As this article shows, the magnitude of the productivity slowdown is unprecedented. A unique combination of adverse circumstances may be largely to blame.

PRODUCTIVITY GROWTH IS central to the well-being of the UK economy. Increasing output per hour worked underpins growth in real wages, increases the tax base from which public services can be financed and has a potential dividend in terms of facilitating more leisure time. So it's bad news that, according to the Office for National Statistics (ONS), real GDP per hour worked in 2018 quarter 4 was only 2.0% above the pre-crisis peak level seen in 2007 quarter 4, and was 18.3% lower than if pre-crisis trend growth had been sustained.

But has a slowdown of this nature happened before? To address this question, we estimated trend labour productivity growth since 1760 (Figure 1). We used a dataset recently produced by the Bank of England which contains a long-run series for annual real GDP per hour worked. We found that trend growth pre-2008 was about 2.3% per year and that ten years on from 2008, labour productivity was 19.7% below the level expected had growth continued on this trend path. So, our findings broadly match those of the ONS.

We then calculated the equivalent statistic relating to earlier trend productivity growth (Figure 2). Clearly, productivity slowdowns where the economy fell significantly below its earlier trend path have happened before. The largest of these episodes, at the end of the so-called 'golden age' of economic growth in the 1970s, saw real GDP per hour worked at 10.9% below its 1971 trend path ten years later. In contrast, the shock of the Great Depression of the 1930s only

... a combination of adverse circumstances, itself unprecedented, may be responsible for a large part of the evaporation of productivity growth since 2008.

provoked a shift to 5.3% below the 1929 trend path after ten years. On this criterion, the impact of the current productivity slowdown has been almost twice as bad as anything seen previously. It may fairly be described as unprecedented.

What might be the explanation for such a dramatic turn of events? The answer to this question has proved elusive. However, it is reasonable to suppose that a combination of adverse circumstances, itself unprecedented, may be responsible for a large part of the evaporation of productivity growth since 2008. This conjuncture comprises the ebbing away of the Information and Communications Technology (ICT) boom, the impact of the financial crisis and, in the recent past, impending Brexit.

ICT is an important general-purpose technology which had a substantial effect on UK productivity growth around the turn of the century. Now, however, its impact is much weaker. Cumulated over the 10 years from 2008, this implies labour productivity in 2018 was about 8.5% lower than if the earlier ICT contribution had been sustained. Although a new General Purpose Technology (GPT) may be on the horizon in the form of Artificial Intelligence (AI), this has yet to have a significant impact on productivity.

The impact of the UK financial crisis on potential output through lower investment of various kinds has been estimated to be between 3.8% and 7.5%. In addition, productivity growth in the financial sector itself has been markedly reduced with the implication that its contribution to overall labour productivity growth has fallen by around 0.6% per year. Thus, the financial crisis may have reduced the level of labour productivity relative to the counterfactual of staying on the pre-2008 trend by 10% or more. ▶

The role of Brexit in the productivity slowdown is, of course, its short-run impact since mid-2016, such as its effect on investment through uncertainty. An estimate of the Brexit effect can be obtained using a statistical methodology which creates a 'doppelganger' economy which is not subjected to the Brexit shock. The result is that GDP (and presumably labour productivity) was about 2% lower in 2018 than in the counterfactual business-as-usual case.

The unprecedented combination of these negative effects account for the UK's productivity being so far below its expected growth in 2018. But, if our diagnosis is approximately correct, there is a silver lining to this dark cloud. It suggests that the context for productivity growth may improve. The worst effects of the financial crisis are now behind us, and AI could well develop into a powerful general purpose technology to pick up the baton from ICT. It is even possible that Brexit uncertainty could evaporate quite soon. That said, it seems only too likely that politicians will exacerbate the productivity slowdown with a no-deal Brexit that would reduce the level of potential output by perhaps another 7 or 8%. ◀

Vae miseris nobis!

About the authors
Nicholas Crafts is the outgoing Director of CAGE and Professor of Economics at the University of Warwick. **Terence Mills** is Emeritus Professor of Applied Statistics and Econometrics at the University of Loughborough.

