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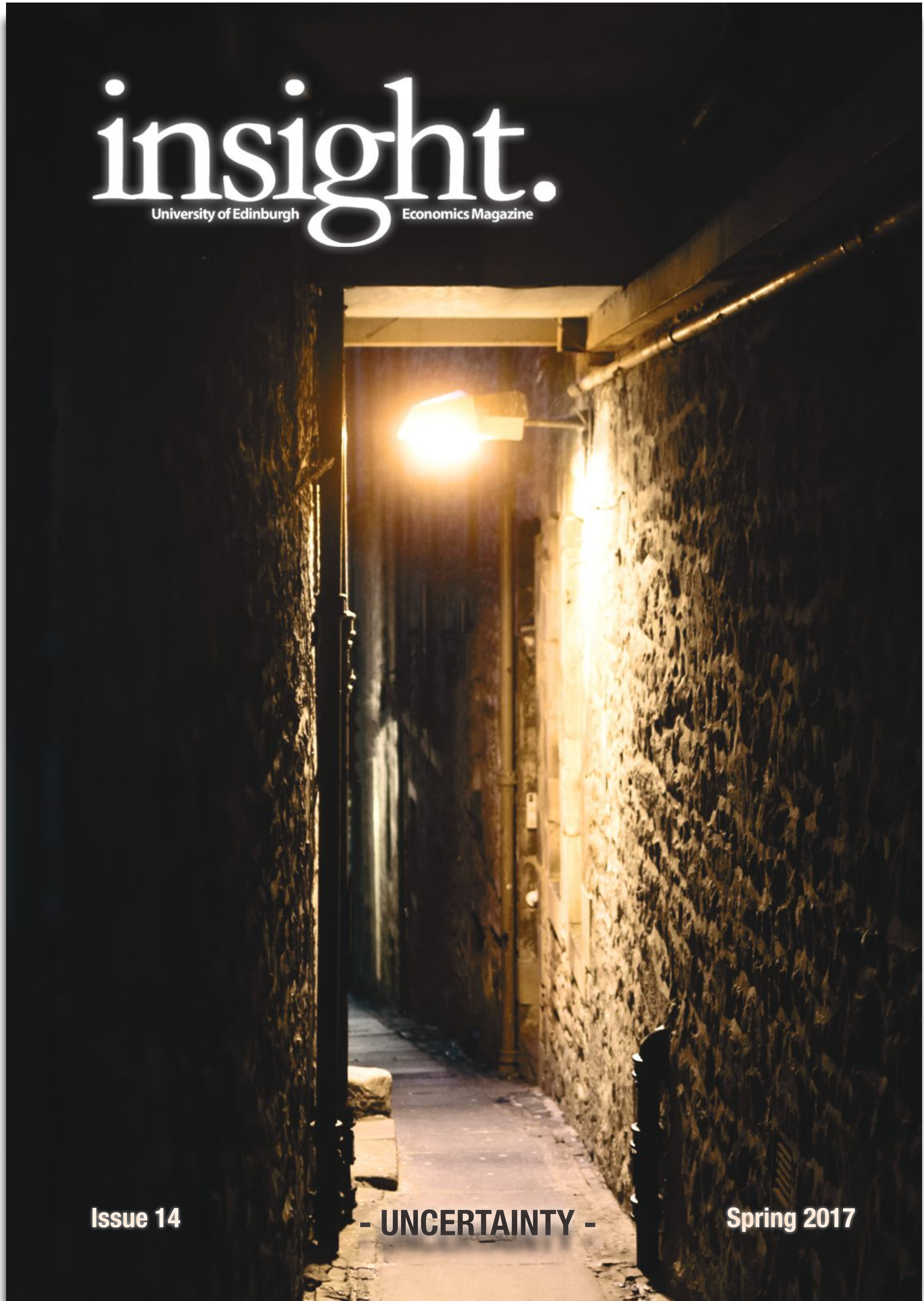
University of Edinburgh Economics Magazine



Issue 14

- UNCERTAINTY -

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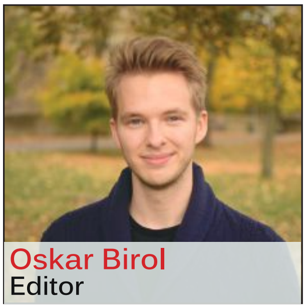
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Insight is the School of Economics' biannual magazine, produced entirely by students. Insight is the perfect platform for students to express their opinions, and to demonstrate their writing skills on any economics-related topics. Our magazine has brought together its readership — which includes not only our members, but also academic staff and students outside of the University.

We welcome writers of all backgrounds! Typically we accept proposals for articles at the beginning of each semester, after which writers are assigned one of our editing team members who work with them to produce articles. If you see yourself as more of an editor, or have design flair and wish to join the production team, let us know!

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We are very grateful to the School of Economics, which generously sponsors the magazine, including our Writing Prizes! Particular thanks go to Christina Napier (the School's Student Experience Officer) who has been an indispensable source of support and advice.

School of Economics
The University School of Economics staff make up one of the leading groups of economic theorists in Europe and the base for the Scottish Graduate Programme in Economics, receiving invariably high ratings for academic standards, teaching and learning resources. The University of Edinburgh has consistently been ranked as one of the top 25 universities in the world.

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Letter from the Editor-in-Chief

Welcome to the 14th issue of Insight!

For this issue we chose the theme of 'Uncertainty'. A large part of economics is about modelling an uncertain world and predicting what it could look like '*t*' time periods from now. This procedure is imperfect, as many of this issue's articles point out, but it is the basis for studying and applying much economic theory. This theme has allowed our writers to examine economic predictions in retrospect, as well as look towards the future making their own predictions for our uncertain world. We hope that this issue is able to stimulate conversation on the uncertainty that surrounds us and the various ways in which we prepare for it.

I would like to take this chance to thank the writers, the Insight team, and the School of Economics, without whom this publication would *certainly* not be possible.

I hope you enjoy our issue,

Melissa Parlour

Melissa Parlour
March 2017

THE UNIVERSITY of EDINBURGH
School of Economics

Cover photo credit: Oskar Birol

REVERTING TO THE MEAN

Jiacheng Xiao asks why economists get it wrong.

If you have been reading the news recently, you may have seen articles criticising the work of economists. There seems to be a constant debate about whether economics should be classed as a science or not. Such voices are particularly strong when there is a recession, which economists often fail to predict. So, why does this occur? Unfortunately, when people treat predictions made by economists as 'weather forecasts' and rely on them, they are often disappointed because economists appear to be quite bad at predicting the future. Recently the Chief Economist of the Bank of England, Andy Haldane, admitted that incorrect economic forecasts have brought economists' reputations into question. When a weatherman get the forecast wrong, the consequences are usually trivial. For example, you decide to wear a t-shirt when it's freezing cold, you don't bring an umbrella when it rains, or you have to play football in a storm. But if economists get it wrong, the consequences are much worse. People make investment decisions that can turn out to be unprofitable if economic conditions differ from the forecasts, which can affect many people's livelihoods. So why do economists get things wrong about the future?

WHY ECONOMISTS GET IT WRONG

Let's start with a simple example using only basic knowledge of economics: supply and demand. Assume people believe economists and think that their predictions are reliable. Then if economists predict that the price of wheat will go up next year, farmers will want to take advantage of this. As a consequence, farmers will plant more wheat and, come harvest time, the supply of wheat will increase. If the demand for wheat does not change, the increase in its supply will cause the price of wheat to fall, not rise. Therefore, it appears to the public that the economist's prediction was incorrect. The problem here is that the prediction actually changes people's behaviour. So, why don't economists take this into account when making their forecast? Well, they do - this is why economists now use 'microfoundations' - or build up their forecasts by looking at individual decisions. The idea is to capture the rules of individual behaviour that don't change when outside circumstances - like forecasts - do. The difficulty in practice with this approach is that there are infinitely many factors which influence decision making. In the real world, economists rarely know the rules of individual behaviour. One recent example, reported in the Wall Street Journal, is that billionaire investor George Soros lost nearly $1 billion in the weeks after the election of Trump. Economists predicted that, due to uncertainty about the future, the US stock market would fall after Trump's election since people should sell stocks and buy gold in order to avoid risks. However, the stock market turned out to be spurred. Unlike the weather, which follows certain immutable rules, people's behavior changes constantly hence making economists wrong when they make predictions based on what people used to do. In general, it is uncertainty of people's behaviour which makes the economist a bad weatherman.

COGNITIVE BIASES

So what drives people's behavior and decision making? It is their cognition. People make their decisions, for example about which stock to buy, by thinking about all information they have. A cognitive bias is a type of systematic error in thinking that occurs when people are processing and interpreting information. When making statements and predictions, economists tended to ignore the effects of individuals' cognitive biases. Economists assumed that on average, those under- or overestimating the market should roughly cancel each other out. Nowadays, as behavioral finance and economics have developed, scholars have started to realise the importance of cognitive biases. If these biases can significantly interact with, or affect the market, then economists may fail to predict the market outcome because it is almost impossible to account for all cognitive biases among market participants. For example, when bad news comes and a company's stock price falls, some people may think that it is a good time to buy this stock while others may think they should sell it, hence making the market outcome ambiguous.

THE REAL WORLD

The world is complicated, and there are too many factors to account for. In order to make useful statements and predictions, economists always make unrealistic assumptions to simplify the problems. But how unrealistic are these assumptions, or, how far away is the economist's world from the real world?

Here are some examples to light the way. Economists always build their model based on the assumption that people are rational. This is an essential assumption because we can only know how people will behave if they are rational — they will make optimal decisions to maximize their own wellbeing. You can't tell what kind of choice a person will make if they are irrational, and this is exactly the problem: one has to assume that people are rational in order to let the model work, but in the real world people are likely to be irrational, in that they often make decisions that may not increase their happiness. Also, economists always have to assume that people have utility functions - or a mathematical formula that describes their happiness - and that they make decisions based on the calculation of their lifetime utility. But is it believable that people are able to constantly reevaluate such a calculation in their head in real world? Moreover, financial theory dictates that a company's stock price should be equal to its intrinsic value - this is the discounted value of all its expected future returns - but in the real world it is hard to calculate a company's intrinsic value. Even if it can be calculated - how many people will actually do that? Last but not least, in macroeconomics, models are built based on the assumptions that, for example, there are only two countries, there is no population growth, and capital can flow from one country to another, and so on. All of these assumptions are unrealistic. Economists apply these assumptions because they do simplify things a lot and make it possible to build models. However, since these assumptions are unrealistic, the world economists build is segregated from the real world. In general, it is impossible for economists to build a model that fully captures the real world.

DO THEY KNOW THEY'RE WRONG?

I still remember my first lesson from my supervisor, Professor Sevi. He said "in economics, we know that our models are always wrong. We build our model, bearing in mind that it is wrong, to see how much it can explain the real world". You see, economists do know that they are often wrong. In fact, treating economists as weathermen is not appropriate. What a weatherman does is to try to forecast the future, but for economists, their major job is to help us learn from the past. Economists are trying their best to summarise and explain what has happened in the past, or, what's happening right now, and use these precious experiences as a guide for our future. Yes, economists may never get it right about exactly when a financial crisis will happen, but what they are trying to do is to learn from past crises, finding out what leads to these crises and what we may be able to do to avoid them in the future. It's not about predicting the future, it's about how to get to a better future. Your future remains uncertain, but there are lights to guide you, so that you don't get lost. ■

Monetary Determinism

Andrew Womer examines the impact of financial globalisation on monetary policy independence

Any of those who have glanced at an undergraduate economics textbook will be familiar with the idea of the so-called 'policy trilemma' or 'impossible trinity'. Frequently accredited to the economists Robert Mundell and Marcus Fleming, the policy trilemma suggests a country cannot simultaneously have free capital flows, a fixed exchange rate, and independent monetary policy. The underbelly of why the three cannot be concurrently pursued lies in the uncovered interest rate parity, which asserts that the interest rate differential between two countries is equal to the change in the exchange rate between each other's currencies. If this principle did not hold, then there would be the opportunity for investors to make risk-free profit on the market. To understand the mechanics of the trilemma, it is helpful to use a hypothetical.

BANGISTAN'S WOES

Let's say the fictional small open economy, Bangistan, is trying to achieve free capital flows, a fixed exchange rate and autonomous monetary policy, and is now going through a recession. Bangistan sets the interest rate below the world interest rate by increasing the money supply in order to stimulate the economy. Domestic investors will sell Bangistan dollars and buy higher yielding foreign currency, putting downward pressure on the price of Bangistan dollars on the foreign exchange market. If Bangistan wishes to sustain the fixed exchange rate it must sell its foreign currency reserves and buy back Bangistan dollars on the foreign exchange market, putting further downward pressure on the currency. Of course, this cycle ends with Bangistan's efforts trivialised; it will eventually run out of foreign currency reserves and its currency will depreciate after all.

In part because of neoclassical models of international finance, it has become the norm to accept free capital flows and to choose between a fixed exchange rate and independent monetary policy. Most major economies (like the US and UK) have chosen independent monetary policy and a fiat currency or floating exchange rate, while many developing and some smaller developed countries have chosen the fixed exchange rate system. Some notable exceptions to these generalisations are China, who to some degree has enacted capital controls, and the countries in Eurozone bloc, who de facto have a fixed exchange rate due to their currency union.

WHAT TRILEMMA?

The consensus around the basic underpinnings of the trilemma is fraying, however. Hélène Rey at the London Business School has mounted a serious charge against the policy trilemma. She has stipulated that allowing free capital flows may actually induce a loss of monetary policy independence regardless of the exchange rate regime in place. Instead of a trilemma, Rey's results suggest that there is instead an 'irreconcilable duo': a choice between free capital flows and independent monetary policy. The culprit? Financial globalisation. Rey argues that there is indeed a *global* financial cycle involving capital flows, asset prices and credit growth. Further, across the different exchange rate regimes, the prices of risky assets—i.e. equities and corporate bonds—move in 'lockstep' with the VIX (volatility index). But perhaps more unsettling, through examining the dynamic interrelations of the VIX and the Federal Funds Rate (FFR), Rey has found that movements in the FFR affect global credit flows and bank leverage. Essentially, this means that in an international financial system with free capital mobility, the monetary policy of the Federal Reserve plays a key role in driving global monetary conditions, fiat currency or not. If true, would this really trivialise the role of central banks in controlling prices and unemployment domestically? Yes. While interest rates in the broader economy are determined through a number of factors, asset prices and bank leverage are crucial to the process. As we've seen through the central banks' post-financial crisis bond purchasing programs (a.k.a. quantitative easing), rises in the prices of government and corporate bonds pushes down interest rates in the broader economy. Further, the leverage of banks in a given country impacts the access to credit for consumers. For instance, if banks wish to restrict the amount of credit

European Central Bank

Flickr User Jurjen Van Enter

they give to borrowers, they would reduce their leverage, pushing up interest rates on loans.

