# COVID-19 Pandemic: Challenges and a Way Forward

*Panu Poutvaara, Madhinee Valeyatheepillay (EconPol Europe, ifo Institute, LMU Munich)*

headed by

**ifo** INSTITUTE
Leibniz Institute for Economic Research
at the University of Munich

CE PS

CEPII
RESEARCH AND EXPERTISE
ON THE WORLD ECONOMY

CERGE
EI

CPB Netherlands Bureau for Economic
Policy Analysis

INSTITUT FÜR HÖHERE STUDIEN
INSTITUTE FOR ADVANCED STUDIES
Vienna

KOF
KOF Konjunkturforschungsstelle
KOF Swiss Economic Institute

REM
RESEARCH IN
ECONOMICS AND
MATHEMATICS

Toulouse
School of
Economics

uc3m
Economics

SAID
BUSINESS SCHOOL

UNIVERSITY OF
OXFORD

UNIVERSITY
OF TRENTO

VATT VALTION TALOUDELLINEN TUTKIMUSKESKUS
VATT INSTITUTE FOR ECONOMIC RESEARCH

ZEW

# COVID-19 PANDEMIC: CHALLENGES AND A WAY FORWARD

Panu Poutvaara, Madhinee Valeyatheepillay[1]

## Abstract

COVID-19 pandemic has claimed more than 1.5 million lives globally, and resulted in the worst global recession since the Second World War. This policy report provides an overview of the number of cases, death toll, and economic disruption that COVID-19 has caused, as well as of the measures taken to combat it. Our main conclusion is that suppression is the preferred option both for health and the economy. Countries that fail to suppress the pandemic risk a disastrous overburdening of their health care system, resulting in a situation in which intensive care units run out of beds and patients who could have been otherwise saved die. Sacrificing lives does not save the economy. Short of an effective vaccine, no single measure is enough to stop the pandemic. Instead, societies need a combination of effective social distancing measures, careful hygiene, use of masks in indoor public spaces, as well as contact tracing. Also, population-scale testing could play an important role in combatting this and future pandemics. Recent research has also established that public attention to COVID-19 pandemic plays an important role in explaining cross-country differences in the implementation of non-pharmaceutical interventions that save lives.

Keywords: COVID-19, pandemics, suppression, non-pharmaceutical interventions, testing

---

## 1 INTRODUCTION

The coronavirus (COVID-19/ Severe acute respiratory syndrome coronavirus 2), first identified in Wuhan City in China in December 2019, has rapidly evolved into a worldwide pandemic and spread to 218 countries to date. When the World Health Organization (WHO) declared COVID-19 as a pandemic on 11 March 2020, there were 80,955 cases in China with 3126 deaths, and 37,364 confirmed cases, and 1130 deaths in the rest of the world (World Health Organization 2020). Mobility of individuals and superspreading events meant that most countries around the world were not spared. COVID-19 has also spread much faster than the Middle East respiratory syndrome coronavirus (MERS-CoV) and the SARS-CoV[1] (Petersen et al. 2020). What makes COVID-19 especially hard to stop is that those infected tend to pass the disease on already when they are still asymptomatic. (Lavezzo et al. 2020). As a result, COVID-19 has spread exponentially. As of December 8, the COVID-19 pandemic has claimed globally more than 1.5 million lives; the real death toll may be considerably higher as especially countries with less developed or severely overburdened health care system may fail to register which deaths have been caused by COVID-19. The number of confirmed cases has passed 68 million (John Hopkins University, 2020).

Severe cases of COVID-19 are especially prevalent among the elderly and people with certain chronic conditions. However, serious and fatal cases have also included relatively young people and healthy adults (Hanlon et al. 2020). Using the World Health Organization (WHO) Global Burden of Disease 2010 life tables, loss of life for COVID-19 has been estimated to amount an average of 12 to 14 years of life in the UK[2] (Hanlon et al. 2020). Moreover, as shown by a study by Hampshire et al. (2020), COVID-19 can have severe long-term health consequences, for example limited lung volume, decreasing IQ levels. Currently, several parts of the world are experiencing a second wave of the virus. Responses from governments to curb the number of cases around the world are differing. Throughout the pandemic, governments face the urgent issues of assembling information on effective non-pharmaceutical countermeasures (NPCs).

This pandemic represents a new, unprecedented situation for affected countries and poses new challenges both for social life as well as the world economy. To help minimize the spread of the virus, most countries implemented quarantine and social

---

[1] $R_0$, the average number of transmissions from one infected person, for SARS-CoV-2 is in the range of 1.8 to 3.6. In contrast, the $R_0$ for SARS-CoV and the 1918 influenza pandemic is between 2.0 to 3.0, substantially lower for MERS-CoV, and the 2009 influenza pandemic, at 0.9 and 1.5, respectively.

[2] The global burden of disease 2010 includes 21 country regions.

distancing measures. When these measures did not suffice, countries applied partial or national lockdown. However, as shown by a study conducted by Oxford University, not only the time course of the infections varies significantly from country to country, but also there is a substantial variation in social distancing measures taken by individual countries (Hale 2020). The timing of these measures is of crucial importance: Pei et al. (2020) estimate that the United States could have avoided more than half of reported infections and deaths as of May 3, 2020 by implementing the same control measures just one week earlier. To deal with the economic downturn in the countries and stabilize the economy, governments have announced stimulus packages and used monetary and fiscal policy measures which will be outlined in our report.

This report starts by outlining in section 2 the evolution of COVID-19 cases and death toll in EU countries and compares the EU cases with low and high number of cases globally. Although the focus lies on European countries, European countries will be put in a global context for comparison purposes. Section 3 summarizes the effects of COVID-19 on the economy, focusing on labor market effects and trade. Section 4 discusses social distancing measures taken to combat the pandemic, and section 5 provides an overview of economic measures taken. Section 6 discussed alternative approaches of suppression and heard immunity that have been put forward to end the pandemic, and makes the case for why countries should adopt the strategy of suppressing COVID-19, outlining measures that could be part of the toolbox. Section 7 presents results concerning the role of public attention and section 8 concludes.

## 2 COVID 19 CASES & DEATH TOLL

From December 2019 until March 2020, China remained the epicenter of the pandemic and accounted for a high number of the COVID-19 cases. Although China experienced a decline in infections in April, the number of cases surged in most of the rest of the world. In Europe, the situation worsened dramatically from February onwards, first in Italy and later in other countries such as Belgium, France, Spain, and the United Kingdom. In the United States, the epidemic situation was worsened by President Trump's downplaying the related risks, declaring repeatedly that it will go away and contradicting the official recommendations of his own government. Many countries are currently experiencing a second wave, with many European countries showing even higher reported incidence rates than in spring; it should be noted that as testing has expanded considerably, the number of cases in spring may have been severely underreported. Several countries have entered again partial or national lockdowns to

curb the number of cases. The evolution of the number of cases is shown in Figure 1: in this section, we bundle EU countries, as well as high and low cases countries outside the EU in different Figures.

The cumulative number of cases in Belgium, the Czech Republic, Finland, France, Germany, Italy, Spain, and Sweden can be seen in Figure 1 (a). As of December 8, 2020, France has experienced more than 2.3 million confirmed cases (World Health Organization 2020). The jump in new cases at the end of August and the subsequent increase in the number of cases led to a new national lockdown in France in early November. The Czech Republic had initially low number of cases, but the situation worsened dramatically in the fall. Finland and Germany, having a total of more than 28,000 and 1.2 million COVID-19 cases respectively, accounted for a relatively low number of cases.

Figure 1 (b) shows the number of infections in the US, the UK, Brazil and Russia, which are countries that have struggled with relatively large number of cases. The US, the UK, Brazil and Russia all saw a rapid increase in the spread of the virus. As of mid-July, Brazil reported about 1.8 million SARS-CoV-2 cases, the second-largest number in the world, and more than 70,000 deaths; as of December, Brazil had 6.7 million cases and 180,000 confirmed deaths; only the United States had more deaths.

In contrast, Figure 1(c) illustrates countries with rather low number of cases, comprising of Australia, China, Japan, New Zealand, South Korea, and Taiwan. Border controls, distancing, lockdown and case based controls at an early stage led to a low number of cases in New Zealand, South Korea and Taiwan: these countries committed to early elimination strategy.

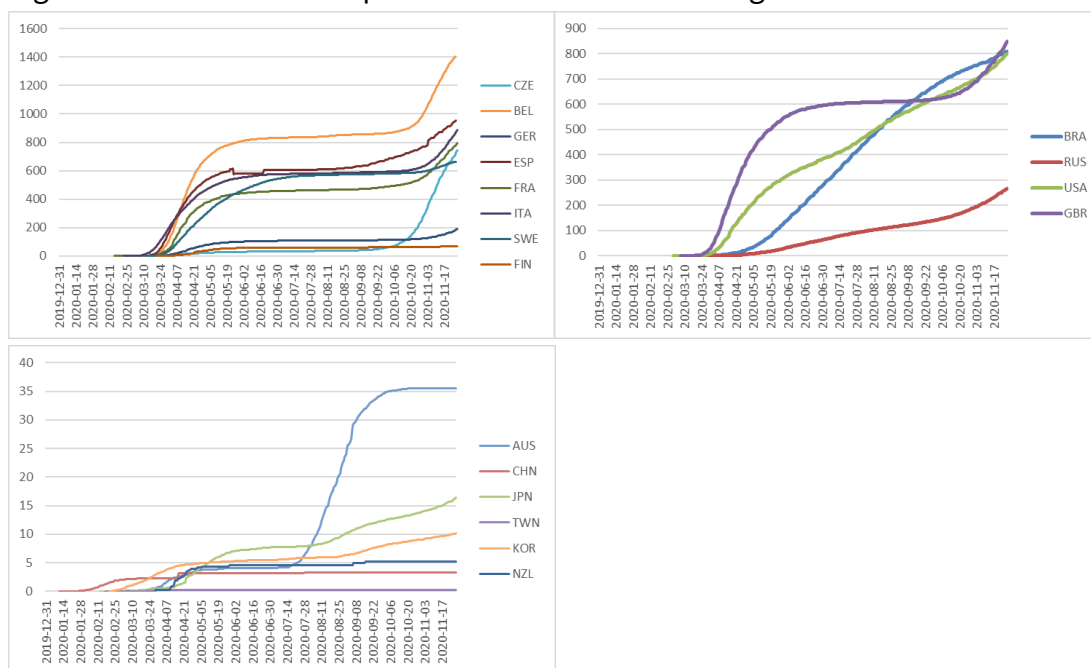Figure 1: COVID-19 Cases per Million Inhabitants among Selected Countries
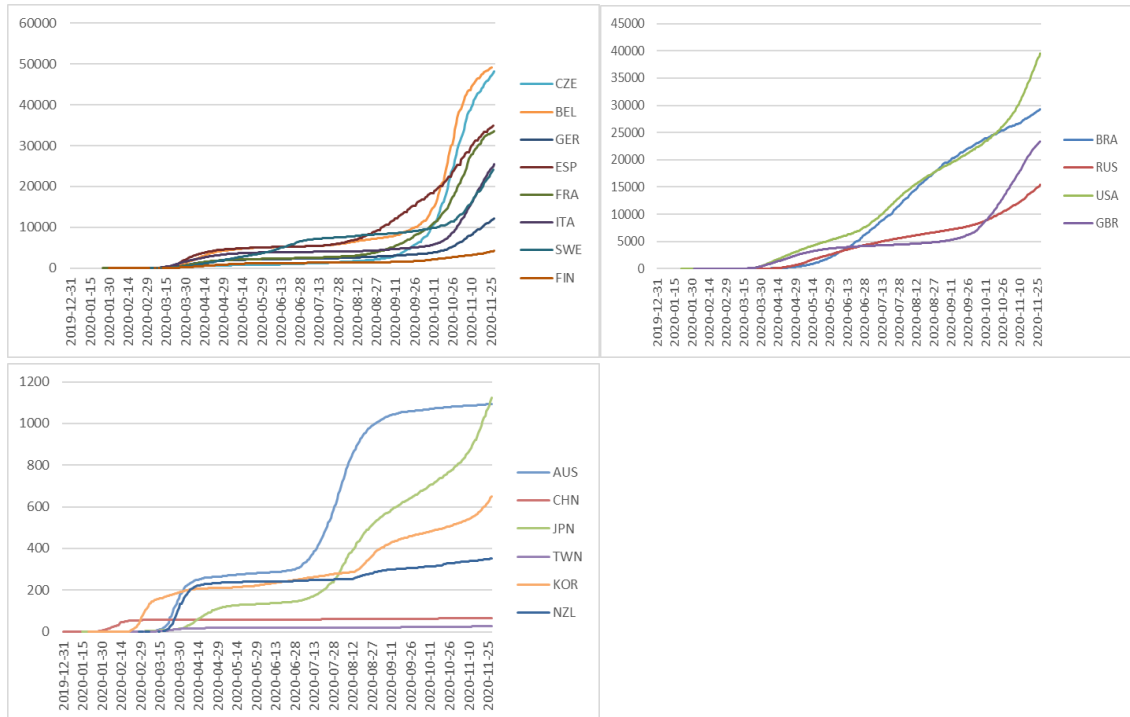


