

WILL WE ALWAYS NEED MONEY?:
ON THE NECESSITY OF A MONETARY SYSTEM
IN A POST-SCARCITY ECONOMY

HONORS THESIS

Presented to the Honors College of
Texas State University
in Partial Fulfillment
of the Requirements

for Graduation in the Honors College

by

Jarod P. Angehr

San Marcos, Texas
December 2019

WILL WE ALWAYS NEED MONEY?:
ON THE NECESSITY OF A MONETARY SYSTEM
IN A POST-SCARCITY ECONOMY

by

Jarod P. Angehr

Thesis Supervisor:

Robert Price, Ph.D.
Department of Sociology

Approved:

Heather C. Galloway, Ph.D.
Dean, Honors College

ABSTRACT

This project examines the need for a monetary system in a post-scarcity economy. The thesis does not seek to answer if a post-scarcity economy could exist, but rather it attempts to answer the questions centered around the purpose of money in a hypothetical future economic situation in which technological advances have led to an abundance of resources. The study first establishes constraints within which a post-scarcity economy would most likely operate, and then uses a combination of two analysis methodologies to explore the need for a monetary system in such a society. The methodology for the research includes (1) an examination six common trends in current futuristic writing and sociological arguments for a post-scarcity future and the paths leading to it, (2) combined with an analysis of quantitative data for real-world trends and examples of technological and social advances supporting the six common trends. The study concludes that it is possible for a post-scarcity economy to exist without a monetary system on an individual level, however, it would require some form of resource accounting done on a macro-level. The project further concludes with three alternative methods in which this higher-level accounting could be conducted and how a post-scarcity economy would function with each.

ACKNOWLEDGEMENTS

Foremost, I would like to express my sincere gratitude to my thesis advisor, Dr. Bob Price, for his continuous support of this thesis, as well as for his patience, enthusiasm, mentorship and immense knowledge on the topic. His guidance helped me at every turn of this project and his ideas sparked interesting discussions in the wiring of this thesis. Not only did Dr. Price help me to first become excited about this topic, but his tenacity in encouraging me to constantly improve and refine the ideas I have put forth in this project were instrumental in the outcome of this thesis. I could not imagine having a more involved and diligent advisor and mentor for this project.

I would also like to extend thanks to Dr. Ron Haas for his excitement and ideas about this project, as well his willingness to accept a thesis topic that is not the norm for the department.

Finally, I would like to thank Dr. Galloway, those involved with the Honors Thesis program, and the Honors College faculty who have helped to make my Honors College experience so impactful to my personal growth and education.

TABLE OF CONTENTS

Introduction	1
Frameworks for a Post-Scarcity Economy	4
Advancements in Automation and Technology	12
Decreases in Conspicuous Consumption	31
Removal of Incentive to Make Profit	38
The Role of Corporations	44
Conclusions	52
Works Cited	60

WILL WE ALWAYS NEED MONEY?

It has often been envisioned, either through movies, literature, or general economic speculation, that the world of the future could be one in which we do not care all that much about the price of things. Whether that is a result of all things being free, provided for by a government or corporation of some sort, or because the citizens of such a world do not fear running out of credits or whatever currency may be in use, if any, there seems to be such an abundance of things in these imagined futures that the economic principles we adhere to today are an afterthought. While the means by which goods are acquired are rarely the same from one piece of science fiction or futurist narrative to another, what some futuristic models seem to have in common is that their economies are not governed by scarcity. It appears that once scarcity is removed from the equations, the laws of economics as we have understood them are removed as well, and thus the purpose of having a monetary system to exchange values also comes into question.

It is hard to imagine a path to such abundance, however, as our brains have been conditioned since the beginning of trade among other members of your species only to understand a world that functions on the understanding of scarcity. This understanding has shaped the trajectory of our species as it provided the rationale for forming tribes to protect a group's resources from other groups whose aim was to acquire that group's resources. These tribes later turned into governments whose sole purpose was one and the same, act in a way that best protects the resources of its people and do what it can to grab more resources when possible. Scarcity has even shaped the way in which we function as individuals, and thus attempting to understand a world wherein the rationale that has

shaped the entire history of our species is removed, becomes a difficult task to take on. Money, in various forms, has been our solution to dealing with scarcity. Because of this, if we wish to explore a world that is post-money, we must first try to understand a world of post-scarcity.

Foremost, what I am investigating is not *if* a post-scarcity economy could exist. For this discussion we will assume that it could. The question here is if a post-scarcity economy would require a monetary system to function, and if so, and whether it would be required for all types of transactions.

The first step is making clear what a post-scarcity economy is. While there is no formal definition, it is generally accepted that a post-scarcity society would be an economy in which most goods can be produced in great abundance with minimal human labor needed, so that they become available to all very cheaply or even freely (Sadler 2010). Now, while some models outlined a situation wherein no scarcity of any resource existed, these models struggle to hold up realistic projections of technology based on the advancement trajectory we are currently witnessing. In other models, which seem a bit more likely for the near future, it is often illustrated that this theoretical economy would not be completely void of scarcity, rather scarcity will have decreased to a significant and meaningful level for most resources. This will be the underlying factor for the framework of the post-scarcity economy used in this paper. With this general understanding of what a post-scarcity society is, being that it is an economy with low, not no, scarcity, the opportunity to pose questions around the purpose of a monetary structure in such an economy arises.

A few of the questions that can be posed around this post-money debate, which I will attempt to answer in this paper, are as follows: Is it possible for the global economy to achieve near post-scarcity, so that on an individual level, monetary transactions would be useless? What are the possible paths that could lead to a global economy in this state? Are there current trends that would support forward momentum toward a self-sustaining, post-monetary economic system? If a post-scarcity economy could function on an individual daily level without a monetary system for an exchange of value, would there still need to be some monetary system used for transactions on a higher level? My goal is to contribute to the discussion around the future of capitalism and the role scarcity and conspicuous spending may play in that future by searching for meaningful solutions to these lingering questions.

Through my experience with economic and financial research, I intend to investigate the multiple plausible paths through which the reduction of scarcity could answer these questions and ultimately result in a global post-monetary economic system. This will be done by examining trends in technological advancements and sociological arguments for a post-scarcity future and the paths leading to it, combined with an analysis of real-world examples of technological and social advances supporting those trends. In my research of dozens of post-scarcity models, I have uncovered six commonalities, that suggest particular pathways to which global economies could hope to achieve post-scarcity. Yet, the question remains, could these pathways lead to a post-scarcity model that is free of a structured monetary system?

FRAMEWORKS FOR A POST-SCARCITY ECONOMY

To begin a discussion around if these six pathways could lead to a post-scarcity society that is free of a monetary system in some way, we must first ask the question: What would a post-scarcity world look like?

While it would be near impossible to accurately predict how a post-scarcity economy would operate exactly, we can build a loose framework of what it could look like to help us better imagine this concept. First, let me reiterate a main point of this argument. Post-scarcity does not mean the world has no scarcity, just low scarcity. In short, a post-scarcity world has low scarcity compared we know now, but is not governed by scarcity.

While post-scarcity may seem all very hypothetical, it is important to stay grounded to reality and recognize that post-scarcity is a very obtainable, maybe even probable, future. After all, dramatic decreases in scarcity have happened countless times in the past. Arguably the most important of these scarcity reductions was the advent of fire. Now with a way to cook meats and remove bacteria and other harmful elements from previously inedible foods, our tribal ancestors were able to increase the amount of consumable food in the ecosystem. “Foods that humans cannot digest in their natural forms – such as wheat, rice and potatoes – became staples of our diet thanks to cooking.” (Harari 2018). Cooking also removed bacteria and parasites from food, making it easier for humans to chew and digest long-held staples like nuts, fruits and insects. While chimpanzees could spend up to 5 a day chewing raw food, humans could get the same nutrients in only an hour of chewing per day (Harari 2018). This would have reduced not only a scarcity in foods but also in time. Now that humans were spending less time eating, there would have had drastic effects

on the daily activities and lifestyles of those living in this new reduced-scarcity world. We would expect the same to happen if we were to reduce the scarcity on things such as energy production capabilities.

The next obvious advance would have been advances in irrigation and canals, which dealt with a scarcity of water, a huge bottleneck on agriculture back at the dawn of history. Irrigation advanced sprung out of the agricultural revolution, and helped to bring about another decrease in food supply scarcity. This also would have changed society and human culture in countless ways. Instead of spending days gathering or hunting, and changing locations after the food supply had diminished, our ancestors could spend time focusing on other pursuits which led to structured societies, written laws, and eventually the development of small family units instead of tribes.

Any number of advancements since, from bronze to crude oil refining, have led to massive decreases in the scarcity of pivotal resources and each has reconstructed our daily lives and defined the future of our species in their own way. Of course, populations typically rose at that point when an immediate scarcity problem was solved until that commodity became scarce again or another commodity that wasn't too scarce before took its place (Pennington 1996).

For example, “you get low on land to grow food on and someone invents cheap nitrogen fertilizer made using fossil fuels and the population rises from that and now the demand for those fossil fuels rises for their other applications like cars and electricity. Or you invent a new and better strain of a staple crop that produces 20% more food and the population rises 20%” (Arthur 2016). In other words, scarcity is not a zero-sum game. Once a scarcity problem is solved, a population can expand again until a limit is met, and that

limit is either the same scarcity or a new scarcity of a different resource. The conclusion that can be drawn from this is that a post-scarcity economy must either be a relatively young economy or one that is in a steady-state economy. A steady-state economy, as outlined by economist Herman Daly, is one that is at zero-growth in the sense that population growth matches use and abundance of resources so that actual economic growth is as near to zero as possible (Dietz and O'Neill 2013). Whereas a young economy means a scarcity problem has recently been solved and the economy is not growing at a massive rate to meet a new scarcity. As stated previously, populations tend to grow following the freedom from a previous scarcity so we would also need to assume that a post-scarcity society has a population that is not growing or is growing at rate that corresponds with quantity of available resources. In this case, as population doubles the quantity of available resources would also have to double. We are moving in this direction as higher education and mass spread of knowledge have led to a decrease in the number of children born per family unit (Kim 2016). With an increase in improving the efficiency of using our finite resources and an expansion into the solar system increasing those resources, or possibly technological advances creating new solutions for resources, we might maintain a slow stable growth for hundreds of years before we hit a scarcity wall again. Furthermore, we can conclude that a post-scarcity economy could function off of the new adoption of technological changes and a solution to massive job loss and thus be a new economy by definition.

Now that we have identified the role in which scarcity plays in every aspect of our life, mental state, and ecological future, it is time to ask what, specifically, a post-scarcity economy could look like. As mentioned, any post-scarcity economy is either in a temporary

growing phase or has stabilized to some level. Either way, it cannot be focused on constant year-over-year growth, as that would push in the direction of scarcity too quickly. This will be our first constraint.

Secondly, in a finite Universe with entropy, which appears to be what the one we live in is like, you inevitably have scarcity issues so you cannot be completely without scarcity. Therefore, a post-scarcity economy is one that has *low scarcity*, not *no scarcity*. The important factor here is that scarcity is something that is not a primary element in decision making and is not a governing principle of the economy.

It is also important to bring into account that we must not look at individual versions of post-scarcity as they are often in conflict with each other. What you may view as a perfect society, someone else may view as a restrictive, authoritarian dystopia. So, as a constraint, we will focus on the economy as a whole, working for the largest benefit for the largest group of people, not just so that everyone is living happily.

Forth, post-scarcity does not mean that everyone has everything they need in their home, but just that we have an abundance of overall resources. You may not be able to print food in your home, but you also put no worry into where your next meal is coming from.

Additionally, we must avoid an overly simplistic view of economics and scarcity that assumes we are just talking about material goods (Arthur 2016). Privacy is a commodity for example. One that is very expensive in an advanced society. In 2017, The Economist published a report confirming that for the first time, data was a more valuable resource than oil in terms of overall dollars spent in the market. While it may not be a physical resource like oil, it isn't something that can be overlooked. In addition to this,

privately held research is an incredibly lucrative industry because of its value as well. Furthermore, it is my opinion that reputation, sense of accomplishment, joy, happiness, and love are all resources too. Take the example from earlier of never having to worry about where your next meal is going to come from, this must also mean that someone has not chosen that meal for you. While you may have unlimited food, if someone is telling you what and when you can eat, you probably do not have a lot of joy or happiness, and thus you are not post-scarcity. So, as a fifth constraint, non-material resources are in abundance as well.