WHAT NOW?

In her paper, Rey calls for a serious revaluation as to the benefits of keeping the capital borders open, particularly for developing countries who tend to have the highest capital inflows and are the most vulnerable to volatile capital movements. Even prior to Rey's paper, there has been claims to the effect that changes in the Federal Reserve's policies influence capital movements in emerging markets. Many economists have asserted that the easy policies of the Federal Reserve in the wake of the financial crisis contributed to the mass influx of capital to emerging market economies—in search of high returns on investment. In between April of 2009, when the FFR was lowered to 0.18%, capital inflows to emerging market economies rested at just 1.56%. After two years of easy monetary policy, capital inflows surged to 7.47%, nearly quintupling. Moreover, economists explain the recent decline in capital inflows to emerging markets as a function of the real and expected increases in the FFR, which has taken place over the past two years. However, there is room for rebuke. In their own analysis, the Federal Reserve found that the spike in capital flows to emerging markets actually began in the mid-2000s, well before the financial crisis and easy monetary policy from the Federal Reserve. On the contrary, the surge seen in the 2009-2011 period reflects instead a 'bounce back' in capital inflows following a temporary decline during the financial crisis. So, if not the FFR and global financial cycle, then what can explain the variation in capital flow across emerging market economies? The Federal Reserve contends that endogenous factors are at work primarily. They say the decline in capital flows post-2010 have been a response to dwindling emerging market output-growth and the global weakening of commodity prices, of which many emerging market economies are reliant.

Of course, it is not hard to see why the Fed would want to make the case that their policies are contributing to economic volatility in the developing world. Nevertheless, the case for financial globalisation as a significant determinant of monetary policy around the world is not clear-cut. However, Rey's arguments do not fall on deaf ears in a world where there is much more financial interconnectedness and volatility. What is the way forward? Unlike some economists, Rey does not suggest to hop on the capital controls train, despite her proclamations of the 'irreconcilable duo'. Instead, the Federal Reserve and other major central banks should concentrate on the potential spill over effects of their policies when setting policy. Yet, it is difficult to imagine the central bank of a single country assuming responsibility for global finance, particularly considering the political climate in the US and elsewhere. Although economists still tend to agree that open borders are a good idea, it will be a challenge to convince developing countries that capital controls are all doom and gloom when there are instances, like China, where it has proved to be effective. ■

Sailing Through the Dark

Nishith Hegde, the winner of the 'Best Writer' prize, explores how the presence of uncertainty affects decision-making and economic policy.

We possess neither the ability nor the technology to perfectly know everything about our world, and yet find ourselves with no choice but to navigate it, directed only by fragments of information that we use to illuminate and infer the path ahead - as though sailing a ship through the ocean guided only by the stars. This state of partial information, *uncertainty,* is what couches every action we take, and every perception we form.

When it comes to decision-making, therefore, two problems arise. Firstly, we are almost always making decisions under false assumptions – or rather, under a simulacrum of the truth that is merely an imperfect impression. Put simply, we misunderstand the world we live in, and, in response, select options that therefore lead to negative outcomes. But the second is even more fundamental: even when the first problem is solved by just giving us the full information we require, when we're given hard statistics, or dealing with perfect hypotheticals that pose no risk to us personally and cannot be affected by unforeseen factors, the mere *presence* of uncertainty creates infuriatingly inconsistent decision-making.

The foundational pillars of modern economics rely upon the economic agent being rational and utility-maximising. In reality, this archetypal economic agent cannot even consistently determine their own preferences.

Our decisions entail important consequences. They shape our behaviour and our interactions – They are the difference between a happy day and a depressing one, between winning big and losing it all, between a guilty verdict and an acquittal. But moreover, they have severe implications for policymaking. Widespread, false, assumptions create perverse electoral pressures for legislators, producing ill-suited policy. But there are additional consequences to this irrational tendency: a framing bias affects the testing of different policy options, and even *well-suited* policies are limited in their effectiveness. Economic models may have all the answers – but they remain ineffective when their consumers themselves are stubbornly imperfect.

So why does the presence of uncertainty encourage these behaviours? And are there solutions to accommodate them in policymaking? Slowly, our understanding of both is starting to advance.

HEURISTICS

Ultimately, this behaviour is caused by our use of shortcuts. In order to save precious mental processing power, and form decisions quickly, we adhere to a set of rules of thumb in order to form conclusions about the world. These are known as *heuristics*. Here's an example: studies repeatedly show that groups of test subjects demonstrate a tendency to prioritise perceptions over evidence. A key 1974 study by Amos Tversky and Daniel Kahneman demonstrated that when a company with 30 engineers in it, and 70 lawyers, was described, and then some characteristics of a particular employee (meek, isolated, introverted) given, a significant proportion of test subjects believed the employee to be an engineer. The probability of being an engineer was registered by subjects as close to 50%, even though the real probability, absent stereotypes, is 30%.

The really interesting finding came when they compared these outcomes across groups who were given different information. With no characteristics at all, groups correctly identified that the likelihood of this employee being an engineer was 30%. But when told *irrelevant* characteristics (no children, unmarried, or demonstrating promise) that were completely outside of the stereotypes of engineers and lawyers, test subjects reverted to their previous prediction of close to 50%: a partial information set led to *less* accurate decision-making than no information at all. What this suggests is that in the presence of even the smallest uncertainty, our decision-making switches from rational to heuristic.

Further to this, have you ever wondered why restaurants stock incredibly overpriced wines that are clearly poor value, and that almost no-one buys? One reason may be *the compromise effect*. If presented with two distinct options, a cava for £10 a bottle and prosecco for £15, you may find yourself preferring the lower-priced cava. But in the presence of an alternative, for example a £35 champagne, there is a strong tendency to choose the middle-price wine ahead of the lowest: people outright reverse previous preferences for no reason other than the presence of another alternative. This shows how even our own preferences become incredibly context-dependent, and subject to a framing effect; while the restaurant takes in an extra fiver in revenue.

Likewise, there is strong evidence that individuals exhibit an *anchoring* effect. This effect essentially says that estimations and predictions are not rationally and independently determined; rather we take some initial 'anchor' and shift that value upward or downward. This again leads to a number of problems. For example, adjustment is often insufficient

– when shown a random two-digit number, and then asked to predict whether that number was higher or lower than the real percentage of countries in Africa, test groups often adjusted vastly differently based on their starting figure. Groups that started with 10 had a median final estimate of 25%, whilst a group that starts with 65 will only adjust down to 45%, nowhere near the true figure: 28%.

Similarly, even when individuals know that a figure circulated in the media is too high, for example that £350 million a day are being sent to the EU, downward adjustments to that figure remain grossly insufficient. And yet, despite consistently misjudging probabilities, most individuals demonstrate overconfidence about their probability decisions relative to the amount of knowledge they actually have!

WHAT DOES THIS MEAN FOR ECONOMIC POLICY?

If your takeaway from this is that individuals shouldn't be trusted, you're on the right track. Contrary to economic theory, preferences are significantly arbitrary and can be manipulated by normatively irrelevant cues. Even writing policy using 'objective' tools such as cost-benefit analyses proves difficult when individuals cannot discuss their own preferences correctly, since the experience of that potential benefit is itself uncertain to them.

Economics is, at essence, the act of comparing the value of things. We can give a machine a price, using its cost, depreciation, demand, and so on - but what of the environment, or health? It is here, in welfare economics, that irrational decision-making proves particularly frustrating. One example: individuals have a very low willingness to pay for services like healthcare, but their willingness to accept its absence is also low. So, a policymaker trying to spend a government budget to maximise utility will find that funding these services 'misallocates' funds, and yet, so will withdrawing those resources. It is not that citizens are lying about whether they value healthcare highly – it is, perplexingly, that they *simultaneously do and do not,* based on how you ask them. And since we cannot plug people into some utility-reading machine, and utility is inherently subjective, asking them is the best way we've got: we just cannot fully trust their answers.

Some solve this dilemma by outright ignoring reported utility and preferences, and instead elect to just make decisions on people's behalf, but this itself runs into philosophical issues regarding paternalism. Can the state truly know us better than we know ourselves? Perhaps such a route would prove no better at creating positive policy outcomes than the status quo, or if it did, only achieve them by stripping individuals of their own agency: after all, why then elect representatives in the first place? In light of this, the clearest solution appears to be stripping away as much uncertainty as possible. Stronger limits on the way information is presented and restrictions on the extent and nature of political campaigning may have a significant effect, as might reducing our reliance upon polled data for welfare and utility analysis. Ultimately though, the battle of policymakers against these confounding outcomes is a battle against human nature; for when things are uncertain, our decision-making is the most human of all: fundamentally irrational. ■

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Talent... or Rent-Seeking?

Feiyang Shi assesses the roles of talent, opportunism & chance in inequality, and how they can be adressed through policy.

When someone says "inequality," what comes to mind? Employment discrimination, differences in education opportunities, class discrimination? These are the talents-related issues that the majority of people would recognise as causing inequality in society. Besides that, people are also discriminated against due to their gender, ethnicity, or are provided with very different levels of opportunities for self-development and education despite initially they have the same level of merit. The government has a range of policies to deal with these issues, but in practice how effective are they for constructing more equal economies? With the gap between the rich and poor growing ever larger, it is time to look beyond the inequality among individuals and explore other factors that are causing inequality.

THE TALENT-DISCRIMINATED

Until now, most of the studies done on inequality are focused on the talent side. Many countries have sanctioned policies to eliminate and prevent accumulated-wealth-driven inequalities, gender inequalities and racial inequalities. For example, on the education front, primary education is now provided for 92% of the children in the developing world, further target is already listed in the Millennium Development Goals. On the fiscal side, to combat inequality, the OECD countries have reformed the tax and transfer system. The new transfer system contributed to 3/4 of the reduction in inequality. For the more direct discrimination cases concerning race and gender, there is a rise of awareness on a global scale, leading to the introduction of development measurements such as the Gender Inequality Index (GII) measuring gender disparity.

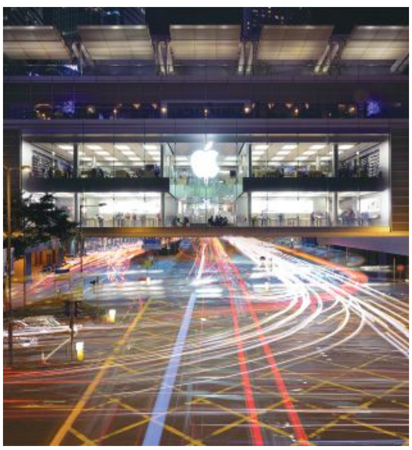
Although on the action side the implementations seem very positive, outcomes still lag behind. In fact, recent development shows that the income gap between the rich and poor across the globe continues to grow, indicating that existing policies aimed at tackling inequality are not enough. In the US, the share of national income going to the top 1% has doubled since 1980s while the top 0.01% has quadrupled. So what is the missing piece to this extreme wealth and inequality puzzle?

THE PLOTTERS

Now, let us imagine that you are mistakenly being served with documents related to a lawsuit. Even though you are innocent, to make your stand in the courtroom requires you to find a lawyer. In this case, you not only need to endure the process, you also need to pay to get your justice. This small-scale rent seeking behaviour can cause some annoyance. But when it happens in society at large, chance-taking and rent-seeking behaviour often translate the same or lower level of merit into much higher return, causing complaints about systemic injustice and inequality. It may be argued that this only happens to a few individuals, thus the effect is negligible. But as Oxfam stated, the top 1% earns more than the rest of us summed up in 2015. When global income is so concentrated, it worth examining the effects of these behaviours on extreme inequality and extreme wealth accumulated over time.

Apple's revenue, for example, is greater than Bangladesh's GDP. But is it purely merit based? In other words, does Apple deserve greater returns than an entire country? Apple displays rent seeking behaviour via "intellectual property and tying" mechanisms. People purchase Apple device in hope to enjoy the full level of satisfaction it can provide. However, many software and hardware tied to the device for maximising its performance require separate payments. This functions in a way similar to that of two-part pricing. It indirectly presses consumers to increase their expenditure on the products and thus increases the producer's share of surplus. Also, because the international market is growing ever more integrated, strong businesses, like Apple, Toyota and Samsung, are growing even larger by seizing the opportunity to appeal to a much bigger consumer group.

By simply riding on the wave of globalisation, strong businesses are able to generate much higher revenues with much less effort. By tying products, companies are generating more revenue from consumers' dependency and need. More generally, research shows that rents of cronyism, inheritance and monopoly attribute to 65% of the global wealth of billionaires. Extreme wealth is getting stronger as income and wealth is "being sucked upwards", it seems like



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The Weight of Wages

Elisabeth Dietz explores the frequently overlooked emotional component of labour

In the modern economy, along with greater economic uncertainty, there is an increased demand for emotional labour. Emotional labour here refers to the process where workers manage their feelings in accordance with organisationally defined rules and norms. Pret A Manger even trains its workers to exhibit qualities like being 'genuinely friendly', and not 'just being here for the money'. Penn State organisational psychologist Alicia Grandey calls emotional labour 'invisible work'. From studying burnout and exhaustion in call centre workers and bus drivers, she concludes that the emotional costs to workers are large enough that emotional labour expectations should be dropped. Yet why do they persist, and why is this work not compensated for?

SERVICE WITH A SMILE

The rise of 'service with a smile' is connected with economic uncertainty. Some argue that it is post-crash precarity that is causing the rise of emotional labour, with the spread of zero-hour contracts and temporary employment. With a globalised workforce and overall higher unemployment, there is more competition for work - and thus employers can demand more from workers while paying them less and offering them lower job security. In what economic theorist Jeremy Rifkin calls 'cultural capitalism', where experiences are commodified, customers feel they are paying not just for the act of consumption, but rather for an identity – a 'feeling'. While we might suspect that the Starbucks barista handing us our Pumpkin Spice Latte is underpaid, we don't want to be served by someone who seems like they hate their job.