*Note:* In Figure 1(a), the selected countries comprise of Belgium, the Czech Republic, Finland, France, Germany, Italy, Spain, and Sweden. Figure 1(b) illustrates number of cases in Brazil, Russia, UK, and US. Figure 1(c) shows infections in Australia, China, Japan, New Zealand, South Korea, and Taiwan.

*Source: Our World in Data (2020)*

Figure 2 shows the number of deaths per million inhabitants and we follow the same categorization as in Figure 1. The way deaths from COVID-19 are counted also makes a difference in the numbers. For instance, Belgium counts deaths in hospitals and care homes, and includes suspected rather than confirmed deaths from Covid-19. Spain encountered a high number of deaths as of end of September, with total of about 31,000 individuals. Sweden which depended on voluntary social distancing, experienced a high death toll in comparison to other Nordic countries, with 58.1 per 100,000 inhabitants as of end of September 2020 (The Economist, 2020). In contrast, Denmark only had 11.1 and Finland had 6.19 cases per 100,000 individuals. In Sweden, deaths were particularly concentrated in nursing homes. The death toll remained rather low in Australia, China, Japan, Taiwan, South Korea and New Zealand due to swift measures taken by those countries. The number of deaths in Australia has been rising significantly since end of July.

Figure 2: COVID-19 Deaths per Million Inhabitants among Selected Countries



*Note:* In Figure 2(a), the selected countries comprise of Belgium, the Czech Republic, Finland, France, Germany, Italy, Spain, and Sweden. Figure 2(b) illustrates number of deaths in Brazil, Russia, UK, and US. Figure 2(c) shows death toll in Australia, China, Japan, New Zealand, South Korea, and Taiwan.

*Source: Our World in Data (2020)*

Several serosurveys examining existing antibodies against SARS-CoV-2 in blood samples hint at substantial underreporting of COVID-19 cases due to limited testing and issues in attribution of the cause of death (The Economist, 2020). Studies conducted in Sweden, Spain and the UK indicate that the actual number of cases could be 17 times, 10 times and 14 times higher than the reported number of cases, respectively. Overall, serosurveys imply that a global multiplier of approximately 20 can be expected.

It is also very likely that the number of deaths in official statistics is undercounted. This can be inferred by looking at the excess mortality data in countries available on a monthly basis: most Western European countries, some Latin American countries, the US, South Africa and Russia have in sum recorded 55 percent more deaths between March and August than those attributed to COVID-19 (The Economist, 2020).

## 3 EFFECTS OF COVID-19 ON THE ECONOMY

Economic activities in various countries have been brought to a standstill due to the severity of the coronavirus and the lockdown measures implemented. Several businesses closed over an extended time period in an attempt to reduce the number of COVID-19 cases. As a result, countries experienced higher unemployment rates, a fall in business sentiment and a contraction in Gross Domestic Product (GDP), plunging them into deep recession. According to forecasts of the World Economic Outlook Report (2020), COVID-19 is expected to cause the deepest economic downturn since the Second World War and global real GDP is predicted to decline by 4.9 percent in 2020. The decline in real GDP is forecasted to be larger than during the 2008-2009 economic crisis: the decrease is expected to be larger for whole year 2020, and especially large between March and May. Projections for the economies of the Euro Area range from a decrease of around 9 percent to 10.2 percent (World Economic Outlook Report, 2020).

The Euro Area is predicted to face a steeper decline in output than the rest of the world. Countries including France, Italy and Spain may experience a downfall of almost 13 percent in economic activities in 2020, while the UK faces a decrease of 10.2 percent in real GDP. In comparison with other European countries, the German economy is expected to absorb the shock better with a decline of around 8 percent. The severity of the decline in GDP in different economies is determined on the one hand, by the extent of dissemination of the virus, and on the other hand, on the magnitude of countries' reliance on global trade, tourism, commodity exports, and external financing (World Bank 2020).

The GDP decline has led to profound repercussions on labor market outcomes and on several sectors in European countries. As shown by Fetzer et al. (2020), this, in turn, causes a substantial increase in economic anxiety during and after COVID-19. There is also a large dispersion in beliefs about the risk factors involved in the pandemic and these beliefs causally affect the economic anxiety of individuals. The increased uncertainty caused by the virus led many employers to adjust their workforce and has put millions of jobs at risk. In the following subsections, we will outline the effect of the pandemic on the manufacturing sector, labor market outcomes, in terms of increased part time work, higher costs of job search and job loss, and on trade.
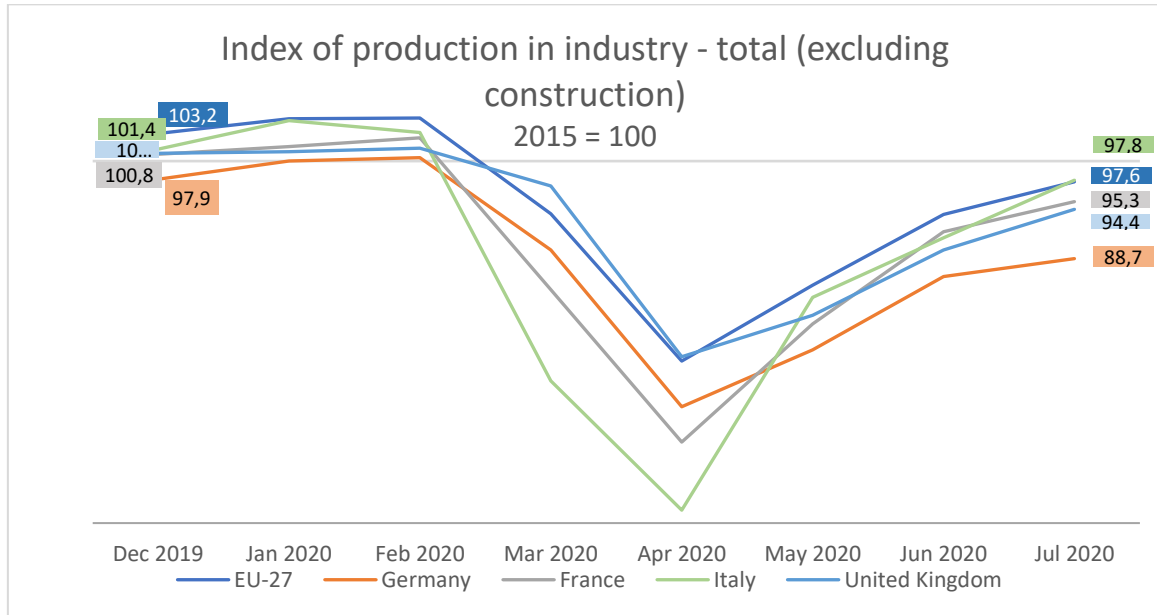
*3.1 Impact on Manufacturing Sector*

COVID-19 has affected the manufacturing sector profoundly. Supply chains have been disrupted and industrial activity has declined, leading to a decrease in the revenue in this sector. In this subsection, we focus on the effect of COVID-19 on the manufacturing sector.

As China closed its borders in January, the slowdown of international trade began to cause severe supply shortages and hampered production in the EU manufacturing industry, while reduced demand and retail sales restrictions put further pressure on the businesses. As shown in Figure 3, in the EU27 countries, industrial production reached its temporary low in April (76.8; index 2015 = 100), decreasing by 27.7 percent compared to the previous year. In Italy, the decreases was 43.4 percent. Production subsequently recovered to a large extent, even though July's production was still about 7 percent below the 2019 level (Eurostat 2020).

Small and medium enterprises (SME) are particularly affected by the current economic situation due to larger financial and liquidity constraints. The decline in demand poses problems for manufacturing SMEs because they often operate in markets with highly elastic demand and are, in general, bound to exclusive production agreements. For knowledge-based SMEs, the problem lies on the supply side, since no research can be done without access to appropriate facilities. Recently, the gradual relaxation of workplace restrictions has allowed these firms to take up work again, and EU programs, such as program for the Competitiveness of Small and Medium-sized Enterprises (COSME) and the European Scale-up Action for Risk capital (ESCALAR), provide financial support to facilitate this process. Juergensen et al. (2020) shows that in the longer term, manufacturing SMEs will have to reorganize their supply chains, strengthen digital sale channels and attempt to diversify their customer base in order to increase resilience to macroeconomic risks.

