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THE GLOBAL ECONOMIC EFFECTS OF THE COVID-19 PANDEMIC: A BIRD'S-EYE VIEW[**]

'Health is not everything, but without health everything is nothing.'

Arthur Schopenhauer

The aim of the article is to provide a general, broad picture of the economic effects of the COVID-19 pandemic, without going into the details. The impact of the pandemic on economic growth was sharp, with sudden and deep decline,

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followed by complete and swift recovery. Both the supply and the demand side contributed to this dynamic, based on the same factors (morbidity and mortality, behavioural adjustments of individuals, and government pandemic control measures), although with quite distinctive mechanisms of impact. It was the uncertainty of both the supply– and demand-side economic agents that was decisive for the sudden drop in the level of economic activity. Macroeconomic policies, both monetary (quantitative easing) and fiscal (budgetary deficits) proved timely and prevented a global depression. In the aftermath, the side effects of these policies are substantial inflation, increased basic interest rates to counter that inflation, increased sovereign debt, and its threatened sustainability.

Key words: *COVID-19 pandemic*. – *Economic growth*. – *Government control measures*. – *Macroeconomic policies*. – *Inflation*.

1. INTRODUCTION

Since the outbreak of the COVID-19 pandemic, a horrendous volume of academic papers dealing with the economic effects of the pandemic has been published, with a substantial share of them dealing also with the macroeconomic policy responses to the crisis. The production has been so voluminous that even bespoke literature review articles have been published. This article is quite different. It is not a literature review. It is not a chronology of events. It is not a comment on specific government macroeconomic or any other policies designed to cope with the economic effects of the COVID-19 pandemic. The aim of the article is rather modest: to provide only a general broad picture of the economic effects of the COVID-19 pandemic, without going into the details and controversies. In short, it aims to provide a bird's-eye view from a considerable altitude – a sketch, not a detailed oil on canvas painting.

The structure of the article has been defined by this objective. The section following the introduction analyses the demographic impact of the COVID-19 pandemic, focusing only on the demographic effects that have significant economic impact. The third section of the article deals with the impact of the pandemic on economic growth. The fourth section of the article considers the supply-side impact of the pandemics as the explanation of the volatility of the level of economic activity. The fifth section deals with a complementary explanation based on the demand-side impact of the pandemic. The following section of the article considers the impact of the

pandemic on poverty and economic inequality. The seventh section deals with the macroeconomic policies that were enforced during the pandemic and their legacy. The eight section concludes the article.

2. DEMOGRAPHIC IMPACT OF COVID-19 PANDEMIC

Although the subject of the paper is the economic effects of COVID-19 pandemic, the most significant of all impacts of the pandemic is its demographic effect – it is, after all, about human lives and health. Furthermore, the demographic effects have their own consequences on economic activity and growth, both on the supply side (labour and human capital supply on the production factor market) and on the demand side (consumption of goods and services). Accordingly, the demographic effects of the pandemic will be considered first.

2.1. Morbidity Rates

Total (cumulative) number of confirmed cases of COVID-19 woldwide, as of 15 October 2022, was almost 621million (620,878,405), according to the WHO.[1] There are two important remarks. On the one hand, this figure does not represent the number of people who contracted the disease, as some individuals contracted COVID-19 more than once. The number of cases is inevitably greater than the number of people who contracted the disease. On the other hand, the number of cases is indisputably underreported for a number of reasons, especially as testing has not been universally available, particularly during the period immediately following the outbreak of the pandemic (Lau *et al*. 2021; Whitaker *et al*. 2021). Furthermore, a substantial number of people who contracted the disease did not get tested or did not report the disease to the healthcare authorities, so these cases of COVID-19 have not been recorded. Finally, there is noise in reporting of the national health institutions to the WHO that has been downward biased.[2] Accordingly, all the biases in case reporting are downward, hence it is reasonable to

[1] *https://covid19.who.int/* (last visited 15 October, 2022). This date is a cut-off date for the demographic analyses in this article unless specified otherwise.

[2] As demonstrated by Richards (2020), this is especially the case in poor (developing) countries and their reporting to the WHO.

assume that the total number of COVID-19 cases is underreported. The expert opinion expressed in the WHO report is that the magnitude of underreporting is about 40 per cent (WHO 2021).

The global level morbidity rate of the COVID-19 pandemic is at this moment 2.83 per cent.[3] This is comparable with estimates of the Spanish flu pandemic, based on the estimate that the total number of the cases was around 500 million (Taubenberger, Morens 2006, 15), making the morbidity rate of that pandemic around 27 per cent.[4] Nonetheless, there is no room for jumping to the conclusion that the Spanish flu was 9.5 times more widespread, for a few reasons. First, the COVID-19 pandemic is still ongoing, with increasing cumulative total number of cases, possibly increasing the global morbidity rate.[5] Second, the number of recorded cases is biased downwards, implying that the true morbidity rate of the COVID-19 pandemic is already higher than recorded. Third, the estimated morbidity rate of the Spanish flu pandemic is only an expert opinion, rather than an estimate based only on solid health statistics and properly defined reporting procedures.

As to the global dynamics of the COVID-19 cases, two undisputed peaks of the pandemic can be identified (end of January 2022 and end of July 2022) for the time being (Figure 1).

It is an open question whether this dynamic is accurate, because of the downward bias in the recorded cases; the point is that the downward bias, making the true number of cases greater, is not constant in time. It is reasonable to assume that the downward bias was the greatest at the beginning of the pandemic, as there were no available tests in sufficient quantity and the symptoms of the disease were not well known to physicians, as medical protocols had not been developed yet. Hence, it is reasonable to assume that the left segment of the curve (Figure 1), referring to 2020, is in fact higher than the one disclosed on the figure, more than right segment of the curve, the referring to 2021.

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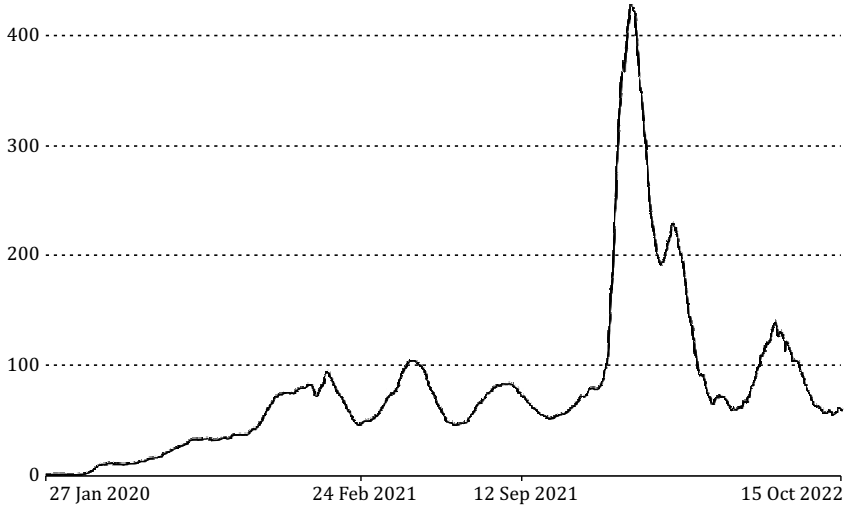
[3] The total world population estimate for 1 January 2020 was around 7,753 million and for 15 October 2022 it was around 7,980 million people. (Worldometer. Current Population. *https://www.worldometers.info/world-population/* (last visited 15 October, 2022). That yields around 21,973 million person-years of exposure to the pandemic, as of 15 October 2022.

[4] The most reliable estimate for the total world population in 1920 is 1.863 million (Maddison 2003). The time span of the Spanish flu was approximately one year; hence the same figure is a good approximation for the person-years of exposure of the population in that pandemic.

[5] It is calculated by using person-years of exposure to the pandemic, as the denominator in the rate calculation. Hence if the population increases faster than the number of cases, the morbidity rate declines.

