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The Impact of Artificial Intelligence on Future Labor Markets

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Abstract: Historically, mechanization and the current artificial intelligence trend have been considered as threats to job stability despite the fact that statistics on production and employment have shown the opposite. The COVID-19 pandemic in 2020-21 stimulated robotization in all types of industry with the substitution of labor, raising unemployment, however, there is evidence of its reduction. The purpose of this work is to show how despite the inevitable robotization and the destruction of jobs, new trades and professions will develop in the same way as happened in the three previous revolutions, including all sectors of goods, services and the military. Without falling into the repetition of the already known history, reference is made to recent publications confronting them with the technological trend inherited from the 20th century, business behaviors in the face of COVID-19 and its effect on the future labor market. Statistics show positive aspects such as fast and efficient adaptation by highly qualified companies and employees. There are negative effects such as the loss of competitiveness of low-skilled workers; loss of bargaining power of unions; increase in the gender pay gap; widening gap between high-tech industrialized countries and underdeveloped ones. It is concluded that immediate changes are required in the reorientation of educational programs towards technological careers, labor reforms, financial reforms. The gap between high-tech industrialized countries and underdeveloped ones will undoubtedly widen unless the latter implement radical and pragmatic changes in their economic policies.

Keywords: Technology, Artificial Intelligence, Robot, Labor Market, Unemployment, Economic Growth

1. Introduction

The COVID-19 pandemic was first reported in China, arrived in Europe in January 2020 and spread throughout the world, has revived with hysterical overtones, the fears of robotization after seeing the layoffs of workers carried out by companies as a result of massive bankruptcies in a global economic downturn.

Many newspaper publications and several academic researchers have recalled the "perverse effects" that mechanization has had on labor since the English industrial revolution of the 18th century: according to this approach, mechanization has always displaced low-skilled labor contributing to generate unemployment and poverty, however, in times of panic, it is forgotten or little is mentioned how mechanization not only eliminated trades but also generated other industries and trades with which workers could improve and reach high standards of living. It is worth remembering the repetitive phenomenon of every industrial revolution: the period between unemployment due to replacement and the new occupation has never been short but long and expensive, that is, relocation to new jobs that demand new skills, more complex than the previous ones, it has not been easy in spite of governmental aid and educational plans.

The objective of this work is to explore how the current technological revolution in artificial intelligence (AI) and its acceleration due to the pandemic, will affect labor markets.

2. The Accelerated Robotization Due to the Pandemic

The pandemic led to quarantines that implied the prohibition of public activities such as free movement in shopping centers, streets, cultural activities, education, sports, travel restrictions inside and outside the countries, which altered consumption patterns, production and distribution, forcing to rethink economic and institutional activity. Companies before the reduction of sales had to reduce costs by means of an accelerated substitution of labor. This labor displacement was carried out without encountering any labor union opposition that would have produced strikes and violent demonstrations since it was forbidden to go out on the streets, in addition, given the harsh reality, workers seem to have accepted the dismissal with resignation. Those who kept their jobs continued to work from home: senior executives and administrative staff worked remotely from their homes using internet platforms, implying an unexpected intensive use of technology, forcing service providers to work developing software to improve platforms. The general feeling worldwide was of a foretaste of the future.

Some examples published by the media and on the internet are cited describing the replacement of workers by robots during the pandemic. Semuels [1] reports how in the United States, robots are doing various jobs: cleaning airports and taking passengers' temperatures; preparing salads in hospital restaurants; security guards in shopping malls and stadiums. Customer calls in call centers are no longer handled by staff but by "chatbots"; robots are walking the corridors in hotels just to open rooms and deliver towels and brushes to guests. Robots were introduced in the construction industry as they can place more than 3,000 bricks in an eight-hour shift, 10 times more than a human can do; they also sow in the fields and as packers in any production plant. In the health sector, robots can replace ophthalmologists and those who take X-rays. In the financial sector, financial analysts and lawyers are replaced: JPMorgan, has AI reviewing contracts to grant loans and doing the work that lawyers used to do in 360,000 hours a year. For years it has been known of the participation of robots in the industry of cars, packaging of merchandise, classification of recyclable materials.

A McKinsey Global Institute [2] survey of 800 executives working in 8 countries confirms that, given the presence of the pandemic and the uncertainty about its duration and impact on the economy, the companies surveyed accelerated digitization in supply chain, customer channels, employee interaction and collaboration, automation, and artificial intelligence.