Figure 3: Index of production in industry – total



Index of production in industry - total (excluding construction)
2015 = 100

Dec 2019 · Jan 2020 · Feb 2020 · Mar 2020 · Apr 2020 · May 2020 · Jun 2020 · Jul 2020

101,4 · 103,2 · 10... · 100,8 · 97,9 · 97.8 · 97,6 · 95,3 · 94,4 · 88,7

EU-27 — Germany — France — Italy — United Kingdom

*Note:* Index excluding construction
*Source: Eurostat (2020)*

*3.2 Impact on labor markets*

The International Labor Organization (ILO) estimates that about 305 million full-time jobs will be lost globally during the second quarter of 2020. A survey by Eurofound in April 2020 shows the percentage of individuals who lost their jobs permanently in the concerned European countries. Figure 4 illustrates a map with the degree to which countries in Europe are affected by job loss. Bulgaria, Poland and Hungary are more affected by job loss while the Nordic countries are less affected.

Figure 4: "Yes, permanently" responses for respondents in the EU27 when asked: During the COVID-19 pandemic have you lost your job(s)/contract(s)?
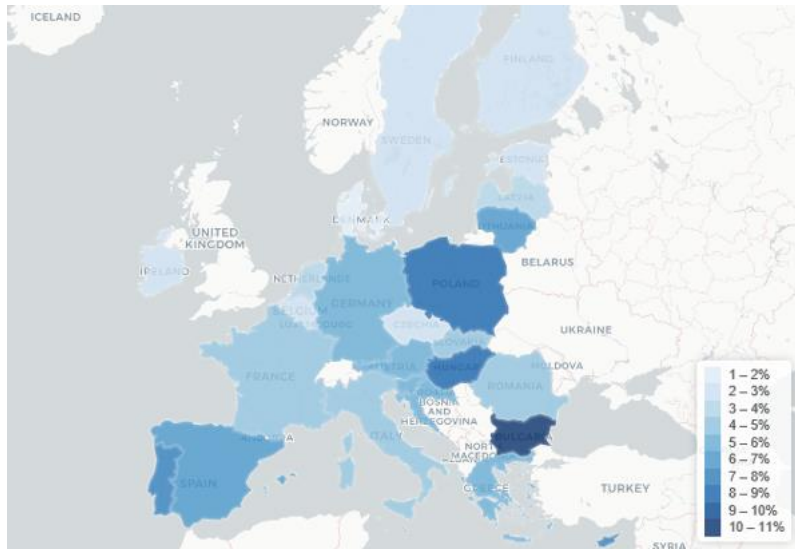


*Note:* Low reliability (*): Latvia, Malta, Netherlands and Sweden
*Source:* Eurofound (2020)

Figure 5 depicts the unemployment rates in the G7 countries from October 2019 to June 2020. The US and Canada exceeded 12 percent of unemployment at the end of March 2020. However, data from June onwards denote recovery in those countries. According to the OECD (2020), differences in unemployment rates can be explained first by extended practice of temporary unemployment in the US and Canada. A second reason is the disillusion of jobless people who stopped searching for jobs in countries, such as in Italy. Last but not least, some countries use job retention programs, which lower unemployment rates significantly (OECD 2020).

Figure 5: Unemployment Rates among Selected Countries
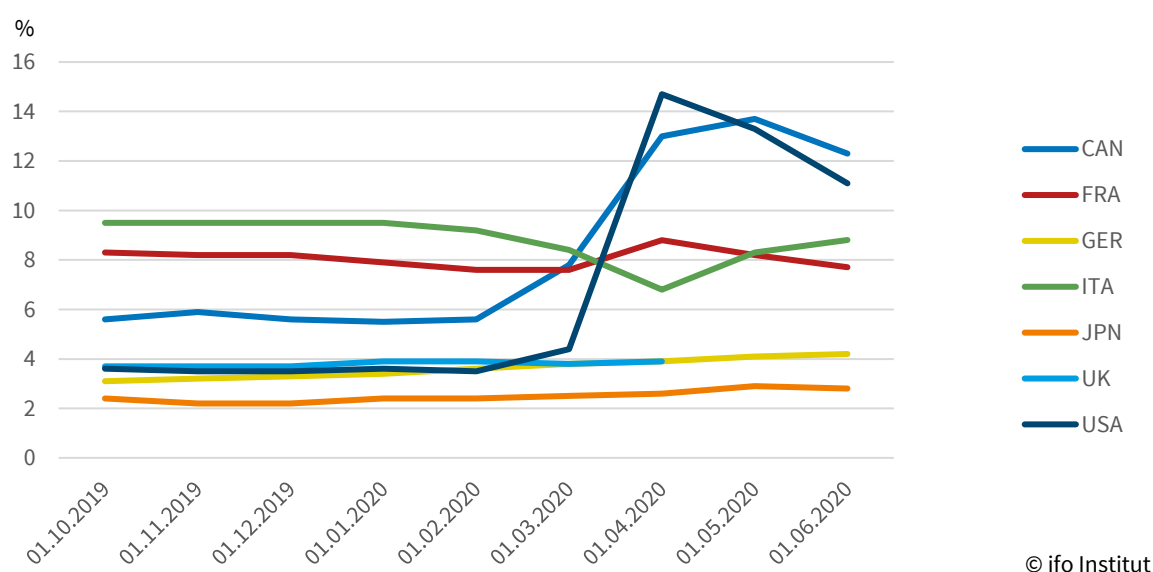


*Source:* OECD (2020), Unemployment rate (indicator)

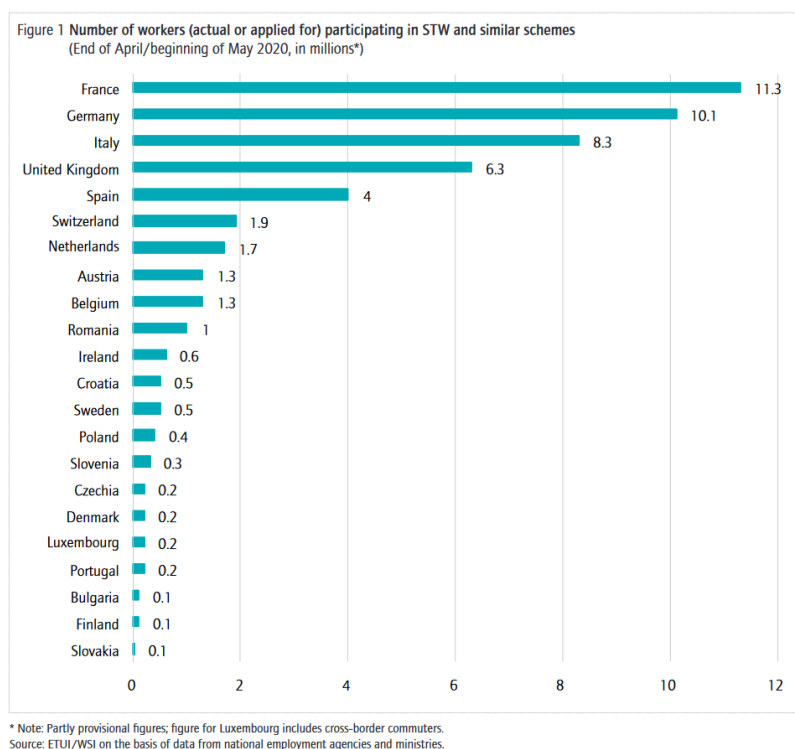Note: Data for the UK after April is not available.

Part-time work has increased during the COVID-19 crisis, particularly due to measures taken to financially support firms affected by a drop in demand. It is estimated that 92 percent of OECD countries have taken these measures. The rationale behind the measures pursued in the EU is to keep businesses afloat by absorbing part of the operating costs, and to preserve employment and income. Emphasis is being put on short-time work schemes (STW). Following the example of the German *Kurzarbeit* (short-time work), all EU27 countries have either created[1] or expanded their STW schemes that are supported through favorable term loans by the European Commission in line with the Support to mitigate Unemployment Risks in an Emergency (SURE) program. Eligibility and replacement rate of previous wages differ among the EU countries, with the replacement rate ranging from 60 to 100 percent. At the end of the first quarter of 2020, the number of applications for STW had risen to more than 50 million[2]. According to the German Employment Agency (2020), company applications for short-time work allowance increased substantially from 1,900 in February 2020 to more than 725,000 between March and April 2020.

---

[1] Bulgaria, Estonia, Hungary, Latvia, Ireland, Malta, the Netherlands, Sweden and Poland are among the countries that have created short-time work schemes.

[2] Including Switzerland & UK, ETUI (2020): time percent2Bwork percent2BM percentC3 percentBCller percent2BSchulten percent2BPolicy percent2BBrief percent2B2020.07 percent281 percent29.pdf

Even with the STW schemes in place, the demand shock as pronounced as the COVID-19 pandemic caused has adverse outcomes on the labor market in the EU. In first quarter of 2020, the first phase of the crisis, unemployment did not change significantly, but the reason is only due to the fact that measures such as STW led to absences from work rather than dismissals. A better indicator is *total labor market slack*[1], which increased in first quarter of 2020. The absences from work also increased, with 4.3 million more employed individuals being absent in first quarter of 2020 compared to the fourth quarter of 2019. Temporary lay-offs, that surged sharply from 0.3 million persons to 2.3 million persons, make for a big part of the absences.

Figure 6: Number of workers (actual or applied for) participating in STW and similar schemes



Figure 1 **Number of workers (actual or applied for) participating in STW and similar schemes**
(End of April/beginning of May 2020, in millions*)

| Country | Value |
|---|---|
| France | 11.3 |
| Germany | 10.1 |
| Italy | 8.3 |
| United Kingdom | 6.3 |
| Spain | 4 |
| Switzerland | 1.9 |
| Netherlands | 1.7 |
| Austria | 1.3 |
| Belgium | 1.3 |
| Romania | 1 |
| Ireland | 0.6 |
| Croatia | 0.5 |
| Sweden | 0.5 |
| Poland | 0.4 |
| Slovenia | 0.3 |
| Czechia | 0.2 |
| Denmark | 0.2 |
| Luxembourg | 0.2 |
| Portugal | 0.2 |
| Bulgaria | 0.1 |
| Finland | 0.1 |
| Slovakia | 0.1 |

* Note: Partly provisional figures; figure for Luxembourg includes cross-border commuters.
Source: ETUI/WSI on the basis of data from national employment agencies and ministries.