Further reading
Crafts, N., and Mills, T. (2019), 'Is the UK Productivity Slowdown Unprecedented?', CAGE working paper no. 429.

But, if our diagnosis is approximately correct, there is a silver lining to this dark cloud. It suggests that the context for productivity growth may improve.

Figure 1: Labour productivity growth, 1857 – 2018, with trend growth superimposed
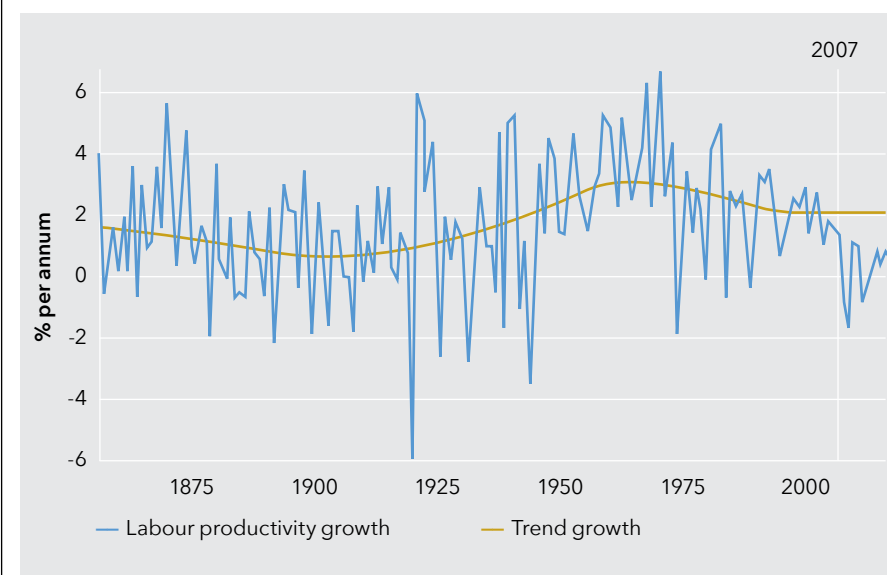

— Labour productivity growth   — Trend growth

Figure 2: Cumulative 10-year ahead difference from trend growth, 1857 – 2008
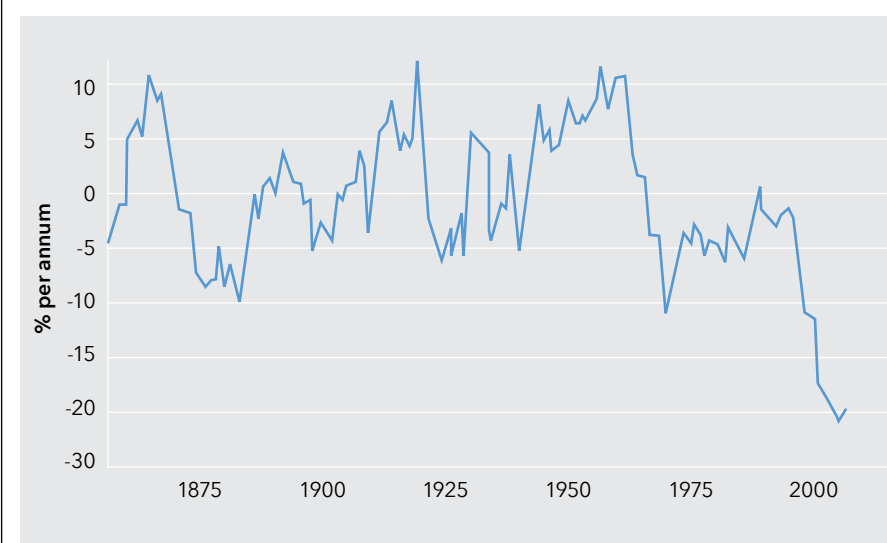
Understanding the relationship between Protestantism and suicide: An economics perspective
By Sascha O. Becker and Ludger Woessmann

Image by hurk from Pixabay

Every year, more than 800,000 people commit suicide worldwide, making it a leading cause of death, particularly among young adults. The prevalence of suicide creates far-reaching emotional, social and economic ramifications, and invokes major policy efforts to prevent them.