A Bernazzani [3] cites the 10 jobs that artificial intelligence will replace in the short term: 1. Telemarketing 2. Public Accountants 3. Compensation and Benefits Managers 4. Receptionists 5. Messengers 6. Proofreaders 7. IT Support Specialists 8. Market Research Analysts 9. Advertising Sellers 10. Retail Sellers.

3. Background

Nowadays, the media and academics continually list the jobs or professions that disappeared with mechanization, systematization, and robotization; the dangers of developing artificial intelligence giving robots the ability to overcome the physical and mental strength of humanity, condemning educated and uneducated workers such as doctors, administrators and blue-collar workers, meaning more unemployment and poverty, since there is no area of knowledge or profession that escapes the power of artificial intelligence. As robots will exponentially increase their knowledge and competitiveness, humanity will not have any opportunity to compete.

This panic is not new; it became strong since the beginning of industrialization in England in 1760, in the United States in 1790 and in France after 1830; in the 20th century with the invention of computers during the World War II, the Cold War. In the 1960s Hollywood produced television series such as "The Jetsons" [4] that show a friendly use of robots cooperating with people in their ordinary jobs. There are also other films such as Kubrick´s [5] 2001: A Space Odyssey, that predicted the capacity of robots to replace mankind and control planet Earth because of their increasing power of self-learning and rationalization. The possibility of the nightmare becoming a reality was evidenced by the massification of personal computers in 1980. Computers and the software involved led to neural networks and increasing robotization in the 1990s.

Recently, academic researchers such as Acemoglu and Restrepo [6] studied the effects of industrial robots on US labor markets between 1990 and 2007. They find a negative correlation between the increase in the use of robots and wages and the level of employment: one more robot for every thousand workers reduces the employment-population ratio by 0.2 percentage points and wages by 0.42%.

Frey [7] in his book, The Technology Trap, makes a historical account from English industrialization to 2017, before the pandemic. Starting with "the poor laws" of Elizabeth I (1610) and others in which the rulers opposed the adoption of mechanization because they defended the rights of workers and essentially internal peace which was based on the defense of labor. The Queen was opposed to the substitution that generated unemployment and insecurity. Inventions made during the pre-industrial revolution were banned until the English expansion began in the seventeenth century. The European expansionism generates the opening of international markets and a rivalry arises between European powers in which it was necessary to think about the competitiveness of exports and justify the adoption of substitute technologies for labor, which was supported by industrialists and politicians even though it harmed workers, who as members of a social class, did not achieve political strength to oppose it. Fortunately, the adoption of mechanization produced cost reductions in production and improved the quality of life of workers in the late 19th century.

Mechanization stimulated the opening of technology companies with the consequent increase in demand for workers; simultaneously, mechanization reduced the cost of manufacturing. The same happened throughout the process of industrialization in the United States. Mantoux [8] explains how industrialization in Europe, although lagging the English, led France and Germany to imitate mechanization and substitution as the only alternative not to give up control of the world to England.

In the English industrial prerevolution there was no justification for granting incentives or subsidies for mechanization (1600-1700) since labor was cheap. Subsidies will be widely used by governments to maintain the country's competitive capacity (worker replacing) in international markets and to strengthen military strategy. The same two reasons remain today: competitiveness and security, leading governments to provide incentives for the development of AI.

In conclusion, most of the studies on mechanization and systematization coincide in stating how technology in the past substituted labor and this was relocated, as well as generating new types of companies, professions and reducing unemployment levels in the long run, however, the time it took to relocate the unemployed population to other industries was costly and very slow, and it was even possible to affirm that the beneficiaries of the mechanization process were not the laid-off workers but those of the next generation.

Despite the slowness of the labor relocation process, Frey affirms that given the complexity and productivity of the current robotization, the relocation time can be even longer and more traumatic because AI can totally replace the human, so it will be difficult redefine the new functions of humans. It is important to make a small definition of artificial intelligence to be able to intuit how dangerous it can be.

4. Degrees of Artificial Intelligence

Artificial intelligence is developed in machines and computers to reproduce the human capacity to think, make decisions and solve problems in any activity: work, scientific, social, etc. Scientists have increased the claims so that they not only try to develop robots that think and act like humans, but that think and act rationally, that is, they surpass the human being since it has been proven ad nauseam that human behavior in making economic decisions such as consumption, investment and other type of decisions, are most of the time irrational. The above is also confirmed by Kahneman [9] studies on behavioral economics.

Artificial intelligence works with computing and databases with the aim of solving problems, but it implies a higher stage that has started from machine learning and deep learning. Whatever the degree of complexity, algorithms are built that seek to create expert systems that make predictions or recommendations based on the input data. There are differences between machine and deep learning: the second is a subfield of the first and this is part of the AI.

