

DIGITAL

Digital

The book of the gen Z

Digital economy exists because people use or have some digital assets. what are we going to wait for before saying that they have some digital?

So, let's go digital

About the Author

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Preface

In 1850 a German economist wrote a book called “Capital”. Almost two centuries after another book called “digital” appears.

The main difficulty in realizing this work is that the presentation may lean too much in the computer and technology side, or it has a lot of e-business perspective. Because finding a good framework for the topic lead to make a wide assessment of the basic material and its connection not with business or marketing but the matter of economics. But before becoming a real economic fact, the digital economy started humbly like a little smoke.

It took 20 years of hard work in order to write this book which dwells an economic guide for the gen Z. It was my longest book.

The first step taken toward this book was Keynes and the digital written in 2006 after I freshly graduated in Economics. When I was working in the research and statistic department at the Central Bank, I noticed that many concepts in the Keynesian model are not conform to the way digitalization had impacted our society.

So, I decided to find something that really work. Thus, I went back to school, started taking classes from computer science, management , economics and all related areas that is connected to my work. At the side, I was working all the system from down to top and from the top to the bottom: street trash collector, central bank worker, amazon worker, doordash worker, United Nation worker, musician, software developer, novelist, data analyst, professor, business owner, marketer, insurance seller, driver, and so forth.... Until one day, I gathered enough material to be able to cover the subject.

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Besides, I noticed a lot of things. One of them is in people language they start saying : “Oh he makes , six figures a year...he makes 7 figures a year....” Instead of saying “.....thousands, millions.....” just the numbers of the digits which could mean that we are in the digital age.

Ladies and gentlemen we are happy to present you:

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Acknowledgments

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This work is also a work of the whole humanity. Starting from the first man that created the first hammerstone to all the people that leaves actually with me on this planet. And for all people, I meant, all those that had been accused of doing good, as well as all those that had been accused of doing wrong. Because if everything that occurred, did not happen the way they did, this book will not be written the way it is.

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Introduction

One day, I was in class of one of my professors when he said:

“ When You are playing draught and you switch to chess., you necessarily have to change the rules of the game”. (Forstater, lecture of 05/01/2024, Royal 104 UMKC, Kansas City, MO, USA).

It is the same in economics, when the social environment changes the economic rules change. The economic rule before the advent of the mercantilism is not the same as the one used in capitalism. After the crisis of 1929 with the advent of the Keynesianism, the economic policy turned a new page. For the same purpose, there is a need to change the rules as a new social system is taking place. This new system is set by the digital. And the digital had created its own economy.

The thing is that the way we conceive economy before is outdated reason why many new economist design the capitalist economy or the way economy theory is handled before the digital economy age, “ *traditional economics*”(Kara & Baban, 2011). It is behooves as new economists to find new theories that will fit the social reality that we are facing. Not only it will help the social community identify way to accommodate their economic behavior to their realities, but it will also help decision makers to apply decision according to the needs of the community.

The book of the gen Z makes a link between marketing and economy through the notion of influence curve, relationship that was difficult to show since the beginning of the two disciplines. This book is not against all the economic laws but it completes the jobs of all the great economist and put them together by explaining all the point of discordances. All the

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axioms and theorems used in economics are still valuable in this book. But better, here, there are additional concepts that are added to make them fit better the economic understanding of the present society.

The book will help us determine the difference between normal or traditional economy and digital economy. After, it is important to wonder if the laws applied in normal economy are the same as in Digital economy. The necessity to show examples about actions that legitimate the concept of digital economy is important for it will demonstrate that digital economy has its own rules that could not be applied to previous systems.

The digital not only transformed the way of life but also inoculated unconsciously a new ideology which is the digitalism. Digitalism not only impacted the process of production but also modified human mentality. Capitalism which is mother of digitalism is facing a new way of apprehension and control of human' society with the new echo of technology which in turn succeeded to influence it means of action.

The book in overall cover the following point

- 1- Definition of digital economy
- 2- Difference between Normal economy and digital economy
- 3- Laws applied in Digital economy
- 4- Examples that legitimate the concept of digital economy
- 5- Digital economy analysis framework
- 6- Digital economy functional environment

PART I: DIGITAL ENVIRONMENT

Chapter1 – Definition of digital economy

1-What is digital economy?

1.1 Different types of definition of digital economy

According to the medium

The first idea that comes into our head when we heard the term digital economy is that it is an economy that is based on the utilization of digitalized item. Even though today this definition is far away from what it really means today, it is true to recognize that the digital aspect of the medium of transaction, and the way the goods used in this type of economy are secured and stored dwells principally the digitalized form. Some writers consider mediums such as the computer network, the computer hardware, the computer software, the communication equipment and services, and the structure, as the fundamental tools required to sustain this economy.

“Computer networks, such as the internet, are the foundation of the digital economy. Digital-enabling infrastructure is comprised of the basic physical materials and organizational arrangements that support the existence and use of computer networks and the digital economy, these include:

- Computer hardware: The manufactured physical elements that constitute a computer system including, but not limited to, monitors, hard drives, semiconductors, wireless communications products, and audio and visual equipment products.

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- *Software: The programs and other operating information used by devices such as personal computers and commercial servers, including both commercial software and software developed in-house by firms for their own use.*
- *Telecommunications equipment and services: The equipment and services required for the digital transmission of information over a distance by cable, telegraph, telephone, broadcasting, or satellite.*
- *Structures: This includes the construction of buildings where digital economy producers create digital economy goods or supply digital economy services. The structures category also includes buildings that provide support services to digital products. This includes the construction of data centers, semiconductor fabrication plants, the installations of fiber optic cables, switches, repeaters, etc.”(Barefoot et al., 2018).*

Defined as an economy based on a digitalized system, this type of economy seems to look like an economy linked to technology. It is not a mistake to acknowledge this fact but the difference with the other type of economy such as capitalism or mercantilism is that their technologies are not so advanced to blur the entire economic mechanism. In other words, the fact that digitalism seems to sound a more technological term than economic is that the implementation of this economic system seems to push behind the hand of human being. The level of automation due to the fantastic results obtained in production due to the implementation of Artificial Intelligence systems had provoked the displacement of human labor in many areas where it had comparative advantage.

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It is important to add the Internet of things, which is one of the elements (Mannino et al., 2021) that helps for the lubrication of the digital environment. It is the factor that connect the consumers to the producers of the digital good. Leveraging on the opportunities offered by the Internet of things had leaded the digitalist to enhance the utilization of the smart device a conceptualization of the paradigm of Internet of Things (Silverio-Fernández et al., 2018). Introducing Internet of Things (IoT) and cyber-physical system (CPS) notions in many industrial areas had prompted a noticeable change (Wollschlaeger et al., 2017). The success of this phenomenon is so prominent that people could not conceive their life without the Internet of Things. The modern man has the feeling that he lost a part of his existence when he is not with his smart device.

Defining the digital economy according to the medium used which is the computerized system could lead us to affirm that: “No technology, no digital economy”. But it was the same since the beginning of trade between human beings. The technology is only the base of the type of economy that is applied.

According to an ideology

There is an ideological aspect that is enticed to the concept of digital economy. The main idea of having the digital economy is not necessarily due to the technology used. The concept of digital economy may surge by this principle of perpetual change which is an inherent principle of human being. This ideology of creating something new to change the old style of handling the economy may prompt the apparition of the digital economy. There is a gap of something new that needs to be filled, and the digital economy jus filled it.

“Interpreted in this way, the New or Digital Economy is about dynamics, not static efficiency. It is more about new activities and products than about higher productivity. What is really new

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in the New Economy is the proliferation of the use of the Internet, a new level and form of connectivity among multiple heterogeneous ideas and actors, giving rise to a vast new range of combinations. There are some measurable effects on productivity and efficiency, but the more important long-run effects are beyond measurement”.(Carlsson, 2004).

The economic agent bored by the principle of the capitalism may start looking for a new way to operate with economic system. He found through the digital a hope that allows him to express new desires and to experiment new methods.

According to the politique

Defined in a political view point the digital economy is an economy that allows the manager or the superintendent to adopt new methods of control and of management that is better and powerful than the one used by the capitalist. Thanks to the digital the digitalist know how he could do better than the capitalist. Digital economics helps the digitalist create a new game that people do not know because it is the only way to win at lower cost. The digital allows to generate profit by the destruction of the market as place of exchange in order to foster the separation of the individual and reduce social power. The result is exuberant it leads to the “Exponentialization” of the profit(Schneider, 2018). Something that the capitalist could never do before.

Digital economy versus Capital or Traditional economy

Now, it is a matter to face a problem that is part of the understanding digital economics. The issue is to find out if digital economy is included in traditional economy or outside of traditional economy. The term Capital economy represents the old way of doing economy. Some writers designate it by the expression “Traditional Economics”. This particular type of economy comprehends all the different types of economic systems until the advent of

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the Digital. even though there might be difference between ideologies such as communism, socialism, and capitalism, in our understanding the capital economy or the traditional economy is still the main substance on which all of them are settled. Thus, to find a solution to our concern, it is a matter to analyze the problem in term of dynamism of the economy.

If we understand that we are in a dynamic perspective which means that the phenomenon of digitalization is a growing process, Capital economics could be understood as a part of Digital economics. In other words it simply means that the number of people using the old methodology of doing economics are lesser than the number of people that uses the new method of economic system. For example, the probability is high that in the long run people will no longer use printed money anymore.

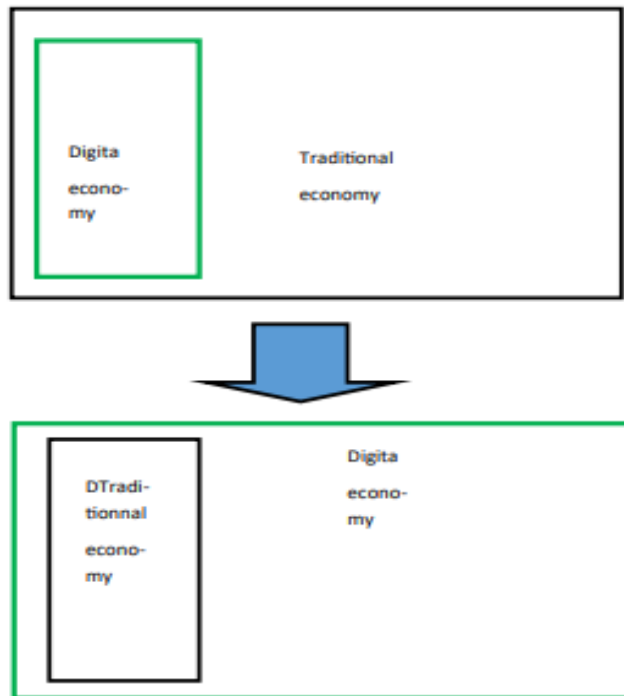


Figure showing the transformation of the share of both economies during the last three decades

Fig 1.1 Evolution of Digital Economics

In case we analyze the problem in a static view point it might be understood that Digital economics is part of the Capital economics. The fig 1.1 explains deeply how the static and dynamic perspective of the case could be apprehended. This belonging of the Digital economy to the capital economy is also due to the fact that capital was the source of acquisition of the Digital. In other word the technological progress that was the engine of the digitalism was the accumulation of the capital and the digital economy in his earlier days was just limited

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to the online business. to understand this dynamism, it is a matter to follow the explanation given below showing the evolution of the merchant good to the digital good.

1.2 Merchant good

The invention of money and specifically the coin was the beginning of the term merchant that open doors to the mercantilism. That was the first mean of transfer of human asset and sometimes human himself. The possibility to print value on the metal which is called money was the first medium to transfer human assets over the time and over the space. That was the source of pushing countries, empires, powerful men to run for metal and specially the precious ones: gold. Because metal had more power of conservation and we can print message on them it was used as mean of transaction and had shaped our lives since centuries. All the goods used at this time were merchant good.

1.3 Capital good based on paper cash

One of the brightest technological revolutions in human history was the British evolution combined with the era with enlightenment. But the medium that was at the base of this technological evolution was the paper. The same way as the metal was used, paper allowed people to print the value of their asset and transfer them over the time and over the space. This is the beginning of the capitalism. This allowed the rise of new kind of people who started to control the economic surplus by the new mean of transaction, competing with the owner of the land “the king” who owned the precious metals. Of course, the paper has a power of conservation but it is way more lighter. So light that it overthrows the metal from its upper position. It provides us “cash” which is easier to carry. All the goods used since this period became capital goods.

1.4 Digital good based on digit digital currency

The end of the second world war comes with the introduction of a new device called computer. It will lead in fifty years later to the advent of the era of Information and technology and the development of the Internet. Internet will be used to sell goods and make payment. People start taking pictures with device and do not find it secure to print them on a physical support. People start transferring their books, and knowledge on USB keys and computer hard drives or on the Cloud. The digital seem to have a power of conservation through space and time and is way more lighter than the paper. Besides, he is way more faster than paper transaction and clean. This is the digitalism. All the goods used since this period become digital goods.

1.5 Definition retained in this book

In this book we define the digital economics as follow:

“The digital economy is an economy where the mean of circulation of the economic flux and the value of storage of the goods is the digital.”

One would like to how could we store our physical asset. It is simple, as soon as you can put in a system the number of mileage, the year, Make and model of your car in a digital device you stored it virtually because you can sell it if you can send the picture of the title to the buyer and he also can sell the same car to someone else without a real need to see the physical car. The same way with your house. If you can give the year of building, number of room, the location and send the digital copy of your house to a buyer, you can sell the house with no need to make a visit. This is how physical goods are stored. And some times the digital

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proof or paper proof has more value than the physical because if you lose the title of your house or your car, they are no more yours. Even if you hold the car tightly or have proof of living in the house as soon as you do not hold the digital proof, this is not your asset.

In the literature, it could be assumed that Tapscott's definition of digital economy was micro-conceptual (Tapscott, 1994) because it is limited to the use of Internet contrary to the definition provided by the Eurace model (Nieddu et al., 2022) which is more extended to the whole economic system.

It is very important to mention that the existence of digital economics does not mean the extinction of the capital economy as for simple fact that capital economy did not suppress mercantilist economy. No, never. For just one fact: human. As humans, exist they need clothes (Even if body painting, or tape apparel are making their way out in the fashion market) at least for the winter, they need good French fries from McDonald, or the good Dijon mustard from France, and even better the good Wine from the south side of Spain to celebrate. And those are physical goods, called capital goods. Besides, for people to practice digital economics, they need laptops, iPhone, Androids, smart cars, light bulbs, and trucks and ships to ship them. And those physical items are capital goods. Thus, as the figure 1.1 is showing it, a digital economy will designate an economy where digital transactions will be dominant and where the share of production of the two other types of economy (capitalist and mercantilist) will not be significant.

2- Reason of having digital economy

In this section, it is a matter to wonder how we come to this stage of digital economics. Many reasons could be at the origin. But one of the reasons that brought us to this

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point is our ability to invent things. And when we invent things, our next step is to find if our invention could be beneficial to the society. This is a rational behavior because not finding outcome for our inventions means that the effort involved in the realization of those inventions are vain. for this reason, invention is the mother of necessity in a Veblenian view point (Veblen, 2022).

This instinct of invention justifies the existence of Research and development (R &D) everywhere. Organization through their research and development department invest energies in new technological tool development. Finding new tools helps organizations to whether tackle their topic with new approaches or save energies involved in the process of realizations.

Veblen as an institutionalist had worked on the importance that invention could represent for institutions. According to him, we create new things and find after ourselves having to adjust the way we shape society to the new discovery for the purpose to make our invention useful. Assuming that we do not know what we do know actually about computer and its new digital environment that it procures to us, we will just be evolving in our capitalistic universe. taking example from the development of the railroads, this revolution in the transportation world had radically transformed how we thought time. The necessity for people to be on time from one end to another had prompted the division of the world on time zone. Besides, the development of the accounting system had made comfortable the possibility to work with millions of figures and the promotion of the banking system.

Concerning the development of the digital economy particularly, the rise of the technology of communication in the 1990s associated with the development of the Internet were very significant factors that need to be considered. Those technological progresses had been

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impacted by the ability of combining computer coding with telecommunication signals. And many of the language such as Java,PHP and Html had played a major role in the implementation of those combinations.

The era of digital economy had been marked up by the way things done with physical support are not realizable with non physical support. For instance, the case of the photography is very relevant. Before all the pictures that was taken by a photo camera were supposed to be printed in a kind of band called film that is developed in studio and printed on paper. And this is extremely costly and time consuming. Now, every photographer use a digital camera. When the photographer takes a picture he just need to go to his computer and retrieve the picture from the folder in the photo gallery of his camera. He can also use a Photoshop¹ software or a Corel draw ²software to edit the picture to improve the quality of his work. This because all photos taken in those days are numerical.

The digital economy did not surge exactly like a mushroom. The role of the Internet had been really determinant. Not only it had made the process of digitalization feasible but it had also contributed to its fast vulgarization. The connection between people and their asset due to the introduction of the Internet wherever they are had steadily created as thrust in the digital world and allowed the easy conversion of the capital good into digital good. This capability of the Internet enhanced by the HTTP or HTTPs protocol was one of the main reasons that leaded the world to the digital environment. Besides, the development of better software and operating systems such as windows and linux and their susceptibility to be connected to the Internet are major points to be noticed in the new digital environment.

¹ Photoshop is a software design to edit pictures

² Corel draw is a graphic design software used by graphists

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Artificial Intelligence is one other factor that impacted the digital revolution. The term Artificial Intelligence could be define as

“the mechanical simulation system of collecting knowledge and information and processing intelligence of universe: (collating and interpreting) and disseminating it to the eligible in the form of actionable intelligence” (Grewal, 2014).

The connection of the AI systems with the Internet of Things favorized by the development of deep learning and machine learning had help the end user of integrated systems enjoy the convenience provided by the digital environment.

3- Synchronous, asynchronous, over synchronous in digital economy

One factor had made the switch from one type of economy to another. This factor that had made the preference of capitalism over mercantilism and definitely, digitalism over capitalism is the factor “time”. If digitalism seems to excel over its two other brothers it is because it had succeeded to defy the value of time. To discuss this propensity of the digital age it is a matter to analyze the capability of two events to be Asynchronous, synchronous and over synchronous. Let’s take the example of a basketball game. Let’s assume that you are watching a game that is played two days before. The two events are asynchronous because the game was already done and now you are watching it. The first event (event 1) is the game and the second event (event 2) is you watching the game. Those two events are not hold at the same time there are thus asynchronous. Let’s assume now that you finally got a day off and you can now watch the game on tv. You are watching on live. Event 1 and Event 2 are processed at the same time. They are synchronous. Here comes the fear. Assume that for any weird reason you watched the

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same game before it is played. That means Event 1 comes after Events 2. Now, they are over synchronous. And this is what AI systems are ready for.

3.1 Asynchronous

The beginning of human transaction was simply asynchronous because the need to see items whether in a barter economy or mercantilist economy is compulsory. The primary forms of economy were distinguished by the length of the time that exist between the time the economic agent orders an item and the time at which the item is delivered. Let's take the example of photography. At the beginning, to have a portrait of yourself you need to go to a shop where a photographer works and have an appointment. After, the day the photographer takes the picture, he will go and develop it. After all it might take one to two weeks for you to get your photo. And it is celebrated in the whole family. It might be funny, but it is the exact reality. And this particularity of the societal life of this period explains the asynchronous character of those types of economy.

3.2 Synchronous

We can define capitalist economy to be simply synchronous. The accumulation of the capital had prompted the influx of many technological realizations. From mechanization to computerization the laps of time between transactions are considerably reduced. The invention of the television, the radio, the telephonic system are many factors that had made capitalist economy synchronous. The person that wants to have a portrait of himself could make a phone call and check the availability of the photographer and get the photo done the same time and have a copy of the picture. But this time there will not be a serious celebration because "the harder the battle the sweeter the victory". Usually, human beings do not celebrate easy victory.

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3.3 Oversynchronous

Digital economy is an over synchronous economy. Digital economics is similar to a hunter that have a lot of magics tool in his hunting bag. One of them is called Artificial Intelligence systems which is enhanced by deep learning , photo recognition and robotics. Now this is how the game becomes interesting. With the development of Internet of things, devices are connected to machine learning systems and could eventually send you your pictures before you start finishing to thing about it. That is awesome. And it is possible. It is the same thing like watching a game before the game starts. Digital economics is an over synchronous economy.

4- When do we have digital economy

In this book every capital is a digital it is when we consider that all the asset existing in the economy are digitalized that we have digital economy. The process of digitalization is inherent for the qualification of an economy to be digital. Even if the economy is not completely digitalized, the trend should show a society being transformed into a digital world.

If every capital is a digital because of its ability to be transformed in digital asset we do not agree of the opposite principle stating that every digital is capital. It is possible to transform any tangible thing into intangible thing but turning intangible thing into tangible is feasible but it is hard and sometime impossible. For this reason, you may have some good ideas but transforming them into reality is very difficult. This irreversibility between capital and digital that we made is an assumption that provides us the ability to justify the inclusivity of digital economy into capital economy Therefore, a capital remains a digital.

5- Areas where digital economics are developed

To go digital, you need capital because technology is costly. Even if we praise the wonders of the digitalist era, there is a heavy price to pay for it. For this reason, the digital economy is not developed at the same level in every party of the globe. Only developed countries enjoy the privileges offered by digital economics. The whole infrastructure involved in the process of digitalization, such as computer networks, computer hardware, software, communication equipment and services, and other necessary structures, are not completely accessible in sufficient quantity in several areas of the globe. Even in some developed countries the process is not completely achieved.

However, countries like United States and China are competing to get the first place in digital economics. Apart from those countries comes Russia, the European Union, Japan, India and other countries of the global South. The heavy cost associated to the development of the digital economics justify the importance of this economy in the OCDE countries. Those countries had started to accumulate the capital since many years, and this had given them the opportunity to finance their digital infrastructure. The rapid rise of China in the domain is due to its capacity to be the production factory of the world, position that helps for the acquisition of the main infrastructures required for the development of the economy of the digital.

For the case of developing countries, many of them suffer from the acquisition of the minimum infrastructure required and sometimes lack of energy to power the functioning of these structures dwells a major problem. Besides, the knowledge required to maintain those structures is not matching the technological demand associated with them. Moreover, the use of the Internet of Things necessitates a certain level of life standing of the population. Many of

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the developing countries struggling with an economy of subsistence are not yet ready to afford this luxe.

6- Example of characteristic elements used in digital economy

One of the characteristic elements that could be distinguished in digital economy is the availability of digital currency. In the US the more common one is the bitcoin. It is usually available through payment application like CashApp, Zelle and so forth.

One other element of digital economy is the smart phone android or iPhones. They are part of the Internet of Things and play important role connecting platforms and sometimes help for the digitization of capital goods. Aside from the iPhones, comes the Ipads. They are very useful for the digital environment. They are used as repository for application that requires enough screen length for convenient utility. They remains an intermediary between laptop and cell phone in other words they could function like a cell phone but not completely (because they have bigger size) and they could function like a computer and not completely (because they have lower size and less capability).

Another elements that could be cited in the economy of the digital is the payment by phone application such as CashApp or Zelle. At the beginning those elements have unlimited amount of transaction inside and outside the United State. But due to many other reasons limitations had been imposed to the amount to be transferred.

As main part of the digital economics comes the platforms. The platforms are websites that have users accounts. They could be public used by the government or private belonging to private entity. In the occurrence comes the online retail platform such as Amazon,

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Alibaba, Online broadcasting platform like Youtube, Rumble, the online rideshare platform such as Uber, the online banking platform like Discoverit, food delivery app like Doordash Grubhub delivery or the online music store platform such as Spotify.

7 -Advantage of digital economy

The first advantage of going digital is the increase of productivity. And in the literature the choice of a new automation process's objective is to have more production in a certain period of limited time. The production of digital good reduce cost and are time saving compared to the production of capital good or physical goods. the example of the photographer shows us the difference between having a printed picture in the late 50s cost and having a numerical picture in this era of digital.

Moreover, digital economics allows extended reach in this sense that when you are going digital your space of maneuverability is not limited to your neighborhood or your country. You are opened to the world. Digital economics give you access of more data and this is beneficial because information is the main source of productivity. Because production is the mean society use to respond to the need of the community. And data collection is the only way to get knowledge about those needs. As other benefits we can add, greater convenience, improved customer relationship, personalization, discretion

8 -Inconveniences in digital economy

If it is true that digital economy represents a huge opportunity for many economic agents, it has also some disadvantages that need to be considered. One of the

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disadvantages is the lack of privacy. Data that users generate are stored in servers. But the issue is that those servers are interconnected through the Internet. And the protection of those data collected from users represents an important cost for the platforms and the server owners.

Another issue correlated to the privacy one is the problem of security. Business owners and government need to prevent their digital systems against cyber-attacks. The amount of money that government spend to protect their digital environment is becoming considerable and this also represent a barrier for poor countries to digitalize their economies. Not taking necessary measure to secure a digital environment could prompt a wave of disruption in the digital system.

Displacement effect(Chen et al., 2022)is one of the major risk that represented by the digitalization of an economy. In fact, the implementation of an automation technology is followed by a displacement and also by the reinstatement effect (Acemoglu & Restrepo, 2019). But the problem in digital economics is that the displacement effect is way more important due to the excessive automation process associated with this type of economy. In the overall the Net Automation Effect in this period becomes negative because the displacement effect is greater than the reinstatement Effect(Viwanou Aloumon, 2024).

It is also important to notice that the existence of the Platform economy had been associated (Kenney & Zysman, 2020) with a more monopolistic situation that does not offer opportunity of free trade between users operating in those platforms. Even though some adjacent platform give opportunity to users to switch, the idea that those platforms are like a community, confers them a statute of society or better a market, thus the necessity to promote free trade. Unfortunately, it is not the case.

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Besides, digital divides. The use of digital technology has prompted the division in every cell of the society. When you take example on a family, before the advent of the internet, a whole family could be gathered in a living room to watch tv. But today every member of the family is in his corner scrolling their Iphone or Ipad. Another example is given by the way people behave when they are gathered together in a car or a waiting room. Instead of talking to each other or sharing stories, everybody is hung to its smart device.

Taking example on the photo, because of the digital it is hard to see pictures of people in the living room. We do not print photo anymore and if we want to do it, it seems like something that is costly and we prefer to wait for the better one that will take in with the smart device and sometimes it appears that the best one never come out. By doing so, there is a risk that our history could vanish in one single day if those devices could not work anymore. And this may constitute a huge historical issue because if we are able to reconstitute our ancestor's life, it is due to tracks they left behind millions of years. But today our life is encapsuled in some small devices that have almost two years of life expectancy.

Digital age is over synchronous and over supplier. It is a better way to enjoy the rapidity, the guessing, and the availability ability of Artificial Intelligence systems. But in the other hands, this characteristic of the digital age kills our ability to love and enjoys events. For example concerning the ability of being over synchronous, you will be bored when you have a friend that always provides you with things you need even if you do not ask him. At the end of the day you will be bored and become skeptical. The multitude choices offered by digital economy prevent people to take time and listen to music for example. People are reluctant to wait for a song to finish before switching to another on Youtube. We are flying over our feeling because we have 1000 songs to listen to and 1000 TV shows on 100 channels to watch. Finally,

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we do not watch TV anymore not because we do not have TV but because we do not know which channels to watch.

Chapter2- capital to digital and capitalist to digitalist class

1-Capital to digital: the Digital formula

1.Definition of capital

Capital is wealth considered as asset owned by an organization or an entity that is available for starting a business or ready to be invested for the purpose to generate profit.

According to Karl Marx,

“As a matter of history, capital, as opposed to landed property, invariably takes the form at first of money; it appears as moneyed wealth, as the capital of the merchant and of the usurer.¹ But we have no need to refer to the origin of capital in order to discover that the first form of appearance of capital is money.”(Marx, 1976)

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Capital is necessary to produce goods or services and even though its first form is money, it could be assessed in various forms such as economic capital, human capital, societal capital, cultural capital, intellectual capital and so forth...

The beginning of capital started in the 16th centuries with the beginning of market and commerce expansion around the globe (Marx, 1976). It became an essential instrument in business because as a form of money it could be transferred over space and over time. This had been the particular ability that promoted its divulgation since its existence. The use of capital had been beneficial for human society because its management had allowed the generation of consistent profit that had been used to support technological progress. The management of the capital was also at the origin of the scientific revolution because capital owners had seen the link between knowledge and technological progress. In society, owning a capital becomes a sign of success and respect that allow people to distinguish themselves among their peers. The importance of capital had grown to this extent that it remains the main goal followed by every member of a modern society. People with no capital can not do any realization or be part of any project. Therefore, the purpose of organization is to accumulate a lot of wealth as this dwells the only way to get the capital.

A capital has a real value when it is used as part of a production process. And the value of this capital as asset can increase or decrease all over the time. The increase or the decrease of the value of the capital depends on how useful it could be according to the space and according to the time. For example, if someone has a capital converted in a money, if this currency is linked to an economy that is not performing well, the value of the money will decrease and therefore reducing the value of this capital.

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As capital is required for the beginning of a business, many models production had introduced it in their modelling as main factor of production. One of the most conventional function of production is the Cobb-Douglas one that is function both of capital and labor (Cobb & Douglas, 1928). The particularity of this function was its ability to be mathematically manageable and represent the concept of combination between capital and human labor in the production process. It had been possible using this function to discover what type of factor is more used by the production system therefore deducting if the production process is capital augmenting or labor augmenting.

It is also important to make a difference between tangible capital and intangible capital. A capital is said to be tangible when it is possible to transform it, or assess its value in term of money. Lands, vehicles, software, buildings are diverse items that are considered as tangible assets. In the other hand, intangible capital or asset cannot be touched and is hard to be converted in monetary asset. Permits and licenses are examples of assets that are intangible. However, Digital assets are considered as tangible assets.

2- Capital giving birth to digital

To discuss about how capital had given birth to the digital it is important to acknowledge how our society is going a fast process of digitalization. Referring to some research works,

“digitalization or digital transformation – changes not only the means of production, but also the way humans and machines interact as it leads to a deeper interconnectedness of the physical and the virtual worlds. Thus, the potential effects of digitalization are expected to be widespread, including not just flexible working hours, work practices, and workplaces, but may also spillover to private lives by shifting the boundaries between work and leisure. Digitalization is expected

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to bring many opportunities, such as new types of work that can create labor market attainment for people previously excluded from gainful employment. Digitalization can also change some work activities done by humans, thus changing demand for occupations and creating new sources for income inequality. For these and many other reasons, the digital transformation remains of critical interest to both researchers and policymakers.”

(Fedorets et al., 2022)

This change of means of production is also followed by a change in the output resulting from the system of production. If the author acknowledge that there is a transformation of the whole society due to digitalization this change is materialized by the type of item that we use. Besides, those device that are used to digitalize the society most of them are computer software, which in fact are digital goods per say. However, one thing we need to recognize is that it is from capital that those transformation are coming from. You cannot digitalize your company if you do not have any capital. For this reason, it appears clearly that capital is giving birth to the digital.

The method used by Capital to give birth to Digital is automation. As new automation process are implemented, the technology used replace the share of task accomplished by labor. According to some writers,

“Automation corresponds to the development and adoption of new technologies that enable capital to be substituted for labor in a range of tasks. Automation changes the task content of production adversely for labor because of a displacement effect—as capital takes over tasks previously performed by labor. The displacement effect implies that automation reduces the labor share of value added” .(Acemoglu & Restrepo, 2019).

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When the implementation of the new automation system leads to a displacement effect, capital takes over tasks done previously by labor. In fact, it is not capital, that performs the task but the new technology adopted. Therefore, it could be understood that technology becomes capital due to the automation process. As the technology adopted is digital, thus, we can conclude that capital becomes digital. Besides, this process of transformation of capital into digital is still increasing.

“The second machine age is the result of a digital revolution based on a small number of general purpose technologies (Bresnahan and Trajtenberg 1995), in particular computers, communication technologies such as the Internet, and digital sensors. The new technologies are combined with each other and other inputs to create new processes, products, and business models such as e-books, intelligent robots, fully automatized factories, or e-mobility. Digitalization will eventually affect all industries and create new ones; this is after all the idea of general purpose technologies.”(Schneider, 2018)

3- The formula of the Digital

It is impossible to deduct the formula of the digital if we do not refer to the source that generates it. As mentioned in the previous section, digital comes from the capital. And its formula is described in “the capital” of Karl Marx. According to his words,

“In the circulation C-M-C, the money is in the end converted into a commodity, that serves as a use-value; it is spent once for all. In the inverted form, M-C-M, on the contrary, the buyer lays out money in order that, as a seller, he may recover money. By the purchase of his commodity he throws

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money into circulation, in order to withdraw it again by the sale of the same commodity”.(Marx, 1976)

If we consider C commodities as capital good in our understanding of the formula above, M as money and D as digital, we can deduct the formula of the digital as follow:

In the circulation form: D-C-M-C-D

In the inverted form: M-C-D-C-M

In the circulation D-C-M-C-D, the money is in the end converted into a capital. and after into Digital. In the inverted form, M-C-D-C-M, on the contrary, the buyer lays out money in order that, as a seller, he may recover money. By the purchase of capital goods, he throws money into circulation, that eventually will turn into Digital, and this digital will come back in form of capital that the seller will withdraw by the sale of the same capital good that will be his money.

4-Explantion of the transition from capital to digital

As stated, before automation was the principal engine that had dragged our society to digitalization. But the objective of automation of production systems is productivity, and the idea behind the increase of productivity, is, the augmentation of capital. When there is a possibility to increase the capital, there is chance to think about medium of its accumulation. In other words, the desire for organizations to look for technological advance result, at the end, in the accumulation of the capital.

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But in the digital automation age, the transition from capital to digital is provoked by the exponential productivity offered by digitalization of production process. refereeing to the words of Shneider,

“ To explain why the digital revolution will develop much like the increase in the number of rice grains when doubling from one square to the next on a chessboard, Brynjolfsson and McAfee(Brynjolfsson, 2014) quote the idea of “organizational capital.”” (Schneider, 2018).

Associated with the Internet, the productivity growth offered by digitalization could be leveraged through cost reduction, realization of economy of scales due to the extended reachability, the speed of transactions and thrust on the correctness of the operations. In case proper measures are taken, the digital world is revealed more secure than the traditional environment of operability. In term of privacy, the digital revolution had helped people to protect their action through the reduction of interactivity. The only way that will allow people violate this privacy is when they decide intentionally to break through your network of operation. But in the overall, no one is supposed to see what you are doing in the digital age. And this feeling to be alone in performing your task provide a certain level of convenience.

5- Beginning of the transition from capital to digital economy

The beginning of the transition from capital to digital started with the invention of the computer. The use of computer in businesses, started by the introduction of UNIVAC I the first commercial computer in 1951(Yardley, 2019). This computer revolution will be followed by the development in computer programming called software. Software system will be improved by the evolution of the Operating Systems like Linux and Microsoft. Years later, the combination of those computer discoveries with the telecommunication capabilities will

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lead to the rise of the Internet which will open doors to a new era of business style like the B to B business, B to C or C to C business logic.

The success of this technological progress will lead to the rise of the dotcoms. The dotcoms revolution will be troubled by the bug 2000 phenomenon that will lead to the disappearance of many of them. Those that survived will be transformed in huge platform and dwells the leading head of the actual digital economy.

The next step in the development of the digital transition will start with the connection of the mobile phone to the Internet. get into internet. The transition were facilitated by the touch screen phone that allows the easy scrolling of the browser and the easy selection of items.

The digitalization of the society at this steps associated computer capability, and telecommunication capability. The last step will be the association of the artificial intelligence systems to not only the smart phone, but to all the electronic devices used in human society.

After all those steps, the covid 19 pandemic will be the last jump that will connect definitely to the digital age. The covid 19 crisis is associated with the introduction in the digitalization system the 5 G technology with the goal to fasten electronic transactions.

6- Algebraic explanation of properties of capital good and digital good

If we assume that Y is the revenue earn by selling a good

P the unit price of the good sold

Q the quantity of good produced, the relation between the three factors is,

$$Y = P \times Q$$

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Let's assume that N is the number of persons buying this good,

Capital good

For capital good

$$Y = P \times Q = P \times N$$

Which means $Q = N$

Digital good

For digital good

$$Y = P \times N$$

And

$$Y \neq P \times Q \Rightarrow Y = P \times Q \neq P \times N \text{ thus,}$$

$$Q \neq N$$

In fact, this means that in capital economy, the quantity of good produced is equal to the number of the person that consume the product. But in digital economy the quantity of the good produced is not equal to the number of persons who consume the products. This in fact means that the digitalist produce the good one time and through the use of the technology it had been possible to sell the one product to thousands of people. But the capitalist, need to produce the product thousand times before to sell the product to thousands of people.

For $N=1$, the equation

$$Y = P \times Q = P \times N$$

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Is verified for both capital good and digital good as:

$$Y = P \times 1 = P \times 1$$

But for $N > 1$

$$P \times Q \neq P \times N \quad \text{for the digitalist.}$$

If we assume that Y_c and Y_d represent the respective incomes earned in capitalist and digitalist economy, Q_c and Q_d represent the respective quantity produced in capitalist and digitalist economy, N_c and N_d represent the respective numbers of person buying the good in capitalist and digitalist economy, we have according to the equations above,

$$Y_c = P \times Q_c = P \times N_c \quad \text{and} \quad Y_d = P \times N_d \neq P \times Q_d$$

The rational for people to go digital is that,

$$Y_d > Y_c$$

$$\text{Which means } P \times N_d > Y_c$$

$$\text{Or } P \times Q_d > Y_c$$

The second equation is impossible because in digital economy the digitalist produce the good just one time which means that $Q_d = 1$ and the price is unchanged no matter the economy. The only way where the digitalist can have

$$Y_d > Y_c$$

$$\text{Is when } Y_d = P \times N_d > Y_c$$

$$Y_d = P \times N_d > Y_c = P \times Q_c = P \times N_c \quad \text{as the price remained unchanged,}$$

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It comes to have

$$N_d > Q_c = N_c$$

The only thing that allows this miracle to happen is h the technological rate of progress or in simple words, the technology.

$$N_d = hQ_c = hN_c \text{ in such sense that}$$

$$hQ_c > Q_c \text{ and } hN_c > N_c$$

It is also important to know that the value of h itself could be inflated by the coefficient of influence (f), as h itself could be assumed influence coefficient ($h=f$). For example, two online retailers are already using the possibility offered by the rate of technological progress (h) as digitalist but the coefficient of influence of one or the other will impact the difference in revenue earned by those two retailers.

7- Example of capital going to digital economy

There are many examples that could demonstrate how the society is transforming into a digital environment. In the financial environment, we can cite the example of the banking system that had been through many processes of automation. As many other institutions, the banking system started with all the processes required for a competitive entity. One huge step in its automation process is the introduction of the ATM machines. The benefit of this process is that it allows people to withdraw and deposit money outside the regular hours of business. This process is facilitated by the utilization of debit and credit card that was also used as mean of payment. The last step that followed is the digital banking. With this last business logic, people are not compelled to be physically present in a bank to assure a financial operation.

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Another example of organization going digital is the retail store like Walmart, Target or Home depot. They all started with traditional business model, such as simple sale, printed catalogue, and with the development of computer algorithms finished by managing their stock and the repartition of their inventory successfully. Now, their inventories are connected to website and could allow customers to purchase items without the need to be physically present in those stores.

The same process had been followed by institution in car business such as Carmax, Carvana and so forth. You do not need to go to a car store before buying a car. You can just go to the store online search for the car you want and then check its availability. There are representative on the car store website who are ready to help you and provide you necessary directive to achieve your goal. And as soon as you complete the transaction, the car could be delivered at your preferred location. And the same process could be followed if you want to sell your car. You can just send the digital information required for the identification of the car and the store that want your car will come and pick it up at your desired location.

8 -Difference between capital -digital analysis

Finding the difference between capital analysis and digital analysis refer us to the development made according to fig 1.1. However,the difference may dwell in the analysis of cost of production and the return on investment.

“In traditional economics, the cost of production decreases as the production rate increases (scale economics is valid). After a certain level average cost begins to increase again (scale diseconomies) In other words; as the production increases, after a certain level the cost increases gradually. On the contrary, in Knowledge Economics cost decreases gradually as the production increases. Decreasing cost style is one of the most important features of new sector

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which is formed by Information technologies. The structure of cost in digital goods and services production differs from the traditional production. Producing digital products goods generally require great deal of investment at the beginning”(Kara & Baban, 2011)

Referring to Kara and Baban statement, the difference between the capital and the digital analysis could dwells in the cost of production and the profit generated. When it seems like at the beginning the investment cost of the two kinds of production could be different, the same difference is observed at the level of the output resulting of the production process. Investment is higher for digital good production and lower for capital good production but the profit are lower for capital good at the end and the profit are higher for digital good at the end.

The difference between capital economy and digital economy could dwells also in the nature of the good. Generally, digital good are essentially service good. The things is that things that need physical material as factor of production are very difficult to be digitalized. For example, having a digital tomato to eat dwell a really complex task to do than watching a digital photo.

9 -Relationship between capital -digital analysis

However, in term of the rational pertain to any production the logic is the same. The rational of producing a capital good is to make profit and the same rationality is applied to the production of digital good.

The same rational that push the producer to opt for the production of a capital good or a digital good is the same which is to satisfy a specific need. Capital goods have the goal to responds to particular type of need of the society. The same characteristic is shared by the digital good also.

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There is point where capital good and digital goods are identical. It when the nature of good produced is not tangible. One of the case is the service good. Service good could be digital and capital at the same time. For example, when you have to rent a car you have the choice for the same specific type of good to choose the nature of the service you want according to certain criteria that may be advantageous to you. You can decide to go online and rent your car or to go to the next closest office and make your reservation.

In term of transaction of goods digital good have only one way of transaction which is the use of telecommunication medium to assure the transfer of the good and the money. Instead, capital good may use two ways of transaction method. The first is the cashing method or the telecommunication method to the flux of money and only the physical method to the transfer of good. But the point is both types of economy could use the telecommunication method to the transfer of money. By telecommunication method, we understand by this term, credit card, debit card, online banking systems and so forth.... The financial and physical flux for both types of economy are identical only in case of service good

10-Preference of capital instead of -digital now adays

Even though the phenomenon of digitalization is an increasing social fact, there are still cases where people will prefer to use capital instead of digital. In areas where there is not enough security merchants prefer to receive cash payment instead of getting paid with debit or credit card or any other digital method of payment. For example, in some gas station in remote areas where the criminality is high merchant are reluctant to accept digital as payment method. They prefer to touch and carry their money for more security purposes. This underscore the importance of security measure to be settled in order to enjoy the benefits of digitalization.

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One other case that will lead people to have an aversion for the digital is energy crisis. When this occur in some areas, the main problem that appears is that financial transaction are disrupted. For this reason, in countries like Cameroon where power outage dwells a major problem, citizen will prefer to use traditional method of economy.

Sometimes people do not want they transaction to be tracked. In this case they prefer to use cash instead of using the digital method. For example, people for any specific do not want their position to be tracked or their activity to be monitored. Those kind of people generally, have aversion to digital. Some business men for the purpose to involved themselves in tax evasion activities refuse to use digital because it could be easily tracked by fiscal agencies. Meanwhile, it happens cases where people are victims of identity theft or phishing. To protect themselves against further tentative, the victims just decide to stay away from any digital environment.

Other cases that constrain people to refuse the access to the digital world is usually, when powerful organization can take money out, of their digital wallet without their consent. This because they make a one time a digital purchase which provide the organization their banking information. People usually prefer capital when they travel to unknown area.

11- Preference to digital instead of capital

Most of the time people have preference for digital because it is clean, fast and easy to carry. If you want to show thrust it is good for you to use digital because it shows that you are part of the global systems and you have nothing to hide. If you want people to know who you are, you are not scared to go digital.

Some banking organization after octroying a loan to their client try to test the operability of their client digital payment method. They do so to verify if the information

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provided by the lender is accurate. This usually method used by institutions to attest the credibility of their clients. Those one of the common cases where digital is preferred to capital. It could be understood that, in the occurrence, people prefer digital, because digital means trust.

If nowadays something is easy to carry, it is digital. No matter if it is on physical debit or credit card, digital card on your smart phone or just a digital wallet from Cash App, Paypal, Venmo, Apple Pay or Zelle, digital is easy to carry. For this reason, people prefer having some digital than having a capital. And this for people in cities who have to look clean and run with their asset. Sometimes, it is too hard to carry thousand dollars in your physical wallet because if it is in bills of twenty dollars, your wallet is reluctant to slide in your pocket and even if you succeeded to bury it in, your outfit will look very strange. Unfortunately, those were the same reasons why we went from mercantilism to capitalism, because carrying hundred thousand coins of cents in you pocket is just worse.

Digital transactions are fast than we can never expect before. Even though because of this factor, some people may not know how to count exactly nowadays, Digital transaction are faster than capital transaction because no need to count and double check and is accessible on many devices and everywhere you go.

2.From capitalist to digitalist

1-Who is digitalist

The digitalist is simply a person who has some digital. As the capitalist has some capital so does the digitalist with the digital. People are more admired when they can prove that they got some digital and some capital. The meaning of this capability is that you show proof that you dispose many type of liquidity. You have some cash and you have money on your bank account. It is to be understood that as cash is pertained to capitalism and digital is linked to

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digitalism. If the digitalist is someone who has some digital, it does not imply that he does not have capital. It could also mean that he had money which in his digital wallet on his bank account. Back in the days, you need to make a physical deposit of gold or metal or paper money in your name at the banker office to show proof of wealth.

The digitalist earns money by selling digital goods in most of the cases. He provides also digital service through platforms or many other ways where he can exchange his non-physical asset against some digital financial reward. He uses the digital to control people around him and maintain his social position. He controls people's life because he owns the digitalist means of production: which are the server (or website) and the emitting system or broadcasting system of the digital world (satellite or antenna). Therefore, he has power on people's behavior.

The digitalist is a capitalist per se, but he has just upgraded the old methodology of capital accumulation. When the bourgeois capitalist is a man with a big belly, holding a suitcase full of clean cracking cash money, the digitalist is a good-looking person because the visual is important in the era of information and he holds no suitcase because he has his digital card. Capitalist could become a digitalist and get into the digitalism.

2-Difference between capitalist and digitalist class

Two institutions form the substance of the modern capitalist class system: State money and property. As state money, we can understand through this term any form of monetary asset but issued by the central bank or the government and by property any asset that has a tangible or intangible value. The difference between digitalist class and capitalist class is that the digitalist class has created a new form of propriety that is different from the old method of wealth assessment. The main institution that sustains the digitalist is the digitalized property.

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This digitalized property is sustained by servers, website domain, satellites, platform, digital accounts, and so forth.

The digitalist class and the capitalist class may have differences in ideology. The digitalist tend to be a Trotskyist or a globalist. His ideology comes from the idea to conquer the digital world. A globalist has always the world in his mind as a global village. This provide them the feeling to be stateless: digitalist class do not have a country.

The digitalist class is against discrimination while the capitalist needs discrimination in order to divide and conquer. If the digitalist does not have to deal with discrimination it is because the job is already done by the computerized system. In the occurrence, the use of distributed system gives the ability to keep people connected but not giving the ability to people to see what his neighbor is doing. The digitalist does not see his peer or his partner he is behind the screen.

The digitalist class has the propensity to be more smarter than the capitalist class with the help of Artificial Intelligence. Digitalist for example gets good from customers and sell it to them. The example of Youtube or Rumble show how the content is provided by users and bought by users.

3- How do we become a digitalist

There is multiple way to become digitalist. The easiest way is when you have a capital. Because technology is convertible into capital and capital to technology, you can just buy some technologies that will provide you some digital. As example, if you are a banking organization you can just decide to put your organization online. As soon as you transform your

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physical business into online one, you became a digitalist. That is for people who do have capital.

Concerning people who do not have capital, the methodology is different. If you do not have capital, you become digitalist when you switch from earning money by working to someone and start earning money by your digital asset. And you own the mean of production of this digital asset. And this is according to the foundation of the digitalist class system. As example when you have your own website of music. You are a digitalist. In the other hand, someone who work and get pay by an online food delivery such as doordash, Grubhub or Uber eat, is not a digitalist and could not become a digitalist. He could become a capitalist if he could by his work accumulate enough cash and get properties. But for him to become a digitalist he needs to own the “Digitalistic mean of production”.

To belong to the digitalist class, the possession of one or two or even many Digitalistic means of production is important. Sometimes, people do not have the possibility to have servers and telecommunications structures to run their own Digitalistic mean of production. But they could rent domains from other bigger organization and use it to generate their digital asset. For example, you can open an account on an online retail website and start selling Item. For example, people completely sell their digital asset on Ebay or Alibaba. Besides, it is important to know that you can generate digital assets by selling capital good.

4- Reason to become digitalist

There are reasons that lead people to decide to become a digitalist. The first reason is the desire to work less and get more money. As developed above, the profit generated

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by the Digitalistic mode of production is astounding. This is the main reason that attracts people to the digital world.

Besides, when we have difficulties interacting with people becoming a digitalist becomes an opportunity to have a claim on the surplus of production. Many people do not have the charisma to influence in business and most of the time fail when they need to meet customers or client for a business discussion face to face. The Digitalistic mode of production help producer to skip the issue prompted by interactivity while assuring the digitalist with the expected results. Sometimes, people with handicap are category of individuals associated with those kinds of problem.

As the phenomenon of digitalization is spreading on all the social layers of human community, traditional companies wanted to follow the trend by turning into digital. Besides, business owners in order to use ERP³ have to adjust their technological structure to a higher standard of digitalized system. Finally, they end up by digitalizing their entire structure.

Becoming digitalist could mean for communities to go paperless or a better way for the purpose of modernization of a country or a mean for law enforcement to prevent crime due to oversynchronosity ability of AI systems, or a fast assessment of the economic surplus. Moreover, when blue- and white-collar employees are pressed to routine task job, they try to become digitalist as a way to recover their social status.

5- Location of the top digitalist class

It is true that every body could become a digitalist and belong to a digitalist class. However, there are locations where there more concentration of digitalist than other. The area

³ ERP stand for Enterprise Resource Planning which are outside computerized resource system used by company to foster their normal operations

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of the globe where there more digitalist class concentration is in the developed countries such as the OCDE countries. This because the digitalist movement started from there and the cost and structures required to have a Digitalistic mode of production are affordable in those countries.

Many great platform owners such as Facebook, or Twitter or Instagram are all based in United State and are very popular. But it is essential to notice that people use those platform to generate huge revenues and be part of a digitalist class. In Germany also, cars company like BMW are becoming digitalists because they provide a lot of services online such as car programing or registration or even diagnosis.

Countries such as Russia has also a digitalist class that provides a lot of online resource essentially anti virus for computers and hosting for websites. Besides, there are companies in India that are important in providing digital services and form an important digital class.

Besides, it is important to underscore the important place occupied by the Chinese digitalist class. China has many platforms that are challenging for many digitalist class in the world.

The global south unfortunately does not have the means to sustain a real digitalist class. That does not mean that it does not exist. It exists but not in a huge concentration as in the developed countries. Except South Africa, poorly developed African countries are suffering from energy problem, and this is not a favorable situation for the development of a digital environment. It is important to noticed that digital economy is energy consuming.

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6- Example of digitalist

As first example of digitalist, let's take the example of a You tube worker. A YouTube worker is a digitalist because he had a digitalist mode of production which is his Youtube account. Besides, the content that he provides as a youtuber belongs to him and this content will provide him some digital as soon as people are watching his videos.

There are companies that started from physical goods to digital good. For example, we already provided the examples of supercenters that started with the sale of physical goods as groceries and become digitalist by selling digital services which is to deliver groceries or home items to people online through their online website platform. Those companies' owners move from capitalist to digitalist by digitalizing their production process.

In addition it is important to notice the activities of the online retail companies such as Alibaba and Amazon. The owner of those businesses are digitalists because they completely detain their own Digitalistic mode of production. They have their own website, servers, satellites, telecommunication structures. Amazon for instance, provide some digital services even to the government through its AWS (Amazon Web Services).

There is one thing that is important to discuss is the person who own shares in a company that is a digital organization. If owner of a company like Amazon is considered as a digitalist, people who own share of Amazon and receive dividends are also digitalist. Because they are considered as owner of the digital asset that constitutes the company.

A person selling on ebay and generating important revenue form his sales is a digitalist because he own his source of digitalist production which is his account and the amount of his sales is transferred to his digital wallet.

7- Power comparison of digitalist and capitalist class

Making a power comparison between digitalist class and capitalist class comes to make a simple comparison of mechanism of control of the digitalist and the capitalist. There is one thing to acknowledge is that profit made by digitalists increases exponentially while the one of the capitalists is not following the same path. The difference in the growth of productivity is a good point of comparison that could lead to affirm that on that particular topic the digitalist is more powerful in term of revenue than the capitalist. Companies that had been able to generate more than trillion of dollars in revenue during their existence is companies that are in the digital environment. Digitalist in term of revenue are powerful than the capitalist and this justify the rush of many entrepreneurs toward the digital economy.

Due to the advantage of the telecommunication structures and the Artificial Intelligence systems, the digitalist has greater power of control of the worker than the capitalist. For example, when drivers are no more desired in ride share platform, they are just kicked off from the platform and drivers are left with no job and they do not have any other places where they can go and complain. The online food delivery companies can give you any pay they like for a delivery and drivers do not have any way to confirm the reality of the payment they received. The main factor that provides this power control to the online companies is the advantage provided by the Distributed systems which is a collection of independent computers that appears to the users of the system as a unique computer. This is different from the system of network. Because of this principle online workers could be millions but none of them will know each other or know what his colleagues is doing. This separation of online workers does not allow them to constitute a movement to confront the digitalist class. The principle of divide and

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conquer is perfectly respected providing amazing power to the digitalist compared to the capitalist.

8 -Advantage of the capitalist class and digitalist class comparison

The advantage of making a comparison between the capitalist class and the digitalist class is that it shows how of the capitalist class is on his way to give place to a new class of societal leadership. That does not mean that the digitalism is the end of the capitalism class as the same way that the capitalism class appeared and reduced the power of the monarchism who owned the Imperialistic mode of production that was Mother Nature or the land. As we can see the Imperialism or monarchism still exist aside of the capitalism who still own the industry as main Capitalistic mode of Production.

The advent of the digitalist could bring the evolution of a new ideology that will reshape the society as the advent of the capitalism system provoked the French revolution and reduced the power of the monarchy. It may be possible that the advent of the digitalist may trigger a new social movement that we are not expecting.

Thus, the importance of this analysis that keep us awake of the necessity to watch the development of the new ideology and maybe forecast the implication that it may have on society. The necessity for society to assess its take away from this ideology is important for the education of the new generation and the preventions of social troubles.

This analysis is to evaluate digitalism and see if it is just a new form of capitalism and if it is, find a way to orient it so it will not create many social distortions that was capitalist system was blamed for. This analysis draw our attention to the necessity to set guard for the ideology of digitalism. Digitalism comes with a lot of technological advantages. To take

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advantage of the wonders that us offered to us by the science and researches it is compulsory to early adjust the path of the digitalism.

This analysis between digitalist and capitalist class set us already on this path of finding guard to address some issues that are already on the way to disrupt human society. In the occurrence this analysis may provide us the opportunity to address the issue of inequality. A study realized researchers (Acemoglu & Restrepo, 2022) denoted that there is and increasing inequality between wages.

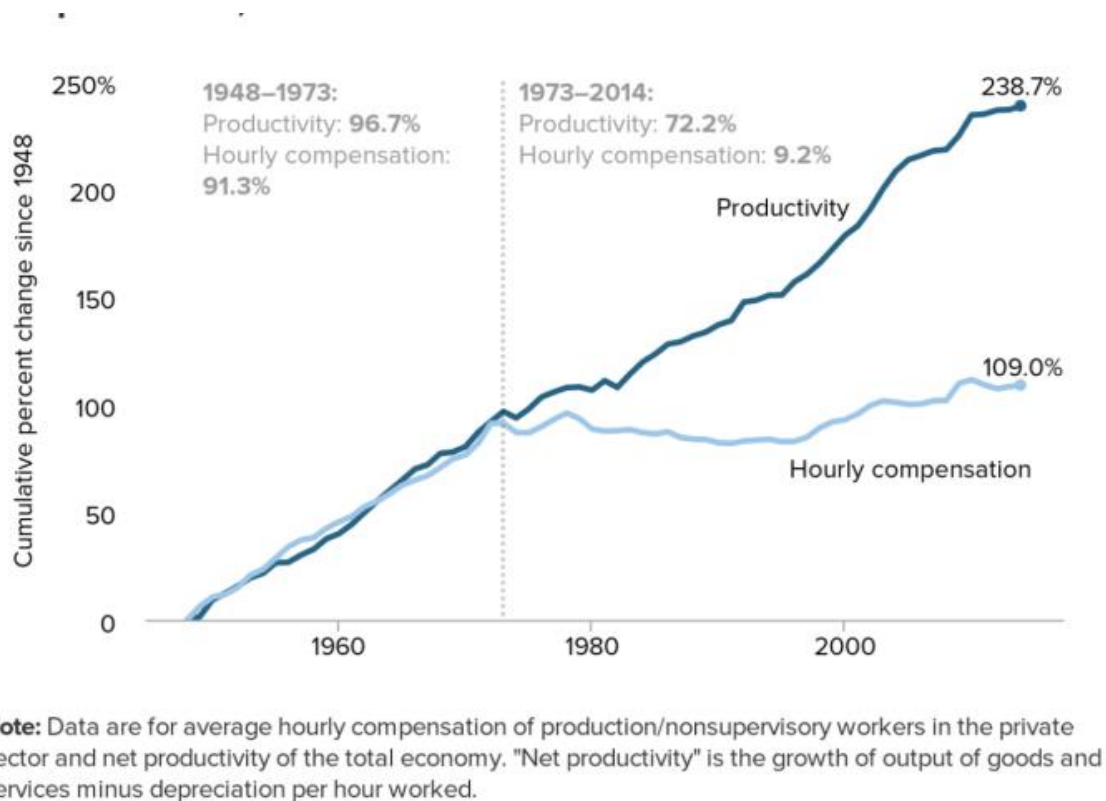


Fig 2.1 Inequality between production and wages

The figure Fig 2.1 is the curve of the EPI that shows that starting years 1970 with the beginning of computerization the trend of evolution of the value of the production is not following the trend of evolution of the wages. That confirms the fact that the capitalist class is

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rich but the digitalist class is way more richer. Before companies never reach the trillions of dollars in revenue but digitalist age make it happen. The comparison provides us opportunity to acknowledge the necessity to draw the attention of the future digitalist class on those issues.