EMOTIONAL LABOUR DOESN'T PAY

Sociologist Arlie Hochschild coined the term *emotional labour* after studying female flight attendants, observing how they 'managed' their feelings in order to produce an atmosphere of calmness. Beyond what we do in our jobs, unpaid emotion work is part of our everyday life. Yet with the shift from focus on manufacturing to service, Hochschild points out that emotion takes a larger and larger place in the formal economy. This particularly applies to 'people jobs' such as care, service or retail work – jobs that tend to pay badly. Indeed we might argue that it is precisely the high component of emotional labour that makes this work 'low-status' and 'low-pay'. Importantly, this is also work that is predominantly done by women, migrants and minorities – making these groups disproportionately affected by the increased demands for emotional labour and its lack of financial compensation.

However, it is not only these jobs that require workers to 'manage' their feelings, even office workers perform emotional labour when they smile at their boss while receiving an unfair critique. A study from the University of Minnesota found that when men shift to jobs requiring increased cognitive labour, they get an average wage boost of 8.8%, but when they move to positions demanding more emotional labour, they experience a 5.7% relative drop in wages. Consequently, it cannot only be the connection with service work and vulnerable workers that explains the poor wages for emotional labour, since this trend persists in all sectors. The researchers suggest that this is because many jobs requiring emotional labour are seen as 'vocations', and employers know they can get away with paying less for work that people 'love' doing.

GENDERED LABOUR

Although current economic insecurity is making the issues surrounding emotional labour more visible, neither precarity nor the gendered nature of emotional labour is new. Perhaps examining its role in our private lives can offer us an explanation for why emotional labour is not considered 'proper work' to be compensated for in the formal economy? The domain of emotion and the labour of caring has traditionally been placed on women, and this work's displacement to the private realm has rendered it informal, unpaid, and ultimately uncertain in nature - despite its necessity in making the formal economy functional. In fact, philosopher Silvia Federici argues that it is domestic and reproductive labour that allows capitalism to be profitable and that this is precisely why it is not monetarily compensated for – even as this kind of labour increasingly becomes integrated into formal jobs. Her 'Wages against Housework' campaign, echoed by the modern feminists behind #GiveYourMoneyToWomen, attempts to bring emotional labour into the realm of regular labour, in order for it to be recognised, discussed and compensated for - and possibly rebelled against. Given how current economic uncertainty is allowing the demands for emotional labour to grow at rapid speeds, it appears that these questions are as relevant now as ever.

Unless we challenge what is considered valuable labour we are bound to remain stuck in an economy perpetuating inequality - an economy increasingly characterised by fake smiles and exhausted workers. ■

To Risk, or Not to Risk — The Japanese Question

Daniel Ooi explores the socioeconomic and historical forces that have shaped Japan's risk aversion.

'Unless you enter the tiger's cave, you will not get its cub.'

– Japanese proverb

AN IMPOSSIBLE PARADOX

It is ironic that the nation synonymous with risk aversion should also expound the basic principle of risk and return. Japan of the past survived a world war and engineered economic growth so impressive it was dubbed the Japanese growth miracle. But Japan today is known for its obsession with the avoidance of risk. It is Japan's creativity, innovation and discipline that earned its place as a developed country, and yet today it seems impossible to comprehend, how Japan with its risk aversion, could be the great and thriving economy it once was.

A good deal of Japanese risk aversion can be explained by the domestic labour market, namely the annual hiring process where companies recruit large quantities of new graduates simultaneously. Competition is massive due to the large number of candidates with similar qualifications. Students begin job hunting in their second-last year of university and by the start of final year, informal job offers are sent out. Hence, attaining a good position on a regular job at any other time is extremely difficult as firms rarely hire outside of the aforementioned window. Thus, being sacked or leaving a job may lead to lifelong unemployment. This explains surveys that show less than 10% of Japanese workers are interested in taking a job elsewhere, indicating a refusal to enter risk-bearing ventures such as entrepreneurship. In turn, this stems from the absence of backup plans, such as returning to a low-risk career in the event the enterprise fails to materialise. Entrepreneurship is further discouraged by the permanent employment system. Why bother setting up an uncertain enterprise when you can have an unbreakable rice bowl?

Furthermore, it is common for Japanese companies to prioritise seniority over merit in employee promotion decisions. This incentive system promotes risk-averse workplace behaviour where employees seek to remain in their positions as long as they can rather than undertaking risky endeavours to prove ability. This also applies to Japanese entrepreneurship, where Prime Minister Shinzo Abe has identified Japanese risk aversion as the cause of Japan's failure to replicate Silicon Valley. This stems from the shortage of entrepreneurs and investors, which is due to culture that does not tolerate risk-taking as a by-product of innovation. Furthermore, risk-aversion translates into social preferences and norms, such as mothers generally preferring individuals with 'stable' careers such as doctors and company employees over entrepreneurs as son-in-law candidates. Hence, individuals are pressured to be risk-averse, and by self-selection the Japanese labour force becomes increasingly averse to risk in general.

The Japanese aversion to risk is just as conspicuous among firms as it is ubiquitous among the Japanese labour force. Since Japanese business culture is based on trust, firms are socially incentivized to prioritise stable relationships with clients to maintain long term growth. Thus, firms are unwilling to undertake ventures that involve uncertainty since they are viewed as too risky. Due to cross-shareholding between firms and creditor banks, Japanese firms are strongly influenced by their respective banks in terms of company policy. Historically, banks under the keiretsu system have pressured firms to maximise sales rather than profits. This decreases incentives to undertake risky ventures with the goal of profit maximization, as this may require changing business structure and hence risk upsetting relations with clients, which Japanese firms are not eager to do. Similarly, due to significant trade unions and the importance of trust in the employer-employee relationship, firms are unwilling to undertake investments that lead to reorganizing of the production process.

THE SHADOW OF THE PAST

Another interesting avenue to explore is the economic history of Japan. Japan rose from the ashes of World War II and swiftly built a powerful economy, creating the Japanese growth miracle that saw its rise to the world's second largest economy behind the United States. Unfortunately, the miracle growth period ended as the asset price bubble burst in 1991 causing sharp declines in asset prices and bank failures. This in turn led to the period of stagnation known as the Lost Decade.

The Japanese economy before and after the economic crisis changed significantly from the optimism and exuberance of the miracle growth era to the pessimism and risk aversion of the lost decade. Households that banked their hopes on the skyrocketing real estate market saw their savings and assets wiped out as the bubble burst into a shower of broken dreams. Drawing on the dramatic shift in expectations

Flickr User Pedro Szekely

before and after the economic crisis, Japanese households radically shifted toward modern risk aversion. The baby boomer generation experienced the economic crisis first-hand while generation X lived through the immediate aftermath. Since risk-averse parents are likely to raise risk-averse children, the phenomenon perpetuates itself. This is clearly displayed in Japanese saving behaviour. In addition to having the highest saving rate in the world, Japanese households show a clear aversion to saving in the form of stocks, opting for safe haven assets with low volatility such as gold and government bonds despite the low returns. The high savings rate may be due to factors other than risk aversion such as an ageing population, but this preference for largely riskless forms of saving can be mainly attributed to risk aversion. This stems from the fact households witnessed large losses of wealth when stock prices declined sharply at the bursting of the asset bubble. Hence, due to loss aversion, they are reluctant to put their faith in equities as a store of wealth.

AN UNCERTAIN WAY FORWARD

The Japanese risk aversion is not constrained to the domestic market and manifests itself in dealings with the world. Japanese culture centers on conflict avoidance, and places great importance on concession. There is also the culture of dealing with the easy problems before the hard ones. For example, while Sino-Japanese relations are historically strained, political analysts suggest that despite radical nationalists in the political circles, there is no risk of Japanese nationalism going unhinged due to the culture of conflict avoidance as well as risk aversion. In addition, Japan hypothetically has options of provoking a full-blown conflict with China, for example on the issue of comfort women, or making an outright apology to reconcile the nations. Both actions are risky – provoking China is costly, while reconciliation risks riling up Japanese ultra-nationalists that revise the national history for their own benefit. Thus, risk aversion has led to Japan maintaining the status quo for Sino-Japanese relations, despite the strain.

From a national defence perspective, Japan ranks eighth in the world for size of defence spending, despite Article 9 in the Japanese Constitution prohibiting declaration of war. Rather than an indication of risk-seeking behaviour, the defence build-up indicates risk aversion. Japan's defence build-up is insurance to avoid running the risk of being undefended in the event of war, even when it cannot, ironically, declare war.

Considering current global uncertainty, Japan's risk aversion could benefit its economy in the short term. Japan's massive current account surplus makes it one of the world's largest creditors, thus providing a steady stream of income. However, as economies become increasingly isolationist in the face of protectionism and populism, it remains to be seen how Japan avoids another recession since weak domestic demand is unlikely to substitute export-led growth. In the long run, Japan's ageing and shrinking population will not sustain the engine of growth, considering Japan's isolationist immigration policies. Japan's aversion to risk may become a bane rather than a boon to its economy as the start-ups of today will be driving economic growth in the future.

For the rest of the world, it is clear that despite Japan's economic miracle in the past, its current aversion to risk cannot be emulated. While western economies may benefit from some risk aversion, especially considering the financial crisis of the not-too-distant past, it is unwise to adopt Japan's affinity for risk aversion as a guide to policymaking in in the presence of global uncertainty. Japan's risk aversion is unique to itself, a product of its economic history and culture, which cannot be replicated. The days ahead are uncertain, but playing safe is certainly not a risk-free option. ■

The Future of US Trade

Sam Bacevich explores how the Trump administration is impacting American businesses.

On November 8, Donald Trump was elected President of the United States, and the US equity market went on a two month "sugar high." Now, the honeymoon period is coming to an end for many US businesses and investors as Trump has formally notified Canada and Mexico of his intentions to renegotiate the North American Free Trade Agreement (NAFTA), and to pull out of the Trans-Pacific Partnership (TPP).

NAFTA has been a pillar of security and continued growth not only for the United States, but also for Canada and Mexico. Since NAFTA's inception in 1994, trade between Mexico, Canada, and the United States has quadrupled from 297 billion to 1.14 trillion. NAFTA now represents a greater aggregate GDP than the 28 member countries of the European Union, benefitting over 450 million people.

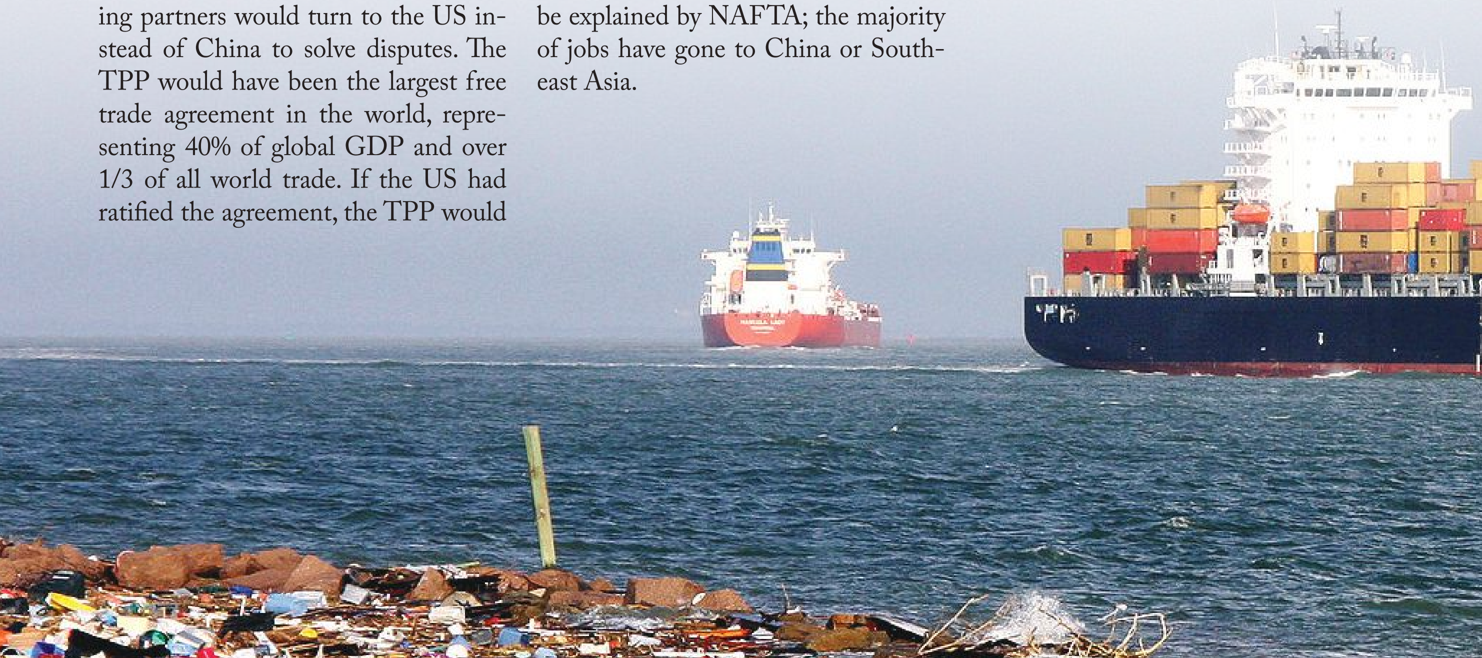
The TPP was not very important economically for the United States, with real GDP improving by 0.15% by 2032. The TPP—as President Obama pointed out numerous times—pushed against China's influence in the region. By securing US interests in Asia and the Pacific, the TPP ensured that trading partners would turn to the US instead of China to solve disputes. The TPP would have been the largest free trade agreement in the world, representing 40% of global GDP and over 1/3 of all world trade. If the US had ratified the agreement, the TPP would have provided the US with $905 billion in exports and $980 billion in imports. However, President Trump withdrew America's support from the TPP on January 23, causing the whole deal to collapse.

WHAT SHOULD US FIRMS DO?

Throughout the presidential race, the American people questioned both Trump's ability to lead the country, and the validity of his claims about trade and the state of the American economy. Is Trump's open hatred of NAFTA warranted, or is NAFTA just another political target in the President's push towards protectionism? In reality, NAFTA has produced mixed results for the American people. NAFTA increases the United States' wealth by $127 billion every year. However, with a population of 320 million, this only translates to about $400 dollars per person out of a GDP per capita of above $50,000. NAFTA has also resulted in the loss of 5 million high-wage manufacturing jobs from the Rust Belt States, which are home to Trump's main supporters. However, recent studies have shown that only about 5% of all jobs lost since 1994 can be explained by NAFTA; the majority of jobs have gone to China or Southeast Asia.