Figure 1.
Total daily new confirmed COVID-19 cases per million people worldwide
(7 day rolling average)



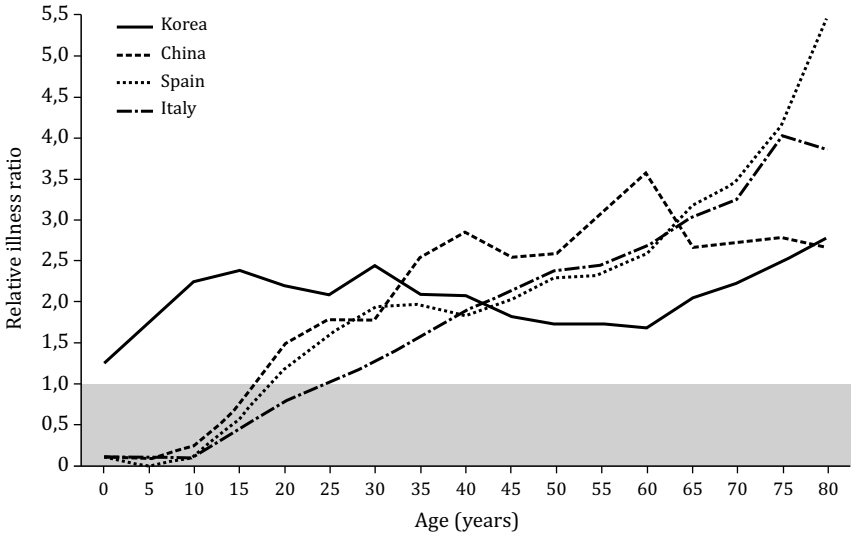
Source: John Hopkins University CSEE COVID-19 Data

The comparison of the morbidity rates across countries cannot provide reliable results because the downward bias in reporting cases of COVID-19 differs from country to country. The availability of the COVID-19 tests has been different, population density is different, the levels of development and coverage of health services differs, and the culture of visiting/calling medical staff varies, as well as the reliability and integrity of national health statistics, hence it would be very misleading to compare the morbidity rates across countries. It is evident and striking that rich (developed) countries have recorded morbidity rates substantially and consistently higher than those recorded in poor (developing) countries.[6] This can be explained only by systematic underreporting of the COVID-19 cases in the poor (developing) countries – nothing to do with the real morbidity rates variance across countries.

[6] Source: *https://covid19.who.int/table* (last visited 15 October, 2022). Even within the EU, the highest morbidity rates were recorded in richest countries (Austria 59.6 per cent and Denmark 57.0 per cent) while the lowest morbidity rate was recorded in the poorest country of the club (Bulgaria, only 18.2 per cent).

Considering the economic impact of morbidity, it is primarily relevant for supply of labour as the people who contract the disease cannot work during the illness and immediate post-illness recovery, and in that way the pandemic related morbidity implies contraction of the global supply of goods and services. Accordingly, the first important piece of information is the time span of illness and post-illness recovery from COVID-19. Although, there is a variation of the time span of illness in the case of COVID-19, it is, in most cases, a matter of weeks, so the time span is rather short, especially when compared to HIV/AIDS, malaria, tuberculosis as widespread diseases, particularly in developing countries. Taking such a time span of the illness into account, the global short run effects of morbidity COVID-19 on the labour supply have not been significant. This is not to say that in some sectors, especially sectors facing an increase in demand, such as healthcare sector, COVID-19 morbidity did not have significant labour supply diminishing effects (medical doctors, nurses, and other healthcare personal), particularly in the times of peak demand. The same conjecture can be made for courier services and delivery of meals/food/merchandise, although these jobs do not require high and specific human capital, like healthcare jobs, hence the labour supply substitution prospects are much bigger.

Figure 2.
Relative illness ratio by 5-year age groups for selected countries in the first half of 2022



Source: Kang, Jung (2020, 157). Relative illness ratio is a measure of morbidity calculated as the share of COVID-19 cases in each group in the total number of morbidity cases divided by the share of the population in the same age group.

Another important piece of information for considering the labour supply effects of the pandemic is age structure of the people who contracted COVID-19. The statistics on the age structure of the COVID-19 are scarce, and they differ from country to country, but according to available data, it is predominantly older people, too old to be in the labour force, who contracted COVID-19 (Figure 2). The only exception has been South Korea, with a relatively flat curve, and the curve for China is not as steep as those for Spain and Italy.

Taking this into account, it seems that the global short run effects of the COVID-19 pandemic on the labour supply due to morbidity have not been substantial. The main reason for such an outcome is basically the short time span of the illness. The question remains whether the COVID-19 mortality produced a substantial effect on the labour supply. Hence, the attention should be redirected to the mortality associated with COVID-19.

2.2. Mortality Rates

Total number of recorded deaths from the COVID-19, as of 15 October 2022, was 6,543,138, according to the WHO. Taking into account that the estimate of the total world population on the same day was around 7,918 million people, and on the 1 January 2020 (the beginning of the pandemic) it was 7,877 million people, this yields a global mortality rate (the ratio of number of deaths to the world population during the pandemic, measured as person-years of exposure for the period) of 0.0379 per cent, for the time being.[7] This mortality rate is far below the mortality rate of the Spanish flu – though calculated using quite a different method, that was estimated to be 2.1 per cent – the Spanish flu mortality rate was around 55 times higher than the current COVID-19 mortality rate.[8] Furthermore, taking into account that the total number of recorded cases as of 15 October 2022 was around

[7] This is the 'crude mortality rate', entailing the total population, contrary to some specific mortality rates, such as infant mortality rate, etc. All mortality rates considered in this paper are crude mortality rates.

[8] This calculation is based on the estimate that the total number of deaths from Spanish flu was 40 million (Barro, Ursua, Weng 2020, 21), although this estimate is not comparable to the reported cases of COVID-19 deaths, because it is the excess mortality number, rather than the (missing) number of recorded deaths caused by the Spanish flu. Furthermore, this is an expert opinion, not an estimate based on vital statistics. Begović (2021) reviews various estimates of Spanish flu excess mortality. It is the following segment of this section of the paper that addresses the concept of excess mortality.

621 million, the average fatality rate of 1.05 per cent is much lower than most serious viral and bacterial diseases.[9] For example, the Ebola average fatality rate is around 50 per cent.[10]

There are several reasons why the data on the recorded number of deaths from COVID-19 are not accurate and why there is a great probability that the mortality figures are biased downward, i.e. that the true number of deaths from COVID-19 is greater than the reported number. The first reason for the bias is that some countries report only COVID-19 deaths occurring in hospitals and people who die from the disease at home are not or at least may not be recorded. This bias is especially prominent in countries/regions with limited hospital capacities and in which the level of hospitalisation of the patients (in-patients) who have contracted COVID-19 has been low. The second reason for downward bias is that most countries report only deaths for which a positive COVID-19 test had confirmed that the deceased patient was infected with the virus.[11] Accordingly, untested deceased individuals may not be included in the recorded COVID-19 deaths. Third, death reporting systems as a part of health statistics are frequently, especially in poor countries without well-developed health statistical reporting, insufficient to accurately measure mortality, i.e. the cause of the *exitus letalis*. This inability decreases the share of the recorded deaths that are attributed to a specific cause/disease, decreasing the number of recorded COVID-19 deaths. Finally, the number of recorded COVID-19 deaths has been manipulated by governments for political propaganda and public relations purpose, releasing doctored downward biased data, usually to demonstrate to the public that they are more efficient in coping with the pandemic than they actually were (Wang *et al*. 2022). All these deviations have the same direction of the error – downward bias.[12] Accordingly, it is reasonable to assume that the true number of the COVID-19 deaths is significantly greater than the recorded number, i.e. that the number of recorded COVID-19 cases is not accurate.

[9] Even though the fatality rate is overestimated, as many COVID-19 cases have not been diagnosed and reported (Angelopoulus *et al*. 2020; Mathieu *et al*. 2020), the true magnitude of the bias is unknown as the data on unreported cases of COVID-19 are not available, though, as already pointed out, the expert opinion expressed in the WHO report is that the magnitude of underreporting is 40 per cent.

[10] World Health Organization. 2021. Ebola virus disease. *https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease* (last visited 15 October, 2022).

[11] Mathieu *et al*. (2020) provide more details about mechanisms of these measurements. *https://ourworldindata.org/excess-mortality-covid#estimated-excess-mortality-from-the-world-health-organization* (last visited 15 October, 2022).

[12] Diagnostic errors are not listed because it is assumed that they are random and therefore unbiased. In principle, the probability of a false positive diagnosis is equal to the probability of a false negative. Accordingly, these errors do not contribute to the downward bias in reporting.

Even if the number of recorded COVID-19 deaths was accurate, let us suppose that, for the sake of argument, it would be an indicator only of the mortality directly caused by COVID-19 pandemic, completely neglecting mortality indirectly caused by the pandemic, the mortality that would not have happened without the pandemic. The pandemic, with the overburdening of the healthcare system, undermined the provision of other healthcare services – it reduced supply of the treatment of other completely non-related to COVID-19 diseases. General hospitals and specialised non-COVID-19 hospitals were converted to COVID-19 facilities, hence both capital (healthcare premises and equipment) and labour (healthcare personnel) have been reallocated from providing healthcare in all other cases to providing healthcare for people who contracted COVID-19, as demonstrated by Fetzer and Rauh (2022).[13] That means that insufficient medical treatment was available for curable diseases, including, for example, open heart and other surgeries, which increased mortality of these diseases. Furthermore, due to the perceived limited provision of non-COVID-19 healthcare services and asymmetry of information, fewer people sought treatment for non-COVID-19 diseases although it was provided, especially in cases of chronic diseases where deaths could be avoided with proper treatment (cardiovascular conditions, respiratory diseases, HIV/AIDS, malaria, tuberculosis, etc.).