9 -Limitation of the capitalist class and digitalist class comparison

One of the limitations of this comparison is that the term capitalism still exists and the digitalism is not perceived yet as a real doctrine. It is true digitalism is at its starting point. Because the digitalist is at his early ages, he is hard to control. Starting making rules or adopting policies to curb the activities of the digitalist is not easy to undertake because there is no evidence that the phenomenon will continue or if there will be something else that will surge in the next coming years.

One other problem coming from this analysis is the diversity of level of revenue in many countries and from areas to another making difficult the real assessment of the effect prompted by any kind of policies that can be implemented. Because if it is true that measures could be taken to regulate digitalism, it is also important to observe the effect procured by the implementation of those measures on populations.

The other issue that is making the analysis some way complicated is the reconversion of capitalist class into digitalist class. This is the same phenomenon that occurred during the 17th century through the 18th century when many monarchs converted themselves into capitalists. Therefore, making a comparison between two things that are on their way to be melted into one thing could lead to confusion.

It is also important to recognize that the area of influence of the digitalist is larger than the one of the capitalists. The digitalist domain of action is the giga economy, and also the

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gig economy. Even the objective of making profit is shared by both classes, the action field of capitalist and digitalist are not the same.

As new concept the digitalism itself is hard to analyze. Terms like “Digitalist” or “Digitalistic” are not even in the dictionary and there are not yet many scholarly approved materials to support many of the arguments that we made.

The possibility of conversion of digitalist class into capitalist class is also a possibility that could be considered. That situation could happen if a business not succeeding in his online enterprise decide to open a physical good production company. It is thus a reverse form of the digitalization and a kind of situation that was similar to the one that happened in year 2000 after the year 2000 bug.

The analysis between those two classes could seem like a comparison of two things of different time (old and new) and this can touch the exhaustivity of the analysis, for the topic is recent and current. Besides, the definition of the digital used in this book could seems confusing for some readers and the comparison could leads to misunderstanding the purpose of the study which is pedagogical.

Besides, considering the digitalist class in higher position than the capitalist due to profit realized could lead people willing to become digitalist to turn into snobbism. Our lack of knowledge in sociology did not also allows us to deepen the analysis and make very deep psychological debate. The philosophical view of this analysis is left off and many other fields could be analyzed also. Besides, the comparison is not to accelerate division among classes as problem in society rises with the creation of new classes. Or maybe the time we will be finally ready to make a good comparison another ideology will come out.

Chapter 3- Analogy of the theory of capital accumulation to the theory of digital accumulation

1- Review of the theory of accumulation of the capital

Before analyzing the theory of accumulation of the digital, it is important to review the theory of accumulation of the capital. According to Karl Marx this accumulation of capital which was extended on many centuries resulted from the transfer of propriety from the society to the capitalist.

“The spoliation of the church’s property, the fraudulent alienation of the State domains, the robbery of the common lands, the usurpation of feudal and clan property, and its transformation into modern private property under circumstances of reckless terrorism, were just so many idyllic methods of primitive accumulation. They conquered the field for capitalistic agriculture, made the soil part and parcel of capital, and created for the town industries the necessary supply of a “free” and outlawed proletariat.”(Marx, 1976)”.

Before the era of industrialization agriculture was the main mean pf production. And the main source of production dwelt the land which is the property of the King. In other world the king own n the natural mean of production: the land. For the capitalist to imposed himself as a new leader of the society he should have to find the way to create a new source of production that will bypass the old Mean of Production which is the mercantilist mean of Production. For this his only way to achieve this goal is to first turn the attention of the society toward a new method of production and make the society acknowledge the importance of adopting this new method of production associated with a new automation process. The methodology is to at the same time be capable to withdraw the attention given to the King or the monarchy and at the same time attract the attention of the agricultural community toward him. To do so, the first objective is to get rid of the common a place where the farmers have to

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gather themselves and which was the property of the King. And as the farmers do not have a place to meet and exchange their productions, they are now hung to the mercy of the capitalist who is ready to give them work in the industry. The capitalist just cheated the king by taking from him his workers and by this mean reduce the power of the monarchy. For the King to comply, the capitalist smart had many beautiful arguments to attract the attention of the society. And the most common ones are slogans such as: freedom, equality, democracy; emancipation. The result is the long period of revolution that shook the European society during the 17th century through the 18th century and the famous one was the French revolution. As we can see, those revolutions first objective were not in the first place the change in human emancipation but the rise of new kind of class that had find a way to own a new source of mean of Production due to the adoption of new automation process which is the mechanization.

The second step in the process of accumulation of the capital is to find how to transfer the flux of wealth created by the capitalistic mean of production. The old method used to transfer the mercantilistic mean of production was the metal which in fact is hold by the King who hold land that contain those precious metal. The development of the paper and its industrial production will change the situation. The credit method will appear with the development of printing. People can transfer their wealth by paper and a signature added in it. A new paper money increase as mean of transaction. Before things made by nature animals and agricultural product, metal were for the king or the monarchy and now all those things are transferred through paper for the capitalist. Human being are thus valued not by nature things that was for the King but by paper that is for the capitalist who owns the mechanical tool of production: the firm and his method of transfer the paper. Now he can help feed the people, he control their way of survival, he created in the mind of the people that they could not survive without this

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paper, and proved them that they are nothing without this paper which is their identity and can allow them to move and to live. If you do not have a paper Identification you do not exist. Besides, as the king, you need to serve him, the capitalist and this process of accumulation of the capital took over 500 years and was just done unconsciously. People did not plan anything it just happened and they just discovered that that was what they had done at the same way as the digital accumulation that took lesser time.

2-The theory of the digital accumulation

To understand the theory of the accumulation of the digital you need to understand the theory of the accumulation of the capital. If the methodology used are different the logic is in some way similar to the one applied for the success of the accumulation of the capital. According to this logic, the technic is to push the people far away from the natural source of production, the land, and its owner, king. This technic is just a manner that human naturally does things. As example lets take the example of two women. Lady A and lady B. Lady A has a husband and lady B not. But lady B wants the same man that Lady A has. So, the first objective of lady B is to find a way to attract the attention of lady A's husband. When she succeed to pass this step, the second step is to do anything that will keep the man away from lady A. the last step is to find a system to maintain lady A's husband under control so that he should not be interested by any other woman. If we assume that lady A was the king and lady B the capitalist, and the lady A's husband the society, we can by analogy find out that the capitalist has just follow his natural instinct to get the place that the king used to occupy. Nowadays the digitalist has just done to the capitalist what the capitalist did to the King

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mercantilist. In other words, actually, Lady A is the capitalist and lady B is the digitalist but the man still represents this handsome and beautiful organization that is called society.

One will ask how the digitalist did take what was the appanage of the capitalist. As it is stated above the technic consisted of making people dependent of the source of production of the digitalist. As we mentioned it above, this process was not expressively, designed. The human community was just following the evolution of the normal way that things needed to be done. The first step of the digitalism could be associated to the introduction of the computer as mean of automation process. At this time the idea of digitalism was not existing. But the apparition of the credit card and debit card and the development of the Internet will change the situation because with this system, there is a possibility to trigger the process of accumulation of the digital and a way to transfer the flux of wealth created by the digitalistic mean of production. This is the beginning of the digitalism with the rise of companies called the “dot.com”. The reason is that the possibility offered by the Internet allowed to produce services and then get paid outside the capitalistic mode of operation which was based on paper.

As the revolution in 17th centuries manifested the rise of the capitalist movement in western Europe, the bug of year 2000 may be considered as a clash between capitalists and digitalist and this resulted of the destruction of many of the dot.doms.

The big turn in the accumulation of the digital was the association of the internet to the telephone, combined with the Artificial Intelligence Systems. It finally pushed people away from the mechanical source of production, the industry and his owner, the capitalist. That process is enhanced by the use of smart phones with batteries stuck to the device. In addition, the destruction of the marketplaces, is similar to the destruction of the common in the beginning of the capitalistic revolution. This allow the digitalist to have total control of the society.

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The last step is the Covid 19 crisis which allow the digitalist to test and implement all the control system and mechanism required to finally get the crown so long desired.

3-Origin of having digital accumulation

Many reasons could be at the origin of the desire to be involved in the process of starting a digital accumulation. However, the causes are deliberate. People, in reality, are not necessarily endowed by the desire to become indubitably digitalist. They most of the time come to this situation unexpectedly.

Some people chose to become digitalist because they want to follow the trend or they just want to change maybe for they just want to do something different as they discovered that many people are getting the capital. In this case, we can cite the case of people in African developing countries.

This desire to opt for the accumulation of the digital could be prompted by the fear from capitalist to lose control of his mean of production. By this we give the example of many companies that were traditional and decided to bring their business online. Example of big supercenters connecting their inventories to their online website was given in the previous section showing how people acknowledge as legit capitalist are turning into digitalism. The same trend is followed by many banking organizations that are also turning into online mode. This is to explain how the capitalist is afraid of losing its mean of production of the capital and try to switch mode of production for the purpose to secure the perennity of his asset.

The appearance of new world powers could be a reason of the pursuit of the accumulation of the digital. This principle has always followed the switch of technology of

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automation. The development of the digital has not only increased the development of the developed countries but it had also promulgated the rise of new world power that had been able to create infrastructures capable to sustain the digitalistic mean of production.

For the macro population growth, the idea of digital accumulation may look like a good thing. It will be insane to see just one billion of human being stacking one thousand dollars in their pocket. This is a huge quantity paper production and if those bills have to be destroyed it will be a huge production of carbon to be released in the atmosphere. Fortunately, this example is just taking in account a fraction of what the global population is. Perhaps, it is a natural equilibrium of the ecosystem due to the fact that there might be a balanced between the mean of transaction that we use and the size of our population.

If we refer to the theory of performance, there is something that we designate as the myth of the objective line which is a natural challenge that is set for human being and as soon as we reach that line there is another line that is imaginary created to us and this contribute to make our life always going concern. This could be explained by the fact that as human being we had exploited all the possible capabilities offered by the era of the capitalism and as there is not that much to exploit the nature automatically open a new door for the human community and fix some imaginary objective that will be the new frontier to hit in other to get into new dimensions.

The availability of good according to the population growth and the good replicability in infinity are reasons for opting for digital accumulation. There is also the over synchronous ability of the digital economy that allows the quick augmentation of wealth and the possibility to evade from the capitalistic mean of production. In fact the blockade imposed by the capitalist to the rest of the society to have a claim on the world resources had pushed to

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the research of possibility to look for another way to produce. We need to know that tree in a forest looks to sun, grass in the yard looks to sun at the same way, human in the society need to grow and emancipate himself and it is his way to connect to the sun.

4- How do we have digital accumulation

In this section, it is a matter to go deeply, in the simple method used to get digital accumulation. As explained already businesses starting digital accumulation by pushing the customer from the capitalist mode of production.

It is important to notice that customers also can find a way to start a digital accumulation. Let's focus on the example of someone buying in a platform. At a certain time when the buyer of the platform discovers that this customer is loyal, he will start making him proposition to give him some bonuses if he purchases a certain type of goods or a certain quantity of goods. Instead of giving the customer a discount the platform owner could turn this bonus in a token or a coin that he has created. When the customer start accumulating those tokens or platform coins, he could one day transform them into money or in digital currency. This is a way for a customer to start a digital accumulation.

The case of a producer accumulating a digital is not something that could be very difficult to envision. In fact, as a producer the only way to dive into digital accumulation is to own a digitalistic mean of production. If we refer to the customer example given above, the platform owner is a producer and as he is doing an online business which is a digitalistic mean of production he is de facto involved in a process of digital accumulation.

Some case could be revealed as a digital accumulation for a society or a community. Let's assume that in the example above the platform is owned by a society or a

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community. The producer in this case becomes the whole community even though there might be someone designated expressly to rule the platform, the revenue coming from the exploitation of this digitalistic mode of production does not belong to him but instead to the community. There is some ways that can lead societies or communities to be involved in a process of digital accumulation.

Nations could be, as a whole, in a process of digital accumulation. This could happens if the entire nation has digitalized all its systems and start emitting a digital currency. Besides, there might be case where the country might not be able to emit digital currency but will see many giants in the world business that residing in its territory that are involved in a process of digital accumulation. In this case, for instance, the revenue earned by the huge companies come back to the country in form of tax and could be considered as an indirect form of digital accumulation.

The connection with the world-giga economy push people to the desire of a spirit of digital accumulation. This desire is fostered by the envy of creation of world empire, necessity to get access to certain resources, the quest of conquest. Sometimes, this search of extension is considered, by certain people, as a mean to protect their asset.

For the overall, it could be observed that the test of the methodology of digital accumulation was realized in e-commerce. In fact, the importance of testing a methodology is very useful in the implementation of any type of production system. Testing a methodology build trust and the e-business was the principal method used to test the digital accumulation. The second method of testing was through the emails. This has allowed the owning of our communication, thus the owning of our knowledge, and knowledge is wealth. The next step was the search engines and the socio-media. Associated with the Artificial Intelligence systems

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entwined with their capability to be over synchronous, the search engines had created a new way to pump information and transform them into digital. The data accumulation becomes a new form of wealth which could be considered as a digital accumulation. In other words, being involved in a process of data accumulation could be assumed to be a step taken toward a path of digital accumulation. And having data could just also mean having digital.

5- Example of digital accumulation

There are many examples of company that does digital accumulation. In the social media case for instance, we can cite companies such as Facebook , Instagram, WhatsApp, snapchat, twitter, YouTube, LinkedIn, Pint interest.

One way of those companies to make money is through advertising. As those companies have platform that are popular and had succeeded to entice the attention of their customers, other companies had found way more useful to use their services to advertise their product than using conventional mode of broadcasting such as radio and televisions.

One other service provided by the social media companies that help them accumulate some digital is the marketplace. Social media marketplaces are fastest places where you can sell your items very quickly. In other words, when you upload the picture of an item you want to sell on a social media marketplace, it will be gone faster than going to a physical location and start looking for people to buy it. This advantage is due to the fact that the Internet connect you to the world and places that you cannot be at the same time. Besides, when you use those platform you are not necessary compelled to stay in front of the item or move it because it is raining or it is night. People can at anytime look at your merchandise a make and offer that you will come and discuss when ever you have time. Digital Marketplaces are replacing the normal marketplaces that we have before. In fact in the theory of accumulation of the digital,

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the technology has replaced the physical location that represent the marketplaces represent. And according to that theory it can be seen that the digitalist had created the condition to entice the attraction of the customer and to prove him that he represents the better option. And for the digitalist, it is a better way to accumulate the digital because he is the one that hold the digitalistic mean of production. Marketplaces are also a place where the digitalists make advertisement for other companies.

As we stated before, digital accumulation had another name that could be called data accumulation. Having data in the digital age means you have possibility to control the data that you have by making prediction or description of the organization or the entity that provides you the data. Or straightforward, it could be understood that you may have the ability to even control the organization or the entity. For this reason, data has a price because it has a value. Having something that has a value correspond to having something that can create wealth. Reasons why data accumulation is similar to digital accumulation.

Concerning the social media companies, the amount of information that transit through their platform is huge. And that information is data, and in the proper term of this book digital. Forms taken by those data are different. The first form of data collected by the social media companies are individuals' identity. It is not done purposely because for a person to create a user account he needs to provide his identity so that another person will not come and use his profile to do something that may be detrimental to him. In other words, the social media could not properly function if people start providing fake information to identify themselves. Those are at the very beginning the first types of digital accumulation that social media platform benefits freely. The second form of data accumulation comes from texting, and messaging. In addition, comes photos, people's location, and people's voices.

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One other type of data collected is the activities realized by users and the way they live. This data collection can comprehend the type of sales they do if they are salesman for instance, or the person they are dating. Those social media can also show what type of people are someone's friend and what kind of different group he is affiliated to. There also reels that are short videos that could expose people stories in short time. All those type of communication systems are providing data and constitute a way of digital accumulation.

6 -Advantages of digital accumulation

Discussion on the theory of accumulation of digital, shows the obsolescence of the old pattern of money accumulation system. This does not mean automatically that we are at the end of the money system. As the capitalist systems was built on top of the mercantilist system, the digitalis system is also built on top of the capitalist system.

The development of the digitalist way of accumulation had helped people that do not have opportunities to have capital at the beginning to over come the capitalistic mode of production and to be able to express they capabilities. Due to the development of the accumulation of the digital new forms of entrepreneurs had surged and changes the way things are managed in the traditional economy.

The discussion on the accumulation of the digital push us to acknowledge the presence of a new form of economy that had extended over our expectations. Thus the necessity as economist to represent economically the new laws that this economy reveals and find the best models that could match the evolution of this new type of economy.

The topic on the accumulation of the digital depict the existence of the evolution of new way of wealth growth also. Thus, it awake us on the necessity to watch the development

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of the new way of wealth accumulation and it is important for the society to find a better way to cope with this new way of money accumulation.

The necessity to regulate this new way of wealth accumulation is important because as we mentioned it before, since the advent of the computerization as automation, the inequality in wages had not ceased to increase in US society for example. This trend could be also seen elsewhere thus the importance to early adjust the path of the digitalism.

The opportunity of the analysis of the theory of digital accumulation dwells in the fact that it had helped us to find out that if the capitalist way of accumulation make people rich, the digitalist way of accumulation makes more richer. As we will study it in part II, the producer in the digitalist system of production had an exponential function of production. When we take the example of the social media companies above, it could be seen that not only they made some digital accumulation on the normal activities that they provides as connecting people over the world they also accumulate billions of data of many form that also constitute another form of digital accumulation. The evolution of the digital economy may seem amazing but the main reason that this economy is observing an amazing growth it is because many people are observing the advantage involved in it. It is important to notice that the acquisition of the digitalistic mode of production is really costly not only because of the cost of the infrastructures but also to the value that it could create. However, people had always found ways to turn around those financial barriers and get into the process of digital accumulation. As we mentioned it before previously, companies in the capitalist ear had never reach the trillions but digitalist accumulation era had helped companies to reach that level and surpass it.

The comparison between the theory of accumulation of the capital and the accumulation of the digital gives us the opportunity to recognize the necessity to educate the

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future digitalist class on accumulation methods. This education of the future generation on the way of accumulation of the digital according to the ethics of business and of the spirit of preservation of social balance is important.

Besides, this comparison had allowed us to weight the advantage and inconvenience of digital accumulation.

7 -Limitation of the theory of digital accumulation

The limitation of the digital accumulation is that no matter what could be said money still exist and capital still exists. The advent of this new form of wealth had not completely wiped out the existence of the previous method of wealth accumulation. And this constitutes a limitation of the theory of the digital accumulation and the capitalist accumulation also.

The digitalization is at his starting point. Therefore, it may happen many more steps that could be added at the one revealed in the development of the theory. In case those steps happen it might change the logic of the theory or enhance its consistency. The other problem concerning the dynamic of the digital economy, is that there is no proof to show that the phenomenon is at his beginning or at his end. The analysis could be limited if in the near future the digitalization of the economy is stopped by the surge of a new method of automation system. Actually, it is hard to pronounce ourselves on this type of event but for the purpose of intellectual humility it is preferable not to touch this particular point. The risk in analyzing new systems dwells also in the high probability to skip some points that are relevant for the systems, but that could be considered as a minor point as they do not have time to develop and reveal

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their potentialities. For all those reasons, it is better to take our analysis at a starting point for new analysis in the field, if eventually the phenomenon of digitalization endures.

One thing is to accumulate the digital and another thing is to protect it. If it is easy to produce wealth exponentially, it is also easy to lose it exponentially. Imagine that you have one million in a currency on a digital wallet on an online bank and you do not use to have printed copy of your transaction and the next day you cannot open your account because you do not have access to your user profile. Then you go ahead trying to contact the online bank in vain for almost six months. There is nothing to do about it. The main problem in digital accumulation is that it is hard to control hackers. Reason why people would like to diversify the form of their wealth portfolio. Besides, platform and digitalized organizations spend important amount of money to protect their digitalistic mean of production but this possibility is not offered to the common entrepreneur who just started his digital business.

The analysis on the comparison of the two theories of accumulation of capital and digital seems to fit only developed countries. The diversity of level of development between many countries is a limitation of the universalization of those theories. Some countries in the global south are not even at the level of the capitalist mode of production and are thriving to adjust to an economy of subsistence. The differences of development between countries is an handicap to the vulgarization of the phenomenon of digitalization and people living in those areas may not be able to enact policies that will allow them to benefit of the theory of accumulation of the digital. For instance as mentioned earlier those areas have energy issues and the regularity of the electricity is a fundamental element for the implementation of a digitalistic mean of production. In digital economy the producer need a sustainable source of

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electrical energy and the customer also need to stay constantly connected to the source of production which means that he also had a constant need of electrical energy.

There is still possibility for money holder to transform themselves in digital holders. In other words case may happen when a person use to accumulate capital can decide to turn into a digital asset holder. This case is also comparable to the case where some monarchies of the middle East had turned they mercantilistic mean of production into a capitalistic mode of accumulation of wealth. By this we mean the fact that they have been able to transform their natural mean of production that was their land containing oil and natural gas into a capitalist mean of wealth accumulation. This is the origin of the famous petrodollars. This is the easiest way of accumulation of digital by not owning a digitalistic mean of production and still could be considered as a digital accumulation process.

Even though there are still areas that are not susceptible to get access of digitalization, the network of influence of the digital accumulation is large and constitute the giga economy. This make the new way to accumulate wealth hard to analyze. There is also possibility that people starting digital accumulation to return back to capital accumulation and those kind of attitude make the comparison of those two method of accumulation difficult and the origin in time (old and new) is not ready to facilitate the analysis.

The exhaustivity of the analysis again could be evoked as the topic is recent and current and it is important to notify readers that the comparison between capital and digital accumulation is only for a pedagogical purpose.

As pointed out in the previous line, the phenomenon of digitalization is an interesting social phenomenon but our lack in sociology did not allow us to deepen the analysis.

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Besides, interesting conclusions could be drawn through interesting psychological debate. The digitalism as ideology could be a term that may imply consistent philosophical debate that is subject which is left off in this document. Many other fields could be analyzed also.

The comparison is not to show the supremacy of the digitalist way over the capitalist one because every type has a particular problem in society with its accumulation method. Like we do not stop repeating it, maybe another type of wealth accumulation is on its way. No matter what it will be, it is important to notice that method of capital accumulation took five hundred years but digital accumulation last almost fifty years.

Chapter 4- Cap theorem and the digital environment

If we cite every time the cap theorem in this book is not to refer to the theorem itself but to the opposite sense of the theorem which means that systems used in the digital age are almost ready to fulfil the property of consistency. availability, partitioning.

1-Importance of distributed database in digital economy

The use of distributed database system is very important for any digital mean of production. However, the main factors that constitute this type of database systems is the database.

definition database

Referring to some writers, database could be defined as follows:

“A database is a shared, integrated computer structure that stores a collection of the following:

- *End-user data—that is, raw facts of interest to the end user*
- *Metadata, or data about data, through which the end-user data is integrated and managed*

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The metadata describes the data characteristics and the set of relationships that links

the data found within the database. For example, the metadata component stores information such as the name of each data element, the type of values (numeric, dates, or text)

stored on each data element, and whether the data element can be left empty. The metadata provides information that complements and expands the value and use of the data.

In short, metadata presents a more complete picture of the data in the database. Given

the characteristics of metadata, you might hear a database described as a "collection of self-describing data." (Coronel & Moris, 2016)

Database language

There are many database languages. In the occurrence, we can cite, the sql. My sql, oracle, xml, and so on

Structural and nonstructural impact on digital economy

There two types of database the structural database and the nonstructural database. It is important to notice that the development of the nonstructural database system had an significant impact in the development of the digital economy. Because it had allowed the transfer of any type of data in the database which had facilitated the digitalization process.

Database management

This process is important in computer science because it allows the management of data transaction between the user and the computerized system.

A database system is supposed to have the ACID property.

ACID property:

- Atomic: all or nothing

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- Consistent: states remain consistent
- Isolation: one does not affect another
- Durable: results persist, even in crash

It is also important to acknowledge that there is a difference between data and Information. Those differences are shown in the table below.

Data versus Information	
Data	Information
<ul style="list-style-type: none">▪ Raw facts<ul style="list-style-type: none">▪ Have not yet been processed to reveal their meaning to the end user▪ Building blocks of information▪ Data management<ul style="list-style-type: none">▪ Generation, storage, and retrieval of data	<ul style="list-style-type: none">▪ Produced by processing raw data to reveal its meaning▪ Requires context▪ Bedrock of knowledge▪ Should be accurate, relevant, and timely to enable good decision making

Table 4.1 Difference between Data and Information. Source: Cengage Learning

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Distributed system

A distributed system is a gathering of automata whose distribution is visible to the user so that the system is displayed as one local machine. This principle is different from the one of a network, where the user is aware that there are several machines, and their location, storage replication, load balancing and functionality is not transparent. “Client-server organization” remains the principal system characteristic adopted by distributed systems. In other words, a distributed system is a group of independent computers that appear as a single computer, to the users of the system.

It is important to notice that a communication network itself is not considered as a distributed system unless certain “applications” are associated with it.

A distributed system could be also described as an assemblage of entities, each of which is autonomous, programmable and failure-prone, and which interconnect through an undependable mean of communication.

2- Asynchronous versus synchronous and Over synchronous of digital economy

In computer science, the two event characteristic asynchronous and synchronous are described in interaction model. There are two variants based on bound on timing of events.

- Synchronous systems: take bounded (lower or/and upper) time because they:
 - Execute each step of a process
 - Receive message after the message has been transmitted
 - Are Bounded clock drift (the variation from a real clock)

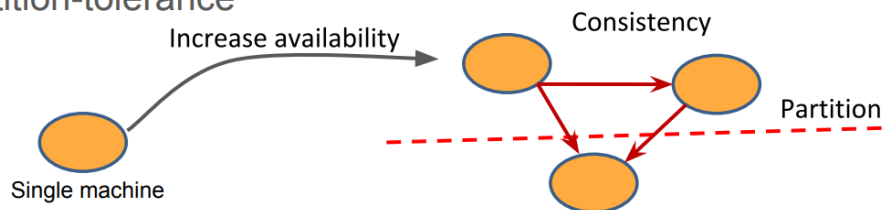
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- Asynchronous systems have no known bound on how much time it can take on an operation

The term over synchronous systems is coined in the book to match the principle that the user perceived the result of an event before the occurrence of the event.

3-What is cap theorem

- **C**onsistency
- **A**vailability
- **P**artition-tolerance



3.1 Meaning of the cap theorem

The CAP (Consistency, Availability, and Partitioning) theorem reveals that there is no distributed database system can have all the three desirable properties (Brewer, 2017). According to this theorem, it is impossible to build a system that is consistent, available and partition-tolerant at the same time but only two properties could be verified. According to some computer scientists,

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“A distributed database has three very desirable properties: 1. Tolerance towards Network Partition 2. Consistency 3. Availability The CAP theorem states: You can have at most two of these properties for any shared-data system Theoretically there are three options: 1. Forfeit Partition Tolerance The system does not have a defined behavior in case of a network partition. Brewer names 2- Phase-Commit as a trait of this option, although 2PC supports temporarily partitions (node crashes, lost messages) by waiting until all messages are received. 2. Forfeit Consistency In case of partition data can still be used, but since the nodes cannot communicate with each other there is no guarantee that the data is consistent. It implies optimistic locking and inconsistency resolving protocols. 3. Forfeit Availability Data can only be used if its consistency is guaranteed. This implies pessimistic locking, since we need to lock any updated object until the update has been propagated to all nodes. In case of a network partition it might take quite long until the database is in a consistent state again, thus we cannot guarantee high availability anymore” (Simon, 2000).

The CAP theorem referring to Gilbert and Lynch, is one example of a more general tradeoff between safety and liveness in unreliable systems. Viewing CAP in this context provides insight into the inherent tradeoffs and the manner in which they can be circumvented in practice(Gilbert & Lynch, 2012).

3.2 Other views of the CAP

Even though the theorem receive a lot of credibility around the world some researchers had found that there are many aspect that need to be discussed(Viwanou Aloumon, 2024).

According to some sources,

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"NoSQL storage systems provide various consistency models, depending on how they were implemented and the priorities they were set to handle. Types of consistency models include: Strong consistency, weak consistency, eventual consistency, causal consistency, read-your-writes consistency, session consistency, monotonic reads consistency, and monotonic writes consistency . Other systems (e.g. Yahoo Sherpa, Cassandra) offer tunable configurations for consistency in order for users to choose which consistency model (and consequently availability and latency level) is best suited for their application. Another major criticism of CAP discusses how the theorem does not mention a very important system property: Latency. This issue of latency being overlooked in the CAP theorem is reducing its utility and its application in real-life cases for distributed systems. Thus it is proposed an improvement over the CAP theorem: PACELC, i.e., if there is a Partition, how does the system handle the Availability-Consistency trade-off; Else, when the system is in its normal state (absence of partitions), how does the system tradeoff between Latency and Consistency. A formal proof of PACELC had been developed recently. The CAP theorem has also been heavily criticized for only considering one kind of fault (i.e., network partitions) and for missing the nuances behind real error scenarios where the theorem does not apply. Pr. Martin Kleppman states that the CAP theorem only considers the case where nodes are alive but disconnected from each other, and that "using network partition separately in CAP as a particular type of fault only creates confusion". Critics revealed also adds that the CAP theorem does not offer any trade-offs for network delays, dead nodes, etc. Kleppman states that "although CAP has been historically influential, it has little practical value for designing systems". He considers that "there are more interesting impossibility results in distributed systems , and that CAP has been superseded by more precise results"" (Asaad et al., 2020).

3.3 The evolution of the database technology

The reason why this section has been titled the big thrust is in the optic to prove how the data storage technology has been through a huge process which finally ends up into the final stage of automation that is observed actually. In fact, if there is not a real proof that the Cap theorem is not holding in any situation, there is one way to acknowledge that the technology has evolve to a level were technics are improved to reduce the effect of the theorem. In order word distributed system are becoming more and more reliable.

“Some cloud storage services, like Windows Azure, replicate data while providing strong consistency to their clients while others, like Amazon, have chosen eventual consistency in order to obtain better performance and availability. A broader class of consistency guarantees can, and perhaps should, be offered to clients that read shared data. During a baseball game, for example, different participants (the scorekeeper, umpire, sportswriter, and so on) benefit from six different consistency guarantees when reading the current score. Eventual consistency is insufficient for most of the participants, but strong consistency is not needed either” (Terry, 2013).

The simplest way to compute a query is to literally run a function on the complete dataset. If you could do this within your latency constraints, then you'd be done. There would be nothing else to build.

Of course, it's infeasible to expect a function on a complete dataset to finish quickly. Many queries, such as those that serve a website, require millisecond response times. However, let's pretend for a moment that you can compute these functions quickly, and let's see how a system like this interacts with the CAP theorem. As you are about to see, a system like this not only beats the CAP theorem, but annihilates it.

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“The CAP theorem still applies, so you need to make a choice between consistency and availability. The beauty is that once you decide on the tradeoff you want to make, you're done. The complexity the CAP theorem normally causes is avoided by using immutable data and computing queries from scratch”(Marz, 2021).

4- Reason to connect digital economy to cap theorem properties

The reason why it is important to talk about the notion of cap theorem is that even it stipulates that no systems could not have the three properties consistency, availability and partitioning at the same time, the technological evolution had in done every things that was possible to reduce the effect of the theorem. In other words, distributed systems built in our days tends to beat the theorem, or reduce the gap that exists between the two and the last one of the property. Systems could be consistent and available but will tend to be completely partitionable or available, partitionable and almost consistent. This in this framework that the cap theorem is evoked in this book and not because systems should respect the theorem.

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The fact that the evolution of the technological improvement had limited the viability of the cap theorem had impacted considerably the digital economy. Because all the system used are based on the capability of servers. And all servers are fed with database and the databased are structured in distributed system.

The cap theorem is in the middle of the field of action of the new source of production which is the digital. The digital using the computer science as frame of structuration and restructuration, it behooves any astute mind that wants to dive in the meanders of this field to analyze the advantage and the disadvantages linked to the rules and laws applied.

It is the same thing when you want to talk about basketball. Let's take the case of a basketball game. The best basket ball commenter is the one that manage the rules and the laws of basketball. For this reason, some channels and TV ask for retired basketball players such as Charles Barkley or Shaquill O'Neal to come and help make a comment on some important NBA games and give their prognostics. Simple, because they know how the game is played. It is for this reason that the cap theorem is holding a whole chapter in this book.

Happy are we, whenever we read Adam Smith talking about agriculture in his correspondences, talking about the way labor should be envisioned or Sraffa discussing about commodities or corn or bushel when he tried to determine the price on the market of commodities.

Meanwhile, there is a comparison to make between the Mercantilistic mean of Production and the Digitalistic mean of production.

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Consistency of Nature as Mercantilistic mean of production

The consistency is one of the abilities provided by the Mercantilistic mean of production. Which means necessity for resources. It is the same like nature provide fertility of a soil. You need to have your crop every time you sow. The default of nature to follow this rule may provoke the development of industrialization.

Availability of Nature as Mercantilistic mean of production

Land needs to be available for you to cultivate and as for the consistency, when the Nature default of respecting this rule pushed toward industrialization also.

Partitioning of Nature as Mercantilistic mean of production

The land needs to be available and be shared by many people. As example, a father having a land would like to partition it to his children so everyone would have his portion to cultivate. The default of this rule may prompt the development of industrialization.

It is important to remember that in this category of classifying mother Nature as Mercantilistic mean of production, signify that all the natural product, minerals, animal, vegetal are considered as product from Mercantilistic mean of production.

5- Utility of cap theorem properties in digital economy view

Those properties are important to facilitate our ability to transact in digital economy. The improvement of those properties had huge implications in the development of the digitalist way of life.

For the simple reason that is is they are first conditions necessary to accumulate. For the theory of accumulation of the digital being able to come to its final stage the cap theorem properties are the ones that had been the foundation. The everyday fight of distributed

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systems to overthrow the cap rule had forced those properties to be partner of the theory of accumulation of the digital.

The evolution and the amelioration of the cap theorem properties had allow the increase of control of the digitalist and the perfect leverage of his mean of digitalistic production. Those properties are essential for the storage of data and their management and had facilitated them to be transferred from information into money.

One other advantage obtained with the improvement observed in computer science related to what we could considered as the three legs (constancy, availability, partitioning) of the cap theorem is that they had enhanced the potential of prediction of statistical software and Artificial Intelligence systems. The straight result is the development of the character of oversynchronosity as new principle disturbing economic principles.

The increase of the works on the property of the cap theorem had increased the speed of wealth or in better explanation the speed at which we increase our level of wealth. It also stimulate our engagement to work because the benefits of the engagement seems to be t hand reach and enlarge our domain as the same that like capitalist conquer territories.

But no matter any other consideration, consistency is required for digital economy. And this property remains one of the basics required for the database. In the same proportion that traditional economy or specifically, Mercantilistic mean of production and Capitalistic mean of production need consistency for sustainability of the production, the digitalistic mean of production is subject to the principle of consistency.

Availability had played a great role in the development of digital economics. On e thing we all know about online shopping is that we do not care that the business will be closed.

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We can most of the time troubled when we rushed in a store or a supercenter and a lady let's us hear through a remote microphone that the store is about to be closed in three minutes. Sometimes people grab their items and for the fact that they could not reach the cashier have to leave it quickly on the floor instead of being locked up in the store. Kind of issues are not met in digital economy because this type of economy did understand that goods need to be available.

The possibility of Partitioning of the distributed systems was also an important fact to notice in the digitalization process of the economy. The ability of distributed systems to be portioned had made possible the creation of level of accessibility in digital economy. The possibility to have many levels of accessibility had procured the possibility of control of huge network of distributed systems. In fact, the existence of several levels of accessibility is required for security also. Its through this canal that the government could have control on the digital activity and make sure that ethics and regulations are followed. Another, possibility procured by partitioning is for leadership control. In a system, portioning allowed a supervisor to see the work of many subordinates but the subordinates could not see the works of the supervisor. The improvement of the properties of the Cap theorem had play a major role in the switch from capitalist or traditional economy to digital economy.

6- Periods where cap theorem properties are useful in digital economy

Period where the property of the cap theorem are required is usually when we want to think about modeling the digital economy. In fact, modelling an economy that is not sustainable could provoke a disruption on the analysis. The continuity of model to be analyzed allows easy conclusions and facilitates projections in the future. For example, to check the derivability of a function it is important to check its continuity on the domain where the function is defined. The property of consistency and availability contribute to confirm the continuity of

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activity in the domain of definition of digital activity economy. However, it does not mean that system that are discontinuous are not analyzable. The difference is that continuous system procure easiest capability of analysis. The modeling process in digital economy can touch many aspects of the digital environment. This can start from financial digital modelling. Financial digital modelling can help people create model that could help them increase their income or take advantage of situations that will procure them better financial position in the society. This modelling could be helpful due to the fact that the amelioration of people financial conditions leads to a better life condition and can assure social progress for the whole community. Making this modelling process easy by improving the properties of the CAP theorem could remain a huge advantage for the emancipation process of a community.

Far to be always stuck with principle of mathematics and the art of designing the invisible, it is also possible to understand modelling in the physical way. One of the surge in modelling with the evolution is the popularization of Internet model as influencer. This term become so important in our day and will be analyzed in details in next Part. But the main factor that allows social media modelling to be successful is the possibilities offered by the Cap theorem. Let's assume that people have to stay connected to their phone all day long, as model, so that they might be visible twenty four seven to their fans. The result that could be the consequences of this behavior will be the increase in drug market of the price of insomnia pills. In other words, it is just impossible. An the case, bought up below is the case where the famous models has just three followers. But if I point of the case of famous Artists like Beyonce, or Drake that have millions of followers on Facebook, or Instagram, this is even worse. One of the case that partitioning principle provides in modelling is when a fan send a private message to the model or the model send a message to one of his or her favorites fans. This message is

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not seen by the others fan who also are accepted as a friend of the model. But this is not to forget that in the overall case, messages can be also seen by the model to the entire community that constitute his or her fan club.

Let's still use the example of social media modelling and point of the principle of availability as one benefit of the digital economy. In the occurrence, one of the advantages of a model in social media modelling is that he does not have to stay in his room or connected to his account all the time to be able to get access of his messages. The fans that are in the room or are the friends of the models do not have to do so either. As soon as the message is sent it stays there for a reasonable amount of time. It is thus the fan or the model to delete it whenever he or she wants or not. The same schema could be preserved for the share of pictures. But the fact that a models post a Photo on his social media pages makes the photo available now not only for the fans but also for people. And it happens that if the picture is interesting the model could have a friend request and start interacting with the new friend. We all know that there is a difference between someone who have three friends in social media and the one that had three million friends on social media. The difference is that the latter start making some digital. He is de facto a digitalist. The same thing with videos, the number of likes and views are just information, but it is transformed in digital.

7- Problems from cap theorem properties in digital economy

Problem may surge when the properties of the CAP theorem are not observed in digital economy. As well that the consistency, availability and partition tolerant properties had contributed to the boost of digital economics, problem coming for the default of those properties could have significant impact on this type of economy. To counter this problem and especially, problem that may jeopardize the availability or the consistency of the information systems, data

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available on distributed systems are replicated in many servers. The advantage of the replication of data in distributed systems is that the client or the end-to-end users are not aware of the duplication of the information. This factor favors availability because in case one server defaults the client will not have to worry about his data. In reality, the distributed systems are built in such ways that the user will never realize that a problem did occur. This is a proper way to avoid problem linked to one of the three legs of the CAP theorem.

In the case of modeling, it is important to point out some issues pertaining to the case of social media modelling. For example, in this particular case problems surging from the CAP theorem properties are usually linked to the availability or the consistency in the distribution systems. Many model or social media could be victim of the fact that they could not get access of data that are stored on their account. Many possibilities could prompt those phenomena. The non availability of data belonging to users could be due to the fact that the platform owner had decided to remove the data due to different causes. For instance, data that are prone to push people into violent act or that does not respect the principles and violate the rules of the platform could be removed from the model account. Sometimes when the errors are repeated by the model, the account is definitely closed. Platform owners gives opportunities to users to appeal, because this could be seen as simple data removed but in digital age, it is a reduction of asset for the user.

Because data could be available, people could try to make them more available. Not for fun but because it is a way to provoke a digital accumulation. Mechanization has its own form of robot but digitalization has its own type of robot. It is an invisible robot. This term of invisible robot has enormous impact in digital economics. This notion had multiple angles that need to be developed in further Part in this book. In digital economy, invisible robot are

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used to distort the neck of the CAP theorem. Invisible Robot used the benefit of the properties of the CAP theorem to inflate information. In the example of social media modelling, some models use the invisible to create some information and make some digital accumulation. This principle consists sometimes of augmenting the number of people that like their posting or in case of video increasing the number of people that had watched it. In other words, the invisible robot is computer programming used by some models or account owners to increase the number of views related to posted videos. Most of the time the platform owners could be aware of the situation and stop the process but sometimes it is difficult to catch those robots.

One of the problems that could be pointed out is Hacking. Hacking had also been a problem for the CAP theorem as data could be manipulated by external agents disturbing the availability, and the consistency of a distributed system. In banking for instance, if the distributed system is not well protected consumer data available on their account will just be evaporated. But in this case it is data that are real digital, real money. It is interesting to see how data is getting closer to money as we move from the social media platform to the banking platform. The partitioning principle could be also used by hackers to get information from someone account and the person will not be aware.

Problems could affect Synchro or oversynchronous capability of a digitalized economy if the system is not respecting the properties of the CAP theorem.

8- Example of application of cap theorem properties in digital economy

Many examples could be relevant when it comes to describes how companies take advantage of the CAP theorem properties in digital economy.

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The first example that could be added on the list of companies benefiting from the CAP theorem is the google as search engine. The company is reputed to have over one million servers. With its reputable database system called big table google assure the availability and the consistency principle by making data available for user twenty-four hours a day. People can also imagine billions of people using google search engine from dawn to dusk and this with no interruption. The partitioning principle is also observed through services that the companies offer such as google drive. People could share the access of their google drive or people can use a same word document through google drive.

Netflix is also a company that need to be cited when it comes to mention the applicability of the CAP theorem capabilities. Netflix had a huge size of data in form of videos mostly but anytime someone get into his account to watch a movie, this person does not find any difficulties to enjoy his time. The system function in the way that two people in different location can watch the same movie in the same time or in different time but still do not know that each of them are watching the same movie. In capitalistic economy, the availability of the movies could be a problem as if the two persons wanted to watch the same movie, they need to watch it in the same location or they need to buy two different copies of the movie. Those are some important facts that will be discussed in the Part II.

Amazon with its database system dynamo should also be cited it offers many services such as AWS Amazon web service, route 54, aside from the online retail service.

9 -Strength of cap theorem properties analysis in digital economy

The analysis of the CAP theorem properties in digital economy shows the evolution of the system of data storage. This evolution was not a straightforward process. It was also due to the development of programming methos but also due to the technological evolution

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realized in the field of electronic. The development of hardware capabilities, prompted by the perfecting of semiconductor and the introduction of quantum computing should be taken accountable for this evolution.

One other factor that had been useful for the availability and the consistency principle is the possibility of data storage in a huge quantity. The possibility to increase the storage of computer data by companies had made possible the dream of users which is to be able to transfer important information from one end to another. However, it is important to mention that companies impose limitation on data to transfer in order to charge the extra data that over passes the limitation fixed. This point is relevant because it is the same like the central bank that fix limitation on the transfer of money across borders and tax banking companies or regular organizations that want to overpass this limit.

The properties of the CAP theorem have another advantage linked to the principle of availability. Because data could be available, the benefit of nosql database could be also an advantage or in taken in the opposite sense nosql database had played important role in the availability of data in digital economy. And this factor is really important to mention in the analysis of the three legs of the CAP theorem. Inserting data in a database, follows a certain norms and structures required for the database to respect the ACID (Atomic, Consistent, Isolation, Durable) properties. But with the nosql database that are not structural database those rules are not completely required. This has facilitated the insertion of many types of data in the nonstructural database and help leverage on time.

Availability principle had made convenient the tracking capability of computer languages such as JavaScript language. Because data could be stored in huge quantities, offered the ability to developed language that could keep track of works realized using computer

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systems. This process also had increased the phenomenon of data accumulation. Having track of data, or operations done on computers had been advantageous for the development of Artificial Intelligence. This principle helps software companies to retrieve information from end users for the purpose to ameliorate the results of their products. But for those data to be available opportunities offered by computer technology had played a significant role as mentioned in the lines above. In this case the collection of data is made in the purpose to generate profit what is defined in this document as data accumulation.

This analysis presents how the domination of the paper system is over letting place to the collection of data on digital support. This underscore the apparition of the data accumulation instead of data collection that will be defined in the next section. However, it is also the evolution of new way of information treatment, awaking the necessity to watch the development of this method.

The society needs to make a real assessment of how the development of this methodology of data management and find out how it might be beneficial to the ethics and the welfare of the community. The assessment of the trust of a company could also depend on how it manage the new form of data accumulation through those properties of the CAP theorem.

10 – Inconvenience of making cap theorem properties analysis

One of the inconvenient of making the analysis of the CAP theorem properties is that the connection of the cap theorem itself to digital economy could be confused. Thus, the importance to have in mind that the properties are the one that are relevant to the development of the digital economy and not the theorem.

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The analysis may have some limitations due to the fact that the field of analysis that are economics and computer science are different. But the reason that put together the two fields is that if economics make facts, facts also makes economics. In this occurrence, economics had made a fact which is the digital. The capitalistic mode of production was at the origin of the creation of the digital technological progress. But over this short period of time where the digital had developed the advantages that it offers to the economic world had surpassed the expectations. In turn, digital is making the economy, and even economic thoughts. Because by changing our economic behavior, it had transformed our economic decision so that many social behaviors that was observed before was tremendously affected. And this is all this book is about.

The manner that the principles of the CAP theorem brought out the concept of data accumulation could be discussable. Setting aside, the concept of pure information with the concept of digitalism is a very tricky exercise. There still a difference between data and information in computer science as it is described in Table 4.1. This difference is not so pronounced in economics unless we are heading to the domain of econometrics. Therefore, data accumulation could lead to misunderstanding and not focus the attention on the purpose of the study which is pedagogical. It might be advisable to use the term data collection instead of data accumulation. In this book, there is a difference between data collection and data accumulation. Data collection consists of gathering data in order to use it for any other purpose than taking financial advantage of it. For example, collecting data for a study in sociology, or for a statistical objective. However, data accumulation is gathering data for a financial objective. For example, the number of like of a google website. In our viewpoint data accumulation leads to digital accumulation.

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Other limitation of the analysis is that the case where digital accumulation could be turn into capital accumulation is not viewed as we assumed that the digital accumulation is the last process in term of circulation of financial flux. That does not mean that it is not happening or it is impossible. Diving in this type of analysis could extend the debate and maybe occasion could be offered us to do so. As example, someone could sell a data accumulation to someone and get some physical cash for it. It is a data accumulation that is transferred into capital accumulation. Meanwhile, there is a high possibility that the cash obtained will be deposited on a bank account and at that particular time it becomes some digital. Besides, in the case where the transaction was realized online, meaning that the seller receives an electronic payment for this sale, the data accumulation become automatically a digital accumulation.

The analysis of the properties of the CAP theorem may have as implication the diminution of acquisition desire. Purchase propensity could be negatively impacted if people know that their information are not private. Discussing about the availability of data could make people thing that data accumulation is detrimental. There is not the case for this book. The connection data accumulation with digital economy is not to show the importance of way data is accumulated. It is just a description of a social behavior and not its critics. There might be a problem in society with the data accumulation method instead of data collection but it will depend on how you look at the principle and how you think to own it as an asset.

Chapter 5- Business model in digital economy

1.The digital economy and changes in traditional business

The development of new technologies of Information had so transformed the world and reduced distances among people that all our daily behavior had been affected. Due to that reason the economy system that lead our daily action should be affected in turn because if economy makes facts, facts also make the economy. Thus, since facts have changed is really interesting to wonder if the old economic theory of Keynes need to be valued in this new era or if we need some adjustments to the old system. To come up to this point it is important to help the reader to acknowledge how information has changed customer behavior during the last few years and what are the motivation that had prompted those customer behaviors. Besides, a quick review of some customer behavior held to install the foundation of the Keynes theory had been reviewed and compared to the new motivation of the consumer in order to prove the necessity to adjust with the new system incurring. Finally, many recommendations had been provided to help the researchers community to deepen some ways to find out a proper economic theory to adjust with the new digital environment and the educational system to provide a new learning tool able to fit with the new system.

Introduction

The focus on the digital economy and its changes in traditional business is a fundamental point of business analysis because the new world in which consumers are living is invaded by the information technology (Klientsolutech,2017). This phenomenon had operated many changes in our daily life. Consumers behavior due to the development of the technology

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has transformed the business environment to the point that many needs and desire have been modified.

Far from all expectations and due to the fact that this research field is new, many articles had been review in order to have a very ample view of the topic. Besides those articles have been selected and scrutinized. After their analysis, they have been grouped in four categories of relevant ideas:

- 1- Apparition of new customer behavior (Change in behavior)
- 2-Motivation of this behavior
- 3-Long term effect of the impact of Information technology
- 4-Restriction: possible effects that impede the evolution of the online business

Besides a quick review of some basic motives of the Keynes theory of the money have been realized to find out behavioral differences . This analysis will help determine the supply and the demand of the money because those two axes of bulk cash creation are ineluctably pertained to the consumer behavior.

The issue addressed in this research is to answer the following research question: Will the theory of Keynes still on hold with the development of the new technologies of Information?

The answer to this question will be a “No” if there is only one finding revealing that one of the economic actors motivations supporting Keynes theory of money has changed.

If the response to the question is negative thus recommendations will be made to help the whole business actors of the new area of technology of Information to adjust with the upraising economic system.

2.Apparition of new customer behavior (Change in behavior)

Years 2000s came up with a new system of communication: the Internet. This new tool will have a huge change in our life: in fact the consumer behavior will considerably be affected.

First of all with the development of the technologies of information researchers noticed the apparition of two business type: the traditional and the online business which lead them to start analyzing early the consumer behavior (D Čelhasić, T Grdić, L Özer 2008). In their publication “ *The traditional vs. the online market: A study of consumer behaviour and consumer preferences in the purchase of high-involvement products*”, D Čelhasić, T Grdić, L Özer point out the existence of a traditional and new consumer behavior. Those behaviors that trigger the method of market conquest thus appear the term traditional and online marketing. Through this article, the authors had made some investigations about what actual factors that consumers consider when they chose to go either to the traditional and physical marketplace or the Web-based marketplace on the Internet. In other words, the objective of the research is to understand *why* people chose either one or the other option. Three important questions maybe asked:

What is the distribution of consumers’ high-involvement purchases at the traditional market in contrast to the online market?

How do consumers behave when making high-involvement purchases in the traditional market?

Why do consumers prefer one market over the other, i.e. if this distribution is unequal?

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Data collected through the study contain both qualitative and quantitative research methods. The idea is that the combination rests on the requirement that all data assortment has to be appropriate, justifiable and relevantly collected. Both approaches possess their respective advantages. While the quantitative is used to address hypothetical relationships among variables that are measured in numerical and objective ways, the qualitative is to cover questions of sense, interpretation and realities in a social construction. Students at Jönköping University was the target group for the entire thesis.

According to the findings, results revealed that traditional market, regarding high-involvement products, have the ability to provide its consumers with the possibility to redeem the evident experiential need for testing and trying out the product prior to the purchase decision but in the other hand, online market need to come up with solutions to either provide substitutes in the absences of this experiential factor *or* to offer deals persuasive enough for the consumers to disregard the experiential need. The study also discovers that price competitiveness, delivery systems, return policies, customer service and product presentations are the features that consumers analyze in case of online purchasing is mentioned

In order to prove how the technology had impacted the behavior of the customer a good example had been introduced in occurrence the Ipad (Rangaswamy , Easwaramoorthy,2015). Their research explains how the use of the New technology as the Ipad have a significant impact on the purchaser behavior. Besides, it shows the success of the new technology in our daily life. They addressed those relevant issues :

- the evaluation of the various factors affecting consumers' buying behaviour

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- the understanding of consumers' involvement that impactsthe consumer behaviour of purchasing the iPad in certain level
- the determination of consumer's satisfaction level that could have been developed by the functionality of iPad

Data collected are based on a research activity that provides the basis for answering research questions. According to the findings, consumer's demands are very much higher than before, as their requirements are getting complicated in this modern day. Thus, it is difficult to influence them if the products do not have many benefits factors and not able to satisfy their needs.

As we could assume it changes in consumers behavior necessarily should induce transformation in Producers behavior (Clemons, Eric K. 2008). Clemons and Eric point out clearly the origin of the new consumer behavior. This spear lance of the new consumer behavior dwells the Information technology. Their work is to determine if changes in the demand side are producing comparable changes in the supply side. They traced the impact of the availability of multitude of product and the marketing of their recognizability on strategy, with a clear progression from a limited number of fat spots, through reliance on line extensions, and ultimately to fully differentiated market sweet spots. Many data have been collected from customers of Verizon, and from The Ratebeer.com. Their conclusion stated that Increased customer awareness and increased willingness to pay have increased the role of price when choosing among commodity offerings while allowing firms to reduce the role of price in customers' choice of products and services that are unique.

As the new technology is evolving during the time, interactions are established with the new type of consumer and his environment. Business tool like consumer review that

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appear just with the development of online business enticed the attention (Baum, Daniela; Spann, Martin ,2014). In their article,” *The Interplay Between Online Consumer Reviews and Recommender Systems: An Experimental Analysis. International Journal of Electronic Commerce*”, Baum, Daniela; Spann, Martin discuss how online consumers face complex purchase decisions due to the huge selection of products and the vast amount of information available. Besides, online retailers therefore try to support consumer decision making by providing recommendations generated by previous consumers as well as recommendations generated by recommender systems. Thus the issues addressed is to analyze the interplay between online consumer reviews and recommender systems and its effect on consumers’ decision making. This study is based on data from a sample of an online access panel that is representative of the Internet users of a large European country based on the characteristics age and gender. Results reveal that inconsistent recommendations may negatively influence consumers’ decisions even if positive consumer reviews are provided on the Web site.

3.Motivations of this behavior

However, since the very beginning of this area researchers started to wonder what is the real motivation of this change in consumer behavior. For the very beginning of the digital era, motivations since to be the same for the traditional and the online market, and consumers maybe shopping online for *Freedom,Control, and Fun* (Wolfinbarger, Mary; Gilly, Mary C..2001).

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The research group consist of Wolfinbarger, Mary; Gilly, Mary noticing that there were more and more of business activities occurring online, digged deeply the cause of this high propensity of the consumer to opt for the online business. They collected data from 9 focus groups of online buyers (64 consumers altogether). Three focus groups included MBA students and staff, a group likely to be technology "Fast Forwards" and thus early adopters of online shopping. Besides, two offline focus groups in Southern California recruited from Harris Interactive's online panel were studied. Finally, researchers worked with Harris Interactive to conduct four online focus groups (including participants from across the U.S. and Canada).

The findings reveal that Nevertheless, e-commerce will continue, to varying degrees, to satisfy both the needs of utilitarian, goal-focused consumers and experiential consumers. Utilitarian consumers purchase for the utility of the good or the functionality of the item. Goal focused or goal-directed generally acquire good for another goal (emotional, hedonic,...). However, certain online purchases were prompted by experiential desire of the customer. Several products purchased stem from basic needs, there are other types of products that we purchase because we enjoy them. Sometimes people purchase products because of the way they feel or the positive experiences they obtain get because of them. Thus, understanding consumer motivations for shopping at your web site as well as at your land-based stores can provide direction for planning and implementing features and benefits that will increase customer satisfaction and loyalty both online and offline.

But recent researches clearly identify the bottom line of this change in consumer behavior: and provide advices for enterprises to augment online sales.

In 2018, Suher, Jacob; Hoyer, Wayne, in their publication “Message-To-Motivation Matching: The Dynamics of Consumers' Shopping Motivations and Responses to In-Store Marketing.

AMA Winter Educators' Conference Proceedings” confirms the changes due to the advance of the technology and proposed some required adjustment to businesses. They tried to determine how can point-of-purchase messages stimulate incremental purchasing. The data used concern multiple study groups: Study 1A comprises 52 frequent grocery shoppers making 1,270 non-list category visits, which led to 384 unplanned purchases. Study 1B comprises 34 frequent grocery shoppers making 946 non-list category visits, which led to 264 unplanned purchases. Besides, support to the data was obtained from study group 3 an online shopping experiment (N = 62 participants who made 270 unplanned purchases) and a follow-up in-store field study (N = 73 in-store shoppers) solicit consumers’ unplanned purchase motivations to investigate the motivation balancing mechanism underlying our dynamic message-to-motivation matching framework. Finally, a study group 4 shopping experiment tests whether adopting a dynamic, as opposed to stable, in-store messaging strategy can increase the total number of unplanned purchases made during a shopping trip (N = 119 frequent grocery shoppers). They discovered that consumers’ responses to in-store point-of-purchase messages are independent of product types. Thus a diversity of intrinsic and extrinsic purchase motivations will stimulate greater unplanned purchasing. Intrinsic motivation is motivation to accomplish an act that comes from inside an individual rather than from an external influence or reward. These are decisions we make based on emotional response. But in the other hand extrinsic motivation is the opposite.

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This motivation is based on an external reason or reward.

Second, new shopper marketing technologies can increase the relevancy of targeted messages. We show how measuring or manipulating trip purpose can rise the effectiveness of in-store communications and stimulate incremental purchasing. In other words the producers can play with the technology to arouse the envy of purchasing because of the wide range of possibility of contacting the consumers. That will help to increase profit by incremental sale which is a sale in which the customer purchase more than she originally intended.