These economic statistics fail to demonstrate the importance of NAFTA for US businesses. United States businesses depend on NAFTA to maintain supply chains that cross both the Canadian and Mexican borders. When General Motors needs a seat belt, the nylon is produced in Mexico before being sent to Canada to be dyed and stitched. Once the fabric is finished, it is sent back to Mexico for assembly before being tested and adjusted in the US. This integrated supply chain has been crucial to competing with foreign firms. NAFTA is largely credited with the survival of US manufacturing during the onslaught of cheaper products from Asia in the 1990's.

The TPP, on the other hand, represents a "what if" scenario for US businesses. By breaking down tariff barriers in countries such as Vietnam and Malaysia, US companies would have had more efficient supply chains for their labor-intensive products. However, TPP is also the first multilateral trade agreement to address the trade concerns of small and medium enterprises. By removing red tape and opaque trade rules, small businesses across the Americas and Asia-Pacific can trade



more effectively in new international markets. For companies like Exxon Mobil and Intel, the TPP would have further broken down tariff barriers for their goods. The TPP would have continued to give US multinationals access to the extremely profitable developing economies and investment protection, which would allow them to compete with previously government owned enterprises that still dominate their "home" markets in Southeast Asia.

THE VALUE OF TRADE

US multinationals should not arbitrarily bring manufacturing jobs back into the United States if it will negatively impact their performance. Yes, firms have a responsibility to their employees, and should consider the repercussions of relocating jobs overseas. However, they also have obligations to their shareholders to maintain profitability, and their customers to continue to offer affordable products. Even before the ratification of the TPP, many US firms were already investing heavily in Vietnam and other Southeast Asian countries. In reality, the removal of free trade will negatively impact US firms, but not so significantly as to disrupt international supply chains. This begs the question of why did Ford Motor Company, for example, reallocate a $1.6 billion investment originally earmarked for Mexico back to the United States? The Trump administration quickly took credit, saying "Ford to scrap Mexico plant, invest in Michigan due to Trump policies," but Ford was already planning to move jobs back to the United States. Ford's proposed Mexican plant would increase the production capacity of their popular Ford Focus sedan and hatchback, which is expected to decline in demand in the upcoming decade. In light of this prediction, Ford decided to invest in their production of high margin SUVs and their luxury brands which are already produced in the United States. Ford took a purely strategic decision, and repackaged it in order to appease a new president who sees globalization as the root of all America's woes. Trump, with one tweet, can send a company's stock into a downward spiral. When Trump tweeted at Boeing about the expenses incurred in building the new Air Force One, Boeing stock fell over 1% in premarket trading. Ford coolly avoided this threat by giving the president what he wanted to hear, while simultaneously making a sound business decision.

In a worst-case scenario, negotiations between Donald Trump and Mexican president Enrique Peña Nieto break down. If NAFTA is completely scrapped, many US companies would no longer be able to compete as effectively in the global marketplace. In this situation, US companies will need to invest more heavily in countries with bilateral trade agreements. Trump extolls the virtues of bilateral trade agreements, and the US has not pulled out of a bilateral trade agreement in over a century. Countries like Nicaragua, Panama, and Peru all have bilateral free trade agreements with the US, each offering ideal environments to produce labor intensive goods while also maintaining relatively close proximity to the US. Even with NAFTA in place, US multinational businesses would save significantly by moving some manufacturing processes to developing countries with bilateral trade agreements like Panama. If US firms hope to weather the uncertainty during Trump's term, they should consider increasing foreign investment into countries such as these, where the manufacturing benefits are effectively the same, but will not be harmed by Trump's rhetoric.

THE FUTURE OF US BUSINESS

There is a reason for US businesses to fear the outcome of Trump's proposed renegotiation of NAFTA. The disruption to their global supply chains could cause substantial losses. Moreover, shifting manufacturing jobs back to the US is not the best solution because high wages and labor laws will increase the price of goods. US businesses need to find a compromising ground with the Trump administration. US businesses should follow Ford's example of repackaging sound business decisions as political appeasement, while making investments into countries with bilateral agreements with the US. The small investment back into the US will satisfy the Trump administration, while the larger foreign investment in nations with bilateral trade agreements would allow any US company to maintain its competitive edge in the global market. ■

FEMA

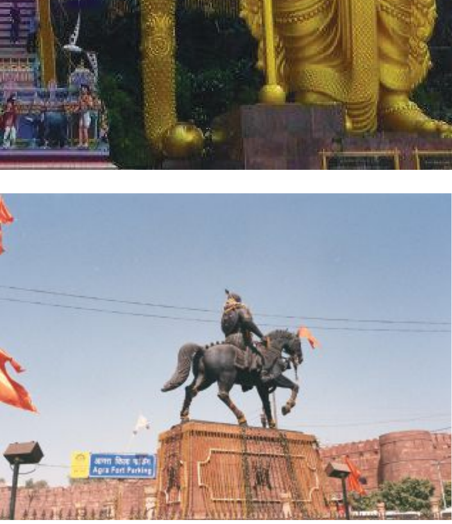
GO ABROAD ECONOMICS

FRANCISCO CUOTO &
MARTIN SAMSON

Above and Abroad

Go Abroad Economics began with a trip to Dubai in February of 2015. In the two years since then, it has undertaken six trips to four different continents with trips to Japan and Scandinavia planned for this summer. These trips are largely organized by the students themselves and are prefaced with in-depth economic studies of the destinations. The program has allowed Economics students to not only put their learning into practice, but also to see first hand the the world that economics tries so hard to model.

Most recently, students travelled to two destinations which, in addition to their agreeable winter climates, offer unique economic case studies, detailed in the pages to follow. Destinations planned for the next academic year will be anounced in April. Further information is available by contacting GoAbroad@ed.ac.uk



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La Vida Cubana

MARTIN SAMSON

The Go Abroad Economics trip in February took thirteen students and three members of staff to Cuba for eight days. Our many weeks of research, planning and meetings leading up to the trip gave us insight into Cuba's culture, economy and legal system. Yet many questions remained unanswered. What do Cuban shops sell? What do Cubans think about tourists? What is the future of the U.S. trade embargo? We were excited to find answers to such questions first-hand.

Seeing Havana for the first time was surreal. Driving through the city in American cars from before Cuba's 1959 revolution, we saw dilapidated and colourful buildings spanning further than the eye could see. Instead of advertisements, we saw billboards condemning the U.S. trade embargo and posters of Che Guevara and other revolutionary leaders promoting continued support for their cause.

The upbeat rhythms of Cuban music frequently filled the air. At salsa clubs, we joined locals in a variety of dances combining Spanish and West African traditions. Taking part in a weekly religious festivity, we experienced a popular religion in the country called Santería. It came about in the early 1500s, when the religions of West African slaves fused with the Roman Catholicism of the Spaniards. Speaking with a panel of researchers from the University of Havana, we were surprised to hear that Santería has expanded internationally, and spawned a multi-million dollar religious tourism industry in Cuba.

The people we met were more open than we had imagined. The local families we stayed with were warm and caring. During our trip, locals were very friendly and assisted us where possible. Speaking to the local population, tourists are seen as an excellent avenue for economic growth, rather than a threat to income equality. While images of the revolution still dominate the city landscape from schools to cigar factories, a strong American influence is evident through posters of Hollywood celebrities, and the U.S. sports jerseys that we frequently saw Cubans wearing.

CHALLENGES & OPPORTUNITIES

During our visit to the U.S. Embassy in Havana, the Deputy Ambassador predicted that the Trump administration will continue the path for greater cooperation with Cuba. He also highlighted some major transitions and challenges facing the country. First, Cuba has a growing elderly population and a low fertility rate. This, when combined with the high migration among the younger generation, challenges the ability of the country to finance its current welfare system. Second, many in the country's political leadership, including Raúl Castro, will retire within a couple of years, allowing the younger generation to exert greater political influence. This generation is less attached to the ideals of the revolution, and is more open to privatisation and foreign direct investment. The challenge for the Cuban government is to form political consensus on how to balance these growth opportunities with their desire to maintain egalitarianism and state control.

Meeting with economics professors from the University of Havana, other challenges became apparent. Despite its fertile soil and agreeable climate, more than 80% of food consumed in Cuba is imported. A proposed solution for decreasing the country's import dependence is to increase domestic food production by forming cooperatives; farms that are run on a communal basis by farmers who pool their resources. We visited an organic cooperative called Organiponico Vivero Alamar, a short drive from Havana. In just twenty years, the cooperative has grown from a small vegetable garden to supplying produce to 50,000 people annually.

The cooperative has created incentives, such as dividend payouts and a generous employee benefits package, for attracting and retaining highly motivated individuals. The cooperative's 160 members are committed to the mission of feeding the local community, and have been very successful in doing so. However, they face hurdles on a daily basis, such as limited access to equipment and capital. On a broader level, there is also a challenge of scaling and expanding the cooperative model across the country. One member of the cooperative mentioned that she would like to see changes to the country's strong social security system, as it creates little incentive for people to strive for more.

The university professors also highlighted tourism as another great opportunity for the country. We experienced this first hand in the ecovillage village Las Terrazas, an hour's drive from Havana. For much of the twentieth century, the village was dominated by unsustainable forestry. Within the span of a few years, Las Terrazas was transformed to an attractive tourist destination, with luxury hotels, coffee production, and art shops. Tourism now generates almost all of the village's revenues.

CUBAN LIFE (LA VIDA CUBANA)

Currently, the country operates a dual currency system, with tourists paying in CUC, which is pegged to

the U.S. dollar, and locals receiving wages in the local currency, CUP. This benefits the government when paying workers locally because they fix the exchange rate at an artificially low level. The downside of this strategy is a distortion in salaries, which contributes to an enormous waste of human capital. Our tour guide, whose monthly wage as a doctor is US$40, earns several times this amount in the tourism industry, where wages are paid in CUC. One of the researchers argued that currency unification would help to resolve this issue.

We also experienced more mundane aspects of life in Cuba, such as frequent queuing and a lack of variety in goods, indicating a lack of market forces. In the supermarket near our accommodation, many shelves were empty and an entire aisle was filled with a single brand of Cuban mayonnaise. At a beach café near exclusive hotels in the touristy Varadero, most of the menu was unavailable and they ran out of standard items like ketchup.

We were, however, impressed with how well many aspects of society function. The healthcare system seems outstanding, with low waiting times and highly qualified staff at hospitals. Buses run frequently, and roads are generally well-paved. Despite poverty in rural areas, children are well fed, wear clean uniforms and attend schools. Attendance is strictly enforced, with police officers visiting parents whose children fail to attend school. For each missed attendance, parents receive increasingly severe fines according to their household income. Security is high, with guards posted at regular intervals throughout the city, and violent crime rates are exceptionally low.

Given the relative isolation of Cuba from the international community, and the prevalence of communism, we were surprised to find many parallels between the life in Havana and Edinburgh. The economics curriculum at the University of Havana and the University of Edinburgh are very similar. Cubans watch American TV shows from HBO, listen to music on their phones, and go for drinks with friends. Many openly discussed the failures of the government, and spoke candidly about the economy.

The opportunity to travel to Cuba with the School of Economics to learn more about the country's economy was an incredible experience. It was also a pleasure for our group to spend time together, whether at a Cuban hip-hop concert, or swimming by the beach. Cuba is a truly fascinating country, the uniqueness of which has to be seen for oneself to be understood. It is now up to the younger generation to balance the country's many positive qualities with the new growth opportunities and transitions it faces. ■

Developing Delhi

Francisco Cuoto

When the School of Economics presents you with the possibility of participating on a research field trip to Delhi, you can't really say no. Or that's what the fourteen of us thought when we saw the list of destinations offered this year on the Go Abroad Economics scheme. For all of those interested in development, poverty and inequality, or just Indian food, Delhi was the obvious destination.

THE BACKGROUND

Part of the preparation for the trip consisted of reading a series of academic papers about India's economic performance, with a special focus on the period since 1991 when this vast country decided to open its economy to the outside world. Since then India has been growing at a steady rate of 6% a year, uninterrupted during the financial and commodity crises which curtailed the growth of 3 of the other 4 BRICs (Brazil, Russia, India, China).

However, a key theme which ran through all of these readings was that since 1991 there is a growing dichotomy in India: despite the impressive growth of the services and technology sectors, half of the population is still working in the primary sector and very little movement from agriculture to industry has actually occurred. While South Korea, Thailand, China, and more recently Vietnam, have all managed to use their comparative advantages to foster their manufacturing sector and elevate a large part of their population out of poverty, only 20% of India's population works in industry.

At first glance this might not seem that big an issue – what's wrong with India leap-frogging from the industrialization phase straight into being a services-driven economy? It might not prove an issue to those who manage to obtain a degree from one of India's top higher education institutions. Yet for the masses in the poorer states of India, who have little choice but to enrol in public schools where teaching quality is of laxed rigour (PISA test results show that there is a five-year effective gap, or a 200-point difference between India and China), the possibility of working for Infosys, Tata or the Indian State are but a distant mirage. The fact that the world's most expensive house (a $2 billion home in Mumbai) is in a country with literacy rates of 71.2%; a worse life expectancy than the Gaza Strip; and lower female labour force participation rates than Yemen, really shows the extent of this dichotomy.

With some of these stark and hard-to-digest facts in mind, we set to India to hear about solutions to these extensively documented problems, and to try to understand whether this unprecedented development model will provide decent standards of living to all the 1.3 billion people living in India.

THE MEETINGS

Our meetings with Seema Bansal, head of BCG's Public Sector Practice in Delhi; and with the Centre for Civil Society (CCS), a self-described neo-liberal think-tank consistently ranked as India's finest, gave us some first-hand insights into the state of affairs in the Indian primary education system. Mrs Bansal's work with the education board of the state of Haryana focused on improving the standard of public schooling by increasing teacher accountability – i.e. making sure that teachers actually show up to class and really do spend their day teaching. The rolling out of Aadhaar (India's biometric identifier citizenship card) will hopefully, in Mrs Bansal's view, help reducing fraud and improving oversight.

The CCS has left its mark on Indian policy debates by arguing for the widespread adoption of school vouchers, allowing parents to essentially transfer the money that the Indian state invests in public education into private schools, which they argue provide significantly better education and life prospects for children. When around 35% of households voluntarily send their children to private schools despite all the free amenities (lunch, uniform, textbooks) offered by public schools and the meagre disposable income of the average household, it is hard to argue against CCS's policy recommendation for allowing more private sector involvement.