The other side-effect of the pandemic was a thorough change in lifestyle due to the pandemic. There have been two reasons for that change. The first one are the widespread non-pharmaceutical precautionary government pandemic control measures, like social distancing and various types of lockdowns, including even curfews in some areas, during certain periods of the pandemic, especially early on, when no vaccines were available. The second one is voluntary behaviour restrictions that people imposed on themselves in fear of contracting COVID-19. These lifestyle changes have caused two countervailing effects on mortality that were caused by COVID-19 pandemic. On the one hand, the lack of regular recreational physical exercise, either due to lockdowns or to fear from contagion, led to the deterioration of the health of many people with chronical diseases, like cardio-vascular conditions, and their premature death, consequently increasing mortality. On the other hand, lockdowns prevented the contraction of other infectious diseases with possible lethal outcomes, such as influenza

[13] The capacity of the health care system is fixed in the short run, primarily due to the inflexible supply of specialised labour (medical doctors and nurses), hence the change means only reallocation of available capital and human resources from one use within the healthcare system to another.

(flu),[14] and decreased mortality of traffic, mainly road accidents, due to travel restrictions, as demonstrated by Oguzoglu (2020). Furthermore, because of the decreased level of economic activity due to the pandemic, the level of air pollution dropped, pushing down the number of deaths due to chronic respiratory diseases (Bourzac 2020; He *et a*l. 2020). Because these indirect effects of the pandemic are countervailing, which one is dominant is an empirical question and the answer differs from one country to the other.[15]

From the viewpoint of economics, and perhaps not only economics, the crucial issue is the total loss of life due to the pandemic, meaning mortality both due to the direct and indirect effects of the COVID-19 pandemic. In short, the mortality that is relevant for considering both the supply-side and the demand-side effects of the pandemic is the mortality that would not have happened without pandemic. That is precisely the excess mortality.

2.3. Excess Mortality Rates

The excess mortality concept is based on counterfactual reasoning because it represents the difference between actual (recorded) mortality, regardless of the cause of death, and the mortality that would have been achieved, again regardless of the cause of death, without the pandemic (Wang *et al*. 2022, 1514). Accordingly, the rationale of the measure is to encompass total net mortality due to the pandemic, regardless of the specific cause of death. In that way both the direct and indirect effects of the COVID-19 pandemic on mortality are included.

[14] As pointed in Mathieu *et al*. (2020), because COVID-19 'competes' with other causes of death, such as the flu, this means that COVID-19 deaths are not by default excess deaths. It is possible for there to be more confirmed COVID-19 deaths than excess deaths, and in fact it is also possible to have confirmed COVID-19 deaths without *any* excess deaths. The drop of excess death during some periods in some countries is explained by frail individuals who died from COVID-19 earlier in the year who might have otherwise died from their chronical diseases, such as heart disease, respiratory diseases, etc. (Schwartz *et al*. 2020).

[15] Brodeur *et al*. (2021) points out that there is heterogeneity across countries regrading population compliance with the government lockdown policies and reviews the literature that addresses the factors of that heterogeneity (Coelho *et al*. 2020; Fan *et al*. 2020). Whatever the factors may be, it is important to distinguish between nominal lockdowns and effective lockdowns. The findings regarding the economic effects of the lockdowns are based only on the effective lockdowns.

Data on all-cause mortality is much more reliable than specific COVID-19 deaths records, but since this is a counterfactual analysis, the data on mortality without the pandemic is not available and must be estimated, with a substantial number of methodological challenges.[16] It was Wang *et al*. 2022 that produced the most reliable estimate of global mortality without the pandemic, using a bottom-up approach based on the estimates for all countries and territories, obtained through six regression models, each of them selected for a country/territory according to its specific demographic features. The mean values of the estimated excess mortality, as well as the 95 per cent confidence intervals, were generated for the national, regional, and global levels.

The results of this estimates are for the period from 1 January 2020 to 31 December 2021. During that period the total number of reported COVID-19 deaths was 5.946 million worldwide, but the estimate in Wang *et al*. (2022, 1518) indicates an excess mortality of 18.2 million people, implying that the ratio between excess mortality and reported COVID-19 mortality on the global level is 3.07.[17] This means that the excess mortality rate of the pandemic is, or more precisely, on 31 December 2021 was 0.1161 per cent, while the mortality rate based on the recorded COVID-19 deaths was 0.0379 per cent. The estimated value of the COVID-19 excess mortality rate, compared to the expert opinion of the excess mortality rate of the Spanish flu (2.1 per cent) demonstrates that the Spanish flu pandemic was (for the time being) 55 times more deadly.

Excess mortality rates significantly differ from country to country, providing evidence of significantly different national patterns of the COVID-19 pandemic and distinctive conditions relevant for health outcomes: capacity and resilience of the healthcare system, vaccination effort and its reception among population, public policies of social distancing and lockdowns, preferences of the population for social distancing, etc. The country with the highest excess mortality rate was Bolivia (0.7349 per cent) followed by Bulgaria (0.6473 per cent) and North Macedonia (0.5836 per cent), while

[16] Begović (2021) reviews these challenges in the case of the Spanish flu pandemic, considering that the pandemic started during the major demographic impact event – the First World War. It was Murray *et al*. (2006) who addressed these challenges in the most consistent manner.

[17] This is the mean estimate. The estimate with a 95 per cent confidence interval is from 17.1 million to 19.6 million. This means that the probability is 95 per cent that the excess mortality figure is within this range. The corresponding probability that the global ratio between excess mortality and reported COVID-19 mortality is from 2.88 to 3.30.

Iceland, Australia, Singapore, New Zealand, and Taiwan (province of China) had negative excess mortality rates, meaning that the behavioural changes due to the pandemic, and strict lockdown measures, including severe traveling restrictions, reduced mortality more than it was increased by the COVID-19 deaths. As for the excess mortality rates in the small sample of the countries with substantial population, China recorded 0.0006 per cent,[18] India 0.1525 per cent, the United States of America 0.1793 per cent, and Russia 0.3746 per cent.

Because there is no linear relation between mortality and excess mortality, and because the factors that influence excess mortality, as well as the intensity of their impact, differ from country to country, the ratio between excess mortality rates and mortality rates based on reported COVID-19 deaths varies significantly across countries. There is a substantial heterogeneity in epidemiological profiles among countries, already mentioned distinctive conditions regarding the health outcomes, as well as heterogeneity regarding the downward bias in reporting of COVID-19 cases, i.e. manipulation of the data by governments for public relation purposes. In some cases the ratio is so high (Tanzania 178.9, Nicaragua 149.9, Burundi 126.9, Tajikistan 115.8, South Sudan 109.0, Eritrea 94.9, Chad 83.9, Burkina Faso 67.1, Somalia 66.8, etc.) that it can only be explained by faulty national reporting system for COVID-19 deaths. Whether this is the consequence of the poor effectiveness of the system itself, because it is not well developed, or deliberate government policy, with public relations aims, cannot be answered without delving into the specific details of each of these countries.

The only other study of the global excess mortality comparable to Wang *et al*. (2022) is the one conducted by *The Economist*.[19] This research resulted in quite similar estimates of global excess mortality due to the pandemic: 18.0 million people (200,000 less) with a somewhat wider 95 per cent confidence interval. Nonetheless, due to different applied methodologies, there are substantial differences in estimates at the country level. Perhaps the most

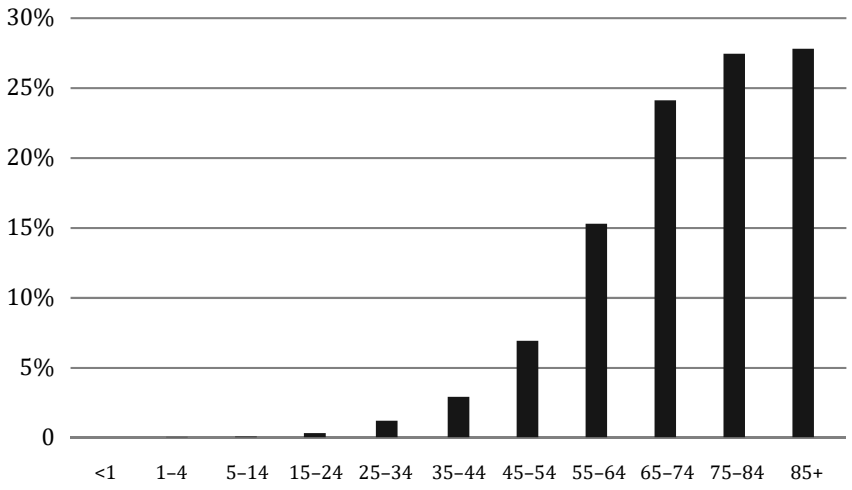
[18] Rather early and draconian lockdowns in China prevented the spread of the virus from Hubei province, where the city of Wuhan is located and in which 94 per cent of all excessive death in China are estimated to be, but also it enabled rather low national level of excessive mortality rate.