RELIGIOUS DENOMINATION has long been observed as an important factor related to suicide. In his classic *Le suicide* (1897), sociologist Émile Durkheim presented aggregate indicators suggesting that Protestantism was a leading correlate of suicide incidence. The proposition that Protestants have higher suicide rates than Catholics has been 'accepted widely enough for nomination as sociology's one law' (Pope and Danigelis, 1981). Our research tests the proposition using data from 19th century Prussia. We find evidence to support Durkheim's theory, and apply an economics perspective to understand why suicide rates are higher amongst Protestants. With suicide rates amongst Protestants remaining higher than those of Catholics in the 21st Century, these findings provide an important context for understanding the sociological and theological factors linked to suicide today.

To test the prediction that Protestants have a higher propensity to commit suicide than Catholics, we compiled evidence from 19th-century Prussia. We looked to the 19th century for two reasons. First, it is when Durkheim published his work on suicide, second, because religion was more pervasive at the time. This does not mean that belief was uniform and always aligned with Church doctrines, just that virtually everyone adhered to a religious denomination, and that religion pervaded virtually all aspects of human life. Prussia also has the advantage that neither Protestants nor Catholics were small minorities of the population. They lived together in one state with a common setting of government, institutions, jurisdiction, language and basic culture. We found – and digitised – data from the Prussian statistical office. For the years 1869-71, local police departments meticulously administered data on suicide from 452 Prussian counties.

Numerically, the difference in suicides between religious denominations in Prussia is huge: suicide rates among Protestants (at 18 per 100,000 people per year) are roughly three times as high as among Catholics.

In principle, perhaps the biggest challenge for an empirical identification of the effect of Protestantism on suicide is that people with different characteristics might self-select into religious denominations. For example, are people who are depressed more likely to become Protestants? But the self-selecting factor is less of an issue in 19th-century Prussia. There (as in many other places) individual change of denomination was almost unheard of, and religious affiliation derives from choices of local rulers made several centuries earlier. For the social scientist, Prussia presents another advantage. During the Reformation, Protestantism spread in a roughly concentric fashion around Luther's city of Wittenberg. This pattern can help to link cause and effect between Protestantism and suicide.

As a consequence of this geographic pattern of diffusion, the share of Protestants is higher near Wittenberg. So is the suicide rate.

The share of Protestants in a county is clearly positively associated with the suicide rate. The average suicide rate is notably higher in all-Protestant counties than in all-Catholic counties. Numerically, the difference in suicides between religious denominations in Prussia is huge: suicide rates among Protestants (at 18 per 100,000 people per year) are roughly three times as high as among Catholics.

But what is the reason for this relationship between Protestantism and suicide? This question is an important one for modern policy. Protestant countries today still tend to have substantially higher suicide rates, suggesting that the relation of religion and suicide remains a vital topic.

Previous social science research on suicide has looked at the matter from an economics perspective. Economists have modelled suicide as a choice between life and death where the utility of staying alive or ending life are weighed against each other. If the utility of staying alive falls below the utility of ending life, suicide is an 'optimal' choice.

Within such a framework, two classes of mechanisms predict higher suicide rates of Protestants than Catholics from a theoretical viewpoint. First, as Durkheim suggested, Protestant and Catholic denominations differ in their group structure. Protestantism is a more individualistic religion. According to this 'sociological channel', when life hits hard, Catholics can rely on a stronger community to support them.

We think there is also a 'theological channel' to understanding suicide. Protestant doctrine stresses the importance of salvation by God's grace alone, and not by any merit of one's own work. By contrast, Catholic doctrine allows for God's judgment to be affected by one's deeds and sins. As a consequence, committing suicide entails the disutility of forgoing paradise for Catholics but not for Protestants.

Catholics (but not Protestants) also consider the confession of sins a holy sacrament. Since suicide is the only sin that (by definition) cannot be confessed, this creates a substitution effect that diverts Catholics from committing suicide. It steers them towards other responses in times of utmost desperation.

