

WYE

By the Global Association of Economics Education of the United Kingdom (GAEE UK)

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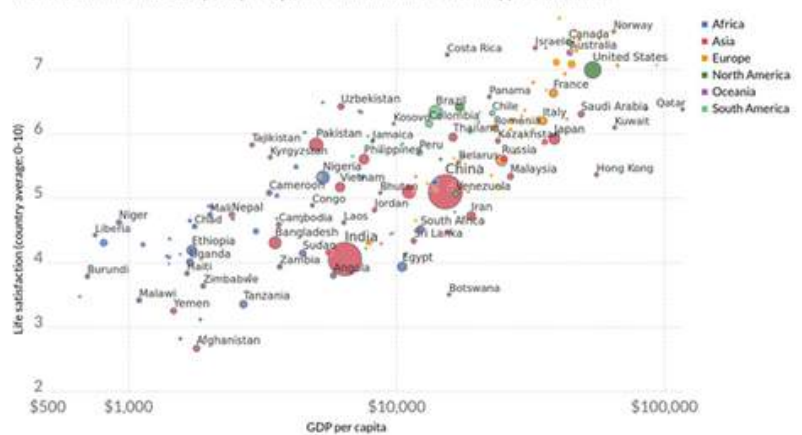
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SHOULD GOVERNMENTS STILL PRIORITISE ECONOMIC GROWTH IN THE 21ST CENTURY?

For decades, the success of a government was measured by the growth in its economy, and its GDP per capita. While there certainly is a link between GDP per capita and overall well-being of the people within a country, it is actually far smaller than people tend to think, and in fact almost non-existent in developed countries. This is the reason why many countries have recently started focusing on well-being as one of the measures of success. If we take happiness as the ultimate goal of any society, the governments need to take far more things into account than simply increasing economic output.

Self-reported Life Satisfaction vs GDP per capita, 2017

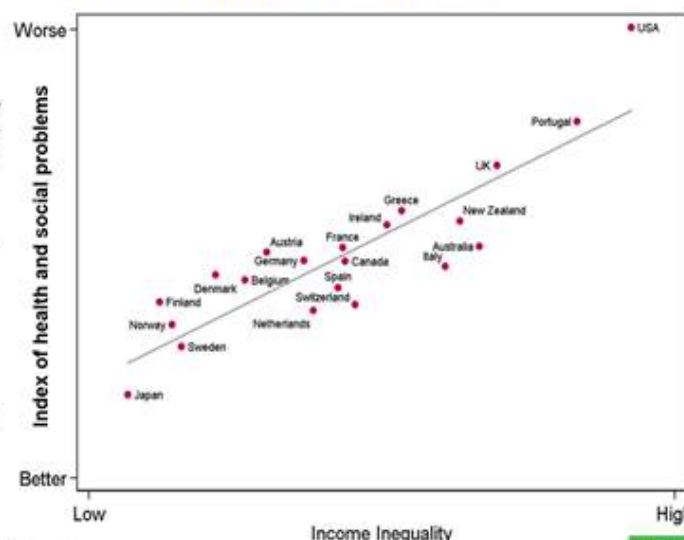
The vertical axis shows the national average of the self-reported life satisfaction on a scale ranging from 0-10, where 10 is the highest possible life satisfaction.
The horizontal axis shows GDP per capita adjusted for inflation and cross-country price differences.



Although we can see that the two variables are directly linked, meaning on average countries with higher GDP per capita will have higher levels of happiness, the distinction becomes apparent when you look at an individual level. Tajikistan, for instance, with a GDP per capita of \$8701, placed higher on the World Happiness Report than Hong Kong, which has a GDP per capita of \$48,7553. At the top, we see the outliers in the Scandinavian states. These countries have recently emerged both as some of the most successful economies and the countries with the happiest people. A common feature of these countries' economic systems is progressive tax, with very high rates for the top bracket. This has led to a decrease in socioeconomic inequality in these countries. In rich countries, inequality has been shown to be directly correlated to the amount of social problems within the country:

Health and social problems are worse in more unequal countries

- Index of:
- Life expectancy
 - Math & Literacy
 - Infant mortality
 - Homicides
 - Imprisonment
 - Teenage births
 - Trust
 - Obesity
 - Mental illness – incl. drug & alcohol addiction
 - Social mobility



Wilkinson & Pickett, *The Spirit Level*

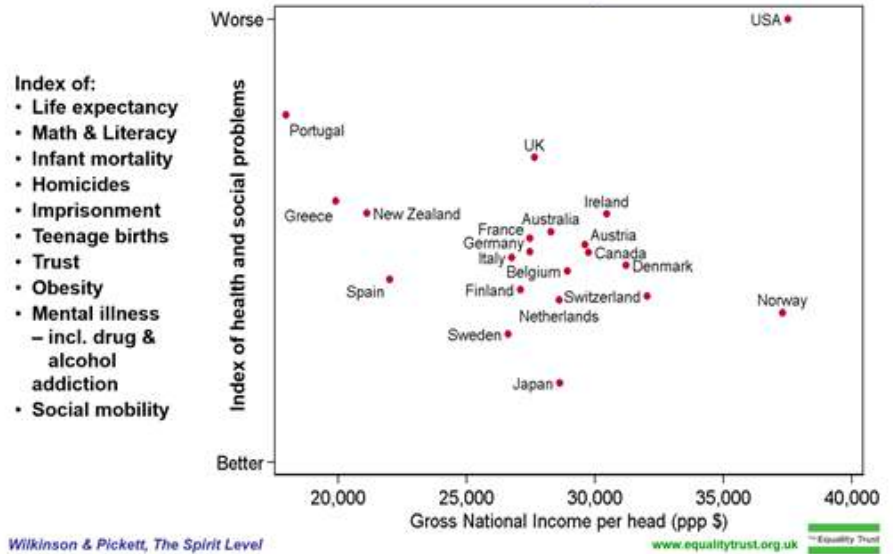
www.equalitytrust.org.uk

Equality Trust



This near-linear relationship is a contrast to the graph of the same social problems and the same countries against GDP per capita, where we observe almost no relationship.

Neither health nor social problems are related to national income per head



The study also provided some insights into some of the major social problems linked with inequality in wealthy countries, many of which have also been proven to affect overall well-being:

Table 1: The strength of relationships between income inequality in rich countries and various health and social problems

	Correlation coefficient
Social immobility	0.93
Teenage births	0.73
Imprisonment	0.67
Trust	-0.66
Mental illness	0.59
Obesity	0.57
Homicides	0.47
Educational performance	-0.45
Life expectancy	-0.44
Infant mortality	0.42
Overall index	0.87

Source: Wilkinson and Pickett, 2009b

Judging from this, one of the ways to increase overall well-being is to place have progressive taxes, particularly targeting the richer part of the population. This money can be used to improve healthcare, education and police.

According to UNESCO, poorer children are more likely to be bullied. Child bullying can not only cause physical damage, but it also often causes long-lasting mental damage, as well as having a negative effect on the child's education, potentially decreasing their chance of employment. The government should increase funding to schools in poorer areas, as well as educating both teachers and pupils in order to prevent bullying, and further promoting mental health support within affected regions.