Compared to other regions, Europe presents one of the largest losses in hours worked, with Southern Europe leading at 23.9 percent, Northern Europe at 16.6 percent,

---

[1] Eurostat: EU labour market in the first quarter 2020: "total labour market slack […] comprises all persons who have an unmet need for employment either because they are unemployed […], are close to unemployment […], or are working part-time and would like to work additional hours"

Western Europe at 14.8 percent, and Eastern Europe at 13.6 percent in the first quarter of 2020. Actual working hours in the EU decreased considerably, with the sharpest drops in Italy (-9.7 percent), followed by Slovakia (-8.7 percent), and Austria (-7.9 percent). ILO estimates that the hours worked in Northern, Southern and Western Europe and Eastern Europe have declined by 18.1 percent, representing about 28 million full-time equivalent jobs, in the second quarter[1]. Furthermore, the losses of working hours in the Europe and Central Asia are estimated at 11.6 percent in the third quarter of 2020.

The labor market shock caused by COVID-19 has impacted women disproportionately due to the nature of their job and the increased need for child care. For instance, 30 percent of women in the EU compared to 8 percent of men work part-time and women are more likely to interrupt their work to care for children or other family members (European Parliament 2020). As suggested by Alon et al. (2020), the drop in employment caused by social distancing measures is especially pronounced in sectors, such as tourism and accommodation, retail, and food and beverage services, which have a high female employment share. On average, across OECD countries, women are highly present in the food and beverage services, and the accommodation services, accounting for 53 percent and 60 percent of these industries respectively (Qeisser et al. 2020).

Women are not the only vulnerable group in terms of job loss. Alstadsæter et al. (2020) state that in Norway, the pandemic disproportionately affected financially vulnerable population, as well as parents with younger children. The shock has furthermore been "driven by layoffs in smaller, less productive, and financially weaker firms." Adams-Prassl et al. (2020) claim that there is an inequality in job and income losses based on the job type and individual characteristics in the US and UK. They also find that there is a higher probability for drop in income for the young and for people without university education.  Profeta (2020) provides an overview on the specific challenged that women face due to COVID-19.

Another group of vulnerable population is workers in the undeclared economy. Williams and Kayaoglu (2020) assert that undeclared work is especially prevalent in

---

[1] ILO Monitor: COVID-19 and the world of work. Sixth edition.

the hospitality, retail and services sector and make the case that the EU should opt for a voluntary disclosure initiative to pull workers and enterprises into the declared economy, as this group has no access to the extended financial support that should provide relief in this transitional time period. Ebata et al. (2020) point out that undeclared workers could increase the spread of the SARS-CoV-2 virus since they are not part of the social security net and need to continue to go to work in order to sustain themselves.

*3.3 Impact on trade*

Commencing with the closure of the Hubei province and Chinese borders in January, national lockdowns directly affected global trade networks. The fear that COVID-19 will speed "slowbalization" - a term used to describe a decline in trade, multinational profits, and foreign investment- kicked in, especially due to the complexity of global supply chains (Economist 2020). Total merchandise exports from EU27 countries decreased by 30 percent between January and April 2020, but have come close to pre-pandemic levels in July (US\$ 467.3 billion; -7 percent compared to July 2019). Similarly, the US export volume has declined by 29.8 percent from January to a low in May, even though improvement has been slower than in the EU.

Taiwan recovered rather quickly in terms of export: as trade partners shut down, Taiwan's goods exports, nevertheless, contracted by 14.6 percent between December 2019 and April 2020. The export volume has, however, recovered quickly to attain pre-lockdown levels by July. Similarly, in mainland China, the near elimination of COVID-19 around March allowed for the reestablishment of its trade networks more rapidly than other major exporting economies. After Chinese imports to EU27 countries had reached a temporary low in March, the easing of COVID-19 restrictions and pent-up products from the previous months caused a spike in the monthly import volume in April which surpassed pre-pandemic levels by over 2 billion Euro, with an increase from 31 billion in October 2019 to 33 billion Euros in April 2020.

Although goods imports from China started to surge by April, the EU export volumes to EU-27's other two main trade partners, the UK and the US, declined by over a quarter and have only improved slowly until July. Moreover, as shown in Figure 7,

goods exports on which the economy relies heavily from the EU have yet to reach pre-pandemic levels; trade relations to the UK and US have especially suffered.

Figure 7: EU-27 value of goods imports (a) from and exports (b) to main trade partners
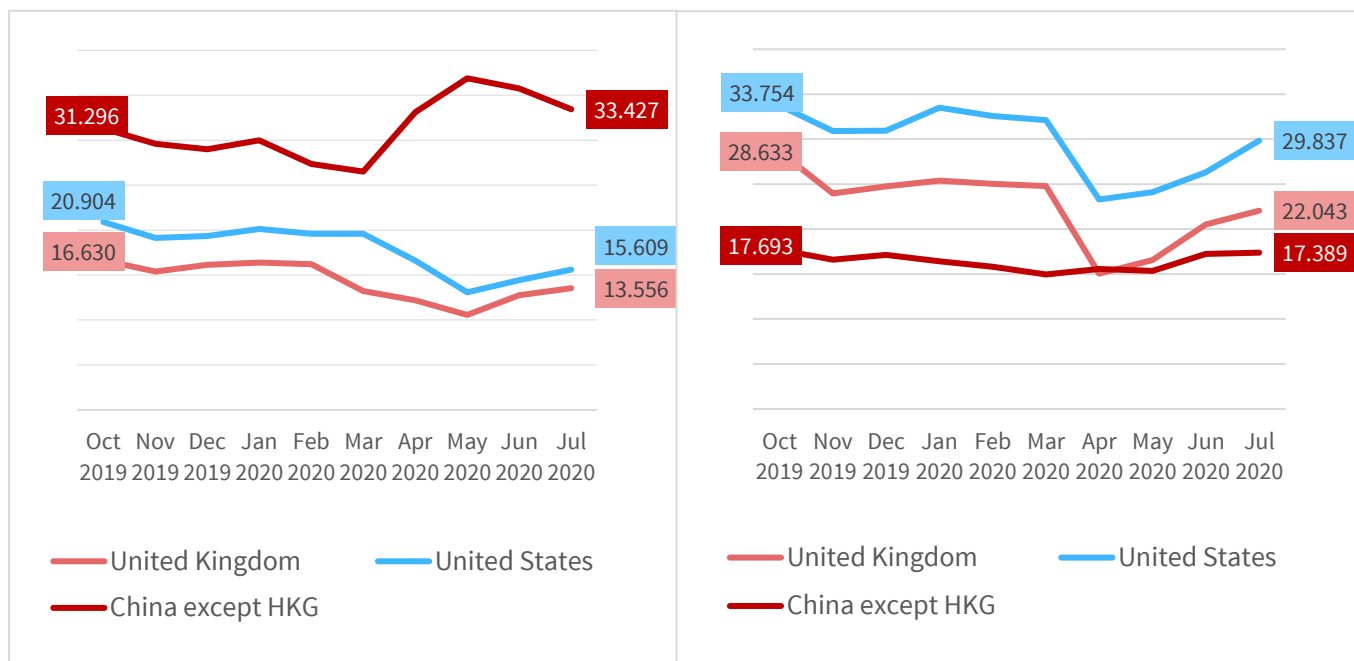


*Note:* EUR million, seasonally adjusted, Oct. 2019 – Jul. 2020
*Source: WTO Data (2020)*

Trade in services has equally been affected significantly. As shown in Figure 8, the monthly volume of commercial service imports into EU27 countries declined by 32.6 percent from 91.2 US$ billion in January 2020 to 61.5 US$ billion this April, and has slowly risen back to 70 billion US$ until July (WTO trade data). Commercial service exports (extra-EU) have suffered a similar loss of 28.8 percent from 89.9 US$ billion in January, even though recovery has been at a quicker pace. The service export volume had risen back to $82.6 billion by July 2020.

Figure 8: Value of commercial services imports (a) and exports (b)
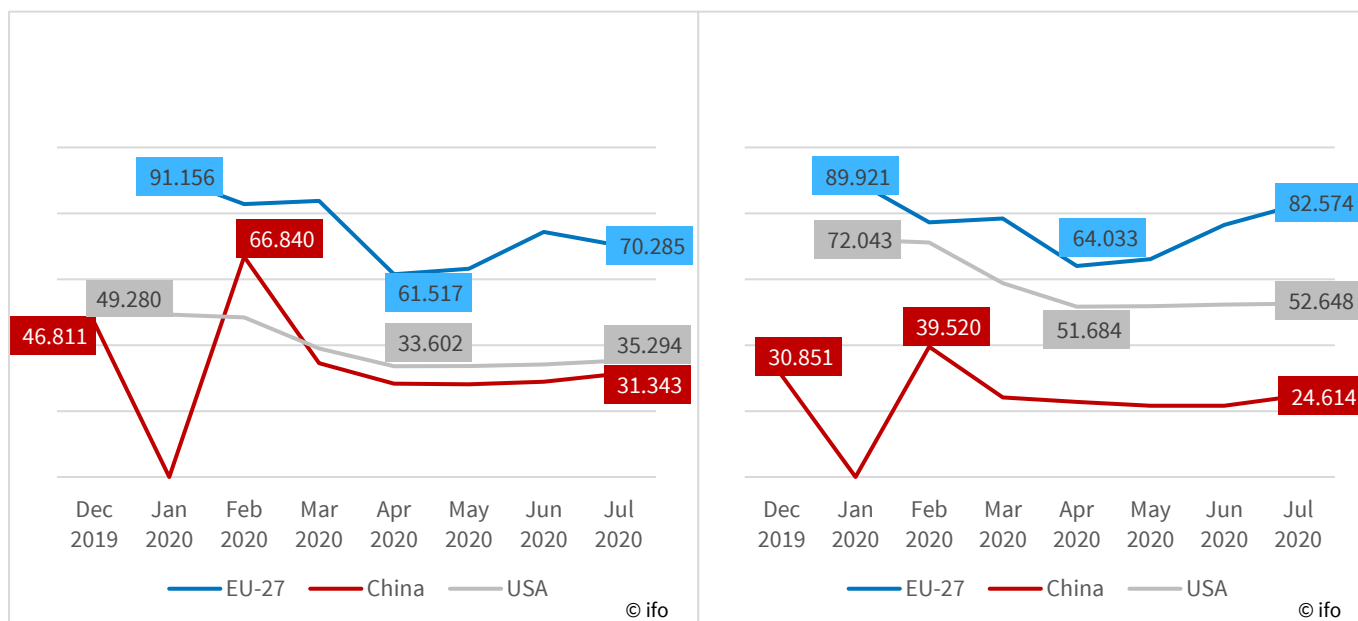


*Note:* USD million, monthly, Dec. 2019 – Jul. 2020
*Source:* WTO Data (2020)

## 4 SOCIAL DISTANCING MEASURES

Social distancing measures in public spaces comprise of NPCs aimed at decreasing disease transmission and in turn lowering pressure on health services. Those measures comprise of isolation of COVID-19 patients, quarantine after travels, school closure and workplace closure, travel ban restrictions and cancellation of public events among others. When it comes to the specific measures taken to limit the access to or even fully close down public places and businesses temporarily, Benzell et al. (2020) use mobile cell phone movement patterns in the US and find that "banks, general merchandise stores, dentists, grocery stores, colleges and universities should face loose restrictions".

