

EDITORIAL

Outbreak: The Role Played by Science

The Covid-19 Pandemic begins in Wuhan. It is considered that the first patients trace back to December 2019 [1]. Since then, the world has experienced, continent by continent, the shock that follows the virus' touch, unraveling what seems to be a conundrum between countries' priorities towards health outcomes as well as economic ones. The novelty of the disease came along with a broad spectrum of approaches toward the global crisis generated by the virus. On one hand, some policies focused on the idea that exposure to the virus would naturally bring immunization to the community, like in the first approach of the United Kingdom. Shortly after, awareness from collapsing health systems would push measures toward a more middle grounded approach.

On the other hand, the idea of total confinement was appealing. This approach raises a couple of issues, as well. The first one is related to the immediate or very short-term economic cost of such measure as well as the medium- and long-term consequences on economic growth and its implications. The second issue is related to immunization or, in this case, the lack of it. We estimate that pure strategies are either not feasible (collapse in the Health System) or not affordable (economic shut down for a considerable period). Therefore, a middle ground approach seems to be a reasonable approach for low income, middle income, or indebted economies. Considering that the virus cycle takes years, a state of fully immunized population would be reached through a strategy that follows a path that avoids the health system collapse and promotes the economic recovery that can afford such a policy. Therefore, the effort needed during these times must prioritize people's wellbeing in two dimensions: Health conditions and Economic conditions.

Economic Perspective

The economic perspective for the world has been cut due to the virus' effect [2-4]. The coronavirus outbreak has impacted economic growth, employment, and poverty all over the world. According to Fitch Ratings, it is expected that the world GDP will contract by 3.9% in 2020, a recession of unprecedented depth since World War II. The present condition would be twice as severe as the 2009 recession. In a similar vein, The Time reports that the European economies are on course for an unprecedented recession due to lockdown measures [2]. Furthermore, the *International Labour Organization* foresees the loss of 12 million full-time jobs in Europe in 2020 due to the Coronavirus outbreak [3]. In the US, unemployment claims increased dramatically. The new applications brought the total number of jobless claims, from mid-March until the beginning of May, to 33.3 million. This phenomenon was the signal that preceded the 14.7% unemployment rate in April 2020. Moreover, young people are especially vulnerable to the negative economic impact of coronavirus. For example, considering the last recession, youth unemployment was impacted deeper than unemployment overall. Early evidence suggests young people's jobs concentrate on the sectors most affected. Therefore, they are more likely to lose their jobs [4]. On top of that, evidence also suggests that a significant period of unemployment can have a damaging impact on young people's long term employment and earning prospects [5]. These are times then, when the world is suffering from economic contraction and unemployment in which youth are specially affected. Additionally, The World Bank estimates that 49 million people will be pushed to extreme poverty due to the impact of the Covid-19 [6]. In this sense, crucial measurements must be done to revert this complex scenario.

Economic Growth and Productivity: Research, Knowledge and technological changes

Economic growth is one of the most powerful tools for reducing poverty, reducing unemployment, and improving the quality of life. Both cross-country research and country case studies provide overwhelming evidence that rapid and sustained growth is critical to making faster progress towards improving poverty and bringing jobs back [7]. It has been shown in literature that differences in productivity explain around 90% of the difference between rich countries and developing countries. It has also been shown that increasing productivity is the most effective way to enhance economic growth [8]. If productivity impacts growth and growth impacts poverty, employment, and the quality of life, then the question that arises is: How to increase productivity? An answer to this question was provided by Paul Romer (Nobel Memorial Prize in Economic Sciences in 2018) and his contribution to the understanding of endogenous growth models. The central idea is that investment in human capital, innovation, and knowledge are crucial contributors to economic growth [8]. Hence, knowledge based on society should be the fundamental pillar to change the global effects of the present pandemic.

Human capital, innovation, and knowledge are determinants of technological changes that determine productivity. Therefore, the role played by Universities and research institutions is crucial not only to surpass the current situation but also to ensure a medium and long term growth path toward recovery. The world is taking a hit. Tough times are ahead of us. However, the theory and evidence show that we are going to recover as fast as we can improve productivity. The harder we invest in human capital, knowledge, and innovations, the faster the growth will be, the quicker we recover.

In a trivially adjusted model from [8] it can be shown that an increase in the fraction of labor-making ideas will increase the growth rate of knowledge. The current situation generates an economic state in which less people are producing output due to the labor cut generated by the outbreak. Moreover, as we mentioned before, the youth population is particularly affected. Using Romer's ideas for endogenous growth we could imagine an alternative state of the economy in which less people produce output, however the fraction of labor-producing ideas is increased, increasing knowledge and pushing technological boundaries. It is unavoidable that the output per capita today jumps down, but the growth rate will increase for all future years. Therefore, the economy would recover faster. Thus, today we face two different paths towards the future. The first one represents the economic evolution in the case where the economy takes the hit, and nothing else is done. In this case, there are immediate negative consequences on GDP, jobs and poverty, but also there will not be fundamental reasons to predict or to expect improvement in the future growth path. The second one relates to the economic evolution when measures are taken today toward increasing human capital and knowledge. Romer model tells us that the immediate negative consequences on GDP, jobs and poverty are unavoidable. However, there are fundamental reasons to predict and to expect a faster recovery.

Investing in human capital today will make future pandemic crises easier to work with. Although, we cannot foresee what the next crisis will be about, we can ensure that we will be better off if right now we begin by supporting science strongly and decidedly. Here's an example to illustrate the point better. In 1968, in the thermal vents of Yellowstone, Thomas Brock, a microbiologist at the University of Wisconsin, discovered a form of bacteria (*Thermus aquaticus*) that can survive at very high temperatures [9]. In 1976, Dr. Alice Chien and others discovered and reported the purification and characterization of DNA polymerase of *thermus aquaticus* [10]. Then, in 1985, Dr. Kary Mullis invented the process known as polymerase chain reaction (PCR) for which he obtained the Nobel Prize Award in Chemistry in 1993. Nearly five decades later, the discovery of *Thermus Aquaticus* has proved to be vital in the process known as the polymerase chain reaction, which is used to duplicate specific pieces of DNA. Today, PCR is the fundamental basis of the world's strategy intended to contain the outbreak. This

essential tool is our first line of defense in this current situation. It is important to notice that this essential tool is here now due to science work that started around fifty years ago.

Finally, it is essential to notice that during the current Coronavirus outbreak, many job positions are suspended, delayed, or definitely lost. This is because the work associated with those jobs is not likely to perform, or not financially feasible. However, academic and research positions are, in most cases, not only viable but necessary. Universities and Research Institutions can pave the road to restore the economy. Moreover, Universities and Research Institutions can make us closer to the proper treatment of the virus. In summary, academic and research jobs, i.e., science, can be the key to recovery and the key to embrace under better conditions future crises.

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