[19] *The Economist*. 2022. The pandemic's true death toll. *https://www.economist.com/graphic-detail/coronavirus-excess-deaths-estimates* (last visited 15 October 2022). This is ongoing research, hence the results disclosed on the web page are continuously updated and are not related to the results provided in this article, which refers to the results on 31 December 2021, i.e. results comparable to Wang *et al*. (2022).

important is China, where *The Economist* estimates of the excess mortality is 23 times higher than according to Wang *et al*. (2022).[20] The cases of the countries with lower excess mortality estimates provide for the convergence of the global estimates of the pandemic-related excess mortality between the two research endeavours.

The third research endeavour in the field of excess mortality is being pursued by the WHO.[21] The global estimate of the excess mortality is somewhat lower than in the two previous studies – 14.9 million people, with the lower 95 per cent bound of 13.2 million and the upper bound of 16.6 million. It is expected that all three studies will continue and that the estimates for 31 December 2022 will be available. That will resolve whether there is convergence of the results or not.[22]

Figure 3. Age structure of mortality in the USA



Source: CDC, *https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm#SexAndAge*

[20] Even if *The Economist* estimate is accurate, China's excessive mortality rate is still very low, more than 6 times lower than the global average.

[21] World Health Organization. 2021. Global excess deaths associated with COVID-19 (modelled estimates). *https://www.who.int/data/sets/global-excess-deaths-associated-with-covid-19-modelled-estimates* (last visited on 15 October 2021).

[22] It is worth noting that only results of research done by Wang *et al*. (2022) are peer reviewed and published in the most respectable academic journal with clear and unambiguous description of the methodology.

As previously mentioned, it is excessive mortality that is relevant when considering economic effects of the pandemic, both in terms of labour supply and aggregate demand. Nonetheless, for labour supply, the critical information is the age structure of the excess mortality, as it provides intelligence on loss of the working age population. The only way to get that information is to analyse the age structure of reported deaths, i.e. reported mortality, and to assume that the age structure of the reported mortality equals the structure of excess mortality.

The most reliable available data on the age structure of reported deaths is from the USA (Figure 3).

The most important conclusion is that deaths of the people who are the core of the labour force (15–64 years) is only 25% of all deaths. The age structure of deaths is heavily tilted towards older people – over the age of 65 – already (to the great extent) out of the labour force. This is quite distinctive from the age structure of deaths during Spanish flu, in which most of the victims were not only of the working age, but also at the most productive age. Accordingly, due to the rather low excess mortality rate, substantially lower than the Spanish flu pandemic, and an age structure heavily tilted towards people out of labour force, the COVID-19 pandemic has not produced – for the time being and in the short run – a significant decline of the working age population and therefore has not significantly decreased the global supply of labour as production factor.[23]

Although it is evident that excess mortality is the demographic indicator that is relevant for the consideration of the economic effects of the COVID-19 pandemic, it is of utmost importance to understand the relative contribution of the factors to excess mortality, how that contribution pattern varies across countries and what are the factors that influence the pattern (Wang *et al*. 2020). Nonetheless, available estimates on excess mortality provide a solid foundation for analysing economic effects of COVID-19 pandemic.

[23] Bloom, Khoury *et al*. (2020) emphasises the often unmeasurable and disregarded economic contribution of older people, such as daily care for their grandchildren. With high mortality of the older people, their care services would have to be replaced by people from the labour force, undermining the effective supply of labour on the production factors market, as an indirect effect.

3. THE IMPACT OF THE COVID-19 PANDEMIC ON ECONOMIC GROWTH

The impact of the COVID-19 pandemic on the level of economic activity and economic growth will first be analysed in this section of the article and then the mechanisms of that impact will be analysed in the following two. The macroeconomic impact of the pandemic is disclosed by comparing economic growth rates for selected years (Table 1).

Table 1.
Economic growth rates 2018–2022 for the world, groups of countries and selected countries (per cent)

	2018	2019	2020	2021	2022
World output	3.6	2.8	-3.1	6.0	3.2
Advanced economies	2.3	1.7	-4.5	5.2	2.4
USA	2.9	2.2	-3.4	5.7	1.6
Euro Area	1.9	1.3	-6.3	5.2	3.1
Germany	1.5	0.6	-4.6	2.6	1.5
France	1.7	1.5	-8.0	6.8	2.5
Italy	0.9	0.3	-8.9	6.6	3.2
United Kingdom	1.4	1.5	-9.8	7.4	3.6
Japan	0.8	0.7	-4.6	1.7	1.7
Emerging markets and Developing economies	4.5	3.7	-2.1	6.6	3.7
Emerging and developing Europe	3.1	2.1	-2.0	6.8	3.7
Emerging and developing Asia	6.4	5.5	-0.8	7.2	4.4
Latin America	1.0	0.0	-7.0	6.9	3.5
Middle East	1.9	1.4	-2.8	4.5	5.0
Sub-Saharan Africa	3.2	3.2	-1.7	4.7	3.6
China	6.6	6.1	2.3	8.1	3.2
India	6.8	4.2	-7.3	8.7	6.8

	2018	2019	2020	2021	2022
Russia	2.3	1.3	-3.0	4.7	-3.4
Brazil	1.1	1.1	-4.1	4.6	2.8
South Africa	0.8	0.2	-6.4	4.9	2.1

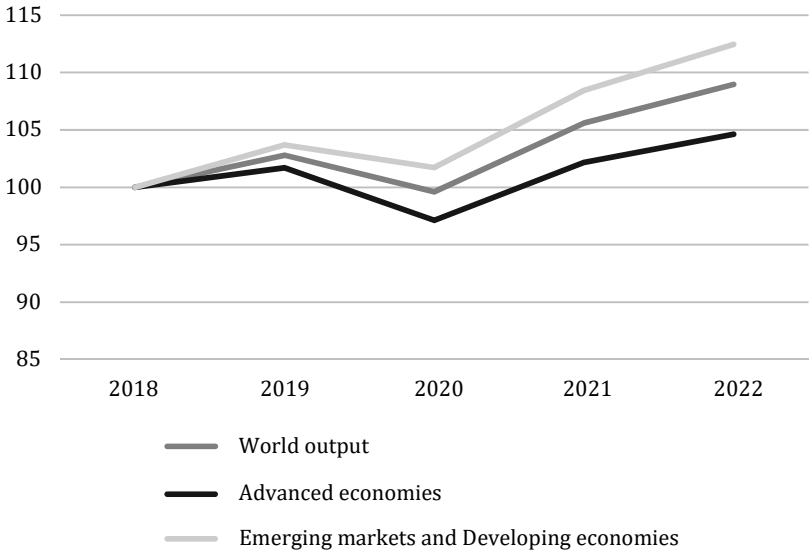
Source: IMF (2020), IMF (2021), IMF (2022a). Figures for 2022 are projections released by the IMF (2022a) in October 2022.

As January 2020 is considered the first pandemic month, the economic growth rate from 2019 is a reference growth rate for considering the economic effects of the COVID-19 pandemic, especially taking into account that this year was the year of rather sluggish economic growth compared to the previous year – 2018. The global 2019 growth rate, i.e. the growth rate of the world output, was significantly lower, as were the growth rates of all selected regions (save one with the equal growth rate), and almost all selected countries. The point is that in 2019 the world economy was already slowing down, for reasons that are beyond the scope of this article. The point is, however, that the growth rates in 2019 were not exceptional high – on the contrary, they were rather low, which make them an appropriate benchmark for considering the economic effects of COVID-19 pandemics.

The pandemic had substantial effects of on economic growth. Global growth rate dropped 5.9 per cent points (from 2.8 per cent to –3.1 per cent), growth rate of advanced economics dropped slightly more – 6.2 per cent points (from 1.7 per cent to –4.5 per cent) – and the growth rate of emerging markets and developing economics slightly less – 5.8 per cent points (from 3.7 per cent to –2.1 per cent). The only selected country that recorded a positive growth rate was China (2.3 per cent) but experiencing a growth rate drop of 3.8 per cent points (China's growth rate in 2020 was only 38 per cent of its growth rate in 2019). In short, sharp and substantial decline of economic activity was recorded in 2020 as a consequence of the outbreak of the COVID-19 pandemic.

This was followed by similar sharp and substantial recovery in 2020, with the growth rate of world output at 6.0 per cent in 2021 (5.2 per cent in advanced economies and 6.6. per cent in emerging markets and developing economies). The level of the world output in 2021 was higher than in 2019 – full recovery was achieved, even in the case of advanced economies with more modest growth rates in 2020 than the global one. The dynamics of the world output, as well as the output of the two groups of nations (advanced economies, on one hand, and emerging markets and developing economies, on the other), perfectly follows a V-shaped curve (Figure 4).