The speediness and severity of implementation of NPCs varied from country to country and played a role in the spread of the virus. Some countries have been more proactive than others at dealing with challenges brought by COVID-19, and

implemented NPCs at an early stage. Table 1 shows the number of days from the first coronavirus case to lockdown measures being implemented.

Table 1: Speed of response – days passed in relationship to first confirmed death date

| Speed of response: days passed in relationship to first confirmed death date | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Days passed | Country | Date of first | School | Workplace | Cancel | Restrictions | Close public | Stay at home | Restrictions | International |
| | Austria | Mrz 13 2020 | 3 days | 0* | 3 days | 3 days | 0* | 3 days | 0* | 0* |
| | Belgium | Mrz 10 2020 | 4 days | 3 days | 0* | 8 days | - | 8 days | 4 days | 0* |
| | Bulgaria | Mrz 12 2020 | 0* | 1 day | 0* | 1 day | - | 6 days | 6 days | 0* |
| | Croatia | Mrz 25 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| | Cyprus | Mrz 25 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| | Czech Republic | Mrz 24 2020 | 0* | 0* | 0* | 0* | - | 0* | 0* | 0* |
| | Denmark | Mrz 16 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| | Estonia | Mrz 26 2020 | 0* | 1 day | 0* | 0* | - | 3 days | 0* | 0* |
| | Finland | Mrz 22 2020 | 0* | 0* | 0* | 106 days | - | 0* | 0* | 0* |
| | France | Feb 15 2020 | 16 days | 31 days | 14 days | 14 days | 30 days | 31 days | 28 days | 0* |
| | Germany | Mrz 10 2020 | 0* | 12 days | 0* | 0* | - | 0* | 8 days | 0* |
| | Greece | Mrz 12 2020 | 0* | 0* | 0* | 6 days | 2 days | 13 days | 9 days | 2 days |
| | Hungary | Mrz 17 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| EU Countries | Ireland | Mrz 12 2020 | 1 day | 0* | 0* | 0* | 15 days | 14 days | 14 days | 25 days |
| | Italy | Feb 23 2020 | 0* | 0* | 0* | 0* | 17 days | 0* | 0* | 0* |
| | Latvia | Apr 4 2020 | 0* | 0* | 0* | 0* | 0* | 0* | - | 0* |
| | Lithuania | Mrz 21 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| | Luxembourg | Mrz 14 2020 | 2 days | 0* | 0* | 0* | 0* | 3 days | 1 day | 151 days |
| | Malta | Apr 10 2020 | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN |
| | Netherlands | Mrz 7 2020 | 5 days | 5 days | 3 days | 5 days | 24 days | 0* | 8 days | 12 days |
| | Poland | Mrz 13 2020 | 0* | 1 day | 3 days | 18 days | 27 days | 18 days | 0* | 0* |
| | Portugal | Mrz 18 2020 | 9 days | 0* | 1 day | 1 day | 1 day | 1 day | 1 day | 0* |
| | Romania | Mrz 23 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| | Slovakia | Apr 7 2020 | 0* | 0* | 0* | 0* | 0* | 0* | 0* | 0* |
| | Slovenia | Mrz 18 2020 | 0* | 2 days | 1 day | 0* | 0* | 0* | 12 days | 0* |
| | Spain | Mrz 5 2020 | 4 days | 4 days | 5 days | 5 days | 9 days | 9 days | 4 days | 5 days |
| | Sweden | Mrz 12 2020 | 0* | 13 days | 20 days | 0* | - | - | 23 days | 7 days |
| | India | Mrz 13 2020 | 0* | 3 days | 0* | 6 days | 7 days | 0* | 3 days | 0* |
| | Japan | Feb 13 2020 | 18 days | 12 days | 7 days | NaN | NaN | 36 days | 12 days | 0* |
| Per request Countries | South Korea | Feb 21 2020 | 0* | 3 days | 0* | 0* | NaN | 2 days | 2 days | 0* |
| | Taiwan | Feb 13 2020 | 0* | NaN | 21 days | NaN | NaN | NaN | NaN | 0* |
| | UK | Mrz 7 2020 | 11 days | 9 days | 10 days | 16 days | 13 days | 6 days | 15 days | 100 days |
| | USA | Mrz 1 2020 | 4 days | 18 days | 0* | 10 days | 16 days | 14 days | 13 days | 0* |
| Sources ("read columnwise") | | https://ourworldindata.org/covid-deaths | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf | https://www.bsg.ox.ac.uk/sites/default/files/2020-09/BSG-WP-2020-032-v7.0.pdf |
| 0* = indicates that the measure was implemented before or in the same day as the first death; | | | | | | | | | | |

*Note:* 0* indicated that the measure was implemented before or in the same day as the first death.
*Source: Our World in Data, Oxford Policy Tracker (2020)*

Germany has managed to limit the extent of the COVID-19 outbreak early on better than other big European countries. On March 22, Germany enforced strict physical distancing guidelines based on the reproduction rate, banning groups of more than two people in public and shutting down some businesses. Furthermore, the social distancing measures were adapted from state to state. Unlike some other EU countries, nonetheless, Germany never issued a curfew. This reflects a general pattern: countries that reacted before the epidemic spread uncontrollably did not need to impose a lockdown to control the epidemic.

Together with the social distancing rules, Germany benefits from 8.3 hospital beds per 1,000 people and is among the top five countries in the EU for the number of nurses (13.2) and physicians (4.2) per 1,000 people (World Bank, 2020). Germany has further focused on collecting and analyzing data and communicating the results to the public in order for the population to comply with the measures. Setting clear expectations and providing transparency to the public on the criteria for government decision making about reopening is a key factor in gaining public trust. In a global context, South Korea has fared similarly to Germany by managing to keep infections among the over-70 population to only 11 percent of all cases, reporting a case fatality rate of 17 percent for this group, and maintaining a low overall case fatality rate of 2.4 percent. Efficient testing in South Korea, a country of 51.8 million, complements social distancing. South Korea conducts around 15,000 tests a day as of February 2020 and has drive-through test centers (Lee and Lee, 2020).

In contrast to several European countries implementing lockdown measures to "flatten the curve", Taiwan emerged as a success story and did not have to enforce a national lockdown, leaving public spaces open and businesses running as usual. Despite Taiwan's close proximity to China, the center of the virus outbreak, it has only reported 509 cases and 7 deaths out of a population of 23.8 million as of September 2020. Taiwan's experience with Sars in 2003, and the bird flu in 2013 have been influential in shaping its response (The Guardian, 2020). As preventative measures, most premises take temperatures and use hand sanitizer before allowing customers access. Furthermore, Taiwan's success has largely been attributed to the use of technology, including phone tracking enforcing quarantine, monitoring of high risk individuals through mobile phones, a centralized epidemic command center, its single-payer healthcare system, and swift decision making with travel bans (Wang et al. 2020). Contact tracers in Taiwan log 15 to 20 contacts for each person in comparison to France and Spain that log only three contacts (The Economist, 2020). Whether Taiwan's success can be replicated in European countries remains doubtful due to differences in institutions, culture and society, with Taiwan placing strong emphasis on the collective over the individual.

**5 ECONOMIC MEASURES RELATED TO COVID-19**

In response to the COVID-19 crisis, European countries (as well as the United States and other major economies) implemented fiscal and monetary measures to stabilize the economy. The fiscal measures comprise of discretionary fiscal stimulus measures, state guarantees for loans to firms and other liquidity support measures. Moreover, countries have focused on health spending and measures aimed at supporting unemployed individuals through various social transfers. On the revenue side, deferrals of tax and social security contributions are aimed mainly at providing liquidity support to households and companies. The European Central Bank (ECB) also implemented monetary policy to stabilize the economy. The following subsections focus on the fiscal and monetary measures that the governments have or will implement.

*5.1 Fiscal measures*

In May 2020, the European Central Bank (2020) forecasted that discretionary fiscal measures aggregate at 3.25 percent of GDP at the euro area level. Furthermore, state guarantees for loans to firms and other liquidity support measures account for about 20 percent of euro area GDP, as defined by the stability programs laid out at the end of April. The EU SURE program is attempting to save jobs with about €100 billion in financial relief. Furthermore, the Coronavirus Response Investment Initiative provides liquidity to businesses affected by the pandemic. The European Investment Fund has also made available about 8 billion Euros in financing for 100,000 small businesses affected by COVID-19 (European Commission, 2020b).

Additionally, fiscal measures have been implemented by governments in most countries in terms of income support measures for individuals and households, tax and contribution policy changes, public sector subsidies to businesses, tax deferrals and social security contributions, public sector loans or capital injections to businesses, and loan guarantees by the state, benefiting private borrowers. Nevertheless, there are large differences in the size of fiscal packages implemented in the different countries, especially when it comes to amount of state guarantees. The differences increase the risk of uneven recovery in the different EU countries and raise the issue of fragmentation between the different economies_The reason for the

variation in the design of fiscal measures is partly due to differences in institutional and economic characteristics. Furthermore, variables related to trade and politics play a role in the differences in the magnitude of fiscal measures.

There are several income support measures in terms of extension of unemployment benefits, one-off payment for family and child benefits among others. In Germany, for example, the government compensates 70 to 80 percent of salary losses of childless workers, and 77 to 87 percent of workers with children under the STW scheme if the working hours were reduced by at least 50 percent (OECD 2020). In Italy, self-employed benefit from an allowance of EUR 500 monthly for up to 3 months in the municipalities most affected. In the UK, a new Job Support Scheme was introduced in November 2020 to protect viable jobs in businesses who are facing lower demand over the winter months. Sweden increased funding for the public employment service and labor market policy programs.

Germany, for example, offers a comprehensive package of tax measures for companies, where payments can be postponed until the end of the year. The US and China have fewer measures, and some of them are only offered for a shorter period. Germany, Italy, and Sweden also allow the deferral of several taxes over a long period. Germany also allows the deferral of the income tax, the corporate tax and the VAT until the end of the year without interest. In Italy, social security and welfare contributions can be deferred in addition to withholding tax and VAT. This is similar in Sweden, where companies can delay their social contributions, together with the VAT, and payroll taxes. Protection of SMEs have been particularly important as they generally have lower liquidity. In Sweden, SMEs can defer all of their taxes and can also claim back the taxes paid in 2019 and either pay it later or set it off against future losses.