These are the constraints for what a post-scarcity society cannot be. To recap, for this discussion, our post-scarcity model assumes the economy is not pushing for massive year-over-year growth as most economies in 2019 are, the society is not completely without scarcity but is at a point where scarcity does not govern the economy, the post-scarcity definition does not necessarily imply that everyone has everything they need in their home, but rather that they would not have to be too concerned about where or how to get what they need, and that low-scarcity is not just limited to widgets but is inclusive to intangible resources as well. Now, to provide a reasonable basis for exploring potential pathways to reaching this society, we must outline characteristics you would probably see in a post-scarcity economy.

First, everyone would have more access to resources than they do now. That would encompass everything one would need to survive, such as food, water, housing, transportation, etc. We would assume no place classifies as a post-scarcity society if concerns for this need were not either non-existent or so minimal that you barely thought of them. Possibly these are provided by the government automatically, or possibly they just

make up such a minimal portion of income that it is just a footnote on your monthly budget, either way, they create no anxiety for anyone (Joseph 2018). Most Marxist post-scarcity civilization models assume everyone is getting their needs for food and safety, short and long term, provided for by the government, while a more libertarian one assumes everyone still pays for them, it's just that they are so minimal of concerns (Wood 1993). In these models, only very strange events could cause it to be otherwise and you'd have a government safety net or private charities or friends and family to help.

This ties in closely with our second characteristic which is abundant safety and security. This encompasses both physical and financial. Given everything required for peaceful survival is provided, post-scarcity societies should have far lower concerns about violence directed against individuals as there is less desperation to drive crime and fewer concerns about long term safety and security. We'll dig into the details later about how this may come about but right now the main point is that no one is really worried about getting robbed or getting evicted and becoming homeless.

The third characteristic is access to free-flowing, honest information. As we mentioned earlier, data is a key resource and so by default, open-source or open-access to data for everyone will have to be a key component of the society. There will inevitably need to be a "transition from proprietary research, data hoarding, and internal development to collaborative commons contributions" (Joseph 2018). A post-scarcity society must also have open-access to some form of formalized education. What this education format would be and how it would be provided is not important at this point, just that it is provided.

A fourth characteristic is that conspicuous consumption is, for the most part, shunned. This would not be something a government a government could enforce, but the

general consensus of the society would be that there is no reason to own too many nice things just for the sake of having them. This is more of a psychological and sociological change than anything else. It's hard to say how it will come about but generally, people will have a bit less of a materialistic view or at least just not going through life focused on having the best and shiniest new toys (Webb 2019).

The last characteristic of what we might see in a post-scarcity society is that a post-scarcity society will probably have to have superior automation and technology than what we have now. It goes without saying given that we are currently not living post-scarcity. While a global imbalance of wealth has led to some people feeling the effects of scarcity less than others, there is still enough scarcity in general resources that most people, economic decisions are made with scarcity in mind. The emphasis here is that technology and automation ought to have improved to a point where the number of finite resources we have available to us has minimal effects on the number of goods we can make or the speed at which we can make them.

It is also important to note that there are more characteristics that a post-scarcity society might exhibit, the aforementioned are merely likely characteristics to help understand what a post-scarcity society is and how it may function. Additionally, I do want to bring into account some of the psychological characteristics that will have to be at play as they are often the basis for counterarguments to the general probability of having a successful post-scarcity society.

Many argue that without a need to work, there would be no purpose to life and no sense of accomplishment; this cannot be underplayed. If we use Maslow's hierarchy of needs, we understand that there is much more to the human condition than just merely

existing (Olsen 2004). That is, to get humans to successfully participate in a society, there must be more to life than having material comfort. While it is not a perfect model Maslow's pyramid remains useful. The argument that working plays a large role in our mental wellbeing is significantly tied to Maslow's highest tier, self-actualization, or how we perceive our meaning of life. Maslow suggests that having an understanding of one's purpose is vital to self-motivation and mental wellbeing. For better or for worse, for many people, their need for a purpose has long since been fulfilled by working hard to obtain the life they desire (Deckers 2018). If the need to work was removed, and all other needs were provided for, you could reasonably see psychological problems where people were unable to define why they were living, or what it is they are supposed to do during life. While this may not be true for everyone, many people around the world still see their purpose in life as merely ensuring that they have met all other needs of the pyramid for themselves and in some cases, for others around them as well. Of course, this potential self-worth problem could be solved by taking up other, once deemed unprofitable, pursuits such as art, travel or poetry. It is impossible to say what these new pursuits will be or how this problem will be solved, but what is important here is that in a post-scarcity society, it is solved. People still do wake up with an agenda of things they want to get done even though they generally do not have a fear or anxiety component driving them on. They are not getting out of bed in the morning for fear that if they do not, they will starve to death or lose all their friends and family. While this is not the argument of the paper, nor relevant to the argument, it is important to note that the human need for purpose cannot be ignored and creating a post-scarcity society may cause problems in this regard.

Anyhow, I am not implying that a post-scarcity society is at the most probable future scenario, but it is at least a realistic possibility. The question now becomes, what happens in the interim? In other words, what are the pathways that must emerge to achieve a proto-post-scarcity economy (Webb 2019), and do they require a structured monetary system to work effectively?

ADVANCEMENTS IN AUTOMATION AND TECHNOLOGY

For a post-scarcity economy to arise, we must first have changes in our society in terms of how we make purchase decisions, how we view subsidies and work, and the role we allow certain institutions to play in our lives. But a big part of making a post-scarcity economy a reality is the technological advancements that will need to occur. These advancements could serve not only as the backbone of the economy and social structures but also be a catalyst for other necessary changes in the world to occur.

Imagine you have the opportunity to travel back in time and ask someone in the year 1900 what they think the end of the century will look like. They may be able to tell you that automobiles will be more important in our lives or that air travel will become a popular mode of transportation. They may even be able to predict that someone could watch a motion picture in their own home, but would they be able to predict something like the rise of the internet? Could they predict the shrinking of electronic components that would allow someone to carry around a computer in their pocket? It seems unlikely someone from the year 1900 could predict these particular things, because the immediately preceding technology had not yet been created or popularized. They could predict

increasing popularity in automobile ownership because automobiles were cutting edge technology at the time. But the first semiconductor was not invented until 1901 (Jakubowski and Łukasiak 2010), so how could a person in 1900 even conceive of something like a cellphone? By the same logic, we cannot reasonably predict, or even comprehend, all of the technology that will arise to lead to a post-scarcity economy. In fact, I believe it would be a failure to think we could. However, we can make predictions about technology that would probably have to exist for a post-scarcity economy to exist based on technology that is on the rise today. I have selected six areas of technology which I think will be pivotal to generating, and later sustaining, a post-scarcity economy. The six technological areas of advancement are (1) efficient use, production, and storage of energy and resources, (2) advancements in network feedback, IoT, and blockchain, (3) widespread adoption of and advancements in omnichannel and automated payments, (4) advancements in mobility and transportation, (5) adoption of a digital abundance via open-source systems, and (6) improvements in agriculture and food production technology. To explain each of these areas, I will first illustrate why they would be needed for a post-scarcity economy to function, then I will provide real-world examples of the advancements we are seeing today, and I will finish the analysis of each area by making predictions on the improvements we will likely see predating an immediately post-scarcity economy.

Efficient Use, Production, and Storage of Energy and Resources.

The backbone of a post-scare economy is its ability to produce, maintain, control and distribute energy in a highly effective way. Energy production and distribution is arguably the primary scarcity driver in most things we consume today. After all, to do or make anything, you have to have some sort of energy at play. In the past, energy for a

factory may have come from coal, steam, or a water mill depending on the era, whereas today, the majority of production and logistics activities are powered by fossil fuels. The problem with all of these forms of energy sources is that they are finite in nature; we can't simply make more coal or more fossil fuels. Instead, if the world is to advance to a point where scarcity of energy is almost non-existent, you arguably need an energy source that is renewable in nature.

For decades, we thought energy of the future would come from popular renewable energy solutions like wind, solar or hydroelectric, but we now know that even these renewable sources have their own issues. For starters, the aforementioned renewable energy sources are very inconsistent in output. For example, if a city, which relies heavily on solar power, goes through a relatively overcast season, solar energy becomes scarce. While there may be a virtually unlimited supply of wind and UV rays, our ability to collect them *is* limited. Additionally, it is near impossible to predict inconsistencies in the short run. You may be able to anticipate less solar energy in the winter months, but will you know just how overcast those months will be? Even if you did, could you do anything about it? If you lived in ancient Egypt and you relied heavily on grain, you knew you needed to store more grain for the off seasons to make up for the lack of yield in those seasons. But energy doesn't store as easily as grain does. You can't simply put it in a silo and let it sit. This brings up the next big problem. Batteries by nature create a limit on energy storage, so even if you could predict an unusually low-wind season affecting wind energy output, there isn't much you could do about it. "The sheer magnitude of the battery storage capabilities required to power a small city during insufficient energy generation conditions is daunting" (Siegel 2017), and battery advancements aren't occurring at a rate that would

lead us to believe this problem is going to be solved anytime soon. So, the solution to this future energy crisis must be something that is renewable and nearly unlimited in production ability regardless of external conditions.

The most likely solution that we can predict based on today's technology is nuclear fusion energy. Nuclear fusion is a complicated process but put simply it is the process of combining two light atomic nuclei to form a heavy nucleus. Fusion energy is the hypothetical process of capturing the energy emitted during this process (ITER 2019). Not to be confused with nuclear fission energy, which combines heavy elements to create energy and produces radioactive waste in the process, nuclear fusion does not use or create radioactive elements and therefore has no toxic byproducts (ITER 2019). This would mean that fusion energy could be produced at a massive scale with almost no limitations. Additionally, it is estimated that fusion can create four million times the energy produced by chemical reactions such as burning coal or gas (ITER 2019). To sweeten the deal, the elements required to conduct fusion reactions, such as Deuterium, tritium, and lithium are in such a great abundance on Earth, they are nearly inexhaustible (Ongena and Van Oost 2004). "Deuterium can be distilled from all forms of water, while tritium will be produced during the fusion reaction as fusion neutrons interact with lithium. Terrestrial reserves of lithium would permit the operation of fusion power plants for more than 1,000 years, while sea-based reserves of lithium would fulfill needs for millions of years." (ITER 2019).

Of course, the best solution for the future would not be a reliance on any single energy source but rather a balanced mix of energy that will likely include the other problematic renewable sources mentioned earlier. That said, fusion may be a big contributor to this energy mix. Other solutions may come from non-terrestrial sources such as asteroid

mining, which could provide more elements for fusion reactions or other previously unknown energy sources. Regardless of what the future of energy may be, an abundant energy solution must arise for a post-scarcity economy to exist.

Advancements in Network Feedback, IoT, and Blockchain.

For a post-scarcity economy to be sustainable, it is likely that we will have to have a much higher degree of connectivity to a central data storage solution in almost all aspects of our lives. The reason is, in order to efficiently monitor and distribute energy and resources properly so as to not get anywhere near exhausting them, there would have to be a rapid way to collect meaningful data from almost everything that is using that energy. This would likely mean that the system monitoring this data would know exactly how much coffee is being demanded in a certain zip code and could predict how much coffee will be required in that zip code in the near future. This information would allow such a system to control the distribution of the global coffee bean supply accordingly. In order to do this, however, there must be a way to collect massive amounts of data from various sources, both individual consumer data and commercial usage data, in real-time. A world where all energy demands are monitored in real-time may seem outlandish or possibly too overbearing to be a possible reality, yet we are already seeing trends converging to this point with the rise of IoT technology.

The Internet of Things, often referred to as IoT, is a system of interconnected objects that have the ability to transfer data over a network in real-time without human interaction (Hendricks 2015). These objects include wearable technology like smartwatches that monitor how much you walk or where you go. They also include regular household items like smart light bulbs that monitor energy usage or smart pipes which

monitor water usage. So why would there be a push to spend money today to create a network of data for the future? Well, because it makes our lives easier on an individual level. Not only can smart lights monitor and report energy usage, but they can turn on and off by voice command or by a mobile application. As a consumer, you may not care about the data very much, but replacing old objects with new things that make your life easier is something you may care about. There may not have to be a huge government push to drive the spread of IoT, it may come naturally as consumers adopt products like Apple Watches and Amazon Alexa devices simply to automate their lives. Either way, the important application here is that IoT has the potential to provide large quantities of raw, real-time data and analytics in a meaningful way.