Figure 4.
Dynamics of the aggregate output 2018–2022



Source: IMF (2020), IMF (2021), IMF (2022a). Figures for 2022 are projections released by the IMF (2022a) in October 2022.

This dynamic demonstrates that swift recovery of the world economy occurred without the end of the COVID-19 pandemic, as it was still ongoing at the time this article went to press. The recovery in 2021 is the consequence of introduction and adjustments of government policies, both macroeconomic and pandemic control, adjustments of economic agents and introduction of vaccination. Some of these adjustments, which lead to the recovery, and the sources of severe decline of the world output that preceded them, are to be considered in the following chapter, but for now only changes in the volume of international trade will be analysed. Changes in that volume were more intense than the changes of the output, both in terms of contraction in 2020 and recovery in 2021 (Table 2).

It is evident that the drop in the volume of foreign trade was much harder than the drop of the output, as well as that its recovery was more intense than the recovery of the output. Apparently, international trade was more vulnerable to the COVID-19 pandemic than the output, i.e. the level of economic activity.

Having sketched the world economy dynamics at the time of COVID-19 pandemic, the analysis of the factors that shaped the observed dynamics and the mechanisms of their impact will follow. Supply side factors and mechanisms will be considered first.

Table 2.
Volume of the international trade (annual growth rates) for world and groups of countries (per cents)

	2018	2019	2020	2021	2022
World Trade Volume (goods and services)	3.6	1.0	-8.2	10.1	4.3
Advanced economies (import)	3.0	1.7	-9.0	9.5	6.0
Advanced economies (export)	3.1	1.3	-9.4	8.7	4.2
Emerging markets and Developing economies (import)	5.1	-0.6	-8.0	11.8	2.4
Emerging markets and Developing economies (export)	3.9	0.9	-5.2	11.8	3.3

Source: IMF (2020), IMF (2021), IMF (2022a). Figures for 2022 are projections released by the IMF (2022a) in October 2022.

4. THE SUPPLY SIDE OF THE COVID-19 PANDEMIC IMPACT

There are several sources of effects of the COVID-19 pandemic on the supply side, i.e. the decreasing aggregate supply, irrespectively of the change in aggregate demand, thus decreasing the level of output. They are: (1) morbidity and mortality, (2) behavioural effects of the pandemic, and (3) government pandemic control measures. All of them will be considered in both the short run and the long run.

The first one is morbidity and mortality of the COVID-19 pandemic. It is intuitive to conclude that both morbidity (in the short run) and mortality (in the long run) decrease the supply of labour. This conclusion applies also to the human capital that is temporarily (morbidity) or permanently (mortality) lost from the production process. This intuitive finding is confirmed by the human capital augmented production function model (Bloom, Kuhn, Prettner 2022) adjusted to accommodate disease of interest, along the lines of the basic model (Lucas 1988).

Although this mechanism of aggregate supply drop is theoretically well established, it proved to be rather negligible in the COVID-19 pandemic. In the case of morbidity, the short time span of the COVID-19 did not significantly affect the aggregate supply of labour. As already pointed out, this is not to say that in some cases there was a substantial temporary and sectoral shortage

of labour decreasing the level of that specific output, especially in the health services. As to the mortality of the COVID-19, for the time being it has not generated significant shortage of labour for two reasons. First, the excess mortality of COVID-19, which is the only relevant mortality for the labour supply considerations, has been rather low (0.0379 per cent), much lower that the excess mortality of the Spanish flu (2.1 per cent), for example. The other reason is that 75 per cent of the deaths are people over 65 years of age, i.e. people who (to a great extent) had already been out of the labour force. According to these findings, the loss of human capital at the global level, i.e. the decline in supply of human capital, is also not significant.[24]

Economic historiography has demonstrated that huge mortality rates (like the Black Death bubonic plague pandemic) substantially decreased the supply of labour, pushing wages up and providing incentives for change of the capital-to-labour ratio, substituting labour with capital (Clark 2007; Jedwab, Johnson, Koyama 2022). This push of wages have not been recorded during the COVID-19 pandemic, hence the substitution of labour with capital in the cases where it has happened has not been caused by morbidity and mortality.

The long run effects of the COVID-19 pandemic on the supply of labour human capital are still unknown but should not be downplayed. Although there is some anecdotal evidence that prolonged COVID-19 can affect productivity of labour and even human capital (Lagadionu *et al.* 2021), there has been no systematic exploration of the subject for the time being. Especially missing are the results on the long run effects of COVID-19 on human capital since the outbreak of the pandemic was less than three years ago. It was demonstrated, by empirical evidence that supported the Fetal origins hypothesis in the case of Spanish flu (Almond 2006), that the detrimental effects of pandemic on human capital can occur decades later. It is still early to judge what will be the long run effects, if any, of COVID-19 on human capital and the effective supply of labour in the future.

The second source of decreasing aggregate supply is behavioural effects of the COVID-19 pandemic, as people, considered as labour force, voluntarily changed their behaviour with the outbreak of the pandemic and the prospects of contracting the disease. It is important to distinguish voluntary change of behaviour, considered as the second source of decreasing aggregate supply, from the changes of behaviour induced by government measures, such as

[24] People above 65 years have substantial human capital in terms of education and experience, but their human capital is generally not supplied to the labour market. Nonetheless, their human capital, in terms of good health, is usually depleted, due to their age.

mandatory social distancing and lockdowns. The point is that even without government pandemic control measures, the behaviour of the economic agents would change.

These behavioural responses were encompassed by a formal model (Eichenbaum, Rebelo, Trabandt 2020; Bloom, Kuhn, Prettner 2022), based on the standard microeconomic model of individual's rational behaviour aimed at utility maximisation. Although preventive activities (social distancing, purchasing of protective gear, etc.) generates disutility, they increase expected utility of noncontracting COVID-19 and all the consequences. Each individual selects their own equilibrium level of preventive measures, such as social distancing, with countervailing effects. Though this outcome has more severe impact on consumption and aggregate demand (to be considered in the next chapter), it also affects the labour supply, as the priority of social distancing made people with such preferences to leave the labour market, if certain adjustment was not possible.

As to the adjustments in the labour market, the labour supply is very heterogenous with some people/jobs easily switching to working from home and others sticking to their workplaces, mainly those in personal services industries. This division has been recorded between people with substantial human capital, college educated people, engaged in nonrepetitive jobs, on the one hand, for whom it was easy to switch to working from home, and people with low human capital, without college education, on the other, engaged in more or less repetitive jobs, for whom it was virtually impossible to switch – it was predominantly the latter who left the labour market.[25] With a high wage educational premium, at least in advanced economies, this development has had a significant impact on income inequality, which will be considered below.

The long run effects of social distancing on the aggregate supply and production process are still unclear. It is evident that Internet-based communications provided a reliable framework not only for education and working from home, but also for many forms of efficient and cost-cutting business communications. During the pandemics, the early IT glitches were sorted out, so this technology proved itself. Accordingly, the death of the office has been announced,[26] and even the future of the city has been questioned

[25] That is especially true in the case of informal employment in such jobs, as no government-induced restrictions or costs to the employer can be applied – labour shedding has been much easier for the employer in these cases.

[26] Catherine Nixey. 2020. Death of the office. *The Economist. https://www.economist.com/1843/2020/04/29/death-of-the-office* (last visited 15 October, 2022).

(Glaeser, Cutler 2021). Furthermore, there is transformation of many service industries, with online cultural, sport and entertainment events, including online sightseeing tours across the world (Barrero, Bloom, Davis 2022). Obviously, the (innovation technology) seeds of these developments had already been planted – it was the pandemic that made them to grow.

The third and possibly the most important source of effects of COVID-19 pandemic on the aggregate supply are government pandemic control measures: compulsory social distancing and lockdowns, including border closures. These measures affected not only the labour supply, but predominantly business decisions. As to the compulsory social distancing, many of the services (culture, entertainment, hospitality, sports, tourism & travel, some segments of education) were affected by the outright ban or limited supply quotas during certain stages of the pandemic, especially its early stage. Lockdown restriction increased the cost of travel and transportation, and severely affected international supply chains of the modern global economy. During the pandemic, globalised and highly segmented production chains that dominate modern manufacturing (Baldwin 2016) proved to be very vulnerable to logistics, and lockdowns proved to be effective constraint to such logistics, in terms of transportation of either inputs or outputs. That is the reason why global industrial output crucially depends on the lockdowns in China, because a huge number of intermediary products (components) manufacturers are located in that country.