So which of the two classes of theoretical mechanisms – the sociological or the theological channel – is more likely to account for the higher suicide rate among Protestants? Additional analyses that draw on historical church-attendance data and present-day suicide data confirm the sociological rather than the theological mechanism. One key is that the suicidal tendency of Protestants in the 19th century is more pronounced in areas with low church attendance. The strongest effect is thus more likely to be found in areas with little social integration rather than in areas with high devotion to the Protestant doctrine.

Meanwhile, more contemporary data shows that, while Protestants still have a higher suicide rate than Catholics, suicide is highest among

... more contemporary data shows that, while Protestants still have a higher suicide rate than Catholics, suicide is highest among people without a religious affiliation who are not subject to theological doctrine.

people without a religious affiliation who are not subject to theological doctrine. Both pieces of evidence suggest that the sociological channel to explain Protestants' higher suicide rate is more relevant than the theological channel. ◀

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Are happy people more cooperative? Understanding how good mood affects productivity in the workplace
By Daniel Sgroi

Results from recent laboratory experiments suggest that while good mood will normally boost workplace productivity, this might be blunted when cooperation with others is a vital feature of the job.

Those who witnessed the mood-boosting clip or were given fruit or water were significantly more productive (10-12%), putting in greater effort.

WE KNOW THAT INVESTMENT in mental health and wellbeing at work can improve productivity. In 2017 the UK government published an independent review of mental health and employers which supported wellbeing improvements at work as a means to boost productivity (Stevenson and Farmer, 2017). A Deloitte report published as part of the review found that investment in workplace mental health and wellbeing gives an average return of 4.21:1 on any money invested, and anything up to 9:1 is possible (Hampson et al. 2017).

But what effect can interventions to improve general mood at work have on productivity? Do workers in a good mood work harder? In a series of studies, we looked at simple ways businesses might improve mood in the workplace, and the effect this might have on productivity. Our methods were often quite straightforward and cheap to make operational: even just showing people a ten minute comedy clip had a powerful effect on productivity. But some of our most recent work provides a more complex story that reveals when a good mood can be very effective at boosting productivity and when it might be less effective. ▶

In one study (Oswald et. al., 2015) we recruited more than 500 subjects in a laboratory experiment to complete a simple task (adding as many numbers together as they could in a tight time limit) and paid them based on the number of problems they solved correctly. We showed the workers a movie before they undertook the task: either one designed to make them feel happy; or a placebo 'neutral' clip. Alternatively, we provided them with free fruit or water.

Those who witnessed the mood-boosting clip or were given fruit or water were significantly more productive (10-12%), putting in greater effort (answering more questions) while maintaining the same error rate – so they produced more correct answers and were paid more. We also replicated our findings using real-world happiness shocks; finding that subjects who had suffered losses in their close family up to five years earlier were around 10% less productive.

Our results seemed to reinforce the expectation that good mood improves productivity at work. Nevertheless, we worried we might be missing negative aspects of mood. The problem with our 2015 design was that the workers were on their own. What about team-based work where cooperation is important? Would good mood also increase cooperation?

In another experiment (Proto et. al., 2017), we hired another 490 laboratory subjects to play a repeated Prisoner's Dilemma: possibly game theory's most well-known social dilemma. Subjects face a classic trade-off: cooperate with the other player, and if both cooperate then there is scope for a big return (but a failed attempt to cooperate is very damaging); or go for the best individual payoff, which is smaller than the joint payoff, but much safer (with no need to trust anyone).

Decades of laboratory experiments and fieldwork tell us that although economics predicts selfish 'individual optimisation' (a failure to cooperate) people do in fact cooperate quite well. But we are not quite sure why or when they will do so. The aim of our experiment was to see if mood might help provide some insight. At the same time, by examining a repeated Prisoner's Dilemma, we could explore the role of mood in tasks that require interaction and repetition.

Once again, we induced different mood into different groups of people, using movie clips, music and mood-boosting statements. We allowed players to chat with each other because that is how people coordinate in most real-world settings.