Unemployment and general lack of involvement in the community are large causes of mental illnesses, which are especially prevalent in the elderly. Depression is more than twice as common in the unemployed part of the population than those who are employed, and almost one in five of the long-term unemployed (over 27 weeks) in the USA suffer from the illness⁶. In order to decrease unemployment, the government can improve the quality of education, especially for those from poorer backgrounds. Assistance schemes can be introduced to help those out of employment. Retired people can be encouraged to be involved with their community, for example through local charity participation, or by formation of local clubs where people with common interests could gather.

Another frequent cause of unhappiness is the general feeling of social injustice, especially within the legal systems, as well as corruption within the government. The relativity of contentment accounts partly for the low happiness in unequal countries. The government should strive for equal treatment of all citizens by the legal system, potentially through its reformation or through independent monitoring. The government should also aim to strike down on corruption through the potential introduction of new laws, as well as full disclosure of all income, property, savings and foreign accounts from its politicians annually. It should introduce laws to prevent tax avoidance from wealthy people and large corporations, which have been a part of the reason for recent increases in inequality. These laws can include obligatory publishing of financial data for all countries of operation for TNCs.

An essential part of happiness for many people is the work-life balance. When people have to work fewer hours, they have more time to spend with their friends and family, exercising, or resting, which can reduce their feeling of stress and anxiety. The Scandinavian countries, which have already been mentioned, have some of the lowest average working hours, with very high compensation per hour (in Denmark, for example, the average per-hour pay is around \$50). It has been proven that people take less time off sick and cut down on less productive tasks, so the productivity decrease can be held to a minimum while greatly improving the workers' overall well-being. This may also help to reduce unemployment as more workers are hired, increasing labour participation. In order to encourage shorter working weeks, the government can enforce working hour limit, as well as potentially reducing the maximum number of hours for some occupations.

From the graph of GDP per capita vs Happiness two countries stood out- Costa Rica, which has far higher happiness than its GDP per capita would suggest, and Hong Kong, which is the opposite. I will use these two cases as examples of factors other than income and wealth that affect the happiness of the people.



Costa Rica

A large part of the Costa Ricans' overall happiness is their physical well-being. Their government invests large amounts of money into healthcare. As a result, their life expectancy is over 80 years, with medical insurance a fraction of the cost of that in the US.

Although both their taxes and their national income is low compared to many countries, they still have money to fund social projects and healthcare since they abolished their military in 1949. This decision also prevented the formation of military dictatorships like in many other countries in that region, with the country remaining completely democratic. Although this would not be feasible in many of the bigger countries, such as the USA, which has obligations to defend 69 countries through treaties, the expenditure on defences can still be cut, as for example an internal study identified \$125 billion of bureaucratic waste within the Pentagon. Costa Rica has very low levels of pollution, and the government has planted vast green areas, all of which have been shown to improve both physical and mental well-being. It also plans to become carbon neutral by 2050.

Physical mental well-being is affected by the foods you eat. The Costa Rican government encourages the growth and consumption of healthy foods, such as lean meat and vegetables. They also eat very few processed foods, and many vitamins that guard against mental health problems. Although processed food and red meat tax has been discussed in many countries, few have taken action.



Hong Kong

With one of the highest GDP per capita out of any country, a fast-growing economy, the 2nd most economically free system in the world, and the highest life expectancy in the world, by any traditional sense of the word, Hong Kong has been very successful in recent times. However, this has not been reflected in the happiness of the people, as it ranked just 78th on the World Happiness Report. There are many reasons for this:

Due to its free economic system, which has very low taxes and tariffs, free immigration etc, Hong Kong has the 11th highest inequality out of any country, far higher than that of the United States. Whilst it has many wealthy businessmen, it also has 20% of its population living below the poverty line, which is already very low compared to Hong Kong's GDP per capita (at around \$6,000 per year, more than 8 times lower than Hong Kong's GDP per capita).

Another problem from the perspective of the citizens of Hong Kong is their oppression from mainland China which, according to them, has violated the so-called 'one country, two systems' agreement, and has been manipulating their elections. In fact, almost all dictatorships, no matter how successful or how free its people are in other areas, rank low on the World Happiness Report (compared to their economic output). It would appear that freedom of choice and speech are essential to human nature, and all governments should aim to give a political voice to its citizens.

Conclusion

The government focusing on the economy rather than the people has greatly increased productivity in the past, leading us to the technology that we have today. For example, the use of child labour and decrease in life expectancy in many regions were the cost of the jump in output during the Industrial Revolution. But we like to think that our perception of the value of human life has increased since then, and governments have begun to take the individual citizen into account. However, this requires a change of perspective from the government, and a complete revision of its policies.



Hans Rosling channels his passion for fighting ignorance and creates a masterpiece in the book *Factfulness: 10 Reasons We're Wrong About the World – and Why Things Are Better Than You Think*.

The book begins with a series of simple questions: What is the life expectancy? What percentage of the world has access to electricity? The survey results highlight our ignorance, and even well-educated individuals score worse than chimpanzees answering randomly.

Hans Rosling, accompanied by Ola and Anna Rosling, tries to prove that the world is improving even though many think otherwise; they explain how statistical illiteracy, outdated resources, and urgency lead to our misconceptions. *Factfulness* uses data and anecdotes to dissect the causes of our common misconceptions; Rosling lists ten instincts that cause us to fail to identify and celebrate the 'silent miracle of human progress.'

Rosling's use of high-quality graphics enables him to make *Factfulness* accessible but also an informative read. In his chapter on the Gap Instinct, Rosling uses a chart of babies per woman and child survival rates to debunk the common misconception that the world is divided into two distinct groups, and he concludes that the terms 'developing' and 'developed' countries are outdated as several countries exist in the middle of the chart.

Rosling's chapter on the blame instinct is particularly enthralling and uses historical examples of behaviours that are still relevant today. The rapid spread of syphilis led to numerous European countries blaming it on each other – the Polish, for example, called it the German disease. This behaviour is quite like America's treatment of the coronavirus and how it was labelled as the 'China virus' or 'Kung Flu' to blame China for its spread. The chapter emphasises the problem blame causes and how it leads to us attributing more power than an individual deserves.

All in all, *Factfulness* is a must-read and will influence the way you see the world.