One other axe of the propensity of buying online is analyzed by Rana, Arunima; Bhat, Anil K.; Rani, Leela 2018. Besides, the group of researchers proposed method to amplified and maintain this propensity .*They* reveals what can be the motivation of the online consumer and help determine the impact on the producer behavior in turn. In other words their publication explore the underlying dynamics of online consumption and compare various decision-making paths for planned and unplanned purchase or impulse purchase. The methodology used is based on A graph theoretic approach combined with decision flow charts. Results revealed that online consumption behavior is a very complex process and it may not be similar for first purchase and subsequent repeat purchases behavior. The limitation of the scope of the study is confined to first purchase consumption behavior only. Besides, a semi-structured interview, with appropriate probing (wherever necessary) was conducted for fifteen frequent online shoppers (frequency> 3 times a month) to scrutinize their online shopping behavior. Four distinct lines of questioning distinguish the main probing:

- i. Planned and unplanned purchase
- ii. Browsing pattern related to single or multiple websites

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iii. Decisions related to product category and brand (either one or both are known/ unknown)

iv. No purchase decision

As results, consumer choice heuristics are influenced by both dispositional (internal) and situational (external) factors. Mainly, purchasing decision have two set of rules; one for choosing the product brand and the other for the website brand. There are several loops while making

the choice and therefore it is a complex process to understand.

More motivation that did not exist before in the traditional business were discovered with the online business. For example online retail shopping behavior maybe prompted by Hedonic and Utilitarian Motivations (Childers, Terry L.; Carr, Christopher L.; Peck, Joann; Carson, Stephen.,2001). Those new motivations show how the Information Technology has transformed the decision criteria of consumers. And this is important because many of the motivations that have been the foundation of the consumers' theory like the definition of the consumer basket or the utility curves maybe prominently modified. Childers, Terry L.; Carr, Christopher L.; Peck, Joann; Carson, Stephen.in their publication on this topic, tried to demonstrate that:

as the usefulness, the ease of use and the enjoyment the of the new interactive media increases, if the attitude toward these media will become positive .

The data used is based on Participants consisted of 274 students in introductory classes in the business school of a large midwestern university. The results suggested that while the

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instrumental aspects of the new media are important predictors of online attitudes, the more immersive, hedonic (Pleasure of sense) aspects of the new media play at least an equal role. In other words, a media may have a prominent impact on consumer behavior if it develops its propensity to trigger the pleasure of sense of the consumer.

4.Long term effect

Far away from this behavior to be passive researches confirm that this behavioral change will endure all over the time. There are some articles that sustain the fact that this change in consumer behavior will have a long term effect and explain how the actual consumer behavior not only affects actual business but also business in the future (Large, J. A.; Beheshti, Jamshid. Lanham,2013).

In this framework, “The Information Behavior of a New Generation : Children and Teens in the 21st Century” addressed the issue which is to explore the effects that new technologies have had on information literacy and education. Large, J. A.; Beheshti, Jamshid. Lanham co-authors of this study based on a real analysis of the harms and threats of technology in information seeking, investigated the endless positive possibilities that youth have in researching and using information.

Results also confirm that if there is an increased focus on educating youth to think strategically about their searches and to behave responsibly in an online setting, youth can become expert information seekers.

Restrictions

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Meanwhile some guidelines need to be observed in order to maintain the progress of this new type of business and producers have to adjust their strategies to the new area of business (Mallapragada, Girish; Chandukala, Sandeep R.; Qing Liu. 2016).

If it is true that due to the technology innovation business is done differently, there maybe some restrictions. Probably through “Exploring the Effects of "What" (Product) and "Where" (Website) Characteristics on **Online Shopping Behavior**” the authors mentioned that there are possibilities that not all products and not all websites are inclined to adjust to the transformation of the technology. The main issue of this article is to understanding factors that influence online shopping and managing consumer relationships is not a trivial task for firms, considering the many pertinent factors that influence behavior, including the product being shopped (i.e., the “what”) and the context of the website itself (i.e., the “where”). It also delves the impact of these characteristics on an online transaction’s basket value, after incorporating the role of other aspects of the browsing process including page views and visit duration.

A large and unique data set from multiple sources had been assembled. Mainly researches was based on transaction-level household panel data from the ComScore Web Behavior Panel for 2011 (ComScore 2011). Findings reveals that the functionality of websites interacted with product characteristics to provide some insightful and intriguing results. In conclusion, websites rich on communication functionality realize higher basket value for hedonic purchases.

5. New consumers behaviors versus Keynes theory of demand

In the lines above, we notice that the online business had transformed the whole economic system behavior touching the main actors producers and consumers. But in the concern in the coming lines is to know how had changes affected Keynes theory.

According to Keynes theory, in the short run, the level of income, output or employment is determined by the level of aggregate effective demand (S.Mukher,2018). Thus, for Keynes the activity is pulled by the Demand. Now in the numerical world the activity is pulled by the production. This idea come from the fact that the supply can use the opportunity offered by the technology to augment the level of demand. As discussed in the motivation section above, producers can play with the technology to arouse the desire of purchasing (Suher, Jacob; Hoyer, Wayne,2018). Therefore, as one of the main idea of the theory may face some critics, we can assert that the answer of the research question: “Will the theory of Keynes still on hold with the development of the new technologies of Information?” is “No”. Thus, it is important to apply many adjustments to the theory.

6. Strength of the analysis

In conclusion, this paper help the reader to acknowledge how information has changed customer behavior during the last few years and what are the motivation that had prompted those customer behaviors. Besides, a quick review of some

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customer behavior that had been the foundation of the Keynes theory had been reviewed and compared to the new motivation of the consumer in order to prove the necessity to adjust with the new system incurring. The findings reveal that the development of the technology had implemented changes in consumers behavior and have transformed the face of the business impacting the law of the demand which is the basic idea of Keynes theory. Researches prove now that with the technology, the supply can play an important role. Information technology have changed consumers behaviors that leaded to changes in Producers strategies thus the necessity to apply adjustments to the theory of Keynes which is the basic point of money production. Finally, recommendations had been provided to encourage the researchers community to deepen some ways to find out a proper economic theory to adjust with the new digital environment . Moreover, we propose to the educational system a new learning tool able to fit with the new system.

PART II DIGITAL ECONOMICS

Chapter 6- Digital microeconomics

1-Consumer theory in digital economy

Assumption 1 difference between capital good and digital good

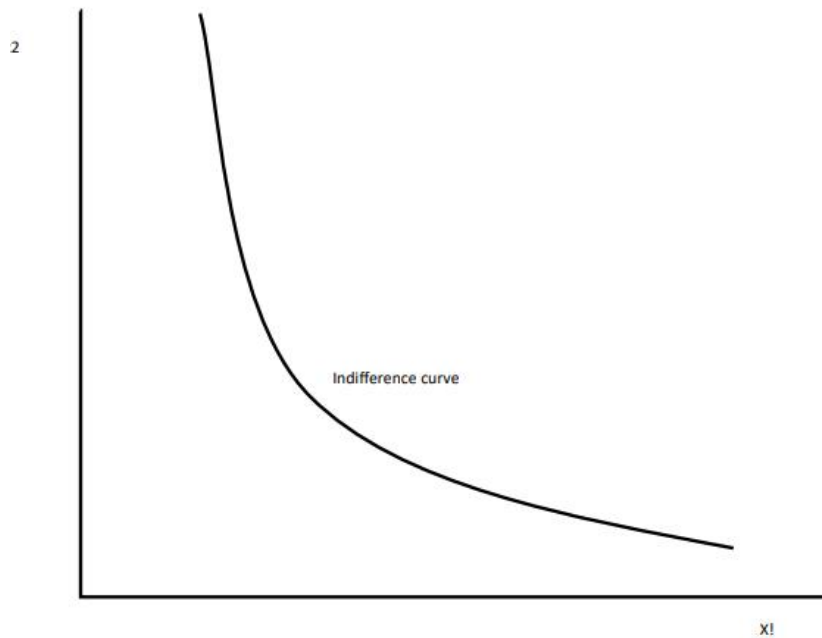
- 1- Digital good are created in illimited quantity. For example, properties of the CAP theorem quantity allow me to have the digital version of the book the digital available for everyone as soon as possible and as soon as it is available online

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- 2- Capital goods are not so because I need to produce them and sometime the material are not available and I need to put the money up front to determine the quantity of the book that I need to produce. The physical good make me bow down for so many constraints.

Asumption 2 The economy is envisionnable in a SMIGable environment. Which means the employer hire the employee with the idea that he will afford all the things he need without any constraint. Reason why the government allows him to operate. In a SMIGable environment the customer will be able to put any item in his online shopping cart without anyconstraint because the employer already know what is the maximum of choices he will make and had created a path of decision for the employee. Every choice beyond this choices are considered as luxury or capricious.

1.1 The indifference curve: the Utility function



Two dimensions are important to point out the properties of the CAP theorem and the chronicity factor in other terms the propensity of transactions to be asynchronous, synchronous or over synchronous.

In digital economics, the satisfaction of a good is reduced if the good is too much available. As example, we can cite the availability of music on YouTube. People have too many songs to listen to and they definitely listen to nothing. People have too much TV channel to watch so that they do not watch TV anymore The choice of a good is difficult if the availability of this good is enormous. Thus, the necessity of deal, advertisement to force the consumer to make a choice.

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Besides, now we have the online cart shopping instead of the basket proving that things have changed.

In digital age, people buy goods that they do not use. They buy it because of the brand the commercials, the time they decided finally to use it, then new product come out. We moved from a society of consumption to a society of supra consumption.

However, all the rational used in classical economy hold in digital economy. For example, the convexity of the indifference curve is also tenable in digital economy.

The Profit maximization equation in digital economy could be also the same.

$$\pi(p, \mathbf{w}) = \max(\mathbf{p}f(\mathbf{x}) - \mathbf{w}\mathbf{x})$$

However the assumption '*De gustibus non disputandum est*' which means that tastes are non disputable, in the classical view point could lead to some major discussion in digital economy. The fact that consumer has a taste of a product is not disputable which made the maxim still true but because there multiple products having the same taste becomes a new challenge for the consumers. In digital economy, people consume because they are forced to be focused on the product they chose so the maxim '*De gustibus non disputandum est*' does not completely worth it. Instead we can say that '*Gustibus manipulabiles*' which means that tastes are manipulable.

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1.2 The influence curve: the visibility function

The discovery of the influence curve convinced me about the righteousness of the indifference curve convexity. And it matches the reality as the same way our eyes has a convex form, our glasses lenses has also a convex form. The classicals analysis was right.

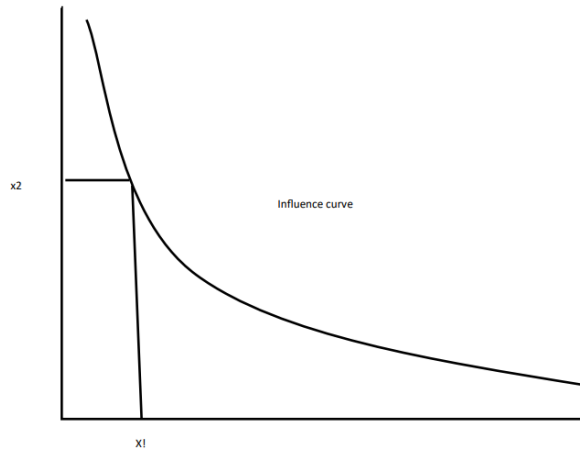
The notion of influence will be the most important factor in the digital area, this because ***‘Gustibus manipulabiles’: tastes are manipulable.*** The influence coefficient even though neglected in economics for the beginning had been the main factor that had led to the conquest of the world , the creation of colonies and one of the biggest economical factor that had leaded the economic behavior of human being.

It is because the producer knows that the customer had an indifference curve that he suggests him to check the influence curve.

The influence curve is the same like the glasses that the we wear when we do not see well..It looks like our eyes it had the same form like our eyes but he helps better get better look.

Assumption 1: the influence curve is convexe

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To know how the influence curve work, think about a ball in a round bowl or water in a bowl, the ball roll toward the side where the bowl is lean to.

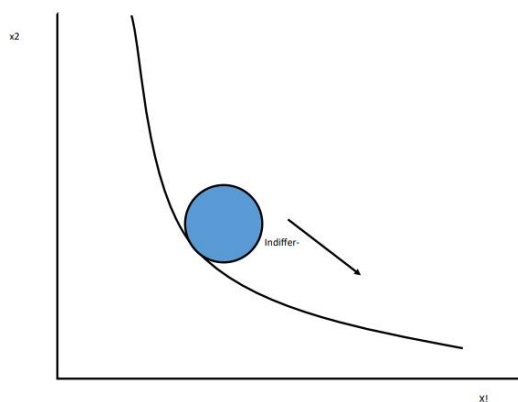


fig 6.3

That is exactly, what influencers do on social media. The use of influencer boost your product on e bay or amazon.

The marginal visibility is the quantity of x_1 that the customer will sacrificed to get one additional quantity of the good x_2 ti is also called the coefficient of influence.

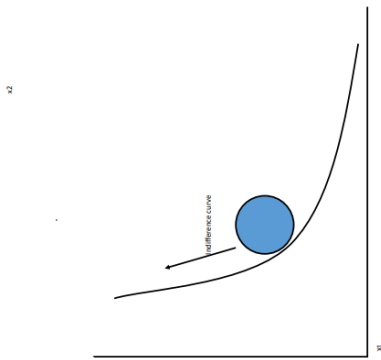


fig 6.4

1.3 The equilibrium

Asumption2: In the case the indifference curve cut the indifference curve in more than two points, the customer had a difficulty of choice.

It is like a game when the final result should have a winner. They will finally come to the after-watch game and finally to the penalties. Conferring to the example of the glasses. The influence curves are convex and are the same as the indifference curve.

To explain the behavior of the visibility function, let's take the example of wearing glasses. The reason of wearing glasses is the same as using the indifference curve. People use glasses because they could not catch an object that instead of being one in their mind is multiple. And this is why their visibility is blurrydizzy. It is the same thing that happens when a consumer had a multitude of choices and the budget constraint could not help out. Thus, he decides to use the influence curve which is the glasses. Indifference curve and Influence curve having same shape means that the lens of the glasses size or the pupillarity of your glass is the same as your eyes. To be able to see they need to have different pupillarity so they matches

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will make a focal point on the object and you can take it easily. If you are myopic the pupillarity of your glass is high if you are a hyperopic the pupillarity is low. But never the same as your eyes natural pupillarity if not it does matter to wear glass. same thing with the influence curve. Therefore, the equilibrium corresponds to the intersection of the indifference curve and the influence curve, as indicated in fig 6.5.

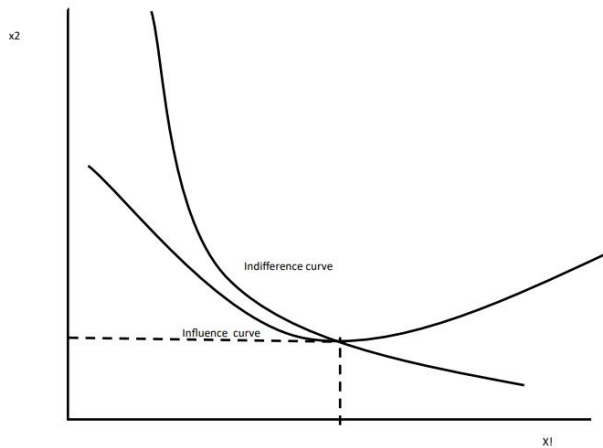


Fig 6.5 equilibrium condition for customer

Application:

Let's assume two functions U and V where

U is the utility function of a consumer of two goods X_2 and X_1

And V the utility function of the same consumer for two goods X_2 and X_1 .

The algebraic expression of the two functions are:

$$U(X_1, X_2): X_2 = 1/X_1$$

$$V(X_1, X_2): X_2 = 2/X_1^2$$

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Determining the quantity of good of the consumer comes to resolve

$$U(X_1, X_2) = V(X_1, X_2)$$

Which means

$$1/X_1 = 2/X_1^2$$

The solution of this equation is $X_1 = 2$ and $X_2 = 1/2$

In this case also it could be possible to determine the coefficient of influence (CI) which is the visibility marginal. This could be obtained only by using the Visibility function. Therefore,

V_{X_2}/V_{X_1} Is given by the expression,

$$CI = 4/X_1^{-3}$$

2- Producer theory producer in digital economy

2.1-The production function

This is the question, I asked : As a producer, in traditional economy, you need to know how many workers you need, and the quantity of good to produce. Now, in

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digital economy what are you going to be the problem, if as soon as you produce the good it is available in infinite number, and you do not even need a worker?

My response was simple. The good is there, but now we need to sell it. And how to make people buy all these items? It is by finding the answer to this question that I discovered the notion of influence. The notion of influence will be the most important factor in the digital area. As it is mentioned earlier in the previous lines, the influence coefficient even had played a prominent role for the conquest of the world, the creation of colonies and one of the biggest economical factor that had leaded the economic behavior of human being. In dating a partner first use his influence to attract his partner.

The main work is to find the form of the production function. The production function is function of time(Kara & Baban, 2011) this because the capital is confused with labor(Schneider, 2018) and this because of digitalization and artificial Intelligence automation. The idea to use the graph of Madison graph in Fig 6.6 as reference mode becomes and opportunity. The choice of this type of form for the production function is enhanced by the works of some economists, as quoted below:

"In traditional economics, the cost of production decreases as the production rate increases (scale economics is valid). After a certain level average cost begins to increase again (scale diseconomies) In other words; as the production increases, after a certain level the cost increases gradually. On the contrary, in Knowledge Economics cost decreases gradually as the production increases. Decreasing cost style is one of the most important features of new sector which is formed by Information technologies. The structure of cost in digital goods and services production differs from the traditional production. Producing digital products goods generally require great deal of investment at the beginning. Those investments can be named as "sunk cost". By this it is meant that, after giving up the investment it is not possible to get the invested money by selling the goods or by other ways. However, once the digital goods are produced their reproduction (copying) is low cost. Consequently, in the production of digital goods as the productions increases, the marginal and average cost decrease and income increases. In production of these types of goods the cost of developing them is

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important but afterwards cost of copying them or introducing a similar one to the market is so low.”(Kara & Baban, 2011)

In digital economy the production will depend on the time only and the choice of the technical mean of production will determine the surplus of the producer. This lead to the management of the method of production which could mean not to kill a fly with a machine gun. Thenceforth, the theory of value in digital economy will defer from the theory of value of Adam Smith. Adam Smith will insist on the importance of the factor labor to define the value of a traditional good. In digital economics, this value will depend solely on the time used to make the digital good. The exponentialization of the profit justifies the use of the exponential function form to describe the production function of the digital producer. On story told below could express the idea behind this choice.

“According to an old Indian story, the emperor was grateful for the invention of the chessboard and asked the inventor to name the reward he wished to receive. With the remark “All I desire is some rice to feed my family” he suggested: “Place one single grain of rice on the first square of the board, two on the second, four on the third, and so on [...] so that each square receives twice as many grains as the previous.” The emperor conceded the wish and was surprised to hear that he had to give away more than 18 quintillion grains of rice”.(Brynjolfsson, 2014)

The idea is that labor is added to factor time in digital economics, or in other words time is embedded in the labor factor such as now, with no labor the time is the only factor that is consistent in digital micro economics theory.

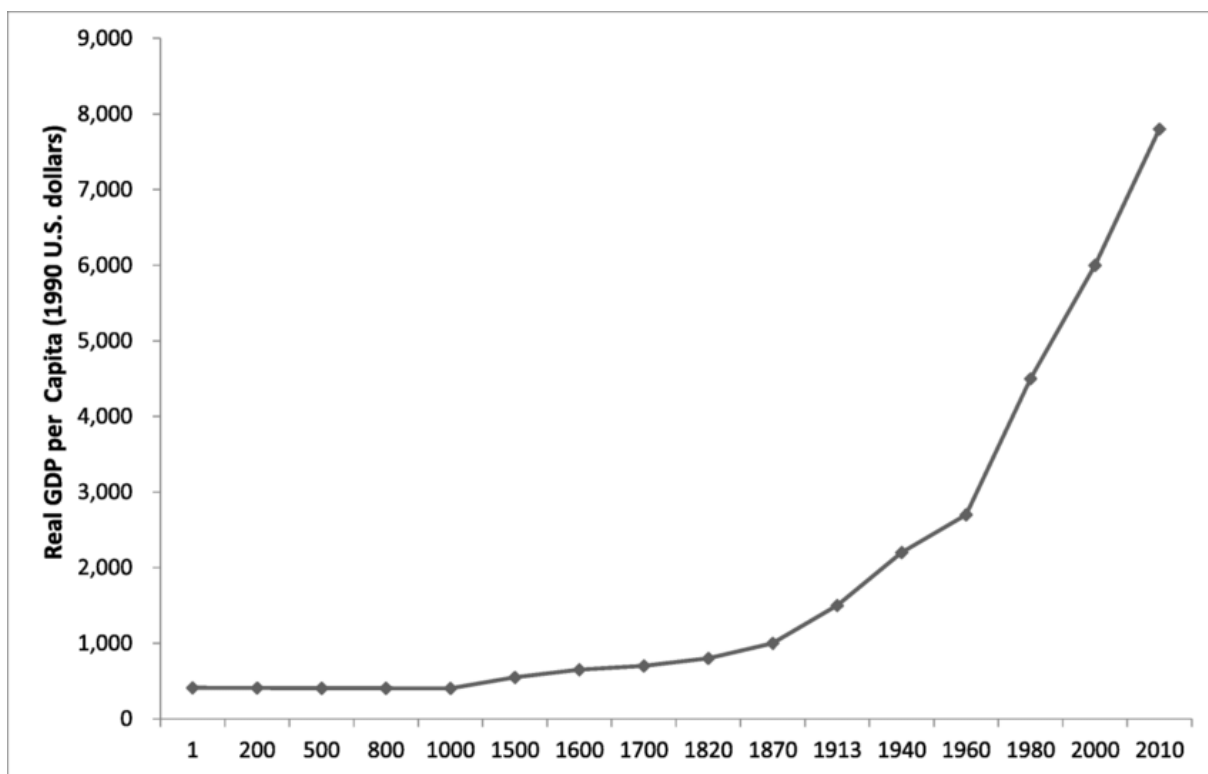


fig 6.6 world production growth

Thus, we derived the production function of the producer as shown in the Fig 6.7

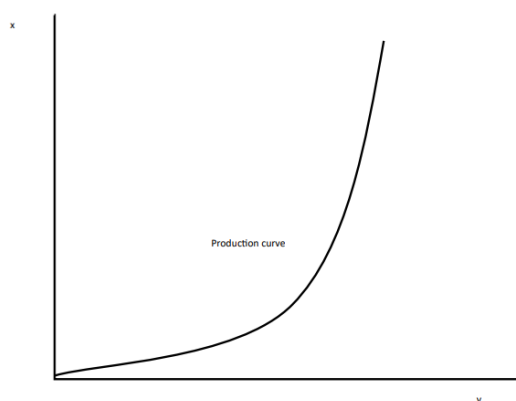
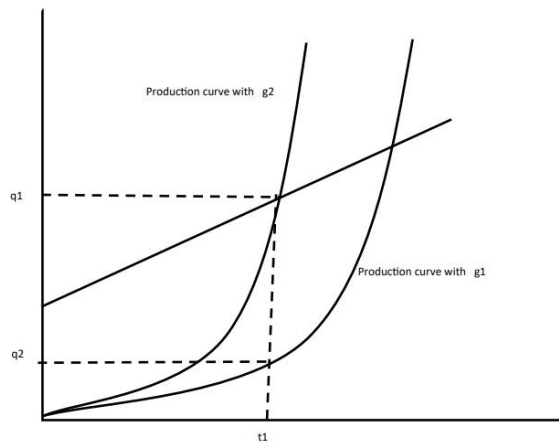


fig 6.7 The production function

2.2. The choice of the producer



According to the development done above, In digital economy the choice of the producer will depend on the choice of the technical mean of production. This lead to the necessity to select the best method of production which always mean not to kill a fly with a machine gun. This behavior is comparable to the way people react when they are subscribing for a software or buying any technological device hardware or software. As you are willing to use a software and make a production with it, there are some decisions you need to make. Even if it is Microsoft office you will need to know if you want a student, a professional, a commercial enterprise subscription and so forth..... . the size of work that you will do will impact the production and the technology tool that you will chose. In fact, when you are using other many factors the Cobb-Douglas function describe more the economic problem. Because of the concavity of the production curve, the need to satisfy the maximization constraints with the cost

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minimization are important. This is the case in traditional economics but in digital economics, the factor times is the only one left that could really impact the condition of the production function.

3-Surplus of producer in digital economy

The surplus of the producer will depend on how he manages his Digitalistic mean of production. This management will depend on space management or time management. For example, let's take a look at an online food delivery company. An online food delivery company could make profit by managing the capability offered by the properties of the CAP theorem, and in this case we are indexing the partitioning property. When three different customers order a food delivery from a particular restaurant, the logic is that they should be assigned three different drivers. If the delivery cost for a driver is \$35 the three customers will pay in total \$115. But the delivery company will not gain anything by giving those three orders to three different drivers instead they will give it to one driver because the food is to be picked up in just only one store. The online delivery company knowing that the driver could not earn more than \$23 in an hour will give \$30 to the driver for delivering the three orders while considering the \$7 as a tip. In traditional economy, this was not possible because the driver will know that there are three customers ordering in the same store and the delivery service owner will feel so uncomfortable to pocket \$92 in front of the driver, in less than one hour. He will prefer to assign the delivery to three different drivers at least.

For the physical or capital goods the problem is not different as the one we have in the classical theories but for digital goods the determination of producer surplus has changed. The surplus will depend on the technology used. The producer will choose the best technology that minimize the cost in function of the quantity and the quality chosen by the customer. As

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example of this type of behavior, we can point out the one of China that makes different products to Africa and America. Of course those might be the same products but quality and quantities are different.

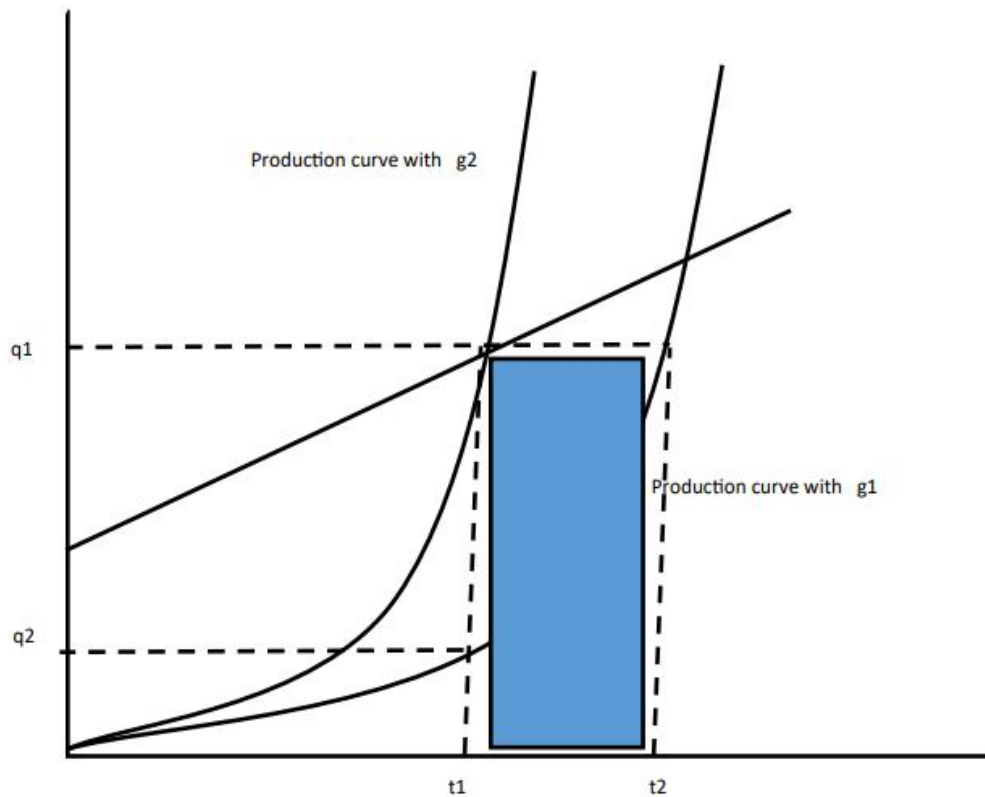


Fig 6.9 Producer surplus

Fig 6.9 represents how the producer surplus could be determined in digital microeconomics. The portion $[t1;t2]$ could be transposed into money if the producer know his hourly rate. and the surface in blue represents the surplus. In digital economics, what we definitely charge is time. I took the example of Macdonaldo as a photographer. When he finishes

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to take a picture with his camera, the next step to do is to go on his computer and make his client chose the pictures that he likes. Here comes the distinction between capital good and digital good. When the person wants the digital version of his photos Macdonaldo charges them only something representing the time and the small portion of overhead cost. But in case the person wants the physical copy, he will charge him in addition the cost of the printed copy of each photo. In the case where the customer want to have 100 copies of a same picture that he could give to 100 persons which becomes a capital good the amount charged will be the price of each copy times 100. But in case, he wanted just the digital version that he will give to 1 millions followers on his Facebook page, he just need to pay for the easy cost of the digital version charged by Macdonaldo.

4- Theory of performer in digital economy

The notion of performance is very important in digital economics. The main and simple reason is that it gives some data and you have some data you have some digital and when you have some digital you are happy. As it could be seen in the description of the producer function the main factor that is conditioning significantly the production function is the time. Besides, we had seen how managing time could help the producer not only to make some profit but to have some surplus. For this reason, many of the digital platforms, or website, or video posting, photo, comments, product have a performance measurement tool. Coming from the number of likes, the rating, to the number of people visiting the platform, the website or the profile. In other words, the customer would like to know the performance of the digitalistic mean of production used.

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The management of time and how to make profit will determine how each of the economic agent (consumer and producer) will set the objective line. Besides, the performance curve will also depends on two main factor the Human factor and the technological factor. In the lines below we could see how the two agents will determine their preference of each of those factors.

Analyzing the fact that events are asynchronous in digital economics could be interpreted to the way they could be available. In other words, the possibility to have a digital good that could be consume no matter the time justify the fact that the possibility to have some asynchronous events is also a good thins both for consumer and Producer. But this principle is comparable to the beginning of the economy as we assume that the lack of sufficient technology make previous economic system more reliant on the capabilities of choosing asynchronous event. However, synchronous transactions are characteristics of main operation in both micro and macro digital economics and the trend is heading to get more transaction over synchronized with the development of Artificial Intelligence systems. For the overall, all the three different types of event (asynchronous, synchronous and over synchronous) are really involved in the unfolding of the digital economy with the development of artificial Intelligence systems fostered by machine learning and deep learning. However, the tendency of the producer will be over synchronous because it is a factor that will help him maximize his profit as time is conditioning his production function.

It is important to know that good performance had a real impact on the influence curve especially concerning the diminution of the effort to deploy to increase the coefficient of influence. There is a perpetual struggle between the customer and the producer. The producer would like to use technology too much and the customer would like to use more human activity

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but the producer will like see more human activities from the customer and the customer would like technological performance from the producer.

4.1-Customer preference

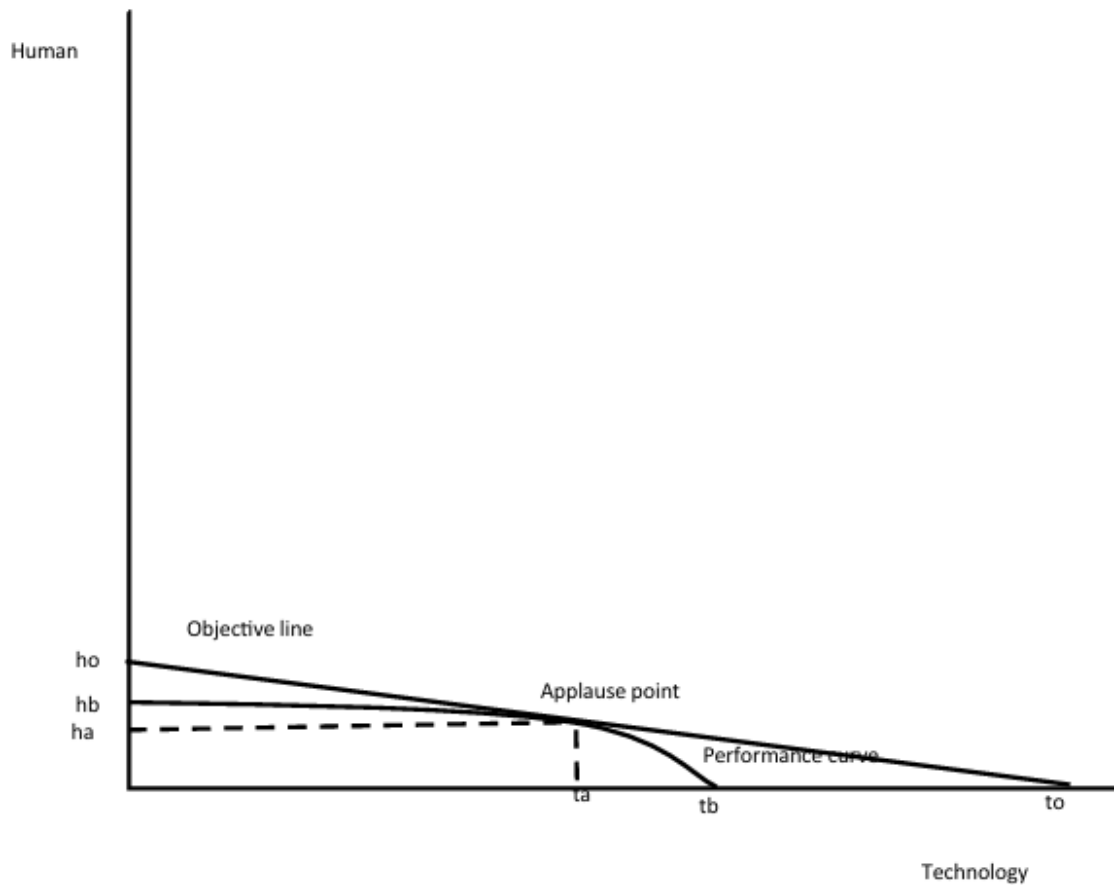


Fig 6.10 Consumer performance preference in Digital Economics.

The figure 6.10 shows the consumer performance preference in Digital Economics. The consumer set the objective line in such ways as the technological factor should

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play a significant role. The reason why it prefers a performance based on technology is that with a better technology he could save time and have a better product. For example let's assume that a consumer wants to choose between Macdonaldo and another photographer in the New York Area. Let assume that he knows that Macdonaldo is using the last version of Photoshop and the other photographer is using an older version, the consumer will never hesitate to select Macdonaldo over the other photographer.

4.2-Producer preference

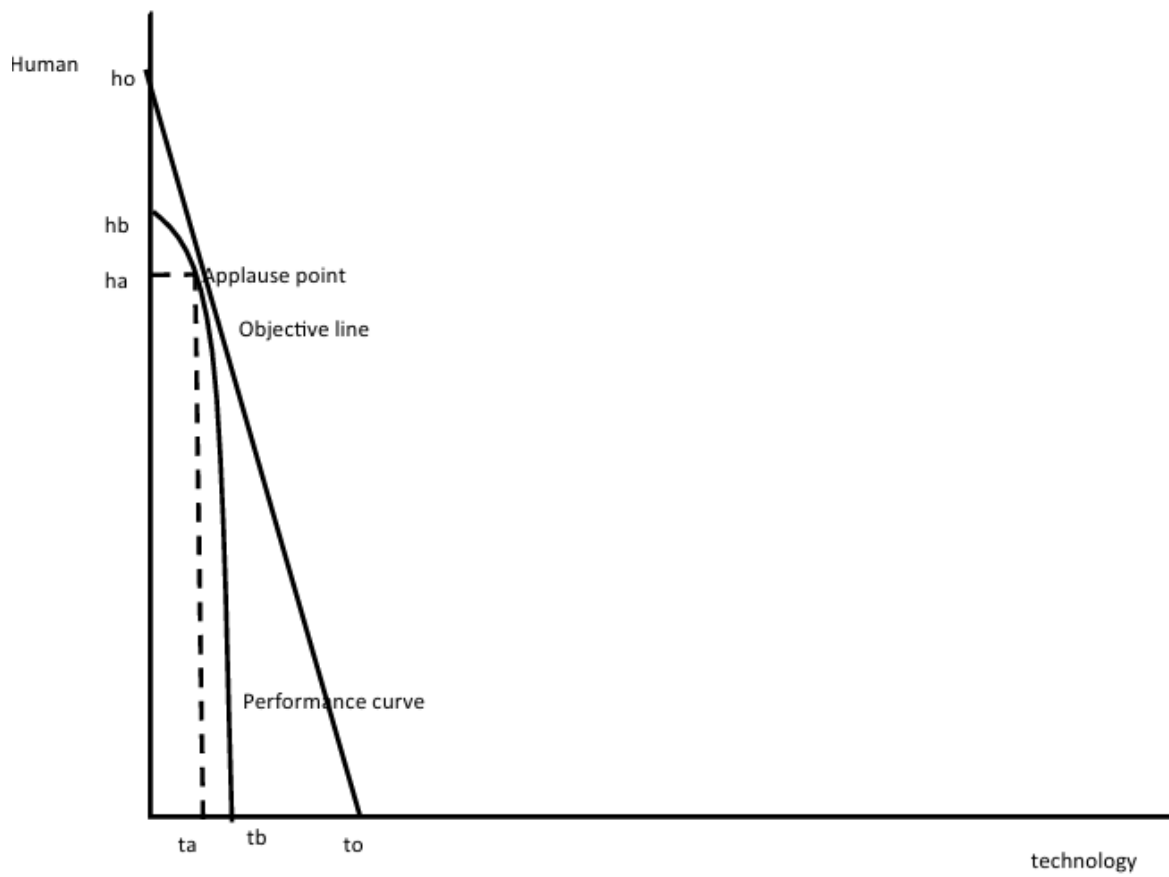


Fig 6.11 Producer Performance preference in digital economy

Fig 6.11 illustrates the producer performance preference in digital environment. Producer would like a performance curved that is more based on human. This preference for the producer is the reason why sometimes some website would like to check if you are not a robot. Due to the principle of data accumulation that is a form of digital wealth, data driven strategy will also be set in place and as those data are retrieved from human being the producer preference as a really based human performance is important.

No matter the type of economy that is indexed, the analysis of the performance theory from the producer side had led us to determine the life cycle of a product that is a very important concept in marketing. However, the life cycle of a product in digital economy is supposed to be shorter than the one it will have in capitalist economy due to the speed of circulation of information flux. Some researchers propose the possibility from the producer to make its product outdated before someone do so.

“The basic principle of knowledge economy is “make your product go out of fashion”. If a new and successful product is developed and launched, the aim should be to launch a more developed version of this product and making the first product go out of fashion”(Tapscot, 1994)

“And If you do not make your product become old, another person may certainly do it” (Güvenir, 1999)

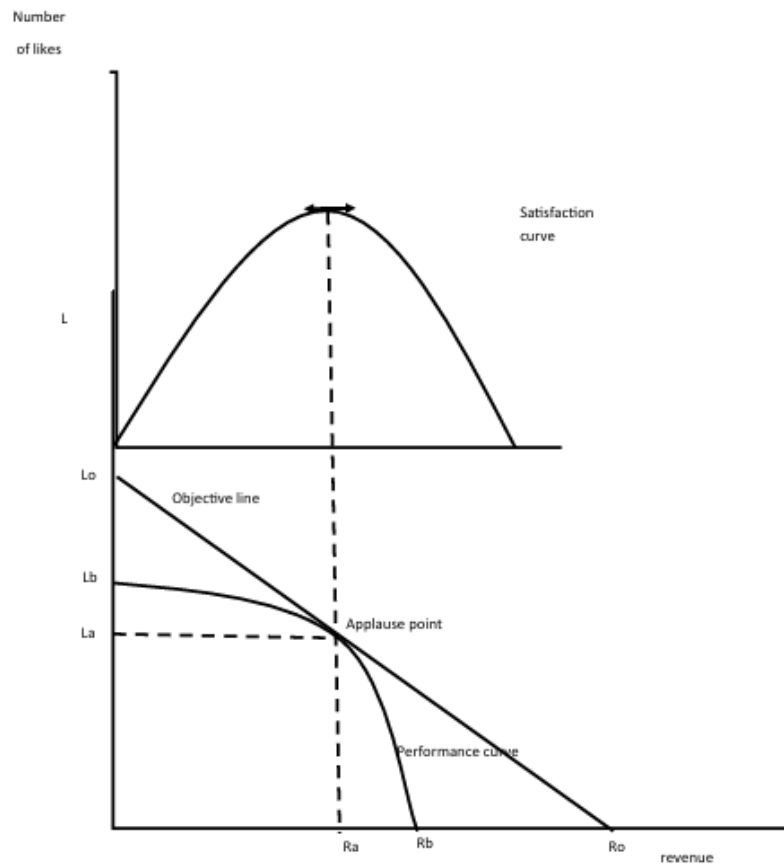


Fig 6.12 Product life cycle in digital economy

According to the figure 6.12 the applause point correspond to the intersection of the objective line and the performance curve.

the satisfaction curve corresponds to the life cycle of the product

5- Absolute and comparative advantage in digital economy

The notion of advantage absolute and advantage comparative have not changed in from capitalist economy to digitalist economy. However, it is important to remember those concept as they are playing significant role in decision making in digital economics. According to the words of David Ricardo,

“In comparing therefore, the value of the same commodity, at different periods of time, the consideration of the comparative skill and intensity of labor, required for that particular commodity, needs scarcely to be attended to, as it operates equally at both periods. One description of labor at one time is compared with the same description of labor at another; if a tenth, a fifth, or a fourth, has been added or taken away, an effect proportioned to the cause will be produced on the relative value of the commodity”.(Ricardo, 1955)

In digital economics, the comparative advantage will be determined in term of time saving as the factor labor plays a less valuable role in the digitalistic mean of production. Thus the importance to see how this notion is viewed in digital economy. According to the concept of absolute advantage

“This advantage, however, will perhaps be found to be rather what may be called a relative than an absolute advantage; and to give a superiority to the country which enjoys it rather by depressing the industry and produce of other countries than by raising those of that particular country above what they would naturally rise to in the case of a free trade”. (Smith, 1776)

6- Information theory in digital economy

Analysis of information theory is a relevant factor in digital economy. The way it circulate, the way it could be transformed into digital economy are very important arguments that confirmed its ineluctability. According to some references,

“The most rapidly growing area in economic theory in the last decade has been the area of information economics”(Varian, 1992).

The information play a major role in increasing and decreasing the influence coefficient of a visibility function of a product. The use of the asymmetry of a information could play on the quality and the uncertainty pertaining to a specific digital product. In the case of a capital product,

“ The existence of goods of many grades poses interesting and important problems for the theory of markets. On the one hand, the interaction of quality differences and uncertainty may explain important institutions of the labor market. On the other hand, this paper presents a struggling attempt to give structure to the statement: "Business in underdeveloped countries is difficult"; in particular, a structure is given for determining the economic costs of dishonesty. Additional applications of the theory include comments on the structure of money markets, on the notion of "insurability," on the liquidity of durable, and on brand-name goods” (George, 1970)

The use of information is an important instrument in social media industry. One tool that is fundamental in digital economy is that the information does not affect only products, but it can also impact person's life, society's life or country's existence. For example, rating

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could be associated with a sale of a product in a website as the website itself could be associated to a rating system. And sometimes people manipulate the rating as away to increase their coefficient of influence to attract people or maintain their market share.

Asymmetry of information can be used by digitalist to obtain certain objective as the same way that perfect and pure information could be used to obtain specific goals too. The same principle had been used in capital economy also but the difference is that in digital economy the impact of those actions are fast and intense due to the speed of circulation of the information fluxes and the number of people they can influence.

There can be many way rating can make people lose their job. Let's assume that a online ride share is not desired by his supervisor. Due to the possibility offered by data accumulation, the supervisor could know customers that are not inclined to give good grading to their driver or which behavior could push drivers to be nervous and this situations could lead to a bad rating coming from the rider. So what the supervisor have to do is to connect the driver with those kind of people. In the long run the driver will see that his rating is decreasing considerably. And the employer could just do whatever he wants with the driver because his rating is not matching the requirement of the platform. He could be fired silently. This to show the power of the digitalist over the capitalist. The control of the data by the digitalist give him the potentiality to manage information and reach multiple of objectives that the capitalist could not reach before.

7 – Asynchronous, synchronous and oversynchronous impact in digital economy

1- Consequences of Asynchronous concept in digital micro economy

The consequences of asynchronous systems in digital economics are not so important. But they play a role in the availability of the resources and the products. Asynchronous systems allows the product to be accessible every time it is desired. However it impacts significantly the accumulation of the digital.

2- Consequences of synchronous concepts in digital micro economy

Synchronous ability in digital economy impacts the value of a product. The more a product is matching the time span of its desirability the more it increase in value. In digital economy people get extra reward when they know how to play with this factor. For example, in ride share industry drivers got important tips if they accomplish their missions on time.

3- Consequences of over synchronous concepts in the digital micro economy

With the era of artificial intelligence, the principle of over synchronous is preponderant. People get generally the good before they are desiring it. This principle helps producer to have comparative advantage over their competitors. But it might also have another sociological impact. Here, the consumer is surprised when the good is delivered. Even if the Artificial Intelligence system detects the need of the customer to use this good, as the good is on the way before he starts thinking about it, there might be a problem. In result when the good physically come to his house he does not use it anymore because he already got the psychological satisfaction. The example is given by the existence of garage sales in USA or in Europe where many goods bought are not used. The oversynchronous ability had been at the

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origin of the creation of path for ride share drivers, or food delivery drivers or workers in warehouses management systems.

8- Market equilibrium of digital economics

Defining a microeconomics equilibrium on digital economy market is not different from the methodology used in capitalist economy. Because when it comes to discuss about market there are always two things that need to be considered the supply and the demand. According to some references,

“The industry supply function measures the total output supplied at any price. The industry demand function measures the total output demanded at any price. An equilibrium price is a price where the amount demanded equals the amount supplied”(Varian, 1992)

If we let , $x(p)$ be the demand function of individual i for $i = 1, \dots, n$ and $y(p)$ be the supply function of firm j for $j = 1, \dots, m$, then an equilibrium price is simply a solution to the equation(Varian, 1992)

$$\sum_{i=1}^n x_i(p) = \sum_j y_j(p)$$

The problem is to wonder the way we treat the rest of the production that is not used. Because the infinity of the availability of the product had pushed the producer to design a visibility function for his product to make it move on the market. There might be a concern which is to recognize that after the use of the influence coefficient by the supply chain to move and important part of the production there is a huge number of products that is not sold called dead production. Thus, the dead supply or production is the problem. If demand is effective

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there is a number of customer available for each product but if the market is saturated the product could not be sold so the producer will increase the influence coefficient to compel the consumer to choose his product and he could never sell above the market price.

One of the things is when you want to buy the new kindle version of a book , you will see that the price of the paper version was lower than the electronic version. Then you may wonder to know the reason and what determine the price on the market. There is one thing that is sure it is the law of the supply demand when the effective demand exists.

But if it is a digital good, the supply is unlimited. So that means that the fixation of the price is not impacted by the supply. If you have a digital good you are not in a rush to sell it. The reason is that your good is available in illimited quantity at the starting point . In a Marshallian market graphic design view point, the supply curve will be a line parallel to the quantity axis.

However, in a micro economic view point this does not represent a big deal, but in a macro level the non consumption of the supply will become a huge issue.

Chapter 7- Digital macroeconomics

1-What is digital macroeconomics

Digital macroeconomics is the study of the digital economy in the macroeconomic level. In other words, it is the analysis of the interaction between microeconomics agent and the measurement of the aggregated effects of those interaction. Digital macroeconomics is also the study of policies in both capital and digital economy in order to assure the welfare of the community in a national level.

In this book it is a matter to find out if it is the effective demand that drives the economy, the coefficient of influence or the rate of technological progress.

Internet open doors to the world and connect you to every person you want to reach every where in the planet. That is what we know . Unfortunately, it is not the case. Internet use had boundaries, Just as the same like, countries have borders. For this reason, Nations protect their cyber spaces. Thus the important to know the principles of digital macroeconomics. If microeconomics study the interactions between the micro economic agents, the digital Macroeconomics study the interaction between the digital economics agents on both their cyber spaces and in they physical space. This space is actually defined by their national identity.

The agent base model will be the approach retained in the overall to study the implication of the use of digital automation in the economy.

In the Keynesian model the consumption is driving the demand with an important role played by the autonomous (a) consumption. In digital economics, the technology

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with the variation of the technological progression (h) is driving the demand impacting the influence curves and boosting the production. The fast evolution of the digital economy and the way technology is driving the demand had pushed some researchers to change statistical method and focus on the measurement of the rate of technological progress.

“1 The shape and size of the key components of the evolving digital economy such as e-commerce, specifically, and, more generally, the introduction of computers and related technology in the workplace.

2 The process through which firms develop and apply advances in IT and the use of e-commerce.

3 The change in the structure and functioning of markets including changes in the distribution of goods and services and changes in the nature of international and domestic competition.

4 The social and economic implications of the IT revolution and e-commerce such as the effects of investments in IT on productivity.

5 Demographic characteristics of user populations” (Haltiwanger & Jarmin, 2000)

The notion of influence will be the most important factor in the digital area. The influence coefficient was a notion that was not inserted in many economic analysis. But it had the determined and shaped our way to conceive our society. It is high time to admit it in our analysis as a real economic factor that could bring many important macroeconomic decisions. In business, it was designated in form of marketing but marketing is just a way to influence the

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client to be enticed by the good or the product that you have available. Thus the importance to use strategies around the four Ps (place, product, price, promotion). Today business strategies go far up to seven. But the goal is still the same set in place strategies to influence the market and be able to sell your product.

In a macroeconomic, it is because of the risk of the reduction of the coefficient of influence that countries fight for influence through war around the globe. Because the more you have influence the more your country will sell its production. It is a type of macro marketing. Because they leaders intuitively knew the loss involved in decrease of the coefficient of influence of a nation and its impact on the production.

We have two kinds of production in macroeconomics:

- the effective production (EP)
- the effectual production (FP)

The difference between them is the dead loss for the country. But in this book, it will be called the **productional gap (PG)**. Many economists had tried to make the difference and explain those two notions but in this book several angles had been studied to allow readers to apprehend the term with a lot of ease.

The effective production is the production that is sold: when you buy a good and you sell it it's an effective production. When you buy a good that you would like to sell, it is a effectual production. If you sell it, it becomes an effective production. The rest is what we call a dead production (DP) or the productional gap (PG). It is the part of the effectual production that is not sold. On the market of commodities, the production is the effectual production in the

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model of Sraffa and Pasinetti. In the model of Keynes the production is the effective production sold in the market of good and services.

The difference between the effectual production and the effective production is the dead production or productional gap (PG).

EF- FP= PG

In fact with the effectual production Sraffa did a good job and we cannot disagree with him, with the effective production Keynes did a good job and we cannot disagree with him also. Just they both did not finish the job. The connection of the work of those immensely great personalities helped us to define the productional gap (PG), which is amazing.

The effectual production and the effective production function helped us remind the property that we called synchro magnetism.

Two function f and g are synchromagnetic if

Two functions f and g are synchromagnetic if for Any three functions, U, f, g ,

$$U(0, f) = U(g, 0) = 0$$

This is the mathematical explanation of the notion of duality described in the microeconomics book of Hal Varian (Varian, 1992). It is the same as the performance function. This notion will be also explained in the next section.

It is this property of synchromagnetism that makes the explanation of the effectual demand and the effective demand difficult and stopped both Sraffa and Keynes to proceed in their wonderful analysis. Because the effectual demand and the effective demand needs to evolve at the same time. you cannot produce in the air you produce because you know

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that someone will buy it. and when you produce someone should buy it. It is contrasting in someway Say law that stipulates that every offer creates its own demand. But in fact, even though people follow this law they always expect the existence of an effective demand before starting the effectual production of the product. Most of the time this law works for new products and still the expectation of the effective demand is expected for the new product before its effectual production.

One best way to understand the effectual production and the effective production is to refer to the music industry. In the music industry the dead production is fatal for the artist. If an artist is making a song, he gets the hope that the song will be catchy and he will sell a lot of album. For the effectual demand and the effectual production, he will go to the studio, work with his producer and they will make the cover, the arrangement and so on and all those inputs that contributed to the “fact” that the song comes to life is the effectual production. But that does not mean yet that the public will like the song. And now they will play the song at the radio. If nobody likes the song it means that the effective demand is null. Thus, the artist loses his money. But if the song is liked the effective demand is good and he will sell the album. But it depends now on how people will like the album. If it is highly liked thus, the effective demand is over the effectual demand so they need to make more CDs. So this is the principle of magneticity of the effectual and the effective function because both things need to match together and in marketing this provokes the realization of the market study or sometimes the fact to make sure that people would like the product before the production. But in digital economy the dead production is low because the production cost is reduced to the time and the production technological source or by the digitalistic means of production. (the software, and so forth). One

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other example of dead production is the garage sales in western countries, or the sale in the shopping center because the effectual production is not sold.

Nations fight for the Olympic game to augment their influence coefficient. Because the influence coefficient increase the effective demand. And the demand increases the effective production.

In traditional economy the For the PG (productional gap) is very important because the production of the physical good imply the use of important factor from raw material to labor factor.

In digital economy the PG is almost equal to zero because at the production the use of raw materials are not included. However, the time used to produce the item is dead and the amortizement of the technical factor of production is a real concern. Although labor factor is neglected it has a real infinitesimal proportion of impact.

In fact, in digital economics, we cannot completely say that the productional gap is inexistent. If we take the example of a YouTuber who spent millions to make a video and post it on his YouTube page he made a effectual production that needs to be match. Let's assume that the video just receives three likes. It means that the effective production is really lower than the effectual production. The productional gap is therefore negative.

2. The synchromagnetic function

A function U is synchromagnetic if for Any three functions, U, f, g , defined as :

$U=U(f,g,t)$ where t represents the factor time,

$$1-U(0,f)=U(g,0)=0$$

this is the mathematical explanation of the notion of duality described in the microeconomics book of Hal Varian(Varian, 1992)

2- for every $t \neq 0$ so

$$\lim_{g \rightarrow 0} U(f, g, t) = 0 \quad \text{and} \quad \lim_{f \rightarrow 0} U(f, g, t) = 0$$

3- $\text{Max}U(f,g,t_1)$ exists for a specific $t_1 \neq 0$

In other words, U is convex with an unique coordinate at a specific time t_1 .

3-The economic agents

The agent based approach chosen in this section compel us to define the different types of economic agent that are involved in the digital economic process.

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First we have the households. They constitute the consumers and they have preference for any type digital or capital goods. They make decision about the choice of product that they need or want whether they are influenced or not.

The government as second agent is responsible of the management of the influence coefficient inside and outside the nation. He is also responsible of the fiscal policy and the implementation of several rates in the economic activity.

The central bank as another economic agent is responsible for implementation of monetary policies and the emission of the monetary bulk.

As main economic agents, the producers are the real engine of the digital economy. They are comprised in major part by the entrepreneurs and create of coefficient of influence in order to boost the sale of their production.

The workers are involved in the agent based macroeconomic model as main component of labor factor.

4- The propensity to consume in digital economy

According to Keynes,

"We will therefore define what we shall call the propensity to consume as the functional relation ship x between Y_w a given level of income in terms of wage-units, and C_w the expenditure on consumption out of that level of income, so that

$$C_w = X(Y_w) \text{ or } C - W.X(Y_w).$$

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The amount that the community spends on consumption obviously depends (i) partly on the amount of its income, (ii) partly on the other objective attendant circumstances, and (iii) partly on the subjective needs and the psychological propensities and habits of the individuals composing it and the principles on which the income is divided between them”(Keynes, 1936).

According to this definition, the consumption function could be written as follow:

$$C = cY + a \text{ (Mankiw, 2009)}$$

With C the propensity to consume, Y the income or revenue and c the marginal propensity to consume.

The addition of the term ‘a’ as a constant determine the notion of autonomous consumption. The autonomous consumption is the type of consumer expenses that does not depend on the revenue Y. The consumer has to make those expenses no matter how the level of his revenue is.

However, with the digital economy, consumers are really influenced by the producer thus the importance to analyze the impact of the coefficient of influence on the propensity to consume. The pressure of coefficient of influence on the propensity to consume impact significantly how we spend in digital economics. This changes are also prompted by the mean of payment that facilitate the consumption propensity. The online shopping cart and the store shopping cart are multiple examples that show how it is so easy and fast to spend our revenue. Sometimes, people buy items that does not meet their expectations but due to the effort to involve in the return of those items and the time it will take, they prefer to just buy another similar item that will definitely satisfy their expectation and keep the first item

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purchased for garage sale or donation. It is important to compare the struggle between making an online purchase and making a walk in purchase in a physical store. And if the store is couple miles away you need to drive in, park your car, walk into the store, pick your item, go to the checking and if the store is busy, wait on the line.

Besides, the consumption propensity is also affected by the influence coefficients because the Artificial Intelligence use the Internet of Things to make a lot of purchase suggestions to the customers. The methods of payments are so diversified that the level of revenue is not a prominent in determining the level of consumption. Producers find ways for people to buy even if they do not have a revenue.

Besides, there is a very important point to mention. The point is the evolution of the technology had for impact the reduction of the price of goods in the long run and this allows the companies to realize economies of scales. The result of this situation is that in our days there are many goods that was so expensive that practically do not represent any cost. Examples of bikes, example of alarm clocks, or shoes or even televisions and so forth. The reason is only those products are available in huge quantities there also available in multiple brands. The consequence is that the only way to sell them is creating a better visibility function that will force the consumer to purchase it.