*5.2 Monetary Measures*
The ECB's monetary policy response focuses on addressing three key issues: (i) market stabilization to avoid fragmentation and safeguard the monetary policy transmission mechanism; (ii) providing central bank liquidity to fund credit provision to the economy; and (iii) "ensuring that the overall stance is sufficiently accommodative" (ECB 2020c). The ECB's policy measures have been providing crucial support to the economy and price stability to help with the tightening of financial conditions that the

economy faced due to COVID-19. This support operates in two ways: (i) ensuring medium-term growth and controlling inflation; and (ii) "removing tail risks around the baseline scenario".

A €1,350 billion pandemic emergency purchase programme (PEPP) was put in place by the ECB to aim at lowering borrowing costs and increasing lending in the euro area. This, in turn, should help citizens, firms and governments get access to funds they may need during the crisis. Monetary measures are also implemented in terms of monetary policy and prudential regulation. However, these measures vary from country to country in their size. Cut in interest rate can make consumers more optimistic about unemployment expectations., as shown by Binder (2020). The author shows that information about the Fed's announcement to cut the interest rate makes some consumers more optimistic about unemployment expectations and induces them to revise their inflation expectations downward.

## 6  STRATEGIES TO OVERCOME COVID-19 CRISIS

### 6.1 Suppression vs. herd immunity

Global reactions to COVID-19 have varied between a view that the epidemic will spread through the population until herd immunity has been reached and an aim to eliminate the pandemic. The contrasting views were summarized in two competing manifestos by scientists. The Great Barrington Declaration (2020) calls for societies to "minimize mortality and social harm until we reach herd immunity." Its proponents argue against current restrictions and suggest "to allow those who are at minimal risk of death to live their lives normally to build up immunity to the virus through natural infection, while better protecting those who are at highest risk." The signatories of the John Snow Memorandum (2020) caution against herd immunity approach, noting that "The infection fatality rate of COVID-19 is several-fold higher than that of seasonal influenza and infection can lead to persisting illness, including in young, previously healthy people (ie, long COVID). It is unclear how long protective immunity lasts and, like other seasonal coronaviruses, SARS-CoV-2 is capable of re-infecting people who have already had the disease, but the frequency of re-infection is unknown."

According to its signatories, "Any pandemic management strategy relying upon immunity from natural infections for COVID-19 is flawed. Uncontrolled transmission in younger people risks significant morbidity and mortality across the whole population. In addition to the human cost, this would impact the workforce as a whole and overwhelm the ability of healthcare systems to provide acute and routine care."

Suppression strategy means adopting policies that aim to bring the number of new infections down close to zero and then maintaining that state by proactive, targeted measures. The goal is to maintain the effective reproduction rate R below 1, meaning that even if new cases would arrive across the borders, they could not spread in the population. It should be noted that suppression does not mean sacrificing the economy to save health. Instead, health and economy are intertwined. Suppressing COVID-19 is important also for the health of the economy.

So far, countries that have pursue suppression strategy have both saved lives and been more likely to avoid large-scale and long lockdowns. With its almost 24 million inhabitants, Taiwan has only about 700 cases and 7 deaths as of December 8, 2020, the latest of them in May (John Hopkins University, 2020). Taiwan implemented targeted restrictions early on, and succeeded in suppressing the epidemic and avoiding a lockdown. Other countries with low numbers of reported deaths in both absolute terms and relative to population include New Zealand (25 deaths), Vietnam (35), Thailand (60 deaths), Norway (361 deaths), Finland (424 deaths) and South Korea (556 deaths).

6.2 *How to suppress COVID-19 pandemic*[1]

The suppression strategy relies on a combination of mutually reinforcing tools. At the individual level, everyday prevention measures include physical distancing, using masks in public indoor spaces, hand hygiene and contact avoidance, like remote work to the extent possible. At societal level, there is need both for preventive measures, especially in avoiding super-spreader events and activities with high transmission risk to the extent that the epidemiological situation requires, and contact tracing. In

---

[1] This subsection draws heavily from Lappalainen at al. (2020), a report by an independent expert group in Finland.

contact tracing, speed in reaching those potentially exposed is of crucial importance. This can be strengthened with contact tracing apps in smartphones that register anonymously other smartphones with the app within a short distance, allowing the system to send an alert to those potentially exposed in case a person using a contact tracing app is later diagnosed. Those potentially exposed can then be advised to remain in quarantine to stop the potential spread. The length of the quarantine is an important choice, and involves a tradeoff between two types of errors: a long quarantine is costly in the likely case that an infection has not taken place, but stops the transmission chain more likely in case infection has taken place. Furthermore, border controls play a central role in preventing re-introducing epidemic in countries in which it has been suppressed.

In November, several vaccine research projects reported promising early results. To the extent that these results are confirmed by later research, vaccinations have a potential to be a game changer in terms of ending COVID-19 pandemic. However, important challenges remain in terms of testing the vaccines, and organizing their production and distribution in the scale needed.

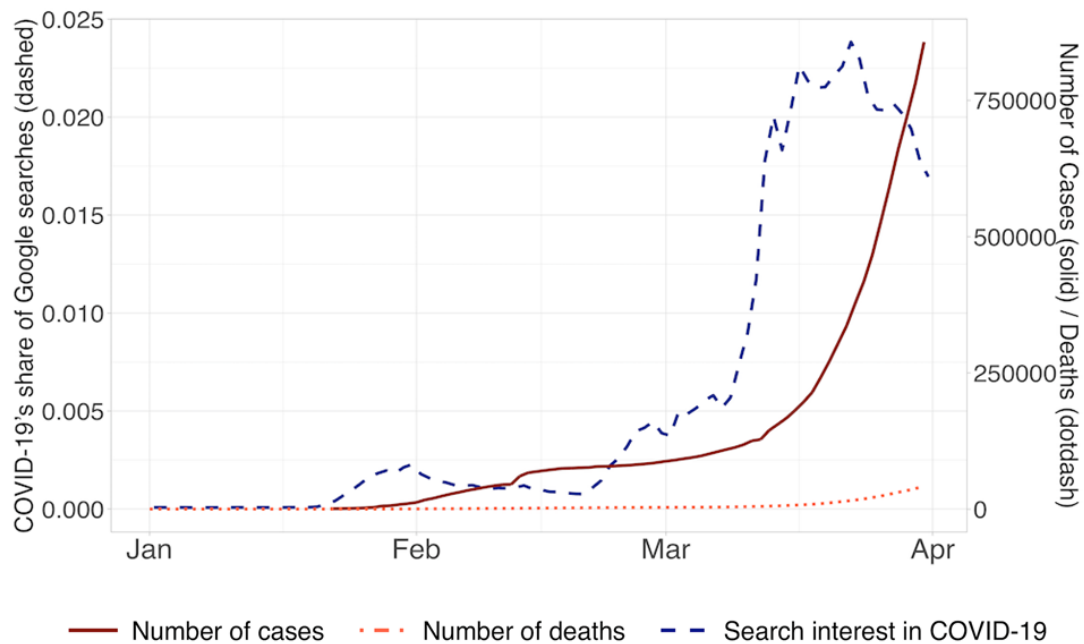## 7 THE ROLE OF PUBLIC ATTENTION

Many European countries have been criticized for being too slow to introduce non-pharmaceutical intervention measures limiting the spread of the COVID-19 virus, with slow reactions leading to an increase in death toll (Odone et al. 2020). An opposite concern is whether the cure is worse than the disease, with various restrictions causing economic devastation. However, Andersen et al. (2020) show that most of the economic contraction occurs regardless of whether governments mandate social distancing or not. While Sweden has not imposed restrictions on social and economic activities, there has also been a decline in consumer spending: a natural experiment using transaction data from bank has shown that aggregate spending dropped by around 25 percent in Sweden and by 4 additional percentage points in Denmark which imposed more restrictions.

Political regimes and politicians' role have been at the center of the debate on speed of NPCs adoption. Adolph et al. (2020) illustrate that US states in which Trump won a higher share of votes in 2016 were considerably slower to adopt social distancing measures. Frey at al. (2020) show that autocratic regimes introduced more stringent lockdowns but were less effective in limiting mobility. Nevertheless, there are wide differences in the speediness of adopting NPCs also between democratic countries, as highlighted by Aksoy et al. (2020). Switzerland, Denmark, and Ireland were rather fast to respond in the implementation of NPCs while the UK and the US were rather slow to respond. However, slow responses by the UK and the US cannot be explained alone by idiosyncratic characteristics of Prime Minister Johnson and President Trump. Pro-European President Macron implemented the first NPCs in France 36 days after the first confirmed COVID-19 case, Socialist Prime Minister in Spain after 37 days, and Social Democratic Prime Minister in Sweden after 41 days. Also, the fast reaction by South Korea does not simply suggest a systematic difference between Western and East Asian countries. For example, Japan waited 36 days before introducing its first NPI.

Aksoy et al. (2020) show that part of the explanation in differences in response delay is due to public attention, measured as the share of daily Google searches in a country related to COVID-19. They obtained the daily share of searches related to the COVID-19 of all Google searches in 174 countries from 1 January to 31 March 2020. They then linked those searches to the daily data on COVID-19 cases and deaths, as well as governments' policy responses. The use of google searches to predict policy responses extends previous research that has used Google Trends to detect regional disease outbreaks (Ginsberg et al. 2009) and predict economic indicators (Choi and Varian 2012).

Figure 9, reproduced from Aksoy et al. (2020), depicts the development in the global number of COVID-19 cases and deaths and public attention, measured as share of google searches. Global cases and deaths remained at a relatively low overall level until mid-March, from which onwards the exponential growth path is clearly visible on a global scale. Public attention increases moderately in late January, declines then again in the first half of February, increasing then in an exponential pattern until mid-March.

Figure 9. Global Google searches related to COVID-19 pandemic and the number of confirmed cases and deaths



Notes: The figure depicts the development of public attention to COVID-19 pandemic at the global level (left axis) and the global number of cases and deaths (right axis) for each day from 1 January to 31 March 2020.
Source: Aksoy et al. (2020).