As demonstrated in China (and not only in China) there is a trade-off between harsh government pandemic containment measures, dominantly lockdowns, and the level of economic activity (Deb *et al*. 2022). This finding is rather intuitive, because lockdowns generate constraints on economic activities. Whole containment measures save lives, due to the constraints, it leads to the drop in the level of economic activity, i.e. the decline in output. Nonetheless, as demonstrated (Bloom, Kuhn, Prettner 2022), this is not the only trade-off: the most important is intertemporal trade-off. If lockdowns are introduced decisively and quickly, that may reduce how long they have to be applied, reducing the time span of the decreased level of economic activity, and enabling economic activity to recover rather swiftly. In addition, sharp lockdown measures reduce the level of economic activity sharply at impact, while continuing without the measures leads to more infections and deaths over time. Thus, in the latter case, the adverse economic effects spread out in time and into the longer run (Bloom, Kuhn, Prettner 2022, 87). Another important intertemporal choice is not about the economy in general, but about spreading COVID-19 cases over time, 'flattening the curve', to enable the fixed-capacity healthcare system to cope with the pandemic. In short, there are many trade-offs and substantial part of them are intertemporal.

It is not only intertemporal choices regarding the pandemic containment measures, but the contents of these measures, i.e. tools that should be used. It was demonstrated (Brotherhood *et al*. 2020), by using extensive set of lockdown policies across the US economy, that testing (of all symptomatic individuals) and quarantining (positive cases) policies were much less detrimental to the level of economic output than general lockdowns.

The long run effects of the noted fragility in the logistics of the international supply chains remain uncertain, as the future path of globalisation also remains unclear, with deglobalisation and reshoring as options that become more viable with the pandemic effects on supply chains and with risk avoidance becoming a priority over outright profitability. Furthermore, it seems that the pandemic-augmented populism and anti-globalisation pressures especially in the advanced economies (Ciravegna, Michailova 2022), were already strong before the pandemic due to discontent of globalisation (Eichengreen 2018). It remains unclear what the future strength of populism will be, but it seems unlikely that globalisation will speed up in the decade following the end of the pandemic. It is both advanced economics and especially emerging markets and developing economics that will pay the price of slowed globalisation or even deglobalisation.

All three sources of decreased aggregate supply, save the first one (morbidity and mortality), worked full power in 2020. That is the supply-side explanation of the drop of output in that year. But the V-shaped curve of economic activity demonstrates that recovery in 2021 was more than enough to compensate for the drop in economic activity. Relevant question is how that happened, taking into account that the pandemic was still ongoing in 2021, with average weekly case numbers above those from 2020? There are three main possible answers to this question, i.e. explanations for the sudden increase in output, considered from the supply side. The first one is the adjustment of the economic agents to the new conditions, maximising individual utility or profitability under now constraints, those they have become accustomed to. The second one is the decrease in uncertainty. As pointed out (Baker *et al*. 2020), about 50 per cent of the drop of the output was due to uncertainty in the first year of the pandemic.[27] Uncertainty had substantially decreased in the second year: economic agents were more certain about the virus and the features of the diseases, more confident about government intervention – both pandemic control (compulsory social distancing and lockdowns) and macroeconomic intervention (especially

[27] Brodeur *et al*. (2021) points out that there is no close historical parallel the COVID-19 pandemic, hence the knowledge of the previous pandemics and their effects obtained in hindsight is of little use or comfort to the economic agents.

subsidies and cash benefits for consumers due to the huge budgetary deficits), more certain about conditions of demand for their products – in short, they were in a better position for business planning and execution of these plans. Perhaps the third answer is rolling out the vaccines and triggering the vaccination process, decreasing risks of contracting COVID-19 and especially substantially decreasing the risk of death or severe consequences if the disease is contracted. This changed the utility function of individuals and enabled them to engage more freely in both production and consumption. Vaccination also enabled governments to relax a bit the strict lockdowns and other containment policies, which contributed to the change of the legal framework of individuals' behaviour.

With aggregate supply side explanation of the V-shaped curve (the sudden drop of economic activity and equally sudden recovery, i.e. bounce back) provided, now the same exercise should be done from the aggregate demand side.

5. THE DEMAND SIDE OF THE COVID-19 PANDEMIC IMPACT

As in the case of the aggregate supply, there are several similar if not identical sources of the effects of the COVID-19 pandemic on the demand side, decreasing aggregate demand irrespectively of the change of aggregate supply, and consequently, further decreasing the level of supply and output. They are the basically the same as in the case of supply side: (1) morbidity and mortality, (2) behavioural effects of the pandemic, and (3) government pandemic control measures. Nonetheless, the mechanism of their impact on aggregate demand is quite distinctive. Most of them are considered in short run, according to the nature of demand, but the long run effects of these changes, and especially government macroeconomic policy to increase the aggregate demand, will be considered in the long run, either in this section or one of the subsequent sections.

The first source of the kind, as in the case of the supply side, is morbidity and mortality associated with the COVID-19 pandemic. It is intuitive that in the short run, mortality permanently decreases consumption and accordingly aggregate demand. Nonetheless, taking into account the low mortality rate of COVID-19, this effect on aggregate demand has not been significant during the pandemic. Furthermore, taking into account that 75 per cent of the cases were persons age 65+, most of them pensioners, it is reasonable to assume that in both pay-as-you-go systems and in funded pension insurance schemes, by stopping paying these entitlements, either consolidates deficits,

if any, or increases payments to the remaining pensioners, compensating demand decline in the short run.[28] In the long run, after the pandemic, these entitlements are expected to grow due to demographic trends unrelated to the pandemic.

The effect of morbidity on aggregate demand is uncertain. On the one hand, it is expected that the illness decreases private consumption, as individuals/households are focused on the illness, with forgone consumption that is not related to coping with the illness and the recovery. Furthermore, illness means that no labour engagement is feasible during its span, and no available income is generated during that time (if there is no social insurance program in place), further driving down aggregate consumption. On the other hand, morbidity increases healthcare expenditures, either public (through publicly provided health services based on health insurance, funded by taxes or contributions) or private expenditures, either channelled through expenditures of private health insurance fund or out-of-pocket payments by households. Hence it is an empirical question whether morbidity increases or decreases aggregate demand. With increased prevalence of serious COVID-19 cases, it should be expected that an increase of aggregate demand, due to disproportional increase of public consumption in the provision of health services, which more than compensates for the decrease in non-health related private consumption. In short, the increase in public expenditures due to morbidity can more than offset the decrease of the non-health related decrease in private consumption, increasing aggregate demand.

That increase in the short run public expenditures on healthcare can be constrained by a fixed capacity of the healthcare outlets. Nonetheless, the outbreak of the pandemic creates strong incentives for investment in new healthcare capacities (hospitals, equipment, etc.) increasing public expenditures and therefore aggregate demand. Furthermore, the pandemic increased expenditure for developing future treatments of COVID-19 and vaccines, also increasing aggregate demand.

The second source of COVID-19 pandemic impact on aggregate demand is the behavioural changes of the population due to the pandemic and its consequences. The most important change of behaviour is increase in saving, i.e. increasing of the share of available income that is not spent, decreasing private consumption, especially of durables. The main motive for such saving is precautionary saving due to uncertainty brought by pandemic. This is very reasonably and quite expected behaviour for individuals/households, as

[28] As to the age structure of consumption, it is intuitive that old people spend most of their income due to high discount rate, i.e. their saving rate is low (Kuhn, Prettner 2018).

substantial number of extraordinary and nonrecurring spendings due to the pandemics can be expected, as well as job/income loses due to the pandemic recession. Hence, it is quite reasonable for most households to reduce their consumption to the essentials in such an uncertain environment. Such behaviour by households implies a drop of aggregate demand, a decline of the economic activity, and an increase unemployment (Guerrieri *et al.* 2022).[29] This was basically a vicious circle: precautionary savings due to pandemic decrease aggregate demand, this drop in demand creates a recession, and the recession strengthens incentives for precautionary saving, creating the even deeper recession.

There was another vicious circle at work in 2020 – the first year of the pandemic. The decrease aggregate demand – due to the pandemic and precautionary savings of households – decreases the level of economic activity, increasing unemployment, as people lost their jobs, and decreasing household incomes, pushing down private consumption and diminishing aggregate demand. Diminished aggregate demand further declines the level of economic activity, increasing unemployment, decreasing income and private consumption, further pushing down aggregate demand. Obviously, government unemployment insurance programs and various job subsidy programs are crucial for breaking this vicious circle.

Another behavioural change was restrained private consumption due to voluntary social distancing, aimed at avoiding infection and contracting COVID-19. That affected demand for many services, i.e. in many service industries (e.g. culture, entertainment, hospitality, sports, tourism & travel, etc.) demand was reduced the demand to zero for a while. Taking into account that a substantial segment of the global economy is based on the service industries, especially in advance economies, the decrease in demand for services made a substantial impact on the decline of aggregate demand. Adjustments by the population and service providers to the behavioural change increased demand for some specific services, such as food/merchandise delivery services operated by online platforms, streaming services for entertainment, as well as online cultural, academic and even sightseeing events, but this increase was far from full compensation for the decline in demand for services.