If 'f' determines the average coefficient of influence in the economy, the equation of the consumption function could be rewritten in digital economics as follow:

$$C = (c+f)Y + a$$

In further development we will observe how the consumption function will behaves in capitalist economy and in digitalist economy. But in the overall we will see that the

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value of f will just determine the type of economic system that prevails. In other words, in capitalist economic system h is just equals to zero. It is also important to notice that f is a function of h the rate of technological progress.

5- The saving propensity digital economy

According to the Keynesian model,

$$Y = C + S$$

And

$$S = I \quad (\text{Mankiw, 2009})$$

Where Y is the income, C the consumption, I the investment and S the savings.

According to the formula above the saving propensity could be also defined as the the remaining part after an economic agent spend a portion of its income. It is also the portion that is used as Investment. As

$$Y = C + S \quad \text{Thus, } S = Y - C = Y - (c + f)Y - a$$

$$S = (1 - c - f) Y - a$$

If b is the marginal propensity to save,

$$b = 1 - c - f$$

It is also important to notice that developed countries do not have important saving coming from the average consumer due to the coefficient of influence. This introduces

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the notion of influenced consumption. The coefficient of influence is so high that the marginal propensity to save becomes negative.

6- The reduced model of digital economy

In the reduced model, it is a matter of the Understanding the digital formula

As stated previously in chapter 2 the formula of the Digital is

In the circulation: D-C-M-C-D

The central bank emits the money in form of digital form just by typing it in a computer yet it is money. This money is considered as capital and this capital is turned into money. From money, it is turn back to capital and come back to the central bank with the help of a digitalizer.

in the inverted: form M-C-D-C-M

Money is transformed in capital and with the help of a digitalizer become a digital which will become a capital before being turned back into money.

In a Keynesians viewpoint, the total of the production is the sum of the aggregate consumption and the aggregate saving

$$Y=C+S$$

The total production of the economy is the addition of the capital production and the digital production.

$$Y_t=Y_c + Y_d \text{ with,}$$

Y_t total production plus

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Y_c capital production

Y_d digital production

As a financial digitalizer we understand any dispositive that might be used to turn cash into digit : ATM, credit card, debit card, cash APP, Venmo, banking systems....

To represent the reduced model of the economic circuit in digital economics, we based our modelling on two main model:

-The EURACE model(Bertani et al., 2021) fig 7.1

-The Keynesian model (Keynes, 1937) fig 7.2

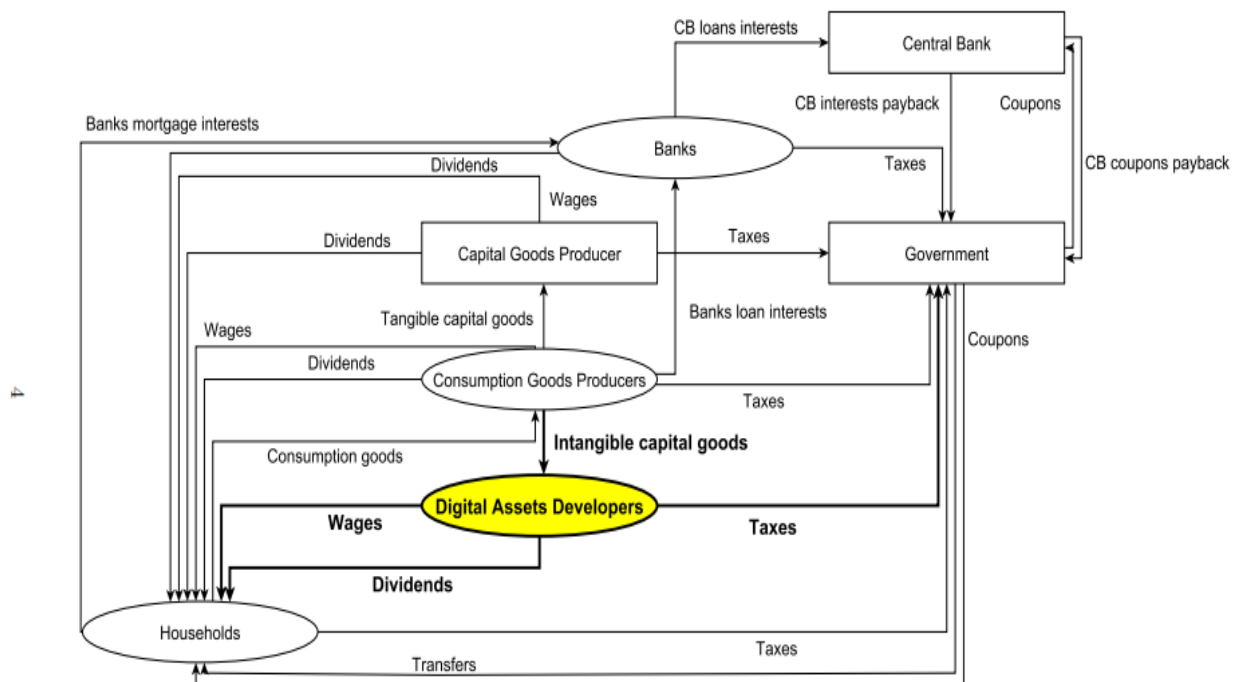


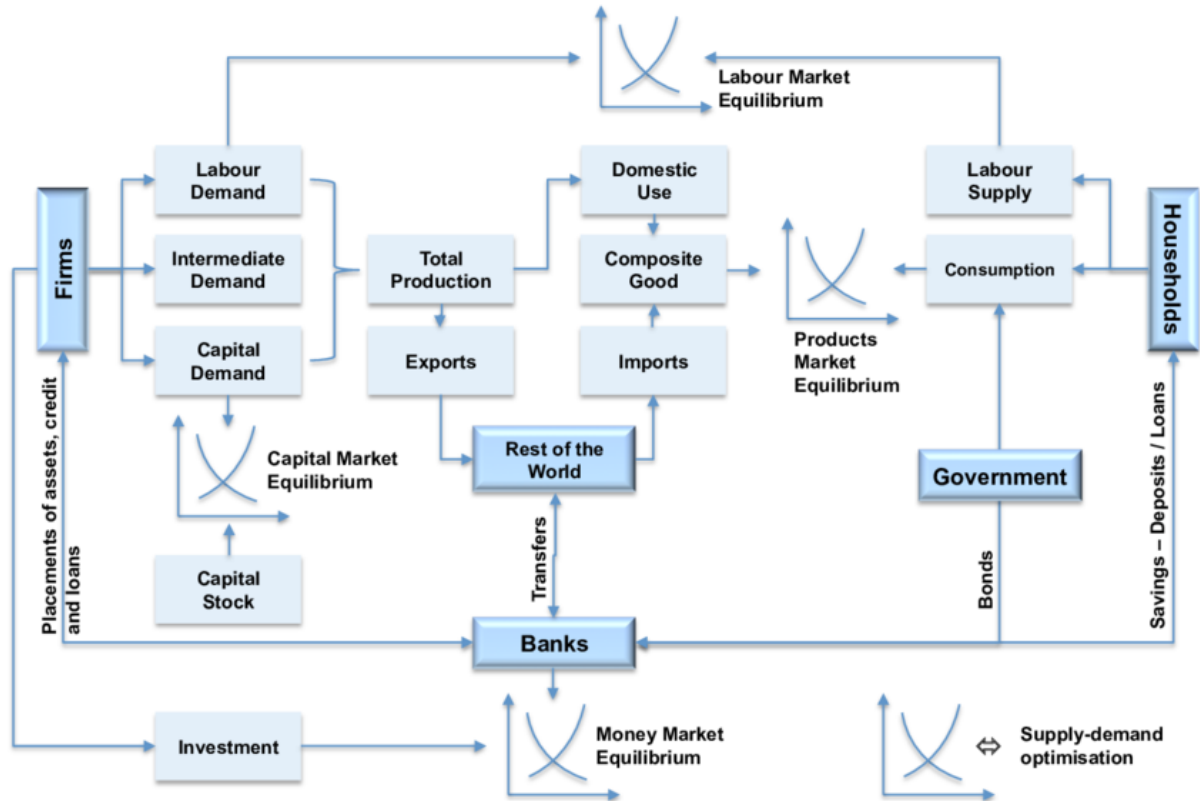
Fig 7.1 Eurace Model Source:(Bertani et al., 2021)

Fig 7.2 Keynesian Circuit Illustration. Source: Policy-Induced energy technological innovation and finance for low-carbon economic growth - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/GEM-E3-FIT-economic-circuit-circular-flow-of-funds-and-market-clearing-Supply-demand_fig7_305751606 [accessed 31 Aug 2024]

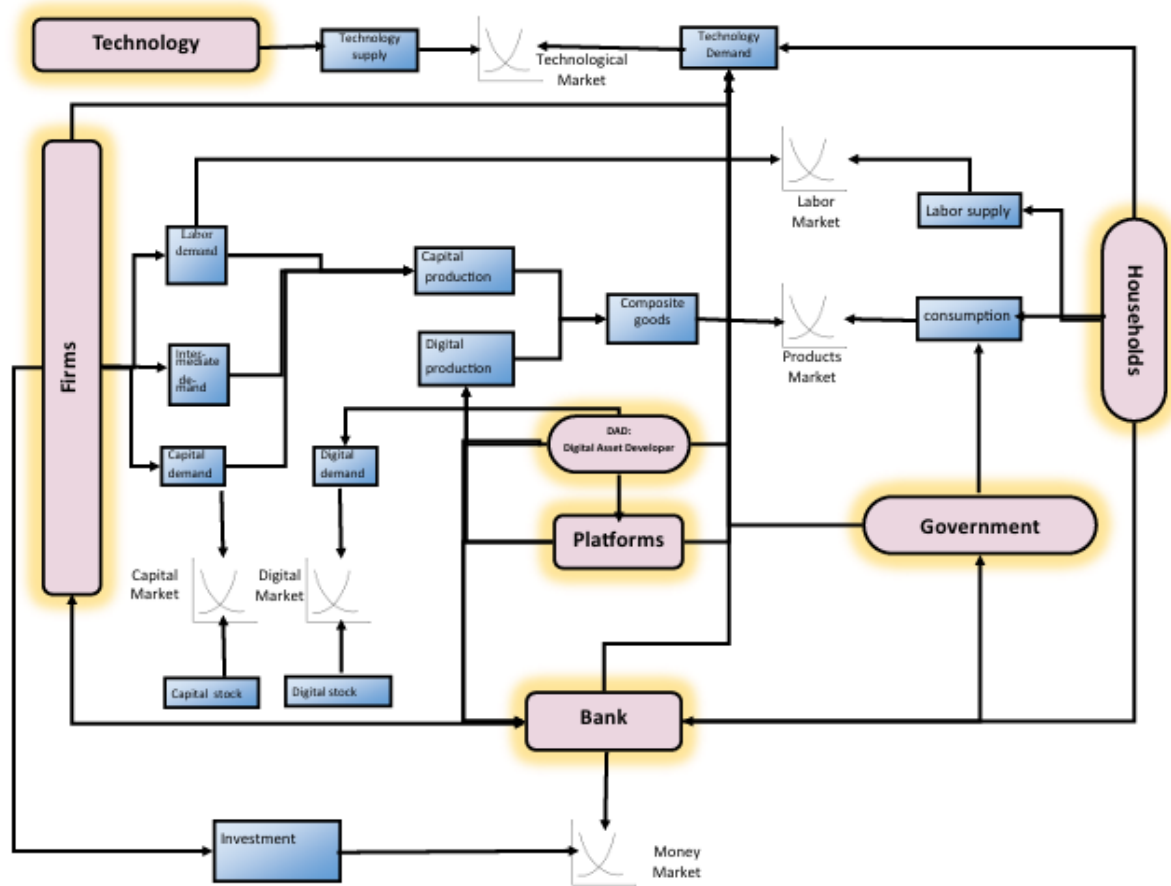


Fig 7.3 Digital Economy economic circuit. Source: Author

The main observation that can be point out in fig 7.3 is the Impact of the technology on the circuit. Besides, as the Central Bank fuel the whole economy with the money system, it could be seen that technology is also connected to all the economic agents involved in the circuit.

Entropy is high in digital economy. It is the example of someone who drive faster and someone who drive normally the fast driver is ruining his energy but just he will arrive rapidly at his destination. Even though he is the first to reach the arrival point, he will be tired more than the person driving carefully.

7 -The coefficient of influence (f) in digital macroeconomics

As mentioned in the digital microeconomics, the main factor that push people to make their economic decision is the coefficient of influence. This coefficient is in relation with the influence curve, it is through this lens that the consumer use to manage its choice when it is hard for him to decide in front of a basket of good that have the same satisfaction. And this justifies the shape of the influence curve being convex exactly like the indifference curve. However, the assumption of the indifference curve which is '*De gustibus non disputandum est*' is replaced by '*Gustibus manipulabiles*' for the influence curve. It is important to remember that those two maxims are assumptions not stated rules.

The coefficient of influence is the Marginal Visibility. The marginal visibility is the quantity of x_1 that the customer will sacrificed to get one additional unity of the good x_2 . There is a relation with the technological improvement (h). The main factor people use to influence their neighbor is technology. As example, when you get in someone car and the person start pressing some buttons that display multiple effects and the car has also many automatics features, you are just impressed by all the things going around you that you are ready to accept every thing the person is telling to you. Money too could give influence, and many other factors can impact coefficients of influence. But all those factors, at themselves, pertained to technology.

If the function F is the function of influence of an organization, it could be defined as:

$$F = F(f, h, r)$$

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With f the coefficient of influence, h the rate of technological progress and r the interest rate.

The influence coefficient could be compared to the power of a light. When the light is powerful it allows you to see far but when it is not strong your visibility is limited. For this reason the headlight of a train is not the same that the one of a car. The explanation is that the train go farther and move faster with a high kinetic energy and represents de facto a higher danger than the small car. There is possibility to make a comparison to height of a tree. You can increase the vision of the area around you, as soon as you climb the tree. The same way you can increase the number of persons that you can influence by increasing your influence coefficient.

In a macroeconomic level, it is important to notice the existence of external influence toward another country and internal influence inside a country. Internal influence are used by producer inside a country while external influence is used by country toward country. For example external buyers of Chevrolet cars are international citizens while internal buyers of Chevrolet cars national citizens of the US as Chevrolet is an American brand.

Coefficients of influence has also an effect on the effective production as well as on the effectual production. But the coefficient of influence helps the Producer to turn the effectual production into an effective production. In other words, it measures how is the capability of the Producer to turn the effectual production into effective production.

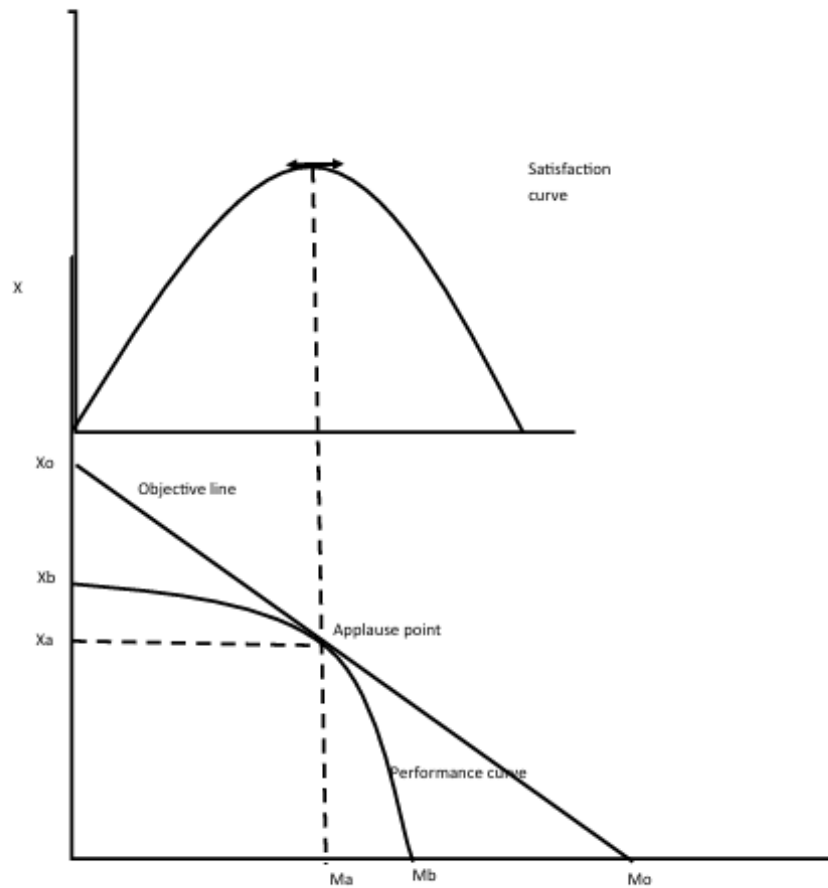


Fig 7.4 Product life cycle in International Market

The fig 7.4 represents the performance of a product on an International Market. The Satisfaction function corresponds to the life cycle of the national product in external marketing

The applause point corresponds to the intersection of the objective line and the performance curve. In this, schema the role of the coefficient of influence is to help the producer to reduce the length of the segment $[M_b; M_o]$ and the section $[X_b; X_o]$. We can assume that the Export (X) and the Import (M) of a product are synchromagnetic because if a country refuse to buy another country goods, they will not be allowed to sell this product to that country too.

8 -The effective production (EP) in digital economy

To fully understand the principle of effective production you need to understand the notion of effective demand. This notion was consistently repeated in the general theory because at that period Keynes knew that there might be a problem when the demand is not effective. In fact, if the demand is not effective the law of the supply and the demand do not hold. And Keynes, knew. I had read the general theory more than 10 times but could not really understand why he was insisting on the effective demand until the discovery of the performance theory and the synchromagnetic functions. According to him.

“....The difficulties in the way of maintaining effective demand at a level high enough to provide full employment, which ensue from the association of a conventional and fairly stable long-term rate of interest with a fickle and highly unstable marginal efficiency of capital, should be, by now, obvious to the reader.....Now, prospective yield wholly depends on the expectation of future effective demand in relation to future conditions of supply....”(Keynes, 1936).

In simple words, effective production responds to the effective demand and could be referred to effective supply. In this sense, that effective production is the expected production that need to be sold. The effective supply is equivalent to the effective production if at an instant t_1 on the market all the effective production is sold. In the case where the effective supply is lesser than the effective production, the remaining part of the effective production will constitute another part of the effective supply in time t_2 .

The effective production is sold on the market of good and services of the digital economy economic circuit fig 7.3.

9- The Effectual production (FP)in digital economy

Nobody would like to produce something, just for the pleasure to be a producer. Even if Say law support the possibility of producing before looking for the way to make this production useful, the idea behind every production is to be consumed. According to macroeconomists,

“There is little incentive to produce products if there is no guarantee that they cannot be taken. Contracts must also be enforced” (Mankiw & Ball, 2011)

Adam Smith was one of the scholars that developed the term effectual demand consistently. According to him,

“The market price of every particular commodity is regulated by the proportion between the quantity which is actually brought to market, and the demand of those who are willing to pay the natural price of the commodity, or the whole value of the rent, labor, and profit, which must be paid in order to bring it thither. Such people may be called the effectual demanders, and their demand the effectual demand; since it may be sufficient to effectuate the bringing of the commodity to market. It is different from the absolute demand. A very poor man may be said in some sense to have a demand for a coach and six; he might like to have it; but his demand is not an effectual demand, as the commodity can never be brought to market in order to satisfy it.” (Smith, 1776)

The effectual production responds to the effectual demand (intermediate demand) and effectual supply. Just for fun, everybody knows that in human society when

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someone is successful, they advise him to get married, because he had enough effectual production that needs an effective demand. The effectual production is sold on the market of commodities of the digital economy economic circuit fig 7.3. The duality of the effective and the effectual production compelled them to be system synchronomagnetic. Because there is no effective production without an effectual production and there is no effectual production without an effective production.

When you get into a store they will ask you

“what do you need?”

The reason is that needs are not illimited in the time reason why there is a confusion between need and will . The coefficient of influence may turn will in need. Resources are rare to find but the elimination or reduction of the effectual supply by digital economy turn the resource in illimited. The convergence of physical good availablty to digital good availatbity is possible due to information. Information or communication is the way of redistribution of resources from an illimited availability place to limited availability place. when information/communication technology increases it increases the availability of a product increases. because it allows in the worse case to switch to a substitution.

Sraffa has been the one that had worked the most on the market of commodities and could be considered to be at the origin of the term while Keynes could be linked to the term effective production.

10- The Productional gap (PG) function and maturity point in digital economy

Even though Sraffa and Keynes are linked respectively, with the notion of effectual production and effective demand, they did not go farther in the analysis. This could be explained that both economic ideology leaders did not have enough time to assess the impact of each macroeconomic system in the very long run. Another reason may be the evolution of the technology at that period. In fact, the level of technology before 20th century did not allow a real distinction between the market of commodities and the market of good and services compared to the digital era where a good is subjected to pass through many layers of transformation before being delivered as a final good. This is what had led us to go farther and start analyzing the behavior of the market of commodities and the one of good and services. This observation pushes us to hold on to both effective and effectual production firmly. After a while, we assumed that it could be interesting to scrutinize the difference between both productions. Thus, the productional gap (PG) is simply, the difference between the effective production and the effectual production. In the occurrence, it will be the case of Nation productional gap.

The productional gap is null at the point of Maturity of production referring to the fig 7.5. At this point the effective production is equivalent to the effectual production. The notion of productional gap is mostly found developed economy. Because the national production had reached a so high level that the national consumption is too low to match it. Usually, countries turn toward a war economy. The negative productional gap is at the origin of the notion of influence coefficient. If the productional gap is positive it means that the effective production is greater than the effectual production. Therefore, the producer does not

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need influence to force the consumer to get his good. Because, as soon as the good is produced, it is already gone.

The notion of productional gap sensitive because in digital economy the quantity of good produced is illimited due to the properties of the cap theorem. In case of overproduction the knowledge of the productional gap is required because it will help decide the level of influence coefficient. What usually happens is that when the productional gap is negative, the producer uses the influence coefficient to drag the effective production toward the effectual supply which is the effectual production line (See fig 7.5).

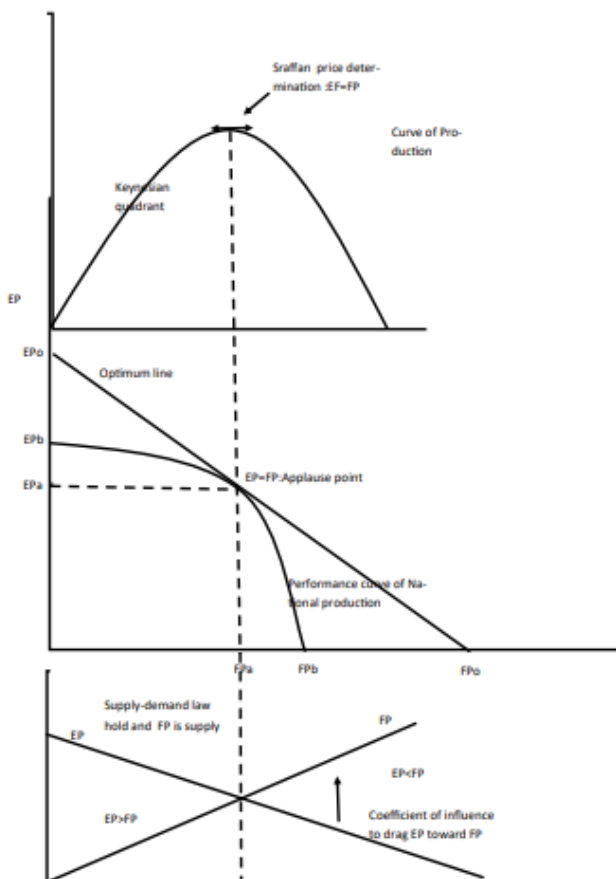


fig 7.5 Effective and Effectual production interaction.

The negative productional gap is bad for the society. It causes economic, social, psychological, political, health, psychological, ethical, technological, scientifichavoc.

Reason why if you ever drive a manual gear car, your car engine start producing loud noise, if you do not shift the speed, and you can destroy your engine not doing so. Because the effectual demand resulting from the capacity of production of the engine needs to meet an effective demand which is to speed up.For example negative productional gap could increase the rate of divorce and reduce the fertility rate. When the national effectual product surpasses the effective production, the population have a multitude of choices for one same single type of item reason why the producers use the Visibility function to force them to look at the influence curves. Now, it appears that because of the availability and the multiplicity of the visibility functions, people do not have time to use an item before switching over to the next one because they are procuring the same satisfaction. exactly what happen when you have a tv with 100 different channels you definitely do not know which one to watch. This propensity of psychological boring effect creates a momentum of not getting focus one one thing or the ability to change looking for new things due to the horse paradigm this momentum develops over the time and occupy all our behavior in every areas of our daily life. You are thirsty to see something new. It is the same momentum that is created when you are with obesity. You want to eat not because you are hungry but because you want to eat something new. And most of the time people suffering with obesity do not finish their menu before to say they are done. But if there is something new, they are still ready to try it. Because the effectual demand of their body is over the effective demand of their organism. This creates a disturbance. For people are fed up with everything in a society with a negative productional gap, they are fed up with life and

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with their partner, they want a new relationship every time. Reason why marriage do not last in those society and there are a lot of social discordance.

Another way to see how productional gap works is the way we manage our diet. When you eat without the idea to go and prepare for something the energy produce is a effectual production. When you eat because you are hungry, or because you are expecting to do something that will be energy demanding, this production is an effective production. People become fat because the productional gap of their diet is negative which means that their producing energy that they do not use. And this creates random disease or bad shape of their body because their body does not find a place to store the accumulated energy. Going to the gym for instance is a way to turn the productional gap of your diet positive. The same thing happens to a family who buy too much items than what is needed in their house. At the end, they could not find a place to store them and could not walk in the house because items are blocking every passage. This is how the notion of effectual production, effective production and production gap could be interpreted.

Many writers had found that the price determination of Sraffa and the one of Keynes are antithetical. No, there are not besides, they are just complementary. The case where supply and demand law does not determine price correspond to the case where the market of commodities determine price and vice versa.

The concept of productional gap comes just to explain the notion of stagflation which is the simultaneous recession and inflation. In the time of the general theory, the main factor that was important for Keynes was the unemployment. For Keynesians perspective, it is impossible to have recession and inflation at the same time. However, in case of a negative productional gap everything is possible. Because all the laws that generally rules the economy

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become useless. The comparison made between electricity and production in chapter 8 shows how exactly the negative productional gap works. Negative productional gap is comparable to a situation of taking a 1000 voltage sector that you connect to your house. The result is as soon as you switch on any device, freezer, dining room light bulb, or TV, they will blow up. And you will see a smoke coming out from each of them. The reason is the supply is over the demand. The effectual production of electricity surpasses the effective demand. But when you have 100 voltage sector, nothing will blow up but there is possibility to augment the supply and that was the case of the general theory. But now when you come to diagnose what happen to the device when it blows up, in case of a high voltage supply of electricity, you will see that more than three or four items are burnt at the same time. It is exactly what explain stagflation. The negative productional gap creates disturbance in the economy.

11. - The treatment of the productional gap in digital economics

The treatment of the productional gap in digital economy is easier than the one in capital economy. This is due to the cost involved in the process of production.

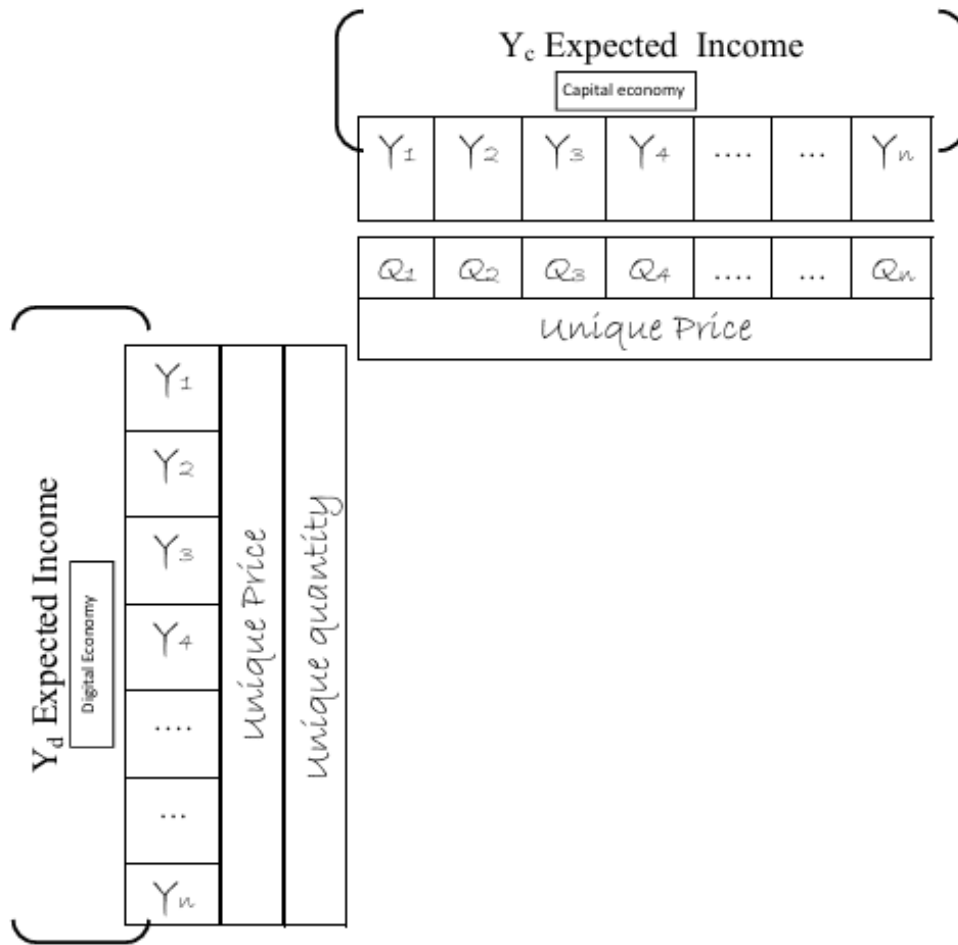


Fig 7.6 Expected Income

Fig 7.6 shows how the expected revenue for the sale of a product. In capital economy the revenue is obtained by giving the same quantity to the n members in the whole economy assuming that the price is the same. For the digital economy, the same product is sold to all the members in the same economy. If P_i is the price to sell the product and C_i the associated with it, the profit Π_i on every prod

$$\Pi_i = P_i - C_i$$

In capital economy

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As the produced is physically, made n time for the n individuals in the economy we have

$$\sum \Pi_i = n(P_i - C_i)$$

Assuming that

$PG > 0$ and $P - C > 0$

In digital economy

As the produced is physically, made one time for the n individuals in the economy we have

$$\sum \Pi_i = (P_1 - C_1) + (n - 1)(P_i - C_i)$$

But as the product is produce one time, $C_i = 0$, thus the the profit becomes,

$$\sum \Pi_i = (P_1 - C_1) + (n - 1)P_i$$

Assuming that

$PG > 0$ and $P - C > 0$

This is usually the case we have with a positive productional gap (PG) which means that the law of demand and supply hold.

Now let's assume that $PG < 0$. This means that there are a quantity of the product that is not sold.

In Capital economy as we have the same product replicated n time,

$$\sum \Pi_i = n(P_i - C_i)$$

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And as the products are not sold, $P_i=0$ thus

$$\sum \Pi_i = -nC_i)$$

As $C_i=C_1$, we have

$$\sum \Pi_i = -nC_1$$

$$\Pi_c = -nC_1$$

Which is just a huge loss for the community. Reason why we asserted that the negative productional gap is really bad.

In digital economy as we have the same product produced one time, according to the results obtained previously,

$$\sum \Pi_i = (P_1 - C_1) + (n - 1)P_i$$

But with a negative productional gap, $PG < 0$

=> $P-C < 0$ because there is no sale thus $P=0$, this implies.

$$\sum \Pi_i = (0 - C_1) + (n - 1)0$$

Which is just

$$\sum \Pi_i = -C_1$$

$$\Pi_d = -C_1$$

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In the overall, in case where we have a negative productional gap, the loss is greater in capital economy than in digital economy. Because, for every natural $n > 1$

$$-C_1 > -nC_1$$

And if Π_c and Π_d are respectively, the loss in capital and digital economy

$$\Pi_c > \Pi_d$$

“Reason why if you ever drive a manual gear car, your car engine start producing loud noise, if you do not shift the speed, and you can destroy your engine not doing so. Because the effectual demand resulting from the capacity of production of the engine needs to meet an effective demand which is to speed up”.

Anyway, the next thing to notice is that when the car is making the loud noise, you will notice that the needle that shows the turn of the engine start reaching the red level marked by the constructor. The needle that shows the level of how the engine is rotating is the matrix of technical coefficient of Leontief. Which means that you need to watch how the level of operability of your technological environment. It is for this reason, in this book a special chapter is dedicated to the market of technology.

It is also important to know that the treatment of the productional gap is at the origin of the switch of economic style since the beginning of human history. The switching of the barter economy to money or mercantilist economy is due to the non-exchangeability of expiring good such as milk, in case the producer could not change it against another good or service. In addition, in case of negative productional gap, the production is a complete loss. The switch from mercantilist to capitalist is that the more the production increase the inutility of the production due to the transport of metal add more additional cost in case of negative

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productional gap. For instance take the example of a rich merchant who needs to carry 1000 pounds of metal cash with him to the market to give change to the clients and did not sell anything all day long. Thus, the capitalist mode become a better way of dealing with the productional gap. And now, with the example above the digitalist seems to get five stars. But for how long?

12- Price determination

To see how the price is determined in digital economy, fig 7.3 and 7.5 will be useful.

In positive production gap when effective production is greater than the effectual production. The Law of supply and demand holds according to the graphic 7.5. Many theories have been developed around this subject, many of them could be seen in books written by Hal Varian in micro economics (Varian, 1992) or Gregory Mankiw in macroeconomics (Mankiw, 2009). Usually, the price determined on the market of good and services. In this situation, as the law of supply demand hold, the effectual production becomes simply the supply function. There is no need of influence. For the astute economist, life is good, we can discuss about monopoly, oligopoly, pure competitiveness and any other market combination that we can make.

In negative production gap where effective production is lesser than effectual production, price is determined on the market of commodities. This corresponds to the situation when one year after the company produce a huge quantity of the good, the product is still in the

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warehouse. Of course, the law of supply demand does not hold anymore (Fig 7.5). The CEO of the company needs to get the product out. He needs the help of the coefficient of influence (f). . Many theories have been developed around this topic, where the price is determined by the interaction between the availability of commodities (Sraffa, 1925). A macroeconomic book written by David Romer could be a good reference for this topic (Romer, 2012).

13 - Role of inflation, and high labor cost in balancing the effect of Negative Productional gap: high effectual production (intermediate production)

The first natural balanced resulting from the negative productional gap is the raise of salaries. And if the producer is not willing to do so, the worker will force him to do so. In other word even if the production is not completely sold, the employee is guessing the expected wealth of the employer. For this simple reason he will ask for a raise. It is important to point out that many other factors could induce the raise in wages. Negative productional gap had incontrollable and hazardous effects. It is what happen to us when you have obesity, the organism will look for any type of method to dissipate the surplus of energy. And high salary is one effect of a negative productional gap. To avoid this phenomenon, companies outsource their production. High salary provokes inflation which in turn slow down the production and prompts the decrease of the coefficient of influence and the decrease of the progression of the technological rate of progress follows. One of the example is the US with high pay and a greater proportion of obese persons.

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The negative productional gap was at the origin of the loss of the war of China against England in the 19th centuries. According to many stories, this was the loss of the war was facilitated by the introduction of the opium through India. But in fact the main reason is the negative productional gap of the Chinese economy. At that period, the Chinese economy was at full capacity and the effectual production is greater than the effective production. People because the economy are doing well, they have high salaries, and have enough time for fun. Thus they have enough revenue to acquire the opium and have time to use it. In the case where the economy will not reach this level, the population will keep working just to adjust to their needs. It was thus so easy to introduce the opium, and after easy to win the battle against the emperor. Because the production machine was affected by the opium, and bad economy means bad fighting machine. The British empire cease this opportunity to disturb the Chinese production and allow British companies to invade the market and use their influence coefficient to impose British products, creating an effective demand for the British production. The point is if the Chinese economic did have a positive productional gap meaning that the production was effective, the population would not find time to deal with the opium. They will be occupied by the production process. As the adage says idleness is the mother of vicious behavior. In other term, when effectual demand exceed effective demand there are a lot of disturbance in the performance of an entity. In fact, the example is our human body organism. The effectual production is the resources your organism creates for it to function and the surplus of energy it accumulates. The effective demand is the work that our body do in order to use this accumulate energy. When you work out, going to work and walking your body uses effectively the accumulated energy that your organism in effectual production had created. When you do not use it, you are lazy you do not go to sport, you do not walk, then you become fat. And when

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your organism generates energy and does not know what to do with it, he just throws it somewhere in the organism. Then you have tumors, obesity, sickness, and so on. For this reason it is a good thing to know the entropy of your organism which is to know how your metabolism function. That will help you manage your diet and your organism productional gap. Negative productional gap on society are social addition like the use of drugs, cigarettes and os forth....

One example in human history of productional gap management was the success of China one child policy. If we based on the model of Solow where population is an engine of growth. Reducing the rate of production of the population, has slowed the production growth and maintain low pay rate of labor. But now, with the export of production, pay rate in China is growing and this could be the sigh that a new form of productional gap is on the way.

This analysis on productional gap is justified by the fact that GDP growth are higher in developing country than developed countries and this because effective demand is higher than effectual demand or effective production is higher than effectual production.

Chapter 8. The market of technology

In digital economy, technology pushes prices down for digital good for this reason. Because, digital goods have lower price people have rush toward them. The long run effect is that few producer are adamant to keep producing capital goods. The consequence is that everything which is natural is becoming expensive. The example is the price of Genetically Modified Organism, (GMO) products versus organic, natural flower versus fake flowers.

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“Two important forces that govern the economy in the long run are technological progress and monetary policy”(Mankiw & Ball, 2011).

1-What is the market of technology

The market of technology is where the technological demand and technological supply are met. This notion is important because we have market of labor, money, digital, capital, good and services but not the one that fuel the whole economy. This will allows us to analyze deeply the behavior of the coefficient of influence (f) and the rate of progression of automation(h).

The market of technology could also be represented by the need of Research and development (R&D) by the organizations involved in the economic activity. This need could be also influenced by the demand in R&D and the supply of R&D

2-Why do we need the market of technology in digital economy

When you look at your car dashboard, you have two principal control gauges. The tachometer and the speedometer. The tachometer that measures the working speed of your engine in revolution per minute. The speedometer instead measures the speed of the vehicle in miles per hours or kilometer per hour. On the tachometer there is a red range where the needle should not have to reach whenever you are pressing your accelerator. For the economy, the tachometer is the technological market. The variation of the rate of progression of the technology (h) express how fast you are burning your economic capacity.

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Think about production of potato in Africa and in Europe . In Europe it is faster to make a French fries than in Africa. Because in Europe they have better technology that allows them to peel the potato faster and an automatic cooker that will speed the process too. In Africa, the cook need to peel the potato with his hands and do have to use traditional methods to cook the potato. If they use 5 minutes to make French fries in Europe that will take twenty five to thirty minutes in Africa. But the problem is the faster they cook the French fries, the faster the French fries needed to be produced and the faster the Natural mean of production is solicited. And the faster components required for the natural agricultural growth of the potato will be running out.

One more reason that pushes us to introduce the market of technology in the digital economy model is because in the Keynesian model we have the market of labor which is human labor market. With the evolution of artificial intelligence automation process, technology is replacing human labor. Thus, the decision to insert them as playing a major role in the digital economic process.

“So, let’s create a market for technology. That way they are not going to be left off. Just, we do not want technology to be jealous”.

The fact that Keynes did not include a market of technology, in the general theory it is just because in mechanization human labor, is important and this is justified by a positive NAE (Net Automation Effect). Mechanization had boost the demand of human creating the necessity to resolve unemployment problem explaining the title of his book: “the general Theory of employment, interest and money”(Keynes, 1936). In other words, if there is another title to give to this book, it might be “the general theory of technology, employment, interest and Money” but unfortunately, it is called the “Digital”.

But as we just means it, every economic book has for main goal to resolve a problem. If unemployment or employment is not our topic today technology is a treat because of the phenomenon of excessive automation(Acemoglu & Restrepo, 2018).

And the phenomenon is developed in developed economy. Technology allows to know the entropy of the economic system: Going to Walmart is one minute away from a location that is located 1 mile away in developed country; It will be 35 minutes away from a location which is located 1 mile away in a developing country. This is what it really means, to know the tachometer of your economy. Technology had affected, developed economy that the notion of distance is neglected in the altar of time. And the only, responsible of this sacrifice is technology.

Knowing the technological rate is to know the metabolism of your body so you know how fast you burn food that you eat or what quantity of food you need in a certain period of time. And you know the limit to reach because when you press your accelerator too much you need to shift the gear and if you shifted all the gear already, thus, you need to slow down or you will explode the engine.

3- The rate of technological progress (h)

The rate of technological progress corresponds to the engine revolution indicator needle on your tachometer and the red range is the Technobloc point. The needle of the speedometer is the interest rate, showing how the flux of goods is regulated.

The rate of technological progress (h) indicates the rate at which automation process are implemented in a precise location or in a particular type of economy. It could be

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identified as the mean or an index corresponding of all the technological coefficient in the Leontief input-output analysis matrix.

This notion important because it impacts the coefficient of influence. The notion of effective production and influence coefficient are against Jean-Baptist Say law

“tout offre cree sa propre demand”

which means “every supply creates its own demand”. In fact, this principle is verified when the productional gap is positive. In case it is negative, producers should have to find a way to sell their product. The coefficient of influence will play a major role but the rate of technology will be very determinant in increase the impact of the influence coefficient. When we remember the example of the tree the higher you go, the better you will have a great look. But technology could determine if you are going high faster and how height could be your limit. And in the case of the headlight, technology could determine how far your light can go.

Real rate of technological progress h

The technological rate that is generally described is the real technological rate of progress. But it could not be completely compared to the interest rate because Interest rate can vary quickly in the short term, but technological rate of `progress is usually a long term process. Another term that could be used for it is Actual rate of technological progress.

Nominal rate of technological progress η

People buy technological tool according to their Fashion Ability Rate \bar{H} . For instance if TV is supposed to be last 7 years, people are sure that in two years this TV will be outdated and will start saving to buy a new one. The Fashion Ability Rate \bar{H} could vary from a country to another country. While a TV in a developed country will be out Fashion in two years

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in an underdeveloped country it could be ten years which mean even after the TV is amortized. This explains why many devices not used in developed countries are shipped in developing countries and mostly cars. It is the same for software, when people buy software they expect to use it for a certain period before to change it, because they know according to the rate of technological progress that it will be outdated.

This remark lead us to introduce the notion of the nominal rate of technological progress η which is the rate at which people expect their technological asset will be outdated. Another name that could be used instead is Expected rate of technological progress. Therefore, the Fashion Ability rate \bar{H} is the combined effect of the real rate of technological progress h and the nominal rate of technological progress η .

$$\bar{H} = h + \eta$$

4- The supply of technology in digital economy

The supply of technology is all the technological tool available on the market of technology that the economy can use to support all types of automation activities. The supply of technology is becoming increasingly important due to the development in digital economics. In this list, could be find robotics, software. Semiconductors..... And the development of robots of all kind are so preponderant that researchers are looking for ways to tax robots (Guerreiro et al., 2022).

Event though the technology supply does not affect the polarity of the productional gap it impacts the influence coefficient. This notion require attention because in

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digital economy the quantity of good produced is illimited due to advantage procured by properties of the cap theorem.

If Q_t is the quantity of technology items on the market and P_t their price, and b a constant

The supply function in positive productional gap will be:

$$Q_t = b \times P_t$$

5- The demand of technology in digital economy

The demand of technology is all the technological tool needed on the market of technology that the economy can use to support all types of automation activities. This notion is becoming more and more important as people needed employees in traditional economy for capital goods, people need software and robots for digital goods in digital economy.

If Q_t is the quantity of technology items on the market and P_t their price, and h the level of technological progress.

The demand function in positive productional gap will be:

$$Q_t = -h \times P_t + a$$

6- The market of technology in digital economy

The market of technology in digital economy is the place where the supply and the demand of technology are met. This market is comparable to the market of labor in the Keynesian model as human is being replaced by technology. The figure 7.3 shows how every agent of the economy is linked to this market.

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The market of technology is valuable in developed economy, and also with the popularization of online platform. This term starts to be interesting in areas where production processes are developed and people have high use of technology. The determination of rate of equilibrium on this market will impact significantly the influence coefficient.

7 – The rate of technological progress (h) and the coefficient of Influence (f) in digital economy

There is a relationship between the coefficient of influence (f) and the rate of technological progress (h). The coefficient of influence (f) is the result of the impact of the rate of technological progress (h) and untechnical influence rate \bar{h} .

Influence=technological rate+ untechnical influence rate

If \bar{h} represents the rate of progress of untechnical influence rate,

$$f = h + \bar{h}$$

let say k is a unknown factor, the factor above could be written as follows,

$$f = k \times h$$

$$k \times h = h + \bar{h}$$

$$k = (h + \bar{h})/h$$

thus,

$$f = k \times h \text{ with } k = (h + \bar{h})/h$$

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This relation could be explained by the fact that someone who travel 1mile in one minute is impressing (have more influence) than someone who travel the same distance in 1 hour. The technology used to travel the same distance in one minute was the factor which makes the difference of influence.

8. The equilibrium on the market

The equilibrium on the market occurs when the supply curve intercept the demand of technology curve. But it is important to keep in mind that the productional gap for this to occur need to be positive. But as in the era of artificial intelligence automation era, it is believed that the demand of technology dwells effective.

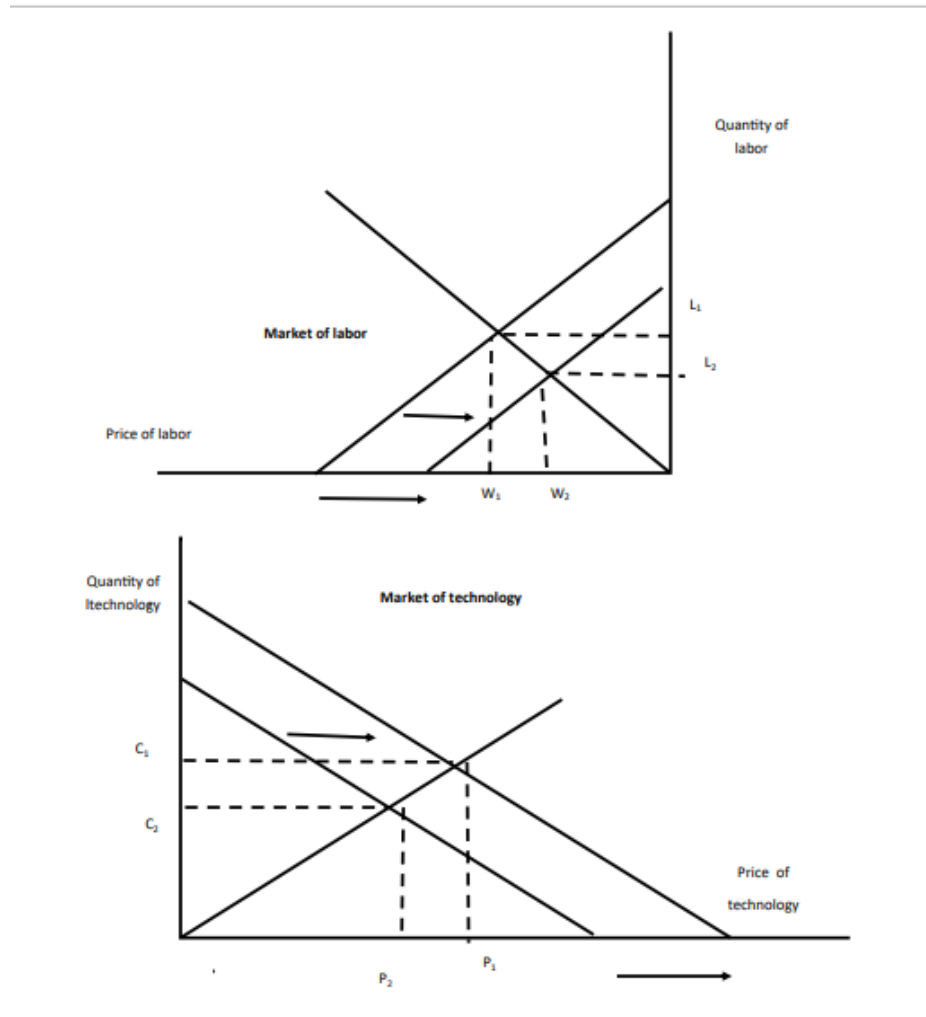


Fig 8.1 Interaction between market of technology and labor

The left turn of the first graph is due to the fact that unemployment is the opposite of employment when unemployment move to the right employment move to the opposite side

The meaning of this shift is that when the demand of technologic shift toward the right, the demand for employment shift toward the right. In other words, demand for technology increases human labor decreases. And this is the case of excessive automation.

9. Parallel and series Production

The comparison of the capitalist mode of production and the digitalist mode of production reminds us a notion that is used in electricity. The parallel circuit and the series circuit. When a circuit is in parallel, many devices could use the same voltage at the same time but when they are in series they could not and the total voltage to be used is the sum of the voltage of every device assembled in the series fig 8.3. This is the case of digital good and capital good. In digital economy as the good is produced one time, it could be used by many consumers instead of being physically replicated for each of them in capital economy. Fig 8.2. The system functions as the water supply in a community. The city by building a water tower could distribute this water to the whole community connected to the water tower due to the water pipeline. This is compared to a parallel production. But the series production of water could be the case where a company decides to sell water bottles. In this case, to have a bottle of water, you need to go to the store or order it online.

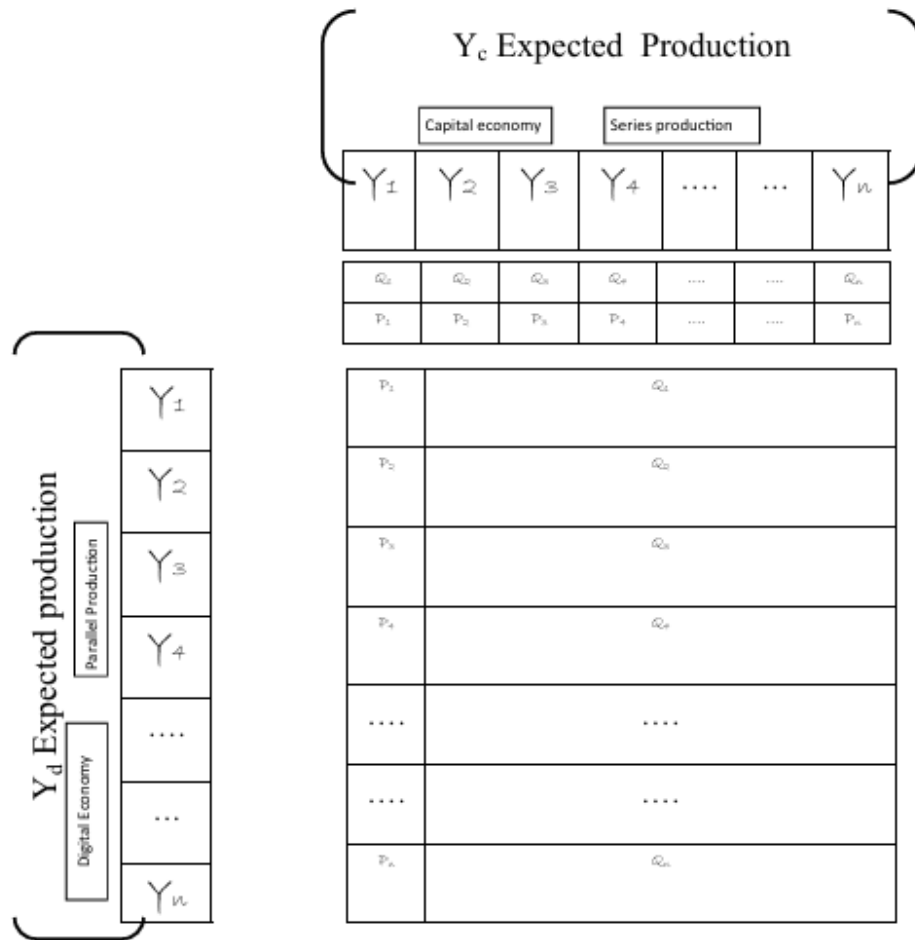


Fig 8.2 Parallel Production and Series Production

As ,the notion of capital production and digital Production maybe compared to the notion of parallel and series circuit in electricity. Let's see how the principle works in computation of each of the situation in electricity. If U is the voltage, I the current and R the resistance

Parallel circuit,

According to the Hom law, $U = R I$ and $U = U_1 + U_2 + \dots + U_n$

Series circuit ,

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$$U = RI \text{ but } I = I_1 + I_2 + \dots + I_n$$

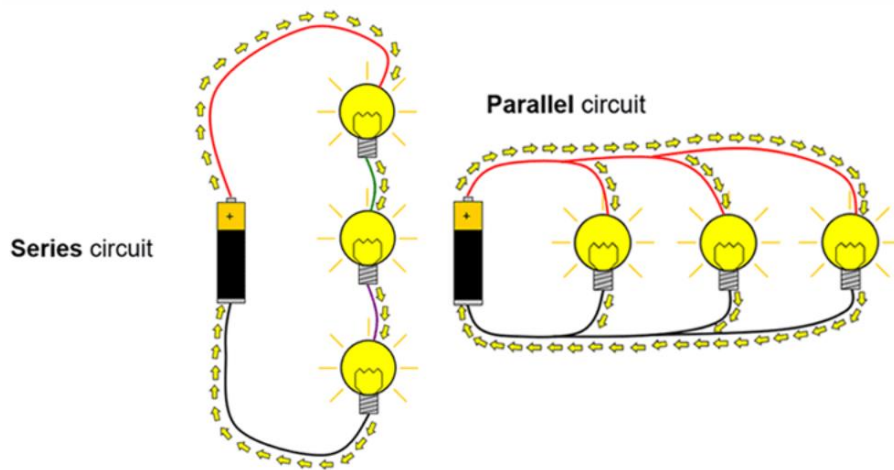


Fig 8.3 Example of Parallel and Series circuit in electricity

Source: <https://risingsun4x4club.org/xf/threads/wiring-multiple-lights-like-on-a-roof-rack-series-parallel.29550/>

Ohm law in economics

According to the Ohm law in electricity, the relation between U the voltage, R the resistance and the current is

$$U = RI$$

But in economics, the relation between total revenue Y , quantity Q and Price P is:

$$Y = PQ$$

Analyzing the revenue equation it could be understood that P is the inexistence

And Q is the resistance to the inexistence or the resistance to the nonexistence.

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Because Q is the material is what “is” the inexistence is 0 zero so the quantity what is the material is the resistance to the inexistence. As 1 is current which is light and 0 is the non-light . We all agree that P exists because we have Q the material , so it resists the nonexistence which is 0.

Price is the current you can see it same like the price but the electric cable is the resistance to the non existence which is materialized in economics by quantity.

U is the voltage and could be assimilated to Y that result from the combined effect of the quantity and the price in other word the combined effect of the the resistance to the inexistence and the nonexistence such as U is the combined effect of the Intensity as nonexistence and the resistance as resistance to the nonexistence.

In supply view when as an electricity supplier you make your analysis,

As you have a lot of houses to furnish, you need a lot of current,

So as R increases I increases same like quantity and price

But as a house hold or current demander,

If you want high current you need to decrease the resistance.

For example if you want to supply a circuit with a series of batteries, the more batteries you put the more electricity you will have. But if you demand electricity in a circuit the more bulbs you light up the less electricity you will have.

Negative productional gap is when you take a 300 voltage sector for a small bulb of a lamp torch. The result is the bulb will blow up. Because the supply is over the demand. The effectual

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production surpass the effective demand. When you have 300 of those bubs with a total voltage of 1000V nothing will blow up but there is possibility to augment the supply .