Indian cities are inevitably associated with slums. Housing and proper sanitation facilities (or the lack thereof) are pressing concerns for these megacities facing the dual forces of population growth and rural-to-urban migration. With that in mind we met with Vinita Yadav, a distinguished professor at the School of Planning and Architecture in New Delhi. Having worked with the state closely in several high-profile housing plans, Mrs Yadav stressed that, in so far as identifying and analysing the issues, the government was doing a fantastic job. The actual problem comes when the plan needs to be implemented, at which point excessive bureaucracy and the lack of up-to-date census data prevent the transformation of these plans into vigorous action.

As the Indian state plays such a big role in citizens' lives – either as a provider of public goods or through the numerous large enterprises which it still controls – we were eager to discuss India's current economic situation with government officials. With that in mind, we met with the Head of Economic Development of the Ministry of External Affairs

(MEA), and the CEO of NITI Aayog, a quasi-governmental think tank. Both focused on the brighter side of the Indian development story: since the 1980s 300 million people have been elevated out of poverty; there is a growing consumer class in dynamic cities such as Chennai, Pune, Hyderabad and Bangalore; and India is truly on the frontier of innovation and entrepreneurship in some of the most high-tech and value-added industries. As the Head of Economic Development of the MEA pointed out, it is very easy to compare India with China (especially in terms of infrastructure), all the while forgetting that Indian policy-makers are democratically accountable to their citizens and must inevitably think in five year political cycles.

First-hand proof of the tech-savvy and entrepreneurial young population both government officials proudly spoke of is Social Cops, a data collection and analytics start-up which has the potential to revolutionize the availability of statistics in a country where census data takes an insurmountable amount of time to be released. Working from an open-space office in the southern part of Delhi (an office which would inconspicuously blend-in in London or San Francisco) we were invited to attend a weekly meeting where some of the workers talked us through some of their fascinating projects.

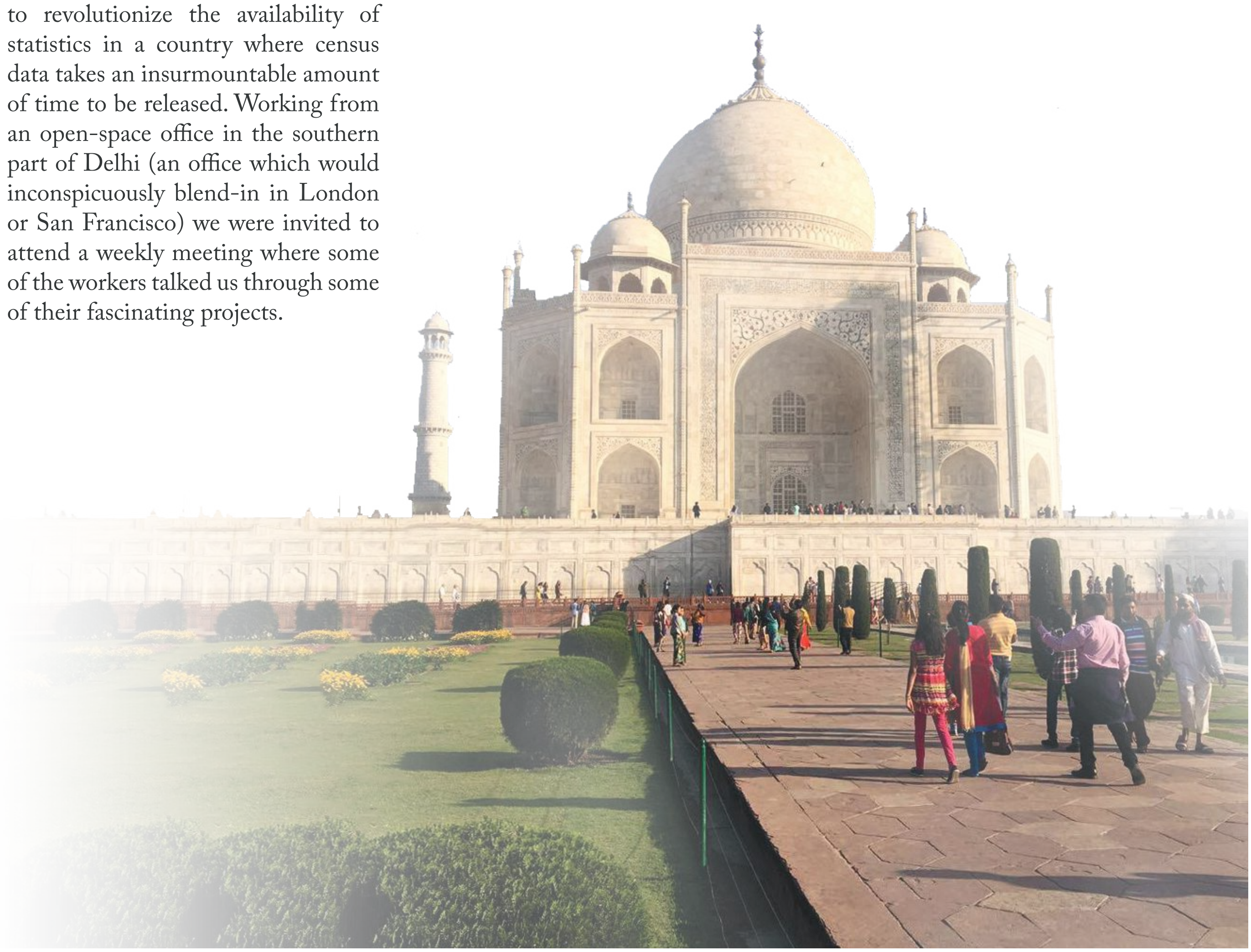
We were also given a very warm welcome to India by Vivan Sharan, an Edinburgh alumnus who is a collaborator at the Observer Research Foundation (ORF), a free-market oriented think tank; and founder of Koan Advisory, a consultancy firm based in Delhi. Besides inviting us to a delicious meal consisting of a wide range of typical Kashmiri curries, Vivan also shared with us some of his thoughts on the role of the Indian state and how, slowly but surely, it was liberalizing and privatizing a few of the strategic sectors that until recently were shielded from foreign investment.

If you add to these fascinating meetings a visit to the Norwegian Embassy and a very tiring day excursion to Agra to see the beautiful Taj Mahal, the inevitable outcome is a jam-packed schedule and a fair share of hectic metro and rickshaw rides. Naturally the food was fantastic - we ate all sorts of curries, accompanied by naans, poppadoms, rotis, uttapams, chapatis, basmati rice and the inevitable milky, sugary chai.

WHAT NEXT?

In regards to the dichotomy and the inequality that currently characterize Indian society it is impossible to forecast what will happen in the next ten to fifteen years. What we can say is that it certainly feels like India is at a crossroads, being held back by the poverty of its rural areas, the widespread corruption and the inefficiency of the state; while at the same time being pushed forward by the dynamism and the charisma of Narenda Modi and his rise to power.

While we wait for India's uncertain future to unfold in front of our eyes, we will always be able to look back at this week-long trip to Delhi with very fond memories. ■



Generosity Through the Generations

James Gigg, runner-up for the 'Best Writer' prize, explores the obligations of current generations to those that will follow in the context of uncertainty

How should we value future generations' welfare? It's a question that we all grapple with. From parents saving for their family's future, to governments planning infrastructure, we all make choices that involve present-day sacrifice in return for future rewards. The fact that many of us regularly make such sacrifices shows that we do value our descendants' wellbeing, but can we quantify this feeling?

This question becomes more salient when one considers the issue many consider to be the world's most important and pressing: climate change. Due to the long-term effects of increased greenhouse gases, as well as the possibility of so-called tipping points, at which future climate impacts become 'locked-in' even though they have not yet occurred, the payoffs to taking mitigating action now are likely to be felt almost entirely by future generations. But the costs of transforming the global economy from a fossil fuel dependence towards a carbon-neutral future will be met almost entirely by current generations.

Given that the decisions on how much and how quickly we should reduce carbon emissions will be taken by current generations, we must find some means by which to judge how much we value our descendants' welfare, compared to our own.

FUTURE RICHES

An important factor in any such decision is how well off our descendants will be. Many economists argue that if future generations will be much richer than us, then we have a less stringent obligation to cut our carbon emissions – or at least that this can happen slower than it otherwise might. This appears to make sense – if future generations will have much higher utility than our own, even with climate change's effects, we ought to prefer reducing poverty and disease in our own generation to reducing the effects of climate change on future generations. The intuition is that if we treat all people equally, comparatively poorer (current) people should be put ahead of comparatively richer (future) people. This is, of course, subject to the proviso that our measurements of 'rich' and 'poor' fully capture people's overall utility, rather than merely their financial wealth.

The trouble is, future generations' utility is highly uncertain. It is dependent on an array of different variables, like productivity, innovation, conflict, and climate, all of which have some probability of being high or low. But, we don't know those probabilities. And even if we use our best guess, we can only tell what is likely to happen – not what will definitely occur. So there will always be inherent uncertainty in our predictions of the future.

DOES THE PAST PREDICT THE FUTURE?

Some point to the relatively steady growth in consumption of recent decades, arguing that past growth figures can be used to project future growth. This method assumes that the future will look much the same as the past, at least in terms of the trend of utility growth, irrespective of climate change. There are two reasons why this might be a less than adequate method of resolving our uncertainty on future growth.

First, available data are incomplete. While countries like the United Kingdom have growth data going back as far as the 19th Century, world data are only held from the 1960s and even these are incomplete. This appears to be an unstable platform from which to base growth projections, even if we can take the past as a reliable predictor of the future.

Second, it is unclear that the past would be a good way to predict growth. Though scientists are increasing the confidence of their predictions, climate change is subject to large uncertainties. The Intergovernmental Panel on Climate Change's 5th Assessment Report states, '[w]arming of the climate system is unequivocal… many of the observed changes are unprecedented over decades to millennia', going on to say that, 'continued emission of greenhouse gases will cause further warming… increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems.' It appears from these statements and the wider evidence that climate change is likely to have profound effects on our collective wellbeing. Climate change is the key threat to human health and wellbeing for the foreseeable future. Therefore, assuming the continued steady growth of the past few decades appears naïve at best. Should we continue on our current emissions path, there is a non-trivial likelihood that we will see large shocks to our collective utility. In the worst scenarios involving high temperature increases, the world may even see 'negative growth' – a year-on-year reduction in our collective utility.

TOO MANY ASSUMPTIONS

So, what solutions are there? Economists have tried to model the future by using so-called Integrated Assessment Models (IAMs). These models take predicted climate impacts and apply them to their likely human impacts. To do this, they must project future growth in consumption. But even IAMs don't provide us with a solution – their predictions themselves rely on assumptions about the underlying values, like productivity and innovation. Furthermore, many no longer see IAMs as an adequate means of predicting the future. Robert Pindyck, co-author of *Investment Under Uncertainty* and various papers on climate modelling, has argued that IAMs "create a perception of knowledge and precision that is illusory, and can fool policy-makers into thinking that the forecasts the models generate have some kind of scientific legitimacy." There are simply far too many underlying assumptions – like the growth rate, but also estimates of climate damages, valuations of human life, and so on – for the models to be taken seriously as predictors of future wellbeing. These immensely complex models are subject to arbitrary parameter decisions made by the modellers such that almost any result can be produced depending on the assumptions made.

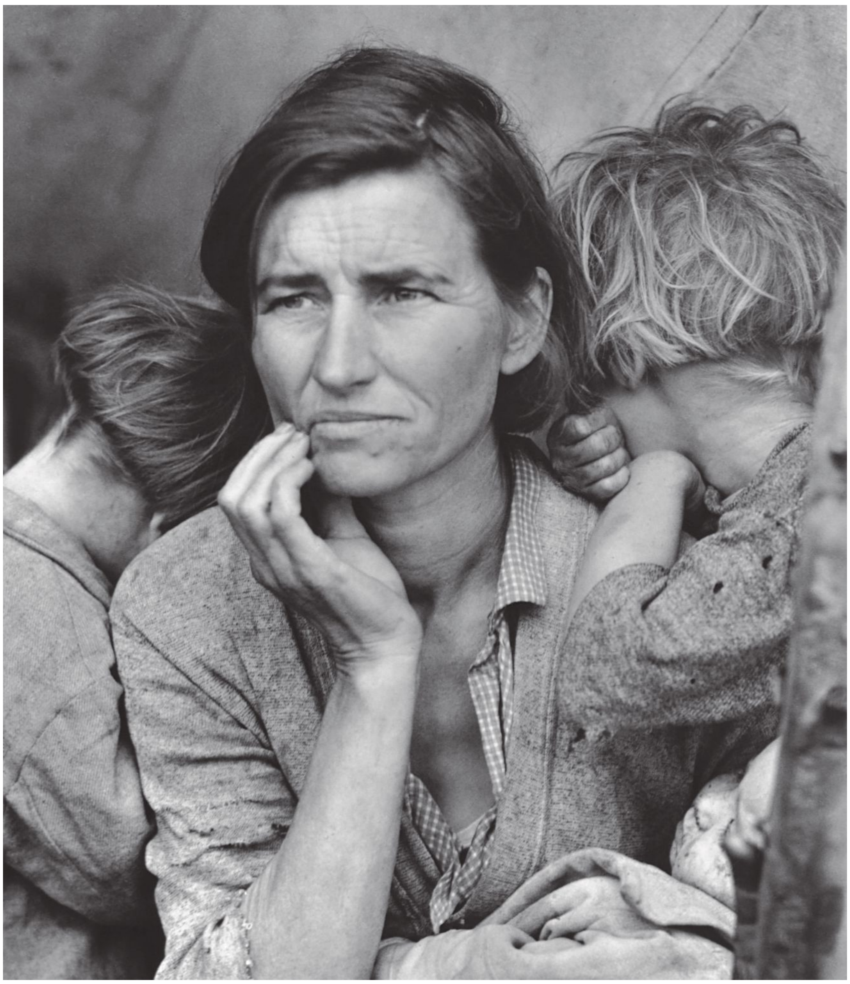
A PRECAUTIONARY PRINCIPLE

So, both the use of past growth rates and IAMs has proved unsatisfactory. Perhaps these methods have taken the wrong approach. Policymakers and international organisations use a 'precautionary principle' when thinking about climate change and future decisions. This principle states that where there is a lack of scientific consensus on a phenomenon which has a risk of causing serious harm, our default position when managing risk should be that the phenomenon is real. The burden of proof lies on those arguing that the phenomenon will not cause harm, or does not exist.