Some cities are turning the elements of a science fiction city into a reality. Songdo, South Korea is one of the first highly connected cities in the world. Being called the “the smartest city in the world” Songdo has a plethora of sensors around the city that “gather information on things like traffic flow and energy use. This kind of information can be converted into alerts that tell citizens when a bus will arrive or notify the authorities when a crime is taking place” (Williamson 2013). The water pipes in Songdo monitor water quality to ensure that drinkable water is not wasted in toilets and showers. Applications of sensors like those in Songdo could help self-driving vehicles make better roadway decisions in the future. Smart lights and pipes may be the future of monitoring energy and resource usage in a way that makes demand predictions more reliable. Wearable technology like smartwatches can help city grids monitor areas where people congregate at certain hours to make better decisions regarding automated transportation. For example, if a city grid knows that a certain area has become popular for lunch, it can anticipate

crowded buses and provide extra transportation support in the following days (Wei 2014). Applications for businesses can go even further. Take the coffee shop example from earlier. IoT could provide a way to monitor exactly how much water, milk, and electricity is being used and could help computers to make better decisions regarding energy consumption in that area. This type of real-time data and network feedback will help to increase economic efficiency and will likely be required in some form to maintain a post-scarce society.

Another important advancement could come from the progress occurring in the blockchain industry today. Blockchain is a way of recording transactions or interactions between parties in an instantaneous way with less human interaction. In an article in the Harvard Business Review, Marco Iansiti Karim R. Lakhani explains that “with blockchain, we can imagine a world in which contracts are embedded in digital code and stored in transparent, shared databases, where they are protected from deletion, tampering, and revision. In this world, every agreement, every process, every task, and every payment would have a digital record and signature that could be identified, validated, stored, and shared. Intermediaries like lawyers, brokers, and bankers might no longer be necessary. Individuals, organizations, machines, and algorithms would freely transact and interact with one another with little friction” Lakhani 2019). While, still in its infancy, blockchain technology, or a future iteration of the technology, could provide the backbone for a globally monitored system of energy usage. In the event that energy credits are distributed to individuals as a means to subsidize consumption in an efficient way, blockchain could provide a method to ensure such a system could operate independently without human interaction.

Omnichannel and Automated Payments.

Over the last decade, we have seen massive improvements that are making payment systems faster and easier to use for consumers. It is likely that ease of payments will be the future as instantaneous and seamless value transfer would provide the framework for consumption in a world not restricted by scarcity. With the rise of automated payments, consumers have begun to think less about the purchase and more about the item. In a study by Wharton School of Business at the University of Pennsylvania, single-touch payment methods reduced online shopping cart abandonment significantly because consumers were less likely to think about the money they were spending by pressing a signal button than they were when they had to put in their credit card number (Wagner and Jeitschko 2017). In a post-scarcity world, even if money were to exist, seamless value transfer seems to be the most logical approach. For example, instead of handing cash to someone at the register, you simply tap your phone, or you don't even go to a register. We could see the rise of cashier-less stores wherein you simply take what you want and walk out, being charged via your phone or some other wearable technology. This is not science fiction; both of these options are already in use today.

Omnichannel is the term used to refer to the convergence of payment channels into one seamless payment channel. We have seen channel convergence trends for the past fifteen years, but with the mass adoption of digital payment channels, the trend is increasing exponentially (Burelli and Lularevic 2015). One of the best examples of this is the Amazon marketplace. Amazon has always been a leader in the online retail space, but its impact goes far beyond just buying products online. Amazon allows users to store credit or debit cards on the website. Once cards are stored, shoppers never have to think about

billing ever again. With their cards saved, shoppers can schedule subscriptions for products, such as laundry detergent or paper towels, to arrive on a regular basis, they can rent movies, or buy products all without having to pull out their credit card. Amazon also revolutionized shopping in a way that has been adopted by thousands of retailers online. When it released One-click purchasing in 1999, Amazon changed the way we view purchasing products. No longer was there dread of entering your card number and having to think twice about if you want the product. The payment aspect of the purchase is removed from thought. All of this has led to a decrease in the cognitive dissonance of making online purchases because all consumers have to do is press a button and the payment is made.

Another leap forward in omnichannel payments, also being led by Amazon, is the cashier-less storefront. Amazon-Go is an emerging brick-and-mortar store concept that allows shoppers to get the items they need without waiting in line to check out. All the customer does is walk in, scan their phone with their Amazon account open, grab the items they need off the shelf, and walk out. So how does it all work? CNN Business reporter Matt McFarland explains, “As you pass through the gleaming turnstile at the door, you scan your personalized barcode from the app. Hundreds of cameras track your every move, keeping tabs on everything you put in your basket. The cameras create a three-dimensional representation of you ... to know that it was you, not the guy next to you, who grabbed that bottle of seltzer. Amazon's software is sophisticated enough to discern from the labels and packaging that you chose black cherry, not lime, seltzer. Packaged foods like sandwiches, wraps, and salads have a unique pattern of circles and diamonds that works a bit like a QR code. The software reads that code and knows you selected a turkey wrap. Weight sensors

on each shelf know when you've removed something, and when you've changed your mind and put it back.” (2018). After you leave the store, Amazon charges you for any items you didn't put back. I think it is likely that we will begin to see more retailers adopt this model as it becomes more popular with consumers.

To summarize, with one Amazon account, you can shop in a physical store, buy products online, schedule subscriptions, rent books, music, movies and only put your card in once. This is the power of omnichannel payment convergence. Keep in mind that it is unlikely that one single company will control all payments around the globe. Instead, it is more likely that companies will merely make it more convenient for consumers by converging all of their payment methods to one account. Opposed to having to pull out a card to shop online with Amazon and then again at an Amazon storefront, a consumer can now make all payments with Amazon through one single Amazon account. That said, Amazon does not control the payments you make at Target and likely never will. Instead, a future consumer may be able to store all of their account information for their preferred retailers in a mobile wallet. This would allow a future consumer to input payment information into the account before they shop and then walk freely through stores and the store would charge their account for the items the consumer choose to walk out with.

Mastercard reports that mobile wallet payments are growing at staggering rates. From 2010-2017, reports showed that mobile payment adoption grew at roughly 31.8% year-over-year (2015). The report also found that 50% of consumers globally who have mobile phones want to use contactless payments. Mastercard reported that when “analyzing these drivers for consumer adoption of m[obile]payments, one of the key factors [was] *convenience*. But it is worth noting that *speed of payments...*” also scored highly. All

this said, with Gen-Z, one of the most technologically developed generations, coming of age, we are likely to see these trends converge into a world where consumers take what they need in a format they prefer (online, storefront, etc..) and payments become something of an afterthought.

So, what does the future look like if omnichannel payment convergence trends continue? I believe that with the coming of age of younger, more tech-savvy generations, the average consumer will care more about convenience than payments. This convenience may come in the form of mobile wallets, contactless cards, wearable payment technology such as smartwatches, or other undiscovered formats. With the increase in ease of payment solutions and a shifting focus toward customer convenience, we may see the cashier-less store model increase in popularity. Additionally, with a generous universal income, we may see the thought of making payments become very small in the consumption process. So, I present the question. If you had a universal basic income stipend that was more than you could spend, and you never had to pull out money or a card to make a payment, would you think about money when you were buying items? If your children grew up in a world where they never saw a payment being made, would they even know money existed? It seems likely that in this scenario, even if money existed, it would not dominate your purchase decisions.

Advancements in Mobility and Transportation.

Advancements in transportation will have to solve first mile/last mile problems for both urban and suburban commuters. It will also be likely that consumers will not have a direct ownership component in the transportation cycle. Congestion and inconvenience are

also major problems with modern modes of transportation; however, technology is already converging to solve these issues.

One of the technological trends that we are currently seeing, which will likely continue for some time, is the automation of delivery services. Automation of delivery services takes cars and trucks off the road, thus freeing up space for other forms of transportation. Drone delivery is likely to increase in the coming decades, which would remove countless delivery vehicles from the roads (Bouton, Hannon, Ramanathan, and Heid 2017). Amazon is once again leading the charge. Expected to launch in 2020, Amazon's drone delivery service, 'Prime Air' will deliver packages under 30 lbs. in just half an hour. Uber and UPS have both applied for Air Carrier Permits with the FAA and are likely to launch drone delivery services in late 2020 or early 2021 (D'Onfro 2019). Computerized cargo matchmaking is also on the rise. These services connect unused cargo space in trucks with cargo. The concept is called 'load-pooling' and could decrease the number of trucks on the roads of cities and suburbs by 30% (Bouton et. al 2017). Load-pooling combined with Self-driving electric semi-trailer trucks could remove the human component from most of the shipping industry. Both Tesla and Daimler, one of the largest semi-trailer manufacturers in the world, are developing fleets of self-driving trucks (Madrigal 2019). This could create a world where most logistics are completed automatedly without any human interaction. In this world, you could order a product online with the click of a button, a robot then takes your item from a shelf, puts it in a box which is automatically load-pooled with other cargo on a self-driving semi-trailer truck, taken to a distribution center near you, and delivered by drone the next day.

The consumer transportation sector will likely see major advancements as well. With the rise of mobility-as-a-service businesses like Uber and Lyft, the way we choose to get around has changed dramatically over the past decade. And it is likely to change just as dramatically over the next decade. Uber published its version of the future in late 2018, saying it sees a world where mass transit is efficient, automated, and on-demand (Madrigan 2019). Uber sees improvements in shipping, logistics, food delivery, and drone-delivery, but most impactful will be in public transportation and rapid last-mile solutions. A report by Deloitte found that Uber's vision is quickly becoming a reality as cities and companies are also adopting this model. Deloitte says that multi-modal transportation is becoming increasingly popular around the globe (Nuttall, Arbuckle, Haworth, Siddall, and Pankratz 2018). Multi-modal transportation refers to a transit method that involves taking more than one mode of transportation to arrive at a destination. While it may seem like more of a hassle, Deloitte found that it was far more efficient. In cities where multi-modal transportation is integrated properly, citizens can order a car to pick them up from their house, drop them off at a ride-sharing hub, and take a city bike for the last half-mile or so to reach their final destination. In Cascais, a municipality located near Lisbon, Portugal, an app has been developed to better serve its 200,000 plus residents. "MobiCascais, its mobility-as-a-service solution, launched in 2016 and integrated different public and private players into a single collaborative ecosystem. MobiCascais allows users to reserve, manage, and pay for every mobility-connected city service by paying a daily, weekly, monthly, or even annual fee. Services such as bike-sharing, moto-sharing, smart parking, taxi rides, transport on request, and carpooling—along with electric vehicle infrastructure, and information on transport (bus and train) routes and stations—can be accessed through

a single card to which users can connect through an app and a web portal. The service is expected to save citizens between 10 to 27 percent of their mobility costs.” (Nuttall et. al 2018). Services like these are popping up around the world and with other self-driving vehicle infrastructure companies like Lyft and Google’s Waymo, a future with on-demand mass transportation services does not seem too far off.

One possible form of on-demand mass transportation is consumer subscription services like MobiCascais, where citizens would simply have the services auto-draft their accounts. Much like a Netflix subscription, if the consumer used the service constantly, the payment aspect would almost become a secondary concern. After all, if you are using it and never physically making a payment, you may never think about the service pulling money from your account. With a UBI in play, it is likely that the payment would not matter to consumers at all. I think it is likely that we will see individual transportation solutions like this arise in the coming years. With the growing cost of car ownership and overcrowded city streets, it seems far more economical and practical to order a car to take you to work than to have one wasting space in your driveway and then wasting space in a parking lot. If these cars were self-driving, cities could remove parking lots all together, opening up more space for commercial or residential development. It’s hard to tell what the future for transportation will hold for certain, but it seems likely that autonomous efficient mobility services will be the prevailing trend.

Digital Abundance via Open-Source Systems.

As we established in the opening of this paper, data is a resource and a very valuable one at that. When data and research are protected and closed off, often so they can be monetized, it can restrict the greater good for society. Research done at Microsoft may hold

the solutions to a problem at IBM, a problem which may be of great help to the world. But, since the research at Microsoft is proprietary, that solution may take IBM years to discover. Not only is this highly inefficient, but it can be harmful to the general population, something that is often not considered in a world driven by scarcity and profit. Additionally, open-access to information must be available or else there would be a scarcity in data, and thus there would not be a post-scarcity economy. In short, open-source promote the free-flow of information and ideas which will spawn innovation for the purpose of the collective and intellectual stimulation rather than profit. This is not only paramount to sustaining a post-scarcity society but is also part of the groundwork which must be laid for one to spawn. So, what is open-source and what does it look like today?