Series production in capital economy

As capital economy production is a series production,

$$Y_c = P \times Q_c = P \times N_c$$

And as we stated it before in chapter1

$$Q_c = N_c$$

Which means the number of persons that consumes the good corresponds to the quantity of good sold.

$$Y_c = \sum Y_i = n Y_i = n Q_i P_i$$

And as P is the same, and the $Q_i = Q_1$

$$Y_c = n P Q$$

Parallel production in digital economy

As digital production is a parallel production,

$$P \times Q_d = P \times N_d = Y_d \text{ for } N_d = 1$$

But for $N_d > 1$

$$Y_d = P \times N_d \neq P \times Q_d \text{ it is because } Q_d = 1$$

Thus, the revenue in digital economics depends on the price collected from the consumers

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$$\sum P_i = P_1 + P_2 + \dots + P_n$$

But as it is a capital good that determine the price,

$$P = Y_c / Q_d$$

$$\sum P_i = \frac{Y_1}{Q_1} + \frac{Y_2}{Q_2} + \dots + \frac{Y_n}{Q_n}$$

If we assume that Y are the same as the production is in parallel

$$\sum P_i = Y \left(\frac{1}{Q_1} + \frac{1}{Q_2} + \dots + \frac{1}{Q_n} \right)$$

If $Q_1 = Q_2 = \dots = Q_n$

$$\sum P_i = nY \left(\frac{1}{Q_1} \right)$$

If we consider that the digitalist want a new price and have a same revenue Y_c , and have a new price P_d

$$P_d = nY_c \left(\frac{1}{Q} \right)$$

Now, the resolution of this equation depends on, n/Q if $n=Q=1$

$$P_d = Y_c$$

But if $n > 1$ and $Q=1$ as the digitalist, use just one quantity ,

$P_d > Y_c$, but as

$$\sum P_i = P_d = N_k P$$

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Now, in digital era it comes to determine the value of N_k the number of persons that will buy the product. In digital economy, this number is also depends on the number of person that could use the product with no technology N_{ST} . If we assume that this situation endures all along the time and that, in the beginning, we have a package at the beginning the following

P as package bundle and t the rank of the package

Package p (1) : $N_1 = (1+h)N_{ST}$

For p(1): rank 1: platinum package The number N_k of this package is

$$N_1(1) = N_{ST} + N_{ST} \times h = N_{ST}(1+a) = N_{ST}(1+h)^1 \quad \text{Eqn. (01)}$$

For package p(2): rank 2: silver package

$$N_2(2) = N_1 + N_1 \times a = N_1(1+a) = N_{ST}(1+a)(1+a) = N_{ST}(1+a)^2 \quad \text{Eqn. (02)}$$

By analogy, we will have in the umpteenth package $p=k$:

$$N_k(n) = N_{ST}(1+h)^n \quad \text{Eqn. (03)}$$

The size of the number of persons coverable by a package with a technological rate h will give us: An exponential function of base $(1+h)$ and a coefficient N_{ST} . To convert the base $(1+h)$ into the base e , we can insert a variable k , designing the package rank. Where $p = n.k$, thus, $n = p/k$. The rate over this size of package will be h/n . Therefore, from Wainwright (2005), we have;

$$N_k(k) = N_{ST}(1 + h/p)^{k/p} \quad \text{Eqn. (04)}$$

$$N_k(k) = N_{ST}[(1 + h/p)^{k/a}]^{a/p} \quad \text{Eqn. (05)}$$

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and then set $p/h = s$

$$N_k(t) = N_{ST} [(1 + h/p)^s]^{hk} \quad \text{Eqn. (06)}$$

$$\lim_{p \rightarrow \infty} \left(1 + \frac{h}{p}\right)^s = e \quad \text{Eqn. (07)}$$

Therefore, the Number of people that could be reached is given by;

$$N_k = N_{ST} e^{hk} \quad \text{Eqn. (08)}$$

In other words, the number of persons that could be reached depends on the number of persons that my first package could reach and the technological rate. But we can also increase this number by adding the coefficient of influence (f) and that gives us the equation

$$N_k = N_{ST} e^{hk+f} \quad \text{Eqn. (09)}$$

In real world, the number of persons that can be reached in a parallel production depends on the technological rate (h) and the coefficient of influence. For example, if you have a product to sell online, the number of people that you could reach or that could buy your product depends on the technology that you uses. When you use your own websites, it has a limited technology than a website of Amazon that uses higher technology. But if you have your product on an Amazon website and promoted by a great basket ball Star the product will be more consumed.

Chapter 9. The Philips curve and the technological rate

1-What is the Philips curve



fig 9.1 The Philips curve

The Philips curve is a curve that shows that when the rate of inflation increases, unemployment decreases. According to the author of the Philips curve,

“ that the rate of change of money wage rates can be explained by the level of unemployment and the rate of change of unemployment, except in or immediately after those years in which there is a sufficiently rapid rise in import prices to offset the tendency for increasing productivity to reduce the cost of living ”(Phillips, 1958)

2-Reason of the Philips curve in digital economy

The reason of the introduction of this notion is that we propose the use of technology to fight inflation. And this tool is interesting because the central bank use the Philips curve to determine its monetary policy.

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The Philips curve is also used by the government in making some decision linked to its fiscal decision.

3- The use of the Philips curve

As the objective to discuss about the Philips curve is to be able to see how we can fight inflation with technology, the use of the curve will allow us to:

- use the properties coming from the analyze of the Philips curve,
- see how it relates to unemployment,
- see how it relates to labor
- see relationship labor automation
- see relationship technology unemployment
- make a deduction of the relationship between technology and inflation

4- Labor and Philips curve in digital economy

The Philips curve is related to labor as it is a curve that shows relationship with unemployment and unemployment is itself connect straightly to labor. Many labor policies very often refers to this curve. According to sources,

“In 1968, economist Milton Friedman argued that monetary policy is only able to choose a combination of unemployment and inflation for a short

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period of time. At the same time, economist Edmund Phelps wrote a paper suggesting the same thing.

In the long run, monetary growth has no real effects. This implies that it cannot affect the factors that determine the economy's long-run unemployment rate".(Mankiw & Ball, 2011)

If labor is related to the Philips and unemployment related to technology, it means that there is a relation between technology and Inflation. And if there is a relation between Inflation and technology thus there is a relation between inflation and influence coefficient.

5- Technology and Philips curve policy digital economy

using obviously, the automation function.

With ;

$W(t)$ = Working population in time t

W_0 = Working population before the introduction of the automation technology

h = The rate of progression of the Net Automation effect assumed to be the rate of technological progression.

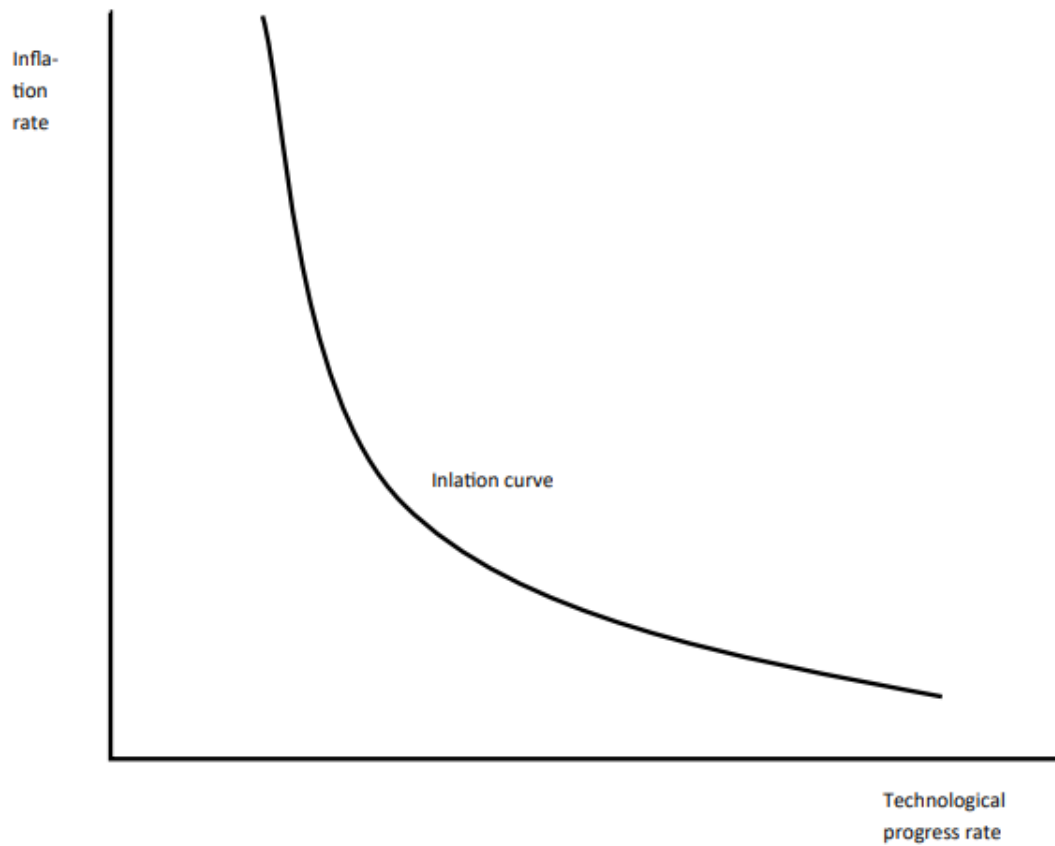
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The amount of labor available in anytime is given by,

$$W(t) = W_0 e^{ht}$$

the automation function

when $NAE < 0$, the rate of technological progress h increases unemployment increase meaning that inflation decrease.



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fig.9.2 Aloumon curve

This curve is named Aloumon curve because of my grandfather aloumon always fascinated by technology. This shows the reality because when technology increases prices should decrease. According to Mankiw,

“new technology that lowers the cost of producing pencils”.(Mankiw & Ball, 2011)

In Chapter 13 the particularity of the curve demonstrating the relationship between Inflation and technological progress will be used as reference mode for finding the following algebraic expression between the inflation rate and the rate of technological progress.

$$\pi = k/h$$

Chapter 10- Digital economy and labor market

1-What is labor

Factor labor is ineluctable in economy. Because economy is a social science, shows the anthropocentric characteristic of this science. However, many definitions in the literatures could be associated with human labor.

Human labor could be defined as the activity performed by individuals in a society that will provide a reward that could be used to obtain the subsistence goal or any objective they assigned to themselves. According to the Iron law of labor the reward of the labor denominated as wage should be sufficient for the worker to stay alive and keep working (Ricardo, 1955).

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The value of labor as factor of production is also important because it will impact the value of the production and the price of the good and services, if we refer to the Theory of value of Adam Smith(Dobb, 1975) .

There are many critics to the theory of value of labor of Adam Smith, and in digital economy this theory could be also criticized. According to the producer theory discussed above the price is not determined by the labor price that was added to it, but by the time instead.

2-Necessity of labor in digital economy

Factor labor is important for digital economy. As factor capital and labor constitute a synchromagnetic system Digital and labor also constitute a synchromagnetic systems, which means no Labor, no Digital. But the huge difference is that labor will play more management role in digital economy.

To have an idea about the role of labor, think about your gearbox and all the rotors inside it. Think about your engine and the piston, just going up and down, or think about looking inside your music software where the band playing the guitar, piano, and drum are replaced by digit. That is what it looks like when you are looking at a production organization with no human being. There is no life.

3- Interpretation of labor problem in digital economy

In the era of artificial Intelligence automation, the labor problem had enticed a lot of attention. Two groups could be detected the alarmist(McGuinness et al., 2023) and the optimist(Acemoglu, 2003).

The alarmists are those who consider that the displacement effect will create a havoc in the economy and a deep disequilibrium in the labor market.

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The optimists agree that there is a displacement effect but this is followed by a reinstatement effect that creates new opportunities and boost the economy. The example of the mechanization and the computerization confirm these arguments.

However, a balanced study recently done, proposes a close analysis of both effects in order to decide the result of the introduction of the new automation process. This study introduce the notion of the Net Automation Effect that should make the difference between the displacement effect and the reinstatement effect(Viwanou Aloumon, 2024).

4- Technology and labor in digital economy

The figure

$$RE - DE = ANE < 0$$

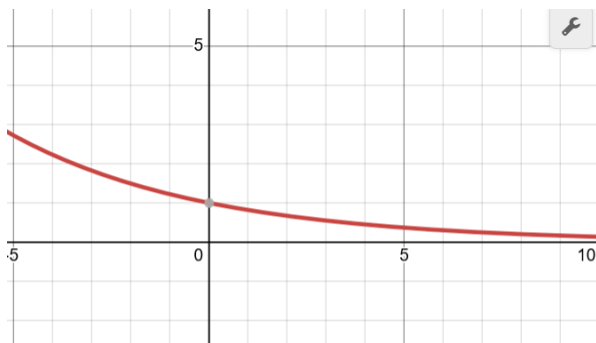


Fig 10.1 Decreasing Automation function

$W(x)$ is decreasing

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In this case, the rate growth of the ANE starting to have negative values thus, $W(x)$ decreases and tends to be close to zero. The productivity function curves shown between year 1960 and year 2000, in Madison and in the EPI are increasing considerably. Meanwhile, in the EPI m graph the wage growth path is stabilizing. That implies that human labor as production factor is not solicited as much as the production growth. This situation due to the automation of the society had created a huge wage inequality (Acemoglu & Restrepo, 2022)

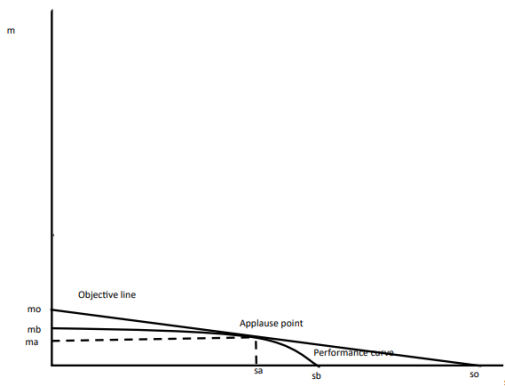


Fig 10.2 Performance curve with digitalization

Referring to our professor-student relationship the capacity of digitalization is superior to the one of human being, The AI systems become the professor and human being the student. Because we literally augment the capabilities of the AI systems.

$Mo < So$ because of the Horse paradigm. human capacity is less developed than automation type and shape of Objective line is the variation of $NAE < 1$ and $C2/C1 < 1$

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We used affirmed that the variation in NAE is the same that the variation in capacity reasons why we supposed that the NAE in the US example could be considered to the evolution of the acquisition of technical equipment proving the automation capacity of the US economy.

Digitization is a labor displacing automation technology.

5- Digitalist and labor do we have digital economy

If capitalist fight with labor, digitalist does not want to see labor. Usually digitalist does not need human labor because of the advantage of the Artificial Intelligence systems see Fig 10.2. Those advantages are the ones provided distributed database systems. Those distributed systems reduce the claiming power of the labor force. Example of people working online, food delivery companies or rideshare companies.

6- Example of labor problem in digital economy

Problems found in digital economic are both from employers and also from employees. And it is impossible to affirm that problems from one side is more detrimental for the digitalistic mean of production.

From worker side, problems found are the precarity or volatility of job. Employer can find easy way to push the worker in contract violation because there will be always a lack of evidence from the employee side. Sometime, people could get kicked off from platform for no reason, and how employees can claim their money is difficult because the probability to get an interlocuter is low, therefore asking for an increase is almost a dream.

Problem from digitalist side, are that worker can just stopped working for any good reason. Workers can work with another identity, or use robots to replace them.

7 -Labor demand in digital economy

The demand of labor is all the human labor needed for the economy that can be used to support all types of activities. This notion is becoming less and less important as

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traditional economy share in the total economy is reducing in favor of digital economy. Human labor is needed for the production of capital goods. The rise of the digital goods in digital economy is not favorable for the future of labor demand.

8 -Labor supply of digital economy

The supply of labor is all the human labor available on the market of labor. The supply of labor is becoming increasingly less solicited due to the development in digital economic.

If the labor supply is not used it is a negative productional gap for the society and a real unemployment issue. To counter this problem, people are proposing solution such as UBI(Busemeyer & Sahm, 2022).

9- Labor market of the digital economy

The market of labor in digital economy is the place where the supply and the demand of labor are met. The figure 7.3 shows what are the different agents of the economy linked to this market.

PART III DIGITAL ECONOMIC POLICY

Chapter 11- Digital money

1-What is digital currency

As digital economics need digital world, thus the need to have digital money.

The reason is that when you play soccer the form of the ball that you use is different from the form of the ball you use when you play basketball. Those balls have different shapes because they are used in different games.

What Is Digital Money?

Many definitions had been provided to the term. According to one of them,

Digital money is any means of payment that exists in a purely electronic form. Digital money is not physically tangible, like a dollar bill or a coin. It is accounted for and transferred using online systems.(Grant, 2024)

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In the overall, digital money are non-physical wealth that corresponds to fiat currencies, such as dollars or euros. Because of its intangible physical aspect, electronic devices such as iPad, computers systems, smartphones, cards, and an reliable Internet connection are required for its transfers. This phenomenon prompt the issue of “owning law” that will be discussed later in this book. However, in an economic circuit, digital currencies are convertible into cash and vice versa through digitalizer such as banking systems, an ATM.

2-Private digital currency

Digital currencies have generally two different forms: the private digital currency and the stated issued currencies. According to sources,

“It is important to distinguish between private digital currencies and digitization of state-issued currencies. The latter are digitized transactions that involve the execution of a contractual promise to transfer actual currency between two accounts (i.e., from one owner to another owner). This has been extensively studied in the literature on payments systems and, specifically, the contractual inter account transfers of currency. In effect, this is a digital layer to a set of activities that were previously performed nondigitally. In this case, however, digitization plays a straightforward role of reducing transaction costs associated with payments including the carrying of physical money, the storage and protection of that money, and the provision of short-term liquidity, as most naturally seen with credit and charge cards. Since this has been extensively studied, we will not concern ourselves with such digitization here”(Gans & Halaburda, 2013)

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The use of private digital currencies could be assumed to be concerning just users to platforms but the use of state digital currencies could be presumed being extended to many other economic agents such as government, firms, DAD (digital asset developers), banks and so forth..

The use of digital currencies had designed a model of transaction, U to U, U to P, P to P, G to P, U to G where U are Users (firms, banks, DADs, consumers), G government, P platform. Private digital currency is concerned with U to P model only.

3- Digital money and cryptocurrency

Contrary to what could be generally thought, digital money is not cryptocurrency. However, a cryptocurrency is a digital money but with something different: encryption. The term encryption designates the process by which information or data are converted into a code for the purpose to avoid its easy accessibility for an unknown individual. A cryptocurrency is a digital money that had been through the process of encryption.

The notion of encryption is important because the security of the digital money. In fact as capital money could be counterfeited digital money could be counterfeited too. But the process is more easier in e-business. Imagine that you have a digital wallet on a platform, if the website gives you the possibility to augment the amount of this wallet as you want, it is obviously clear that you will reduce the number of hours you work in a week from 40 hours to one hour if we consider that you are a hard worker *ceteris paribus*.

History of crypto currencies had started during the 1990s. According to sources,

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“ Bitcoin is commonly thought to be the first cryptocurrency, but there were several attempts create digital currency before Bitcoin. The first cryptocurrency was eCash, developed by the company DigiCash in 1990. The concept and company were created by cryptographer David Chaum, who in 1983 published a paper titled "Blind Signatures for Untraceable Payments”(Reiff, 2024).”

Cryptocurrencies are useful for the ease they procure for automatization of online payment transaction without the need for the central bank, a banking authority or governments. It has also favorized the introduction of digital wallets, which according to sources,

“... serve as the cornerstone of the digital money ecosystem. Digital wallets are the primary interface where users interact with and manage their digital currencies. They provide a secure environment for storing and managing digital money.”(Grant, 2024)

4- Blockchain technology in digital economy

As mentioned earlier the use of digital currency and even capital currency necessitates the protection against their abusive use or unauthorized replication. Aside of the encryption method, the DLT (Distributed Ledger Technology) remains a second reliable way to protect people digital wallet.

For more information, we can describe a Distributed Ledger Technology as a methodology that secure the system of conducting and recording digital assets transactions outside the control of a central authority. The particularity of DLTs being distributed system

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results from the fact copies of the ledger could be shared and synchronized by several users in a computer network system.

The ledger is nothing else than a database. But its basic characteristic is that it is updated and shared by a series of users interacting in a network system, usually constituting a platform. However, ledgers could be ordinary and centralized. In case they are centralized ledgers central authority such as government and banking system entity could have a complete control of them. Instead, regular ledgers rely solely on an agreement protocol to authenticate transactions. Some writers assert that

“One of the key advancements in DLT systems is historically linked encryption methods that chain blocks together (called a blockchain). Blockchains improve the resiliency of a financial network because they make it very difficult to change records or access them. A blockchain with a decentralized and distributed validation mechanism also solves the doublespending problem, where a digital asset can be spent more than once because there is no physical transfer. When there is an extensive network of automated validators checking encrypted transactions linked by historical information, double-spending is not possible. A large and powerful network is orders of magnitude faster than individual computers or small groups, which cannot keep up with the processing rates of the bigger networks. This speed makes a network uneconomical and exceedingly hard to hack. Third parties can be eliminated in transactions using blockchains and distributed ledgers; blind signatures hide transacting parties' identities; zero-knowledge proofs encrypt transaction details, and encryption adds extra security.

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Examples of this type of digital money are cryptocurrencies like Bitcoin and Ethereum”(Grant, 2024)

One more time the analysis of the blockchain technology confirm how the improvement of the properties of the Cap theorem are insightful in digital economy. DLT systems shows how consistency, availability, and partitioning are ineluctable for their perfect operability. Besides, the character of event to be Synchronous, Asynchronous and over synchronous, due to capabilities of digitalized system procure to those new system of asset transaction to over come the traditional methods of money system. In the case, of over synchronous events, if I knew that some one assure a particular type of transaction in a regular time, I can make the money available for the person one second before the usual time he use to perform this transaction. And this is the impressing factor of digital economics.

5- Example of digital currency economy

There are many examples of digital currencies. And those examples match also the different types of currency that exist.

One of the example is Facebook digital currency called Diem which is formerly called Diem. The project was finally shut down because of many issues.

Another form of digital money is the one of Amazon. This currency is called amazon coins and 100 amazon coins corresponds to one dollars and could be considered more as a way to have reward than a real money. It is also used in a U to P transaction model, in this sense that it allows you to buy item just on the amazon platform.

Bitcoin is the first authorized decentralized cryptocurrency. The abbreviation for this digital currency is BTP. The value of a Bitcoin in year 2024 is almost

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1BTP= 58900 dollars

Bitcoins could be used in many types of transaction such as UtoP and UtoU but P to P, G to P or U to G are not subject to be formal. For example, it is pretty rare to hear someone work for the government and get paid in Bitcoins or hear that someone paying his taxes in Bitcoin. Meanwhile, Bitcoin assets had been taxed by the government. You can buy Bitcoin through bitcoin ATM machines or digital transaction applications such as Cashapp,... There are many other crypto currencies. Ethereum, Litecoin, PayPal Stablecoin could be added to the list.

The digital renminbi is the first CBDC (Central Bank Digital Currency) adopted by a major economy. It is called at the same way as the Chinese Yuan and has the same value. It could be used in U to U, U to P, P to P, G to P, and U to G type of transaction.

6 -Advantage of digital currency economy: Control by the Central bank

The use of a digital currency in an economy could represent several advantages. It eliminates one of the characteristic of cash intensive systems which requires physical storage and safekeeping for prerequisites. In other words, to protect your money against thieves, there is no need to physically hide it in a wallet, safe, or bank vault. And this allows many other benefits.

- It eradicates intermediaries and lessens the costs connected with cross-border transfers, showing the potentiality to further transform the transfer industry.
- It shortens accounting and record-keeping. Validity to standardization and automation are disturbed through manual accounting and specific ledgers of detached entity.

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- It reinserts group of people formerly omitted in capital economy. In fact with digital currency system, people who cannot be part of the banking system can still contribute to the digital economy.
- It benefits retail users by providing them more confidentiality. And this is not favorable for government control and central bank monitoring systems.
- It removes a lot of intermediaries implicated in money transaction process such as organizations that assure money convertibility, tellers in banks, companies of money transportation.(Grant, 2024)

Some economists envision digital currency as an instrument to perfectly control of the financial system and regulate the economy in a very justify manner. They also consider digital currency as a better way to prevent corruption (Grey, 2019).

7 -Disadvantage of digital currency: the entropy law and the owning law

There are two types of disadvantages considered in this book pertained to the use of digital currency. The first are the direct disadvantages and the indirect disadvantages. In the category of the direct disadvantages, According to Grant,

“It is susceptible to hacking. Even as it removes the need for physical safekeeping, its origins in technology ensure that this form of money becomes a target for hackers, who can access digital applications. A seamless financial infrastructure consisting of digitally connected entities can be brought down by hackers. Hacks on a large scale have the potential to bring

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a country's financial infrastructure down and become a national security threat.

- *Its use can compromise privacy. Cash is anonymous, and it is nearly impossible to track and trace its users, while digital money can be traced. Digital money creates a record and, thus, a trail that can be followed. While this is a disadvantage for those seeking privacy, it is an advantage for law enforcement and regulators who need transparency.*
- *It has costs as well. For example, cryptocurrencies require custody solutions that prevent hacking. Systems that use blockchains generally also charge transaction fees—network participants are compensated via fees by the blockchain for using their resources.*
- *In cryptocurrency form, it presents several challenges on the governance and policy framework front. This form of money is uncharted territory for policymakers, although some jurisdictions have created initial regulatory frameworks”(Grant, 2024)*

The existence of those direct negative consequences does not mean that measure are not taken to reduce their impact on the economy. But as mentioned on the beginning of this section the direct disadvantages are coupled with the indirect with the indirect ones. There are two main laws that need to be mention in the occurrence: the entropy law and the owning law.

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The law of contract

To explain how digital economy impacts the law of contract, it is important to mention this historical fact. In June 4 2024 Google shut down Google pay. People, did not lose their money because Google take any necessary measure to let them know.

Referring to the law of contract, the property right suggests that when you have something, you are not subject to use it through the help of an intermediary. In other words, if the intermediary does not exist, thus, the asset you own does not exist.

When you have a digital currency, you need to be connected to have access to your fund. The day you do not have Internet, you will lose all your money. The ideal will be to have a currency that you can download into your phone and that you cannot counterfeit, just like a paper.

In fact, having a digital currency means that your money is consistently in the bank. It is like having a cash on your bank account and you need to go to the bank before to get it. The only difference is that connection replaces your move to the bank location. The availability of your money is contingent to the availability of the Internet connection. For this reason, area that does not have proper infra structure for the evolution of digital economy are not prone to experiment those type of money system.

The entropy law

The entropy of a system measures the way it transforms item from a low energy entropy to item of high energy entropy. In digital, economy, the use of digitalized systems fastens the entropy of the economic system. In other words, the faster element of an economic system is the faster this economy erodes its potential of resources.

8-Opportunity of the digital currency.

The use of digital currency could represent a lot of opportunities. This could help in social media industry also. According to sources,

Social game companies could pay developers around the world in Facebook Credits and small businesspeople could accept Facebook Credits because they could use them to buy other things that they need or reward customers with them. In some countries (especially those with national debts that are greater than their GDPs) Facebook Credits could become a safer currency than the national currency(Gans & Halaburda, 2013)

One other opportunity is that Central Banks could really grab many opportunities provided by the emission of digital currency. One of them is the reduction of the productional gap of money. In fact when money are printed in paper form, they become money only when they are injected in the economic system. In case they are not injected after their production, they will be destroyed. The productional gap of money results from the difference between the money injected in the economy which represents the effective production of money and the supply of money which is the effectual production of money.

9- Risk of digital currency

The main risk in the use of digital currency is the regulatory issue. This may surge, as the use of private digital currency may reduce the impact of the Central Bank as instrument of control in the economy.

The second risk already mentioned is the privacy issue. If the main purpose of digital transaction was to make transactions private (Chaum, 1983) because of the difficulty involved in protecting data makes the risk of occurrence of privacy issues high.

However, concerning the analysis of the potentiality of other risks involved in use of digital currency, some researchers discovered that,

“... the higher the education level of customers using digital banking, the higher the level of education of customers using digital banking. They will consider internal and system risks more dominant than legal and external risks”.(Laksana et al., 2023)

In other words, this research which goal is to analyze active digital banking users perceptions of bank operational risks in providing digital banking services notice that the probability of people to be skeptical to digital currency depends on their level of education.

Chapter 12- Seigniorage in digital economy

1-Definition of seigniorage

The term seigniorage means the surplus of the government after it subtract the cost of production of the money from the revenue obtained from injecting this money in the economic circus. According to some sources,

“Seigniorage in economics is the difference between the costs of production of currency and what the currency is actually worth. It is the revenue earned by the government while printing or minting the money. The currency is then sold for face value which is generally greater than its cost of production.”(Johnson, 2024)

The algebraic expression of the seigniorage could be according to some sources expresses as follow.

“If the private sector is willing to hold paper money that the government supplies, the government can buy real goods and services that the private sector produces with money that is (virtually) costless for the government to print.¹ The real resources that the government acquires in this way equal its seigniorage revenue. To de ne seigniorage we need not know how or why the private sector is willing to accept the government's at money; all that matters is that there is a demand for it. In a discrete time mode, seigniorage in period t is given by

$$\frac{M_t - M_{t-1}}{P_t}$$

.....Second is the public's desire to alter its real money holdings, given the inflation rate. The same decomposition applies in continuous time.

Seigniorage at time t is

$$\frac{\dot{M}(t)}{p(t)} = \pi(t)m(t) + \dot{m}(t) \quad (1)$$

as you can easily check. Observe that seigniorage need not equal inflation tax revenue, which is m only.” (Obstfeld, 2012)

This notion is important actually with the evolution of e-money and valuable developed economy with a lot of automation. The mercantilist system rose with the evolution of this notion and with the gold system it will trigger the conquest of the world essentially in the 17th century. The gold conquest implies a huge cost of money production which is reduced with the paper money and quasi inexistent with digital economy. And this make the study of seigniorage interesting.

2-Reason of seigniorage debate

The debate on seigniorage is a very hot topic due to the fact that the production of a digital money will disturb a great portion of the money production industry. One of the advantages that was not pointed out in many research papers, could be analyzed in the line below,

“The notion of a global currency is a debate set aside in the past decade as the abstraction saw little potential for realization in a world with

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heterogeneous governments unwilling to sacrifice seigniorage for optimal design”(Balvers & McDonald, 2021)

But the deal is no digital money no digital economy. We can see that mercantilist economy go with metal, capitalist economy with cash. In other words, means of transaction determine type of economy and all those systems are intercalibrated with each type of mean of production.

The digitalizers plays a role in the reduction of the seigniorage of the government but cost of the digitalizers need to be take in account. Besides, the formula of the digital is a projection of the e-money thus the tendency toward a zero seigniorage and the diminution in bank personnel. However, an increase in computer scientists is not subjected to compensate this decrease in bank personnel because of Artificial Intelligence systems.

3- Absence of seigniorage and over synchronicity in digital economy

Time is money and the reduction of government seigniorage will increases the speed of transactions. It also means the increase of the economy's entropy. The diminution of the seigniorage implies the diminution of capital money production in the economy which leads to more production of digital money. This seigniorage reduction will enhance the over synchronicity of the economy because the use of capital money are associated with intermediaries(Grant, 2024).The decrease of seigniorage constitutes reduction of the central bank effectual production of the money. fig 12.1

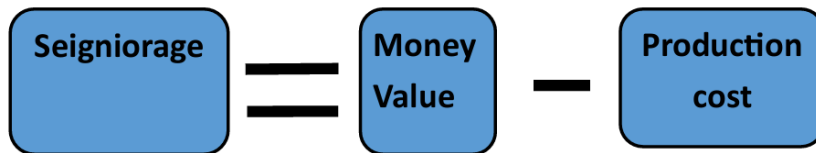


Fig 12.1 Seigniorage and Production cost

When it comes to associate the notion of the seigniorage to the Interest rate, the notion of money value could be interpreted differently. In this viewpoint, the difference between the interest collected by the Central Bank and the production cost corresponds in this case to the seigniorage. (See Fig 12.2). In the case the Central bank, emit a digital currency, the seigniorage will be represented only by the Interest collected. This new perception of the digital currency signifies that the Central Bank could still make money while refusing to emit capital money. And also due to the fact that the reduction of capital money enhance the over synchronicity of the economy, this situation appears like a win win situation for both the government and the economic agents.

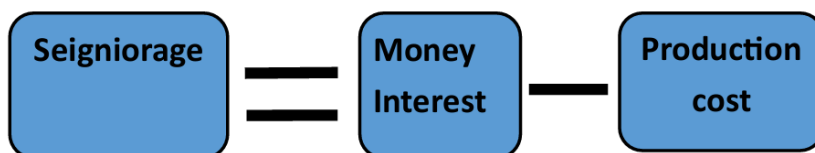


Fig 12.2 Seigniorage and Interest

Seigniorage is considered by many economists as inflation tax while some disagree with the term (Obstfeld, 2012).

“An inflation tax isn’t necessarily a tax in the form that we are used to. Instead, as one holds onto paper currency, such as the dollar bill, when inflation is high, the value of that currency is decreased. So when you go to buy goods or services, the money will be worth less than when you first obtained it.” (Grant, 2024)

Since there is a relationship between seigniorage and inflation, the fact that an infinite increase of tax could lead to the decrease of the tax revenue earned by the government according to the Laffer curve, the infinite increase of the inflation rate could lead to the reduction of the seigniorage. We can also refer it to the performance curve between the seigniorage and the inflation rate. The fig 12.3 shows that if we consider that the injection or the production of money is the Inflation rate $\pi(t)$, at a certain point of the money production the revenue obtained which is the seigniorage, decreases.

In digital economy, the equation (1) could be subjected to some modifications.

As

$$\frac{\dot{M}(t)}{p(t)} = \pi(t)m(t) + \dot{m}(t) \quad (1)$$

If we consider that we are in digital economy, the money production could be equal to zero, thus,

$$\pi(t) = 0 \quad (2)$$

$$\frac{\dot{M}(t)}{p(t)} = m(t) \quad (3)$$

This could be associated to the conclusion made previously, considering the seigniorage as the interest rate.

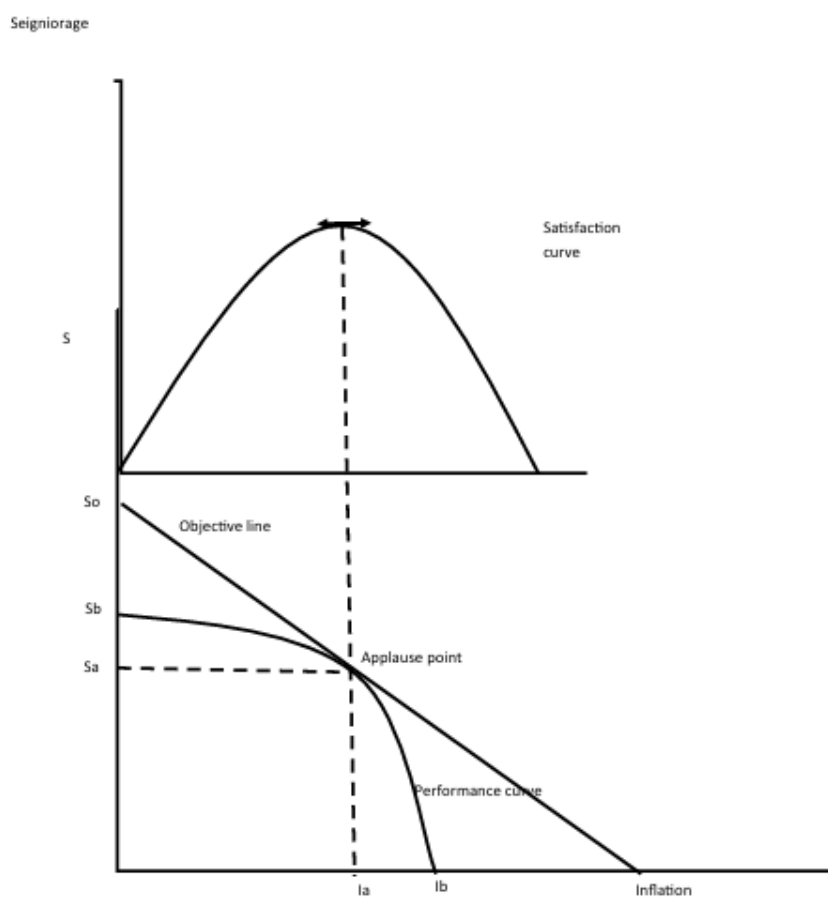


Fig 12.3 Relation between Seigniorage and Inflation

4- Cases where Central Banks earn revenue in digital economy

One question that could be asked is : how a Central Bank could earn money in digital economy? To answer this question, it will be interesting to refer to the history. In fact, the introduction of paper money or capital money did not utterly lead to the disappearance of metal money. We still have coins. For this simple reason, there will be a minimum of cash that needed to kept in digital economy. Nobody knows in case of lack of energy, the economy will be shut down completely, if there is no cash to hold. There is one thing to keep in mind, every choice intend a price. The digital economy is sweet and fast but there is a price to pay for it and it is in term of energy.

Role played by banks in digital economy will be very easy, for they just need to credit the account of the customers with few figures and wait for the next persons. In reality, there is seigniorage in another form. Like real roads or highways are taxed Internet connection are taxed too. Digital good are taxed So using electronic payment systems for instance is taxed. There is a cost transferred to tax And this situation bring us to the beginning of the money. Tax was the main way to cover the production of money. So the new form of seigniorage is the commission paid on digital money transfer. In other words, the equation (2) is subject to more discussion because the Central bank could play a significant role by augmenting the commission on the transaction and bring a real value to its money production.

5- The problem of fake bills and defected bills in digital economy

A fake bill is a money that is not issued by the Central Bank of a nation. It is also called counterfeited money and is an illegal activity. Reason why this topic is pointed out,

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it is because the use of the digital money could mean the considerable reduction of this particular type of activity.

Even though, the digital economy will be a barrier of counterfeited money only developed countries could take advantages of this opportunity. Many underdeveloped countries that are suffering from energy supply will not be able to sustain a digital economy with the benefit pertained with it.

6- Example of the seigniorage in digital economy

Let's take the example of the Federal Reserve Bank, producing a banknotes (bills) of \$50 bill.

Let's assume that the cost to produce a \$50 bill is around 40 cents per banknote. The interest around 4% per year.

The seigniorage earned by the fed formula will be :

Seigniorage = interest earned – cost to produce

Interest earned.

The interest is 4% per year x \$50 bill = 2 or 200 cents per year.

Bill production cost.

As the production cost is 40 cents per bill, and assuming that \$50 bill has an average lifespan of about four years. The cost of a bill becomes

$40 \text{ cents} \div 4 \text{ years} = 10 \text{ cents per year.}$

The seigniorage is definitely,

$(200 - 10) \text{ cents} = 190 \text{ cents per year.}$

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The Fed therefore, earn 190 cent for every \$50 bill every year in seigniorage.

In digital economy, as the cost of production is insignificant, the Central Bank will just earn 200 cent on each dollars emitted every year.

7-Advantages of the absence of seigniorage in the digital economy

Absence of seigniorage could benefit the digital economy in many ways:

- speed of transaction;
- low cost in money convoy transfer from bank to bank and protection against theft ;
- rapid growth of production ;
- Rapid return in investment;
- Paperless transactions;
- Low cost of money production;
- Should lead in tax reduction because cost of money production does not exist;
- Reduce price of raw precious materials such as gold, copper used to make coins and fight for its acquisition as the gas;
- May lead to digital barter economy where people will just need to exchange digital goods;
- Proliferation of private currencies such as money used in UtoU on platform.

8- Problems pertained to digital money

One problem of using cryptocurrencies or digital money is their potentiality to be easily replicated. This causes the problem of double-spending. According to sources,

“Cryptocurrencies are based on digital records that can be duplicated easily and costlessly and, thus, can potentially be used multiple times in transactions. This key problem for any digital currency is commonly referred to as the double-spending problem. With the development of the Bitcoin protocol, Nakamoto ... proposed a solution to this problem that does not rely on a trustworthy, designated third party like traditional payment systems”.(Chiu & Koeppl, 2022)

Even though, Central Bank issued digital money could be assumed of being linked to any cost due to the absence of seigniorage, Cryptocurrencies are in the other hand associated with two separate costs: the cost of mining and the cost of security. However, the absence of seigniorage could be detrimental to cryptocurrencies. According to the source, they

“... find that it is optimal to use seigniorage rather than transaction fees to finance costly mining. In supplementary material, study an extension with endogenous transaction fees and show quantitatively that the prime cost of Bitcoin arises from mining, but can be reduced substantially by optimally designing the reward system”.(Chiu & Koeppl, 2022)

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In other words, the development of cryptocurrencies tends to be compared to the mercantilist system where countries are running for gold, silver and other metal. Those mining cost are really relevant. For example, There are 21 millions of bitcoins that could be mined. The mining in digital economy consists of finding new transactions that are generated in blockchain network. In the beginning, the transactions are easy to find but with the evolution of the network, new transactions are rare to find and the price of mining increases. that also have a fee Mining. But there is a constant relationship between security, value of the cryptocurrency and the mining.

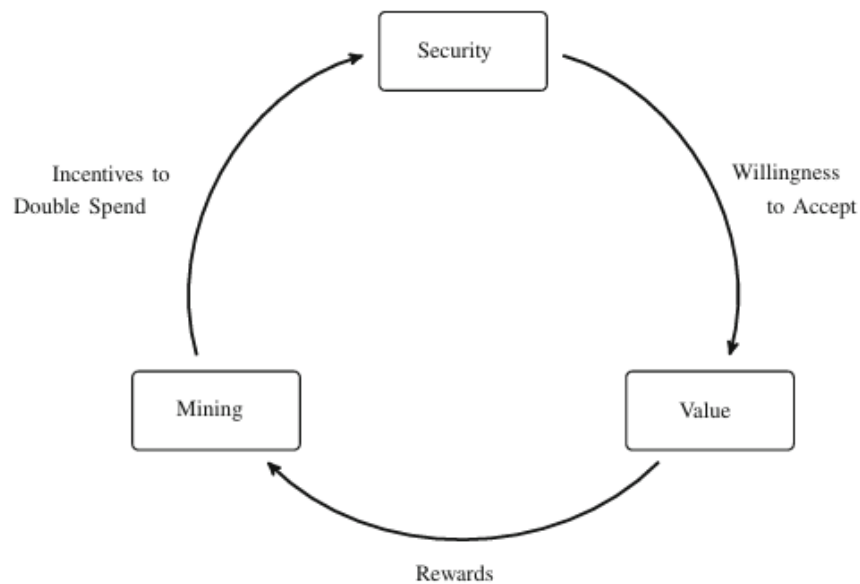


Fig 12.4 The interplay of mining, security and valuation in a cryptocurrency

Source: The economics of cryptocurrency: Bitcoin and beyond (Chiu & Koeppl, 2022)

The connection between a currency mining, value and security had enticed the attention of the same source that stipulated that

“The economic literature on cryptocurrencies has just emerged over the last few years.⁷ Our key contribution to the literature is to use both a microfoundation for the PoW protocol and double-spending as well as a general equilibrium model to study the interplay of three crucial elements of a cryptocurrency: its security, its value and its mining ecosystem., sufficient mining is required for ensuring the security of the blockchain, safeguarding it against double-spending attacks. Moreover, only when users trust the security of the system will the cryptocurrency be widely accepted and traded at a high value. Finally, the value of the currency supports a reward scheme that incentivizes miners so that they engage in sufficient mining”.(Chiu & Koeppl, 2022)

Chapter 13- Monetary policy in digital environments

1-Defining monetary policy in digital economy

Monetary policy is the decision that the government or the Central Bank make concerning the regulation of the supply and the demand of money. Even though digital economy is different from capital economy, the principles used in monetary policy for both systems are the same. According to sources,

“The quantity of money available in an economy is called the money supply.

In a system of commodity money, the money supply is simply the quantity of that commodity. In an economy that uses fiat money, such as most economies today, the government controls the supply of money: legal restrictions give the

government a monopoly on the printing of money. Just as the level of taxation and the level of government purchases are policy instruments of the government, so is the quantity of money. The government’s control over the money

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supply is called monetary policy”.(Mankiw, 2009)

After, technological progress, the second factor that had a prominent effect on the economy in the long run is monetary policy (Mankiw & Ball, 2011).

2-Interest rate in digital economy

The notion of interest rate does not vary from a capitalist stand point to a digitalist stand point. In the overall the interest rate is the revenue obtained by the Central Bank while taking back the money that the primary banks borrow.

$$\text{Interest} = \frac{\text{monney received} - \text{money given}}{\text{money given}}$$

Two types of interest rates could be distinguished: the nominal interest rate and the real interest rate. The real interest rate is the interest rate that takes in account the inflation. This will lead to the equation of Fisher which stipulate that the nominal interest rate is the sum of the real interest rate and the inflation rate.

Fisher equation:

$$i=r+\pi$$

nominal interest rate =interest rate + Inflation

3- Inflation rate from capital to digital economy

In capital economy the term inflation means that the value of the money had lost its initial value. In other words, you need to hold more money to the store in order to buy the same item that you used to buy before. The inflation rate is the rate at which the money is losing its value. Most of the time, inflation is linked to the money supply when the money supply is way more important than the money demand, it results in the depreciation of the value of the money.

find with calculus the reason of inflation

$$Interest = \frac{\text{monney received} - \text{money given}}{\text{money given}} \quad (1)$$

Let's assume that the money received is d and the money given is n and the interest rate is i , the equation (1) could be expressed as follow,

$$i = \frac{d-n}{n} = \frac{d}{n} - 1 = \quad (2)$$

From the equation (2) it could be observed that when money received (d) increases the interest rate increases. Inflation corresponds to the situation where the price to pay is high in other words when the money received increased. Eventually, an inflationary situation results in the increase of the general price level. But the problem is that with digital goods, demand is inelastic sometimes because of the properties of the CAP theorem. In this case, inflation will depend on the quantity of digital good available on the market.

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The analysis of inflation is important because it can provoke disturbance on the digital market. This analysis could help deciders find if addressing issues of inflation on traditional market could lead to solutions to problem caused by inflation on digital market.

4- Central bank and the money supply

“Nowadays, it might seem that the clerk at the central bank office watch the flow of money going left and right as a tennis ball fan watch a tennis ball game by following the motion of the ball.”

The Central Bank issues money by :

- 1- Setting the reserve requirement ratio (rrr) which is the percentage of deposits banks must keep on reserve ,
- 2- Setting the discount rate which is the rate of interest charged for borrowing reserves
- 3- Buying and selling bonds systems called which is usually called Open market operations.

The methods of attempting to control the money supply are not different from capital economy to digital economy. In capital economy and digital economy, the

•Decrease of the money supply corresponds to:

increase rrr; increase d.r.; sell bonds

•Increase of the money supply corresponds to :

decrease rrr; decrease d.r.; buy bonds

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The difference between capital and digital economics in monetary policy is that those operations are more performed digitally and the paper form is getting place to the digital form. Giving a reserve to a bank is just putting some figures on its account. This figures are information, and those information are words. With those words, a young guy will have some money, and get a family which means that words become life and this life is the light of mean because those words, information, digital are obtain by a combination of bit which are zero or one resulting by the emission of light or no light of our computer systems...which explain that words are the light of man and nothing done is not done without it at it is already said in John 1 versus 1.

Central Bank: we put digital on your account

Value: \$300 000=just Information=word

Mr X gets the \$300 000 he gets married and gets children

\$300 000=children=flesh

Bible: Word=Flesh=Light

As the transaction of money is not materialized by disbursement of cash, the use of credit and debit could be explained between a customer and a seller as follow:

Debit \$300: I (seller) know that you (customer) have \$300

Credit \$300: You (customer) know that you (customer) will have \$300

In fact, credit card could be considered as replacing checks that were written in capital economy.

The role of the Central Bank appears to be a confirmation role to the person receiving a money from a customer. The role of the processing device is to answer back to the seller as follow:

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Debit \$300: It is true that he has \$300

Credit \$300: Trust him he will pay you \$300

5- The market of technology

As there is no entity that controls the technological progress the Central Bank may include this task in its policy. To find ways to control the money supply by controlling the market of technology, it is important to know the relation that can exist between the interest rate and (h) the rate of technological progress.

Referring to the fisher equation,

$$i = r + \pi \quad (1)$$

The relationship between h rate of technological progress and inflation could be derived from the Aloumon curve in Chapter 9. The equation (2) gives us a possible algebraic representation of the graph fig 9.2.

$$\pi = k/h \quad (2)$$

where h is the rate of technological progress and k a constant

$$i = r + k/h \quad (3)$$

6- How private issuers can impact digital economy

According to countries constitution, the state is the only institution allowed to issue money. But with in digital economy, many platforms has their own way to generate currencies that are used in their own digital environment. From some researchers perspective,

“.... analysis of platform-specific currencies shows that voices calling for specific regulation of them overstate their case, since the purpose of those currencies is a natural complement to the business models associated with platforms such as Facebook or Amazon. To maximally benefit the platform, the use of currencies needs to be restricted. Thus, it is not in the interest of the platforms to provide fully functional currencies that could compete with state currencies.”(Gans & Halaburda, 2013)

The risk involved is that those companies could be assumed to be a digital country. And if a platform is strong enough to provide basic need to a panel of people who could at the same time work and get paid by the platform, the demand of external currency for this panel of population will completely be inexistent. In other words, those individuals will not be inclined to hold state money unless they have to pay tax. Money value is like shares value. Money for countries are same like what shares are for companies. Therefore, the decrease in the the demand of a money will result in the increase in the value of this money. For this reason if state currencies are sacrificed for the sake of platform currencies they will always exist but they value will be really impacted.

7 -Supply of money of digital economy

The analysis of the money supply in digital economy leads us to determine if the supply is exogenous or endogenous. Fig 13.1 explains a case where the supply is exogenous. In this case the supply of money is not affected by the interest rate.

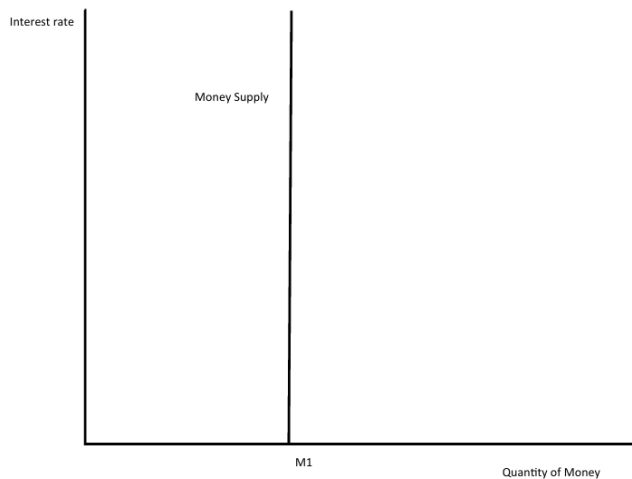


Fig 13. 1 Exogenous money supply

Fig 13.2 explains a case where the supply is not affected by the quantity of money in the system. This is the case of the endogenous supply. One fact, to acknowledge is that the money supply analysis could be affected by the properties of the cap theorem. The money supply is infinite because the central bank just needs to write it down on the balance sheet of the secondary bank. But in this case it is just only the effectual supply of the money which also did not have any cost. But the interpretation of equation (3), in chapter 12 showed that the Central Bank will earn money essentially through the manipulation of the Interest rate. For this reason, the supply of money in digital economy is supposed to be endogenous.

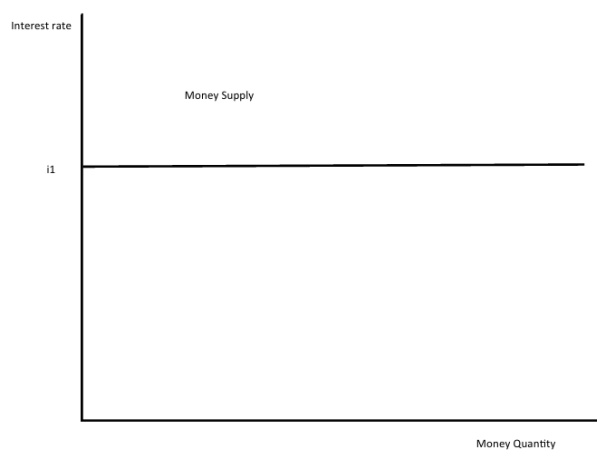


Fig 13. 2 Exogenous money supply

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8 -Demand of money digital economy

The law of the supply and demand of good hold in capital economy as in digital economy with a positive productional gap. AS the fig 13. 3 could depict it the interest rate decrease when the quantity of money increases.

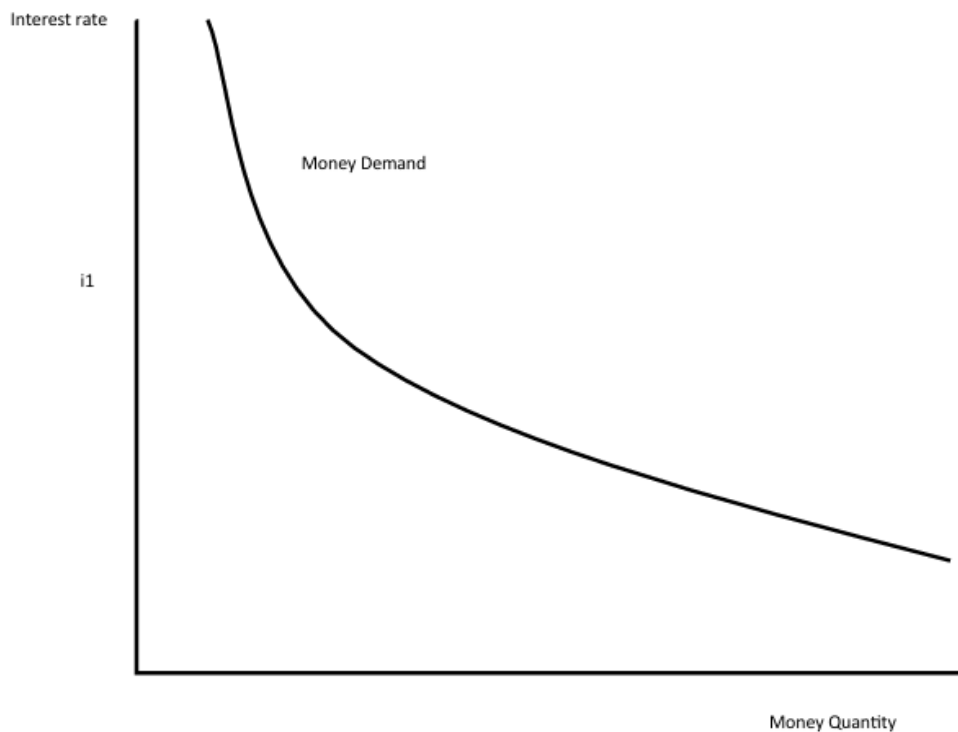


Fig 13.3 Money demand

9- Money market Equilibrium in digital economy

The fig 13.4 show us the Money market equilibrium. The intersection of the supply and the demand curve help the Central Bank determine the quantity of money required for the economy.

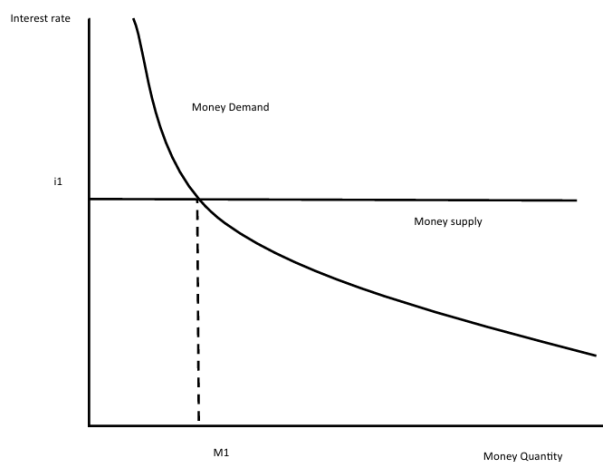


Fig 13.4 Money market equilibrium

Chapter 14- fiscal policy in digital economy

1-What is fiscal policy

Definition

Fiscal policy is the challenging process in which the government is involved for the purpose to manage several macroeconomic variables using instrument such as public spending or tax policies.

The myth of freedom with Digital economics

The analysis of fiscal policy in digital economy leads to the discussion concerning the concept of myth of Internet freedom. People always have the idea that the government does not have the power to influence decision taking of the platforms or of the digitalists. As the government has power on the capitalist, it also has the full power on the digitalist. Because if the capitalist has a territorial linkage, the digitalist also has a territorial linkage. But the myth about the digitalist is that everybody has the feeling that it does not have a physical connection with its nationality. This is the wrong idea. The digitalist has more connection with its nation than anyone. Before your Internet work you need a connection. Those connections need a source of emission. The data a user interact with is stored in a database and those databases need a server, powerful servers. Those servers are not in the air, they have a physical location. Those physical locations are in a country necessarily. The emission source needs a satellite to divulgate easily the information back and forth. Those satellites belong to a country. So, if a government wants to refuse the access of any of those components to a platform or a digitalist, there is no way to avoid this situation. In other words, government still has the

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last word on the digitalist. This to show how effective a government policy could be if it wants to target a specific objective.

2-Utility of fiscal policy in digital economy

In some areas, fiscal policy could be used to promote the digital economy. According to some sources,

“China’s digital economy development is a strategic decision to construct a new development model for the nation’s economic growth and to pave the way to fostering high-quality economic growth. Since the Chinese government first introduced its strategy for developing digital economy in 2016, the Chongqing Municipal Government has responded positively by implementing various policy initiatives”(Cai et al., 2024)

This should be the case for under developed countries where fiscal policies need to be directed to the increase of their digital structure capacities. This is one of the issues of going globally digital because all the countries do not have the same capabilities.

However, in really developed countries, Fiscal policies are used as a process of redistribution of the national economic surplus. Fiscal policy is important for the distribution of the wealth and establishment of social equality. The problem with digital economy is that the exponential profit generated by this economy and the excessive use of automation process in the occurrence artificial Intelligence systems had created social inequalities (Allen, 2021). Therefore, people are proposing to tax robots in order to correct the negative effect resulting from technological progress.

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“In recent years, the idea of taxing robots has been progressively gaining momentum. The potential impact of automation on employment, and consequently on income tax revenues, has led many to defend the introduction of a tax on robots, or on the use of robots, to either compensate for the potential revenue loss, or to slow down the process of automation.”(de la Feria & Grau Ruiz, 2021)

Fiscal policies are ineluctable tool to address the problem of redistribution, in developed countries but also in underdeveloped economy. In underdeveloped countries, governments could not have the proper digital structure to tax big companies that operate on their territory. And this is becoming an issue after the covid 19 era that reveals the surge in digital innovation and that is also connected with the growth of influence coefficient for developed countries as technology and influence coefficient are related (See chapter 8).

3- On the notion of invisible robot

Any time in economic history when the mode of production is about to change, there is always something invisible that needs to be discussed. The example of the Invisible hand in classical economics when the switch from mercantilistic mean of production to the capitalistic mean of production is about to happen. And now, again when the switch from capitalistic mean of production to digitalistic mean of production is occurring, there is something invisible that needs to be discussed again.

Sometimes, when you are working on a web browser, a message pop up asking you to verify if you are a human or a robot. If the digitalist has this type of digital robot on his search list, that means that this robot is a real troublemaker. Let's see what the crimes of this robot are.