Deep learning is composed of neural networks which automate processes, reducing human intervention, as well as being able to work with larger data sets. that is, a growing machine learning; while machine learning relies more on human intervention to learn.

AI can be weak or strong: the weak is also called narrow AI (ANI) which is focused to perform specific tasks. Weak AI drives most of the AI around us today; it analyzes and makes decisions replacing the human being, but it is not smarter yet. On the contrary, strong AI is made up of Artificial General Intelligence (AGI) and Artificial Super Intelligence (ASI). General artificial intelligence would develop in a machine with human intelligence; It would have a conscience of his own that allows it to understand that it can solve problems, make decisions, learn and plan for the future. Koch [10] says artificial superintelligence would surpass the intelligence and capacity of the human brain. Although it does not exist at present, researchers are trying to develop it, therefore it belongs to science fiction, but there is no doubt that it will one day be a reality.

You don't have to be pessimistic either. In the popular imagination, there is the image of the robot that walks the streets and is stronger than the human being, a robot that never gets sick, yet in the near foreseeable time, robots will remain life-limited, disposable machines. They will have manufacturing defects and will also fall victim to viruses developed by programmers and the enemies of the competition. Although one day they will have "intelligence" superior to that of the human being and are self-programming, there is no guarantee that they can reproduce themselves, populate the earth and have a conscience (as in fiction cinema).

From the above, the question arises: what will be the effect of AI on the labor market? Will AI displace human beings? Will it generate unemployment? What jobs will humans do? How will wages be affected?

5. Labor Market Prospects

First, the causes of unemployment must be explained. There are two main types of unemployment: temporary and structural. The conjunctural is temporary, while the crisis lasts, expansion, contraction. The structural one is long-term unemployment, caused by structural failures as a result of underdevelopment: continuous low growth rate, agricultural backwardness, lack of infrastructure and technology, among others.

The causes of temporary unemployment:

Macroeconomic: economic contraction cycles that are generated by different internal and external factors: reduction of fiscal deficits, contraction in international trade, contraction of monetary policy, reduction of domestic demand, high rates of inflation, imported recessions, etc.

The causes of structural unemployment:

1. Demographic trend: high birth rates, foreign immigration of skilled and unskilled labor, migration from the rural sector to the cities.

2. Levels of competitiveness of the country at the international level:
   1) Reduced level of national and foreign investment due to legal and tax restrictions that make the opening of companies and businesses in general unattractive.
   2) political instability, corruption, nature of public institutions.
   3) Lack of communications infrastructure: roads, airports, and sea and river ports.
   4) Deficient educational system: lack of professionals, small supply of qualified workers, abundant unskilled workers.

The following questions arise: Does technology generate structural or temporary unemployment?

How much of the technological substitution is recorded in unemployment rates? The unemployed get a job in another sector quickly and this is registered in the unemployment rates? What if relocation is slow? Unfortunately, everything seems to indicate that the statistics provided by surveyed firms are not clear enough to answer each question in detail, since firms, in their records do not separate investment in AI from traditional investments in capital machinery. More detailed surveys are needed in this regard.

6. Robotics Before the Pandemic

According to IFO [11] in its World Robotics Report 2020, the inventory of industrial robots operating in factories around the world today constitutes the highest level in history and indicates an increase of 85% in five years (2014-2019), however, the recession before the pandemic, it produced a 12% drop in robot sales as the four main user sectors, automotive, electrical and electronic, machinery and metal, plastic and chemicals, contracted. The pandemic has also affected the sales of robots, but in 2021, the recovery was noticed according to what happened in the United States as discussed above. The above statistics show that investment in robots is made mostly in capital intensive industries; further, the reduction in the sale of robots shows that this industry is also affected by economic cycles.

The same report indicates that Asia is the strongest market for industrial robots with China, followed by Japan and India. The share of newly installed robots in Asia was about two-thirds of the world's supply. Most of the robots used in China are imported in order to integrate into the industry and serve the domestic market. Chinese manufacturers still primarily serve the domestic market, especially the automotive sector.

In Europe, the leader is Germany, Italy, France and the United Kingdom. In the Americas, the leader is the United States, followed by Mexico, Canada and Brazil. Most of the robots in the US are imported from Japan and Europe, although there are many North American robot producers.