Open source is decentralized development that encourages open peer collaboration by providing source code, blueprints, and/or documents freely available to the public (Levine and Prietula 2013). The general idea is that if you want the best version of something, it is best to make it available to the public for open collaboration. The reason behind this concept is because it is unlikely that all the smartest minds can make it are working at the same company, and thus opening it to the public gives everyone a chance to offer improvements and unforeseen errors or advances may be uncovered. Generally, open-source refers to software code which is made available to the public. Again, the idea behind open-source is that it is unlikely all the best coders are working for the same company and thus if you wish for the code to have the best iterations, it is better to crowdsource its development. Of course, the problem is that open-source must come at the sacrifice of profits. However, the concept is not limited just to software. The term ‘open-access’ has arisen to describe open access to things other than just software and can be used

interchangeably. Most recently, open-source/open-access concepts have been used for projects in general electronics and construction with the release of blueprints and designs for collaboration, as well as the food and beverage industry, science and engineering projects, and medical research, typically one of the most restrictive industries for sharing research.

Some recent examples of how open-source data sharing is a successful model include the operating system Linux, which now hosts most of the world's server parks (Metcalfe 2012). Continuing with software, another popular example is Mediawiki, the structure on which Wikipedia and other wiki-style sites are built. The most well-known open-source project, however, maybe the Apache HTTP server, which played a key role in the growth of the internet after the project was completed in 1995. HTTP, or Hypertext Transfer Protocol, is an application protocol for distributed information systems and provides the foundation for modern data communication on the world wide web. But as mentioned previously, open-source isn't limited to just software. The Hyperloop Pod Competition in 2015 is an example of how the open-source model can work in engineering projects as well. In the competition hosted by Billionaire Elon Musk's company SpaceX, University students from around the globe competed to design a functioning scale model pod for the future Hyperloop in Los Angeles, California (SpaceX.com 2015).

Medical research will likely be the next frontier for open-source data sharing as pressures against medical patents continue to decrease their effectiveness. The future of open-source information sharing is still very unclear, but one can imagine the usefulness of large collections of data. Who knows, one person's research in Michigan could be the solution to a medical advancement in China that cures a once incurable disease. While

there may not be a sustainable and viable reasons for corporations to forgo profits for the sake of helping the world, that does not mean such a reason could never arise.

Improvements in Agriculture and Food Production Technology.

Food has long been humanity's greatest scarcity, and it's one of the only primary things standing in our way of a post-scarcity economy today. Even with modern improvements, the problem of mass-scale and efficient food production still exists. For a true post-scarce society to exist, food must be in such abundance that there is no limited access to it. This would likely mean that all food is provided in some manner, however, at this point, who pays for the food is not the concern I am exploring. The primary issue I am exploring is, how would humanity produce such high volumes that there was never a scarcity of it, and are we seeing trends pushing in this direction today?

Currently, the world is facing three primary scarcity factors that affect mass-scale food production. Those factors are the availability of (1) land dedicated to food production, (2) water, (3) and arable land, however, advancements are currently underway to address these issues. Vertical farming, as an example, has become increasingly popular as studies are showing it is a feasible method for saving space while producing similar outputs as manufacturing on a horizontal level (Munoz 2017). Vertical farming, as the name would imply, is the concept of growing up rather than out. Recent estimates are now showing that one acre of vertical farming can produce the same output as 4-6 acres of traditional farming. Of course, this is because the farming is done in a one-acre vertical structure consisting of 4-6 worth of farming space internally. The best part is, most of these structures are done inside climate-controlled structures, which means it can be done year-round. Studies have also found that these climate-controlled vertical farming structures can use up to 70% less

water for the same output as traditional farming (Munoz 2017). Vertical farming is already being implemented today with companies like Urban Crops, which uses old carpet manufacturing factories as farming facilities. Aerofarms, another company in the vertical farming revolution has several locations in New Jersey which produces about 2 million pounds of produce per year (Baraniuk 2017).

Another major advancement happening in the agriculture industry is occurring with the help of advancements in LED technology. As LED technology improves, indoor farming becomes much easier to manage and becomes more successful. In the “Controlled-Environment Lighting Laboratory, or CELL for short” (Whetstone 2018), at MSU is making giant leaps in this field. Working with OSRAM Opto Semiconductors, the CELL lab is able to make alterations in lighting quality to activate certain desired traits in plants. CELL has had success in creating desired qualities in plant thickness, color, and taste of the food it grows in the indoor space. CELL is also making advancements in another rapidly advancing agricultural segment, hydroponics. Hydroponics is the practice of using recycled water instead of soil to grow plant life. The CELL lab has proven that hydroponics used in combination with proper LED lighting can be used to successfully grow edible plant life at a scalable level. In a study published in the Journal Agronomy for Sustainable Development, 14 hydroponic tanks have been installed on a rooftop measuring 1,600ft² in Guangzhou, China. The study proved that residents and developers in the Chinese city have the potential to produce a steady supply of vegetables that may even be cheaper than store-bought alternatives on their rooftops. The research concluded that hydroponics can effectively use only 10% of the water used in traditional farming to grow the same output.

The study also concluded that plants can grow faster and have higher yields than traditional farming (Woodward 2017).

Another major advancement on the cusp today is the onset of Robo-agriculture. A term used to describe smart-fully automated farming technology; Robo-agriculture may be part of the future for scalable farming is used in tandem with other advancements. In the UK, a joint project between Harper Adams University and agricultural company Precision Decisions launched a project called Hands Free Hectare which demonstrated that robot farming equipment could plant, tend, and harvest an entire acre of barley without any human involvement (Foley 2019). Advances in this field with improvements in automated ranching could lead to a farming culture with very limited human involvement.

Another advancement in food production may not happen with production equipment but rather society's consumption preferences. In developed countries, a habit to consume more food than is needed is estimated to lead to about a 50% loss of total global food weight (Foley 2019). A cultural shift to consume more moderate portion sizes and eat a more sustainable diet could change production demands dramatically. Decreasing meat consumption, specifically beef, could also lead to more efficient food production as cattle is the most land and resource-demanding livestock currently. In the US, the social sentiment is already shifting toward a diet including less meat and more plant-based meat alternatives as consumers realize the dangers of a beef dominated diet for themselves and the environment (Graça 2015).

The future of food production will likely see a combination of improvements in various industries as well as society. It is likely that more sustainable diets will arise as well as more efficient production habits. What may be unlikely, however, is a switch to the

consumption of liquid or meal bars. In many science fiction narratives, individuals are often depicted as eating or drinking some form of nutrients to replace a meal. While this is clearly efficient on every level, there are no trends to support that this is a desire of the population. In a post-scarcity society, enjoyment and free will must also not be scarce and so it seems likely that the free will to eat what you want would be necessary for one to exist, and thus eating or drinking military-style MREs (meals-ready-to-eat), seems unlikely. What the future holds for agriculture and food is unknown, but advancements must be made to feed a growing population at a rate where there is never doubt with anyone in regard to where their next meal will come from.

DECREASES IN CONSPICUOUS CONSUMPTION

One of the key characteristics of a post-scarcity model is that its citizens, for reasons other than laws having been drafted against it, do not condone conspicuous displays of wealth. While this seems like a subtle, even peripheral, change when compared to some of the other major changes that must occur to push global economies to a post-scarcity state, the reality is norms regarding conspicuous consumption would be paramount in the medium term.

In the 21st century, and for most of human history for so long as we have had organized civilizations, humans have been governed by conspicuous consumption. The term, coined by sociologist and economist Thorstein Veblen in 1899, is used to describe the consumption of luxury goods whose price often far exceeds its value and economic utility and is purchased solely for its value as a status symbol of wealth (Thorstein 1899).

In his work, *Theory of the Leisure Class*, Thorstein noted that pecuniary emulation often caused a trickledown effect on those of lower socioeconomic standings. By trying to emulate those of higher socioeconomic standings, those without the financial means to do so will engage in conspicuous consumption of brands of goods which are over-priced for purposes of creating exclusivity in those who can afford them. People in lower social standings will choose to purchase these products despite having access to reasonably priced products which achieve the same functionality of the overpriced products. Because of this effect, a society exists wherein the economies have created more than the society needs to survive, and endless cycles of economic waste break out.

When this debate arises, it is easy to picture the rich elite wasting money on extra homes, or cars, or planes, when they would survive comfortably with only one of each. While this is a true example of conspicuous consumption, the real social problem occurs at the lower levels. When an individual with the financial means to not feel its effects, purchases an over-priced car, they have certainly wasted money, but this item is not something they have pursued. The purchase of a car was one of necessity, i.e. the need to drive, and the purchase of the over-priced version was merely because they could do so without any significant or noticeable effect on their finances. Now, when someone who does not have the financial means to consume such a product, decides to do so anyway in an attempt to appear as though they are of a higher economic class than they are, the waste is very noticeable. Consider the following hypothetical example. A family is in need of a new SUV and they have the financial means to purchase one for \$40,000. A new Ford Explorer would fit their needs, but instead, they choose to buy a new Range Rover for \$110,000 merely for the status symbol. Arguably, the Explorer would have met the same

need as the Range Rover, the only difference being it would not have come with the same prestige. In this situation, the economic waste is the difference between the cost of the luxury good and the basic good. This is the element of society, the pursuit of goods for status, that has to change for a post-scarcity society to (1) arise and (2) function over time.

When it comes to post-scarcity economies, critics of this argument often make hedonistic claims, protesting that it is the right of an individual to purchase any good they can reasonably afford as it is their right to attempt to achieve maximum happiness (Migone 2007). Since we have defined that post-scarcity could not encompass a society in which happiness and freedom of choice are scarce, this stance cannot be discounted. That said, a change in society resulting in the condoning of conspicuous consumption does not necessarily have to mean there is a reduction of happiness or freedom of choice.

Another claim that can be made is that humans innovate and create because they hope to achieve higher profits and thus consume more. Decoupling the relationship between work and reward would destroy any motivation to innovate and create. This could almost be a variation of the American Dream in the way that phrase often portrays success through hard work and perseverance. It can also be said that in the 21st century, many people do work for the pursuit of profit. That is why in 2015 more college students choose their major based on what they thought the salaries would be over their passion and interest in the subject (Morrison 2015).¹ This is how the world works now, and for many, it is hard to comprehend that there could ever exist a world where people still invented things if they couldn't, make money off of it. But of course, this is not true. The motivation for creativity is not destroyed if it's not being used to acquire wealth, it's just transferred to a higher

¹ The study was completed by the U.K.'s university admissions body, Ucas. The study surveyed 300,000 students personal mission statements submitted for university attendance in 2015.

truth. There will still motivation to innovate, just not materialist motivations. There will still be Jeff Bezos, Elon Musk characters, only they will not be restricted by a need to make a profit. Smart, ambitious, curious types will still exist in the world, and without a need to make money, can truly explore and innovate. They could go on to create an empire-like company that sends crafts into space, terraforming planets, making more real estate. Why would they do this if not to get money? Well, everyone will have their own motivations, but mostly because they can. They might not get rich, but they have the power, reputation, creative freedoms, validation, and also probably some ownerships of those planets which could help. It is hard to say for certain, but one would think that Edison and Tesla did not investigate the conductive properties of electricity for the future dream of profit. Maybe it was because they wanted the credit, but arguably it was because they were both curious and driven internally by a need to discover. For some reason, when we say that no one will need to work to have their needs provided for, we assume that everyone will become painters and poets? By why does this have to be the case? With an efficient education system, it seems equally as likely that we will still have people pursuing sciences just as frequent as we have people pursuing arts. After all, it is the successful creation of an innovative, well-planned business empire like Amazon, just as much an art form as a well-constructed novel.

While it is nice to speculate on the particulars of the functionalities of such a society, why must there be a reduction in conspicuous consumption for such a society to exist? Well, in a post-scarcity economy where *almost* everything is free and easily attainable for everyone, there has to be a natural constraint on ridiculous requests for resources at the individual level. Imagine for a moment that if everyone desired to have a

new spacecraft made every day. The economy would quickly move back into being a scarcity-based economy. On the other side, if there was a central board who told you what you could and could not have or exactly what shirts you could order, you would not have very much free choice of consumption. This, in and of itself, is a scarcity of choice and would prevent the society from being a post-scarcity economy, to begin with. For that reason, people must freely choose not to order a new spaceship every day. So why would anyone choose not to have a new spaceship every day if they could?