Much to our surprise, we found that happier people cooperate significantly less. Figure 1 indicates an almost 65% cooperation rate in the neutral movie clip setting compared to under 40% with the positive mood-inducing movie clip (and we found similar numbers using our alternative forms of mood induction). This also means lower profits for happier people since cooperation, while risky, is where the best payoffs were to be found.

Figure 1: Cooperation rates under neutral and positive mood induction (movie clip method)
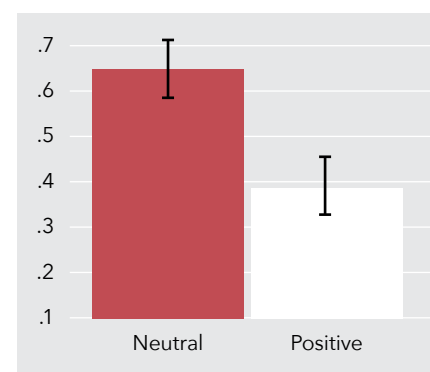
To find out what was going on, we collected data on the words people used when they communicated with each other. We discovered that happier individuals (who faced our positive mood induction procedures) seemed more inward-oriented: they used words like 'I' much more than the neutral group. Second, they appeared to use more negative language, focusing on negative comments when communicating with others. This is consistent with previous work in neuroscience suggesting that happier people are prone to use less information and be more self-oriented. There are many reasons why this might be the case: perhaps the most obvious is that if you are very happy then you have more to lose, and so risking everything by trusting in others to cooperate is potentially more costly.

Putting this all together, it seems that simple interventions to boost mood in the workplace might be a good idea when trust and cooperation are less important than individual productivity: this might be common in factories, offices, call centres and in many other forms of employment. But if teamwork involving the need for cooperation and trust is more important, then mood-boosting practices might be less valuable. Of course, most jobs include elements of both independent and cooperative work and so close scrutiny of their relative importance will turn out to be crucial when thinking about the role of mood in the workplace. ◄

About the author
Daniel Sgroi is a Professor at the University of Warwick, Research Theme Leader at CAGE, an Associate Member of Nuffield College, Oxford and a Research Fellow at the IZA Institute of Labor Economics.

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Recovering the missing billions: How auditing can improve tax collection
By Arun Advani

Last year, £35 billion of UK tax wasn't collected. To give a sense of scale, that is more than the government spends on police, old age social care, nursery places and buses combined. It amounts to almost 6% of all tax due to the government, and it's been about 6% a year for the last decade.

O F ALL THE TAXES out there, this 'tax gap' (the share of tax not collected) is largest in self-filed income tax ('self assessment'). Here, one pound in every six goes uncollected, totalling £7.4 billion.

But who owes this money? To address this question, my research combines confidential data on the tax filings of all 10 million UK self-assessment taxpayers with data on random audits conducted by HMRC over more than a decade.

The first, surprising, result is that underpayment is very common: one in three self-assessment taxpayers are found to have under-reported what they owe. While this might make us sound like a nation of cheats, most of these people owe less than £1000. In fact, the majority of the missing £7.4 billion is owed by only a tiny minority of individuals, making up just 2% of self-assessment taxpayers.

Looking across individuals at what characteristics predict underpayment, a few key results jump out:

- Men are more likely to under-report than women, and since – on average – they have higher incomes, they also underpay more.
- Working age individuals under-report more than pensioners, partly because pension income is harder to under-report than self-employment income.
- A quarter of people with property income under-report, but that

... the majority of the missing £7.4 billion is owed by only a tiny minority of individuals, making up just 2% of self-assessment taxpayers.

Targeted audits bring in £10,000-15,000 on average, four to six times what they cost. So the policy prescription is clear: we should do more audits.

quarter under-report more than half the property income they make.
- On average, individuals with the top 20% of incomes owe about one and a half times as much as individuals in the bottom 80% of incomes.
- Under-reporting is most prevalent in the construction, transport and hospitality industries, where more than half of taxpayers under-report. In addition, those in transport and hospitality who under-report do so substantially, missing out more than half their total income.
- Almost half of filers based in Northern Ireland under-report.