Certainly, there is scientific consensus that climate change is real, human-induced, and dangerous – there is no longer much need for the precautionary principle when it comes to the existence of anthropogenic climate change. But perhaps a solution to the uncertain future growth problem might be to apply a modified precautionary principle. Given that our current development path risks grave harm to both humans and the environment, including the possibility of zero or negative growth in our utility, for the purposes of planning for the future society should assume that these possibilities will occur. The burden of proof should be laid on those who claim continued growth in our collective wellbeing.

So, an answer to the conundrum of future utility may be apparent. Absent further mitigation and adaptation efforts on our part, the current generation should assume that future generations will be only as well off as they are.

Under the assumption of zero or negative growth, we can broadly treat the long-term effects of climate change as though they were happening to the current generation. Unless future generations shouldn't be treated equally purely because they are in the future, they should have broadly the same value as current generations in today's decision-making because we cannot assume that they will be any better off than us; indeed, there is reason to believe they will be worse off. This has the benefit of simplifying our thinking – we can behave as though we ourselves will feel the effects of our actions: a helpful stick to prod us into action. ■



Dorothea Lange

Gambling — Fair and Square?

Kengo Arao explores the mechanisms of irrationality in gambling.

In the first lecture of Economics 1, you encounter the species of *homo economicus* - rational economic agents who maximise their utility based on their clear-cut preferences. In a few weeks' time, you'd find yourself mechanically solving equations for the optimal amount of consumption using demand and supply functions. The degree to which this type of economic thinking applies, however, varies substantially from market to market. Gambling is certainly where actions of participants deviate from this classic assumption of rationality as they suffer from cognitive biases and imperfect information.

ADDICTED TO UNCERTAINTY

Traditionally, monetary gain is considered to be the primary driving force of gambling. People engage in gambling activities as they are optimistic in their chance of winning for several reasons. Kahneman and Tversky point out that people overestimate extremely small probabilities. Although the difference between 0.1% and 0.001% affects the expected outcome substantially, people cannot adjust their estimate accordingly and frame them simply as 'very unlikely'. In addition, successful stories of a one-time winner are often spread by the media and the industry through articles and advertisement, making those rare cases of winning plausible.

However, money alone does not explain the loss-seeking behaviour of gamblers that is commonly observed – the more you lose, the more you press on. A 2013 study by two psychologists Anselme and Robinson finds that it is not money that motivates gamblers; it's the thrill of the game. This is sensible in that a predictable game is inherently dull like watching a football match with a known winner. Measuring the levels of a motivation-inducing dopamine released in (pathological) gamblers and a healthy control group, they find that gamblers become incentivised to gamble more as the level of uncertainty goes up. This effect culminates when uncertainty is at its highest: at fifty percent. Interestingly, both groups experience the same physiological reaction when winning. However, gamblers produce much more motivational dopamine when losing — even higher than when winning! The result is perpetual loss-chasing in gambling, where the only purpose of winning is to pursue more gambling and its uncertainty.

But then, where does this pursuit of reward uncertainty come from? The answer might lie in the animal kingdom, argue the authors. In natural environments, when resources are scarce and the probability of finding them is low, animals face the danger of extinction if they keep their effort at normal levels. Over the course of evolution, animals adapted to generate additional motivation to persevere in a Sisyphean task of finding resources. It is hence possible that the seemingly incomprehensive behaviour of gamblers is phylogenetically passed down from earlier mammalian species.

GAMBLING IN YOUR POCKET

In today's world, gambling is not exclusive to slot machines and sports betting. To attract millennials, casino industries across the world are now turning into mobile games which saw exponential growth over the past decade. Readily accessible gambling environment in your pocket, such as online poker and roulette, would expose a wider range of consumers, especially the young, to the world of gambling. Furthermore, the rise of 'freemium' business model in mobile games, which lets you download the game for free and gives you an option to top up for extra items and turns, complicates the problem. Some games have monetization mechanisms directly comparable to gambling activities. In Puzzle & Dragons, an RPG-style puzzle game mostly popular in Asia, players use in-app purchase for a random draw in an attempt to acquire rare monsters that help you progress in the game, with undisclosed probabilities of winning a rare item estimated at as low as half a percent. It is worrying that gaming companies are effectively abusing the mobile gaming platform across the world to provide legal gambling to children.

The world is now shifting towards liberalisation of gambling. Japan, for example, passed a de facto casino bill in late 2016 to take advantage of the projected surge in the number of foreign tourists as the 2020 Tokyo Olympics approaches. The third-largest economy, with a strong presence in the gaming industry worldwide, is likely to bring a disruption in the increasingly mobile world of gambling.

In today's world where one is potentially exposed to an unhealthy gambling environment online and still constrained by cognitive limitations, we should remind ourselves that we are all at a risk of falling victim to problem gambling, be it through a bookmaker or a mobile game on your phone. ■

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Sending the Right Signals

Fergus McCormack analyses the signalling role education plays in the labour market.

Education is commonly seen as an effective method of improving one's productivity by boosting one's 'human capital'. It can also be construed as a signalling method; a means of demonstrating to employers one's innate productivity.

SIGNALLING

Education as a signalling tool was first identified by Nobel Prize Laureate, Michael Spencer, in 1973. Due to asymmetric information in the labour market, whereby students have information about their employability that employers do not, prospective employees use education as a signal to employers that they are hard-working and intelligent. A useful illustration of this is the perceived desirability of hiring students from prestigious universities, with their stringent entry requirements and high ranking. Acceptance to, and graduation from, such universities signals to prospective employers that the student is the 'cream of the crop', somehow more hardworking, self-driven and focused than other applicants.

However, it could be argued that as labour markets become saturated with graduates (47% go on to higher education in the UK), education becomes inefficient as a signalling mechanism. Having a degree no longer gives a competitive advantage; students must obtain higher and higher levels of education to differentiate themselves in an education arms race. This also limits the potential of skills-based courses, as not having a degree in itself becomes a negative signal to employers.

In addition to the increased financial burden on the state and the student, this also raises questions about the relevance of education. Students want access to the best job opportunities, so they choose the universities with the best reputations. Universities must therefore maximise their ranking to signal their merit and attract the best students. Employers interpret these rankings as evidence that these students represent the 'best catch' in the labour market. However, as rankings are based primarily on research, academic rather than vocational skills are emphasised in the development of programme curricula. As an example, in my own Business course, the focus is on the theory of leadership and innovation rather than their practical application.

THE SWISS SOLUTION

Clearly signalling in education creates significant waste, much of which is financed by the taxpayer. But how can education be used to increase both students' employment prospects and their future productive capabilities? Switzerland, and other countries such as Germany, Austria and Norway, opt for a 'dual' Vocational and Education Training (VET) system, which combines traditional classroom learning with on-the-job training. Around 70% of students in Switzerland opt for this route (Eurostat, 2014), contributing to high student satisfaction rates and one of the lowest youth unemployment rates in the developed world. The fields covered vary from high-tech industry and finance to retail and care services, attracting the best students wishing to work in industry. The vocational system is therefore not prone to the same negative signalling effect as that in the UK. Moreover by offering direct entry into the labour force it reduces the need for education as a signal, and by affording students the opportunity to apply their learning on their placements it resolves the issue of classes being too theoretical. In addition to providing networking opportunities and improving employability, the system also reduces the financial strain on the state (and indeed the future debt burden for students) by providing students with an apprenticeship salary of $600-$800 per month.

As economists we care a great deal about efficiency, and clearly our current system is not optimal in this regard. By focusing excessively on research, we fail to properly prepare our students for the workplace and waste significant time and money on over-education rather than resolving the problem of information asymmetry in the labour market. Perhaps we would be better served by the Swiss system, as it provides a clearer signalling mechanism for both students and employers. It offers students practical experience and helps them to secure employment through placements, while providing employers with an appropriately skilled workforce. However, there are benefits to an education that trains students to think critically and challenge existing norms. The VET system does represent a more streamlined approach to education, which might inhibit innovation by teaching people to think linearly. Which approach yields maximum utility to society? Time will tell. ■

A Cure for all Ills: Targeting Uncertainty in the Pharmaceutical Industry

Elizabeth Harris questions whether the pharmaceutical industry exploits the uncertainty of human health.

Have you ever Googled your symptoms? Most of us who reach out to the internet when we start to feel ill probably have the same goal- we wish to find out what's wrong with us and how we can treat it. The feeling of being 'ill' is the development of any number of changes within the body in an uncontrolled manner. As we start to notice these negative changes- be it a stuffy nose or something more serious- we immediately begin to grasp for means of control, for something concrete and quantifiable. This simple act of searching the Internet can be seen as a deliberate process of searching for reassurance.

The search to lessen uncertainty usually begins with a name, the product of our Internet searches or doctors visit. Having a label is a way of verbalising the things we're feeling in the hope that we'll then be able to get treatment (and sympathy). Medicine, though an extremely uncertain art in itself, offers patients the perception of certainty. A diagnosis, however bad, is more comforting than not knowing. However, language itself is infectious: it spreads from person to person, embedding itself and impacting the way in which the everyday is lived. Language, or in this instance, medical terminology, therefore mimics the conditions it describes. By naming and classifying certain conditions; we transform illness. It becomes diagnosable, communicable, both an official and a social event. In economic terms, these classifications can have significant effect.

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INNOVATIVE PHARMACEUTICALS

The top selling drug in the world is Humira, produced by AbbVie, with sales estimated to reach $18 billion by 2020. This blockbuster drug can be used in the treatment of arthritis, psoriasis and bowel diseases.

Humira's website, laid out in a multi-coloured patchwork, invites you to click on your condition to find out more information, assuring the casual visitor that “We're with you every step of the way”. In short, it's a pretty glossy sales pitch; this is perhaps unsurprising when taking into account AbbVie's marketing budget. In 2015, more than $25 million was spent on direct-to-consumer TV advertising in the US for Humira alone.

The entire consumer experience can be read as offering a path to certainty. The narrative presents the drug as an opportunity, not only for getting better but also for peace of mind. Focus is on transformation; the campaigns lead you to celebrate in others' health and medical certainty, achieved through consumption of a specific medicine, and invite you to join them. Advertising such as this is undertaken with the notion of empowering the consumer. This empowerment therefore targets consumer uncertainty, offering an alternative to their illness experience by emphasising the simplicity and certainty offered by branded drugs.

To consider an example, in October 2015, Fibromyalgia was officially assigned a formal diagnostic code for use in the US. According to NHS.uk, symptoms of Fibromyalgia include widespread pain, increased sensitivity to pain, muscle stiffness, headaches, fatigue, sleep loss, IBS, dizziness and depression. This classification means that it is now recognised as a distinct entity, a specific condition that has been catalogued and attributed with a discrete list of symptoms. The cause of this condition is currently unknown and it has therefore been

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included into the group of 'invisible disorders'.

However, there are several treatment options that have become available and are currently underdevelopment. Most notably is Lyrica, one of the best selling drugs in the world with sales of $6.0 billion in 2014, manufactured by Pfizer. Many Internet sites describing Fibromyalgia specifically highlight Lyrica as a recommended drug. Despite numerous complaints from consumers that it is not particularly effective in treatment of Fibromyalgia, as a generalised anticonvulsant it has the ability to treat a range of issues. Lyrica has, for instance, been approved in Europe to treat generalised anxiety disorders. Consequently, the impact on both patients and companies responsible for the development of drugs such as these is significant.

THE COLLABORATIVE PROCESS: REDEFINING HEALTH

Much of the lobbying for formal recognition of Fibromyalgia, in keeping with trends for emergent conditions, was made by patient groups dissatisfied with what they saw as incorrect diagnosis. 'Invisible disorders' such as Fibromyalgia, whilst causing issues for doctors, represent a significant opportunity for pharmaceutical companies, as they are typically diseases with nonspecific symptoms and a broad spectrum of severity. Consequently, the process of creating illness profiles is collaborative, matching patient demand with the appropriate pharmaceutical product through careful manipulation of both public and professional perceptions of the illnesses. In the words of Adriana Petryna and Arthur Kleinman: "There is much magic in the way pharmaceutical companies target individuals and their bodies, influence the course of therapeutic events and manipulate collective needs and wants" [2006].

The face of modern medicine has undergone rapid development in response to the Internet, which has provided a new platform for patients and pharmaceuticals to be connected. Areas of medical uncertainty, targetable through websites, hold significant potential for large pharmaceutical brands as they offer a direct channel to consumers. This includes social media, with more and more companies using spaces like Instagram for publicising new treatment opportunities, embedded in lifestyle posts.

So what is the effect of this treatment of uncertainty? Whilst ostensibly the process of pharmaceutical development is good for both business and consumers, it is important to note that the extreme commercial outlook of large pharmaceutical companies inevitably has some negatives. Beyond just cost- the price of Humira rose by 68.7% in 3 years- there is a tendency for pharmaceutical companies to neglect the production of more urgently needed medication; which is understood to be an unprofitable investment for research.

Furthermore, many academics have written about the impact that over-medicalisation has on the way we live our lives. Medicalisation is the process of transforming certain areas of human experience by altering the boundaries of what is considered to be 'normal' so that human conditions become treated as medical conditions. This is partly possible through our googling habits as we fuel the need for absolute certainty and lessen the space for individualised experience and self-management. In doing so, we also drive demand for corresponding pharmaceuticals to further satisfy our desire for certainty.

Thus, whilst pharmaceutical sales rise and consumer satisfaction is fulfilled to an extent, difficult questions are raised as to the effect this has on the way we perceive our health and well-being. In this market of targeting uncertainty, the boundaries between health and illness can become blurred. As more opportunities for treatments are presented, they are capitalised on. There is significant profit in our medical uncertainty; that's something we can be certain of. ■

To Predict and Serve

Alec Edgecliffe-Johnson explores how police departments employ predictive methods to compensate for limited resources.

In 1994, at a time of increased gang violence and crime, the LAPD trialed CompStat, the first of many modelling tools for predictive policing. Since then, justice systems around the world have incorporated predictive policing technology at every level, from investigation to patrolling, sentencing and rehabilitation. Advocates cite the potential for efficient resource allocation and greater outcomes in a time of expanded scope of criminal activity and overstretched resources. Critics, however, question both the effectiveness of, and the underlying bias in, these systems as well as their place in justice systems that have not developed in line with the technology.

LOCATION, LOCATION, LOCATION

One of the most common forms of predictive policing technology is geographic crime prediction software. PredPol, a software program that is used in hundreds of cities in the US and UK, generates 500x500 square foot expected "high-crime areas" (HCAs). At the heart of the program is an "Epidemic Type Aftershock Sequence" (ETAS) algorithm, which relates instances of certain criminal activity with areas of past and repeated activity to multiple other sources of geographic data in order to predict future hot spots.