It is hard to say for sure as to why a society would begin to shun conspicuous consumption of resources, but an optimistic view would suggest that it is a general consensus. Maybe, since everyone knows post-scarcity only exists as long as we do not overuse resources and create a new scarcity, people just agree to be mindful of their consumption to keep the economy at bay. Any deviance from this would be viewed negatively and thus people would not be as inclined to consume unreasonably. This seems very unlikely, however, given we can currently not agree to use our resources responsibly even as we know our planet is dying as a result. Additionally, we have welfare abusers today who are viewed very negatively and yet still continue to do so, so pure cohesiveness seems very unlikely. Since it probably will not be a consensus-based reduction in conspicuous consumption, it seems likely that there will have to be an organic social limitation.

One method for this could be through an organic reduction of consumerism. Given the world has become post-scarcity partially as a result of technical advances, it would be safe to assume that some of these advances have decreased a need for individual ownership of certain things. In a world where you can order a self-driving car to pick you up via an

app on your phone thanks to an elaborate network of autonomous vehicles supplied by your city, you would have no reason to own a car at all (Vanderbilt 2018). And by extension, you would also have no reason to get a shiny new Lamborghini. It would just be an unneeded hassle. The same could be said for numerous goods, but the general idea is that there would be no need to take on the extra hassle when most things are provided for you and easier to use. Additionally, if you follow Veblen's thesis that people make purchasing decisions that would be considered conspicuous or wasteful for the purpose of achieving an image, it would be unlikely that anyone would view such a purchase as a status symbol but rather as a foolish choice. The fear of being viewed as stupid could actually be a big driver in why someone would not choose to buy some vehicle that you have to drive, park, and maintain yourself when the alternatives are free. After all, Lamborghinis are very well-made cars, it is desired not out of performance but rather as a status symbol of exclusivity. If anyone could have one, that status would be removed and thus would only ever be purchased if it was the best vehicle to perform a certain desired job.

Another pathway actually results from how such an economy could function without a monetary system. We know that resources would still be scarce, just at a point where we can utilize them efficiently to achieve post-scarcity. Some resource management must occur. Webb establishes a model for this system of resources accounting in his essay, *The Economics of Star Trek*. He predicts that "resources are still accounted for and allocated in some manner, presumably by the amount of energy required to produce them (say Joules). And they are indeed credited to and debited from each citizen's 'account.' ... Because the welfare benefit is so large, the average citizen never pays any attention to the amounts allocated to them, because it's perpetually more than they need." (Webb 2013). If

the society were to use 'energy units' as a stipend to each citizen, it would provide a natural check to outlandish consumption requests. You couldn't order a spaceship every day because of the energy it would require doing so. The system would prevent you from doing so. It wouldn't be because some social ethics board told you couldn't, it would be because it would exceed your energy stipend. This doesn't mean that the society is post-scarcity, after all everything else is provided for. But of course, there is still some scarcity and the system would prevent you from experiencing it. Now of course if you had the energy units saved up to order something outlandish, you could do so. But only at the loss of your own energy units. In this case, if you did use up all your energy units, the mere fact that you were out of units and thus in a situation where a scarcity exists, would mean the world is no longer post-scarcity. Irresponsible people would be at the risk of starvation. That is the reason that a social constraint on conspicuous consumption must exist. If you were to consume elaborate and flashy items instead of food, you would not be revered as wealthy but rather viewed as stupid. Once again, it is probable that most people would choose not to consume something that would make them look foolish if they didn't have too. Obviously, there will be exceptions to this rule, people who would rather consumer something unneeded than eat, and those people may have to face a sort of punishment or limit on their ability to make large requests of the system. In the aggregate, however, I believe most people would not buy the Lamborghini if it did not provide some intrinsic benefit for them, and their peers would look down on them for the poor choice.

It seems that a post-scarcity economy with social stigmas against conspicuous consumption could exist without money but would need another form of accounting. One that could be done for efficient resource allocation. The question now is, would it be

probable for this to happen. I would say yes. Technological advances and maximization of monetary UBI aside, in a society where everything has become so abundant that it makes no clear sense to collect money for it, and people are no longer concerned about flashy items as a result of everyone being presumably already wealthy, thus removing the high-class social allure of flashy items, money would almost become redundant.

REMOVAL OF INCENTIVE TO MAKE PROFIT

We currently live in an age where quarterly profits are held to a higher esteem than anything else. Often, these profits come at the expense of things like employees, customers, social benefit, and the environment. Does it look like you're going to have lower growth than analyst projected? Letting go of your mid-level managers usually does the trick (Aguilar-Millan, Stephen, Ann Feeney, Amy Oberg, and Elizabeth Rudd, 2010). In an age where an abundance of easy-to-produce resources makes it cheap to manufacture, a profit-driven society could never achieve post-scarcity. This is because a need to keep growing profits would push resources to be used to quickly and the economy would quickly hit a new scarcity wall, this becoming scarcity-driven once again. Consequently, we must first achieve a world where the bottom line is the greater good of society, not increase profits. Only then could we achieve and sustain a post-scarcity economy.

For most Americans, this is very hard to rationalize, but in countries like Spain, this is almost a reality. The work culture in Spain promotes happiness over profit. The average

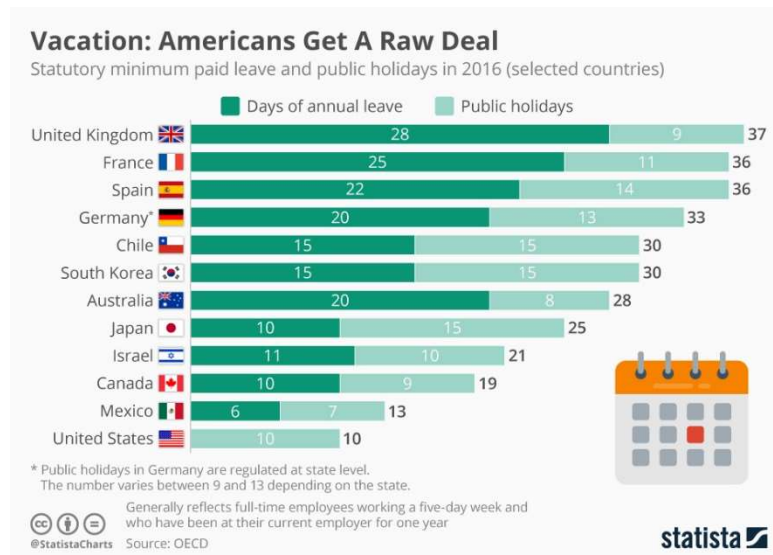


Figure 1

workday starts around 8:30 am and runs until 1:30 pm where most businesses allow their employees a break for leisure activities. Business then picks up around 5 pm and runs until 8 pm (Goudswaard 2012).

In addition, the average

Spaniard in a major city will see around 22 paid vacation days with an addition 14 paid public holidays, compared to the US 10 public holidays showed in figure one above. The average US employee will only see another 15 paid vacation days, and that is if their employer is generous. On top of all that, most business in major cities in Spain will take the entire month of August off (The Economist, 2017) Why? So, its citizens can enjoy the summer weather with family. For most Americans, the response is how unprofitable that structure must be. And they would be right. But that's actually the point. The work culture supports happiness over chasing money, and they aren't the only ones. In Sweden, the culture supports longer work ours than Spain, but employees can expect to take two 30-minute *Fika* every day. *Fika* is a social tradition that usually consists of an office coffee break where work is never discussed. This is of course in addition to the usual hour lunch break. The Swedes will also refuse to work after the workday is over and in fact, attempting

to do so would be alluding to the fact that you do not have any regard for their family to whom they would be trying to spend time with (Forslin, 2017). In the US, if you leave work at 5 pm and your child's school let us out at 3 pm, what are you to do? This is an issue that millions of Americans face daily, but not in Sweden. With a flexible hour's system, as long as employees hit 8 hours a day, they can leave when they wish. So, if your child's school is out at 3 pm, you go in at 7 am after dropping them off and you are out by 3 (Orange, 2019). Additionally, in an OECD study, only 1.1% of the country works more than 40 hours per week (OECD Better Life Initiative 2017). As a result, Sweden consistently ranks in the top 10 for the highest quality of life where the US rarely breaks the top 15 (U.S. News & World Report 2018). So, is it really irrational to assume that business could still get done without profit as a motive, despite what we perceive in the US today?

Even in the US, we may be seeing a transition in business that seems to be going unnoticed. Over the past decade, the companies that have provided some of the most innovative advancements for society cannot seem to make a profit. In today's economy, this is a huge problem and begs the question; should the government bail them out like they did the banks? Are they 'too innovative to fail'? Should they be subsidized since they provide such a demanded service to the whole population? These are the questions of today, but maybe they aren't the right questions to be asking. See, the taxi industry was very profitable for a small number of people, but horrible for everyone else. Then uber stepped in with a solution. One that was very helpful for almost everyone, but not very profitable for anyone. So maybe the questions we should be asking is, should profit be our main concern? Or should advancement and quality and efficiency for the greatest number of

people be our main concern? This is a question that most traditional capitalists refuse to entertain, but the reality is, capitalism is changing right under our feet. And this is only the beginning.

In 2017, 76% of the new stock market listings were unprofitable (Ritter 2018), which is an astoundingly high number considering there were 108 IPOs that year. In 2019, seven of the 10 most followed IPOs were significantly unprofitable. There included Peloton, Slack, Uber, Lyft, Pinterest, and Zoom (Carey 2019). Yet, each one of those companies revolutionized an industry or market segment in almost unimaginable ways. Slack modernized interoffice communication channels taking businesses out of the dark age of email chains, Peloton offered a new form of in-home workout equipment and streaming packages, Zoom made video conferencing cleaner and cheaper for schools and businesses alike. Not enough can be said about how Uber and Lyft have transformed the way we drive and work, and Pinterest revolutionized the online ad industry by providing the foundation for subtle advertisement development and for businesses to engage with their customers in ways they never thought they could. Other companies that have found ways to change the world but cannot seem to pull a profit include Tesla, the company famous for trying to make electric, self-driving vehicles affordable for the average American family, and Spotify, one of the key leaders in revolutionizing the subscription streaming style of music consumption and transformed the way artists can publish content without a record label. While it cannot be added to the list of unprofitable companies, Amazon is worth a mention. Amazon is the third most valuable company in the US by market capitalization, and just above it is Apple, but “Amazon’s profits for the last 20 years total less than \$8 billion while Apple recorded profits of about \$327 billion during the same

period.” (Xin 2018). Arguably both companies are massively transformative, but if it cannot turn a significant profit for investors, how is it still actively trading? At least that is what the traditional capitalist mindset would ask, but in many ways, as a culture, we are already shifting emphasis away from profits and more towards what the company can offer the world.

In the past three years, there has been an uptick in both B-Corp and PBC registrations. A PBC, or Public Benefit Corporation, is a legal formation of a for-profit company whose charter contains a legally binding commitment to a proclaimed public benefit that must be placed above the company’s commitment to its shareholders (Stracqualursi 2017). This is contrary to a normal corporation formation where the company is responsible first and foremost to its shareholders and everything else is secondary. With the traditional style of formation, if earnings per share are going to look low, it is the legal responsibility of the company to increase them. This may include moving factories overseas and using cheaper labor, sometimes children. If the corporation chooses not to use the cheaper labor when it is a proposed plan of action, and it cuts into the shareholder's interest, the shareholders have the right to sue the corporation for that decision (Stracqualursi 2017). With a PBC, this is not the case. If the companies charter says it is their duty to use ingredients in their food that are made local and organic in locations that pay a fair wage, their shareholders cannot sue them for using ingredients that are too expensive when cheaper and reasonable alternatives exist. Put in other words, the company has a legal obligation to do the right thing *before* worrying about profits. B-corps function the same way, only a B-corp, or Benefit Corporation, is not a legal formation but a certification from a third-party non-profit. This is much like a fair-trade certification in

the sense that the company still has a high degree of concern around profit growth but has an understanding with investors that it is best for the company to also do the right thing morally. Most recent data suggest that there were roughly 2,000 B-Corps and roughly 3,000 PBCs at the end of 2018 (Stracqualursi 2017).