Review by: Simeon Audu



THE CASE FOR STIMULUS MEASURES

As the Coronavirus pandemic continues to wreak economic havoc among lower-income families, the debate around further stimulus measures have continued to grow more heated. They have proven vital in boosting consumer spending power and spurring economic activity in sectors that have been hardest hit by the pandemic. In order for a stimulus to have the greatest impact relative to long-term cost, it must be well-timed and implemented efficiently. Before we continue, there is a much-needed comparison to be made between the stimulus checks of 2020 vs those of 2008. A study from McKinsey & Company suggests that the total stimulus for the Covid-19 crisis is already triple that for the entire 2008-09 recession. Governments have allocated \$10 trillion for economic stimulus, leading some fiscal hawks to raise alarms over rising debt as a proportion of GDP. While this argument does have some credence regarding targeted support and effective implementation, the urgency for economic support measures outweighs the cost in the long term. One of the most pressing priorities of Senate Majority Leader Chuck Schumer's is providing Americans with \$2000 dollar stimulus checks in order to support the economic recovery outlined earlier in this article. A sufficiently sizeable stimulus would be a lifeline to a rapidly deteriorating economy, providing support to the 12 million renters in the USA who have fallen behind on rental payments. The reallocation effect stemming from stimulus measures would be a method of offsetting much of the increase in inequalities through the course of the pandemic. However, while direct assistance would buy valuable time, it would not serve as a permanent solution to the concurrent crises and harsh inequalities that the pandemic has sharpened. Ernie Tedeschi, an economist at Evercore and former Treasury official, recently said regarding previous stimulus measures 'the US needs an economic lifeline lasting around 9 months to get comfortably to wide vaccine distribution. This is more like 2-3 months of lifeline'. In conclusion, time is quickly running out for consumers and businesses alike to receive much-needed support. This is not a question of left or right, it is a question of survival.

Article by: Matthew Howard



FREE MARKETS OR COMMAND ECONOMY?

The allocation of scarce resources has been the fundamental economic problem throughout the history of mankind. The simple fact is that resources are limited, whereas our wants and needs are infinite. Therefore, it is crucial that the allocation of these scarce resources is done fairly and efficiently for a society to prosper. The Free Market and Command economies provide two (conflicting) potential solutions to the fundamental economic problem and have been thoroughly experimented with over the past century and beyond.

To compare the two, we should define them first. A free market economy is one in which the decisions regarding investment, production and distribution are guided by the price signals created by the forces of supply and demand. A command economy is a system where the government, rather than the free market, determines what goods should be produced, how much should be produced, and the price at which the goods are offered for sale. Wages and investment are also determined by the government.

Looking at history alone, free market economies have largely been more successful than command economies. Of course, perfect free markets and command economies do not exist in practice. Today, all countries have a mixed economy, with some leaning towards a free market and some towards a command economy. There are numerous successes and failures on either side of the spectrum. I will also reference examples of these to support my arguments.

Firstly, free market economies are better at allocating resources because of the simple fact that they are 'free'. There is no government intervention, which means goods are produced in quantities aligned with the demand for that product. Prices are also determined by how much consumers are willing to pay for the product. Firms in a free market will always want to produce at the equilibrium quantity and sell at the equilibrium price, in order to maximise profit. This means that theoretically there should be no shortages or surpluses from production (since at Equilibrium Price, quantity supplied equals quantity demanded). This would ensure that everything that is produced is consumed by consumers. In this sense, wastage of scarce resources is limited. Allocation of resources is also efficient as resources go where the demand is in a free market.



This also links to Adam Smith's theory of the Invisible Hand. Adam Smith thought that economic entities acting in their own self interests is actually better for society than if they acted with the goal of improving society. This is because when economic entities such as firms want to maximise profits, they will take actions which will also raise economic output. When workers will want to get a pay rise, they make work harder, increasing productivity and therefore economic output, which would raise overall standard of living.

In a command economy, on the other hand, allocation of resources is often quite inefficient. This is because the government decides which goods are produced, how much of each good is produced and what price it is sold at. If, like in a free market, these were determined by demand, allocation of resources would likely be efficient by default. While it is true that these factors which are decided by the government are likely based on consumer demand data, it is often very difficult to get a true idea of it. Examples of this include the USSR, where shortages of various goods were commonplace. A lack of understanding on price setting would mean that in almost all cases goods would be sold at non-equilibrium prices leading to shortages or surpluses. This would be a wasteful allocation of resources.

However, it is true that in free market systems, many people are unable to afford basic needs such as food and healthcare. Therefore, it is often advantageous for countries to have things such as a national health service and food banks as a social security net for its citizens. The UK is an example of such a country. The NHS in the UK has been fairly successful in this regard, providing free healthcare to all citizens. An NHS-like healthcare system comes with its own problems, but it does help with the allocation of the healthcare resource by ensuring all citizens have access to it.

Although, such an assumption only holds true for basic needs - resources such as healthcare and food - everyone should have access to these. Access to other resources is, and should be, determined by whether you are able to afford it or not. Yes, this is inequality. However, this is not necessarily a bad thing. Firstly, inequalities in wealth are largely because there are significant disparities in how hard people are willing to work and how skilled they are at their jobs. In this sense, it would be wrong to say that allocation of resources is unfair in this case, because people are able to afford what they have worked for.

The fact that free markets are meritocracies is also very helpful in keeping labour markets competitive. Seeing people around us who are earning more than us may motivate us to work even harder or acquire new skills which are in demand by firms or society. Such initiatives, although driven by inequality, are effective in increasing worker productivity and therefore boosting economic output. While a greater economic output does not improve the allocation of scarce resources, it does increase the supply of resources to be divided, and thereby raises the overall standard of living of the country. Greater GDP also means a higher national income, which increases the access of resources for poorer people.

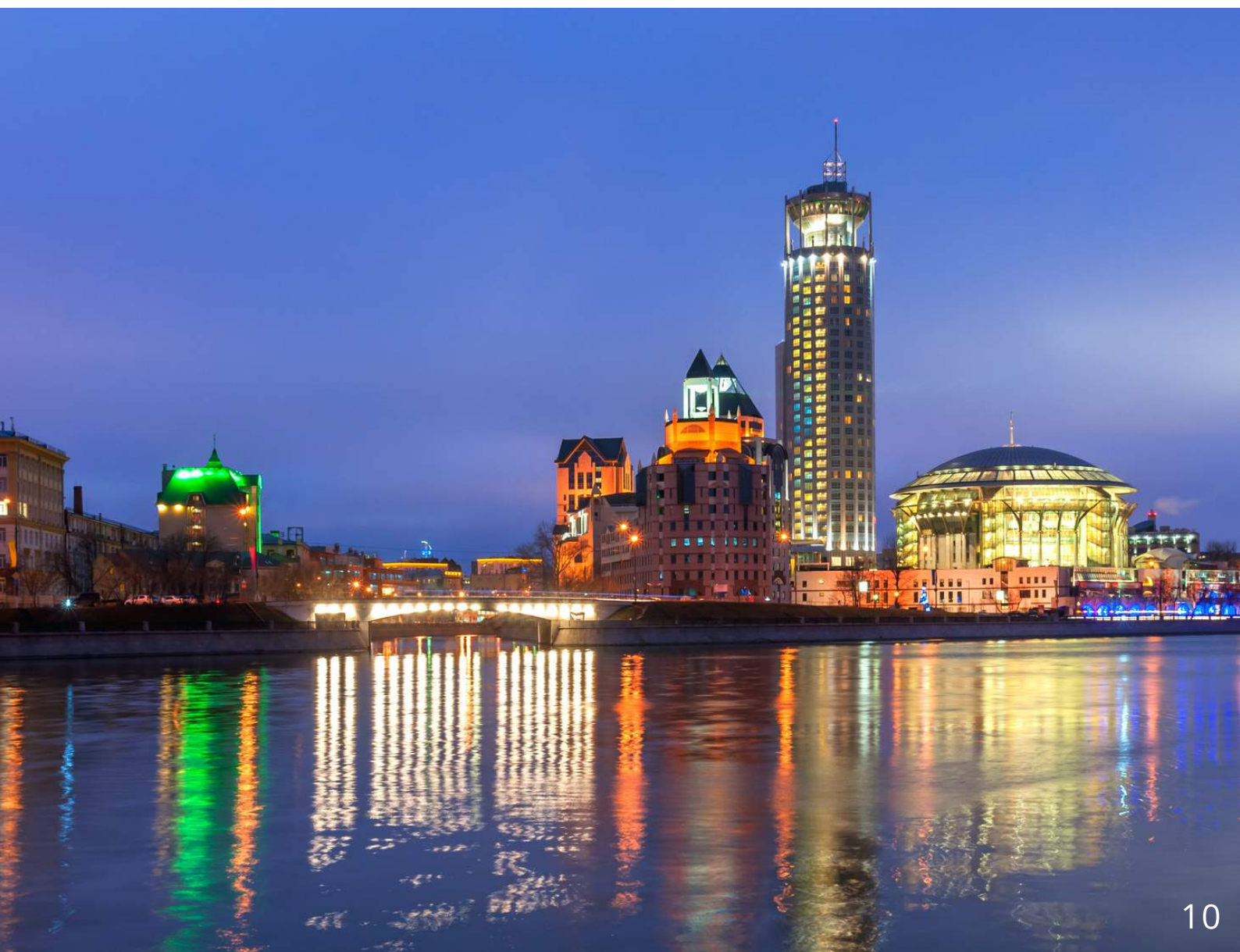
The same analogy could also be applied to firms. For example, inequality may also drive innovation. Competition between firms would be very healthy for the economy as it would facilitate technological advancement and drive growth. It would also mean that consumers have better quality products available to them.