Figures 10, 11, and 12 provide snapshots on epidemic situation and attention around the world at the end of January, February, and March. Figures 10 and 11 show that China was the epicenter of the pandemic in January and February, while Europe and the United States became epicenters largely in March.
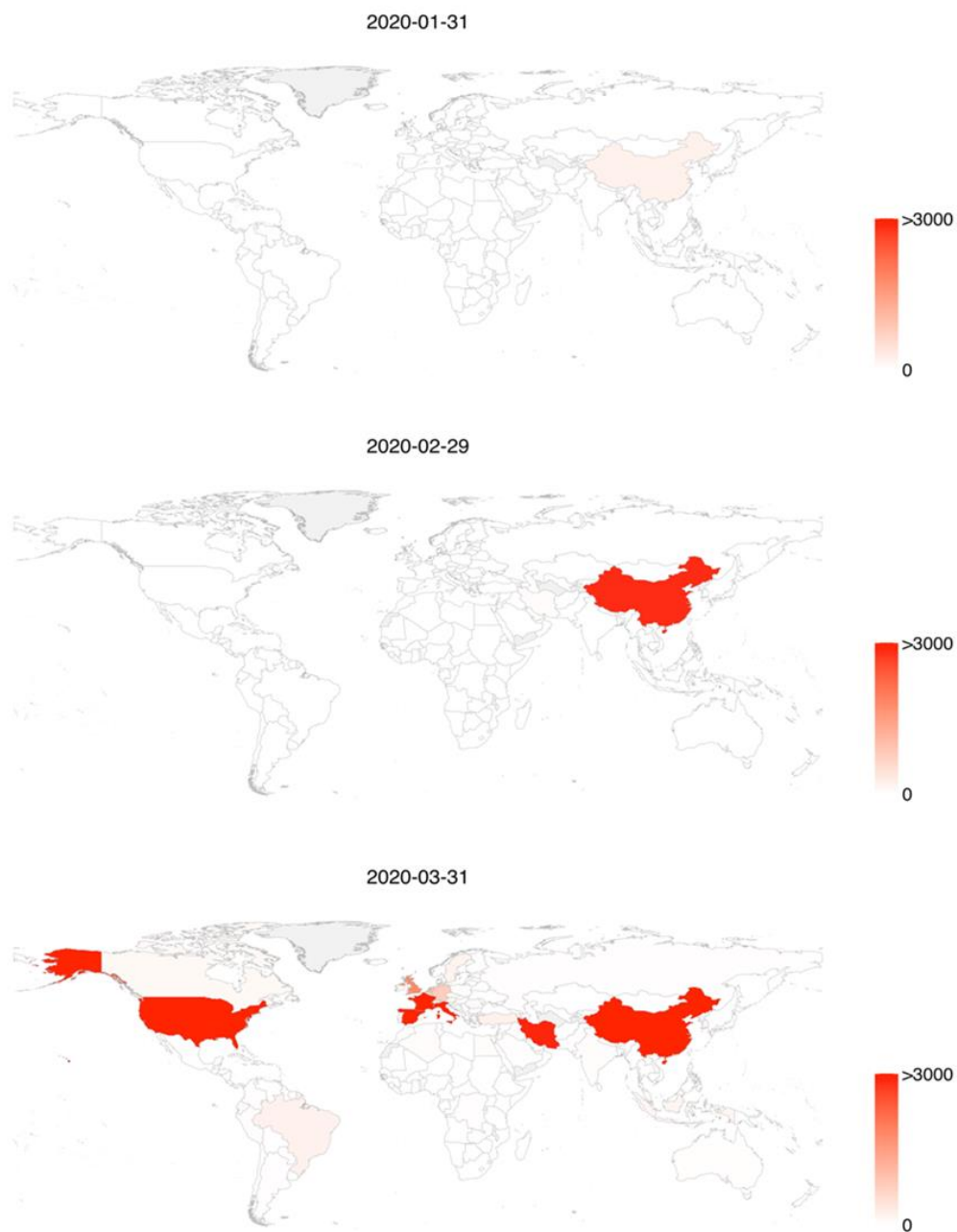
Figure 10. Spread of reported COVID-19 cases around the world
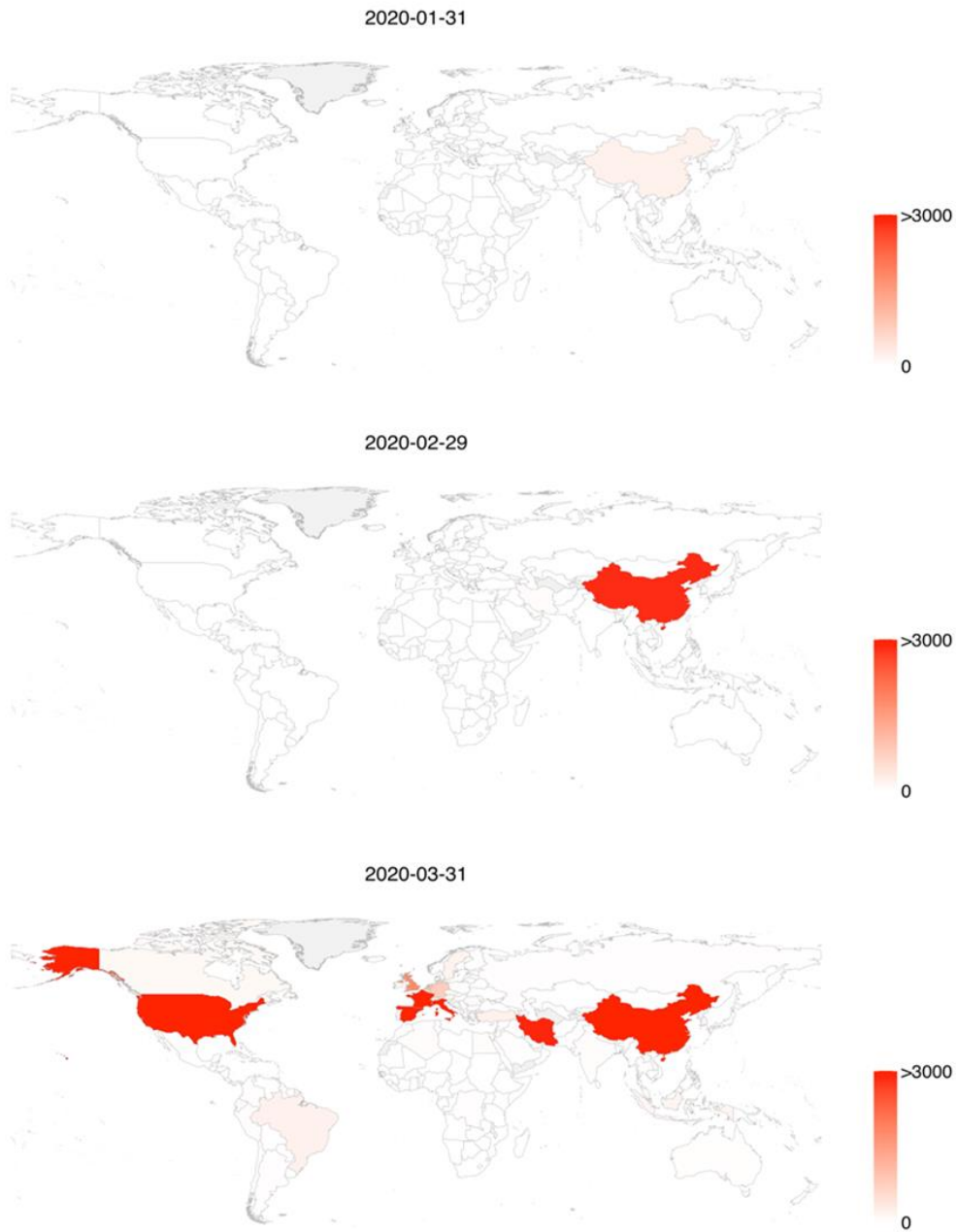


Notes: The three panels depict the number of reported COVID-19 cases in all countries on 31 January, 29 February, and 31 March. Darker red corresponds to higher number of cases.
Source: Aksoy et al. (2020).

Figure 11: Reported COVID-19 deaths around the world at the end of January, February and March



Notes: The three panels depict the number of reported COVID-19 deaths in all countries on 31 January, 29 February, and 31 March. Darker red corresponds to a higher number of deaths.
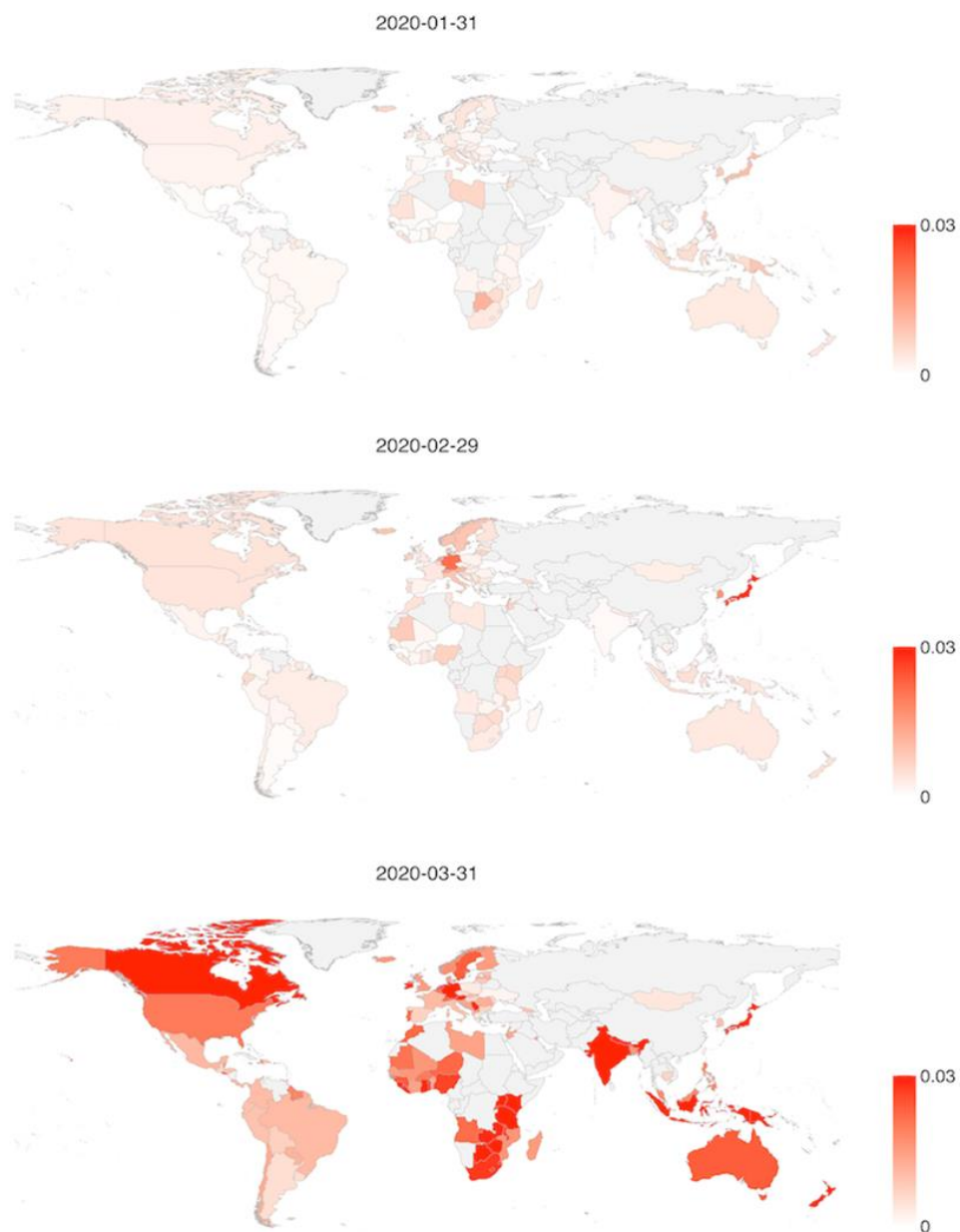Source: Aksoy et al. (2020).