A notable example of a successful B-corp is an all-wool shoe brand, Allbirds. Launching with a mission to use sustainable supplies and techniques when making its products, Allbirds' charter states that it must manufacture with an aim to produce the smallest carbon footprint possible. This includes not only using sustainable wool harvesting techniques, which limits the supply of its products but also using more efficient shipping and distribution channels. While it has sacrificed profit to make this mission a reality, consumers, and investors are flocking to be a part of the Allbirds' family (Raz, 2019). But this trend isn't localized to Allbirds, it is spreading globally. Consumers are shifting their preferences to prefer, and in some cases, expect, companies to put morals over profits. In "A 2014 study conduct by Horizon Media's Finger on the Pulse showed that 81% of millennials surveyed 'expect companies to make a public commitment to good corporate citizenship.'" (Stracqualursi 2017). In a similar study by Nielsen in 2015, the firm surveyed 30,000 consumers in 60 countries to see they would be willing to pay more for a product that they knew was sustainable. They found that 66% of consumers polled *were* willing to pay more, and for those consumers born between 1977 and 1995², that number went up to 73% (Nielsen, 2015). The study may demonstrate that the preference for sustainable products, even at a higher cost, is gaining traction in younger generations. The question is, could this shift in consumer values transition into business values as well?

² Nielsen uses the date range 1997 to 1995 to define the Millennial cohort.

My assumption is yes. Even in the most capitalist view, a business exists to serve the customer, and do so by adapting to changing trends. While businesses may not be intrinsically motivated to forgo profits for more sustainable products, changes in consumer behavior with an increase in available choice of products may be the catalyst that pushes business culture to focus on something other than profit.

Another contributor to a shift away from profit as a primary driver in business could be what every business fear, an increase in taxes. With automation on the rise, there is a lot of talk about taxing the increased productivity of machines that displace humans (VerBruggen 2019). This is not meant to discourage businesses from replacing humans in the workforce, merely a way of redistributing the increased earnings in a way that will hopefully affect those who have been displaced by the change. With a tax on profits from automation, businesses could go down two paths, either accept the tax and care more about the products than the profits or, work diligently to avoid the tax by keeping humans involved in the process, which would more than likely cause lower profits anyway. Either way, it would appear that given the already changing consumer preference toward socially responsible business, automation advancements or widespread social change brought on by consumers and like-minded individuals entering the corporate world in the coming years could lead to a shift away from profit as a priority.

THE ROLE OF CORPORATIONS

In a post-scarcity world of overly abundant resources, it would seem rational to assume that corporations are the ones converting those resources into tangible goods. It

seems highly unlikely that there would be a transition to where governments were the primary manufacturers of goods, and after all, this has been tried in the past with little success. The government's role in such a society would be to provide its citizens with the resources they needed to satisfy basic needs, such as healthcare, education and housing and free and equal access to food and clothing. Thus, it seems likely that the role of the corporations would be very similar to their role today; to manufacture, innovate, and create.

It is also rational to assume that even in a world where one was not required to work as a means of survival, people would still choose to do so. I believe this would happen for a variety of reasons, but chief among them is intellectual stimulation and social interaction. When we envision a culture where everyone chooses to be poets and painters, and I'm sure we would see an uptick in those professions, but I do not believe that is everyone's calling. I believe that there would be plenty of people, with a good education system, who will still choose to be scientists, educators, historians, and businesspeople. Why? Well, that's just what makes some people tick. Take a scholar in East African Studies where the average career salary is \$43 thousand (Payscale 2019) It doesn't seem likely that this individual chooses such a profession just for a paycheck. They choose it because it interests them. This can be said even for careers that pay higher today such as jobs in business and science. Money aside, those are also professions which interest a certain type of person and it would be irrational to believe that those interest would merely fade away with a desire to accumulate wealth.

In this world, people would work differently than we see today. Automation could help to usher in this change as well. In a 2019 study, it was found that 25% of all jobs are at "high risk" of being automated over the next two decades. It was also found that 70% of

jobs are at risk of being automated in a way that would decrease the hours required to work the job by a human input (Muro, Mark, Robert Maxim, and Jacob Whiton). Another study suggests that slight automation of all jobs could lead to total global job loss up to 57% in just two decades as well (The Economist). Of course, this would be a gradual shift over time, but I assume the societal pressure to work like we have today would gradually decrease. Instead of being viewed as a lazy freeloader for not having a job, I believe you would just be viewed as someone whose interests lie outside of the jobs that exist. Additionally, I think the individual mindset toward work would change dramatically. Instead of dreading work on Monday and being excited to leave on a Friday, people are genuinely interested in the work they do. Instead of being an engineer because you wanted kids and needed a job that could afford them, you choose to be an archeologist because ancient societies interest you. Even though you aren't required to, you spend your weekends studying history because it fascinates you to your core and when Monday rolls around, you couldn't be more excited to propose a new dig site. When you're sick, there is no pressure to go into the office. And when your daughter is graduating college, there's no need to worry if you can make it.

While people would presumably still choose to work, as mentioned, it would be in professions that interest them. While this will probably not lead to a shortage of scientists, it may lead to a shortage of interpersonal, low-level nonroutine jobs that cannot be automated. These are jobs that people may not want to take and very few people will have a general interest in. So, how do companies motivate people to take them? This is where companies may have to offer benefits beyond the scope of which the government can offer as an incentive.

Automation will play a pivotal role in changing how we work and how corporations function, but not all jobs can be automated. This presents an interesting set of problems. For example, with current automation advancements, we could soon see an entire McDonald's automated. This would include management, cooking staff, food runners and cashiers. A person would walk in, use an automated ordering kiosk to place their order, their food would be delivered via a slot at the front of the store by means of a conveyor belt or some future such iteration and the transaction would be over. In fact, McDonald's plans to install at least one automated kiosk at every US location by the end of 2020. So, this future is closer than you might expect (Rensi 2018). That said, it may be very difficult to automate janitorial staff (Chui, Michael, Manyika, and Miremadi 2016). According to a study by McKinsey & Co (2016), unpredictable physical labor is one of the least likely job lines to be automated in any industry. Artificial intelligence is getting good, but chances are it still is not good enough to find every puddle of coke in a store. As it seems unlikely anyone will be very passionate about cleaning up after others, how would McDonald's motivate anyone to do this job?

Retail sales may also never be fully automated. We may see an uptick in online sales, but it seems improbable that all storefronts will go extinct, and it also seems improbable that AI and automation improvements will provide a reasonable solution in how humans prefer to buy clothes. Will we reach a point where we are comfortable having an AI help us shop in stores rather than a human? We may, but in the interim, how will Forever 21 convince someone to rehang shirts, open dressing rooms and fold clothes? These are the questions of the future and corporate subsidies may be the answer.

To motivate people to take unwanted jobs, corporations may have to provide incentives. For some jobs, this would be intrinsic. Billboards with statements such as ‘Do you have a natural curiosity about the universe? Come join our spaceship crew’ may incentivize the adventurers. Whereas those with ambitions for reputation and recognition may choose to pursue politics or media. But for jobs that do not offer intrinsic value to most people, the motivators would more than likely be materialistic. Even if there was no desire for conspicuous consumption, it seems likely that having something you desire but isn’t included in your basic stipend could be distributed through an employer. This type of benefit could also offer social mobility. If you aren’t the smartest or the best at anything, just being willing to do jobs others aren’t could provide your family leverage to achieve more notable jobs in the future. Of course, this wouldn’t hold much weight as the social stigma concerning the linkage between employment and a person’s worth would probably be non-existent, being gifted a Bar and Grill in exchange for 10 years’ service as a McDonald’s janitor could put your family name on the map. And who knows what family names could be worth in a society that doesn’t value money.

Corporations are already beginning to offer benefits that once would have been thought of as irrational. Of course, they aren’t handing out Bar and Grill establishments to janitors, but the benefits are still quite meaningful. Walmart, for example, the largest private-sector employer in the US, announced in 2018 that they would be offering a plan to help over 1.5 million of their employees pay for college. In exchange for working with the company while they’re in college, employees can enjoy free SAT prep on top of their tuition being paid *almost* in full. What’s the catch? Well, there really isn’t one. Walmart just asks that employees pay \$1 per day while they are in school and attend one of the six

Universities the program is offered with, which include, The University of Florida (Florida), Brandman University (California), Bellevue University (Nebraska), Southern New Hampshire University (New Hampshire), Purdue University Global (Indiana), and Wilmington University (Delaware). Employees become eligible after 90 days of employment and are eligible for flexible job scheduling, including working the same days and shifts for up to 13 weeks. This also extends to part-time and full-time employees on top of salaried employees (Friedman 2019).

Walmart isn't the only major private employer to take on the higher education burden for their employees. Disney now offers higher education assistance for its cast members after 90 days of consecutive employment through their program, Disney Aspire. Disney Aspire works with the University of Central Florida to provide 100% tuition-free education. So far, "approximately 40 percent of Disney's 85,000 full-time and part-time hourly employees... have signed up for Disney Aspire and more than 6,000 are actively taking classes." (UCF). But the benefits in 2019 do not stop at just education assistance. Other major companies have elected to help their employees in many other ways. Evernote provides house cleaning services twice a month for all 250 of its employees (Richtel 2012). Deloitte, one of the Big four accounting and consulting firms offers "backup care worker if an aging parent or grandparent needs help. The company subsidizes personal trainers and nutritionists and offers round-the-clock counseling service for help with issues like marital strife and infertility" (Richtel 2012). At Facebook, "employees can take home a free dinner or, if working late, their families can come in to eat with them, leading to a regular sight of children in the campus cafeteria. The company also pays \$3,000 per family in childcare expenses and offers adoption assistance of up to \$5,000." (Richtel 2012). Ernst & Young

Australia, another Big Four accounting and consulting firm offers all of its employees 12 months of 'Life Leave' to enjoy life and not miss out on any opportunity because they fear termination. The leave is unpaid, however, but EY will offer part-time hours during the leave if need be and will hold your full-time position for the full 12 months regardless (Ritschel 2019). The list goes on. So, is it unrealistic to assume this trend will continue into the future?

My belief is that no, it is not unrealistic so long as labor becomes decoupled from the means of survival. In other words, people are not just working to make money to keep surviving so they can keep working to keep surviving and so on. It seems evident that in a world where workers have more choice in employment, or to not be employed at all, employers would have to take a larger role in the daily lives of their employees. In this situation, it would become the employer trying to convince the employee of the company's value to them rather than the other way around, which is the world we live in today. Of course, this would be a gradual change, but it starts with the benefits listed above.

This may also be a world where corporations are heavily attached to non-government provided subsidies. It doesn't seem too farfetched to imagine a world where your employer can provide you a better housing situation, or better travel opportunities. For example, if you work at Google, you have access to the google housing plans. Of course, living there would be optional, it may be better than what your government housing credit could provide. For many, just having a house to live in may suffice. But, for the more materialistic individuals, having a better house may be a reason to work. This offers an interesting line of discussion. Of course, the janitor may be given a better house for her work, but it seems equally likely that the companies which provide the most social benefit

would have access to the most resources and thus have access to better housing and benefits. It also seems likely that these companies would be looking to hire the best and brightest. In this instance, would intelligence become a form of currency?

Once again why have to jump back to the question, why would anyone work? The primary answer is personal enrichment, which would probably be a societal norm as well as an intrinsic motivator, but the point being, people would choose to work in things that they find interesting. But how does this affect the bright and ambitious? When you have the ability to take a role with Google or Microsoft, which would you choose? The one that you perceive to provide the most benefit for the world or the one that offers the best benefits? For some, the benefits may be a big deciding factor. This would make the world a more reward-based culture than most would hope for, but it is entirely possible. Assuming the most intelligent people have access to the best jobs which offer the best benefits, as those employers would likely be seeking their skills, using benefits as a convincing tactic, it would make sense that the smartest people would have the best chance at increasing their lot in life. And the smarter you are, the more control you would have in your company. This would not only extend to measurable intelligence in a specific field such as quantum physics but emotional intelligence too. It seems just as likely that those with the tact to work their way up a corporate ladder would benefit in the same manner. This would create a world that may seem unfair and not equal by many people's definitions, but it would also be the closest example to a true meritocracy the world has ever seen. This would even result in political structures where the smartest had the best chance at political leadership. Based on the political climate in 2019, this may not be the worst thing either. It stands to reason that in a post-scarcity world of corporate benefits as a persuasion tactic for employee

retainment, intelligence could very well become a form of currency in the way of accumulating more material possessions than most of the population would be capable of accessing.

Of course, this argument is based on the rationale that resources are allocated in some reasonable manner by some agency to companies based on their social value. With that in mind, it seems rational that the world could still function even without a monetary system in place where corporations served as a means of material accumulation via employment benefits rather than salary. This does bring into question, what if you quit? Would you lose your house? Your travel benefits? That could be the case, but is it not also the case for most people in the world we live in today? The only difference would be that you would have a backup home, healthcare, food, clothing, and anything else you would need in a post-scarcity society regardless of if you quit. Something that is rarely true in the world of 2019.