Corruption is also a big problem with command economies. Since almost everything is regulated by the government, there is great room for corruption by government officials. Things such as the ease of doing business in a country are greatly reduced, meaning foreign investment would also likely decrease. Corruption is a barrier that automatically limits future growth. It also makes distribution of resources more difficult. Things such as government officials taking commissions at various steps of the supply chain, are hugely disruptive to the distribution of resources in a command economy. On the other hand, a free market has problems with administration too. A country without things such as criminal laws and police to enforce it; without legal agreements for financial deals and courts to resolve disputes would also be extremely inefficient.

Theoretically, a pure command economy would be extremely successful and eradicate inequalities by allowing equal and complete access to resources for all. Unfortunately, such a system could never work. This is not just because of the fact that resources are scarce but also simply because humans are selfish. There would always be inefficiencies such as government officials being corrupt because of selfish interests. A farmer would not be motivated to grow crops for society but would be more than happy to invest in new GM crops technology if it means more profit for him. For these reasons, humans would be much more suited to a mixed economy that leans toward free enterprise rather than a command economy, and would then be able to take full advantage of the Invisible Hand. Altogether, I do believe that free markets are significantly better at the allocation of resources than command economies.

Article by: Agastya Nashier



NEW INITIATIVES

WE ARE PROUD TO ANNOUNCE THE LAUNCH OF OUR FOLLOWING NEW INITIATIVES:

Caxton: Following the success of our first four infographics, we are proud to announce the launch of *Caxton* on our Instagram @gaee.uk, our new series of infographics. The objective of *Caxton* is to provide bite-size introductions to key concepts in economics. We post every Tuesday and Thursday, with each infographic generally being four slides long.

Aire Livestreams: With our most recent (third) livestream clocking in a total of 500 views just 24 hours after its debut, we are proud to officially launch *Aire Livestreams*, a weekly livestream where we provide a guided learning session based on the CORE curriculum, a wonderfully thorough introductory guide to the economics of today. Should you be interested, the link to our YouTube channel is:

<https://www.youtube.com/channel/UCMS2-tvZa1GgIKwjwEvWQaw>

TONE Podcasts: We would also like to give our members a heads-up on our up-and-coming *TONE*, a collection of multiple YouTube videos where we apply economics to interesting issues. We hope you will enjoy them.

OUR SCHOOLS

Abingdon School
Bradfield College
Charterhouse School
Cheltenham Ladies' College
Clifton College
The Emmbrook School
Eton College
Farnborough Sixth Form College
Garth Hill College
Godolphin School
Harrow School
King Edward VI High School for Girls
King Edward VI School
King's College Taunton
Lady Eleanor Holles
Mander Portman Woodward
Marlborough College
Radley College
Reigate Grammar School
Sherborne School
St Edwards School
St Pauls School
St Swithun's School
Stowe School
Westminster School
Wetherby Senior
Winchester College
Woking College

Thanks to all the support we have had so far, since the introduction of the Albion Initiative in December, we are currently on target to hit our goal of 10,000 members by next December.

QE; AN INGENIOUS MASTERPLAN OR HYPERINFLATIONARY CATASTROPHE?



Since the 2008 bloodbath, caused by greedy bankers and myopic regulators, a lot has changed, except for the ignorance of our decision-makers across the globe. Huge deficit spending, ZIRP ("zero interest rate policy"), the recent rolling back of vital regulations, and a trade war have caused havoc in economies across the globe behind those pretty numbers we are shown. Is the novel invention, QE (quantitative easing) something different?

This article will focus specifically on the US and its Federal Reserve because the dollar is the world's reserve currency since the Bretton Woods Agreement in 1944. The next two paragraphs will briefly explain quantitative easing.

In a fiat currency, governments have the power to manipulate the currency supply or velocity to boost or slow economic growth. Before the sub-prime mortgage crisis of 2008, this system was based on interest rates.

- *The Fed (Federal Reserve) would cut the nominal base rate (interest charged on commercial banks for loans) if they want to boost the economy and to reach their 2% inflation target. A lower base rate would encourage the banks to loan more from the central bank and lend it out to the consumer who wants to get hold of cheap money. This increases spending by consumers, increasing inflation to the 2% target by an increase in velocity. This is also known as an expansionary policy*

- *A contractionary policy is if the Fed wants to slow down the economy from creating unnecessary bubbles. For this, they will raise the base rate. Banks would be less encouraged to borrow, as would the average consumer.*

During the 2008 crisis, the Fed decided to cut interest rates to near zero, so they couldn't lower it anymore to further stimulate the economy. This left policymakers no other choice but to pump money into the system via quantitative easing. It also had the benefit that toxic assets such as mortgage-backed securities could be bought off the market.

To understand the impacts of quantitative easing, we must first understand what it is. It is a Keynesian theory and is another way for central banks to manipulate the economy. It buys assets, mostly government bonds from the primary banks. This should in a good scenario and the eyes of the central banks have two advantages.

