What would be a sustainable economic and finance system for the public interest?

Introduction:

The question addressed by this essay (*"What would be a sustainable economic and finance system for the public interest?"*) is a longstanding challenge that economists have grappled with for centuries. Thinkers such as Adam Smith, Karl Marx and John Maynard Keynes are just a few of the intellectuals who have proffered suggestions with ideas that met varying degrees of success when put into practice.

The experience of recent decades has demonstrated that the current approach in the Western world has significant issues. The years surrounding the millennium saw numerous financial crises, with the collapse of the hedge fund Long Term Capital Management[1] (1998) followed quickly by the bursting of the Dotcom Bubble[2] (2000) and then, most serious of all, by the Great Financial Crisis[3] (2008). Although the 2010s were mostly free of financial crises, the aftermath of 2008 was felt in the real economy. This led to widespread popular unrest at the state of the "System"[4] with examples including:

- The TEA Party[5] and Occupy Wall Street[6] movements in the US
- The rise of the anti-austerity Syriza party in Greece[7], most memorable for its "Oxi" referendum result which caused turmoil in the European Union[8]
- The emergence of Emmanuel Macron's *En Marche!* movement[9] and the *Gilets-Jaunes* protestors in France[10]

It is also likely that this unrest played a big role in arguably the two most disruptive events of the decade, namely the election of Donald Trump[11] and the Brexit referendum result[12]. Certainly Dominic Cummings, head of the *Vote Leave* campaign, believed it played a significant part when he reflected that "the immigration crisis, the financial crisis, and the euro crisis [had] created conditions in which the referendum could be competitive."[13]

The discontent with the current System is not unmerited. For example, young workers in London hoping to buy their own home faced a depressing situation in the 2010s, with the cost of the average house in the UK capital practically doubling from approximately £280,000 in January 2010 to

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[1] https://www.investopedia.com/terms/l/longtermcapital.asp
[2] https://www.investopedia.com/terms/d/dotcom-bubble.asp
[3] https://www.investopedia.com/articles/economics/09/financial-crisis-review.asp
[4] **Note:** This essay will abbreviate the "economic and finance system" to the "System" for the sake of readability and brevity.
[5] https://www.bbc.co.uk/news/world-us-canada-11317202
[6] https://www.bbc.co.uk/news/magazine-30176406
[7] https://www.bbc.co.uk/news/world-europe-30975437
[8] https://www.bbc.co.uk/news/world-europe-33492387
[9] https://www.bbc.co.uk/news/resources/idt-sh/emmanuel_macron
[10] https://www.bbc.co.uk/news/resources/idt-sh/yellow_vests
[11] https://www.bbc.co.uk/news/election-us-2016-37920175
[12] https://www.investopedia.com/terms/b/brexit.asp
[13] https://www.spectator.co.uk/article/dominic-cummings-how-the-brexit-referendum-was-won

£476,000 in January 2020[14]. Issues like this support the sentiment that the System is rigged so the rich get wealthier whilst the poor struggle to get by.

Given this recent history, it is natural to ask what can be done to make the System more sustainable for the public interest. This essay seeks to address the question by tackling it in three parts. The first is to describe the function of the economy, articulating it as a mathematical problem from which crucial insights can be drawn dispassionately. The second section focuses on the most important component within the System, explaining how it is a source of instability and considering ways to mitigate this risk. The final part uses the insights of the preceding sections to identify key criteria that a more sustainable System must satisfy and then suggests a solution which, fittingly, is in keeping with the actuarial approach to problem-solving.

Part 1: Understanding the economic system as a mathematical problem

"The problem of distribution is so complex that it has to be outsourced to the collective intelligence. No person, group of persons or imaginable computational device can perform the calculations of price. The measurements can't even be made. This is because the price of anything is dependent on the price of everything else and, to make it worse, is always shifting. Flawed as the Free Market system is, we don't have anything better."[15]

Dr Jordan Peterson

Any proposal for an economic system should start by considering what fundamental purpose the economy serves. It is impossible to evaluate the merits of a System without first defining what it is seeking to achieve.

This essay contends that the primary objective of an economic system may be stated as follows:

The economic system should ensure there is an adequate supply of all goods and services at the locations they are needed at the precise times they are required.

Failing to achieve this objective would mean there was a shortage of some good or service at a time and place it was needed, resulting in dissatisfaction for the individual(s) affected. There are numerous examples of economic systems which have failed very badly at meeting this objective; for instance, the Venezuela of President Nicolás Maduro has suffered mass shortages including power outages, lack of medical supplies and scarcity of food.[16] Western economies have typically performed better than this low benchmark as shortages have been rare (notwithstanding issues during the recent Covid pandemic[17]), but clearly they fall a long way short of perfectly satisfying the primary objective.