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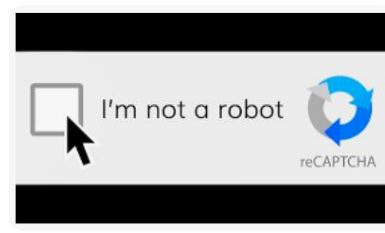
to verify that you are not a robot page



Verify You're Not A Robot™ Scam Sites



Click to Verify You're Not a R



In mathematics, when it comes to deal with a problem having an unknown factor the first thing we do to solve the problem is to give a name to this factor (x,y,z...). After you gave it a name, it is easier to plug it in a series of equations in order to determine the value of this unknown factor. As this robot is an unknown element for all the economic system and the technological environment, let's give him a name so we can assess its proper value and find a solution to the problems it might prompt. Let's call him: Invisible Robot. Just the way it is.

"Invisible Robot or I rob"

"Yes, Mr I rob, you are robing us, but you will not rob me"

Just to have an idea about what Mr I-rob does, it is important to refer to the section of this book's preface when in hiring process, it comes to make a choice between the guy who has done 20 jobs in one year and the one who has done one job in 20 years. The choice of the hiring team will be based upon those following arguments.

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Lets assume that the guy who works 20 jobs in one year is A and the one who works in 20 years in one job is B.

Case 1: both are ill-advised,

For A, the employer will say that if A does not know anything at least he knows 20 people, he will help for economy of scale.

For B he could not help because probably, he might not be promoted because he is not good at his work.

So, the guy A is better

Case 2: Both are Smart

For A, the hiring team may think that he got a lot of experiences in many jobs so he will be good for economy of scope and besides, he knows at least 20 different people, so he is good for economy of scale.

For B, the employers will agree that he is an expert in what he is doing but he does not know more than one people.

So, the guy A is better

In both case the guy A is always better than B. The guy A is I-rob who can do multiple tasks in a few spans of time. Reason why the digitalist likes him, because it can help in many areas. Now, think about all those jobs that I Rob can do in one minute and see how he is getting more and more experience. Experience in economics, is designated by the term Joint Wealth of Knowledge. See how much in digital economics, I-rob is used, and imagine how

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many times and how is the quantity of the joint wealth of knowledge he is stealing from us. As community knowledge, society knowledge, nation knowledge, humanity knowledge.

In an organization, if they are skeptical to introduce you to the principal point of decision of the institution, it is because they are not sure that you will stay for the long run, and not because of the money you will get. They are protecting the joint wealth of the knowledge. The company does not want you to go out with the techniques they use to conduct their activities.

When you give a fish to someone you feed him for one day but when you teach him how to fish you feed him for his entire life. This knowledge is acquired when we are working in a process of production. But with the existence of invisible robot, with the development of Artificial Intelligence systems, this knowledge is evading for human society.

Let's take the example of a man who hires a band of four people to play a song. The drummer, the base player, the pianist and the vocalist. Before they finally play the song those four people should have to rehearse, while rehearsing, they might probably learn something new or ameliorate their skills. Besides, this song may inspire one of the member to write another good song. All this indirect small advantages are going straight in the joint wealth of knowledge of the society.

Now, let's assume that the man change mind and decide to use a software to play the song. What the software needs is to know how the song is written. And the software can play the different part of the song, piano, drum, baseline, and even vocals. The man will let the software play the music and get rid of the band.

The Invisible robot steal a huge part of the joint wealth of knowledge deemed to be an asset of the society and which is useful for the entrepreneur to generate a new wave of job creativity. If I can write this book, who took me twenty years, it is because I leave some experiences that had opened my eyes on things that I could never know. People tell interesting stories better only if they leave those stories. We all learn from experiences. If I was using Artificial Intelligence to do all the jobs that I have done, I could never been able to describe many phenomena revealed in this book, what will just happen is that I will keep asking I-Rob: Why this is happening? Why that is happening? And at the end I will definitely can not write this book. But, I-Rob will but he does not need to. And Even if he will or he wants, he will prefer to tell those stories all share those experiences with his dear brothers and families of Invisibles Robots. Not because he does like human being, but because with his brother and families Invisible Robots, they share the same soul, the same bit (instead of same blood) and the same creator who is Human being. Just like Robinhood in the forest of Sherwood.

In the overall, the invisible robot for the digitalist is the perfect worker but the betrayer for the employee and the fake citizen for the tax assessor

4- Technology and fiscal policy in digital economy

The necessity to find how fiscal policy will take advantage of fiscal policy is beneficial for the redistribution of the economic surplus. There is a relation between unemployment and technology and there is a relation between unemployment and fiscality. In fact when unemployment increases taxes collected are low. It could be deducted by transitivity that there is a relation between technology and fiscality.

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Most of the time fiscal policy is impacting the growth resulting from technology. For people to take advantage of fiscal policy they need to control the technological policy. Most of the time people enhance the development of their technology while in the other hand some people slow the development of their policy. In other words, fiscal policies are variable according to the areas and the level of development.

5- Difficulty of fiscal policy in digital economy

Fiscal policy in digital economy is a hard process. Even though governments have capability to control digitalist, taxing in digital economy is not an easy task. According to sources,

“Tax policy reform specifically targeting the digital economy is being hotly debated in the European Union. EU member states have had difficulty taxing digital technology giants such as Amazon, Facebook, and Google. Supporters of reform, such as the governments of Germany and France, argue that companies operating in the digital arena profit unfairly from their internet-based operations. Others, such as the governments of Ireland and Luxembourg, worry that tax reform could lead to double taxation and higher prices.”(Jakurti, 2017)

One other difficulty comes from the notion of the invisible robot. But to go deeper in the analysis, it is important to understand how the taxing procedure works. There are two forms of tax: the direct tax and the indirect tax.

- 1- direct tax: tax on revenue and production

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- 2- indirect tax : tax on expenses. But the person who paid the tax on revenue get taxed again when he spent more.

But usually, the only to tax robots is through indirect tax. Real robot are taxed through tax on property. But the issue is with AI the invisible robot is not taxed. One other fact is that we know the national production by taxing the revenues but with the production of the Invisible Robot, it will be difficult to assess properly the national production.

6- Example of fiscal policy problem in digital economy

One example of fiscal policy issue is for example a digitalist that uses a platform that is located in another continent to generate a revenue. Normally, at the end of the year he needs to file his taxes. But the question where is it subject to send his tax documents? To the country of the platform or to the country where he physically resides.

The other question that is to be asked is to know which of the countries will claim the payment of those taxes if the digitalist defaulted. The answer of this question is difficult to answer because fiscal policies varies from a country to another, therefore only specialists could dive in the subject and find an intersection point between the fiscal jurisdiction of those two countries.

However, it is too soon to give up on the subject because as the phenomenon of digitalization is recent, fiscal experts do not have necessary time to find the proper way to adjust the fiscal problem.

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7 - Model with fiscal policy in digital economy

Referring to the Keynesian model, (Mankiw, 2009) a restricted economy with Y as production, I as investment, C as consumption, b as marginal consumption and a as autonomous consumption, T as total taxes, t as tax rate could be expressed as follow:

$$Y = C + I \quad (1)$$

$$C = a + bY \quad (2)$$

$$Y = C + I + T$$

$$\bullet Y_d = Y - T \quad (3)$$

because disposable income is aggregate income less taxes.

Since taxes can be determined by the tax rate times aggregate income:

$$\bullet T = tY \quad (4)$$

$$\bullet \text{In consumption side } Y_d \neq Y$$

Then:

$$\bullet Y_d = Y - tY \quad (5)$$

• And the production depends on the production of human labor (Y_{HL}) taxable and the Invisible robot production (Y_{IR}) not taxed

$$Y = Y_{HL} + Y_{IR} \quad (6)$$

$$Y_d = Y - t(Y_{HL} + Y_{IR}) \quad (7)$$

$$Y_d = Y - tY_{HL} - tY_{IR} \quad (8)$$

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The tax not collected in digital economy by the government is tY_{IR}

In digital economy in the other hand, the national accountant makes the redistribution with a disposable income (Y_{nad})

$$Y_{nad} = Y - tY_{HL} \text{ but}$$

$$Y_{nad} > Y_d \text{ because of } tY_{IR}$$

But in the consumption side, the real disposable income (Y_{rd})

$$Y_{rd} = Y - tY_{HL} = Y_{nad}$$

Which explains how the consumer is paying a tax (tY_{IR}) that is not coming back to him. In a macro economic standpoint the tY_{IR} remains the part of the economic surplus that is not caught in the digital economic system. That is due to the production of the Invisible robot.

Let's take the example of the man who hires a band of four people to play a song. The drummer, the base player, the pianist and the vocalist. The group after being paid will pay a total direct tax $Tb1$ and while spending that money will pay a total indirect tax $Tb2$.

Now, let's assume that the man change mind and decide to use a software to play the song. The man maybe will pay an indirect tax $Tm2$ when he is buying the software. The total loss in this case from the government is $Tgl = Tb1 + Tb2 - Tm2$.

According to the model presented above, the tax not collected by the government (tY_{IR}) because of the Invisible Robot is:

$$tY_{IR} = Tgl = Tb1 + Tb2 - Tm2.$$

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This situation is only verified in a case of excessive automation with an negative Net Automation Effect (NAE). In Case with of a positive NAE where automation is followed by a significant reinsertion effect the effect of the Invisible Robot is null.

8 -Fiscal policy across border in digital economy

Talking about fiscal policy across border is to analyze how a government collect taxes from product imported into its country. This notion is important because the intangible goods could not pass through a border. Trajectory of physical goods are different from trajectory of a digital goods.

Although, there might be gateway and limitation is usually about transactions. Many scenarios are possible. People can find a way to skip the financial transaction and escape for taxes associated with it. Paying a good in a foreign country should pass through the conversion of a currency into another before the transaction could be completed, in capital economy. In digital economy goods could pass from a country to another with no control.

Chapter 15- from macro economy to giga economy

1-Definition of giga economy

As capital had leaded to the macro economy, digital had leaded to the giga economy. Giga economics is the branch of economy that study the interrelation between an entity and all the nations of the entire planet. The difference between macroeconomics and gigaeconomics dwells in the analytical level. Gigaeconomics has broader level than the macroeconomics analysis. If macroeconomics studies interaction between economic agents in a nation, or between nation, gigaeconomics studies interaction between individuals and group

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of nations. And this was possible because of the advantages provided by digital economics. According to sources,

“It is also possible that with development of interplanetary communications and arising of an opportunity to conduct economic activities in the aerospace, we will have to face a new broader analytical level. The level may be referred consistently as a giga scale competitiveness whole searching new theoretical references within gigaconomy (interplanetary economy)”(Lis & Wanat, 2014).

For the digitalist this economy contains some real challenges:

- 1-He needs to satisfy his ambitions which is to conquer the world at least in the field where he had a comparative advantage
- 2- He wants to be the richest man or woman in his field
- 3- But he can achieve this goal without the help of his government
 - a-because he needs a strong currency,
 - b-there is no strong currency without a strong influence coefficient of the government
- 4-the digitalist wants to have an influence coefficient stronger than the one of the government
- 5-But the digitalist cannot be strong if the people of his government do not need his service
- 6-the digitalist wants to have more money from the people who are ruled by the government but do not want to give less to the government

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So this is how the gigaconomy is set up. How to resolve this problem of maximization of profit.

2-Difference between gigaconomy and gig economy

There is a difference between gigaconomy and gigaconomy. The term gig in gig economy is also an abbreviation for gigabyte(Oranburg, 2018). Referring to some researchers,

“New business models have emerged in the late 20th century due to Internet (IT) development and digital transformation. One of them – known as the gig economy – represents a new business concept that stands for a market system in which individuals offer their services on a fixed time basis to other business through a digital platform.....the concept of the gig economy is based on a triangular relationship between the individual (worker; provider), the digital intermediary of the process (online labor platform) and the end-user of the service (employer). Such a concept implies various benefits for all parties involved but also brings many new challenges” (Huđek & Širec, 2023).

Even if economists doubt of the effectiveness of this economy(Healy et al., 2017), some think that it is important to wonder what it means for workers (Donovan et al., 2016) because this type of economy procure flexible benefit to all stakeholders involved in this economy (Oranburg, 2018). The term gig economy could be assumed to be economy of labor (Wood et al., 2019). According to some works,

“....The gig economy is seen by many neoliberal policy-makers as an ideal form of work, set gradually to replace the costly rigidities of the old-fashioned employment contract. Firms can maximize flexibility by calling on and paying

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self-employed workers only when they need them to perform specific task....”(Crouch, 2019)

But it also important to notice that the development of the gig economy is accelerated by the phenomenon of digitalization (Oyelere et al., 2022). In the overall, the gig economy is a concept linked to the labor aspect of the gigaconomy. In other words, gigeconomy is part of the gigaconomy.

3- Role of the Internet of Things in gigaconomy

The Internet of Things plays an important role in not only in the digital economy but also in the gigaconomy. It could be considered that

*“The **Internet of Things** (IoT) is an interconnected network of objects which range from simple ... terminology used on further research in the Field of **digitalization** and smart technologies(Silverio-Fernández et al., 2018).*

Referring to a research realized by Mannino et al, some scholars define the Internet of Things as ,

“...an ecosystem that contains smart objects equipped with sensors, networking and processing technologies integrating and working together to provide an environment in which smart services are taken to the end-users”(Asghari et al., 2019)

According to Mannino et al, the use of the Internet of Things had spread to many areas of the society.

“.....this ecosystem is being applied in healthcare, environmental, smart cities, commercial and industrial contexts. IoT has led to an interconnection between people and objects at an unprecedented scale and pace ... and will allow new strategies to improve quality of life Furthermore, connected devices could be programmed to make autonomous decisions and adequately inform users to make the best decisions ... ”(Mannino et al., 2021)

The Internet of things, by creating a connection between entity of a macro level, has also allow the interaction between entities in across countries borders. Thus, it has imposed itself as an ineluctable component of the development of the gigaconomy.

4 -The role of the platforms in gigaconomy.

Platforms plays a huge role in the gigaconomy because they represent the main factor that interconnect all the economic agents involved in this type of huge economy. In the literature they are pertained more to the concept of gigeconomy because it gives the opportunity of workers all over the globe to trade their professional experience no matter their residential location (See fig 15.1). According to Vallas and Schor,

“The rapid growth of the platform economy has provoked scholarly discussion of its consequences for the nature of work and employment... Platforms are seen as entrepreneurial incubators, digital cages, accelerants of precarity, and chameleons adapting to their environments. Each of these devices has limitations, which leads us to introduce an alternative image of platforms: as permissive potentates that externalize responsibility and

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control over economic transactions while still exercising concentrated power. As a consequence, platforms represent a distinct type of governance mechanism, different from markets, hierarchies, or networks, and therefore pose a unique set of problems for regulators, workers, and their competitors in the conventional economy” (Vallas & Schor, 2020).

The role of Platforms extends over the area of the gigeconomy to become a prominent element of gigeconomy in this sense that its ability to interact with international workers demonstrates how far its connected to the factor labor. This connection is the basis of the development of the gigeconomy because the main factor of analysis in every type of economy is the factor labor. For example, the macroeconomy is born due to the fact that Keynes was addressing issues on unemployment(Keynes, 1936).

One of the main reasons that leads the Platform to play a determinant role in the gigeconomy is that this economy free them from the regulations and the pressure of governments. Because they have the ability to get advantages provided by another country where they operate, they are not compelled to comply to the exigences of their country of origin. The gigeconomy model is a tool for platforms to also impose their viewpoint to countries (Even to their country of origin). Platforms powers in digital economics is comparable to Multinationals power in capital economics. Currently, all the Multinationals are adopting Platform business models and are practicing gig economy.

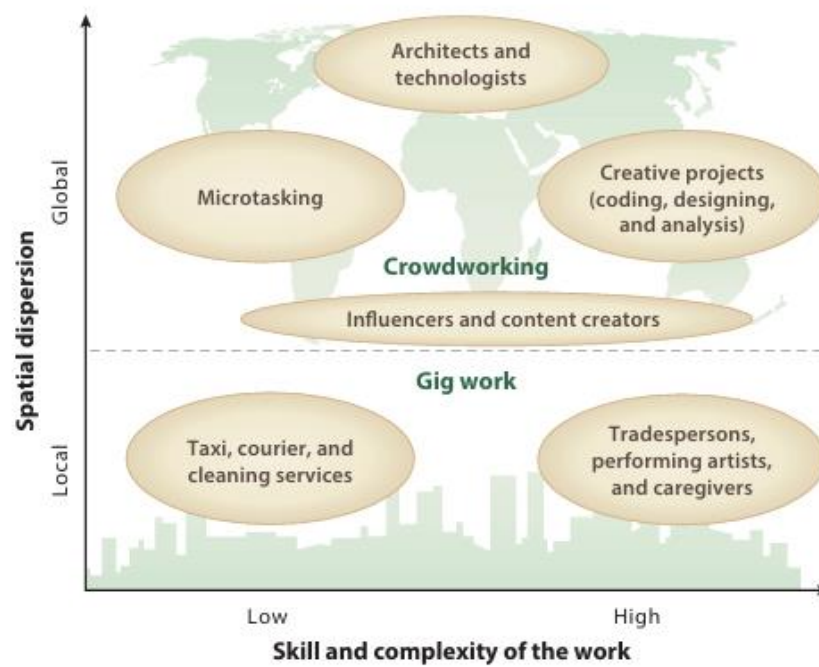


Fig 15.1 Platform model source: (Vallas & Schor, 2020).

According to other sources,

“Digital platforms, understood as multi-sided matchmakers, have amassed huge power, reimagining the role of consumers, producers, and even ownership. They increasingly dictate the way the economy and urban life is organized. Yet, despite their influential and far-reaching role in shaping our economic as well as sociocultural world, our understanding of their embeddedness, namely how their activities are embedded in systems of social and societal relationships and how they conceptualize their main functions and actions in relation to their wider setting, remains rudimentary.”(Hardaker, 2021)

5-The economic agents in digital gigaconomy

Economic agents involved in the gigaconomy are different from the ones we can see in the macroeconomic level such as the difference that exist between economic agents from a micro to a macroeconomic level. The fig 15.2 shows how those economic entities interact in a gigaeconomics perspective.

International producer of technology: In this category of economic agent are all the companies firms, that deliver to the market technological tool. It is important to notice that technological tool could be physic or digital. In the case of digital tool, intellectual tools like book in finance that could help in financial engineering could be considered as an digital technological tool.

Multinationals: It is all the companies that multiple branches across the globe. We consider that all firm in the macro economic level is affiliated to a multinational. They are supposed to produce capital goods.

Platform: As described above their role are significant as they control the labor aspects of the gigaconomy.

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Int DAD: They are producers of digital goods and they are a resultant of a network of digital asset developers of a macro entities. This is explained by the fact that a digital asset developer has a specific market target and for each specific target each DAD from every part of the world connect together to form an international group. For example, in programming, there some developers that are android app developers and some that are apple app developers. Every type of developers form an international network and share between each other their knowledge as if there are from a same group.

International Users: We regroup in this category households, governments, and every entity that use the capital, and digital goods available in the International market of good and services.

International Banks: This type of economic agent is the group of Central Banks, International Banks, International Digital Banks, that may be able to assure digital transaction between economic agents.

6 -The model of digital gigaconomy

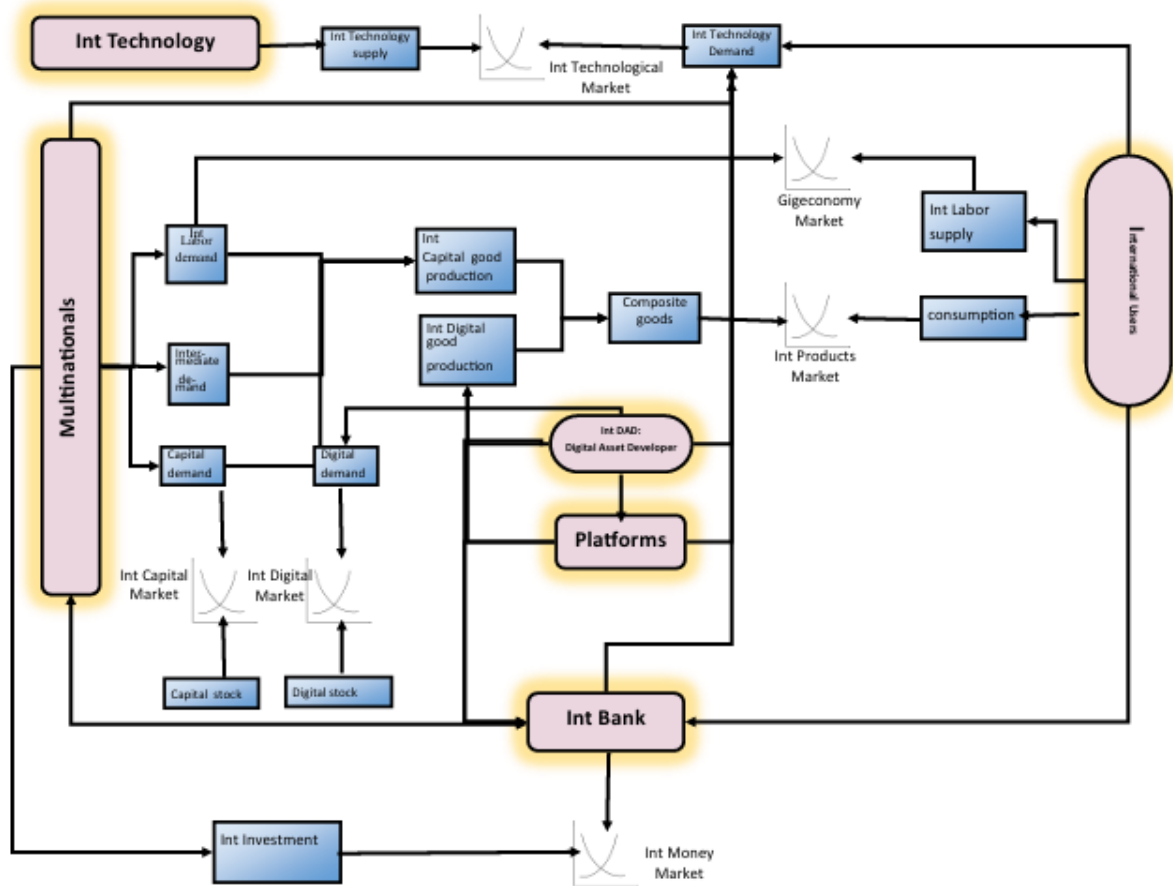


Fig 15.2 Model in gigaconomy

The model in fig15.2 shows how the schema of the economy in a giga perspective. In this economy, there is no government and it might seem like the regulation of the market and the mechanism of trade will depend of the influence of the multinationals or the platform or maybe the International DADs.

The role of the governments are not significant for this reason we associate them as a regular Users, same as household. As an example, lets take a poor country that wants to

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buy a X amount of gold in an International market, at the same time let's assume that a very rich Business man wants the same amount but want to pay 2X for the same amount of gold. The result is that the Business man as a simple person will get the amount of gold and not the country. This explain why in a gigaconomy, the role of governments are not significant.

However, if the role of governments is not important in gigaeconomics, their influence coefficient are useful for Platforms and Multinationals. The influence coefficient (f) of a Platform or Multinationals in a gigaconomy depends on their personal influence in macroeconomic level (f_m) and the influence coefficient of their country of origin (f_c). For example, a platform from USA and a platform from Fiji Island does not have the same coefficient of influence as well as Facebook and Instagram does not have the same influence coefficient.

$$f=f_m+f_c$$

The model in gigaconomy is a combination of the macroeconomic and microeconomic model which is considered as a superposition of the digitalist and the capitalist economic model. The gigaeconomics model is built on top of the macroeconomic model and the macroeconomic model on top of the microeconomic model. This is justified by the fact that capitalist model is built on top of the mercantilist model. The fig 15.3 show how the model pertain to the mercantilistic mode of production is very simple and represent a micro economic economic stricture. The main agents involved are just the Monarch and the households. And this confirm the point that we made concerning the fact that a switch of a type of mean of production is equivalent to a shift of the type of economic level of analysis. And this corresponds also to a period of social disturbance which is explained that all the new agents involved in the new process of production try to find a certain equilibrium in the social structure.

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And this explains the multiple revolutions that happened starting from the 16th century when the beginning of the capitalist mode of production corresponds to the advent of many political revolutions. And this brought the concept of Presidency instead of the old concept of King or Emperor as main actor of an entity's leadership.

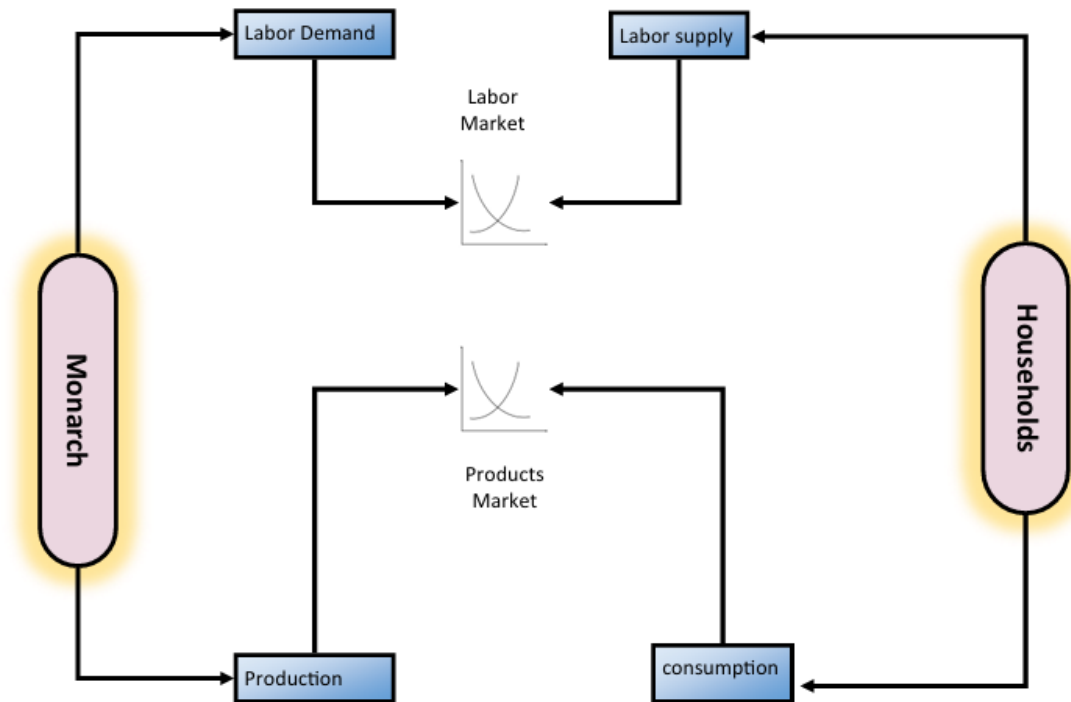


Fig 15.3 Economic Model in Mercantilism

PART IV GENERAL EQUILIBRIUM and GROWTH

Chapter 16. The general equilibrium

1-The meaning of the general equilibrium

The significance of a general equilibrium in digital economy corresponds to find an optimal influence coefficients, according to the capabilities and resources available in the

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current time and according to the level of technology. And this optimal equilibrium should be equivalent to the equilibrium in all the other markets.

However, this optimal influence coefficient needs to match the equilibrium conditions at the Gigaeconomic level and on the Macroeconomic level.

Giga equilibrium corresponds to a situation where the optimal influence coefficient allows the equilibrium on all the international markets (fig 15.2)

Macro equilibrium corresponds to a situation where the optimal influence of the nation reflects the equilibrium on all the markets.

2- Keynesian circuit in capital economy

To build our agent based model, the Keynesian model (Keynes, 1937) represented by fig 7.2 had been used as a basis of analysis to the capital economy. This the digital economy does not correspond to the disappearance of the capital economy. Instead, the digital economy is built upon the capital economy.

3- Eurace model economy

The second model which has been used as reference mode in the building of our Hybrid agent based model is The EURACE model(Bertani et al., 2021) represented in fig 7.1. This model was really helpful, but did not incorporate the capital economy inside its representation significantly.

4-Hybrid model of digital economy

The hybrid agent based model of digital economy has used the Keynesians economic circuit and the EURACE model as reference mode. In the reduced form (fig 7.3), the rest of the world is omitted. For the general equilibrium, we added the rest of the world that will help determine the influence coefficient for the country which could be used by the Platforms and the Multinationals.

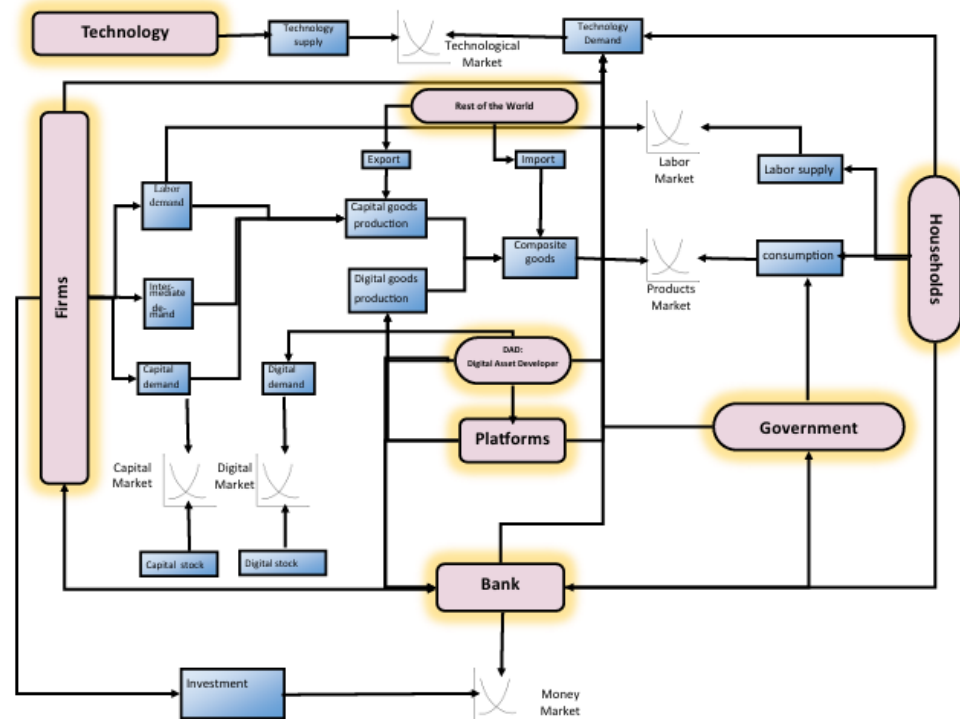


Fig 16.1 Digital economic circuit

It is important to notice that the rest of the World is connected just to the capital goods because the exportation and the importation of the digital goods are done straightly through the Platforms. The link between the model of gigaconomy and macroeconomy in

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digital economy is assured by the Platforms. In the Gigaeconomic model, governments and households are just users, and the Rest of the world is composed by the households and governments which are Users, thus the aggregation of the model in the general equilibrium leads to the Gigaeconomic model fig 15.2.

5- The Product market equilibrium in digital economy

In a macro economic level the equilibrium will depend on the supply and demand of digital and capital goods on the market and this in case of a positive productional gap.

In a Giga economic level the equilibrium will depend on the supply and demand of digital and capital goods on the International market of good and services, with a positive productional gap.

In case of a negative productional gap the price will be determined by the price on the market of commodities.

6-Money market equilibrium in macro digital economy

In a macro economic level the equilibrium will depend on the supply and demand of digital and capital currencies on the International market.

In a Giga economic level the equilibrium will depend on the supply and demand of digital and capital currencies on the International market.

It is important to know that the money market in giga economy and macroeconomy are the same. According to sources,

“Under a system of floating exchange rates, the exchange rate is set by market forces and is allowed to fluctuate in response to changing economic

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conditions. In this case, the exchange rate e adjusts to achieve simultaneous equilibrium in the goods market and the money market. When something happens to change that equilibrium, the exchange rate is allowed to move to a new equilibrium value”(Mankiw, 2009).

7- Labor market Equilibrium in giga digital economy

In a macro economic level the equilibrium will depend on the supply and demand of labor on the labor market.

In a Giga economic level the equilibrium will depend on the supply and demand of labor on the International market of labor.

8 – Technological market equilibrium in digital economy

In a macroeconomic, level the equilibrium will depend on the supply and demand of digital and capital technological tools on the market of technology.

In a Giga economic level the equilibrium will depend on the supply and demand of digital and capital tools on the International market of technology.

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9 -Financial market equilibrium in digital economy

In a macro economic level the equilibrium will depend on the saving and Investment of digital and capital asset in the macoreconomy.

In a Giga economic level the equilibrium will depend on the savings and Investments of digital and capital assets in the gigaconomy. According to Mankiw,

“... saving and investment can be interpreted in terms of supply and demand. In this case, the “good” is loanable funds, and its “price” is the interest rate. Saving is the supply of loanable funds—households lend their saving to investors or deposit their saving in a bank that then loans the funds out. Investment is the demand for loanable funds—investors borrow from the public directly by selling bonds or indirectly by borrowing from banks. Because investment depends on the interest rate, the quantity of loanable funds demanded also depends on the interest rate.” (Mankiw, 2009)

10- Summary in digital economy

In summary, finding a general equilibrium will lead to find a solution for the seven equations according to Mankiw.

The model has seven equations:

$Y = C(Y - T) + I(r) + G + NX(\epsilon)$ IS: Goods Market Equilibrium

$M/P = L(i, Y)$ LM:

Money Market Equilibrium

$NX(\epsilon) = CF(r - r^*)$

Foreign Exchange Market

Equilibrium

$$i = r + E \pi$$

Relationship Between Real and

Nominal Interest Rates

$$\epsilon = eP/P^*$$

Relationship Between Real and

Nominal Exchange Rates

$$Y = \bar{Y} + \alpha(P - EP)$$

Aggregate Supply

$$\bar{Y} = F(\bar{K}, \bar{L})$$

Natural Level of Output

These seven equations determine the equilibrium values of seven endogenous variables: output Y , the natural level of output \bar{Y} , the real interest rate r , the nominal interest rate i , the real exchange rate ϵ , the nominal exchange rate e , and the price level P ”(Mankiw, 2009).

According to the technological market, we are adding the real rate of technological progress h and the nominal technological progress rate η . With the Fashion Ability rate \bar{H} being the combined effect of the real rate of technological progress h and the nominal rate of technological progress η and the coefficient of influence (f) being the result of the impact of the rate of technological progress (h) and untechnical influence rate \bar{h} and k a constant. The equilibrium on the market of technology could be determined by the following three equations:

$$\bar{H} = h + \eta \quad (1)$$

$$f = h + \bar{h} \quad (2)$$

$$\pi = k/h \quad (3)$$

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with the Fisher equation we can determine the relation between the Interest rate and the rate of technical progress.

As $i=r+\pi$ according to Fisher equation, we have

$$i = r + k/h \quad (4)$$

if $f=\alpha h$ with α being a constant, referring to Chapter 13, we may have

$$i = r + \alpha k/f \quad (5)$$

in other words, those results show that there is possibility for the Central Bank to adjust the rate of technological to the interest rate and to the coefficient of influence.

Chapter 17- Digital political economy

1-Necessity of a new political economy

The development of new technologies of Information had so transformed the world and reduced distances among people that all our daily behavior had been affected. Due to that reason the economic system that leads our daily action should be affected in turn because if economy makes facts, facts also make the economy. Thus, since facts have changed it is really interesting to wonder if the Economic thoughts have been transformed in this new era and what is their impact on the political economy of nowadays. To come up to this point, this

paper will drive the reader through the acknowledgement of how information has changed customer behavior during the last few years and what are the motivation that had prompted those customer behaviors. Besides, an analysis had been made through the big icons of the economic thoughts starting from Adam Smith, through D. Ricardo, Karl Marx, J.S. Mills and Keynes. Finally, this paper pushes the analysis a little far by scrutinizing the impact on the digital on the political economy initiated by several economic entities.

According to the D.Gartenstein⁴ “punching the clock” is an expression usual for companies that require physical presence at work. In other words, if for an entire month an individual omit to clock in and clock out, he could forget his pay check during this period even if his coworkers had noticed his presence. The main reason is there no jurisdiction that will accept his claim because it is the word of the computer versus his word and for the matter of fact the word of the computer is prevailed over human being word. The conclusion is obvious: the digital is controlling and ruling human being. In a business⁵ perspective, the focus on the digital economy and its changes in traditional business is a fundamental point of micro-economic analysis because the new world in which consumers are living is invaded by the information technology (Klientsolutech,2017). This phenomenon had operated many changes in our daily life. Consumers behavior due to the development of the technology has transformed the economic environment to the point that many needs and desire have been modified. Thus, the importance to notice the apparition of a new customer behavior prompted by the new type of economy, the motivation of this behavior and the long-term effect of the impact of

⁴ Daniel Gartenstein explains how a punch clock in a workplace provides employers and employees with a degree of accuracy when measuring payroll hours

⁵ The paper starts the analysis from a business stand point because it is relevant part of. the micro-economy. The aggregation of this microeconomical entity will form the effectual market according to the economist Saffra.

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Information technology. However, it is fair to point out some possible effects that impede the evolution of the online business.

As it is obvious that the digital had operated a effectual change in human life the needs to analyze its impact with economics thoughts is really ineluctable. With this new era of digital economy, the question that may be relevant is to analyze certain of the ideologies of the classics, neoclassic, Keynesians and Marxist according to the new social behavior and identify a new ideology derived from it.

Conscious that the new economic era will generate a new thought ,the incentive to observe some repercussions on the political economy will provide an insightful point to our analysis.

Three principal sections will be distinguished in the following lines:

The reality of the digital

Economic thoughts and the Digital

From Economic thoughts toward Political economy in Digital era

Section II-Economic thoughts and the digital

In this session, thoughts generated by the digital economy are analyzed through fives important works released by icons of the economy. Those icons are Adam Smith⁶, David

⁶ Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* published in 1776

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Ricardo⁷, Karl Marx⁸; John Maynard Keynes⁹ and J.S. Mill¹⁰. The methodology will consist on how the social transformation has impacted the view point of those economic thoughts according to specific topics usually encountered in economics. Among these topics, those analyzed are value and distribution, competition, accumulation, technological change, unemployment, effective demand, business cycles, money and credit, capital. However, some other supports from the literature will be added to strengthen some argument to provide a deep understanding of the topic whenever it is required.

2-Value and Distribution

This notion of value is observed differently according to the different school. The view point differ from the classic , neo classic to the Marxists.

In the wealth of Nation Adam Smith describes the notion saying that: “The word VALUE, it is to be observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called value in use; the other, value in exchange.”

For David Ricardo's theory of value , it is important to refer to this quote where he affirm that “The value of a commodity, or the quantity of any other commodity for which it will exchange, depends on the relative quantity of labour which is necessary for its production, and not on the greater or less compensation which is paid for that labour.”¹

⁷ David Ricardo, *Of the Principles of Political Economy and Taxation* published in 1821;

⁸ Karl Marx: the Capital published in 1867

⁹ J.M. Keynes: The general Theory of the employment, interest and Money published in 1936

¹⁰ J.S. Mill: The principle of Political Economy first edited in 1848

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This notion of value according to Karl Marx take another color when he provide to it an unit of measure: money. This is obvious because he was preparing a way to lay down his theory based on the capital. According to Marx, “The first chief function of money is to supply commodities with the material for the expression of their values, or to represent their values as magnitudes of the same denomination, qualitatively equal, and quantitatively comparable. It thus serves as a *universal measure of value*. And only by virtue of this function does gold, the equivalent commodity *par excellence*, become money”.

In digital economy value is related to information. what information this product reveal to others? Thus the importance of the notion of brand Nike and Reebok...for consumers for instance. For the producer the objective could be: What information can be linked to my produce to make it valuable?

For the first time of the digital economy, the Information was related to the notion of value through the concept of Innovation. Innovations were largely designed to support large organizations’ internal processes and help them operate more efficiently. But with digital innovations, innovators are displacing legacy organizations. (Maxwell,2019).

Nowadays, how this innovation convey a message to the consumer by the use of information received and resent to the consumers in another version is very important. Digital innovators—like Amazon and Uber and Tesla—are winning because in the digital economy, value is created differently. Digital relationships provide data that reaches farther into a customer’s world than into those of competitors. This data makes possible new relationships with customers and a new level of intimacy, allowing firms to personalize offerings for example describing the circulation of the flux of information between producer and customer. In fact, the input is the information from the customer and the output is the value added which is how this

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information is returned to the customer. The digital economy is resulting in new types of value chains, partnerships, and ecosystems(Maxwell,2019).

For example, let's assume that a customer is known for showing that he is important. The input of information is "show of importance". This information acquired by a shoes retailer will be added to the variety of shoes that will be proposed to him. When he will be offered to buy an expensive Nike brand shoe that he will obviously buy, it means that the output of information send to the customer is "show my importance by the wearing of this expensive Nike shoe". The value added is the information of "show importance" transited through the commodity shoe. Thus, it appears that in the digital economy value is confounded to information.

3-Distribution

The concept of distribution started with the works of David Ricardo. In fact, Ricardo work in a period of industrial development contrary to Adam Smith. Between that time there is a conflict between capitalist and landlords According to introduction of Saffra in the correspondence of David Ricardo: "The only important difference is in the place given to Rent, which was dictated by the necessity for Ricardo of 'getting rid of rent' (as he put it), in order to simplify the problem of the distribution between capitalist and labourer.³ As a result, unlike Adam Smith, he deals with Rent immediately after Value and before Wages and Profits". In Ricardo view point, distribution for him is efficient when surplus is distributed in favor of the capitalist. Taken in this framework, it's better for the community contrary to Malthus who think that it is better when the distribution is done in favor of the landlord. "the greater part being obtained by the better distribution of capital.'(Ricardo,Page198).

Nowadays, this concept of distribution becomes a little bit difficult to apprehend. The digital economy has broken the borders between countries and thus Government have

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difficulties of transaction control because of the speed of goods circulation that are now intangible. So The theory of distribution becomes harshly applicable the result is that In today's markets, firms and executives with even the tiniest competitive advantage grab all the spoils(Rodriguez-Montemayor,2018).

In many developed countries, Income inequality has increased during the past three decades. In some countries like the U S, data shows that the income share of the top one percent has soared from an average of 27 times more than the bottom one percent in the 1980s to 81 times more in 2014. It appears then that technology has long been recognized as one of the drivers of income inequality – together with globalization and other structural and institutional factors (Rodriguez-Montemayor,2018).

4-Competition and Accumulation

In economy, those two concept had been fundamental when it comes to determine the incentive of the behavior of many actors of the economy. For Adam smith the notion of competition was important to determine the notion of effectual demand in order to make a distinction between the market price and the natural price of a commodity. Referring to his terms “When the quantity of any commodity which is brought to market falls short of the effectual demand, all those who are willing to pay the whole value of the rent, wages, and profit, which must be paid in order to bring it thither, cannot be supplied with the quantity which they want. Rather than want it altogether, some of them will be willing to give more. A competition will immediately begin among them, and the market price will rise more or less above the natural price,...”¹¹

¹¹Smith, Adam. The Essential Adam Smith (p. 188). W. Norton & Company. Kindle Edition

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To debate about the concept of competition, it is prominent to acknowledge that the competitive market has been the frame of analysis of the law of returns. Saffra, “the idea of interdependence between quantity produced and the cost of production of a commodity produced under competitive conditions is not suggested by experience at all and could not arise spontaneously. It can be said that all classical writers accept implicitly, as an obvious fact, that cost is independent of quantity, and they do not bother to discuss the contrary hypothesis. This idea of interdependence has taken shape recently.in an indirect way, as the result of the change in the basis of the theory of value, from cost of production to utility.”¹²

The 'laws of motion' of capitalism ,is pertained to the notion of accumulation. According to Marx “The law of capitalist production, that is at the bottom of the pretended “natural law of population,” reduces itself simply to this: The correlation between accumulation of capital and rate of wages is nothing else than the correlation between the unpaid labor transformed into capital, and the additional paid labor necessary for the setting in motion of this additional capital.”

But in the digital economy the digital is just and technological instrument of the capitalist. It has just an endogenous growth of the capitalist system. Example of Walmart that use a fascinating technology to dispatch its merchandise or Amazon that uses business analytics to forecast its sales those company crushes the development of the upcoming start up that has not any chance to survive.

Digital had opened the frontier to the infinite enrichment and fast enrichment, astonished accumulation, but crisis , perfect liberty under Smith renewed because frontier does

¹² Pierro Saffra On the Relations Between Cost and Quantity Produced page 3

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not exist. For example, McCain uses Teradata intelligence tools to integrate data from all of their process and present to the business decision makers. McCain executives and managers were able to receive and process data collected from McCain manufacturing facilities, warehouses, stores, and employees (Teradata, 2018). This data helps drive business decisions regarding which product sells best in what location and to which customers.

5-Technological change

Starting with the classics economics thoughts, the development of the technology have been a source of progress. For Young a technological change does not mean automatically that there will be an increasing return. He said that “What is required is that industrial operations be seen as an interrelated whole”¹³.

Romer point out the notion of endogenous growth stipulating that “As in neoclassical theory, the focus in endogenous growth is on the behavior of the economy as a whole”¹⁴ meaning that an exogenous technological change should not have to be mentioned in order to explain why income per capita has augmented.

For Brian, technology has a positive feedback contrary to many assumptions held in economy. According to his words, “technologies typically improve as more people adopt them and firms gain experience that guides further development. This link is a positive feedback loop: the more people adopt a technology, the more it improves and the more attractive it is for further adoption.”

¹³ Allyn Young, Increasing Returns and Economic Progress, *Economic Journal*, 1928. (Page 14)

¹⁴ Paul Romer, The Origins of Endogenous Growth, *Journal of Economic Perspectives*, 1994.(page3)

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The exogenous factor of technology has created many problems in the era of digital economy. Creating economy of speed¹⁵ this era is distinguished by the fast circulation of information thus the fast evolution of technology to the detriment of companies of low income that could not support the fee of new technology implementation. For example, the utilization of cell phone from using keypad to screen touch was so fast and had seen the disappearance of Motorola cell phones.

Companies has found a new way to take enough advantage from consumers, for example before when your car has issues you can fix it if you have some skills in mechanic, now you need to deal with the carshop who has the software of diagnosis of your vehicle. In their side, dealerships advocate that it is the only way to preserve job of their technicians. And this is in reaction of the existence YouTube and website that divulge technics of fixing devices for free.

Companies that outsource their computer services to ERPs¹⁶ by using application have to deal with software companies that charge them execrably to improve the quality of the software or update to the new system of information or for maintenance. At the end technological growth in digital economy has acerbated the gap between the small enterprises and the multinationals and is used as mean to maintain the profit over the real consumer that had any other choice to escape from the net of the capitalist.

An article written by Kessler describes the phenomenon. according to her words,” Fixing some problems in today’s new cars requires some relationship with their

¹⁵ Economy of speed is when a company can grow rapidly, with successful services able to acquire huge numbers of new users in just a short span of time

¹⁶ ERP **Enterprise resource planning** is business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources.

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manufacturers. This has been the subject of a massive negotiation, similar to the debate over whether smartphone manufacturers like Apple should make it easier for other companies to fix their phones. With cars, though, the whole argument is about to change: because as much as computers have already changed cars, connecting those computers to the internet could change the auto industry even more.”

6-Analysis of the notion of unemployment

Referring to the literature of economics thoughts, Keynes was the first to fix the unemployment as general goal of the government by setting up the foundation of the macro economy. His analysis of the economy is obviously pertained to his period which is before the first great economic recession and the first world war. In this period, the huge part of the population was suffering depicting the ineluctable need of employment. In his book the general theory. Keynes asserted that “Having, however, satisfied tradition by introducing a sufficient number of simplifying assumptions to enable us to enunciate a quantity theory of money, let us now consider the possible complications which will in fact influence events:

- (1) Effective demand will not change in exact proportion to the quantity of money.
- (2) Since resources are not homogeneous, there will be diminishing, and not constant, returns as employment gradually increases.
- (3) Since resources are not interchangeable, some commodities will reach a condition of inelastic supply whilst there are still unemployed resources available for the production of other commodities.
- (4) The wage-unit will tend to rise, before full employment has been reached.

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(5) The remunerations of the factors entering into marginal cost will not all change in the same proportion”

He continue in the next paragraph that:.

“Thus we must first consider the effect of changes in the quantity of money on the quantity of effective demand; and the increase in effective demand will, generally speaking, spend itself partly in increasing the quantity of employment and partly in raising the level of prices. Thus instead of constant prices in conditions of unemployment, and of prices rising in proportion to the quantity of money in conditions of full employment, we have in fact a condition of prices rising gradually as employment increases. The theory of prices, that is to say, the analysis of the relation between changes in the quantity of money and changes in the price-level with a view to determining the elasticity of prices in response to changes in the quantity of money, must, therefore, direct itself to the five complicating factors set forth above”(Keynes, 1936).

This system of macro economic that has for objective to reach the full employment required the action of the government through the interdependence between the central bank and the fiscal system. However in the digital economy, the state as regulator of employment is not valuable because internet offers the opportunity to have a job in any part of the world. For example, if you are an engineer in India you can work in USA staying in India.

To address this issue of infinite domain of Internet, some new concept of economy start to appear: the concept of e-government. The OECD in one of its publication proposes a complete shifting from the e-government to a digital government¹⁷

¹⁷ This chapter of the OECD provides guidance on how broadband-enabled central and sub-national governments can become more agile, efficient and effective in fulfilling their roles, while responding to citizen and business’ demands for greater transparency and inclusiveness in public sector operations

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A second issue surging in the era of the digital economy was the replacement of human being not only by robot but by software. For example, you can use FLstudio¹⁸ to play a guitar in a band instead of hiring a guitar player. According to Rotman¹⁹

“That robots, automation, and software can replace people might seem obvious to anyone who’s worked in automotive manufacturing or as a travel agent. But Brynjolfsson and McAfee’s claim is more troubling and controversial. They believe that rapid technological change has been destroying jobs faster than it is creating them, contributing to the stagnation of median income and the growth of inequality in the United States”.

Because of the circulation of the information the unemployment is not used as disciplinary mean by the capitalist. The speed of circulation of the information in the digital economy and the world as a planetary village reduce the problem of unemployment.

So how could the problem of employment could be solved if the digital economy embraces enough problem comprising the definition of the value of the labor , which is referred to the time. There is a huge disequilibrium between time and money because of the difficult control of the information. Some times a job requiring 10hours could be done in one minutes depends on the new technics of information. However in case where the computer may have issue this job could take more than 10 hours. Besides, in this new era the information has a huge impact on the ratio effort /wage. The more informed is a person working on a process the more efficient he is to do his work.

¹⁸FL Studio is a digital audio workstation developed by the Belgian company Image-Line. FL Studio features a graphical user interface based on a pattern-based music sequencer

¹⁹ For D. Rotman, automation is reducing the need for people in many jobs. Are we facing a future of stagnant income and worsening inequality?

7-The concept of effective demand

Basing on a heterodox approach, the notion of effective demand requires a particular attention. To tackle the principle of effective demand, it is required to referred to its first initiator who is Keynes. He says in the general theory that

“if effective demand changes in the same proportion as the quantity of money, the quantity theory of money can be enunciated as follows: 'So long as there is unemployment, employment will change in the same proportion as the quantity of money; and when there is full employment, prices will change in the same proportion as the quantity of money’”

In other terms the whole economy is driven by the effective demand

In fact he defines the effective demand as

“..... simply the aggregate income (or proceeds) which the entrepreneurs expect to receive, inclusive of the incomes which they will hand on to the other factors of production, from the amount of current employment which they decide to give.”(Keynes, 1936)

With the digital economy , the economy is driven by the information. This does not mean that the economy is not driven by the demand. It is but the economy in this case tries to fight for the profit of the consumer by reducing the time of access to the satisfaction of a particular good or service by playing with the information tool as perfect instrument.

According to Dawson, Hirt and Scanlan “In the zone to the upper right, digital technology makes accessible, or “exposes,” sources of supply that were previously impossible (or at least uneconomic) to provide. In the zone to the upper left, digitization removes distortions in

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demand, giving customers more complete information and unbundling (or, in some cases, rebundling) aspects of products and services formerly combined (or kept separate) by necessity or convenience or to increase profits”.

The occasion to connect consumers and customers by lowering transaction costs while reducing information asymmetry was given to market makers with a newly exposed supply, combined with newly undistorted demand because of the development of the digital economy. For example, Airbnb has not built new buildings; it has connect people's spare bedrooms into the market uncovering consumer demand for more diversity in choices conveniences, prices, and lengths of stay. In the same framework, the ride share company Uber, has not acquired new cars; it has brought onto the roads motor vehicle that were underutilized previously, while augmenting the pleasure of getting a ride. In both cases, though little has changed in the underlying supply-and-demand forces, equity-market value has shifted massively (Dawson, Hirt& Scanlan,2016).

It is then accurate to do an analogy by saying that as the economy was driven by the effective demand according to Keynes, the digital economy is in the other hand driven by the effective Information.

This bring us to the understanding of companies like Ebay, Alibaba, and Amazon that has developed their business by connecting buyers to sellers through their platform creating a new economy that we may described as an economy of warehouses. In fact, the economy of market is on the way of disappearance with the digital economy letting place to the economy of warehouses.

8-The concept of money and credit

To tackle the concept of money and credit, it is important to discuss about the price of money generally concealed in the term of interest rate. Keynes words pertained to interest reveal that: “Thus the rate of interest at any time, being the reward for parting with liquidity, is a measure of the unwillingness of those who possess money to part with their liquid control over it. The rate of interest is not the 'price' which brings into equilibrium the demand for resources to invest with the readiness to abstain from present consumption”

For him quoting Marshall on an neoclassical view of the interest rate , 'Interest, being the price paid for the use of capital in any market, tends towards an equilibrium level such that the aggregate demand for capital in that market, at that rate of interest, is equal to the aggregate stock forthcoming at that rate”.

But far away to those definitions , the attention will be focused on the impact of those instrument in the present financial system. The approach that reveal itself interesting remains Minsky analysis of the financial system. For Minsky Hyman Philip Minsky was an American economist, who analyzed this issue and has demonstrated how financial system are not eternally stable. In his framework, he develops theory concerning Money Manager capitalism and shadow banking.

Wray , according to Minsky’s perception of Money and Banking, “anyone can create money” but he continues that “the problem lies in getting it accepted. And therefore, banking is not “money lending”—a money lender must first obtain money before making a loan according to Krugman’s view of banks. Furthermore in chapter 6, he quote Minsky affirming that “stability is destabilizing” and this appeared to induce the last few decades of U.S.

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experience, during which financial crises became more frequent and increasingly severe. He listed, for example, the savings and loan crisis of the 1980s, the stock market crash of 1987, the developing country debt crises (1980s to early 1990s), the Long Term Capital Markets (1998) and Enron (2001) fiascoes, and

the dot-com collapse (2000–2001) as precursors to the final “great crash” in 2007.

However, the economist Grey demonstrates how the problem of fraud is resorbed ultimately by the advent of the digital economy. According to his words, the future of the banking system is in the digital economy. In his paper, he discusses the future of banking in a digital fiat currency (‘DFC’) regime, described like a monetary regime in which retail and wholesale consumers have straight access to public digital checking and payments services, free from the endemic bank-centric depository system. He insists on this regime, where banks will still operate the valuable social function of underwriting loans and evaluating collateral, even as their checking and payments processing functions will be tend to obsolesce. In this digital environment, payments system resiliency will be developed, which will correctly address the safe asset shortage problem pertained to insurance caps on bank deposit accounts.

Therefore according to Grey as a member of the modern money theory the era of the digital economy represent the end of the financial instability. In fact, nowadays with the centralization of the information and the development of the technic like the blockchain and the bitcoin it is more easier to check the credibility of an entity applying for a loan . Time to connect a credit score to a social security number and their inscriptibility are amazing creating a viable environment for the financial system.

9- The capital.

The notion of capital cannot be discussed without the concept of capital developed by Karl Marx. Quoting Marx in the Capital:” The circulation of commodities is the starting-point of capital. The production of commodities, their circulation, and that more developed form of their circulation called commerce, these form the historical ground-work from which it rises.

Contrary to Ricardo²⁰ who works on the distribution of the profit and Karl Marx talk about the capitalization of the profit. For him “On the one hand, because the notion of “means of subsistence” would considerably expand, and the laborer would lay claim to an altogether different standard of life. On the other hand, because a part of what is now surplus labor, would then count as necessary labor; I mean the labor of forming a fund for reserve and accumulation.”

In fact Marx starts from the point that labor produces the labor power which will create the wage and the wage accumulation will form the capital. According to his words on page 381: “Hence, we may understand the decisive importance of the transformation of value and price of labor-power into the form of wages, or into the value and price of labor itself.”

However, in case that all the wage is used to generate just the labor power. There is no more creation of surplus and therefore no accumulation process to produce the capital.

The important point that is relevant for this analysis is that the formation of the capital is pertained to a tangible asset realized by effort which is in turn something visible or measurable.

²⁰ See above in the same section how D.Ricardo discuss about the notion of the distribution

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But for the digital economy, the surge of the intangible asset is preponderant. This does not mean that the physical capital describe by Marx and the other icons of the economy was deemed to obsolesce but their place in the new era is more and more reduced.

On the subject Senzheng.blog published an outstanding article saying that “The intangibles are the assets which make or break the digital transformation. In business, the intangible assets drive the tangible success: The beautiful minds of extraordinary people that imagine our future and the force of the smart and skilled collective that puts the transformation in motion.”

The digital had provided a new form of fast accumulation but combine money to idea instead of money to physical strength. Due to the importance of money becoming idea then surges the notion of intellectual property and the development of the sector 4 and 5 of the economy. Shortly, it will not be odd to say that accumulation of good is now accumulation of ideas

While observing the business model of companies like google and yahoo they both seem to have the same business model but the difference just subsist just in the difference of idea. Google²¹ is way more based on the location research when Yahoo²² on information research. However in nowadays both have crossed their stand point they still have on each other a comparative advantage on both domain

²¹ Google Google LLC is an American multinational technology company that specializes in Internet-related services and products, which include online advertising technologies, search engine, cloud computing, software, and hardware

²² Yahoo! is an American web services provider headquartered in Sunnyvale, California, and owned by Verizon Media.