- *With an increase in demand for government bonds, their prices would increase, driving down their yield. Central banks assume that lower yields would result in higher consumer spending and investment because the return from the bonds are lower. There is a crucial flaw in this argument, which I will get to later.*

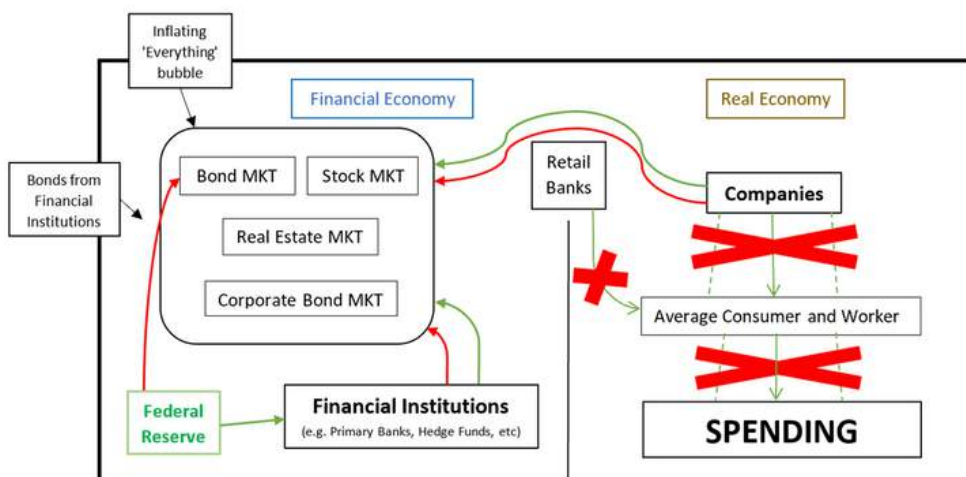
- *The second "advantage" that QE has is that in return for the sold bonds, banks get currency which the Fed digitally create out of thin air. Banks can therefore lend out more to the consumer to spend, or with which companies can expand and hire new workers. These extra wages would potentially further boost the economy.*

The loans that the PDCF (Primary Dealer Credit Facility) would dish out would also increase the amount of dollar-denominated credit, lowering the value of the dollar. As paradoxical as it sounds, a weaker dollar is advantageous for the US. It increases exports and makes foreign investments into the US more attractive. An example of this would be the 30% increase in the S&P in 2013 during QE3, where \$85 billion worth of assets were purchased.

It all sounds too good to be true, doesn't it? Indeed, it is.

The flaws of these arguments are complex. As financial institutions receive their newly created money or borrow it from primary dealers, instead of lending it out to the average consumer, they invest it into different markets as they tend to be higher yielding than loans and RISK-FREE. Risk-Free? Yes, the Fed has signalled to the investor that they have a put on the stock market. The Fed has always lowered rates and injected more money into the repo market or increased monthly QE purchases when the markets slowed down. This made the stock market surge to new heights, as long as the Fed kept up the injection of liquidity.

Companies also stopped investing in productivity but rather into the stock market. With less income from companies, the average consumer would be reluctant to take on debt. This causes only 8-9% of the injected liquidity to reach the average consumer, which is where the second argument also falls apart.



I made a visual representation to make this easier to understand. Green arrows indicate the flow of money. The red arrows show what the entities want to buy.

As you can see above, QE causes many entities to buy assets, artificially inflating those financial markets creating an 'everything bubble'. This is very dangerous because as soon as the Fed cannot keep up with the liquidity demand, or a global catastrophe such as the coronavirus pops that bubble, we will witness something far greater than even the 2008 meltdown.

Another consequence of rising asset prices is that it creates and exacerbates wealth inequality, one of the most pressing issues in society in this generation. Those who possess those assets will see their net worth skyrocket, while the working class must watch how their employers jump on the bandwagon. The Bank of England even admitted this: *"Of course, higher asset prices will make some people better off"*.

The following disturbing image was taken from CNBC's show 'Mad Money', hosted by Jim Cramer, after the Fed announced their 2.3 trillion-dollar stimulus package on April 9th amid the Covid-19 crisis. It highlights the huge discrepancies between the 'real' and 'financial' economy.



You must be asking yourself, when will the Fed stop this destructive policy? They can't. Excess liquidity for a prolonged period causes a dependency on that liquidity. If the excessive liquidity suddenly cuts off, something called the 'liquidity trap' develops. This is like the withdrawal symptoms of a cocaine addict, except for that the cocaine is the newly created, legally counterfeited currency by the Fed, and the addicts are the financial institutions. The graph below clearly shows a positive correlation between the Fed's balance sheet and the S&P 500 (with the exception of the Covid-19 crash in March 2020).

In 2018, the Fed constructed a plan to carefully reduce its balance sheet. The fear caused by 'Quantitative Tightening' caused a bear market with the market reaching its bottom on Christmas day. In response to the repo turmoil of September, the Fed decided that it was necessary to implement QE4, even though they were too ashamed to call it that way.

The Covid-19 crisis has brought QE to a new dimension. Not only is the Fed able to buy student loans, car loans or any other loans, but they have churned up their currency production to 600 billion PER WEEK and inflating their balance sheet to over 6 trillion (as of April 8th). It is important to understand that this number will change as the virus panic settles down, but it shows to what extent they want to go, to kick the can down the road, so that the imminent collapse doesn't happen on their watch. Fully aware, of course, that the longer they wait, the more catastrophic the outcome.

Will the increased currency supply from QE directly cause hyperinflation? The short answer is no. Technological innovations pushing down costs of consumer goods in combination with the small percentage of liquidity ($\approx 8-9\%$) reaching the real economy will cause inflation rates to be stable. What it will cause is a societal spit between the 'haves' and the 'have-nots'.

Strong signs of populism as a result of this have shown across the globe, whether it is Donald Trump and Jair Bolsonaro's victory in presidential elections or Brexit. In response, the left side of the political spectrum, candidates like Bernie Sanders, Jeremy Corbyn or AOC have gained huge momentum. Their policies, although not directly caused by QE, would cause huge economic meltdowns to the point that MMT (helicopter money as Austrian economists would call it) would be inevitable. This, in turn, would undoubtedly lead the world into hyperinflation, which will not only cause the value of Gold and crypto currencies to skyrocket, but it also must be followed by a complete reshuffle in the global monetary system and put an end to this fraudulent fiat currency scheme.

An aerial photograph of a dense urban skyline, likely New York City, featuring numerous skyscrapers and buildings. The image is used as a background for the page, with the title text overlaid on the left side.

SCOUT ARTIST CONTRIBUTORS

Matthew Howard

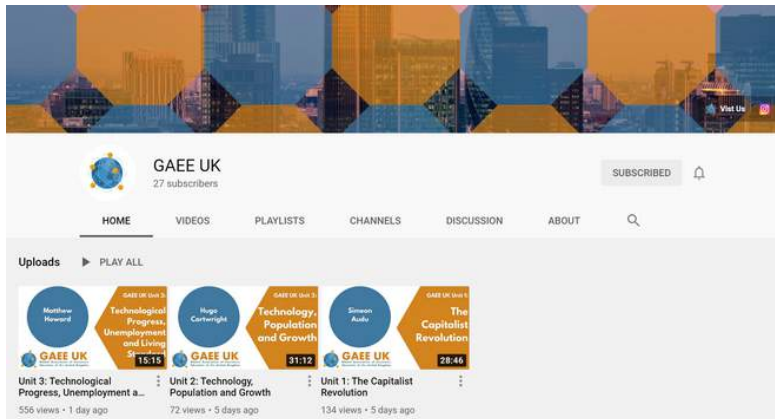
Matthew has been a member of GAEE UK right from the word go, he has worked on a variety of projects including outreach in Wales and Northern Ireland, writing content for the website and most recently the highly successful *Aire Livestream* on Unit 3.