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[14] https://www.ons.gov.uk/economy/inflationandpriceindices/bulletins/housepriceindex/march2021

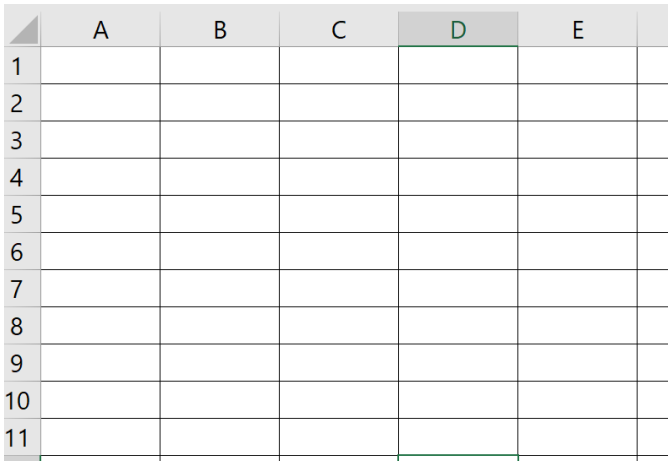
[15] https://www.youtube.com/watch?v=V7HPbjsYYGg ; https://www.youtube.com/watch?v=D6A0ybZmmTo&t=1693s

[16] For example, please refer to this report published by the World Food Plan: https://docs.wfp.org/api/documents/WFP-0000114546/download/

[17] For example, there was a toilet paper shortage in the early stages of the Covid pandemic (see https://www.forbes.com/sites/stevebanker/2021/10/01/toilet-paper-shortages-empty-shelves-and-panic-buying-just-how-bad-was-grocery-service-in-2020/?sh=7c9e989d7b1a) and later a petrol shortage (see https://www.bbc.co.uk/news/explainers-58709456), itself partially due to a shortage of HGV drivers

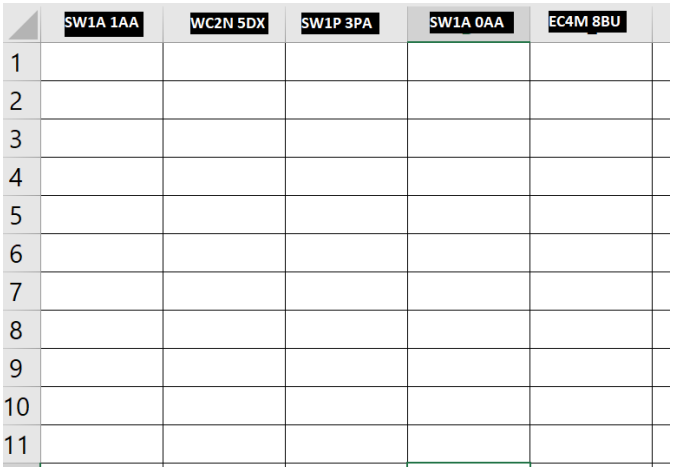
This begs the question of whether the objective is 100% achievable: is there a System that can deliver such a utopia?

The answer is almost certainly “no”. To understand why, it is extremely instructive to use the analogy of a spreadsheet to visualise all of the activity in an economy and thereby conceptualise the problem. So imagine starting with a blank spreadsheet, just a grid of rows and columns:



	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

Imagine that each column corresponds to what is going on in a different location of the economy; for example, if this were used to describe the UK economy then each column could represent a different postcode:

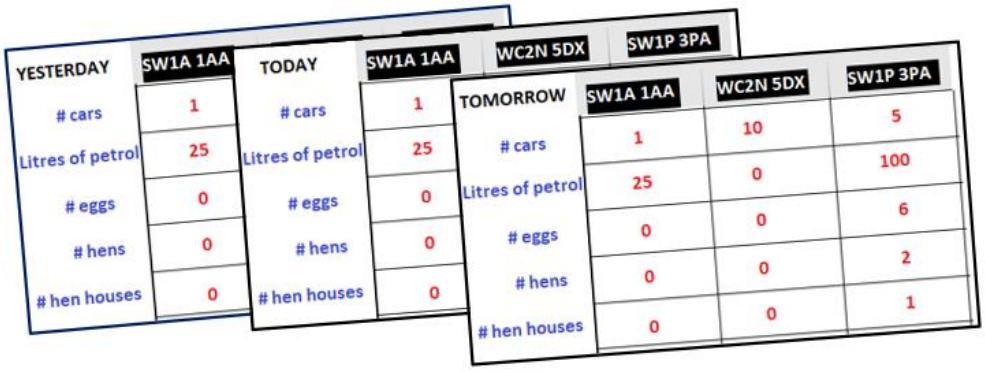


	SW1A 1AA	WC2N 5DX	SW1P 3PA	SW1A 0AA	EC4M 8BU
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