The report shows the 15 countries in the world that most installed robots (in thousands of units) in 2019 were: China (140.5), Japan (49.9), United States (33.3), Korea (27.9), Germany (20.5), Italy (11.1), France (6.7), Chinese Taipei (6.4), Mexico (4.6), India (4.3), Spain (3.8), Canada (3.6), Thailand (2.9), Poland (2.6), Czech Republic (2.6). The total sum of those installed in the 15 countries was 319.9, of which China installed approximately 43.8%. It is striking that China, the country with the largest amount of labor in the world, is the one that invests the most in robots.

China, India and other countries with large populations are examples of how AI can alter the neoclassical theory of comparative advantage. According to theory, China and India should specialize and export unskilled labor-intensive goods (higher share of unskilled labor than machinery) since labor is very cheap. Before AI, the theory made a difference between the machine and the worker. The machine was made to replace the worker in physical jobs, but not in intellectual ones. The production functions clearly differentiated physical capital from human capital, now, robots are thinking machines and cheaper than labor, potentially capable of replacing any human capital, qualified and unskilled, eliminating the physical and qualitative difference between machine and worker. It is to be hoped that in the future only those industries in which humans are not competitive will be robotized. Obviously, it is worrying to think that in the future, the production function excludes human capital.

However, given that the United States continues to be the engine of the world economy, it is worth doing a preliminary analysis of how AI has affected the unemployment rate, observing figure 1 constructed with data taken from the World Bank [12] Anyone could believe that in the countries where greater mechanization and investment in AI have been, the higher the unemployment rates should be, however, the growth rate of the United States GDP and its unemployment rate from 1960 to date, indicate that an expansion of investment in AI has not seriously altered the unemployment rate. The red curve represents the unemployment rate which has behaved according to the growth of the GDP: when there is a recession, unemployment increases; expansion reduces the unemployment rate. It is assumed that the United States has invested massively in AI, both business and military since 1960 and that this has fueled economic growth. The fact that the unemployment rate behaves according to cycles indicates that investment in AI is determined mainly due to cycles, although there can also be a bidirectionality: an international conflict or war stimulates investment in high technology industries including AI, stimulating economic growth, reducing unemployment and stimulating consumption.

Regarding the pre-pandemic years, note that the growth rate of the United States GDP has been below 2.5% since 2008, even so, in the Obama and Trump administrations. After the 2008 crisis, unemployment gradually decreased from 9.9% to 3.6% in 2019, the lowest unemployment rate since 2000. The pandemic produced the recession, unemployment rose to 6.7% and despite the aforementioned increasing robotization, unemployment in June 2021 fell to 5.4%. Apparently, robotization helped a rapid job creation in certain industries that offset layoffs in others.

Similar behavior is to be expected in the other developed countries; It will only be known when the pandemic ends.

Still, world statistics indicate a rapid recovery to the extent that the 2020s are thought to be the repetition of the 1920s and 1930s, after the Spanish flu pandemic and the 1930 depression respectively.
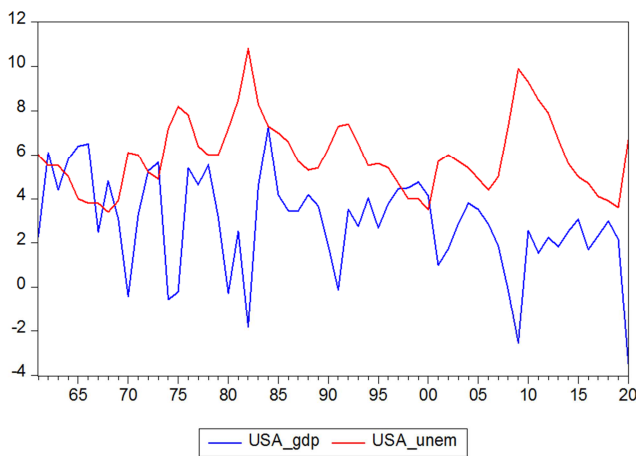
Figure 1. USA. Rate of growth of GDP and unemployment rate, 1960-2020.

7. Reasons to Invest on Artificial Intelligence

The massification of AI will accelerate regardless of what happens in the labor market: it does not matter that unemployment increases and wages fall, because AI is being used for two correlated objectives:

1. Increase economic competitiveness: includes production of new goods and services for internal and external consumption; low-cost production in order to win world markets.
2. National security: arms race on land and in space.

The correlation of the two objectives originated with European expansionism after the discovery of America: the conquest of markets, natural resources and raw materials is supported by military force. Economic security is a national security issue, so large budgets are allocated to the development of high technology related to the military, that is, economic survival goes hand in hand with military force and technological development that implies the use of AI, a phenomenon that continuously feeds on itself and that cannot be broken despite short-term economic and structural crises. Ruttan [13] shows how he military industry also generates employment and is a strong participant in the labor market, especially demanding for skilled labor. Remember that large companies in the automotive, machinery and electronics sector not only produce goods for consumption but also for the military industry: General Motors, etc.