Matthew is an aspiring economist, and is particularly interested in political economy and macroeconomics. He regularly attends lectures both online and in person from across the UK.

Mariya Mahmood

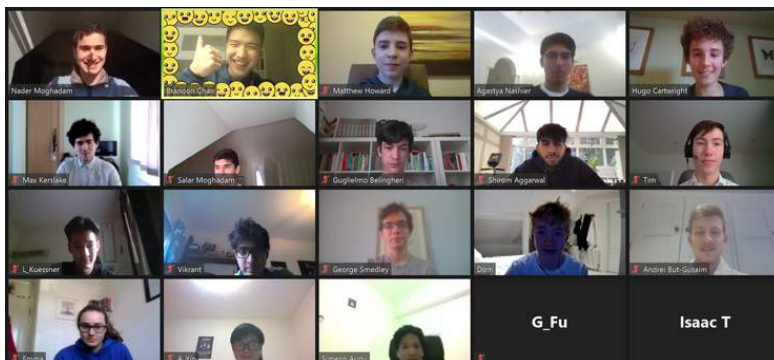
Mariya is a more recent member of GAEE UK, she has mainly worked on outreach in Hampshire and surrounding counties. She has brought schools into the organisation such as Woking College, Farnborough Sixth and many more. Her contribution to GAEE UK is invaluable and we hope it continues for many years to come.

GALLERY



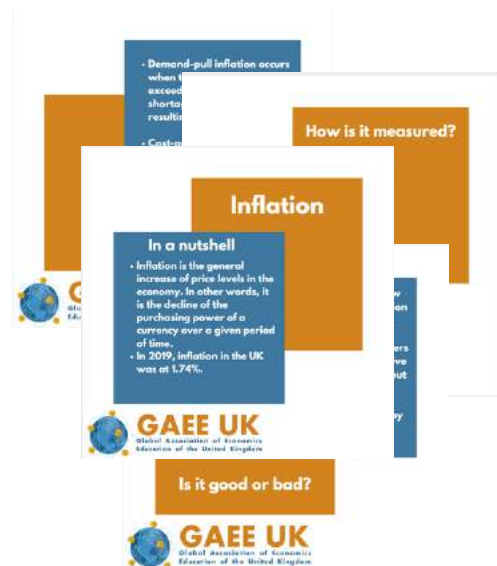
Aire Livestreams available for free on our Youtube channel, our most recent livestream gained 500 views in 2 days.

Our website launched at the start of 2021, all of our resources are on there. Check it out at: gaeeuk.org



Our second livestream was well received with over 20 tuning in live to listen to Hugo Cartwright speak about Technology, Population and Growth.

Caxton is an initiative created this January to provide infographics and other resources directly to social media. We publish new infographics twice a week on our Instagram: [@gaeeuk](https://www.instagram.com/gaeeuk)



A GAME THEORY ANALYSIS OF THE CHINA-US TRADE WAR

Abstract

This essay is intended to provide some understanding of the China-United States trade war using game theory. It concludes that we should place more emphasis on cooperation-inducing institutions such as the World Trade Organization (WTO). No prior knowledge of game theory is required to understand this work; a GCSE Mathematics course should suffice. The following aspects of game theory are included in this essay: Nash equilibrium, Prisoner's Dilemma, extensive form games, and backward induction.

Keywords: Game theory, trade war, Nash equilibrium, extensive form games, backward induction.

Introduction

International cooperation is often called for by politicians and commentators alike. If countries stand to benefit from cooperating, should it not be rational for them to cooperate? In light of the China-United States trade war, such a claim has once again been put forward.

But what if this were not the case? What if there were a distinction between a socially desirable outcome and that resulting from the rationality of individuals? What if countries were simply confused?

This essay analyses two distinct scenarios of the China-US trade war, with the aim of demonstrating that cooperation-inducing institutions such as the World Trade Organization (WTO) are paramount to solving both such scenarios. The body of this work is split into three sections; the fundamentals of game theory are first introduced, followed by a construction and analysis of two scenarios of the trade war.

1. Game Theory: The Fundamentals

Game theory is not about 'playing games,' It is about conflict resolution between rational but distrustful beings." (Poundstone, 1992)

There are numerous 'games' in play around us, whether we actively participate in them or not. From poker to billion-dollar auctions, to the Cold War – games are truly everywhere. The purpose of game theory is to use mathematics to understand how and why we interact with each other the way we do. And it is not just humans that game theory can be applied to: it also finds its uses in evolutionary biology and computer science.

This section will introduce three building blocks of game theory: players, payoffs, and the Nash equilibrium.



1.1. Players

Every game consists of at least two players. In game theory, there are two key assumptions we make about these players:

1. The goal of each player is to maximise their gain. This can be thought of as each player acting in his or her self-interest.
2. Both players know that the other player has the same goal. Thus, both know the other to be rational. (Nordstrom, 2020)

Hence, not all interactions may be modelled using game theory. Sometimes players may act irrationally (inconsistently). Sometimes players do not seek maximum gain: they may be satisfied as long as they achieve a certain absolute objective. For example, a student may be satisfied with achieving an absolute mark of eighty and not be incentivised to score any higher.

Other aspects such as instinct, habit, or laziness affect how players make decisions.

Nonetheless, game theory can be incredibly insightful, as it is here. Using mathematics, we can logically explain why seemingly counter-intuitive actions, such as a trade war, are actually rational.

To circle back on our idea of players, each player must decide on an act based on their expected gains. These gains are expressed using some real number (e.g. +5, -3,) which is known as a payoff value. When an act corresponds to some payoff, the payoff is said to be the utility of the act. Note that for the same act, each player may assign a different utility to it. Hence, a player can be said to maximise their payoff by choosing the act with the highest utility.

1.2. Payoff Tables

When two players interact, their actions form a possible outcome. To express this outcome, we form a payoff table. As a simple illustration, the game Chicken is introduced here. In Chicken, Alice and Bob are racing towards each other. They each would like to avoid a crash, and win. Whoever chickens out first, loses. Suppose Bob and Alice are both independently capable of choosing one of two actions: Speed or Slow. Alice's options correspond to the rows of the payoff table, and Bob's options correspond to the columns of the payoff table. The table below illustrates this (Figure 1a).

		Bob	
		speed	slow
Alice	speed		
	slow		

If Alice and Bob both choose Speed, then they crash. Hence (Speed, Speed), which denotes (Alice's choice, Bob's choice), results in the lowest payoff for both individuals. Let us arbitrarily set the payoff vector of (Alice's payoff, Bob's payoff) for (Speed, Speed) as $(-1, -1)$. If Alice chooses Speed and Bob chooses slows, then Alice wins, and Bob loses. They do not crash, but Bob chickens out first. Hence, both receive a payoff higher than (Speed, Speed); but since Alice wins, she receives a higher payoff than Bob. We set the payoff vector for (Speed, Slow) as $(3,0)$. The converse applies if Bob chooses Speed and Alice chooses Slow. The payoff vector for (Slow, Speed) is $(0,3)$. If Alice and Bob both choose Slow, then they do not crash, but no one wins. The payoff for playing Slow here is higher than when it was played in (Speed, Slow). Hence the payoff vector for (Slow, Slow) is $(2,2)$. Figure 1b illustrates these values in the payoff table. For ease of interpretation, Alice's payoffs are in the bottom-left corner of each box, and Bob's payoffs are in the top-right corner of each box.