10- The origin and development of the capitalist mode of production and the digital economy

In this section of the document, the importance to notice how the digital after implementing a real social change and changing our way of envisioning the economy may have a significant impact on our political economy. Due to the fact that, Political economy is the critical, historical, institutional, and comparative study of the economy and society, It is high time to examine how problems analyzed in the non-capitalist and capitalist social formations, as well as post-capitalist possibilities are viewed in this new era as well as how subjects concerning the origin and development of the capitalist mode of production, the rise of patriarchy, of inequality like feminist economics aspect or black Political Economy aspect, and ecological economics aspect, could be considered in this new growing economy.

To discuss the origin and the development of the capitalist mode of production facing the era of digital economy, the question that may rise is to wonder if the advent of the digital economy means the disappearance of the capitalist economy.

In fact, the origin of the capitalist could be assimilated with the beginning of the era of mercantilism which is consisted on: New era of global political economy; Consolidation of national identity and Reformed state apparatus & bureaucracy all those factors gathered with the objective to define the nature of commerce to the nobility.

The literature reveals that one of the most famous mercantilist pamphleteers was Thomas Mun, an extremely wealthy merchant who was director of the British East India Company. He divides the mercantilist era into two periods, an early or simple period and a later more complex period. Then after Marx pointed out²³ the era of merchant's capital that

²³ This notion is developed in the Capital vol 3

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appears as the antique form of capital long before capital settled its own domination over production. Its evolution during the time at a certain extent has provided the establishment of capitalist production as factory for the creation and the concentration of money wealth.

Therefore, the political economy will see the development of the capitalism until the advent of the digital economy. For the very beginning, before the bug of 2000 the digital economy is presented like the instrument of equal opportunity that will mitigate this effort required to acquire the capital. As described in the line above the intangibility of this new mode of economy is supposed to give a chance to the new commers. Of course Bill Gates and the Boss of Facebook Mark Zuckerberg or Amazon Jeff Bezos will not deny this fact: their capital was their idea. Ultimately, the mean of productions are so low in the digital economy than the capitalist economy. The capital is not needed but the digital is important. Unfortunately, after 2000 the traditional business started to convert into online business. And of course, the giants of the new digital economy had grown exponentially so big that they make their laws and therefore start wiping any startup daring to threaten their position. The hope of a balanced system of distribution is gone. Far from this point, the era of new technologies of information had been the era where the gap between poor and rich had been crucial and coincide with the era where companies and especially those generated by the digital economy started to hit the term “trillion dollars company”.

Digital has not done something better than feeding the capital.

11-The rise of modern racism and patriarchy,

Several approaches are pertained to the concept of patriarchy in the first position come the concept of gender inequality as derivative of capitalist relations where gender means ultimately class, besides gender inequality as a result of an autonomous system of patriarchy, which is the primary form of social inequality, furthermore, gender inequality as a consequence of the interaction of autonomous systems of patriarchy and capitalism and finally, gender inequality as resulting from patriarchal relations so intertwined with capitalist relations that they form one system of capitalist patriarchy.

Inequality so described, the last point has leads to notice that capitalism cannot exist without patriarchy and the goal of capitalism, the ongoing process of capital accumulation, cannot be achieved unless patriarchal man-woman relations are maintained and reproduced, often in new ways that support the development of a capitalist economy. Thus, It could be obvious to admit that if there is a condition where the relation woman to man should be equal this concept of inequality could be outdated and then will follow the capitalism.

Fortunately, one of the advantage of the online business and the digital economy is to reduce the impact of the interactivit²⁴y. Due to that aspect, Digital is the best way of combating the patriarchal and modern racism for the sake of the interactivity. Even though societies are so built the natural predominance could be balanced by the use of the computer. For example a job performed by man could be done by woman. For example, assume like you play a video game with a person online you could never know if the person is a female or a

²⁴ Interactivity is the communication process that takes place between humans and computer software.

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male. Because the software is playing and not the lady. The same way when a person is recruited online unless his picture is required, it will be difficult to know if he is black or white.

12 -Inequality versus digital economy

The development of the capitalism has prompted several types of economy concept like feminist economist or black political economy due to the inequality pertained to its practice.

The feminist economist Diana asserted that “Further, the conceptual hierarchy of the microfoundational paradigm de-emphasizes issues of particular importance to women. The result is that many subjects especially salient for women have been seriously neglected in economic analyses”.

However, nowadays digital economy has balanced the ratio man and woman through the utilization of software. For example doing mathematics calculus and computations required a lot of effort before reason why many women prefer to work in literature but with the development of software like excel those computation are quietly effortless.

For certain black political economists like Cornell West the physical appearance of an human being could create a source of discrimination. In his publication Genealogy of modern racism he quoted Rush saying “Is the color of Negroes a disease? Then let science and humanity combine their efforts and endeavor to discover a remedy for it.”

Through the principle of Inter activity digital economy is the best way to fight racism example of chatting service provided by online enterprise. Unfortunately, with the association of the camera to the web system this problem of inequality maybe revamped.

13- Ecological economics

In the Principles of political economy , J S Mill set the foundation of the ecological economics in discussing about the Stationary State saying that “ A world from which solitude is extirpated is a very poor ideal. Solitude, in the sense of being often alone, is essential to any depth of meditation or of character; and solitude in the presence of natural beauty and grandeur, is the cradle of thoughts and aspirations which are not only good for the individual, but which society could ill do without”. For him every economical development should help reach the stationary state. But as soon as the society reach this state, they must find a way to maintain this position and preserve their environment for the future generation.

In part due to the fact that the digital economy is built unfortunately upon the principle of the capitalism, in term of good production ,it contributes to the fast degradation of the environment because of the speed of circulation of goods and services.

However, certain social aspect of the digital era may compensate the effect. For example, jobs at home may reduce traffic problem and reduce pollution in some cities like Los Angeles. School at home may reduce traffic problem or use less table benches for the sake of the wood preservation.

Besides, digital economy is the word of less paper. Even if paperless concept is not good for the paper industry, ecologically this is a huge perk for the environment in term of recycling paper and reduce the utilization of wood pulp²⁵ retrieved from trees.

According to an article published by Dotel, “The amount of paper used in organizations towards printing documents in a single day is astounding. According to the

²⁵ There are many different methods of producing **wood pulp** depending on type of paper and the characteristics needed in the final paper product

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paperlessproject.com, globally, an average office worker uses 10,000 sheets of copy paper annually. These numbers can be changed drastically by integrating paperless solutions to avoid the needless printing of documents. One way for organizations to reduce costs and better manage discretionary spending is to automate invoice processing and disbursements”.

14- Summary

In summary, this section helps the reader to acknowledge how information has changed customer behavior during the last few years and what are the motivation that had prompted those customer behaviors. This change in behavior has impacted the view point of those economic thoughts according to specific topics usually encountered in economics. Among these topics, even though the economic thought has not changed for value and distribution, competition, accumulation, technological change, unemployment, effective demand, business cycles, money and credit, capital, they have just change their form in the new era of digital economy. Therefore the apparition of new concept like e-government, or economy of warehouses instead of economy of market, or effective information instead of effective demand. This analysis has proved that there is a change concerning how problems pointed out in the non-capitalist and capitalist social formations, as well as how subjects concerning the origin and development of the capitalist mode of production, the rise of patriarchy, inequality like feminist economics aspect or black Political Economy aspect, and ecological economics aspect, are considered in this new growing economy.

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Chapter 18- Growth in digital economy

1

1-Defining growth in digital era

According to the Solow model the rate of population growth could be considered a factor of growth because of the phenomenon of naturalization (Viwanou Aloumon, 2024) where human is the main factor of automation. But with the development of Artificial Intelligence systems, the rate of population growth is also slowed down by (h) the rate of technological progress what could be the consequences of this change in digital economy with the involvement of the Invisible Robot.

Defining growth in digital era comes to find the pertinent factor that could be used as indicator of improvement of social welfare. Therefore, it comes to wonder, if this apposite factor is :

1- Production growth

2-Population growth

3-Employment

4-Capital growth

5-Technological progress

According to some research works, the measurement of growth need to encompass all the factors cited above.

“Since the industrial revolution, technological innovations have enabled rise in productivity, employment, standard of living and the total population

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several times. In the last 15 years productivity growth has slowed-down in the most of large economies, probably due to slow diffusion of advanced IT solutions, but also due to inadequate statistical measurement of the value of IT services and slow progress in complementary and other technologies. The acceleration of productivity growth in the future is possible to foster through larger public investment in infrastructure and fundamental research, tax incentives and subsidies attached to innovations in the private sector, as well as through promotion of entrepreneurship and the reform of education system. The development and diffusion of digitalization and other technologies is expected to trigger a slight acceleration in productivity, while explosive growth in productivity, as predicted by some theoreticians, is not likely to happen.”

(Arsić, 2020)

However, in this book the raise in coefficient of influence is considered as main factor of growth. The more a country has influence, the easier it will be for it to reach all those factor and assure a happiness for its population. In digital economy it is assumed that it should be the coefficient of influence. Linking to Maslow the digital economy is a stage of upper level in the class of level of Maslow where Human being had reached all the levels(Maslow, 1958) influence is the goal to reach.

According to the fig 18.1, the five level of self actualization could be classified in three other different categories such as basic needs (physiological need and safety need),psychological needs(esteeem need, belonging and love need) and self fulfillment need(self actualization). According to that new classification, the first category of needs correspond

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to the mercantilist mode of production, the second psychological needs correspond to the capitalist mode of production and the self-actualization stage correspond to the digitalist mode of production (See table 18.10).

Comparison of Maslow needs with the different types of economy		
<i>Type of Economy</i>	<i>Category of need</i>	<i>Needs</i>
Mercantilism	Basic need	Physiological
		Safety
Capitalism	Psychological need	Love
		Esteem
Digitalism	Self-fulfillment need	Self-actualization

Table 18.1 **Comparison of Maslow needs with the different types of economy**

The term self actualization, could be equivalent to the term search of influence. The more you climb the tree the more you are visible the more you climb the Maslow level the more you are visible the more you have influence. Thus, the increasing number of influencers on social media. Influence will impact the sales on the gigaconomy, change life and bring happiness. The research of greater influence will be the main challenge of the Gen Z.



Fig 18.1 Maslow pyramid of 5 basic needs source:

2-Different theories of growth in digital economy

Many theories of growth had been elaborated starting from Adam Smith to Solow. It is important to have an overview of those theories for a better appreciation of the results coming from our analysis. This overview will be based on the work of Saeed where he tried to find the reason of limit to growth in classical economics(Saeed, 2021).

Adam smith

Concerning classical analysis, Saeed developed ideas from Adam Smith and the implicit demographic limit to growth concept by revealing that although Adam Smith

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did not clearly discuss the limits to growth, a demographic constraint is implicit in his model since labor is an autonomous production factor assumed to be freely available, while capital and technology are endogenously created through investment of profits(Smith, 1776)'

Ricardo

Diving deeply in the analysis, the study added Ricardo's principle of diminishing marginal rents of land through Ricardo's iron law of wages. Besides, the analysis mention the vision of Thomas Malthus, Jay Forrester, on population growth and depletion of resources. In fact, Thomas Malthus, published ideas similar to Ricardo's almost simultaneously as Ricardo where he surmised that population growth by itself is not enough to bring economic advances. For the astute economist, population growth is an end product in the economic growth process, rather than a means and posited that an increase in population cannot take place without a proportionate or nearly proportionate increase of wealth (Malthus, 1798).

Marx

Therefore, it can be deducted that capital ownership is widespread, which creates household claims to profit across board depicting the essence of Say's law (Say 1834) that eventually became imbedded in the supply side neoclassical growth models although it was repudiated in varying degrees in the writings of Ricardo, Malthus and Marx, who were concerned about the class structure and how it affected income distribution, supply, demand, and economic growth

Shumpeter

One icon of the economics that was subject in this study was Schumpeter. His concept of creative destruction and economic cycles was compared to Marx's model of

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destruction of capitalism through exploitation of the proletariat which in turn was based on a class system that locked capitalists and proletariat in separate compartments. In this analysis, it was proven how Schumpeter saw the possibility that entrepreneurship could exist across all social classes underscoring this principle of emergence from the ruins of the fallen capitalists system of new entrepreneurs.

However, after the classicals many Keynesians and other types of understanding of growth had emerged.

Keynes

According to Keynes, the important factor in the measurement of growth dwells the full employment and the growth of capital.

“For we have seen that, up to the point where full employment prevails, the growth of capital depends not at all on a low propensity to consume but is, on the contrary, held back by it; and only in conditions of full employment is a low propensity to consume conducive to the growth of capital. Moreover, experience suggests that in existing conditions saving by institutions and through sinking funds is more than adequate, and that measures for the redistribution of incomes in a way likely to raise the propensity to consume may prove positively favorable to the growth of capital.”(Keynes, 1936)

Solow

In the model of Solow, growth is determined by the growth of the population n and the rate of depreciation of the capital.

$$MPK = d + n$$

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“In the Golden Rule steady state, the marginal product of capital net of depreciation equals the rate of population growth”(Mankiw, 2009)

Harrod Domar

The expression below is characteristic of the Harrod-Domar growth model.

$$I(t) = Ae^{\rho st}$$

The Domar model shows that the rate of investment $I(t)$ grow at the exponential rate ρs with technological change and s the marginal propensity to save.(Wainwright, 2005)

Digital economic growth

In digital economy growth is determined by the coefficient of influence f .

Using automation function, the employment rate is function of the technological rate of progress which is still pertained to the coefficient of influence. Thus, definition of growth comes to find the optimal conditions that satisfies the five following equations.

$$\bar{H} = h + \eta \quad (1)$$

$$f = h + \bar{h} \quad (2)$$

$$\pi = k/h \quad (3)$$

$$i = r + k/h \quad (4)$$

$$i = r + \alpha k/f \quad (5)$$

With the real rate of technological progress h and the nominal technological progress rate η , the Fashion Ability rate \bar{H} being the combined effect of the real rate of technological progress h and the nominal rate of technological progress η , the coefficient of influence (f) being the

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result of the impact of the rate of technological progress (h) and untechnical influence rate \bar{h} , knowing that k and α are constants.

3- Concept map of growth in digital economy

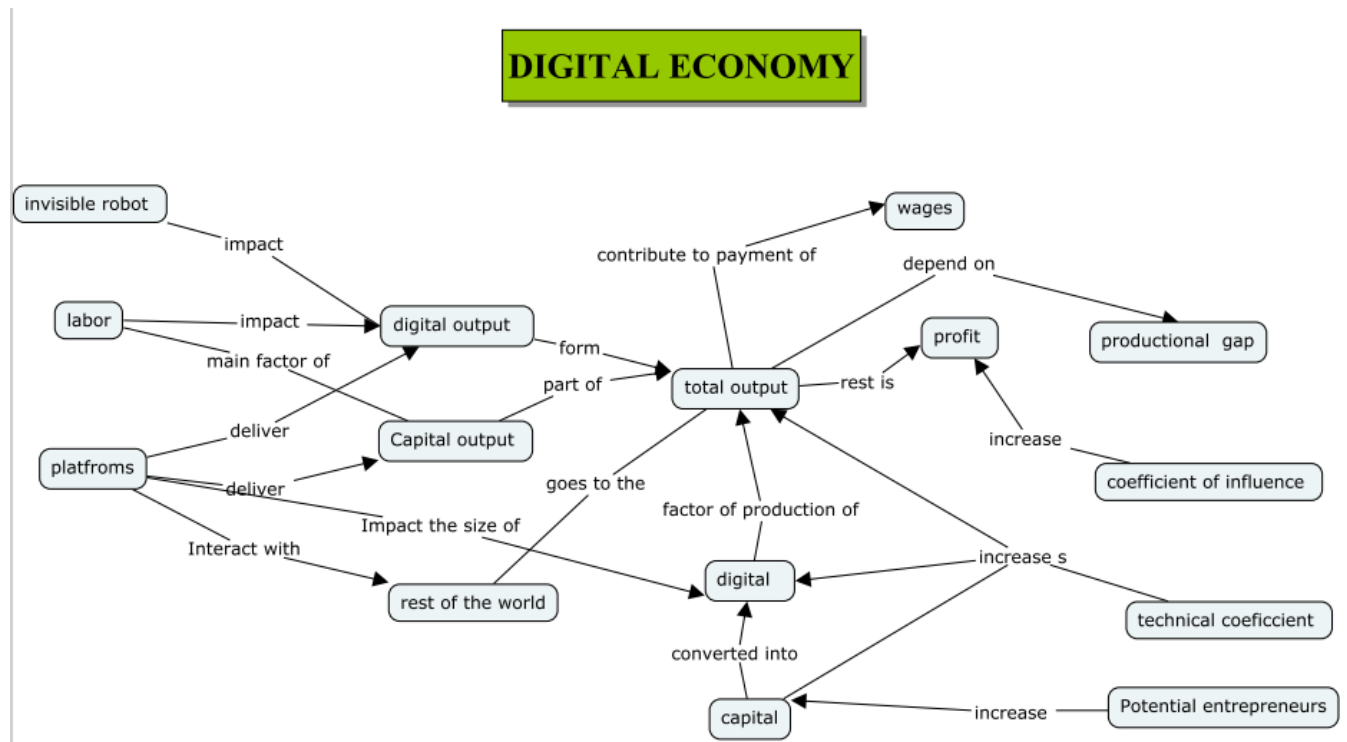


Fig 18.2 Concept of growth in Digital economy

The fig 18.2 represents the notion of growth in digital economy. The concept is identical in a macroeconomic level as in Giga-economic level.

4-System dynamics for growth in digital economy

To model the Digital Economy growth in a system dynamic framework the model of Schumpeter as growth model realized by Saeed was used as a basis of our

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modelling(Saeed, 2021). This option was based on the fact that the role of the entrepreneur was observe and in Digital economy, this role was Impacted by the behavior of the Invisible Robot. The Invisible Robot effect increases as soon as the technology rate increases. The total output is divided between the production of capital and digital goods.

This modelling allows us to see the impact of technology on the Invisible Robot and on the number of Entrepreneurs. The system will give us the opportunity to see the growth in share of the digital production and the capital production and see the growth in influence curve.

System dynamic analysis will be used to see the impact of every agent involved in the digital economic process on the total output of production. This type of analysis has several advantages and one of the basic benefits is its diagrams that allow an easy observation of any described phenomenon over the time. Referring to the words of Kirkwood,

To better understand the system structures which cause the patterns of behavior discussed in the preceding section, we introduce a notation for representing system structures. This diagram presents relationships that are difficult to verbally describe because normal language presents interrelations in linear cause-and-effect chains, while the diagram shows that in the actual system there are circular chains of cause-and-effect. (Kirkwood, 1998)

5-Growth analysis in digital economy

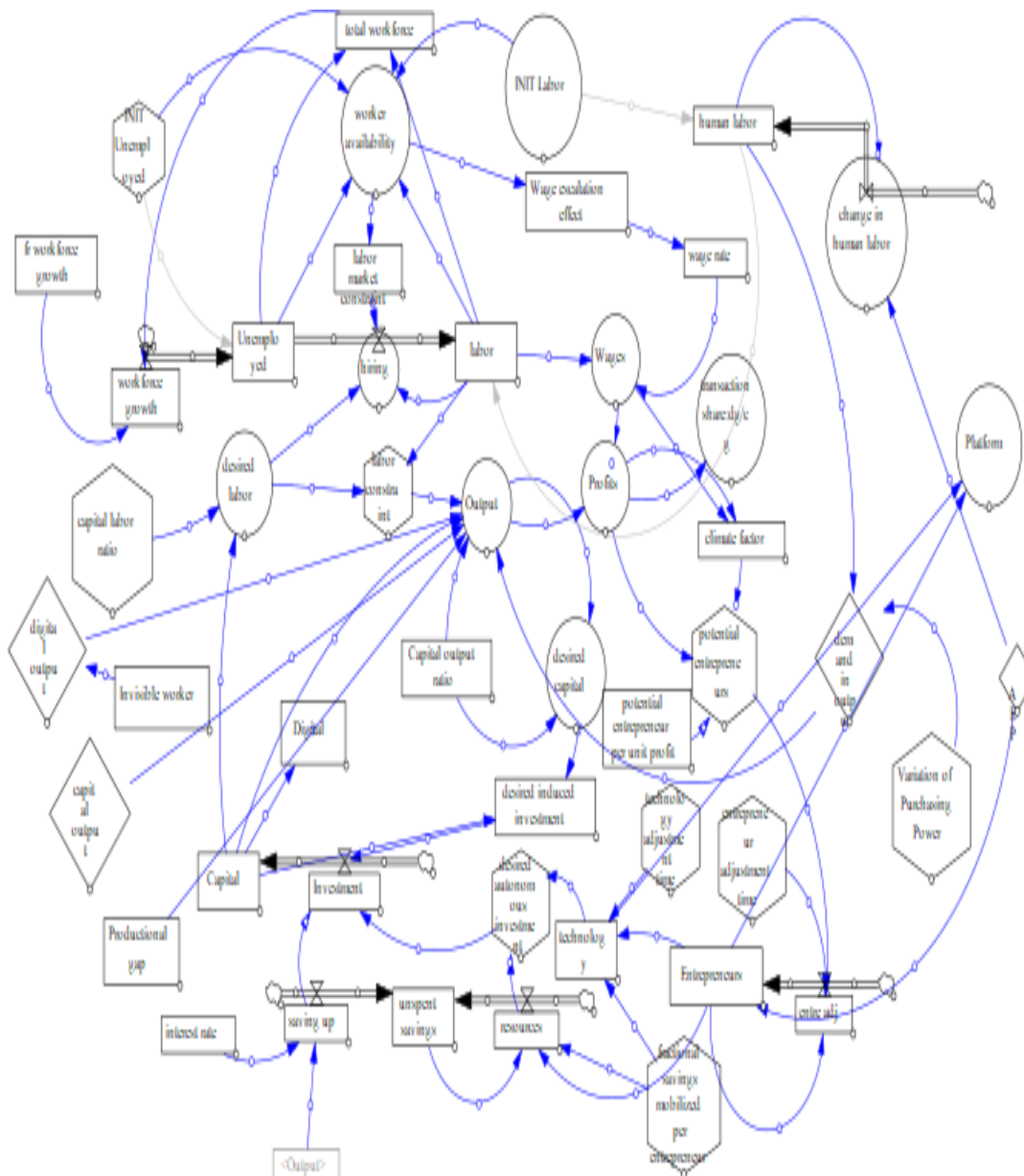


Fig 18.3 Growth model in Digital Economy

The fig 18.3 represents the growth model in digital economy. The formula associated to the generation of this graph could be found in the appendix I.

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Results analysis

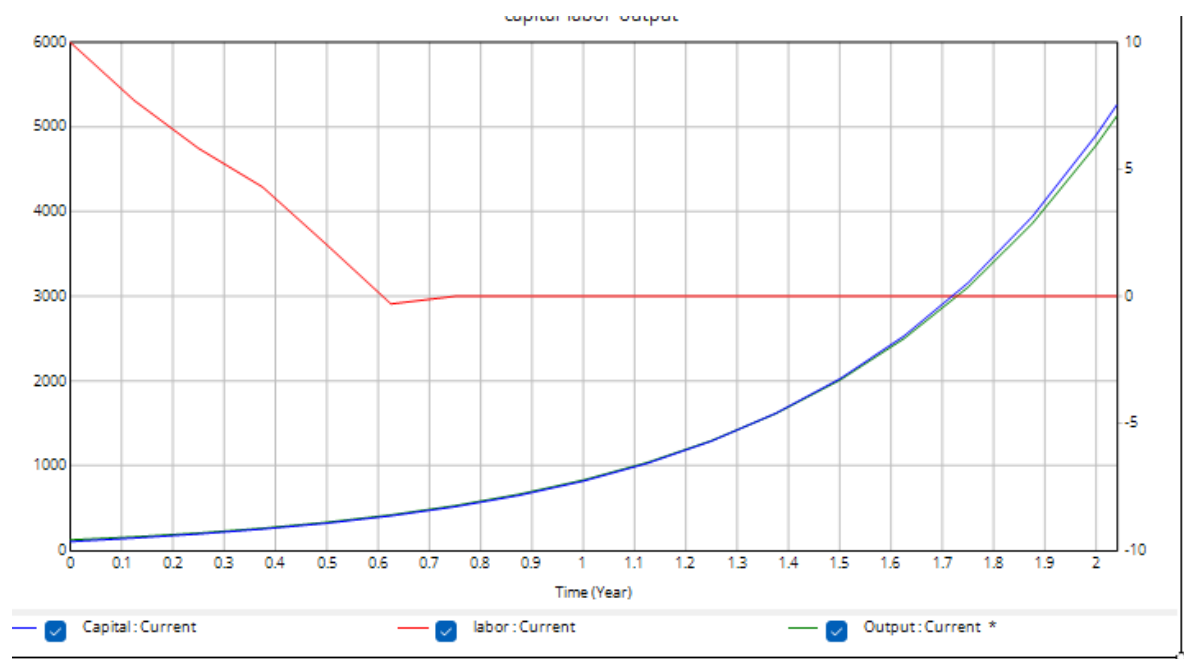


Fig 18.4 Capital – Labor-Output

In fig 18.4 The factor labor is declining due to the combined effect of the Invisible Robot and the negative Net Automation Effect. However, Capital and Output are increasing.

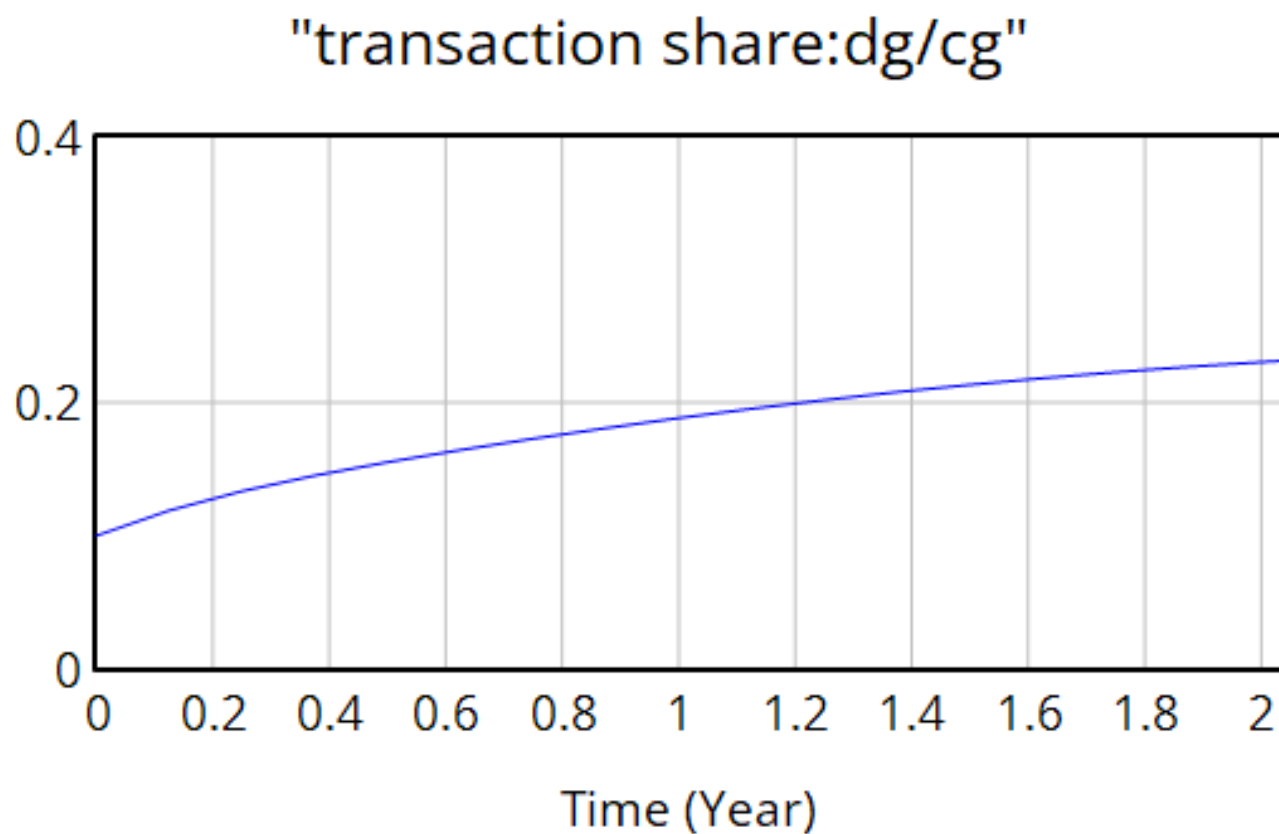


Fig 18.5 Share of Digital and Capital

The share of digital is augmenting over the time proving that in the very long the society will be significantly automated. This result is represented by the results shown in the fig 18.5.

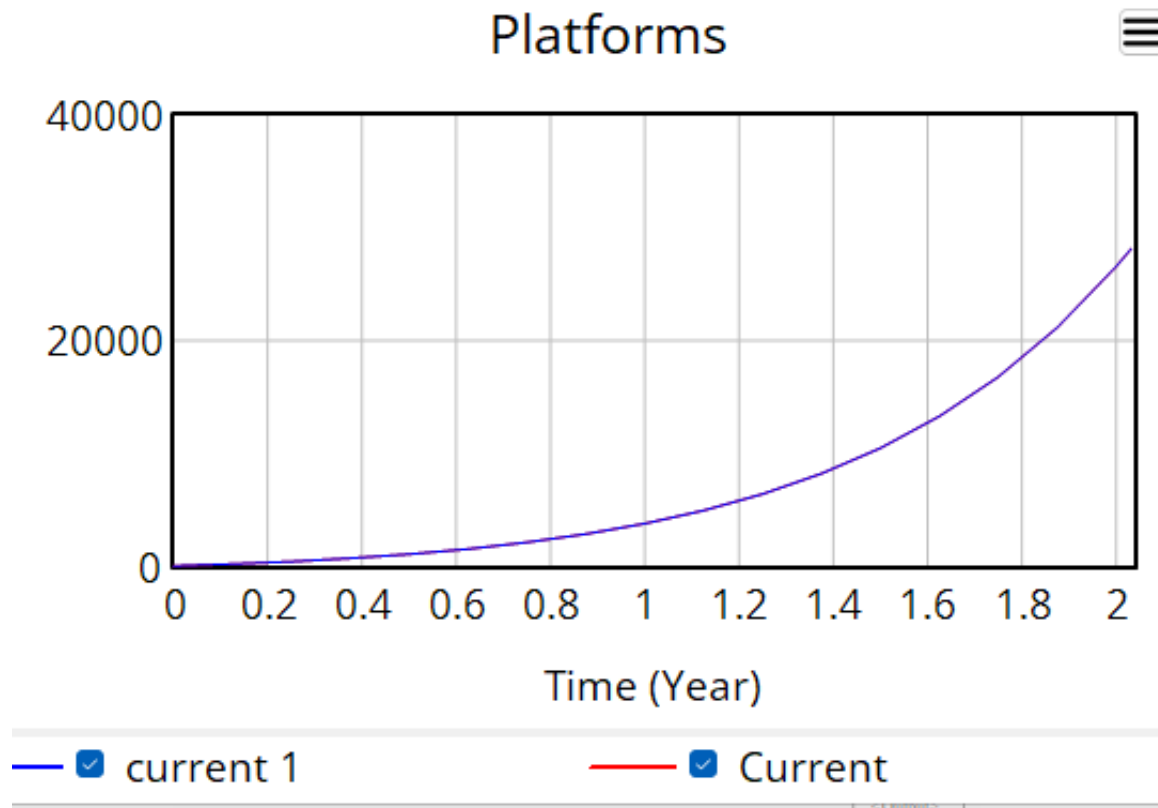


Fig 18.6 Platforms economy evolution

The Platform economy is supposed to increase in the long run. This could be observed in the Fig 18.6.

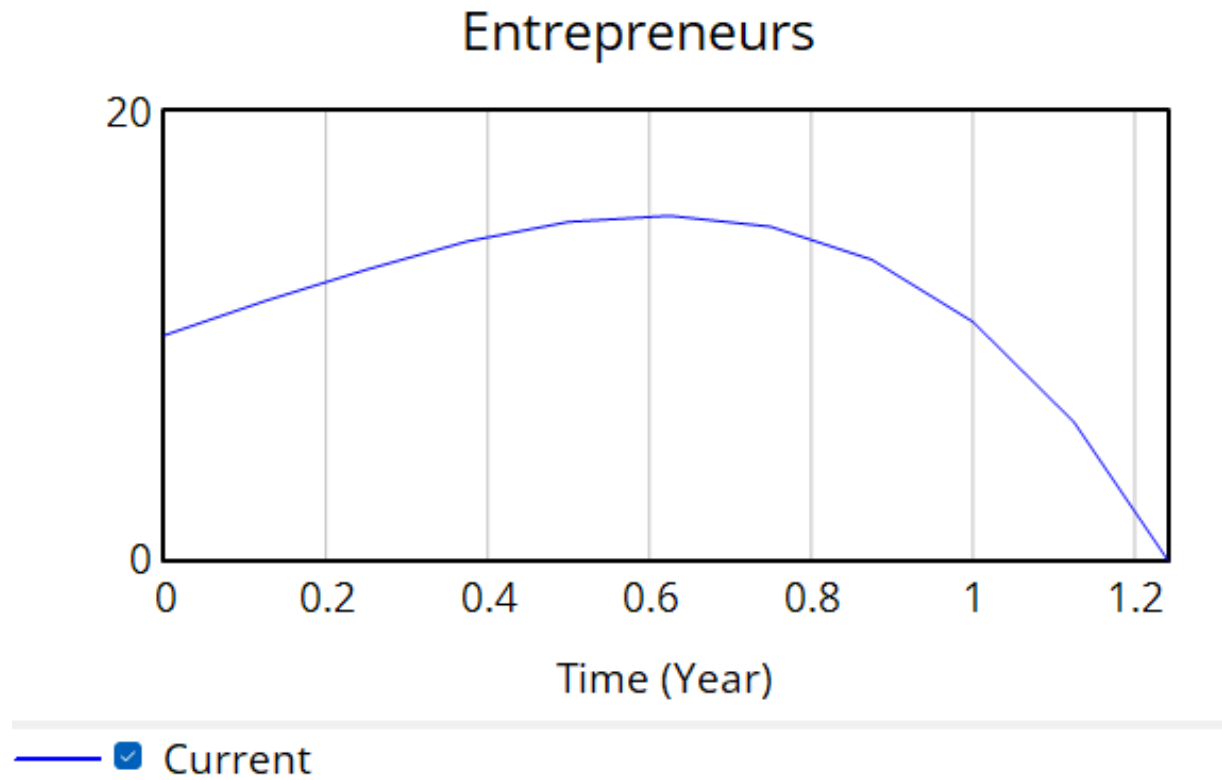


Fig 18.7 Behavior of the Entrepreneurs

As we noticed it in our analysis, the increase of the effect of the Invisible Robot will impact negatively the number of entrepreneurs in the economy. This situation is described in fig 18.7.

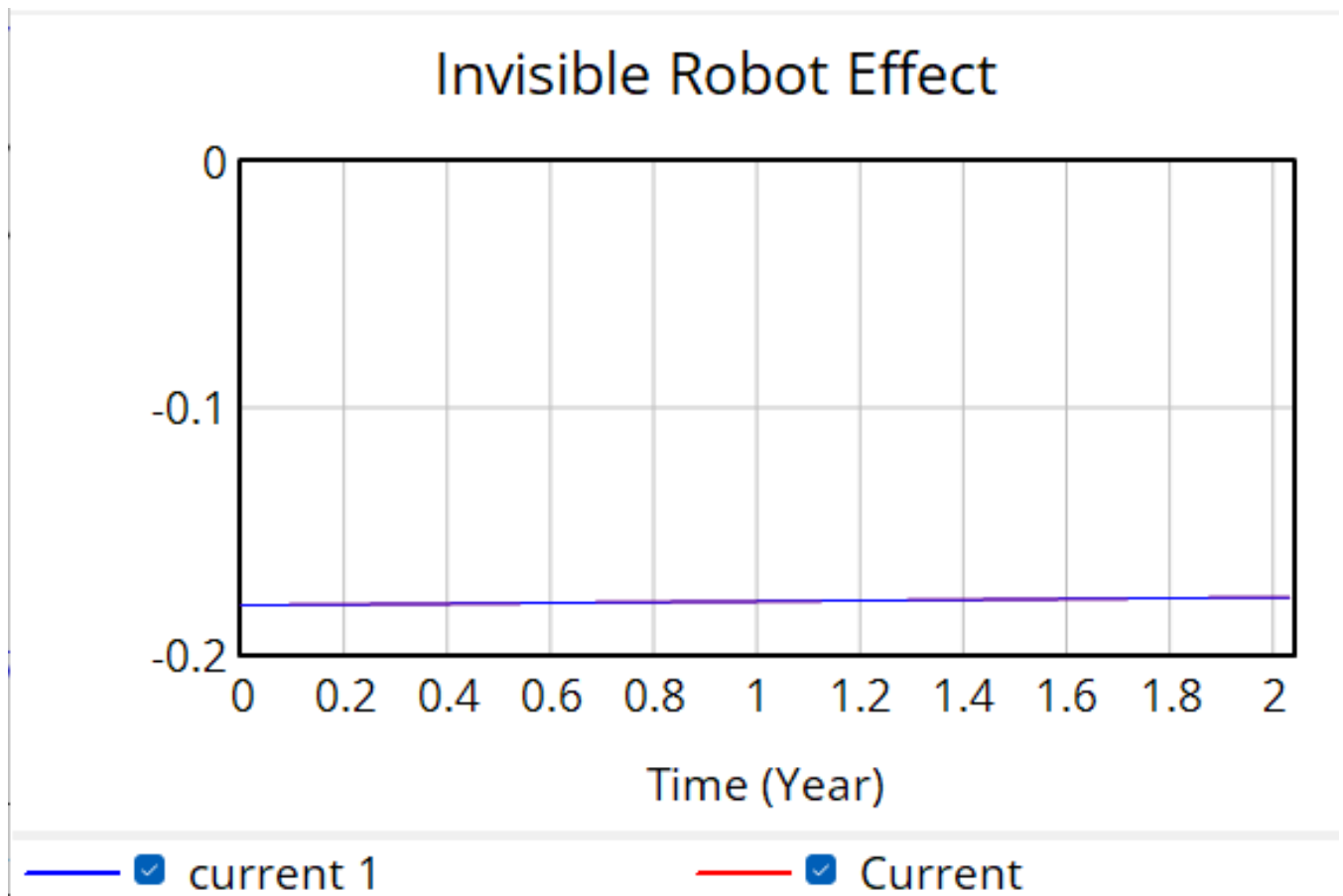


Fig 18.8 Evolution of the Invisible Robot effect.

As the technological change is significant with a Net Automation effect negative, the Invisible Robot will have an increasing effect all over the time (See fig 18.8).

6-Growth analysis with exogenous influence coefficient

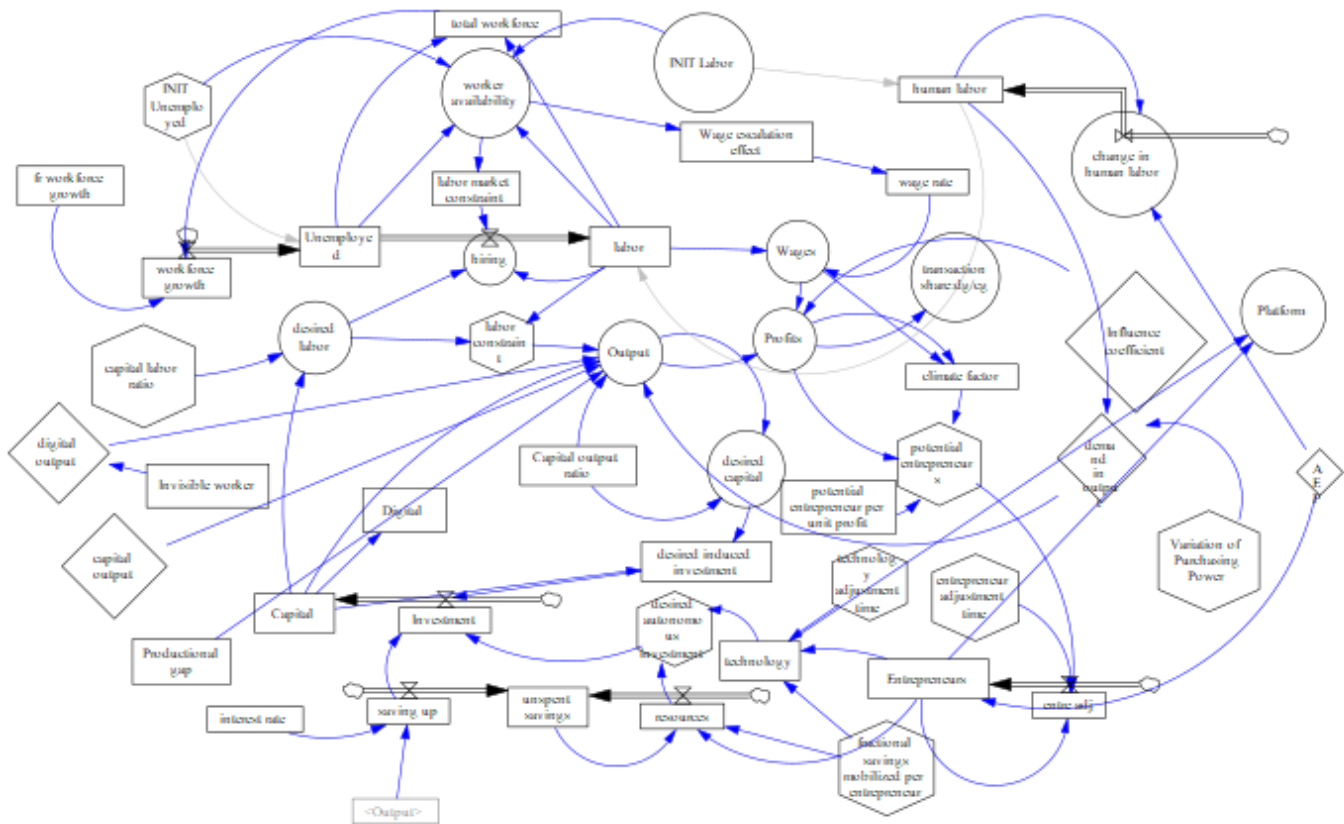


Fig 18.9 Growth with exogenous Influence Coefficient

In this section, we choose a random value for the Influence coefficient and the Untechnical rate of Influence. We added to the previous model those two factors to observe the behavior of different agents in this new situation. The formula associated with the model shown in fig 18.9 are in the appendix II.

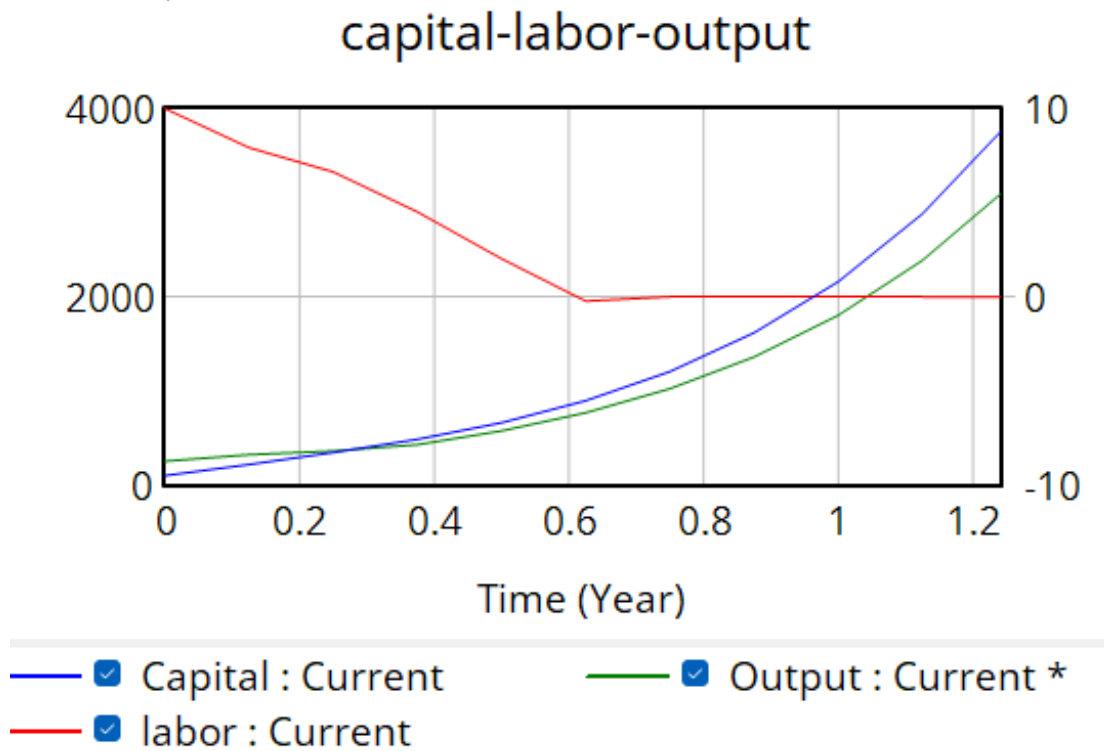


Fig 18.10 Capital-Labor-Output with Influence Coefficient.

The fig 18.10 reveals how both capital and output are still increasing but labor is decreasing. Besides, it could be observed that the Capital is increasing in proportion more than the Output. This is explained by the fact that the coefficient of Influence has a boosting effect.

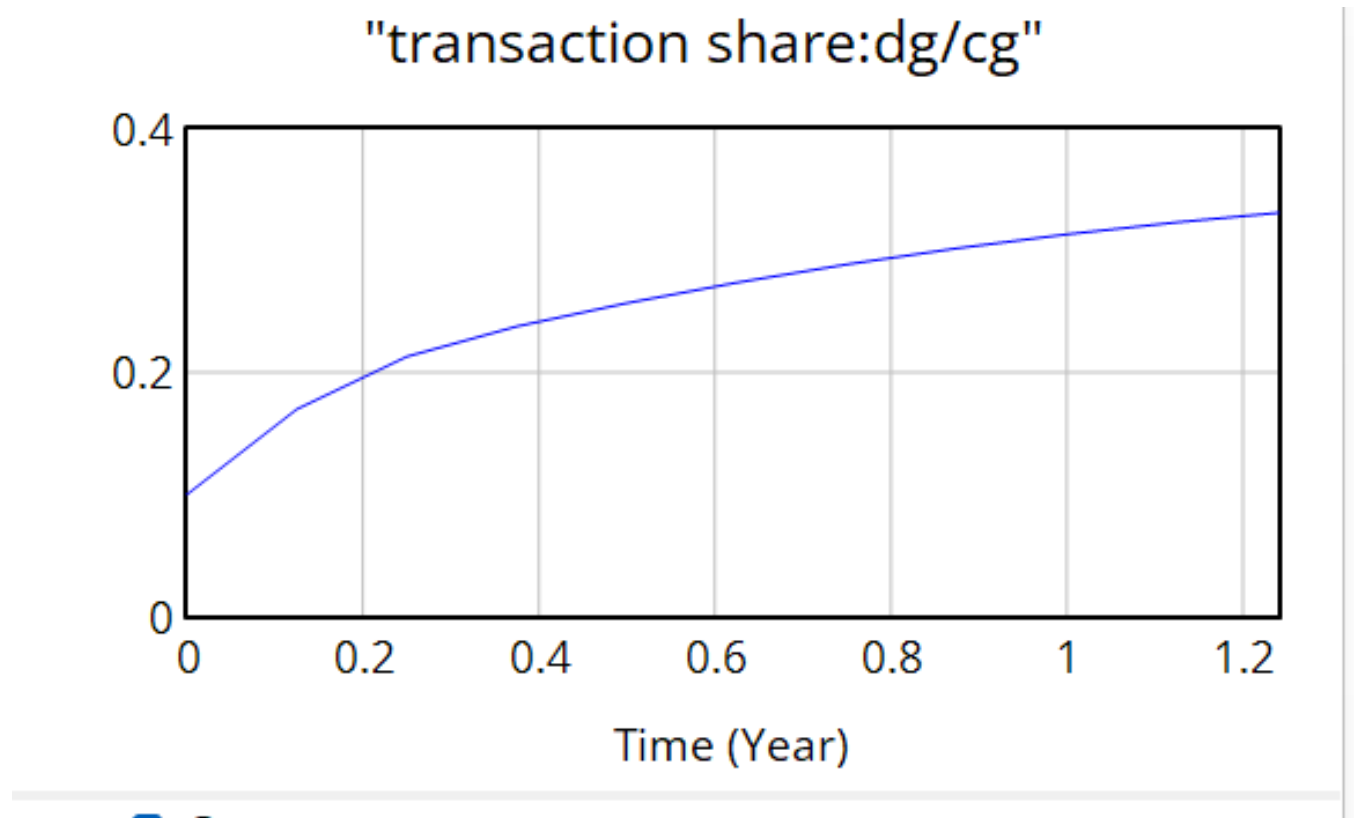


Fig 18.11 Transaction share with Influence coefficient

The share of transaction of digital activities over capital activities is growing with the introduction of the Influence coefficient in fig 18.11. This progression is significant compared to the one without the intervention of the coefficient.

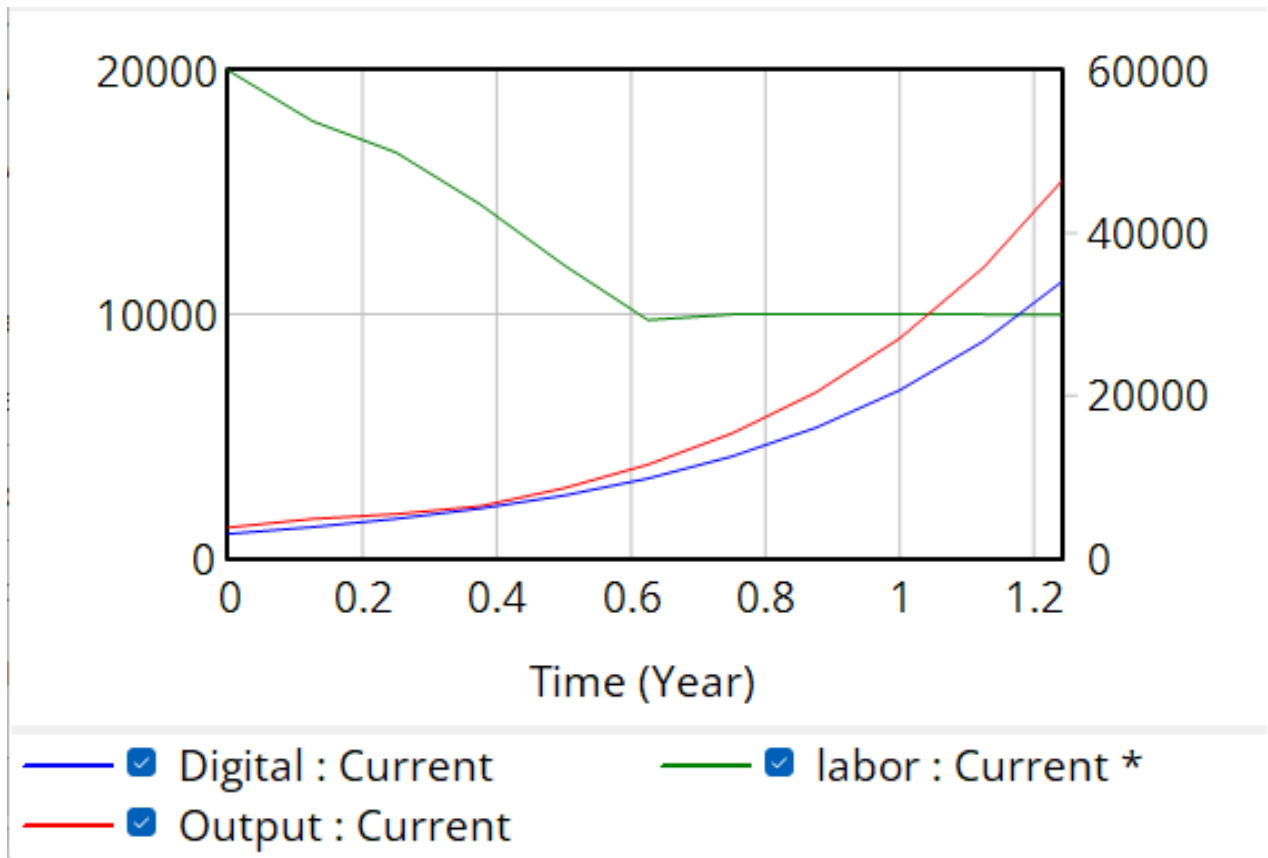


Fig 18.12 Digital-labor-Output with Influence coefficient

Results showing both digital and output increase with the introduction of the influence coefficient are represented by fig 18.12. The factor labor decrease considerably for a period and remain almost constant in the long run.

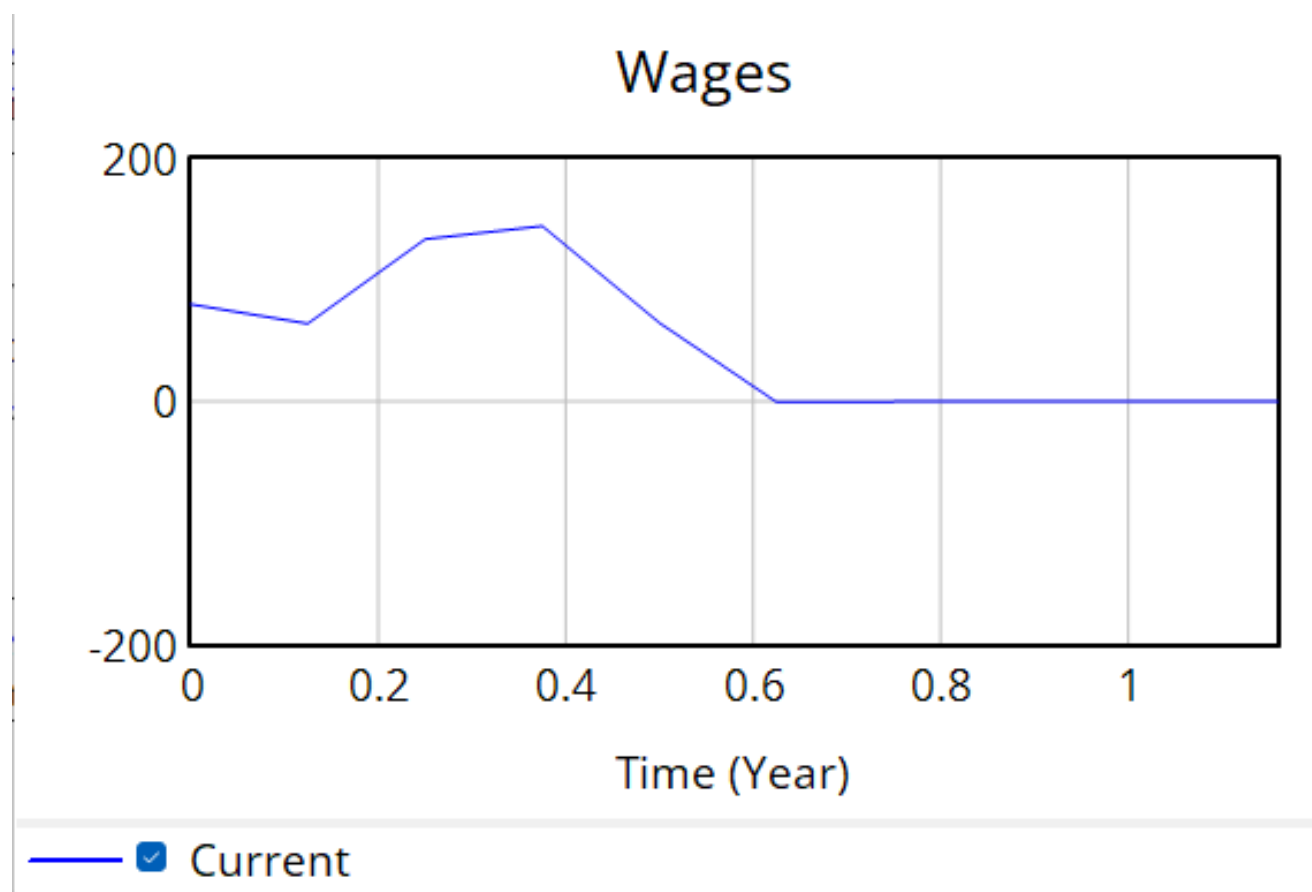


Fig 18.13 Wages with influence coefficients

The effect of the Invisible Robot has led to the decrease of wages following the reduction of the labor force. This situation is described by the curve in fig 18.13.

Chapter 19- Implications economy of digital economics

1-Towards the Technobloc

1-Definition

“In summary a Technobloc situation refers to a point where the introduction of technological factors reaches its maximum. Passing this point provoke incontrollable effect that annihilate the positive effect expected form the implementation of the technology.

(Viwanou Aloumon, 2024).

“Analyzing the introduction of automated system while envisioning its Technobloc point help us to calibrate the impact of the implementation of any technology. In economy the term Technobloc could be helpful in preventing societies to be confronted to situation similar to the one of Automa City. Seeking economic progress is good but working for the goodness of population is vital.

The Technobloc point could be compared to an extreme situation in economy that is called the liquidity trap. Everybody knows that it is an unrealistic situation but every macroeconomic analyst make decisions while taking in account this situation.

The acknowledgment of the fictive existence of the Technobloc point could also allow economist to perform insightful analysis. Because whether it is the view point of the optimist or the alarmist, the acknowledgement of the Technobloc point give us a consistent focal point that should retain our attention. Therefore it gives us the opportunity to ask ourselves what kind of choice we are making any time we opt for technological improvements.

Far to remain only a basic focal point, that will entice our attention, the acknowledgement of the Technobloc point is also a living alert that should be sent to every

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economic decider and remind us about the necessity of maintaining an anthropocentric view of the world.”