After Mao's death in 1976, China sought to integrate into the world economy to emerge from underdevelopment. China implemented a policy of openness to foreign investment and international trade. Corporations from the United States and Europe moved there in order to take advantage of cheap labor. Some companies closed production in their countries, raising unemployment, as happened in the American rust belt [1] where its inhabitants saw their standard of living reduced.

The product made in China has been imported to the United States, which, being cheaper, forced many local producers to invest in robots to compete. This phenomenon was repeated in European and Asian countries. As China integrated into globalization, geographical borders were erased and investment in robots did not consider geographical or political barriers but rather corporate interests: the practice of intra-industry trade has been more important than trade between countries. The United States' trade deficits with China are "justified" because imports of Chinese products are manufactured by American companies located in China that use Chinese labor and help improve the standard of living of the American consumer who buys low-priced products.

The fantasy of Chinese integration into the international economy lasted two decades, while China did not look like an economic and political competitor that could affect European and north American interests, however, in the last decade, China's expansionist interests under the current Xi Jinping's government, Brown [14], have increased the likelihood of a conflict. The interests of American and European investors are at risk because since the government of Donald Trump the trade agreement with China has been renegotiated and restrictions have been established on technology transfer to China, a policy continued by the actual President Biden.

Obviously, national economics is not only about economic growth, income distribution, employment, social welfare, etc., but also has a face of international politics and security. The competition for political and economic control of the world is disputed between the western-type democracies (American, European, Asian) and the dictatorships of Russia and China. Vincent [15] cites what Putin said verbatim "Artificial intelligence is the future, not only for Russia, but for all humankind. It comes with colossal opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world. " Consequently, the development of AI will depend more on the arms race than on the economy; the first will determine the second.

8. Political Systems, AI and Labor Markets

While in western democracies, workers and unions can oppose the adoption of labor-replacing technologies when they are affected, in dictatorships this opposition is prohibited and eliminated. In democracies, political and academic debates are generated about the damages resulting

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1The Rust Belt: geographic region from New York to the Midwest that was once dominated by manufacturing. This region suffered an industrial decline due to the relocation of factories abroad. Abandoned factories rusted from exposure to the elements.

from the adoption of the IA, and it could even be achieved that its constituents did not approve in Congress the use of certain technologies that threaten job stability, violate human rights or some ethical principles, on the contrary, in dictatorships, there are no debates for any of the above reasons, allowing their immediate implementation. Dictatorships could gain leadership in labor-replacing areas and increasing their competitiveness in military and international markets as evidenced in China. If the superiority of the Western powers is threatened, there will undoubtedly be political and military forces pressing for the greater use of AI to counteract the disadvantages in the face of dictatorships, making the interests of those affected subordinate to national security. A good example of competitive strategies is given by the Artificial Intelligence and National Security, published by the Congressional Research Service [16], updated November 10, 2020.

Another aspect of dictatorships is that the performance of the labor market is secondary. Population excesses in some regions that in democracies would produce a drop in real wages according to market forces, on the contrary, in dictatorships such as China, as reported by The New York Times [17], excesses are eliminated through forced population transference dictated by the Communist Party of which there is evidence that the population is transferred from the rural to the urban sector. This phenomenon alters the supply and demand of labor along with urban wages, in addition to placing a larger population in construction and industry that generates greater added value. Rural labor can be substituted for AI in agricultural production thanks to the fact that robots can increase agricultural productivity.

History teaches that in the politics of the superpowers, national security is more important than labor instabilities, moreover, it has been shown how internal contractions and unemployment are eliminated with the start of a war in which use is made of new advanced technology weapons: the two world wars were preceded by a strong expansion industrial military in Germany, the United Kingdom, France and Japan. Remember how Germany, in the 1930s, reduced unemployment with the expansion of the military industry, highly connected with the automotive, steel, construction and infrastructure industries. The Soviet Union and the United States also did it during the wars. On the contrary, the end of WWII created a depression in the United States from 1948 to 1949; the termination of the Korean war generated economic contraction during 1954 to 1958, then it is to be expected that these phenomena will continue to be repeated with the accelerated injection of AI.