Bob

speed

slow

speed

slow

-1

3

0

2

-1

0

3

2

So, what is the optimal response for Bob and Alice? The answer is the Nash equilibrium.

1.3. The Nash Equilibrium

The Nash equilibrium is perhaps the most important component to the whole of game theory. Discovered by John Nash, laureate of the Nobel Economics Prize and the Abel Prize, the Nash equilibrium is the basic building block of finding solutions to a game. The solution is the best reply a player can make given the decision of the other. For example, if Bob chooses Speed, since $0 > -1$ and Alice wants to maximise her payoff, Alice chooses Slow. This outcome $(0,3)$, i.e., (Slow, Speed), is a Nash equilibrium, as when either player is given the other's strategy, i.e., Slow or Speed, neither wants to switch their strategy. For ease of visualisation, we circle her best reply and payoff given Bob's strategy Speed (Figure 2a).

When both payoffs are circled in a box, we know that said outcome is a Nash equilibrium. Hence, from Figure 2b, we see two Nash equilibria in Chicken: (Slow, Speed), and (Speed, Slow). Here, "[t]he players have a joint interest in avoiding mutual disaster" (Binmore, 2007).



	speed	
speed	-1	-1
slow	0	3

Figure 2a

	speed	slow	
speed	-1	0	-1
slow	3	2	0

Figure 2b

There is actually a third Nash equilibrium. The previous two are known as pure strategy equilibria: players play one strategy only. The third equilibrium is a mixed equilibrium. This is when a player plays a mixture of strategies so the other is indifferent towards either of their strategy choices. The player is randomising. Note that this is also a perfectly consistent type of play. The opponent is now indifferent to any strategy he plays because he will receive the same payoff on average. A good way of understanding this is how we intuitively randomise our strategies in Rock-Paper-Scissors; we do not just play one move all the time: we keep our opponents guessing. Randomising can also be a Nash equilibrium! Here, perhaps Alice is unhappy that the Nash equilibrium (0,3) is being played. If Alice plays her mixed strategy, Bob is then indifferent towards any choice he plays, as his expected payoff from either choice is the same. The mixed strategy for Alice here is to play Speed half of the time and Slow the other half of the time, randomly (see Appendix 1). The game Chicken was chosen here because it demonstrates both pure and mixed equilibria.

To recap, we know that there are three Nash equilibria here: two pure and one mixed. This concludes the introduction to game theory fundamentals. In the next section, we shall construct and analyse our first model.

2. Scenario One: The Prisoner's Dilemma

We may consider the trade war as a game between two players: The United States and China.

They may choose one of two actions: negotiate for free trade (N), or raise tariffs (R).

In our first scenario, we adopt the classical economic belief that, all else remaining the same, reducing imports and increasing exports results in higher GDP (Gross Domestic Product). This originates from the formula $GDP = C + I + G + (X - M)$, where C denotes consumption, I denotes gross investment, G denotes government spending, and $(X - M)$ denotes exports X minus imports M . From this, it is therefore theoretically rational for a country to raise tariffs to reduce imports. When both countries adopt protectionist policies, both countries suffer. For example, the Smoot-Hawley tariffs of the 1930s played a major role in the Great Depression (Alfred, 1995). The same may be said for this trade war. Due to the recent trade war, American companies lost 1.7 trillion USD in value (Amiti, Kong, & Weinstein, 2020), and China suffered a 35 USD billion dollar loss in exports to the US market in 2019 (United Nations, 2019). Given the circumstances above, the payoff table has been constructed to reflect these relationships, as shown in Figure 3. Note that the numbers themselves are not particularly important, it is the relationship (difference) between the numbers that should be noted as expressing the conditions above.





		China	
		N	R
United States	N	3 3	1 ⑤
	R	⑤ 1	② ②

There is only one Nash equilibrium here (R, R): there is only one outcome where both payoffs are circled, and the mixed strategy equilibrium is invalid (for the country playing a mixed strategy, the probability of it playing both strategies must be positive; Appendix 1 provides the fundamentals of calculating a mixed equilibrium). It is never rational to play N here, as, if one plays N, the other will choose R to maximise their payoff. This model is an iteration of the famous Prisoner's Dilemma, where although it may be beneficial for both players to cooperate, the result is that both players harm each other. Society tries to avoid such outcomes by cooperating and agreeing beforehand how they will play. For countries, this means institutions such as the World Trade Organization (WTO). This simple model is one possible explanation of the trade war. However, one of its assumptions is that the classical belief is actually correct.

What happens if the US benefits more from trade than tariffs?

3. Model Two: Confusion

When countries change their stance on trade policy, their trading partners are not necessarily informed of these changes (Mann, 1987). This may result in two countries playing two different games, whilst each presumes the other to be playing the same one. This change may have been ongoing over many years, culminating in a sudden change of policy when there is a change in administration. Furthermore, our payoffs should be a function of both economic benefit and political benefit, particularly for the US.

We now refine our model with two payoff tables: one before, and one after 2017 (Figure 4). We make two changes to the US's payoff in the pre-2017 table compared to our first model: the US's payoff for (N, N) versus (R, N), and the US's payoff for (N, R) versus (R, R). In both circumstances of the pre-2017 table, the US plays N whatever China plays. These changes have been made because we account for the moral benefits of the US administration upholding free trade (Woerth, 1995). Historically, political benefit has generally outweighed economic concerns in when the US conducts trade policy (Mann, 1987). These changes have not been applied to China because of its historically consistent focus on growing economic wealth above all else, as seen from its Five-Year Plans.

		China	
		N	R
United States	N	⑤ 3	② ⑤
	R	3 1	1 ②

Figure 4a: pre-2017

		China	
		N	R
United States	N	⑤ 3	1 ⑤
	R	3 1	② ②

Figure 4b: post-2017

A wide-angle photograph of the main entrance to the Temple of Heaven in Beijing. The image shows a long, paved path leading to a large, traditional Chinese building with a red roof and ornate wooden doors. The path is flanked by white stone railings. The sky is clear and blue. The number 23 is visible in the bottom right corner.

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We now conduct the same procedure for China. China now actually has two payoffs to consider: the payoff from (N, N) and the payoff from (R, R). China will now opt for N as her payoff, for her payoff from R is certainly lower than N ($3 > 2$). This is indicated with the bold line connecting China to the US in the diagram above.

Thus, by identifying the bold line which runs through the decision tree, we see the solution for our post-2017 game is (N, N), leading to the payoff node (5,3).

But since China is necessarily confused in the change in US policy, it will choose to play according to the payoff table of pre-2017: by playing R. The US is therefore forced to respond with R as well. Thus, we see that this confusion leads to an undesirable trade war. Only until the US has played a sufficient number of times of R would it successfully signal to China that the game has changed. Here we see why we supposed China to move first. The purpose of the assumption is to enable us to examine how the change in US administration caused China to play in a “confused” manner.