The third source of COVID-19 pandemic impact on aggregate demand are the government measures to contain the pandemic, e.g. compulsory social distancing and lockdowns. These measures particularly affected service

[29] The long run effect of this behavioural change is that the increased saving rate and subsequent increase in the volume of savings may enhance long run economic growth, due to the increased level of investments (Bloom, Kuhn, Prettner 2022).

industries that are based on personal contacts and high likelihood for infection. Whether voluntary social distancing affected aggregate demand more than government measures is an empirical question. The important takeaway is that when the number of cases drops, then it is both government measures that are relaxed and the probability of infection that decrease, so both channels affecting the aggregate demand work in the same direction reinforcing each other.

A rather relevant analytical question is whether it is possible to distinguish the supply-side effects of the pandemic from the demand-side effects. Nonetheless, much more than an analytical question – this is relevant macroeconomic policy question. For example, if the economic downturn is caused by supply-side constraints (e.g. imparted chains of supply), policies directed at the demand side would not only be ineffective in terms of increasing the output but would also produce adverse effects, such as inflation (Acemoglu, Tahbaz-Salehi 2020). Nonetheless, as pointed out in the literature (Bloom, Kuhn, Prettner 2022), based on the review of several models (Balleer *et al*. 2020; Brinca, Duarte, Faria-e-Casttro 2020; Broduer *et al*. 2021; Baqaee, Farhi 2022; Guerrieri *et al*. 2022) the relative importance of the two sides is a priori unclear. As to the a posteriori models, it should be expected that the results, however reliable they might be, will crucially depend on the assumptions of the models used and especially on the sector and its features. For example, it is reasonable to expect that the output of the manufacturing industry, which is based on the global supply chains, even without behavioural adjustments and government measures that substantially affected demand, would suffer more from the supply-side effects than the service industries, which are based on local inputs and whose demand is vulnerable to behavioural changes regarding social distancing and government measures aimed at curbing the pandemic. Again, perhaps this is much more important for macroeconomic policies than for a posteriori academic debate. Especially considering that government measures focused on controlling the pandemic have affected both the supply and the demand side, decreasing both.

This point is strengthened by the intertwining between the supply and the demand side in the modern globalised economy, described as a complex web of interconnected parties: employees, firms, suppliers, consumers, and financial intermediaries. Everyone is someone else's employee, customer, lender, etc. (Gourinchas 2022, 33). In short, it is a circular flow framework that is appropriate for considering the impact of the pandemic on the macroeconomy. Finally, as demonstrated by Guerrieri *et al*. (2022), the supply shock that works through lockdowns, layoffs, and firm closures not only decreases the level of economic activity *per se*, but also subsequently

creates a drop in aggregate demand and thereby deepening the recession – a 'Keynesian supply shock', as described by the author. This provides not only evidence of interdependency between demand and supply, but also the existence of a vicious circle, regardless of which of the two initially declined.

Furthermore, as to the undisputed interdependence between supply and demand, as already pointed out, it was uncertainty that was a crucial contributing factor to the sharp drop in economic activity in 2020. This uncertainty affected both the supply and the demand side, as demonstrated in this and the previous section of the article. With a substantial chunk of that uncertainty removed in 2021, as economic agents became used to the pandemic ('better the devil you know than the devil you don't know') and familiar with government measures, both pandemic control and macroeconomic policies, and as the vaccines were rolled out, the aggregate output recovered to the pre-pandemic level, due to both increase supply and demand, regardless of their relative contribution.

6. THE IMPACT OF THE COVID-19 PANDEMIC ON POVERTY AND ECONOMIC INEQUALITY

It is rather intuitive that poor households were affected economically by the COVID-19 pandemic much severely than the rich households, increasing intranational economic inequality.[30] The first reason for that is that their consumption prior to the pandemics was closer to the subsistence consumption and the drop in consumption due to the lack of income, brought about by sudden unemployment, may be of such magnitude that the outcome is consumption lower than subsistence consumption. This is especially significant in poor countries (Bloom, Kuhn, Prettner 2022). Furthermore, the cumulative savings of the poor are rather small, even negligible (their saving rate is low due to the increasing marginal propensity to save), so their financial buffer is rather modest. All this has made poor

[30] This insight is based on the mechanism of income distribution affected by the pandemic. In short, it refers to pre-tax and pre-transfer income distribution. During the pandemic massive government transfers in rich countries temporarily decreased income inequality (OECD. 2022. Income inequality (indicator). *https://data.oecd.org/inequality/income-inequality.htm* last visited 1 December 2022). Nonetheless, the sustainability of these transfers is questionable, and based on historical research, it is convincing that pandemics have long-lasting implications on income inequality (Furceri *et al*. 2022). There is no reason to think that the legacy of the COVID-19 pandemic will be different. On the contrary, it could be more resilient than the legacy of the previous modern pandemics.

households very vulnerable to the pandemic and government measures to cope with it, making them prime candidates for transfer payments, not only for macroeconomic reasons (boosting private consumption as a segment of aggregate demand). Nonetheless, as pointed out by Glover *et al*. (2020), the costs of redistribution should also be taking into account.

During the lockdown stage(s) of the pandemic, the most important distinction that was created in the labour market was between the jobs that can be done from home and those jobs that require face-to-face interaction of some kind, some of them even within the informal sector. While remote working jobs were not affected, the face-to-face interaction jobs were substantially affected due to behavioural changes and lockdown policies, creating job losses, increasing unemployment and even increasing the number of discouraged workers – those who ceased actively searching for work. These developments should be considered within the framework of labour heterogeneity, especially in terms of human capital. Work from home requires a substantial level of human capital, usually college education and full IT proficiency. Accordingly, it is people with a high level of human capital – who already obtained educational premium in their wages and belong to the rich (specified as above median income people) – that remained employed with the more or less the same level of income, provided that the industry they worked in did not experience a complete, though temporary standstill (e.g. tourism). It is people with low human capital – whose wages are already below the median income and cannot work from home – that lost their jobs and income (Adams-Prassl *et al*. 2020; Yasenov 2020). This development not only decreased the welfare of the poor (specified as below the median income people), but also increased economic (income) inequality.[31]

It has also been demonstrated (Alon *et al*. 2020; Forsythe *et al*. 2020) that because women's employment is concentrated in face-to-face jobs in sectors of personal services, such as education, the income inequality between man and women increased with the pandemic.[32] Also, the closure of schools and

[31] In advanced economies income inequality has already increase in the last few decades due to intensive technological progress, globalisation, and the resulting change of the structure of the economy and available jobs, decreasing employment opportunity and wages for people with low (below-median) level of human capital (Case, Deaton 2021).

[32] As to education, the shift to online education protected the jobs of women with high human capital, as they continue to be employed, working from home. This may not be the case with women with a low level of human capital. Again, the crucial distinction is high/low human capital. Also, personal services in health care provided by woman (those whose demand substantially increased during

day-care centres led directly to increased childcare needs, with direct impact on women's employment, especially in the case of single mothers. This may further increase economic inequality along gender lines.

7. THE APPLIED ECONOMIC POLICIES AND THEIR LEGACY

Most of the economic policies or, considered from another viewpoint, economic policies with the most impact during the pandemic, have been macroeconomic policies, with its two pillars: monetary policy and fiscal policy.

Monetary policy was constrained because of its starting point. For years – since the 2008 financial crisis – the interest rate policies of the central banks around the world has been zero bound, meaning that there was no room for basic interest rate decrease – a conventional monetary policy measure to stimulate investments and capital expenditure. Not only that in the long run, investments, though with a time lag, contribute to the potential growth in the future, but they immediately increase capital expenditures (for equipment etc.) as well as employment, increasing aggregate demand. Accordingly, there are at least two channels in which the decline of basic interest rates increases aggregate demand, which dropped after the outbreak of the pandemic for the reason explained in the previous section. Such a decline was not available to policy makers.

A tried and proven (in the aftermath of the 2008 financial crisis) substitute has been applied – quantitative easing (QE): the outright purchasing of debt securities by central banks, increasing money supply since saving glut effectively decreases the monetary mass in circulation. It is QE that facilitates monetary expansion, effectively creating additional money in circulation (Tooze 2021a).

The other aim of QE, as an intervention by central banks, was stabilisation of the financial markets, especially debt securities markets, aimed at preventing financial crises that would spill over to the real sector, as it happened in the Great Depression of 1929 and the Great Financial Crisis of 2008. By having the dominant place on the purchasing side of the secondary market, central banks, applying QE, were market makers, regrading securities'

pandemic) are based on substantial and specific human capital, which cannot be accumulated swiftly, therefore once again the crucial distinction is high/low human capital.

prices, creating investors' confidence in the market and virtually eliminating liquidity risk for investors in debt securities, especially government bonds, and up to a point, mitigating their default risk.