CONCLUSIONS

With both changes in society on the population and on the individual level, in combination with advances in technology, it seems not just possible, but probable, that we could achieve a post-scarcity economy. However, a question remains. Would it be possible for this society to arise and exist without a monetary system? I reason that, yes it could. Of course, even without a structured monetary system, I believe there would need to still be two main accounting needs to be met. The first is that there must still be some system of accounting so as to block any outrageous orders on the individual level, and second, there

must be some system in place to mitigate unusual but necessary transactions between businesses and/or governments.

One possible avenue to achieve this would be to use ‘energy units’ as a form of efficient resource allocation rather than using a monetary Universal Basic Income. With energy units, citizens are given the right to consume so much energy per month, a number that is far beyond what anyone could reasonably use, and their energy use is deducted from a digital wallet. To the everyday person, they never think twice about getting a cup of morning coffee from their local coffee shop. They walk in, scan their phone, pick up their coffee and walk out. Much like Amazon Go, the shop charges the consumer’s account as they walk out, but because their energy unit balance is so high, they are never concerned to check it. On the back end, the energy required to grow, harvest, transport, roast and grind the beans is all accounted for through the transfer of energy units. This data isn’t handled by any team of accounts, but rather through a high degree of network feedback, and a distributed ledger system. The accounting is done instantaneously and without any human involvement. Thanks to improvements distributed ledger technology, all accounting is hands-off, but if need be, the government could receive a snapshot of any industry at any moment. There is no committee who needs to decide how many energy credits should be given to each person, nor is there a vote to decide. Thanks to increases in network feedback capabilities, the system in place knows exactly how much people are consuming, what they are consuming, how much energy will be needed tomorrow, next week, next year ect., and how much energy can be reasonably distributed to each person. If data shows that people tend to consume more potatoes in the winter, the system plans to grow more potatoes in preparation. In the event of a catastrophe, the system could even reduce energy stipends to

redirect them to affected areas. Of course, no one would notice, because the balance is still outside of their realm of consumption and there is a social stigma against buying flashy unneeded items. Additionally, these units cannot be traded or transferred so they are not used as currency. They also prevent someone from making unreasonable demands of the system. You couldn't order 10 new spaceships as the system would be alerted to an unusual energy consumption attempt. The units could also not be accumulated, in other words, unused units do not roll over per month. This prevents the inevitability of unit hoarding which could, in turn, create a scarcity of its own, and also create class structures of people who have more units and people who have the normally allotted amount. In essence, the units can only be transferred to businesses. Businesses also use these units for manufacturing goods amongst each other. That said, what happens when unusual orders outside of their allotted energy unit balance occur?

I believe it is possible for a third-party currency to arise as an intermediary as a solution to complex trade. We already see this today with the rise of cryptocurrencies as well as other non-government issued currencies. Notable examples include the Lewes pound, which is a currency issued by and used in the town of Lewes, East Sussex (Catlin, 2009). The most topical example, however, is carbon credits. Carbon Credits are credits issued by a particular government to business and gives them the right to emit only so many pollutants per unit (OECD, 2014). If a business goes over their credit usage, they can receive massive fines. However, if a business does not use all of its credits, it can sell them to businesses that have used all of theirs. This process is called emissions trading and is quite popular around the world (U.S Environmental Protection Agency, 2019). I believe the business currencies of the future will function along the same lines in that they are only

used by businesses, given an individual consumer would have no use for an emissions credit, and that they are only used in extreme situations. As far as normal business operations go, most businesses do not think twice about their emissions units, but when they start getting close to using their lot, each one becomes very important. The same will be likely for energy units and a third-party currency. If a business is close to using all of its energy units allotted, it could purchase some from another business using a cryptocurrency offered through some global regulating entity (Webb, 2013). Of course, this would be a form of currency, but it is at a level where it is not a driving factor in most people's decision-making process. Take the following hypothetical scenario as an example:

Let us say a business owner Elon Musk needs 2 interplanetary spaceships constructed on a reasonable timeline. There is no problem with this order, he simply transfers energy units to the team building the ships and the order is complete. However, next week a situation arises where he quickly needs 10 more ships. He does not have the monthly energy credits to complete this so he must 'buy' more from business around the world. Since those businesses are not going to use them, it is a simple and efficient redistribution of unused resources and the global resource quantity is not overburdened as those credits have already been granted. However, if he cannot find enough available credits to buy, he simply cannot complete the order. This would be a natural check to ensure that resources are never overused, and post-scarcity is maintained.

Effective and efficient energy and resource use will be the primary goal of a post-scarcity economy. The use of energy units as a way of monitoring and maintaining efficient energy and resource usage could serve as a replacement for money. Consumers are now granted a balance of energy they can take from the world, a number that is far higher than they could actually use thanks to advancements in resource usage, and never think twice about many they have. In short, money is replaced merely resource consumption, thus changing our perception of 'spending' altogether.

Advances in automated payments may also play a big role. While there still may be a purpose for money, albeit mainly for general resource accounting purposes, automated payments may cause money to be something of an afterthought, if a thought at all, and to play less of a role in our decision-making process. With the dramatic increases in automated payments over the last decade, the cognitive dissonance in making purchases has changed from 'can I afford this' to 'is this the best product'. Services like Amazon Go, Amazon subscriptions, and one-click payments have almost removed the thought of spending money from making a purchase. Consumers can now subscribe to their favorite laundry detergent on Amazon and have it delivered monthly. Right as you are about to run low, boom, another one appears on your doorstep. If you do not actively go look at your bank account balance, you may not even remember how much you have been charged. And if you do, you probably do not care that much because it is the product you wanted right when you needed it. The same concept applies to services like Netflix. You could log on every day, watch the shows you want and never think twice about the payment. At some point, Netflix will charge your bank, but chances are, you do not even remember what day the bill comes through. Why? Because the payment has become an afterthought. You are

so caught up in consuming the service that you could care less about the payment. Long gone are the days where you saw the cash in your wallet slowing decreasing as the month went on. No more do you get a bill in the mail with the cost of your Netflix subscription. You no longer see the amount you would once write on a check and place in the mail to be processed. Automated payments have become the new reality and they aren't done advancing yet. The payments of the future have taken a new face: mobile payments. While already popular today, estimates suggest that mobile payment popularity is growing at over 80% per year (Toplin 2018) and there are no signs of slowing. Now, even when you see the price at the register, you do not put too much thought into the payment. You simply tap your phone and a split second later, bam, you've paid. But do you know how much money you had left for the month when you made that payment? For most people, the answer is probably no. Why not? Because the payment almost seems unreal. Our concept of money as we have known it is not just a phone tap. And yet by tapping your phone on a screen, you are making a payment. Are these advancements creating the physical and psychological infrastructure for payments of the future?

Imagine for a moment a world wherein your government distributed universal income was far more than you could conceivably try to spend. In this world, mobile and automated payments are the only way to make a purchase. You go through life everything you use on a daily basis delivered to your door when you need it. When you want new clothes, you simply go to the store and tap your phone or maybe a bracelet and the clothes are yours. While you do not notice it, your account is being charged for everything you use. Money still exists but you never think about it because you do not see it and you are never worried about running out. While the money is real, it does not control your decision-

making process. This is just one of the possible monetary futures that could arise as a result of an overly generous UBI, technological advancements and improvements in resource use efficiency.

Another possible monetary replacement could be the use of intelligence as a currency. This would more than likely arise in a world where work was not required, but some people still choose to do so for self-enrichment. In this world, it is also likely that corporations, while regulated by the government, control the resources of the world. They still operate efficiently but are not driven by profit, so resources are not abused and squandered. Inevitably, corporations have access to nicer items than that which the government can provide. So, in turn, corporations could provide their employees access to better housing, space travel, etc. Since no one would be required to work, corporations could use these better resources to recruit the best and the brightest. Imagine in this world that IBM and Microsoft are both trying to convince the smartest members of society to work for them. Of course, there is an intrinsic value that will come into play but signing bonuses such as better housing could play a key role in someone's decision-making process. In this situation, just choosing to work would more than likely give you access to better options, but the smarter you were, the better chance you would have to work for a company with the best benefits, and the more leverage you would have in asking for more benefits. This is a more materialistic view of the future, but you could argue that materialism is a base nature for modern humans. As a result, the smartest would become the most powerful in a society, making it a true meritocracy. In this world, the smartest could simply use their names as an attachment of their intelligence to consumers virtually anything they wanted, thus making intelligence a form of currency.

While we have no way of truly knowing what the future holds, it can be argued that it is possible that a future post-scarcity society could exist without a structured monetary system. With that accession made, however, it also must be stated that such a society could not be entirely void of the effects of a monetary system. It is likely that, unless scarcity of all items somehow becomes zero and could remain so indefinitely, the society would require some method of advanced resource accounting that would need to be done behind the scenes. Additionally, massive social change in the way we make daily consumption choices on an individual level would be required to uphold such a society, which would be going against all of human evolution. Even with all of these restrictions in place, it seems as though our current society is advancing at a rate that makes post-scarcity look more and more attainable with each passing decade. While it seems unlikely that we will achieve post-scarcity anytime soon, our recent advancements beg the question, is the world we live in today building the framework for a post-monetary society?

...

WORKS CITED

- Aguilar-Millan, Stephen, Ann Feeney, Amy Oberg, and Elizabeth Rudd. 2010. "The Post-Scarcity World of 2050-2075." *The Futurist* 44(1).
- Arthur, Isaac. 2016. "Science & Futurism with Isaac Arthur." *Science & Futurism with Isaac Arthur*. Retrieved (<https://podcasts.apple.com/us/podcast/science-futurism-with-isaac-arthur/id1224204194>).
- Baraniuk, Chris. 2017. "How Vertical Farming Reinvents Agriculture." *BBC Future*. Retrieved November 15, 2019 (<https://www.bbc.com/future/article/20170405-how-vertical-farming-reinvents-agriculture>).
- Bouton, Shannon, Eric Hannon, Swarna Ramanathan, and Bernd Heid. 2017. "Urban Commercial Transport and the Future of Mobility." *McKinsey Quarterly*. Retrieved November 14, 2019 (<https://www.mckinsey.com/business-functions/sustainability/our-insights/urban-commercial-transport-and-the-future-of-mobility>).
- Burelli, Francesco and Gina Lularevic. 2015. *The New World of Retail*. MasterCard.
- Carey, Scott. 2019. "Biggest Tech IPOs 2019 so Far." *Computerworld*. Retrieved October 26, 2019 (<https://www.computerworld.com/article/3412337/biggest-technology-ipos-2019-so-far.html>).
- Catlin, Stephen. 2009. "New Notes Boost Town's Currency." *BBC News*. Retrieved October 29, 2019 (http://news.bbc.co.uk/2/hi/uk_news/england/sussex/8132024.stm).
- Chui, Michael, James Manyika, and Mehdi Miremadi. 2016. "Where Machines Could Replace Humans—and Where They Can't (Yet)." *McKinsey Quarterly*, July. Retrieved

October 22, 2019 (<https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>).

N.C. Corwin, Scott, Nick Jameson, Craig Giffi, and Joe Vitale. 2016. “Gearing For Change.” *Deloitte University Press*, September 29.

Deckers, Lambert. 2018. *Motivation: Biological, Psychological, and Environmental*. New York: Routledge, Taylor & Francis Group.

Dietz, Rob and Daniel W. O'Neill. 2013. *Enough Is Enough: Building a Sustainable Economy in a World of Finite Resources*. San Francisco, CA: Berrett-Koehler.

D'Onfro, Jillian. 2019. “Amazon's New Delivery Drone Will Start Shipping Packages 'In A Matter Of Months'.” *Forbes*. Retrieved November 15, 2019 (<https://www.forbes.com/sites/jilliandonfro/2019/06/05/amazon-new-delivery-drone-remars-warehouse-robots-alexa-prediction/#265eeeac145f>).

Foley, Jonathan. 2019. “A Five-Step Plan to Feed the World.” *National Geographic*. Retrieved November 15, 2019 (<https://www.nationalgeographic.com/foodfeatures/feeding-9-billion/>).

Forslin, Liselotte. 2017. “Fika.” *Sweden.se*. Retrieved October 26, 2019 (<https://sweden.se/culture-traditions/fika/>).

N.C. Frase, Peter. 2016. *Four Futures: Life after Capitalism (Jacobin)*. London: New York.

Friedman, Zack. 2019. “Walmart Expands College For \$1 A Day.” *Forbes*. Retrieved October 22, 2019 (<https://www.forbes.com/sites/zackfriedman/2019/06/12/walmart-college-education/#5d7bc925613f>).