In the 2020s, robotization and AI will receive stimuli from the new challenges for humanity: the exploration of Mars, the Moon, commercial flights in the stratosphere, etc. The conquest of Mars is equivalent to the discovery of America. These events will be the "new frontier" for the powers and will have a multiplier effect on industrialization and job creation. The cold war with rival countries generates the foundations for new mass consumer products that improve people's lives: remember how the computer, invented for

military purposes for the Second World War, became a mass consumer good that it improved the quality of life of the population and generated advances in the industry, therefore, it is to be expected that the race for AI supremacy will produce identical effects.

9. Impact of AI on Labor Markets

The overcrowding of AI will have effects on labor markets and other aspects:

1. Acceleration of Globalization. Everyone is aware of how technology globalizes, however, the pandemic accelerated globalization. In all countries, businesspeople and governments were forced to use platforms (Teams, Zoom, etc.) belonging to Microsoft and a few others. The worldwide dependence on a few networks and more importantly, the global dependence on technology, especially that produced in the United States and the English language, became evident. Given the possibility of the appearance of new viruses, the current work at home, served as a technological learning; on the other hand, AI providers will remain motivated to prepare new products and services that integrate the world around a platform. This implies a growing demand for AI-qualified employees.

2. Reduction of migration. Countries with low population growth rates that have fostered immigration of cheap labor and skilled professionals will not depend on immigrants as most jobs will gradually be carried out by robots. Immigrants will be subject to more demanding selection processes.

Migrations such as those that occurred during the colonization of the Americas, Australia, New Zealand, etc., largely sponsored by governments to solve population excesses, will hardly be repeated. The colonization of the new lands open to conquest (Siberia, Northern Canada) because of climate change, will initially be carried out by robots capable of facing the harshness of nature: robots will open the way for settlers to settle. The same will happen in the space race; robots will be used for the exploration of Mars before humans establish bases.

3. Wages in developed countries will stabilize. The high salaries generated by the shortage of professionals of any kind, qualified or not, will be stabilized because the increases in labor demand will be met by robots. Also, remember that robots don't get sick, don't unionize, don't go on strike, don't ask for vacations and don't ask to retire quickly.

4. Workers unions will continue to lose influence. Faced with the threat of labor substitution by machines and robots, labor unions have lost their bargaining power, especially in sectors and in countries where there is labor informality.

It is necessary to differentiate between the union strength in the developed countries with those of the underdeveloped ones. In the developed ones, investment in AI can generate labor conflicts because in some of them, there are high levels

of labor unionization, on the contrary, in the underdeveloped ones, according to AIL [18], in Colombia, only 4.6% of the workers are affiliated to unions, most people work in the informal economy. The situation is similar in the rest of Latin America and surely in most of the underdeveloped countries. In any country, where there are protests and strikes because of the IA, the integration of the IA will be slow and difficult, which can drive away national and foreign investment.

5. New ways of hiring. Since China's entry into international markets, Chinese companies flooded the world with their low-cost products given the low Chinese wages compared to those of the OECD, in addition, the latter have had to pay high income taxes under the welfare economics programs. Since the 1980s, employers have pushed for liberalization of labor markets, that is, more flexible forms of hiring to compete with China. Paradoxically, no country has worked as much in favor of the capitalist system as China: from the isolation imposed by the communist ideology it passes to the other extreme by integrating most of its population into the capitalist system. This led to economies of scale so large that they lowered labor costs and prices, destroyed the foundations of Europe's welfare economy, weakened labor unions, forced governments to cut taxes, and stimulated the global competitive game.

For employers, the pandemic allowed them to obtain a strength in the labor markets that would have been impossible to obtain in elections; in the same proportion it weakened the employees. Telework was improvised, which includes hiring by tasks, rather than by schedules and other contracting modalities, however, there is a risk of drawing up contracts with serious disadvantages for workers; If this happens, employees will be encouraged to start their own businesses. The foregoing requires legal speed. Historically, economic practices and markets have always moved much faster than legislation; it is always late in regulating and solving conflicts.

6. The chances of opening new businesses will increase. Employees in the administrative and technological areas will make more use of applications that provide information, contacts, and ideas for doing business. AI will continue to make the world smaller and connect employees to become entrepreneurs, facilitating the formation of international work teams.

7. Increase in job instability. This because of the contract modalities. Firms will be more inclined to impose their hiring models and employees will have more opportunities to offer their services through growing networks, taking advantage of new hiring modalities.

8. Some jobs will disappear, and others will appear, as happened with machining and systematization. There will be new engineering related to robot programming, production, maintenance, and whatever variety of AI is developed. There will be momentum from the aerospace and related industries.