An important point to note is that this study focuses on people not paying everything they are legally required to, either by mistake or deliberate evasion. It does not include avoidance behaviours or so-called 'tax planning'.

So how do we bring in more of that missing money? My findings suggest that increased use of targeted auditing would be a cost effective way of recouping missing tax revenue. An important part of this would be to make better use of third party information: cross-referencing what taxpayers report against information available from other sources. Having this information makes individuals less likely to misreport (since they know they will get caught), and easier to spot if and when they do under-report.

Using information already available can also go a long way to predicting who is likely to under-report. This information, like the findings uncovered in this research, allows audits to be targeted at people who are most likely to be under-reporting significant amounts, maximising the unpaid tax that is uncovered.

There is an added benefit to the

auditing process: not only do audits pick up historic underpayments, they also change taxpayers' behaviour. Tax payers completing self assessments report higher levels of incomes for five to eight years after an audit, compared to people who weren't audited but could have been. This suggests that audits reduce future under-reporting, at least for a time.

Taking into account the additional revenue brought in from the changes in behaviour, audits bring in on average around two and a half times as much revenue as previously thought. Comparing this to the cost of audit, even random audits come close to breaking even. Targeted audits bring in £10,000-15,000 on average, four to six times what they cost. So the policy prescription is clear: we should do more audits.

This would help bring in the missing money – money that can be spent on schools, healthcare, defence or other public services. An additional auditor doing targeted audits would raise enough to pay their own salary and the salary of at least four nurses too.

It would also reduce the current unfairness in the tax system that most people pay their taxes properly while a small minority substantially underpay. ◀
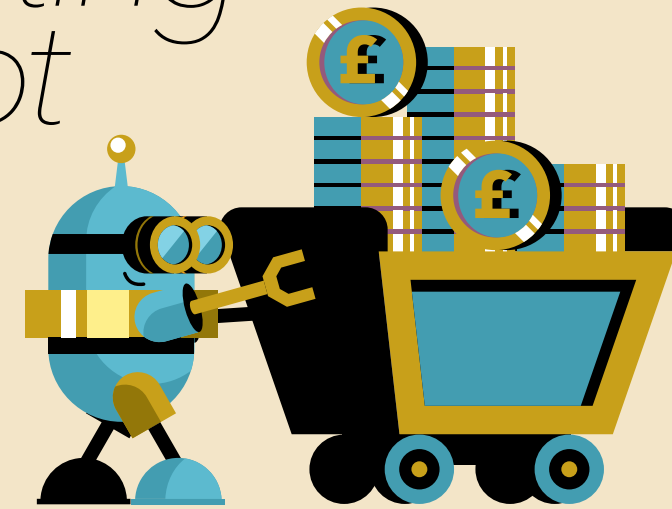
About the author
Arun Advani is Impact Director for CAGE and Assistant Professor at the University of Warwick.

Further reading
Advani, A., Elming, W., and Shaw, J. (2019), 'The Dynamic Effects of Tax Audits', CAGE working paper no. 414.
Advani, A. (2017), 'Who does and doesn't pay taxes', IFS Briefing Note, BN218.

Parting shot

I T IS WONDERFUL to learn that the Prime Minister believes that Britain will enter a post-Brexit 'golden age' such that by 2050 we will be the most prosperous economy in Europe. After the stagnation of living standards in the past ten years, this is most welcome news. Or at least it will be if it comes to pass.

The term 'golden age' is widely used to describe British economic performance in the years 1950 to 1973. Over that period real GDP per person grew at 3% per year, unemployment averaged 2% per year and inflation was 4% per year. It was a time of 'inclusive growth', when income inequality remained relatively low and the regions shared in the good times. The bad news was that other European economies did even better, especially in terms of economic growth, so that by 1973 real GDP per person in Britain had fallen appreciably behind France and West Germany despite starting out well ahead in 1950.