Meanwhile the rows describe the amount of different things that happen to be at each location. For example, the first row might be the number of cars, the second row the volume of petrol, the third row the number of eggs, and so on until the full list of goods and services is exhausted:

	SW1A 1AA	WC2N 5DX	SW1P 3PA
# cars	1	10	5
Litres of petrol	25	0	100
# eggs	0	0	6
# hens	0	0	2
# hen houses	0	0	1

This large yet simple grid succinctly summarises how all of the wealth in an economy is spread across it geographically. But it is only a snapshot of the position at one point in time: the numbers in the grid are in constant flux, changing from one second to the next. Nonetheless, the structure of a spreadsheet can still be used to visualise the whole situation intuitively, it just requires having a different worksheet to represent each point in time:



What is gained from this spreadsheet analogy? Aside from providing a way of neatly visualising the economy, it also converts the worded definition for the System's primary objective into mathematical terms. The nebulous goal of delivering "an adequate supply of all goods and services at the locations they are needed at the precise times they are required" translates into solving a set of equations within a spreadsheet format, one equation for every grid cell of the "future worksheets". Any actuary can relate to a challenge of this kind.

However the mind-boggling complexity of the problem becomes quickly apparent. To cite just three insurmountable issues:

1. The number of equations on just one "future worksheet" is practically unfathomable. An actuarial estimate based on the number of UK postcodes (~1.7m[18]) and the number of words in the dictionary (~0.25m[19]) puts the grid size for the UK economy at approximately half a trillion. This is likely to be an underestimate as there are a considerable number of variants for each item: shoesizes differ and not everyone will be satisfied with plain vanilla ice cream.

   (In mitigation, the vast majority of grid entries will need a value of zero. Yet this provides no relief: there is no way to identify these empty cells quickly).

2. The equations are nested in nature. As the saying goes, "you can't make an omelette without breaking eggs" and so the availability of omelettes depends on how many eggs there are; yet eggs need to be laid by chickens, who in turn need to be accommodated in hen houses and so the formulae quickly descend into an almost endless chain of preceding variables. Worse still, many of the variables would implicitly become functions of themselves through these chains. To extend the spreadsheet analogy, this corresponds to an unwelcome abundance of circular reference warnings!

3. In addition to being unknown, undefinable and uncountable, the equations are constantly morphing over time as the needs of the population change. For example, the individuals born tomorrow will differ in unpredictable ways from those dying today and so there is always a constant shift in terms of both what people need and the wealth available to meet these demands.

If an actuary were confronted with this resource allocation problem in real life, they would quickly abandon any attempt to solve it manually. The task is simply impossible.

What are the consequences of failure? It is not an immediate disaster: each worksheet is effectively pre-populated with whatever was left over from the preceding timestep and so some locations will have all the resources they need. However, there will inevitably be an excess supply of certain items at some locations whilst at others there will be shortages. Moreover, it should only be a matter of time before shortages in one area have a knock-on impact on the supply chain that cause shortages of ***everything***; think of the old nursery rhyme[20]:

For want of a nail the shoe was lost.

For want of a shoe the horse was lost.

For want of a horse the rider was lost.

For want of a rider the message was lost.

For want of a message the battle was lost.

For want of a battle the kingdom was lost.

And all for the want of a horseshoe nail.

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[18] According to the website https://ideal-postcodes.co.uk/guides/postcode-facts

[19] Based on the number of non-obsolete words in the second edition of the Oxford English Dictionary: https://public.oed.com/history/oed-editions/#third-edition

[20] https://allnurseryrhymes.com/for-want-of-a-nail/

The interdependent nature of the spreadsheet equations helps to understand how shortages in one location start to trigger shortage problems in other resources and locations. The initial shortage effectively introduces a mathematical constraint on one equation, which prompts constraints on further equations and so on, with the cascading effect impossible to predict due to the sheer complexity of the system. However, the net impact of this is easy to assess: it creates a natural entropy in the system that slides it remorseless over time towards the "steady state" of zero wealth at each location (i.e. mass shortages) unless corrective action is taken to address each shortage before these negative consequences develop.