While PredPol confines itself mainly to property crime and drug use, another similar program, HunchLab, focuses on more serious violent crime. HunchLab's models integrate sophisticated geographic data including location of areas with high footfall like bars and bus stops, as well as historic seasonal crime patterns, weather and temperature data, and a number of other metrics, many of which have not been publicly disclosed.

HunchLab has yet to report its effectiveness but PredPol has displayed fairly substantial results. Instances of criminal activity were reduced by approximately 13% following a four month trial use of PredPol in the Foothills District in Los Angeles. By comparison, in neighbouring districts that had not implemented the software, criminal activity rose slightly or showed no change. Similar positive results were reported in two districts in Atlanta that introduced it and even more significant reductions have occurred during use in smaller cities.

It is, however, difficult to determine whether the relationship is causal or merely correlative. It could simply be that officers spend more time policing predicted HCAs. Furthermore, this focus on specific areas increases the likelihood of over-policing and, in turn, the threat of fraught relationships between law enforcement and community members. Officers deployed in these areas may be more likely to see normal behavior as suspicious and may be more likely to take action. Recent shootings in a number of US cities serve as a stark reminder of the consequence of armed officers who perceive increased levels of threat.

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There is also an enormous potential for bias in the system itself. While neither PredPol nor HunchLab use racial data explicitly in their predictions, by incorporating past data like arrest data, and by relying on human operation they may inadvertently incorporate racial bias. Equally, geographic data may be skewed by a reporting bias: wealthier neighborhoods tend to report criminal activity more readily than lower income neighborhoods that may face significantly more crime.

PREDICTING THE INDIVIDUAL

While programs like PredPol and HunchLab focus on geographic data, other initiatives in the legal system focus on individuals or groups of individuals. For example, some police departments have deployed sophisticated analysis tools that examine social media activity and assign threat levels to certain groups based on what they write or post. This helps them identify particularly dangerous groups like gangs and trafficking rings with varying levels of success.

Additionally, certain social media websites have developed algorithms to scan conversations between individuals that may indicate paedophilic activity. The social media companies are then able to report this information to authorities directly, replacing the need for a warrant to search conversations. Most would agree that preventing this sort of activity is in the interest of the public, but this is less clear when we consider programs developed by companies like ECM Universe which identify potential extremists online or software that scans social media for potential riots or mass gatherings. To what extent should we be preempting potential crime and at what cost to personal privacy?

Perhaps the most troubling advancement in the realm of predictive policing is the application of machine learning algorithms to risk assessment scores. Tests like NorthPointe's COMPAS, which is widely used in the US, aggregate a series of data points on individuals including attitudes/personality types, relationships, association with criminals, educational attainment, employment history and history of violence to predict potential risk of future criminal activity.

Historically, the use of these scores was largely restricted to post-sentence decisions related to resource and time allocation in rehabilitation. Individuals with lower risk scores, for example, may have historically received lighter parole sentences and fewer police check ups than those with higher ones. In recent years, however, algorithmic risk assessments have been increasingly integrated into sentencing decisions themselves, prompting judges to assign more stringent sentences to individuals with higher risk scores. This is exactly the fate of Wisconsin-resident, Paul Zilly whose prosecutor recommended a year in county jail and a short period of supervision but whose judge, upon seeing his risk assessment, imposed a 2-year sentence in state prison and a 3-year period of supervision.

From the outside, the use of mathematically rigorous processes appears to eliminate human bias and therefore we are quick to overlook the massive potential for bias in the human-made programs. While demographic details like race and income are not assessed directly, they are often incorporated into the data through correlated variables. A meta-analysis of the COMPAS results found that while the program predicted the rate of recidivism with approximately 61% accuracy, predictions failed for whites and African Americans in different ways. African Americans were roughly twice as likely to be labelled higher risk for recidivism and not commit a crime than whites (44.9% and 23.5% respectively) and whites were roughly twice as likely to be labelled low risk and then re-offend than African Americans (47.7% and 28% respectively). Additionally, a staggering number of inputs in programs such as COMPAS are related to economic background and therefore poorer individuals are theoretically more likely to generate negative scores than wealthier ones.

THE THREAT TO LEGITIMACY

Clearly there are still substantial concerns regarding bias in the models to be addressed, but if the trajectory of predictive policing continues, the models will become increasingly commonplace. The question then becomes, what does this mean for our justice system? The core characteristic of a functioning and just legal system is legitimacy, and legitimacy is underpinned by both societally favourable outcomes and a just process. In order for society members to assess a just process, transparency is required and predictive policing adds further levels of obscurity that detract from the legitimacy of the system.

Many of the software programs including PredPol, HunchLab and COMPAS are proprietary software and the exact mechanisms of the underlying algorithms are considered trade secrets. Equally, the justice system itself has not evolved measures of compensatory transparency. As such, law enforcement agencies are rarely forthcoming with their data and risk assessment scores are often not available to their subjects, and even if they are, are often incontestable.

Predictive models pose an ever greater challenge to transparency as they integrate larger degrees of machine learning with unspecified rules for finding patterns in increasingly complex data sets. Experts predict a time in the development of predictive policing machine learning algorithms when humans will be genuinely incapable of interpreting the mechanics of the algorithms. We would then face a situation in which algorithms that hold substantial influence over criminal justice systems lie beyond human comprehension.

There are, however, alterations that can be made to partially negate the growing lack of transparency. We could request independent review of policing procedures, more information regarding the algorithmic mechanisms employed by human designers and increased scrutiny and contestability of risk assessment scores. It does not, however, seem advantageous, on an outcome or a procedural level, to halt the use of the inherently incomprehensible machine learning algorithms, especially as data collection expands and we demand greater degrees of accuracy. Their role in crime reduction is clearly beneficial to society, and there is a clear procedural benefit of well-functioning algorithms that remove the influence of human bias in various policing decisions. For example, one can imagine a time when controversial policing methods like stop and frisk are allowed only in algorithmically defined HRAs.

In order to design and implement accurate, unbiased algorithms that result in better outcomes and fewer instances of human bias we will need to sacrifice ever larger degrees of transparency, and with it, legitimacy as we know it. This is the true cost of certainty regarding criminal activity in a world that relies increasingly on algorithmic prediction. Unless we preempt these technological changes with adaptations to our justice systems, there is a substantial threat that this loss of legitimacy will result in a loss of trust, accountability and human control in our justice systems. ■

Mind the Gap

Stian Sandberg looks at the transitions that lie ahead for various forms of transportation.

Over the course of the last decade, we have witnessed an unparalleled increase in technological innovation. We are used to hearing stories about how robots and technology are replacing workers on factory floors, but surely, they will never be able to automate *my* job, right? According to the 2013 Oxford study "The Future of Employment" by economists Carl Benedict Frey and Michael A. Osborne, 47 percent of the total US employment is at risk of being automated, with the transportation industry one of those most vulnerable to automation. With this estimation in mind let's take a closer look at transportation in the UK as an example of what might happen if an entire industry were automated.

CHALLENGE OR OPPORTUNITY?

Frey and Osborn's findings that transportation is one industry most susceptible to computerisation seems like a fairly natural development. After all, self-driving cars are already on the road, and self-driving trains and public transport are nothing new. The incentives to implement automated transportation are quite clear: safer and more cost-effective transportation.

In the UK, a fully automated transportation industry would result in the loss of almost 1.6 million jobs. Even more specifically, Frey and Osborne estimate that there is a stunning 89 percent chance of taxi and chauffeur services being completely automated over the course of the next few decades. These occupations alone provide over 200,000 UK jobs. One of the arguments against the looming threat of complete automation is that labour unions will fight this, refusing to allow 1.6 million people to suddenly be without a job; it is hard to fathom the level of chaos that would ensue in labour markets following such a large displacement of workers. Unfortunately, history is not on their side. Unions and workers fought for their rights during the industrial revolution when machines were replacing them on the factory floor, yet factory floors as we know them today are filled with robots doing most of the work. This battle is also being fought in the transportation industry. In 2012, then mayor of London Boris Johnson announced that the London Underground would be fully automated by 2022. This would effectively mean that over 3000 drivers in the Tube Network would find themselves swiftly without a job. As expected, the unions are strongly opposed to this notion, raising concerns over safety and the accompanying reductions in staff level. Unfortunately, the workers have a history of losing when employers are faced with great economic incentives to replace them. It happened during the industrial revolution, and it will happen again.

One of the most interesting economic impacts of this movement, is what Andrew McAfee, co-director of the MIT initiative in the Digital Economy, has called the "Great Decoupling of the Economy". This is where even though employment and household income is stagnating, we still observe a steady increase in labour productivity and GDP. Up until the early 2000s, these four factors have been growing alongside each other, but in recent years' employment and household income have stagnated. This is an indicator that more and more jobs are being automated.

TRANSPORTATION IN THE UK

So what will this mean for the future of employment? Many economists, academics and governments are now beginning to research this question seriously. Many argue that we should embrace automation of labour as soon as possible, and start working on economic policies that will accommodate those in the labour force who automation displaces. On the other hand, critics of automation have pointed out that a world where capital is more important than human skill and education could lead to higher inequality.

This debate has inspired a number of policy initiatives from groups on both sides of this argument, the most notable of which is likely the Universal Basic Income (UBI). A UBI seeks to provide everyone with a basic guaranteed income regardless of employment or wealth, crucially allowing those experiencing structural or temporary unemployment to continue to support themselves.

Whether this is the solution or not is open for debate, but what *is* certain is that we as a society need to acknowledge the potential of technology-induced mass unemployment, and work towards a solution for those most at risk.

Automating the Automobile

Sameeran Khamamkar inspects the future of transportation technology by studying Tesla and their influence on the automobile industry.

Elon Musk, CEO of SpaceX and Tesla Motors, has been taking the world by storm with his innovative and ultramodern ideas to drastically improve both land and space travel. It is he we credit with the current trend of implementing space-age technology into cars, but is his vision for Tesla and the rest of the automobile industry economically feasible?

ELECTRIC CARS

Until recently, electric cars were perhaps viewed as novelty items, toys for the high net-worth individual who wishes to demonstrate their desire to be ecofriendly and modern. The average consumer has never considered them a viable option when shopping for a new car. This niche market is where Tesla developed their name into a luxury brand: The Tesla X Model sells for over £80,000. Although they began and thrived here, where their innovation was unmatched and competition was low, they wish to spread to the mass market by introducing the Tesla Model 3.

Although cheaper and more affordable, the Model 3 still manages to retain the technology that goes into the more expensive models, including the electric power. As markets continue to rise and the uncertainty following the financial crash diminishes, more and more people are willing to spend money on cars. In fact, the past year was record-breaking in terms of cars sales in the United States. Additionally, China, India, and other emerging markets are also experiencing significant growth. As the consumer class expands in these emerging markets, those who are successful will be looking to up and coming brands such as Tesla to flaunt their newfound wealth.

TESLA TECH

Tesla and other electric car manufacturers have spent vast sums of money to keep themselves afloat in hopes these trends continue and have a snowballing effect, making a society that runs on electric cars a possibility. Tesla themselves have only been profitable in one quarter since its Initial Public Offering (IPO) in 2010, but Elon Musk is confident he can sell 500,000 cars in the year 2020 even though he has only sold 50,000 cars to date.

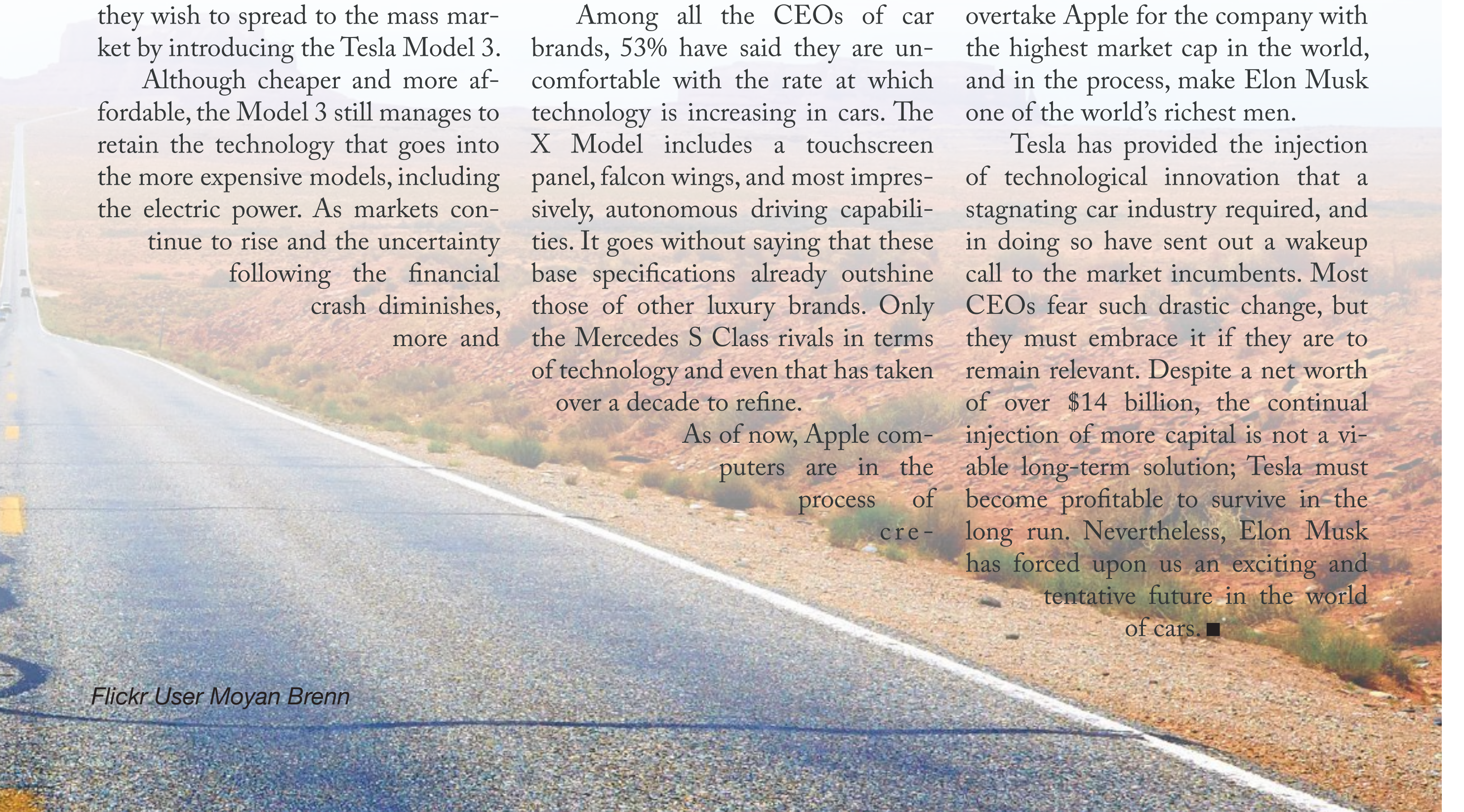
Among all the CEOs of car brands, 53% have said they are uncomfortable with the rate at which technology is increasing in cars. The X Model includes a touchscreen panel, falcon wings, and most impressively, autonomous driving capabilities. It goes without saying that these base specifications already outshine those of other luxury brands. Only the Mercedes S Class rivals in terms of technology and even that has taken over a decade to refine.