Goudswaard, Anneke. 2012. *Organisation of Working Time: Implications for Productivity and Working Conditions*. European Foundation for the Improvement of Living and

Working Conditions. Retrieved (https://www.eurofound.europa.eu/sites/default/files/ef_files/pubdocs/2012/50/en/2/EF1250EN.pdf).

Graça, João, Abílio Oliveira, and Maria Manuela Calheiros. 2015. “Meat, beyond the Plate. Data-Driven Hypotheses for Understanding Consumer Willingness to Adopt a More Plant-Based Diet.” *Appetite* 90:80–90.

N.C. Guerreiro, Joao, Sergio Rebelo, and Pedro Teles. 2019. *Should Robots Be Taxed?*

N.C. Guigui, Ulrike, Chris Allen, Sebastian Gores, and Alex Kostecki. 2019. “Payments and the Future of Mobility.” *Deloitte Insights*, April 1.

N.C. Hannon, Eric, Colin McKerracher, Itamar Orlandi, and Surya Ramkumar. 2016. “An Integrated Perspective on the Future of Mobility.” *McKinsey Quarterly*. Retrieved November 14, 2019 (<https://www.mckinsey.com/business-functions/sustainability/our-insights/an-integrated-perspective-on-the-future-of-mobility>).

Harari, Yuval Noah. 2018. *Sapiens: a Brief History of Humankind*. New York: Harper Perennial.

Hendricks, Drew. 2015. “The Trouble with the Internet of Things – London Datastore.” *London Datastore News*. Retrieved November 15, 2019 (<https://data.london.gov.uk/blog/the-trouble-with-the-internet-of-things/>).

ITER. 2019. “Advantages of Fusion.” *ITER*. Retrieved November 15, 2019 (<https://www.iter.org/sci/Fusion>).

ITER. 2019. “Capturing the Energy.” *ITER*. Retrieved November 15, 2019 (<https://www.iter.org/sci/makingitwork>).

- Jakubowski, Andrzej and Lidia Łukasiak. 2010. "History of Semiconductors." *Journal of Telecommunications and Information Technology* 3–9. Retrieved November 14, 2019 (https://djena.engineering.cornell.edu/hws/history_of_semiconductors.pdf).
- Joseph, Peter. 2018. *The New Human Rights Movement: Reinventing the Economy to End Oppression*. Dallas, TX: BenBella Books, Inc.
- Kim, Jungho. 2016. "Female Education and Its Impact on Fertility." *IZA World of Labor*.
- Lakhani, Marco IansitiKarim R. 2019. "The Truth About Blockchain." *Harvard Business Review*. Retrieved November 15, 2019 (<https://hbr.org/2017/01/the-truth-about-blockchain>).
- Lee, Xin En. 2018. "No Profit? No Problem. Investors Keep Snapping up Loss-Making Companies." *Yahoo! Finance*. Retrieved October 22, 2019 (<https://finance.yahoo.com/news/no-profit-no-problem-investors-082100068.html>).
- Leeward Capital Management. 2017. "The World's Most Valuable Resource Is No Longer Oil, but Data." *The Economist*. Retrieved October 13, 2019 (<https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>).
- Levine, Sheen S. and Michael J. Prietula. 2013. "Open Collaboration for Innovation: Principles and Performance." *Organization Science* 25(5):1414–33.
- Madrigal, Alexis C. 2019. "The Future According to Uber." *The Atlantic*. Retrieved November 15, 2019 (<https://www.theatlantic.com/technology/archive/2019/05/how-uber-justifies-its-ipo-valuation/588979/>).

- McFarland, Matt. 2018. "I Spent 53 Minutes in Amazon Go and Saw the Future of Retail." *CNN*. Retrieved October 23, 2019 (<https://www.cnn.com/2018/10/03/tech/amazon-go/index.html>).
- Metcalf, Randolph. 2012. "Examples Of Open Source Software." *OSS Watch*. Retrieved October 23, 2019 (<http://oss-watch.ac.uk/resources/softwareexamples>).
- Migone, Andrea. 2007. "Hedonistic Consumerism: Patterns of Consumption in Contemporary Capitalism." *Review of Radical Political Economics* 39(2):173–200. Retrieved (<https://journals.sagepub.com/doi/abs/10.1177/0486613407302482>).
- Morrison, Nick. 2015. "The Surprising Truths About How Students Choose Their Majors." *Forbes*. Retrieved October 16, 2019 (<https://www.forbes.com/sites/nickmorrison/2015/06/22/the-surprising-truths-about-how-students-choose-their-major/>).
- Munoz, Kissairis. 2017. "Vertical Farming: Farms of the Future? The Pros & Cons." *Dr. Axe*. Retrieved November 15, 2019 (<https://draxe.com/health/vertical-farming/>).
- Muro, Mark, Robert Maxim, and Jacob Whiton. 2019. "Automation and Artificial Intelligence: How Machines Are Affecting People and Places." *Brookings*. Retrieved November 27, 2019 (<https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/>).
- Nielsen. 2015. "Nielsen.com." *Nielsen.com*. Retrieved (<https://www.nielsen.com/us/en/press-releases/2015/consumer-goods-brands-that-demonstrate-commitment-to-sustainability-outperform/>).
- Nuttall, Kellie, Tim Arbuckle, Leighton Haworth, Mark Siddall, and Derek Pankratz. 2018. "Harnessing the Future of Mobility." *Deloitte Insights*. Retrieved November 14, 2019

(<https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/government-and-the-future-of-mobility.html>).

OECD Better Life Initiative. 2017. “How's Life in Sweden.” *How's Life?* Retrieved October 25, 2019 (<http://www.oecd.org/statistics/Better-Life-Initiative-country-note-Sweden.pdf>).

OECD. 2014. “Tax Treaty Issues Related to Emissions Permits/Credits.” *OECD Better Life Initiative*. Retrieved (<http://www.oecd.org/tax/treaties/report-emissions-permits.pdf>).

Oleson, Mark. 2004. “Exploring the Relationship between Money Attitudes and Maslows Hierarchy of Needs.” *International Journal of Consumer Studies* 28(1):83–92.

Ongena, J. and G. Van Oost. 2004. “Energy for Future Centuries: Will Fusion Be an Inexhaustible, Safe, and Clean Energy Source?” *Fusion Science and Technology* 45(2T):3–14.

Orange, Richard. 2019. “How Stockholm Became the City of Work-Life Balance.” *The Guardian*. Retrieved October 26, 2019 (<https://www.theguardian.com/cities/2019/may/22/how-stockholm-became-the-city-of-work-life-balance>).

Payscale. 2019. “Bachelor of Arts (BA), Middle Eastern & African Studies Degree.”

Pennington, Renee L. 1996. “Causes of Early Human Population Growth.” *American Journal of Physical Anthropology* 99(2):259–74.

Press Release. 2019. “UCF.com.” *UCF.com*. Retrieved (<https://www.ucf.edu/news/disney-ucf-team-up-free-tuition-cast-members/>).

- Raz, Guy. 2019. "HOW I BUILT THIS WITH GUY RAZ." *HOW I BUILT THIS WITH GUY RAZ*. Retrieved (<https://www.npr.org/2019/06/07/730695224/allbirds-tim-brown-joeey-zwilling>).
- Rensi, Ed. 2018. "McDonald's Says Goodbye Cashiers, Hello Kiosks." *Forbes*. Retrieved October 22, 2019 (<https://www.forbes.com/sites/edrensi/2018/07/11/mcdonalds-says-goodbye-cashiers-hello-kiosks/#38f7ff646f14>).
- Richtel, Matt. 2012. "Housecleaning, Then Dinner? Silicon Valley Perks Come Home." *The New York Times*. Retrieved October 22, 2019 (<https://www.nytimes.com/2012/10/20/us/in-silicon-valley-perks-now-begin-at-home.html>).
- Ritschel, Chelsea. 2019. "A Company in Australia Is Offering Employees 12 Weeks of 'Life Leave' a Year to Travel, Work Part-Time, or Just Relax." *Insider*. Retrieved October 22, 2019 (<https://www.insider.com/ernst-and-young-offers-staff-12-weeks-of-life-leave-to-travel-or-relax-2019-3>).
- Ritter, Jay R. 2018. *Initial Public Offerings: Updated Statistics*.
- Sadler, Philip. 2010. *Sustainable Growth in a Post-Scarcity World: Consumption, Demand, and the Poverty Penalty*. Farnham, Surrey: Gower.
- Siegel, Ethan. 2017. "The Future Of Energy Isn't Fossil Fuels Or Renewables, It's Nuclear Fusion." *Forbes*. Retrieved November 15, 2019 (<https://www.forbes.com/sites/startswithabang/2017/04/12/the-future-of-energy-isnt-fossil-fuels-or-renewables-its-nuclear-fusion/#1888c3403bee>).
- SpaceX. 2015. "Hyperloop." *SpaceX*. Retrieved November 15, 2019 (<https://www.spacex.com/hyperloop>).

Stracqualursi, Maria. 2017. "THE RISE OF THE PUBLIC BENEFIT CORPORATION: CONSIDERATIONS FOR START-UPS." *Boston College Law Lab*. Retrieved

(<http://bclawlab.org/eicblog/2017/3/21/the-rise-of-the-public-benefit-corporation-considerations-for-start-ups>).

The Economist. 2017. "Why Europeans Slack off in August." *The Economist*. Retrieved October 26, 2019 (<https://www.economist.com/the-economist-explains/2017/08/25/why-europeans-slack-off-in-august>).

The Economist. 2018. "A Study Finds Nearly Half of Jobs Are Vulnerable to Automation." *The Economist*, April 24. Retrieved (<https://www.economist.com/graphic-detail/2018/04/24/a-study-finds-nearly-half-of-jobs-are-vulnerable-to-automation>).

Toplin, Jaime. 2018. "The Mobile Payments Report." *Business Insider*. Retrieved October 22, 2019 (<https://www.businessinsider.com/the-mobile-payments-report-2017-12>).

U.S Environmental Protection Agency. 2019. "Allowance Trading". *U.S Environment Protection Agency*. Retrieved October 26, 2019 (<https://www.epa.gov/airmarkets/trading/>).

U.S. News & World Report. 2018. "The 80 Countries With the Highest Quality of Life." *U.S. News & World Report*. Retrieved October 26, 2019 (<https://www.usnews.com/news/best-countries/quality-of-life-rankings>).

Vanderbilt, Tom. 2018. "Why Waymo's Fleet of Self-Driving Cars Is Finally Ready for Prime Time." *Smithsonian Magazine*. Retrieved October 16, 2019 (<https://www.smithsonianmag.com/innovation/waymo-fleet-self-driving-cars-ready-prime-time-180970713/>).

- Veblen, Thorstein. 1899. *The Theory of the Leisure Class: An Economic Study in the Evolution of Institutions*. London: Macmillan.
- VerBruggen, Robert. 2019. "Don't Tax Robots (Yet)." *National Review*. Retrieved October 26, 2019 (<https://www.nationalreview.com/magazine/2019/10/28/dont-tax-robots-yet/#slide-1>).
- Wagner, R. Polk and Thomas Jeitschko. 2017. "Why Amazon's '1-Click' Ordering Was a Game Changer." *Knowledge@Wharton*. Retrieved (<https://knowledge.wharton.upenn.edu/article/amazons-1-click-goes-off-patent/>).
- Webb, Rick. 2013. *The Economics of Star Trek: The Proto-Post-Scarcity Economy*. 5th ed. Amazon Digital Services LLC.
- Wei, Joseph. 2014. "How Wearables Intersect with the Cloud and the Internet of Things : Considerations for the Developers of Wearables." *IEEE Consumer Electronics Magazine* 3(3):53–56.
- Whetstone, Holly. 2018. "Growing Food in the Future." *Michigan State University: AgBioResearch*. Retrieved November 15, 2019 (<https://www.canr.msu.edu/news/growing-food-in-the-future>).
- Williamson, Lucy. 2013. "Tomorrow's Cities: Just How Smart Is Songdo?" *BBC News*. Retrieved November 15, 2019 (<https://www.bbc.com/news/technology-23757738>).
- Wood, John Cunningham. 1993. *Karl Marx's Economics: Critical Assessments*. Vol. I. London: Routledge.

Woodward, Katie. 2017. "Hydroponics: the Future of Farming." *Food Processing Technology*. Retrieved November 15, 2019 (<https://www.foodprocessing-technology.com/features/featurehydroponics-the-future-of-farming-5901289/>).

...