This phenomenon of a prosperous economy descending into mass shortages has been observed many times in history. The aforementioned Venezuela is just a recent example. Typically these situations are characterised by an over-reliance on central planning in their economic activity[21], akin to an actuary desperately engaged in a futile attempt to solve the spreadsheet problem manually.

But numerous economies do not suffer this fate and it is vital to understand why. The reason is that the hypothetical actuary adopts a savvier approach to tackling the problem: instead of trying to solve the spreadsheet equations manually, the actuary deploys an automated solver like the "Goal Seek" function to generate solutions, albeit imperfect ones, at a faster pace than the actuary could ever feasibly do themselves. In the real world, this "Goal Seek function" is the dual mechanism of *market prices* and *the profit motive* which function within free markets: shortages create higher prices and the potential for profit, which automatically attracts resource allocation to the problem area in the economy. This mechanism works against the entropy issue, with the system effectively healing itself as problems emerge.

This insight is nothing new, it is simply the "invisible hand" of Adam Smith[22]. But the spreadsheet analogy (henceforth referred to as "God's Spreadsheet"[23]) allows us to understand the vital importance of this mechanism in tackling a mathematics problem that any System unavoidably needs to solve. There is a crucial conclusion to highlight: any proposal for revisions to today's economic systems **must** contain an equivalent mechanism to tackle the mathematics problem. Whilst it does not necessarily need to be based on a free market approach to resource allocation, it is important to note that there is no other tried and tested approach which has worked sustainably on the scale of a country; moreover, there is a sorry history of well-intentioned attempts to overhaul economic systems "for the public interest" which failed to appreciate this issue and the results have repeatedly been mass deprivation and misery[24]. Therefore, based on the historical record it is reasonable to assume that any sustainable System will be rooted in something resembling the free market approach that has flourished in the West (notwithstanding its imperfections).

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[21] Perhaps the most well-known example is the economic implosion of the Soviet Union: https://www.investopedia.com/articles/investing/021716/why-ussr-collapsed-economically.asp

[22] Readers familiar with the teachings of the Austrian school of economics may also recognise that the spreadsheet description of the economy overlaps closely with the ideas behind the Economic Calculation Problem posed by Ludwig von Mises (although Mises articulated this criticism of central planning at a time long before spreadsheets!).

[23] The name "God's Spreadsheet" seems appropriate because only an all-powerful and omniscient deity could work with such an infinitely large object.

[24] As previously noted, Venezuela and the Soviet Union are two prime examples. Communist China was another example of a country which suffered due to central planning, but the decision of its political leaders in the late 20th Century to "liberalise" its economy (i.e. move back to a greater reliance on free market forces) helped to move it quickly towards a state of prosperity.

Some would take issue with this conclusion. The free market has vocal critics who advocate for replacing it wherever possible by some form of government intervention. However it is clear from the example of God's Spreadsheet that government regulations correspond to constraints on the spreadsheet equations (likely making them more difficult to solve) and government provision of services is the same as an attempt to solve some of the equations manually. It is obvious that significant government intervention would do more harm than good without a viable alternative to stand in for the price/profit mechanism. These critics can be convincingly dismissed by politely and dispassionately inviting them to attempt to solve the mathematics problem.

On the flip side, others would infer from the analysis above that the level of government intervention in an economy should be minimised. There is some truth to this. However, it would be an over-reach to conclude that government activity should be dogmatically reduced as far as possible: it is still conceivable that some government intervention could improve on the outcome arising entirely from market forces. Moreover, government intervention might actually be needed to protect the workings of the price/profit mechanism. A safer conclusion to draw would be that government intervention should be focused on a relatively small number of limited areas where a well-informed public debate agrees it achieves more good than harm. Meanwhile the majority of the economic resource allocation should be driven by free market forces.

Of course, the focus of this essay is on improving the sustainability of the current economic and financial systems. Whilst it is useful to have concluded that the System must almost certainly be rooted in a free market approach, this does not present a definitive recommendation: capitalist systems can take many forms and a variety of different implementations can be observed by simply comparing the approach between Western countries. Moreover, it is indisputable that capitalist systems have often been beset by instability. This raises questions about their sustainability, particularly over the long-term. In order to address these concerns and identify the type of free market System which might offer a more sustainable future, it is important to identify and understand the reasons for the instability. Luckily the issue is well-understood and the problem stems from one component of the economy, arguably the most important element of all: the price of money itself, commonly known to actuaries as "the interest rate".