As of now, Apple computers are in the process of creating their own new smart car. Additionally, luxury brands such as Mercedes, Porsche, Jaguar, and Aston Martin, will soon be releasing their own technologically advanced cars to compete with Tesla's most expensive models.

THE FUTURE

It is safe to say that Tesla is a rare phenomenon. It is once in a blue moon that a company can enter a highly competitive market and manage to hold its own against the likes of Porsche and Mercedes. In addition, Tesla has not only survived but grown despite logging negative cash flows for almost the entirety of its lifespan. It requires large injections of capital which have come from SpaceX, SolarCity, and a volatile yet rising stock price. It also requires faith in the company, which Elon Musk and his employees clearly have. They believe Tesla will reach positive cash flows in the 3rd quarter of 2020, eventually overtake Apple for the company with the highest market cap in the world, and in the process, make Elon Musk one of the world's richest men.

Tesla has provided the injection of technological innovation that a stagnating car industry required, and in doing so have sent out a wakeup call to the market incumbents. Most CEOs fear such drastic change, but they must embrace it if they are to remain relevant. Despite a net worth of over $14 billion, the continual injection of more capital is not a viable long-term solution; Tesla must become profitable to survive in the long run. Nevertheless, Elon Musk has forced upon us an exciting and tentative future in the world of cars. ■



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New World Disorder

Rafael Lobo Barbosa da Silva explains how the current world order is itself, out of order

Imagine you were asked to explain to someone from 1917 how the current geopolitical situation looks today. The dialogue would go something like this: "Of course! Russia and the United States, the latter now run by an ex TV star, are flirting with each other, precipitating a relationship based on protectionism and populism. Meanwhile, Germany arises as the new great defender of a liberal allegiance while struggling to hold Europe together under a supranational and single market project, and China, a socialist free-market economy, is leading on creating the greatest trading partnership to integrate the Pacific Ocean economies." After hearing all this nonsense, our time traveller guest would most likely faint and drop dead out of disbelief.

However unbelievable, this is in fact true. And even ten years ago, no one would ever say that one day, the president of China would stand at World Economic Forum meeting in Davos and advocate for free trade, while less than one month later the president of the USA would propose a 20% tariff on Mexican imports and consider extending tariffs to other major trading partners.

As the world stands on the verge of a crisis of conscience and uncertainty looms across the horizon, we must ask ourselves the fundamental question of where is this ship headed, and who are its commanders?.

THE OLD TV-STAR AND THE SEA

Few could have believed Donald Trump stood a chance on the White House run, though as the days passed and a crescent support arose, finally, by a short margin and the graces of the electoral system, the old TV Star was elected to the office of president of the United States of America.

The Mexican peso plunged as the markets watched the unlikely scenario come to reality. During his first week in office, Trump rejected the TPP, raised tariffs on Mexico, apart from many other of his Executive Orders, by the stroke of a pen. Now, he threatens NAFTA, accused of having stolen American jobs.

As the United States turns into itself and embraces protectionism, we have seen the dollar become stronger, Dow Jones reaching the golden 20,000 mark and companies, allegedly, are bringing their plants back to American soil and away from foreign shores. It all looks like a "good deal", but sooner or later, the hype surrounding protectionism will dampen as the consequences, namely, the leading position America has on and in global markets, falls .

THE MERCHANT OF BEIJING

One out of every ten companies listed on the top Fortune100 list is Chinese. Relevant and competitive in nearly every sector of the economy, China has shown the ambition to surpass the stage of 'Factory of the World' and take the lead in global markets.

Chinese wage and currency strengthening structured the path for developing a dynamic internal economy, achieved through a thriving entrepreneur community and a strong consumer class. Sounds a lot like the American Dream, doesn't it? The consequences of this shift are already evident. The stock of Chinese investment surpassed the Europeans and Americans in Africa and Latin America. Brazil, South America's largest economy, reported last year that their largest trading partner is now China, and no longer the USA. Zimbabwe, in the east of Africa, has accepted the yuan for everyday transactions since 2015. In the Eurasian continent, the Peoples Republic proposes the recreation of the Silk Road, connecting different parts of China to the European lands through hyper speed railroads that go across more than ten countries. And as the United States retreats into protectionism, the possibility of a world lead by China becomes increasingly real.

THE ADLER'S FLIGHT

The European Union crisis is indeed a complicated one. The long-lasting conflict in Syria, and the Middle East more generally, has recently caused a mass exodus of people seeking shelter in Europe. However, their timing is inopportune. Europe is still a continent crawling out of 2008 and stumbling through crisis after crisis trying to navigate a way out. Portugal, Ireland, Italy, Greece, and Spain—the 'PIIGS'—threatened a debt crisis and witnessed the rise of far-left parties. On another front, the echoes of nationalism from across the ocean encouraged the growth of far-right parties in Eastern Europe and France.

Concurrently, The English Channel continues to get wider as Great Britain makes its long and uncertain march towards Brexit. At the beginning of February, the House of Commons accepted Theresa May's plan to trigger Article 50, and when it truly comes to fruition, Brexit could catalyse an Italeave, a Deportugal, Czeckout and even a Frexit, now alarmingly possible as Marie Le Pen of the Front National confirms her run to the Elysée, threatening the very existence of the Union.

And on the Eastern Front, the

European Union faces a belligerent Russia, who they fear has the ultimate plan of restoring the Soviet Empire's influence and borders.

If somehow, the largest economy in Europe, Germany, finds a way to handle extremism from both the left and right, solve the immigration related issues, and preserve the single currency while maintaining peace in the continent, the Adler is set to take the place of the Bald Eagle in defence of the Liberal Order.

SHATTERED TRUST

Since 2008 the public has continued to lose faith in large public institutions. How could the banks gamble with people's savings on dangerous unprotected speculation, only then to be bailed out by the government using the same tax-payer's money?

Surrounded by these questions and the wavering support of these public institutions, some people started to develop ideas and systems that purposefully go outside of current marketplaces and guidelines.

Arguably, it all began with Bitcoin back in 2009. The idea was to make a digital currency that didn't rely on central banks, and was transparent—every transaction could be checked and validated in a public ledger, available to every person connected to the network. Since then, the digital currency has been through ups and downs, however, within less than one decade, the value of the Bitcoin currency rose by over 900%.

Furthermore, an interesting development from this technology is the Ethereum Project. The Ethereum Project is an open source environment designed for people to create networks of compromise around a series of "smart contracts" that they can freely join. This means giving the choice to people if they want to be subject to a determined set of regulations or not.

The driving technology behind these inventions is the block chain technology—a decentralized validation process that goes across a network of computers to serve a purpose, as everyday transactions, regulations, ID and much more. The promise is that if it endures the hordes of regulators and bureaucrats, people will no longer have to place their trust on a central authority that has let them down so many times in the past.

THE FEW, BUT DETERMINANT CONCLUSIONS

Of ancient Greek origin, the word crisis means "to choose" and could no better describe the current situation.

The series of events that led us to the current state of the world is irreversible. Globalization is going backwards, nationalism is erupting, and frontiers are being reshaped by the power of will. The state of affairs reminds us of the 30's, and the march back to the past means potentially falling off a cliff towards further instability and even war.

Will the Berlin-Beijing global allegiance be able to stand against the Moscow-Washington compromise? Will the World Order survive the greatest test it has ever faced?

From the ship, many questions float on the horizon at the dawn of this new era. But one thing is for certain: These are interesting times. ■

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Ensuring insurance

Eden Packer examines the role informal insurance plays in the lives of the world's poorest.

The life of the median earner in Uganda is vastly different to that of the UK. The current 2017 *vegetable shortage* has broccoli purchases limited to 3 per customer in supermarkets. For consumers in the UK, this just means switching to a substitute for a while. To a subsistence farmer, however, bad weather can mean the loss of half the year's income.

Living on under $1.90 a day puts a person in extreme poverty according to the World Bank, and all aspects of their daily lives are fraught with economic dangers. Slight inconveniences the developing world shrugs off as background noise can be life-altering. Limited job security and brevity of employment mean a slight labour shock in an urban environment, but can take a large chunk out of the labourer's consumption, most of which is spent on vital goods and services. Small business owners can be pushed into a poverty trap by theft, seeing limited assistance from generally sluggish, and often somewhat corrupt institutions. Falling ill grinds any form of productivity to a halt, sometimes for prolonged periods, which is often made more severe by lack of access to basic healthcare. Large fractions of the year's income can be lost. Unlike financial gamblers in New York or London, the isolated farmer is entirely liable.

RISK-MINIMISING LIVES

In a setting as old as time where the market for insurance is limited, the poor treat their lives like hedge-fund managers, their current and future assets a portfolio that needs diversification. This starts with the family. High fertility rates, not without their developmental issues, ensure multiple income streams. Where poverty is worst, ages in which productive work begins can be far younger than in mature economies. Having many children further serves to ensure a degree of protection for the parents in later life.

Many people choose to spread their assets thin in ways rarely seen in the developed world in order to reduce income uncertainty. With crops, professions and even whole geographical areas at risk of dangerous shocks, an individual can meaningfully reduce their risk by holding many different professions as the chance of work dropping off for all of them simultaneously is small. It is not uncommon for a family of three to share seven different professions, and even those working in time consuming agriculture often spend less than half their time in the fields. The production of simple goods such as jewellery and clothing is a popular branch of secondary work in India. Women spend an hour selling in the markets then move onto other work. Whilst demand in this market can often be volatile, jobs have reasonably low barriers to entry and the hire-and-fire culture of urban environments also allows for quick replacement of faltering sources of income. Increasingly, urbanisation in Benin does not always consist of whole families. Several members migrate for periods of weeks or months for short-term work, thus ensuring a shock in either location is cushioned. Plots of land in nearby, but distinctively different areas of the same town can guard against flooding or other location-specific damages.

In addition to occupational lifestyles, the larger community often plays a crucial role in savings and risk mitigation. In India in particular, marriage can be used to cement relationships between families, one benefit of which is the assumption that members will help others out at the event of a shock to income. General networks of friends and associates are used in this manner. In communities often based on ethnicity or religion, located mostly in rural settings, these arrangements consist of informal loans and gifts to one another when required. Savings clubs, such as a Rotating Savings and Credit Association (ROSCA), are widely used in Africa. The ROSCA system consists of individuals or groups depositing a fixed amount into a pot on a regular basis, upon which members take it in turns to receive the full contents. No profit is made, but this allows for the achievement of cyclical large useful sums, rather than regular negligible amounts, in addition to preserving one's money at a zero interest rate into the future.

ELEGANT SOLUTION OR STICKY SAFETY NETS?

Choosing to spread yourself so thin has important opportunity costs: women taking on three or more professions sacrifice efficiency and quality compared to those who specialise in one craft. This is pertinent in agriculture, as limited time spent on farming often means non irrigated land is worked, massively lowering productivity. The hesitancy of migrants to search for good long term urban jobs in order to be available for return home to the countryside keeps them working in traditionally unskilled roles.

Poor people are often extremely risk-averse. As mentioned, large falls in consumption and available income are possible. This, combined with heavily tradition-centred community, means disproportionally more weight is given to a damaging

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loss when compared to a substantial gain. Farmers more at risk of uncertain weather patterns employ a more conservative capital usage, at the expense of realisable output gains. Upgrading the technology at hand isn't any more of an option when it involves spending large sums on new crop seeds, compared to just saving some from the previous harvest. Far more time is spent protecting against a catastrophic faltering than is efficient.

The "helping-out" system has its own problems in its reliance on moral outreach. Gifts, loans and other assets tend to find recipients in other individuals and families, as this aid feels far more personal, meaning health problems where help is needed for hospital care receive far less attention than damage to property, which can be directly replaced.

BRIDGING THE INSURER-CONSUMER DIVIDE

Formal insurance possesses large potential to improve on the unreliability and inefficiencies of the informal risk-minimising economic lifestyle. Micro-finance institutions are a buzz-word in development economics, seen by many as the solution to a vast untapped market. However, selling a relatively modern and innovative product to buyers with lives steeped in tradition proves difficult: how do you sell insurance to those who have never heard of the concept?

Quite separate are the issues in the informational divide between formal finance and rural consumers. Participants may experience moral hazard when a purchaser behaves more erratically now that they know they don't bear all the damage of their losses. Lack of reliable information about market demand can grind the whole industry to a halt. Akerlof's adverse selection principle is common even in private health insurance in developed economies such as the USA, when those under higher health risk are more likely to look for insurance, pushing up prices to inviable heights for the average person, in developing countries the fallout of a bad illness worsens the division resultant from information asymmetry. Furthermore, premiums can be exceptionally difficult to calculate for an individual, where a slightly mispriced policy makes a large difference to incomes.

A complete re-structuring of the risk management of those in poverty is more of a pipe dream than a possibility. However, insurers are adopting a new long term strategy in establishing gradual partnerships with the community as a whole. Through beginning to work with local saving funds, insurers can make the industry far less alien to consumers. Lloyds advocates insuring whole groups of people rather than individuals, removing the information uncertainty from the equation. Effective insurance creates a knock-on effect; with increased collateral, subsistence farmers experience less of a liquidity constraint from local banks able to purchase loans to upgrade their equipment. With time and patience in learning to understand the communities of the extremely poor, micro-finance can boost productivity, lifting huge numbers out of poverty traps and into prosperous specialised work. The informal economy makes up over a third of many developing countries' output and contains billions of workers. It's probably fair to say that safety for our subsistence farmer will see widespread benefits. ■

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