Frey recalls how technology in the past replaced workforce, and this was relocated, in addition to generating new types of companies, professions and reducing unemployment levels in the long term, however, there is evidence that currently, the time for relocation is lengthening. Most likely, the lengthening corresponds to a transitional stage as the education systems in each country gradually adapt to the reality of AI.

9. Temporary and structural unemployment. Given the new working conditions related to future professions, unemployment will continue to be temporary and structural and not totally dependent on investment in robotics, because despite the coming cycles, the new directions of the arms race will generate more employment in these sectors.

10. Labor markets of underdeveloped countries will also be lagging in AI. Many of the current industries, without AI, will be relocated to these countries taking advantage of low labor costs. The speed of AI adoption will also depend on economic development and national security plans. In third world countries there are many political conflicts which make them an attractive market for AI weapons.

Since most of the people in underdeveloped countries work in the informal economy, the adoption of IA will be slow and difficult, which can deter foreign investment.

The high costs of robotization will make these to be integrated in the short and medium term in the large formal industry and the financial sector, which is highly technical. Most companies that are small and medium-sized companies will lag in AI.

Most of the educational systems in these countries have been integrating robotics education since primary education. There are many countries where software designer companies have developed that form the basis for AI developments, such as Brazil and Mexico.

As it happened in Europe after WWII, a factor that will play in favor of wages is the reduction in the birth rate worldwide, especially in the poorest countries. Kearney, Melissa S. and Phillip Levine [19] proved that birth rates decline accelerated with the pandemic. Unfortunately, it must be recognized that one of the causes of low wages in many third world countries is the excess of children and young people.

The difference between the labor markets of cities and the rural sector will continue. Building communication and transportation infrastructure in poor countries is a bottleneck. If the construction of infrastructure required for the internet has been slow and inaccessible in provincial areas, imagine what will happen with the adoption of more complex technologies such as those related to AI, consequently, wages of workers in the rural sector will continue to be lower than those in the urban sectors.

11. Crisis in education systems. In developed countries, especially the United States, rising costs of college education are forcing people to drop out of colleges and pursue education in a community college or get another type of basic education, as college students

receive salaries like those in community colleges. ILO [20] meetings analyze how traditional college education is not attractive to millennials who are geared toward tech professions where higher salaries are earned.

In the educational systems of underdeveloped countries, something similar happens, disenchantment with traditional careers due to the excess of professionals in classical areas and a growing attraction towards technology. But, despite the fact that educational centers are updated relatively quickly in the opening of technology teaching programs, the rate at which the opening of formal companies grows is low, which generates an excess of qualified labor and professional unemployment, forcing the emigration of engineers to developed countries, It is to be hoped that the trend will continue with AI. Colombia crisis 2021: lack of job opportunities, given the high costs to start a formal company that discourages the opening of companies.

12. Youth will continue to be underpaid. The use of children to replace adults during the English Industrial Revolution, is similar to current working conditions in many countries, especially those with high birth rates. The future job market will also keep it in mind: millennials learn technology as children; they are competitive early and able to replace older professionals. They help increase the supply of skilled labor while keeping wages low. Low wages for young people are also supported by the excuse used by employers that young people lack knowledge and experience.

13. Robotization and gender. According to an IMF study [21], robots are used to replace jobs that are repetitive. In some sectors, these jobs are carried out mainly by women, which can increase female unemployment: cleaning, manufacturing, call centers. Frenette and Frank [22] reach the same conclusion in a study for Canada.

There are indications that robotization could increase the gender pay gap. Aksoy, Ozca and Philipp [23] carry out a study taking data from 20 European countries, in which the Impact of the adoption of industrial robots on the gender pay gap. It is shown that robotization increases the salaries of men and women, however, it increases the gender pay gap: a ten percent increase in robotization produces a 1.8 percent increase in the gap. In countries with the largest gap, this tends to increase because men who are currently in jobs with medium and high skills, when receiving help from robots, increase their productivity. Although conditions change from country to country, imagine what can happen in most underdeveloped countries where women hardly have access to education and are exploited in the informal economy, undoubtedly in the third world robotization will increase the gap.