The policy of almost unrestricted QE was effectively a monetary expansion tool and indirect mechanism for funding fiscal deficit, which was the main mechanism of fiscal policy, supporting aggregate demand when it substantially decreased with the outbreak of the pandemic. Direct borrowing by the governments, i.e. ministries of finance, for funding the deficit from the central bank as a creditor has been off the table for many years, and for good reason, given that the history of inflation is to a great extent the history of ministries of finances borrowing from the central banks. Instead, budgetary deficit was funded by issuing bonds on the primary market. Investors who purchased these bonds have been well aware that they can sell them to the central bank at any time, some of them doing so for various reasons, almost immediately after the purchase. In that way, QE has been a method for indirectly funding the budgetary deficit, at least a segment of it, which is essential for fiscal expansion.

Fiscal policy was based on the fiscal deficit and expansion. The main idea of such a fiscal stance was to boost consumption, both public and private, and to compensate for the drop in aggregate demand due to the pandemic (Tooze 2021a). Nonetheless, public expenditures can take many forms and in the case of the pandemic-induced aggregate demand drop it is important to choose measures that work more quickly than others. It was demonstrated that measures such as wage subsidies, expansion of unemployment insurance, transfers to poor people, and loan guarantees work quickly and effectivity in maintaining aggregate demand (Cespedes, Chang, Velasco 2020; Didier *et al*. 2021; Elenev, Landvoigt, Van Nieuwerburgh 2021).

There are two main legacies of these macroeconomic policies. One is increased indebtedness, especially increased sovereign debt. According to IMF (2021b), the global public debt ratio jumped to a record high 99 percent of GDP. Due to huge fiscal deficits and negative growth rates, the first pandemic year (2020) brough about an increase of the debt to GDP ratio in advance economies of 19.2 percentage points (to 124 per cent of GDP), 9.9 percentage points in emerging markets, and 5.3 percentage points in poor economies. Obviously fiscal deficits were the biggest in advanced economies. In the second pandemic year (2021) budget consolidation started, as did recovery, hence the change of the debt to GDP ratio in all three groups of countries for that year was negligible. In short, the level of government debt, measured as debt to GDP ratio, has substantially increased due to the pandemic.

The other legacy of the macroeconomic policies aimed at combatting the pandemic-induced recession is inflation. Monetary expansion, massive amounts of quantitative easing and helicopter money, have led to substantially increased inflation rates. After decades of negligible inflation rates (even deflation in some years and in some countries/monetary areas), in 2021 the year-on-year inflation rate was around 5 per cent in most counties, reaching as high as 10 per cent in some (IMF 2022a). A substantial segment of the population of advanced economies has never witnessed such price increases. The inflation was even augmented in 2022, mainly as an effect of the war in Ukraine, economic sanctions against Russia, and the consequent increase in energy and food prices. Whatever the source of inflation, the textbook appropriate remedy of the central banks is to increase interest rates, therefore, after years of zero bound interest rates there has been a universal increase of them. This makes the two macroeconomic legacies intertwined. For years the substantial debt burden was generally easy serviceable because low, zero-bound interest rates. Now, with the ongoing increase of interest rates and therefor the increase the slice of GDP that is used to service the debt (the interest payment portion of it), the sovereign debt sustainability of many countries will be at risk. It is uncertain whether this will produce more sovereign defaults in the future, but it will inevitably impact economic growth. Although the relation between the level of sovereign debt and economic growth is controversial up to a certain point (Abbass *et al*. 2020), there is no doubt that increased outlays for interest payments slows down the pace of economic growth.

It was Paul Krugman who, according to Tooze (2021b), commented in 2012: 'If it were announced that we faced a threat from space aliens and needed to build up to defend ourselves [the USA – remark by BB], we'd have full employment in a year and a half'. For Krugman, the major if not the only problem of the modern (American) economy has been insufficient aggregate demand and the lack of full employment thereof. The rationale for the quip is that such an invasion would break all political constraints to massive public expenditures, both consumption and transfers, and the substantial fiscal deficits. Again, according to Tooze (2021a), who is a vivid Keynesian, the aliens came in the form of COVID-19 pandemic. Indeed, all the political constraints for massive public expenditures and fiscal deficits were broken due to the pandemic. Nonetheless, what the USA and the rest of the world are left with is high inflation and increased public debt. So much for 'Keynesianism on steroids' thinking – purported by Krugman and Tooze.

This is not to say that the surge in government expenditure, fiscal deficits, and loose monetary policy, channelled through quantitative easing, was wrong. Far from that. This macroeconomic intervention was necessary and

made it possible for the world to not plunge into depression, but rather experience only a short recession and fast recover from it – the V-shaped curve scenario. It was unconventional macroeconomic policies, such as wage subsidies, equity (cash) injections, helicopter drops of liquid assets, and loan guarantees, that proved to be timely and effective (Cespedes *et al*. 2020). But this was a firefight operation. It was unavoidable and, in most countries, swift and decisive, although too excessive in hindsight. Nonetheless, there is substantial smouldering debris after such an operation. And the world will have to live with that debris. Incidentally, it is another ongoing crisis (the war in Ukraine and the economic sanction against Russia) that will make the pile of debris even higher.

8. CONCLUSION

The impact of the pandemic on economic growth was sharp, with a sudden and deep decline of the economic activity, followed by a complete and swift recovery, described by V-shaped curve of economic activity. Both the supply and the demand side contributed to this dynamic, based on the same factors (morbidity and mortality, behavioural effects, and government pandemic control measures: social distancing and lockdowns), although with quite distinctive mechanisms of impact for each side. It has been demonstrated that neither morbidity nor mortality were significant factors in the supply and demand dynamics. It was the uncertainty of economic agents, both on the supply and the demand, side that was decisive for the sudden drop in the level of economic activity. Once economic agents became accustomed to the pandemic, government pandemic control measures and macroeconomic policies – the global economy started to recover.

The economic lessons gained from the COVID-19 pandemic were learned in hindsight and they are not thorough, since the economic fallout of the pandemic will remain for decades to come. Perhaps the most important economic lesson is that a swift, massive and comprehensive government macroeconomic intervention was decisive for the world not to slide into depression. Nonetheless, this intervention created a legacy of inflation and increased sovereign debt. It created another legacy – big government is back. After this success, the confidence of the people in big government (huge, unbalanced budgets, massive subsidies, and transfers, etc.) is substantial. Small-state thinking is in retreat – it is not widespread at the present. The success of the governments in curbing inflation in the future will be crucial for keeping confidence in big government alive.

An unintended side-effect of the COVID-19 pandemic is massive production of academic articles on the various consequences of the pandemic and on the general economic effects of modern infectious diseases. This academic effort, based on big databases and empirical research, have moved the frontier of knowledge in economics and enable us to better understand human behaviour in adversity. It is rather useful knowledge given the likely prospects of pandemics in a globalised world.

Nonetheless, there are some areas that will require more research in due time. The most important area is the impact of the COVID-19 pandemic on human capital. The long run effects of COVID-19 are still unclear. It is also unclear what will be its impact on the children born during the pandemic, especially if the mother was infected during gravidity. Furthermore, the education process has been thoroughly disrupted during the pandemic, distance learning has become almost a standard, and the quality of this type of education is still unclear. We will empirically learn more about it in years to come.

The pandemic provided a grand entrance to working from home and generally remote working. These working practices are undoubtedly here to stay, but it is unclear which areas of work will be affected and to what extent. It is an open question how that will affect the office and the demand for business premises – and even the spatial organisation of cities. It is evident that online business meetings have become a more than reasonable substitute for most business travel and that new online substitutes for leisure travel have emerged. With the new cost functions of many firms and changed preferences of many people, innovations in this area are happening at the frantic pace, therefore these developments should be monitored and analysed, especially factors that will affect the future.

The unprecedented race to the develop an effective vaccine that was one of the responses to the pandemic. Although it is hailed as a success, more analysis is needed regarding the intellectual property rights arrangements and whether there is an arrangement superior to the current one. Furthermore, the distribution of the vaccine and the inoculation process should be researched in detail, especially considering the public good component of the inoculation. What is uncertain and warrants attention is the intensity of the spill-over effects from the innovations focused on the COVID-19 vaccine on other pharmaceutical products and the analysis of the factors that affect these spill-overs.

The future of globalisation is unclear. It is evident that the COVID-19 pandemic has highlighted a number of risks associated with globalisation. It is also beyond doubt that the pandemic provided fuel for populistic,

anti-globalisation movements around the world. Nonetheless, the (future) impact of these developments remain unclear. To what extent they will slow down globalisation and even reverse it remains to be seen. This will be an interesting area for political economy analysis.

In the more academic economic focus, the COVID-19 pandemic is a great natural experiment that can be used in much empirical research as an undoubtedly exogenic change of the economic environment. Academic economists will have opportunity and moral obligation to conduct more research and offer a better understanding of the world we live in. Whether they will rise to the occasion is something only time will tell.

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