If we take the economic outcomes of the 1950 to 1973 period as the criteria, is it likely that post-Brexit Britain can match them, and will Brexit have facilitated them? The answers to these questions are 'not likely' and 'no'. Economic growth of 3% per year will require labour productivity to grow at least that fast. This is only

The key to a new golden age is an era of benign technological progress.

likely if new technologies such as artificial intelligence and robotics have a substantial economic impact. However, if close to 50% of tasks are computerised over the next two decades, as some experts suggest, the pressure on the labour market to adjust will be intense, and it is difficult to imagine that there would not be a significant rise in unemployment, at least for a while.

The impact of Brexit on economic growth will be to make a golden age harder to achieve. The direct impact on the level of productivity will be negative, especially if the UK leaves without a deal. The indirect impact might be thought to come through better economic policy. There certainly are reforms (for example in innovation, infrastructure, land-use planning, skills and taxation policies) which might help growth performance in the medium term. Improved policies have not, however, been precluded by

EU membership. The obstacles are to be found in Westminster not Brussels, and are deeply rooted in British politics rather than stemming from constraints imposed by the EU.

The key to a new golden age is an era of benign technological progress. It might just happen. Even so, it is not going to result in Britain becoming the most prosperous country in Europe by 2050 as conventionally measured by the national accounts. In 2018, there was a big gap between real GDP per person in Britain and in the European leaders. Luxembourg, Norway and Switzerland were 2.3, 1.6 and 1.4 times the British level, respectively. If we dismiss Luxembourg as somehow not comparable, overtaking the other two countries would be quite difficult. The arithmetic of compound growth says that we would need to grow at an average of about 1.5 percentage points per year faster than Norway and 1.0 percentage point faster than Switzerland throughout the next 30 years or so. But a golden age of technological progress would underpin Norwegian and Swiss as well as British growth. In the context of Brexit, it is more likely that, if technological progress were to deliver a golden age, just as in the post-war years, strong British economic growth would not be enough to prevent relative economic decline.

It is, of course, understandable that politicians present an optimistic view of what the economic future will look like under their leadership. By the same token, it is natural that economists are sceptical of this optimism not least because, of itself, optimism does not have the desired outcome. In this case, a reality check shows that Britain is not going to be the most prosperous country in Europe any time soon.

It is perhaps not surprising that politicians have had enough of experts who are unwilling to indulge their fantasies. However, shooting the messenger as an enemy of the people is not going to make the impossible happen. ◀

Nicholas Crafts

CAGE publications
An overview

The Centre for Competitive Advantage in the Global Economy produces a wide range of publications which are available to download from the Centre's website: **warwick.ac.uk/fac/soc/economics/research/centres/cage/publications**

The ESRC Festival of Social Science for 2019 will run from 2-9 November. The Festival celebrates the importance of the social sciences with a wide variety of events across the UK.

CAGE WORKING PAPERS

How polarized are citizens? Measuring ideology from the ground-up
Mirko Draca and Carlo Schwarz
CAGE working paper no. 432
July 2019

The sources of British economic growth since the Industrial Revolution: Not the same old story
Nicholas Crafts
CAGE working paper no. 430
July 2019

Is the UK productivity slowdown unprecedented?
Nicholas Crafts and Terence C. Mills
CAGE working paper no. 429
July 2019

Taxation and supplier networks: Evidence from India
Lucy Gadenne, Tushar K. Nandi and Roland Rathelot
CAGE working paper no. 428
July 2019

Economic growth in Sub-Saharan Africa, 1885-2008
Stephen Broadberry and Leigh Gardener
CAGE working paper no. 425
June 2019

Sovereign debt: Election concerns and the democratic disadvantage
Amrita Dhillon, Andrew Pickering and Tomas Sjöström
CAGE working paper no. 422
June 2019

Did terrorism affect the Brexit vote?
Vincenzo Bove, Georgios Efthyvoulou and Harry Pickard
CAGE working paper no. 415
May 2019

The dynamic effects of tax audits
Arun Advani, William Elming and Jonathan Shaw
CAGE working paper no. 414
May 2019

Discrimination in hiring based on potential and realized fertility: Evidence from a large-scale field experiment
Sascha O. Becker, Ana Fernandes and Doris Weichselbaumer
CAGE working paper no. 412
April 2019