10. Technology Financing Affect the Labor Market

The high rates of professional unemployment characteristic of European countries, OECD [24], may continue as has been evident in recent decades. One of the main causes resides in the financial structure, known as the "German" model, which encourages companies to obtain bank loans as the most accessible way to finance a company, the same happens with start-ups. On the contrary with the "Anglo-Saxon" model, stimulate the opening of new companies with the investment banking process that includes the issuance of shares. The most notable case is that of the United States where the NASDAQ [25] is the exchange where the nascent technology companies are financed. Just remember how the biggest tech companies have been funded: Amazon, Facebook, Tesla, Twitter; the projects of space conquest promoted by Bezos, Musk, Branson, etc. After the Nasdaq they jump to the New York Stock Exchange, or from China to New York, they do not go to the European stock markets. The Chinese opened their own Nasdaq, The Shanghai Stock Exchange STAR Market, officially known as the Shanghai Stock Exchange Science and Technology Innovation Board, is a Chinese science and technology focused equities market established on July 22, 2019. Now the Chinese are opening a third stock exchange in Beijing to serve small and medium-sized businesses BBC [26].

Gómez-Mejía [27] proves that for all levels of technology, companies that are financed with equity issuance are more productive than those that are financed with debt.

Funding is the most important stage of scientific creation. There is no use having ideas if there is no way to turn them into reality. The United States and other countries that follow the Anglo-Saxon model have historically had lower unemployment rates than European countries. In the United States, creatively skilled labor can easily attempt to turn their ideas into a business after they have gone through an investor search process. There are several classes of investors who contribute their capital and experience to the consolidation of the company that will go to obtain capital in the capital markets. In these very favorable conditions for the opening of companies, the supply and demand of qualified labor increases, even, the unemployment rate is not so high during recessions.

Forbes [28] summarizes how Crowdfunding, within Fintech, has become another financing alternative for new technology companies. These perform functions like those of investment funds, only that they do so through the internet. However, crowdfunding does not have the solidity, nor the legal controls that exchanges have, so they can be used by scammers to steal unsuspecting investors. In conclusion, the possibility of achieving low unemployment rates has state and will be directly related to the economic policies and financial institutions that facilitate the financing of AI quickly, safely and at low cost in the achievement of large capitals since AI is highly expensive and requires large capital.

The best example to understand the difference between the Anglo-Saxon and the German model is Latin America. Most of the countries of this continent opted for the German model, that is, the strengthening of bank financing through legislation that stopped the issuance of shares. Latin America

produces many engineers who, due to the lack of financing mechanisms for their projects, since it is impossible to resort to expensive bank loans, choose to emigrate to North America and Europe Latin America is perhaps the continent that most exports human capital to the developed world. Emigration also occurs because the existence of companies with a high technological level is minimal compared to the high supply of qualified labor. Statistics are available in IOM [29] and OAS [30].

Nor is it possible to depend on or believe in the electoral promises of politicians who, during the campaign season, promise to allocate large amounts of capital to help engineers and scientists start their companies. Statistics show that the funds allocated are small. The number of beneficiaries is small compared to what is needed. In addition, it is necessary to bear in mind that in times of fiscal contractions, which almost always occur, the aid disappears.

Since development in AI requires large capital, it is to be expected that the differences in income will increase social conflicts. Historical experience teaches the benefits of democratic capitalism: workers can become shareholders in the companies in which they work. This is the best way that workers can benefit from all robotic and AI developments that fully or partially replace them. But as is well known, most of the countries in the world are led by leaders who do not share this point of view, so it is to be expected that in these countries, not only the social difference will increase but also the lag in front of the countries that successfully fund AI.

11. Conclusion

Mechanization before and the present AI have historically been considered as threats to job stability despite the fact that the statistics on production and employment have shown the opposite. The COVID-19 pandemic in 2020-21 stimulated robotization in all types of goods and services industry in industrialized countries, generating substitution of labor for robots, raising unemployment rates, however, there is evidence of its reduction. Trend studies indicate that robotization will end specific jobs and generate other fields of work, repeating the history of the three previous industrial revolutions. The most recent international political events such as the arms development and the space race demonstrate the growing use of AI for these purposes, which will be an accelerator of robotization with multiplier effects in the goods and services industry. The development of AI requires immediate changes in the reorientation of educational programs towards technological careers, reforms in the liberalization of labor markets with new forms of contracting. AI increases the probability of opening companies, the search for massive mechanisms for financing more efficient technology and cheaper than bank credit and government subsidy. AI adoption also produces negative aspects such as the probable increase in the gender pay gap and the exclusion of those who do not adapt to changes. The gap between high-tech industrialized countries and underdeveloped ones will undoubtedly widen. The latter do not meet the competitive conditions required by the more technified world. Finally, the race for world domination and the special interests of the superpowers will make economic aspects such as unemployment and well-being subordinate to the interests of national security. The growing technological lag of the underdeveloped countries will require that they implement radical and pragmatic changes in their economic policies, including labor and finance.

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