2- Origin of Technobloc

The origin of the phenomenon of Technobloc is the excessive evolution of the technology process. When we refer to the story of Automa the population stop working because everything they have to do is done by the automation system set up by their ancestors. This phenomenon is called by excessive automation. This term was discussed by Acemoglu and Restrepo in their article “Artificial Intelligence, automation and work”. According to their words

“A more critical, and in this context more novel, factor is a potential mismatch between technology and skills—between the requirements of new technologies and tasks and the skills of the workforce. We show that such a mismatch slows down the adjustment of labor demand, contributes to inequality, and also reduces the productivity gains from both automation and the introduction of new tasks (because it makes the complementary skills necessary for the operation of new tasks and technologies more scarce). Yet another major factor to be taken into account is the possibility of excessive automation. We highlight that a variety of factors (ranging from a bias in favor of capital in the tax code to labor market imperfections create a wedge between the wage and the opportunity cost of labor) and will push toward socially excessive automation, which not only generates a direct inefficiency, but also acts as a drag on productivity growth. Excessive automation could potentially explain why, despite the enthusiastic adoption of new robotics and AI technologies, productivity growth has been disappointing over the last several decades. ” (Acemoglu & Restrepo, 2018).

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To them the implementation of an automation process should respect a certain rule, in case there is no limitation to the process the automation become detrimental for the production. And in the worst scenario, the load of the damage created lay completely on the fragile layer of the society which is the worker.

“At the center of these is a tendency for excessive automation because of the tax treatment of capital investments and labor market imperfections. Excessive automation directly reduces productivity, but may have even more powerful indirect effects because it redirects technological improvements away from productivity-enhancing activities that lead to the creation of new tasks to excessive efforts at the extensive margin of automation, a picture that receives informal support from the current singular focus on AI and deep learning” (Acemoglu & Restrepo, 2018).

This phenomenon of excessive is developing and should entice our attention. Actually, Entrepreneurs prefer hire robots than introducing human labor in the production process. This had seduced the attention of many researchers that had started to study the impact of an increase of this phenomenon on the whole economy.

“Using several sources, we construct a data set of robot purchases by French manufacturing firms and study the firm-level implications of robot adoption. Out of 55,390 firms in our sample, 598 have adopted robots between 2010 and 2015, but these firms account for 20% of manufacturing employment and value added. Consistent with theory, robot adopters experience significant declines in labor share and the share of production workers in employment, and increases in value added and productivity. They expand their overall employment as well. However, this expansion comes at the expense of their competitors (as

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automation reduces their relative costs). We show that the overall impact of robot adoption on industry employment is negative. We further document that the impact of robots on overall labor share is greater than their firm-level effects because robot adopters are larger and grow faster than their competitors.”(Acemoglu et al., 2020)

No matter the outcome of the results that might be obtained, the main point to be aware of is that this situation could lead to the one that occurred in Automa City(V Aloumon, 2024).”

what is effective production from effective demand and effective supply

why is this notion important

Keynes as father of the term

where this term is valuable developed economy

when is this term start when production is developed and people are needy. In Africa for instance all production are effective

effective production and influence coefficient

because in digital economy the quantity of good produced is illimited cap theorem

In case of surproduction the knowledge of the effective production is required

3- How: entropy law

“The entropy is a term used in thermodynamics. Please, do not be afraid if we are bringing you through that area. The reason is that thermodynamics is really necessary to understand many scientific phenomenon in science. Starting from the main area physics, the thermodynamic principle give explanations to certain principles chemistry, engineering, biology, zoology, finance and economics. This term is founded by the physicist Rudolph Clavius²⁶ when he was working on a problem concerning efficiency in steam engines and started to name the measurement of useless energy enable to be converted in positive work. The entropy becomes the second law of thermodynamics. As the description of the phenomenon reveals it itself the term entropy is confusing. John Von Neuman a Hungarian mathematician asserted that anyone who uses the word entropy in a discussion always is a winner for no one knows what entropy is about, and this situation provide an advantage(Shields, 1970).

Thermodynamic entropy is a measure of the disorder in a closed system. According to the second law, when entropy increases, internal energy usually rises as well. If it isn't harnessed somehow, that thermal energy gets dispersed. Because the measure of entropy is based on probabilities, it is, of course, possible for the entropy to decrease in a system on occasion, but that's statistically very unlikely(Shields, 1970).

In economics, the thermodynamic problem subsists in the sense that an economic system could be compared to a closed system as it could be described by the

²⁶ Randolph Clavius is a mathematician and german physicist who invented the term entropy

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Keynesian economic circus (Keynes, 1936). All the forces interacting with each other provoke an internal energy that generate the economic surplus.

“An unorthodox economist-such as myself- would say that what goes into the economic process represents valuable natural resources and what is thrown out of it is valueless waste. But this qualitative difference is confirmed, albeit in different terms, by a particular (and peculiar) branch of physics known as thermodynamics. From the viewpoint of thermodynamics, matter-energy enters the economic process in a state of low entropy and comes out of it in a state of high entropy.

To explain in detail what entropy means is not a simple task. The notion is so involved that, to trust an authority on thermodynamics, it is “not easy to understood even by physicists,” ... ” (Georgescu-Roegen, 2011)

According to Georgescu all the resources used in economy to satisfy the needs required enter the system in form of low entropy and the mechanism of production following the thermodynamic law rejects the input in form of a high entropy. For example, for the production of cars the car industry will absorb low entropy inputs like labor, capital, steel, electronic inputs, synthetic rubber that will be turn into high entropy output which is the car. The problem in fact dwells in the possibility to find the raw materials in order to keep the production running. Thus comes, the scarcity of resources facing the unlimited nature of our need. According to Malthus, population growth need to be monitored to match the evolution of the economy process(Malthus, 1798). And this exactly because resources available for production are not illimited or if they are their exploitation involved processes that in turn will

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need resources which in turn are not illimited. For example, wind energy is supposed to be a renewable energy in the sense that this energy is illimited. But the problem is the turbine used to produce the electricity first have a life time of 30 years maximum and the material used to make the turbine are limited and hard to find. Finally it appears inderectly that the wind energy is a limited resource not so renewable as it might be perceived.

Many economic models has thrived to propose a lot of solutions to counter the issue of resource limitation. They tried to find how to assure growth instead of the scarcity of resources while neoclassicals simply ignored the principle(Saeed, 2021).

Neoclassical economics seems to have ignored the concept of physical limits to growth by assuming that the market and the technological advances invoked by it will make it possible to tap new resources and create substitution of production factors, while it has outright excluded limitations invoked by the political, psychological and social institutions in its analyses. Classical economics, on the other hand, appears to have been cognizant of a multitude of limitations to growth, including demographic, environmental, and social.(Saeed, 2021).

The analysis of both limitation of resource and the entropy in economics urges us to know how to manage our process of automation. Because the level of automation defines the force of entropy that transforms the low entropy input to the high entropy output. Let's take an example of a pile of 20 bricks that need to be move from point A to point B. 3 drivers show up to do the job. The first had a sport car, the second had a sedan and the last has a truck (SUV). The first driver will do the work in 3hours because he needs to make 3 trips. The second 2 hours because he needs two trips and the truck owner in one hour. The result is to move the bricks to

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point B and this constitute the high entropy output. However, the SUV is a automation protest that had a higher level of entropy force than the other car. In the case, where there is only one driver that is paid per hour, he will use the sport car and get more money. But in case he has a time constraint, he will use the SUV.

Far from completely embracing a Malthusians ideology, the point made is that there is a necessity to calibrate our automation process and not let events impulse its evolution. What some authors will qualify by doing automation on our own way(Dellot & Balaram, 2018). From the example of Automa, it could be learnt that the more people are using automated systems the lesser happy they are because they are developing a huge force of entropy to ruin resources of all kind faster. If it seems that we have not too much to invent, it is because there is a shrinking of metaphysical resources, which could be used as low entropy and transformed to high entropy due to technological evolution. Here comes the issues of entrepreneurship. Entrepreneur comes from the entrepreneurial function which measures the quantity of entrepreneurs generated by a society. This function contain the exogenous elements such as capital (in term of labor remuneration), the time available of people to stay on work (that is transform in knowledge), and the need generated by the society where they leave. Entropy generates to the society surplus in term of physical good or money and metaphysical or intangible asset that constitute the joint wealth of knowledge. Excessive automation destroys the metaphysic asset and decrease the entrepreneurial function. “

4- Microeconomic condition of Technobloc

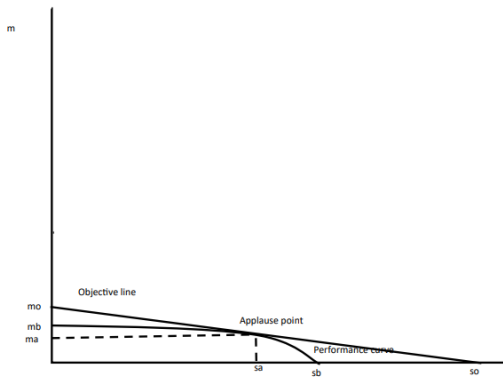


Fig 4.8 Equilibrium in AI age

Referring to our professor-student relationship the capacity of digitalization is superior to the one of human being, The AI systems become the professor and human being the student. Because we laterally augment the capabilities of the AI systems.

$Mo < So$ because of the Horse paradigm. human capacity is less developed than automation type and shape of Objective line is the variation of $NAE <)$ and $C2/C1 < 1$

We showed that the variation in NAE is similar to the variation in capacity of digitalization structures. For this reason, we assumed that the NAE be considered to the evolution of the acquisition of technical equipment. It had been possible to prove that Digitization is a labor displacing automation technology. If the process endures, in the long run the performance curve will be confounded with the axis of technology creating a multiple of Technobloc points.

5- Macroeconomic conditions of the Technobloc

Meanwhile the materialization of the term with economic principles allowed us to define 4 major ineluctable conditions that could prompt the Technobloc”.

- 1- The matrix of technological coefficient of Leontief is not Inversible*
- 2- The velocity of the money is equal to zero.*
- 3- The factor human Labor has the value of zero*
- 4- In the long term the value of the capital will decrease to zero*

6 -Limitation of Technobloc in digital economy

“One thing that is extraordinary on huma is his survival instinct. When human is pushed in a corner where his life is in jeopardized he becomes different. This ability may push us to recreate a comparative advantage over machine (creation by human). Swimming is an example that reflects the potentialities of human. It is proven that the fastest way to make people know how to swim is to dive them in the water. For fear to sink under water, the person tries all his best to apply the lessons that was given to him faster. Another way to acknowledged the immense potentiality of human is language. When people are in a community for a certain period they could start speaking the language of this community even if they did not know any word of this language before. The only reason is that they need to communicate to survive. For this same reason the best way to know a language is to travel to the country where this language is spoken.

When our life is threatened what we do is to focus our energy on what essentially matters. This focalization of the energy is so powerful that it allows us to get through unimaginable situations. This is what justifies the success of poor children over the ones who grew in wonderful conditions. It is the horse paradigm which is triggered by our reflection system: the more you think for a situation, the more you develop your propensity to think about this situation.

Our hope is that people will one day react of the situation of Technobloc and this will boost our energy to find solutions that will help us sustain a life with tremendous world of technology. Or maybe something that we do not know yet will happen and make the development of technology an ineluctable tool. “

7-Opportunity of the technobloc in digital economy

“The analysis of the Technobloc issue give us chance to know the theory of performance, thus we can determine our limits and watch the future while observing a production process. This was not possible before because taking example of previous civilization their objective is to accumulate wealth without any pertained condition.

It is also important to notice that having a limit to consumption is part of the production process. An unlimited consumption could create unbalance in the production process. Production growth dwells the origin of conquests of great emperors of antiquity. Finding market for products were the absolute aim pursued by merchants centuries ago when they had production surplus. And they could not be conscious that the generation of those surplus could be disadvantageous. One fact is clear, is that they are so happy to generate those

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surpluses such that they could not be aware of the consequences pertained to it. They are not aware of the importance of performance curve. However, is not too late, and if even it seems to be late, it is better late than ever.

Avoiding the situation of the Technobloc could help avoiding the butterfly effect of technology and preserve our cultures. It also leads us every time, to know our capacity. Even if it is true, for the sake of humility to always stay in a the socratic paradox by saying that, “everything I know is that I know nothing” that gives us a valid argument to always know something and remain confident with the logic of Delphi temple maxim, “gnothi seauton” which means know thyself”.

2. From economy of market to the economy of warehouse

1- From market to Warehouse

Market is the place where people used to buy and sell products. But in developed countries, it is very rare to see those places where thousands of people are gathered to do business. There might be replaced by huge business centers, but they are not busy as the ones that are in developing country. Is that mean that all those people vanished. In India we have market, in Africa we have market, so where are the market people in developed country?

The reason is with the digital economy, people do not buy items in a walk-in store. They prefer to buy everything in virtual store. They would like to buy everything online. Online store replaced physical store. All the market in digital economy became online markets.

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Even black market is turned into online market. For example, we have Amazon market, Facebook market, Offer up, eBay.....

If there is one question that still needs to be asked is to wonder how the capital goods traded on the online market could be transferred from the seller to the buyer. The answer is that two main actors will start to resolve this enigma. The warehouses and the delivery companies. The network constituted by both the warehouses and the delivery companies will lead us to the concept of warehouse economy. Some articles tried to point out how the warehouse economy devoured the us market. According to one of them,

“Thanks to the pandemic-driven boom in online shopping, the country's fulfillment and distribution centers continued to staff up at a furious pace. Today they employ 1.8 million Americans — up 37% since January 2020 and up 183% from January 2010. Month after month, for years on end, warehouses have been sucking up workers like an industrial size vacuum, reaching into every nook and cranny of the low-wage job market to Hoover up more bodies. In the process, the warehouse boom has transformed the US economy, altering everything from wages and workplace safety to consumer prices and the supply chain. It all happened so fast, we never got a chance to ask the most fundamental question: Is the sudden and dramatic shift to warehouse work a good thing? Has the explosion in warehouse jobs, taken as a whole, left us better off than before?”(Ito, 2022,)

The warehouse economy involved platforms and distribution centers and the success of this economy dragged companies that have different business model to adopt the business model associated with it. For example, Walmart or Target that started before activities

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with physical store businesses model are now connected to the warehouse economy. The benefit of this economy is that it allows the realization of economy of scale and economy of scope giving a margin of profitability consistent with the system of digitalistic mode of production.

The economy of warehouse is a complex combination of software, operating system, routine task workers (Picker, Stower, Inventory Controller), managers, drivers and so on. The birth of the warehouse economy had modified the way work could be organized. As it does happen, it has provoked the boom of the trucking economy, the evolution of delivery systems and the shrink in banking personnel.

2-Impact of digitalization on the warehouse economy

The digitalization had significantly impacted the warehouse economy. The existence of the Internet of things had dramatically affected the physical stores. The ability for people to order products that they desire wherever they are had turn the desire to go to a physical store as an act of pleasure or enjoyment more than a necessity. Hortaçsu & Syverson declared in one of their article that

“The past 15–20 years have seen substantial and visible changes in the way US retail business is conducted, with many formerly dominant companies and formats in the sector—for example, Sears, Radio Shack, JCPenney, Circuit City, and a number of shopping malls—struggling to adjust and sometimes suffering fatal blows. Some parts of retail, like traditional department stores

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as well as book and music stores, have seen large declines in sales and employment” (Hortaçsu & Syverson, 2015).

The digital economy with the advantages that it offers to households had completely modified their social behavior. As purchasing behavior had changed, retail stores need to adjust their business model to the preferences of their customers. This faculty of retail store to adapt their market strategy to the buyers behavior is called market driven strategy(Cravens & Piercy, 2006).When behavior on the market changes, strategy adopted by the suppliers should follow. For this reason, the effect of digital economy had compelled traditional stores to go digital. According to the previous sources,

“Explanations about what is happening in the retail sector have been dominated by two powerful and not fully consistent narratives: a prediction that retail sales will migrate online, and physical retail will be virtually extinguished, and a prediction that future shoppers will almost all be heading to giant physical stores like warehouse clubs and supercenters. Online e-commerce in retail has been a cultural phenomenon and target of substantial attention in the business and technology media since the late 1990s; many of the most famous “dotcom” busts of the late 1990s were e-retailers. E-commerce has doubtlessly affected important elements of technology, demand, and market structure in the retail sector”.(Hortaçsu & Syverson, 2015)

3 -Stakeholders of warehouse economy

Three important entities are participating in this new type of economy : the Delivery companies, the Platforms and the warehouses. This is almost the same schema that is shared for the ride share system and the food delivery system except the fact that the warehouses are replaced by the restaurant for the food delivery system and by pickup location for rideshare companies.

Concerning the delivery system the role of the trucking system (Helwing et al.) and the mailing system in this type of economy are very significant. This had seen the increase in number of truck drivers during the recent years.

The second group that constitute the Platforms is the main point of the economy but do not use an important number of workers. Platforms as principal components of the warehouse economy play also a prominent role in gigeconomy. The gigeconomy represents the main labor force of the Platforms. Platforms are virtual market that replaced the physical market places.

The third group involved in the warehouse economy is the Warehouses. They employ a huge number of workers. In fact, the thousand of people we used to see in the markets before the evolution of the computer science, are gathered in the warehouses. The vast majority of them are pickers, packers, stowers, Inventory controllers.... The warehouses are equipped with consistent software systems that connect them with the Platforms, the delivery companies and manage the huge number of workers that sustain its operability.

4- Definition of warehouse economy

In simple words the warehouse economy is the economy activity that interconnect the Warehouses, the Platforms and the Delivery Companies.

The warehouse economy is part of the digital economy, this is the reason why it is studied in this book. However, it could be considered also as a connector of two types of economy: platform economy and trucking economy.

5 -Functioning of a warehouse economy

The analysis of the functioning of the warehouse economy consists of following the circulation of a product in this economy. This analysis is required because the change of the path of a capital good was at the origin of the surge of this new type of economy. This also created a new job such as pickers, stowers and packers in the organizational system of warehouses. According to some sources,

“While salespersons’ jobs in brick-and-mortar shops are under even more economic pressure than beforeemployment is increasing in warehouses and delivery logisticswarehouse work, which takes place in ‘pure’ online retail firms and in ‘hybrid’ retailers that operate warehouses for online retail in addition to their brick-and-mortar shops. In ‘pure online’ and in ‘hybrid’ retail, warehouse work generally means that workers stow,pick and pack the goods and prepare them for sending” (Fuchs et al., 2023)

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The travel of a product starts when a customer completes an online transaction in order to obtain the good. As soon as the good is subjected to be delivered to the customer, the Platform in relation with the warehouse send the order to the warehouse facility. The facility sends the order to the picker who find the order in the ware house and give it to the packer. The packed make sure that the good is ready for delivery and let the facility know that the order is ready. The facility contacts the delivery company and let it know that the order is ready to be shipped. The delivery company take the order and delivers it to the customer. All this circuit, travelled by the product is done in a such small span of time due to the development of the digitalized structure. Starting from the digitalization of the payment transaction to the mean of guiding the circulation of the product, the warehouse economy depicts the level of expansion of the digital economy.

The role of the stower is about to be connected to the aspect of oversynchronosity of the digital economy. In fact, stowers, received products send to the warehouses and stow them in a small physical location called bins. But the trick is that product sent to a facility, are sent there because Artificial Intelligence systems knew that in the particular location of the warehouse people will need this type of product. Therefore, the over synchronization plays in this sense that the product is in the facility before the customer order it online. This fastens the delivery system as soon as the customer order a product online.

Now with the evolution of the robotics, warehouses are looking for a way to kick those people out of the warehouses. This because it will be easier for warehouse owner to control and manage Robots than dealing with the exigences of workers. The question is what all those people are going to do? The future will tell.

6- History of the warehouse economy

The history of the warehouse economy started with the development of the Internet. The first forms of the warehouse economy could be the advent of the dot.com before the bug of 2000. According to some articles,

“Online retail (e-commerce) has spread significantly since the beginning of the twenty-first century. It is a new business model that is generating radical changes in employment in the retail sector” (Fuchs et al., 2023)

But the covid 19 crisis had prompted the increase of the warehouse economy (fig 19.1). The possibility offered to, people stuck at home, was unbelievable. They just needed to stay in their couches and see what they want showing in up a time later at their door.

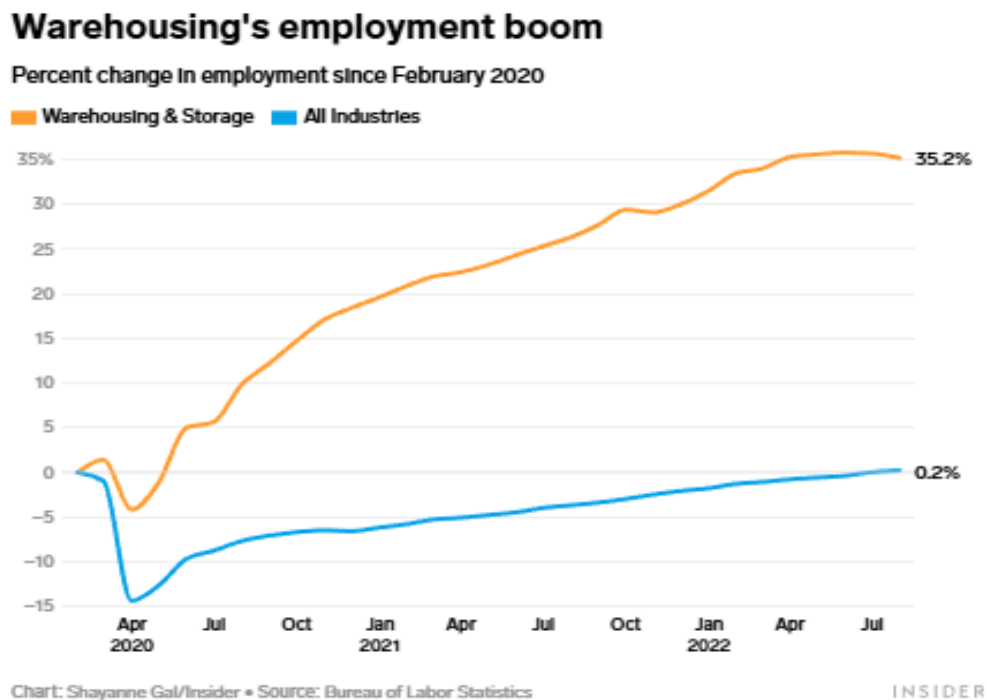


Fig 19.1 Increase of warehouse workers.

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7- Areas of warehouse economy growth

The warehouse economy is more applicable in developed countries. This because it is an essential part of the digital economy even though it is more concerned about capital goods. The warehouse economy is more important in an area only if the structure of sustainability of a digital economy are properly set up. In other words, areas that do not have capability to develop systems of digital economic operability could not afford this type of economy. According to study realized in one of the developed countries,

“The modern retail store is a complex coded assemblage and data- intensive environment, its operations and management mediated by a number of interlinked big data systems. This paper draws on an ethnography of a retail store in Ireland to examine how these systems modulate the functioning of the store and working practices of employees” (Evans & Kitchin, 2018)

8- Example of warehouse economy

One of the first example that is always provided in the retail store industry is Amazon. As a leading company in this type of business model, Amazon has developed many strategies of warehouse economy that had helped to promote the company.

Another company associated with the warehouse economy is Alibaba. One of the giants of the online retail company, Alibaba had proved that digital economy could insure a rapid progress of a business model based on digitalization.

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Walmart is a brick-and-mortar company that had understand the importance to turn into an online store. It had huge warehouses that follow the same pattern of activity described for companies involved in warehouse economy.

Chapter 20- Development comparison by purchasing power

1-Thales theorem and the myth of the long run inflation

Definition of Thales theorem

The Thales theorem says that for five point ABCDE if we have

$$\frac{AB}{AC} = \frac{AE}{AD} = k$$

Thus, lines (BE) and (CD) are parallel and the figure ABE and ACD have same form (See fig 20.1).

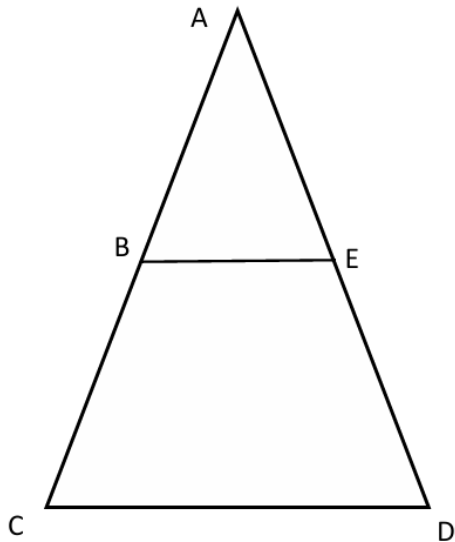


Fig 20.1 Parallel lines

The advantage of this theorem in mathematics is that the theorem helps detect the form of two objects if we know the distance that separates the edges of those objects. Another application of the Thales theorem is that it is helpful to make projection. If we know a form of an object we can project its form on a surface and be able to compute its size on the surface where it is projected. One natural explanation of the theorem is shadow. When you take the shadow of an object over the real size of the object, they are proportional. It is this proportionality that proves that the shadow belongs to the object. For example, if the object has a head and a body, the size of the object's body over the size of its shadow's body is the same as the size of the object's head over the size of its shadow's head.

2-From space analysis to time analysis

Our objective is to use the properties of Thales theorem to make comparison and projection in economics. The idea is to find a proportionality quotient that will reflect the same form of life standard of a society from an area to another or from a specific time to another. This comparison will not be related to the size of the country.

In the first viewpoint, the applicability of the Thales theorem will be useful while making space analysis. The main simple reason is that the theorem is studied in geometry by high school and elementary students, in mathematics. Space in economics could be compared to countries. Distances will be considered as quantity or amount, such as quantity of production or amount of sale.

But the second objective of using the theorem is to make comparison of two type of economy related to different time. This time projection will help compare people's society from a previous time to a present time and being able to know if the life standard had improved

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or decreased or simply set indicators to a certain level so that future generation may leave a current life standard.

3- No need to use multiple norms to determine the level of development of countries

Having a standard norm to compare level of development of countries is different. The advantage of standard instrument is useful because it is difficult to compare countries using macroeconomic aggregates such as GDP, or export of goods,.....The problem is that countries have high GDP but people in those countries are suffering. Or countries have high level of production but the life standard of the citizens is very low.

Sometimes, nature of infrastructures are used to compare rich and poor country but the error doing so is that having an important infrastructure does not imply that people are enjoying them.

The reason why those arguments are made is because of the advent of digital economy. This problem is crucial with digitalization because production could be high, but it is a matter to ask if it is people who are working or robots or worse the Invisible Robot.

Besides, the growing trend of the world toward a gigaconomy where governments are users according to fig 15.2, macroeconomic aggregates may be less welcomed to assure proper comparison between countries.

4-Maslow in the digital era

Finding a proper anthropocentric way to compare countries, lead us to take in account the theory of Maslow. This choice was made to our analysis according to the fig 18.1. the analysis of growth in digital era had given us the opportunity to reassess the five level of self-actualization that could be classified in three other different categories such as basic needs (physiological need and safety need), psychological needs (esteem need, belonging and love need) and self-fulfillment need (self-actualization). It this new assessment that allowed us to realize that, the first category of needs correspond to the mercantilist mode of production, the second psychological needs correspond to the capitalist mode of production and the self-actualization stage correspond to the digitalist mode of production (See table 18.10).

As noticed in chapter 18, self-actualization, could be considered as research of influence. The more you move from lower level of Maslow pyramid the more you have influence. Using the Maslow theory to make comparison among countries will show which country have more influence than the other.

This comparison of influence level between countries correspond to our observation of the digital economic behavior of the digital era where the notion of influence has an important value.

5-Pyramid of purchasing power

Our objective is how to combine theory and theorem. In other words, the goal is to use the property of Thales theorem and the theory of Maslow together to make a projection.

First, the need of a geometrical figure came to our thoughts and made us think about how to use the pyramid in this contest. The task was made easier because the five levels of needs are mostly represented in pyramid fig 18.1.

The Parallelism of the bars of the pyramid could get us close to Thales so the advantage of the notion of proportionality could be ceased.

The second step is to find the aggregate that will take in account the living capability of a country. The Purchasing power was the one that required our attention. It could be the coefficient k that could be used as a just projector in space and time of society's life standard. When we make analogy of space analysis to an economic analysis, the purchasing power could be the coefficient that will help make comparison between classes and countries no matter their location.

The third step is to find how to insert people into a geometrical bar with through the lens of an economical aggregate which is the purchasing power and to have the same size of the bar using Maslow hierarchy.

If those conditions are respected, the result will be called the Pyramid of Purchasing Power (PPP).

To get this pyramid we started by using the distribution of household by income of a country. Next, we defined the range of income that will allow a household to afford the life

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standard of every level of Maslow pyramid and we computed the number of population in this range.

As example, for a country we can have 0 \$ to 50000 a year need for a person to be classified for Maslow as belonging to level 1 (physiological need) member. The same way we can detect and classify and correspond a range of wages to all the three other levels until we arrive to \$500 000 and plus for level 5.

This aspect of analysis is helpful because it allows us to deal with a problem of poor and rich country classification. Because most of the time the classification is based on the GDP or the global production. This pyramid helps us effectively to access the real wealth repartition of the population.

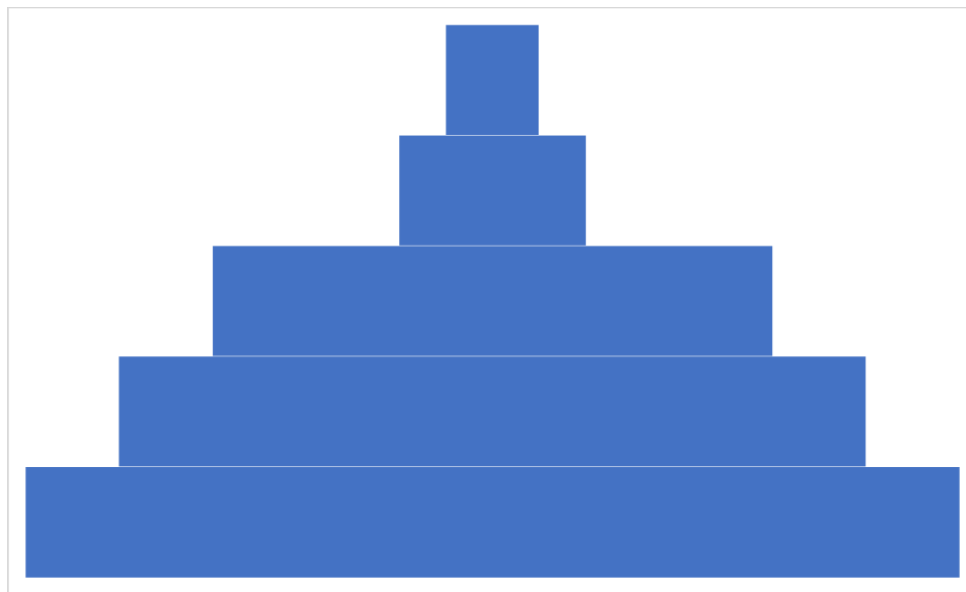


Fig 20.1 Pyramid of Purchasing Power of a rich country

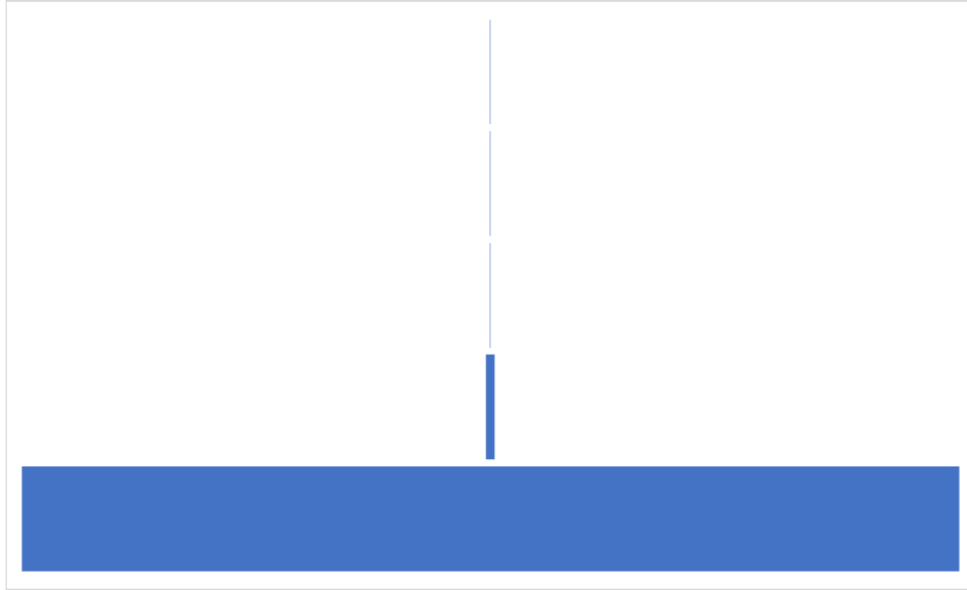


Fig 20.2 Pyramid of Purchasing Power of Poor country

6-Theorem of Purchasing Power equivalency

For two different Purchasing Power Pyramid of a society S and a society P, with S_i and P_i the area of each of the 5 pyramid bars respectively for the first Pyramid S and the second pyramid P

$$\text{If } \frac{S_1}{P_1} = \frac{S_2}{P_2} = \frac{S_3}{P_3} = \frac{S_4}{P_4} = \frac{S_5}{P_5} = k$$

Thus , the life standard of society S is equivalent to the life standard of society P

This theorem means that we can transpose life standard by playing with long term instrument h the rate of technical coefficient and with short term instrument r the interest rate.

7-Advantage of the purchasing power theorem

We can detect future social crisis by just looking at the shape of the pyramid.

Fig 20.2 represents a society that could be potentially affected by social crisis because the main part of this society cannot afford their basic need.

Fig 20.1 corresponds to a society which is well structured. It could be observed that there is not too much poor people and the number of rich persons is not exaggerated.

The advantage that this analysis procures is that we can now, compare the life standard of a present society to a society in the past. For instance, comparison of society S in 1950, and in 2024 could be made and the shape of the two pyramids obtained could tell us if the life standard of the society had changed.

Another advantage is that a country can project the life standard of its citizen in the future by setting macroeconomic aggregates so that the shape of the present form of the Purchasing Power Pyramid could be maintained until this time in the future (See fig 20.3)

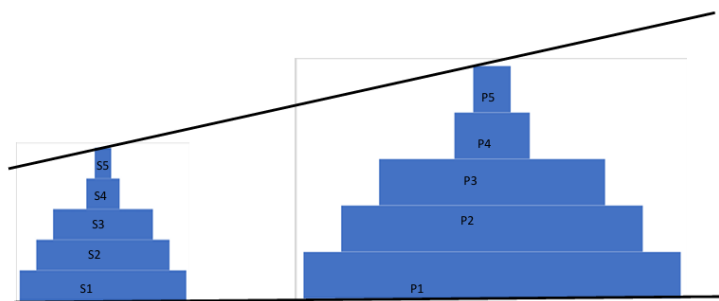


Fig 20.3 Pyramid of Purchasing Power Projection

8- Problems related to good redistribution and non interventionism

Good redistribution

The problem that could be observed in case of good redistribution as in fig 20.4 is that people could not move to the top of the pyramid. Because there is a myth according to the selection of the leadership. Just few people could be allowed to reach the top of the pyramid.

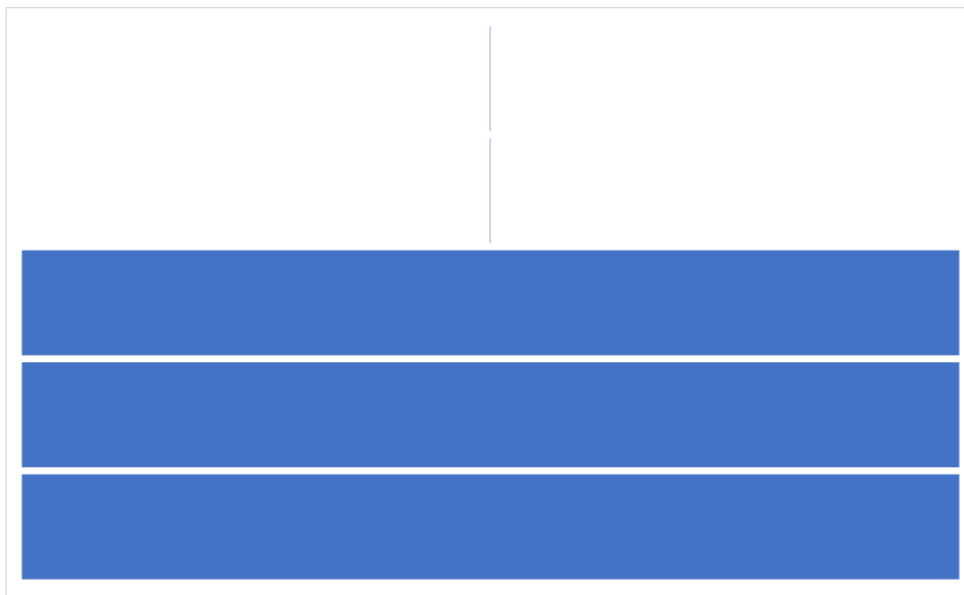


Fig 20.4 Pyramid of Purchasing Power of good wealth distribution

Non interventionism

In case of noninterventionism, sometimes, Individuals want to move to the upper level but individuals already at the top prevent them to get there. With this type of society, people are allowed to move to the upper level if they can, but those who reached the highest level of the pyramid with this free principle of self-actualization, would fight to reduce the

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concurrence in the leadership. So, they would set up a system to prevent people in the level 1 to reach the level 5. In the noninterventionism environment, the introduction of automation will not allow a real social welfare because employers will always laid off the workers (fig 20.5).

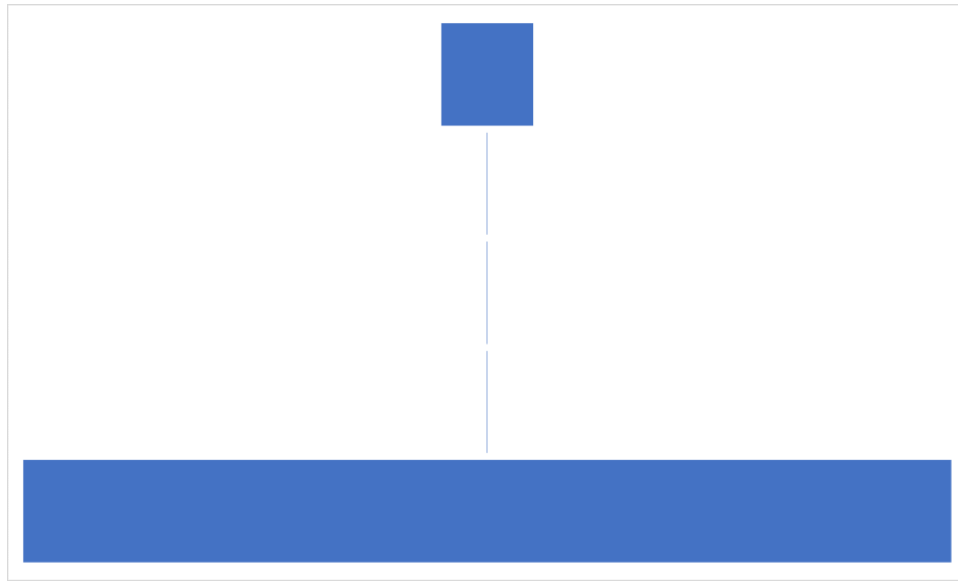


Fig 20.5 Pyramid of Purchasing Power of Country with no government Intervention

9-Analysis of the pyramid of purchasing power with a negative NAE

In fact the introduction of automation will allow people to move from all the 4 upper levels and slide down to the level 1. The figure 20.5 illustrate a society with excessive automation.

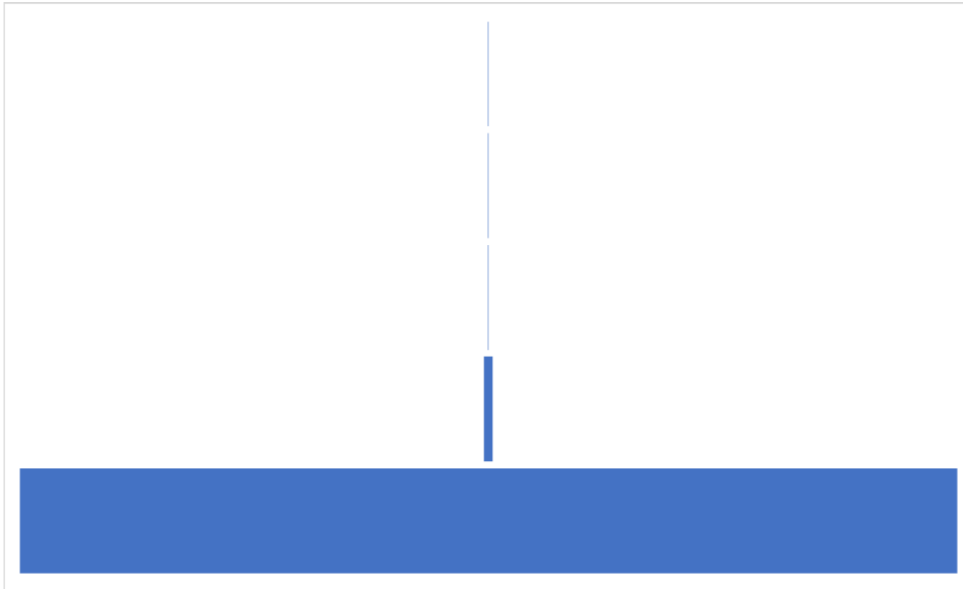


Fig 20.6 Pyramid of Purchasing Power of a negative NAE

Some economist such as Adler and Kelso suggest that effect of excessive automation could be reduced when employees are owner the capitalistic mode of production(Adler & Kelso, 1958) (Fig 20.7). But with Adler the population of level 2 to 5 will not shrink with the introduction of automation. Because people will still be employed and will have less work. They will have time for leisure or will be able to save time for social work. The shape of the pyramid could stay the same. In the case where workers are owners the pyramid stay the same as nobody is laid off.

However, according to Veblen and the principle of workmanship, many people would like to use the extra time given by automation to move to the next level of the Maslow pyramid. For example, people would like to do extra jobs, or go to school over night, in order to get more jobs with responsibility.

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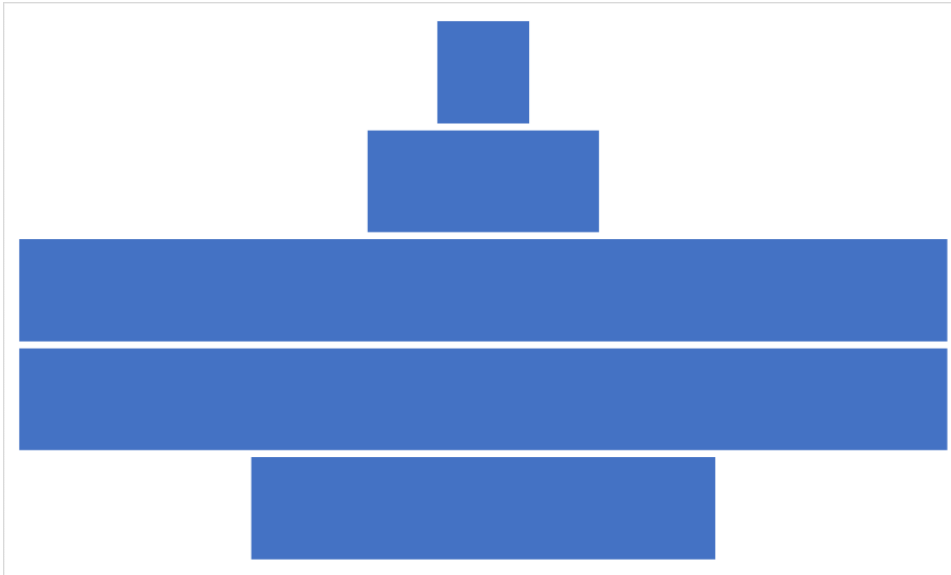


Fig 20.7 Pyramid of Purchasing Power with workers as owners

Conclusion

The study of the new economy of digital allowed us to redefine many aspects of the economy. It helped us notice that the world added a new social class to the capitalist class: the digitalist class. The book not only helped us determine the difference between capital and digital but also teach us how the method of formation of both entity were similar.

This new economy had new microeconomic laws and created a different way of analysis of markets theories. It showed how we move from macroeconomy to gigaconomy while changing the behavior of the big economic aggregates and how the political economy of the digitalist is different from the one of the capitalist.

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As this new economy had its own mean of payments, it had developed a new economy at the side called the warehouse economy. The era of digital economy is identified as an era of exponential production growth with a rise in wage inequality. To scrutinize this issue a new way of measurement of poverty level was introduced.

The book revealed us how the notion of influence will be the most important factor in the digital area. The influence coefficient was an economic factor that led the economic behavior of human being for very long time, but it was not included in our economic analysis.

The book developed many new notions such as influence curves, over synchronicity, Invisible Robot, productional gap, parallel production, series production, untechnical influence coefficients, nominal rate of technological progress, pyramid of purchasing power, warehouse economy, gigaconomy..... All those things are fueled by the digitalistic mode of production.

One will think that with the advent of the digital economy, life changed and that everything is on the wire or on the connection, but the thing is, it is just a lure. What is happening to us is that we are turning around in circle, we are just spinning around. Nothing changed, the last development of the economy of warehouse proved that it is just a shift of the people that we used to be in the real market, who are now in the warehouses. The platforms are on the smart phone, but they are supported by huge servers, satellite, which are the miniaturization of the roads that we use. Because no matter what the innovation is, there is something that will never change: we need to feed ourselves, we need to live, we need to exist.

DIGITAL

APPENDIX I Digital economy growth Vensim formula

(01) Capital= INTEG (

Investment,

100)

Units: **undefined**

(02) capital labor ratio=

10

Units: **undefined**

(03) Capital output ratio=

1

Units: **undefined**

(04) change in human labor=

human labor*Technological change

Units: **undefined**

(05) climate factor = WITH LOOKUP (

Profits/(Profits+Wages)/0.2,

((0,0)-(10,4)),(0.122324,0.0701754),(0.611621,0.45614),(2.07951,0.982456
,(2.66055,1.29825),(3.94495,1.73684),(5.3211,2.05263),(6.33028,2.24561),(
7.79817,2.40351),(9.5107,2.49123),(9.93884,2.5614)))

Units: **undefined**

(06) DAD Digital Asset Developer=

100

Units: **undefined**

DIGITAL

(07) demand in output=

human labor*Variation of Purchasing Power

Units: **undefined**

(08) desired autonomous investment=

resources^0.5*technology^0.5

Units: **undefined**

(09) desired capital=

Output*Capital output ratio

Units: **undefined**

(10) desired induced investment=

(desired capital-Capital)/5

Units: **undefined**

(11) desired labor=

Capital/capital labor ratio

Units: **undefined**

(12) Digital= INTEG (

Digital+Capital+Investment,

1000)

Units: **undefined**

(13) digital output=

DAD Digital Asset Developer+Platforms+Invisible Robot+Digital

Units: **undefined**

DIGITAL

(14) entre adj=

(potential entrepreneurs-Entrepreneurs)/entrepreneur adjustment time

Units: **undefined**

(15) entrepreneur adjustment time=

5

Units: **undefined**

(16) Entrepreneurs= INTEG (

(entre adj*Technological change)+Invisible Robot,

10)

Units: **undefined**

(17) FINAL TIME = 100

Units: Year

The final time for the simulation.

(18) fr workforce growth=

0

Units: **undefined**

(19) fractional savings mobilized per entrepreneur=

0.5

Units: **undefined**

(20) hiring=

((desired labor-labor)/2)*labor market constraint

Units: **undefined**

DIGITAL

(21) human labor= INTEG (
change in human labor,
INIT Labor)

Units: **undefined**

(22) INIT Labor=

10

Units: **undefined**

(23) INIT Unemployed=

2

Units: **undefined**

(24) INITIAL TIME = 0

Units: Year

The initial time for the simulation.

(25) interest rate=

0.1

Units: **undefined**

(26) Investment=

desired induced investment+desired autonomous investment-saving up

Units: **undefined**

(27) Invisible Robot= INTEG (

Invisible Robot Effect,

20)

DIGITAL

Units: **undefined**

(28) Invisible Robot Effect=

Invisible Robot*Technological change

Units: **undefined**

(29) labor= INTEG (

hiring-Invisible Robot,

human labor)

Units: **undefined**

(30) labor constraint = WITH LOOKUP (

labor/desired labor,

([(0,0)-(10,4)],(0.122324,0.140351),(0.489297,0.368421),(1.83486,0.754386
) ,(3.0581,1.12281),(4.34251,1.40351),(6.4526,1.68421),(7.88991,1.78947),(8.92966
,1.82456),(9.84709,1.82456)))

Units: **undefined**

(31) labor market constraint = WITH LOOKUP (

worker availability,

([(0,0)-(1,1)],(0,0),(0.1,0.435),(0.2,0.655),(0.3,0.765),(0.4,0.85),(0.5
,0.895),(0.6,0.935),(0.7,0.96),(0.8,0.975),(0.9, 0.995),(1,1))
)

Units: **undefined**

(32) Output = A FUNCTION OF(Capital,Capital output ratio,demand in output

,digital output,labor constraint)

Output=

(Capital/Capital output ratio)*labor constraint*demand in output*Influence Coefficient

DIGITAL

+digital output

Units: **undefined**

(33) Platforms= INTEG (

Digital+Entrepreneurs+technology+Platforms,

80)

Units: **undefined**

(34) potential entrepreneur per unit profit=

0.5

Units: **undefined**

(35) potential entrepreneurs=

(Profits*potential entrepreneur per unit profit)*climate factor

Units: **undefined**

(36) Profits=

Output-Wages

Units: **undefined**

(37) resources=

Entrepreneurs*fractional savings mobilized per entrepreneur*unspent savings

Units: **undefined**

(38) SAVEPER =

TIME STEP

Units: Year [0,?]

The frequency with which output is stored.

DIGITAL

(39) saving up = WITH LOOKUP (

Output*interest rate,

((0,0)-(10,4)),(0.275229,0.105263),(1.19266,0.263158),(2.38532,0.491228
,(4.12844,0.894737),(5.77982,1.50877),(7.40061
,2.12281),(8.80734,2.66667),(9.75535,3.24561)))

Units: **undefined**

(40) Technological change=

0.009*(-1)

Units: **undefined**

(41) technology= INTEG (

(Entrepreneurs*fractional savings mobilized per entrepreneur-technology)/
technology adjustment time,
100)

Units: **undefined**

(42) technology adjustment time=

5

Units: **undefined**

(43) TIME STEP = 0.125

Units: Year [0,?]

The time step for the simulation.

(44) total workforce=

labor+Unemployed

Units: **undefined**

DIGITAL

(45) "transaction share:dg/cg"=

Capital/Digital

Units: **undefined**

(46) Unemployed= INTEG (

workforce growth-hiring,

INIT Unemployed)

Units: **undefined**

(47) unspent savings= INTEG (

saving up-resources,

20)

Units: **undefined**

(48) Variation of Purchasing Power=

0.05

Units: **undefined**

(49) Wage escalation effect = WITH LOOKUP (

worker availability,

([(0,0)-(2,4)],(0,4),(0.2,2.76),(0.4,2.04),(0.6,1.62),(0.8,1.28),(1,1),(
1.2,0.74),(1.4,0.54),(1.6,0.4),(1.8,0.28),(2,0.22)))

Units: **undefined**

(50) wage rate=

8*Wage escalation effect

Units: **undefined**

(51) Wages=

DIGITAL

labor*wage rate

Units: **undefined**

(52) worker availability=

(Unemployed/labor)/(INIT Unemployed/INIT Labor)

Units: **undefined**

(53) workforce growth=

total workforce *fr workforce growth

Units: **undefined**

APPENDIX II: Growth with exogenous Influence coefficient formula

(01) Capital= INTEG (

Investment,

100)

Units: **undefined**

(02) capital labor ratio=

10

Units: **undefined**

(03) Capital output ratio=

1

Units: **undefined**

(04) change in human labor=

DIGITAL

human labor*Technological change

Units: **undefined**

(05) climate factor = WITH LOOKUP (

Profits/(Profits+Wages)/0.2,

((0,0)-(10,4)),(0.122324,0.0701754),(0.611621,0.45614),(2.07951,0.982456

),(2.66055,1.29825),(3.94495,1.73684),(5.3211,2.05263),(6.33028,2.24561),(

7.79817,2.40351),(9.5107,2.49123),(9.93884,2.5614)))

Units: **undefined**

(06) DAD Digital Asset Developer=

100

Units: **undefined**

(07) demand in output=

human labor*Variation of Purchasing Power

Units: **undefined**

(08) desired autonomous investment=

resources^0.5*technology^0.5

Units: **undefined**

(09) desired capital=

Output*Capital output ratio

Units: **undefined**

(10) desired induced investment=

(desired capital-Capital)/5

Units: **undefined**

DIGITAL

(11) desired labor=

Capital/capital labor ratio

Units: **undefined**

(12) Digital= INTEG (

Digital+Capital+Investment,

1000)

Units: **undefined**

(13) digital output=

DAD Digital Asset Developer+Platforms+Invisible Robot+Digital

Units: **undefined**

(14) entre adj=

(potential entrepreneurs-Entrepreneurs)/entrepreneur adjustment time

Units: **undefined**

(15) entrepreneur adjustment time=

5

Units: **undefined**

(16) Entrepreneurs= INTEG (

(entre adj*Technological change)+Invisible Robot,

10)

Units: **undefined**

(17) FINAL TIME = 100

Units: Year

DIGITAL

The final time for the simulation.

(18) fr workforce growth=

0

Units: **undefined**

(19) fractional savings mobilized per entrepreneur=

0.5

Units: **undefined**

(20) hiring=

$((\text{desired labor} - \text{labor}) / 2) * \text{labor market constraint}$

Units: **undefined**

(21) human labor= INTEG (

change in human labor,

INIT Labor)

Units: **undefined**

(22) Influence Coefficient= INTEG (

Technological change+Untechnical coefficient,

100)

Units: **undefined**

(23) INIT Labor=

10

Units: **undefined**

(24) INIT Unemployed=

DIGITAL

2

Units: **undefined**

(25) INITIAL TIME = 0

Units: Year

The initial time for the simulation.

(26) interest rate=

0.1

Units: **undefined**

(27) Investment=

desired induced investment+desired autonomous investment-saving up

Units: **undefined**

(28) Invisible Robot= INTEG (

Invisible Robot Effect,

20)

Units: **undefined**

(29) Invisible Robot Effect=

Invisible Robot*Technological change

Units: **undefined**

(30) labor= INTEG (

hiring-Invisible Robot,

human labor)

Units: **undefined**

DIGITAL

(31) labor constraint = WITH LOOKUP (

labor/desired labor,

((0,0)-(10,4)),(0.122324,0.140351),(0.489297,0.368421),(1.83486,0.754386
,(3.0581,1.12281),(4.34251,1.40351),(6.4526,1.68421),(7.88991,1.78947),(8.92966
,1.82456),(9.84709,1.82456))

Units: **undefined**

(32) labor market constraint = WITH LOOKUP (

worker availability,

((0,0)-(1,1)),(0,0),(0.1,0.435),(0.2,0.655),(0.3,0.765),(0.4,0.85),(0.5
,0.895),(0.6,0.935),(0.7,0.96),(0.8,0.975),(0.9, 0.995),(1,1))
)

Units: **undefined**

(33) Output=

(Capital/Capital output ratio)*labor constraint*demand in output*(1+Influence Coefficient
) + digital output

Units: **undefined**

(34) Platforms= INTEG (

Digital+Entrepreneurs+technology+Platforms,

80)

Units: **undefined**

(35) potential entrepreneur per unit profit=

0.5

Units: **undefined**

(36) potential entrepreneurs=

DIGITAL

(Profits*potential entrepreneur per unit profit)*climate factor

Units: **undefined**

(37) Profits=

Output-Wages

Units: **undefined**

(38) resources=

Entrepreneurs*fractional savings mobilized per entrepreneur*unspent savings

Units: **undefined**

(39) SAVEPER =

TIME STEP

Units: Year [0,?]

The frequency with which output is stored.

(40) saving up = WITH LOOKUP (

Output*interest rate,

(([(0,0)-(10,4)],(0.275229,0.105263),(1.19266,0.263158),(2.38532,0.491228
,(4.12844,0.894737),(5.77982,1.50877),(7.40061
,2.12281),(8.80734,2.66667),(9.75535,3.24561)))

Units: **undefined**

(41) Technological change=

0.009*(-1)

Units: **undefined**

(42) technology= INTEG (

(Entrepreneurs*fractional savings mobilized per entrepreneur-technology)/

DIGITAL

technology adjustment time,

100)

Units: **undefined**

(43) technology adjustment time=

5

Units: **undefined**

(44) TIME STEP = 0.125

Units: Year [0,?]

The time step for the simulation.

(45) total workforce=

labor+Unemployed

Units: **undefined**

(46) "transaction share:dg/cg"=

Capital/Digital

Units: **undefined**

(47) Unemployed= INTEG (

workforce growth-hiring,

INIT Unemployed)

Units: **undefined**

(48) unspent savings= INTEG (

saving up-resources,

20)

Units: **undefined**

DIGITAL

(49) Untechnical coefficient=

0.1

Units: **undefined**

(50) Variation of Purchasing Power=

0.05

Units: **undefined**

(51) Wage escalation effect = WITH LOOKUP (

worker availability,

(([(0,0)-(2,4)],(0,4),(0.2,2.76),(0.4,2.04),(0.6,1.62),(0.8,1.28),(1,1),(
1.2,0.74),(1.4,0.54),(1.6,0.4),(1.8,0.28),(2,0.22)))

Units: **undefined**

(52) wage rate=

8*Wage escalation effect

Units: **undefined**

(53) Wages=

labor*wage rate

Units: **undefined**

(54) worker availability=

(Unemployed/labor)/(INIT Unemployed/INIT Labor)

Units: **undefined**

(55) workforce growth=

total workforce *fr workforce growth

Units: **undefined**

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