We may combine these two games into one as seen in Figure 6, where P denotes the probability of China believing the US to be playing the pre-2017 game, and $(1 - P)$ denotes the probability of China believing the US to be playing the post-2017 game. As the US plays R more often, P decreases and $(1 - P)$ increases. Thus, we see that the China-US trade war depends on both the magnitude of payoff change for the US in maintaining free trade, and the level of conviction China has on whether the payoffs for the US have indeed changed. Here again, if trade negotiations were more accessible, the signalling of policy change would have been far more effective.

		China	
		N	R
United States	N	3 ⑤	$P \times 2 + (1 - P) \times 1$ ⑤
	R	1 3	② ②

Figure 6: Combined model

Conclusion

In this essay, we explored the outcomes of two simple models of the China-US trade war. The first took on classical economic beliefs and demonstrated the irrationality of cooperation under such beliefs. The second provided a more realistic model of confusion and payoffs from free trade, and used backward induction to show why even if cooperation is desirable, it does not necessarily happen. Both of these models showed the need for cooperation-inducing institutions such as the WTO mediating between countries.

Appendix 1a for "A Game Theory Analysis of the China-US Trade War"

Alice wants Bob's expected payoff for each choice to be the same, i.e. when Bob chooses Speed or Slow, he expects to receive the same payoff. We denote this as

$$E_B(Sp) = E_B(SL), \quad (1)$$

where $E_B(Sp)$ represents the expected payoff for Bob if he plays Speed, $E_B(SL)$ represents the expected payoff for Bob if he plays Slow. His expected value if he plays Speed is equal to the payoff he receives from the probability of the outcome (Speed, Speed), plus the payoff he receives from the probability of the outcome (Slow, Speed). We denote this as

$$E_B(Sp) = P_A(Sp) \times -1 + P_A(SL) \times 3, \quad (2)$$

where $P_A(Sp)$ denotes the probability Alice plays Speed, and $P_A(SL)$ denotes the probability Alice plays Slow. In the same fashion,

$$E_B(SL) = P_A(Sp) \times 0 + P_A(SL) \times 2, \quad (3)$$

Moreover, since the probability of Alice's choices must sum up to one, we know that

$$P_A(Sp) + P_A(SL) = 1. \quad (4)$$

From (4),

$$P_A(Sp) = 1 - P_A(SL) \quad (5)$$

Sub. (2) and (3) into (2),

$$P_A(Sp) \times -1 + P_A(SL) \times 3 = P_A(Sp) \times 0 + P_A(SL) \times 2 \quad (6)$$

Sub. (5) into (6),

$$\begin{aligned} (1 - P_A(SL)) \times -1 + P_A(SL) \times 3 &= P_A(SL) \times 2 \\ -1 + P_A(SL) + P_A(SL) \times 3 &= P_A(SL) \times 2 \\ P_A(SL) \times 2 &= 1 \\ P_A(SL) &= \frac{1}{2} \end{aligned} \quad (7)$$

Sub (7) into (4),

$$P_A(Sp) = \frac{1}{2}$$

Therefore, Alice's mixed strategy is $(\frac{1}{2}, \frac{1}{2})$ for $(P_A(Sp), P_A(SL))$ and Bob's expected payoff is 1 for both choices.



Royal Economics Society Partnership

GAEE UK is delighted to be officially partnered with Discover Economics, an initiative of the Royal Economic Society which aims to promote and inspire 15-17 year olds to consider economics. Through this partnership, we are aiming to be able to produce resources that are more plentiful, and overall of a better quality.



Our January Team:

We offer a warm welcome to this month's new staff:

Albert Davies to lead our operations at Eton College;

Aran Tahkar to lead our operations at St Paul's School;

Conor Cahill to lead our operations at Reigate Grammar School;

Emily Pemble to take on a leading role in our partnership strategy from St Swithun's School;

Mani Mittal to lead our operations at St Swithun's School;

Mariya Mahmood to lead our operations at The Sixth Form College Farnborough;

Pietro Antonaci to lead our operations at Wetherby College;

Sasha Popov to take on a leading role in central outreach from Winchester College;

Shirom Aggarwal to lead our operations at King Edward's School, Birmingham, and King Edward VI High School for Girls;

Sunny Qian to lead our operations at The Sixth Form College Farnborough;

Yasmin Al-Obadi to lead our operations at Lady Eleanor Holles;





THE UNDERCOVER ECONOMIST

By Tim Harford

In his innovative, vivid writing style, Tim Harford breaks down the barriers between the 'dismal science' and the cocktail of norms and peculiarities that make up everyday life. From the importance of where a coffee shop is situated to pharmaceutical prices for LEDCs, *'The Undercover Economist'* has it all.

What makes this book so accessible and yet thorough and comprehensive is the connections that Harford creates in the form of cultural and popular references. His comparison of the truth required for a perfectly efficient economy to the film 'Liar, Liar' is an example of this integration of economic critique and a captivating element that the reader can relate to.

Harford highlights the fine line between excessive marketing and misleading information that governments and corporations use to improve their image and increase profits. He breaks down the misleading items of the 21st century, from fair-trade coffee to protectionist policy.

One of the most captivating and visible investigations of this book was the pricing of supermarkets. The first myth he tackled was the belief that some supermarkets were excessively more expensive than others. By comparing two perceived opposites, Wholefoods and Safeway, Harford explains that it is not the prices of the same product that results in these perceptions, it is instead the items that the average shopper would buy. Instead, Wholefoods expands its offering to consumers by redefining what basics are.

He took this opportunity to explain the practicality of the combination of higher prices and sales in supermarkets to appeal to both price-sensitive and price-blind customers. Shops sticking to the middle of the road year-round fail to attract either customer to its shelves and get squeezed out of the market.

In conclusion, *'The Undercover Economist'* is an extensive summary of the way that economics touches us on a personal level. Tim Harford's book will truly change the way you see the World.

Book review by: Matthew Howard



EDITOR'S NOTE

The world has never felt larger than it does at the moment, coronavirus has had an enormous impact on everyone across the world. During lockdown, we set about to create GAEE UK to offer resources that perhaps weren't being provided in school, or offer those resources to take learning beyond the classroom when there wasn't anywhere to go.

On behalf of everyone involved in GAEE UK and the production of this edition I would like to thank everyone who has been a part of this journey so far. Since we launched in late 2020 we now have members in over 30 schools across the UK taking advantage of the resources we have created.

Members of GAEE UK volunteer in a variety of different roles across the entirety of the organisation from outreach, to content, to our new podcasts and videos. Every single member has a part to play in the cohesive and well oiled machine that is GAEE UK. This is the first time that we have created the Wye magazine, and we have plans to produce it monthly with new sections and content that we can't wait to show you.

We are always looking for members who want to help with GAEE UK in any way, even the smallest contributions can make the biggest difference. If this is you then please do get in touch with us at uk@gae.uk, or get in touch via Instagram [@gae.uk](https://www.instagram.com/gae.uk).

Noah Murdoch

Co-Founder and Editor of Wye



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