Theory of mind and strategic decision-making
Neha Bose and Daniel Sgroi
CAGE working paper no. 409
March 2019

GLOBAL PERSPECTIVES SERIES

CAGE publishes a series of policy briefings in partnership with the Social Market Foundation (SMF). The policy briefings in the Global Perspectives Series are non-technical summaries of one or more academic research papers intended for distribution among policymakers and journalists. They are available to the public on the CAGE website at: warwick.ac.uk/fac/soc/economics/research/centres/cage/publications/globalperspectives

Recent papers include: **Uncollected tax revenue – who is underpaying and what should we do about it**
Arun Advani
Global Perspective Series: June 2019
warwick.ac.uk/fac/soc/economics/research/centres/cage/manage/events/smfbriefing_advani_taxcompliance-final-version.pdf

BRUSSELS POLICY BRIEFINGS

CAGE works in partnership with the University of Warwick's Brussels office to organise briefings for the Brussels policymaking community. For more information see: warwick.ac.uk/fac/soc/economics/research/centres/cage/publications/brussels

CAGE POLICY REPORT

Comprising 18 policy papers, the 4th CAGE policy report entitled **Which Way Now? Economic policy after a decade of upheaval** was published in February 2019. Full report: warwick.ac.uk/fac/soc/economics/research/centres/cage/publications/policyreports/policy-report-which-way-now

CAGE INAUGURAL NICK CRAFTS LECTURE

The final keynote lecture at our 10th anniversary conference was unveiled as the inaugural Nick Crafts Lecture, in honour of our outgoing Director. The lecture, presented on Friday 28 June, was given by a Warwick alumnus, Professor Jim Robinson, Director of the Pearson Institute for the Study and Resolution of Global Conflicts at the University of Chicago. His paper was based on his forthcoming book with Daron Acemoglu, entitled, 'The Narrow Corridor: States, Societies and the Fate of Liberty'. It explored why liberty flourishes in some states but fails in others, and how it can overcome new threats.

EVENTS
SMF/CAGE Seminar
Mirko Draca presents his latest research on the polarisation of political ideologies amongst citizens, 18 September 2019, Social Market Foundation, London.

ESRC Festival of Social Science
The ESRC Festival of Social Science for 2019 will run from 2-9 November. The Festival celebrates the importance of the social sciences with a wide variety of events across the UK. CAGE is delighted to participate in the Festival and will be organising the following event: Cracking down on tax evasion and avoidance. Arun Advani will present evidence on who is underpaying tax in the UK and what can be done about it. He will also explore the issue of tax avoidance, particularly among so-called 'non-doms'. The lecture will be hosted at Warwick University. The date and time of the lecture is to be confirmed at the time of print- please visit the CAGE website for details: warwick.ac.uk/fac/soc/economics/research/centres/cage/events

For all CAGE events go to:
warwick.ac.uk/fac/soc/economics/research/centres/cage/events

About **CAGE**

Established in January 2010, the Centre for Competitive Advantage in the Global Economy (CAGE) is a research centre in the Department of Economics at the University of Warwick.

Research at CAGE examines how and why different countries achieve economic success.

F unded by the Economic and Social Research Council (ESRC), CAGE is carrying out a 15 year programme of innovative research.
    Research at CAGE examines how and why different countries achieve economic success. CAGE defines success in terms of personal well-being as well as productivity and competitiveness. We consider the reasons for economic outcomes in developed economies like the UK and also in the emerging economies of Africa and Asia. We aim to develop a better understanding of how to promote institutions and policies which are conducive to successful economic performance and we endeavour to draw lessons for policymakers from economic history as well as the contemporary world.

CAGE research uses economic analysis to address real-world policy issues. Our economic analysis considers the experience of countries at many different stages of economic development; it draws on insights from many disciplines, especially history, as well as economic theory. CAGE's research is organised under four themes:

- What explains comparative long-run growth performance?
- How do culture and institutions help to explain development and divergence in a globalising world?
- How do we improve the measurement of well-being and what are the implications for policy?
- What are the implications of globalisation and global crises for policymaking and for economic and political outcomes in western democracies? ◄