Figure 12, in turn, depicts search interest in COVID-19 on same days. China and other countries in which the internet is not free are not shows as the numbers are either not available or are not reliable. Comparing attention figure 12 with figures 10 and 11 suggests that attention is to a large extent local. When the virus was mostly limited to Asia, attention in Europe and the Americas remained low.

Aksoy et al. (2020) also analyze to what extent public attention and epidemiological situation in terms of cases in the own country and on the own continent outside own country predict the implementation of non-pharmaceutical interventions. They show that a one standard deviation increase in the share of COVID-19-related Google searches, measured as average within the previous 10 days, is associated with 6 percentage points higher likelihood of NPI being in place on a given day. When comparing standardized coefficients, the effect of Google searches is about half as strong as the effect of cases in the own country, and also half as strong as the effect of cases in the other countries on the own continent. Therefore, public attention plays an important role in explaining cross-country differences in the implementation of non-pharmaceutical interventions.

The extent to which a government responds to public attention is highly dependent on the country's institutional quality. The positive effect of public attention on policy implementation is strongly driven by countries with good institutions. In such countries, public attention may either act as a cover to allow politicians to react fast. This was the case, for example, in South Korea (first domestic contact restriction measures 11 days after the first case reported) and Switzerland (first measure after 3 days). Public attention can also push politicians to act even when they would have been initially reluctant to impose contact restrictions as appears to have been the case in the United Kingdom (first measure after 45 days) and in Sweden (first measure after 41 days).

Figure 12: Search interest in COVID-19 around the world at the end of January, February and March



2020-01-31

2020-02-29

2020-03-31

Notes: Panels A, B, and C depict the share of Google searches related to COVID-19 in all countries on 31 January, 29 February, and 31 March. Darker red corresponds to higher public attention.
Source: Aksoy et al. (2020).

There are also major differences in compliance of citizens to the social distancing measures adopted. Deopa and Fortunato (2020) show that cultural attitudes and behavioral norms influence compliance with social distancing measures in Switzerland. The authors illustrate that German speaking cantons were less responsive to the federal request to "stay at home" than the French speaking cantons and reduction in mobility during the emergency was significantly lower in this region.

## 8 CONCLUSION

As of December 8, COVID-19 pandemic has claimed more than 1.55 million lives globally, and resulted in 68 million confirmed cases. Europe and the Americas have been hit particularly hard. A failure to react to the pandemic early on with targeted social distancing measures, mask mandate, and effective contact tracing has significantly worsened the situation. A part of high death rates in Europe can be explained by a high share of the elderly population, but much lower mortality rates in Japan show that also an ageing society can keep death rates much lower. As of December 8, Japan has registered 2300 deaths, compared with 62,100 in the United Kingdom, 61,200 in Italy, 46,600 in Spain, and 20,000 in Germany. In the United States, President Trump's public questioning of medical experts and repeated assertions downplaying the threat that COVID-19 poses have severely aggravated the epidemic situation.

At the time of writing this report, news about vaccine development are encouraging, and it is to be hoped that the situation will return towards normality in 2021. Yet, important challenges remain before the epidemic can be suppressed. Doing so requires a combination of physical distancing, using masks in public indoor spaces, hand hygiene and contact avoidance, including restrictions aiming at avoiding super-spreader events, and contact tracing. The current situation in most European countries is so bad that further restrictions are implemented, including lockdowns of varying severity. Countries that have successfully suppressed the epidemic, like Taiwan, have both saved lives and avoided lockdowns.

In addition to medical challenges, COVID-19 has resulted in the worst economic crisis since the Second World War. Governments have passed massive stimulus measures, and central banks have provided further liquidity, although ultra-low interests rates already before the crisis meant that the room for conventional monetary policy was limited. European countries have taken extensive measures to protect jobs, like government programs to compensate for lost wage income associated with shorter working time. A prominent example of that is German Kurzarbeit system. In the United States, instead, open unemployment was allowed increase faster, and the stimulus package that was passed in spring temporarily increased unemployment benefits to protect incomes, rather than jobs. An important challenge for European countries is to find the right balance between the urge to avoid bankruptcies resulting from a temporary drop in demand and liquidity problems, and the risk to slow down creative destruction. Although bankruptcies of old firms and temporary unemployment are painful, they are part of the process of economies adjusting to new realities. Disruptions in supply chains and in trade means that the world is likely to be less globalized. Increasing online activities by businesses and increasing home office is likely to make Europe more digitized. While the technological sector is experiencing a boom, other service sectors are exposed to hardships.

**References**

Aksoy, C. G., Ganslmeier, M., and Poutvaara, P. (2020), "Public attention and policy responses to COVID-19 pandemic", CESifo Working Paper No. 8409.

Andersen, A. L., Hansen, E. T., Johannesen, N., and Sheridan, A. (2020), "Pandemic, shutdown and consumer spending: Lessons from Scandinavian policy responses to COVID-19", Manuscript, Available at: https://arxiv.org/pdf/2005.04630.pdf

Benzell, S., Collis, A. and Nicolaides, C. (2020), "Rationing social contact during the COVID-19 pandemic: Transmission risk and social benefits of US locations", Proceedings of the National Academy of Sciences, 117 (26), 14642-14644.

Binder, C. (2020), "Coronavirus fears and macroeconomic expectations", Review of Economics and Statistics, 102 (4), 721–730.

Bootsma, M. C. and Ferguson, N. M. (2007), "The effect of public health measures on the 1918 influenza pandemic in US cities", Proceedings of the National Academy of Sciences 104 (18), 7588-7593.

Bursztyn, L., Rao, A., Roth, C. P. and Yanagizawa-Drott, D. H. (2020), "Misinformation during a pandemic", NBER Working Paper No. 27417.

Chinn, D., Klier, J., Stern, S. and Tesfu, S. (2020), Safeguarding Europe's livelihoods: Mitigating the employment impact of COVID-19, McKinsey & Company.

Deopa, N. and Fortunato, P. (2020), "Social distancing: Why has compliance been so different across Europe?", London School of Economics EUROPP Blog, Available at: https://blogs.lse.ac.uk/europpblog/2020/09/15/social-distancing-why-has-compliance-been-so-different-across-europe (accessed Sep. 2020).

European Commission (2020a), Spring 2020 Economic Forecast, Available at: https://ec.europa.eu/info/business-economy-euro/economic-performance-and-forecasts/economic-forecasts/spring-2020-economic-forecast-deep-and-uneven-recession-uncertain-recovery_en (accessed Oct. 2020).

European Commission (2020b), "Coronavirus: Commission and European Investment Fund (part of EIB Group) unlock €8 billion in finance for 100,000 small and medium-sized businesses", Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_20_569

European Commission (2020c), "Pandemic central banking: the monetary stance, market stabilisation and liquidity", Available at: https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200519~e5203d3520.en.html

European Parliament (2020), Question for written answer E-002125/2020, https://www.europarl.europa.eu/doceo/document/E-9-2020-002125_EN.html.

Eurostat (2020), "Impact of Covid-19 crisis on industrial production", Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Impact_of_Covid-19_crisis_on_industrial_production (accessed Oct. 2020).

Fetzer, T., Hensel, L., Hermle, J. and Roth, C. (2020), "Coronavirus perceptions and economic anxiety", Review of Economics and Statistics, in press.

Great Barrington Declaration (2020), Available at: https://gbdeclaration.org/

Hampshire, A., Trender, W., Chamberlain, S., Jolly, A., Grant, J. E., Patrick, F., Ndaba Mazibuko, N., Williams, S., Barnby, J.M., Hellyer, P. & Mehta, M. A. (2020), "Cognitive deficits in people who have recovered from COVID-19 relative to controls: An N= 84,285 online study". medRxiv.

Hanlon, P., Chadwick, F., Shah, A., Wood, R., Minton, J., McCartney, G., … and McAllister, D. A. (2020), "COVID-19–exploring the implications of long-term condition type and extent of multimorbidity on years of life lost: a modelling study", Wellcome Open Research 5.

Hatchett, R. J., Mecher, C. E., and Lipsitch, M. (2007), "Public health interventions and epidemic intensity during the 1918 influenza pandemic", Proceedings of the National Academy of Sciences 104 (18), 7582-7587.

John Hopkins University (2020), "COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE)", Available at: https://coronavirus.jhu.edu/map.html.

John Snow Memorandum (2020), Available at: https://www.johnsnowmemo.com/

Juergensen, J., Guimón, J., and Narula, R. (2020), "European SMEs amidst the COVID-19 crisis: assessing impact and policy responses", Journal of Industrial and Business Economics 47 (3), 1-12.

Lavezzo, E., Franchin, E., Ciavarella, C. et al. (2020), "Suppression of a SARS-CoV-2 outbreak in the Italian municipality of Vo", Nature 584, 425–429.

Lee, D., and Lee, J. (2020), "Testing on the Move South Korea's rapid response to the COVID-19 pandemic", Transportation Research Interdisciplinary Perspectives, 100111.

Odone, A., Delmonte, D., Scognamiglio, T., and Signorelli, C. (2020), "COVID-19 deaths in Lombardy, Italy: data in context", The Lancet Public Health 5 (6), 310.

Petersen, E., Koopmans, M., Go, U., Hamer, D. H., Petrosillo, N., Castelli, F., … & Simonsen, L. (2020), "Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics", The Lancet Infectious Diseases 20, 238–244.

Profeta, P. (2020), "Gender equality and public policy during COVID-19", CESifo Economic Studies 66 (4), 365-375.

Queisser, M., Adema, W., Clarke, C. (2020), "Response to COVID-19 in Taiwan: big data analytics, new technology, and proactive testing", Available at: https://voxeu.org/article/covid-19-employment-and-women-oecd-countries

The Economist (2020), "Grim tallies, Briefing, The COVID-19 pandemic", Available at: https://www.economist.com/briefing/2020/09/26/the-covid-19-pandemic-is-worse-than-official-figures-show .

The Guardian (2020), "Experience of Sars a key factor in countries' response to coronavirus", Available at: https://www.theguardian.com/world/2020/mar/15/experience-of-sars-key-factor-in-response-to-coronavirus

Wang, C. J., Ng, C. Y., and Brook, R. H. (2020), "Response to COVID-19 in Taiwan: big data analytics, new technology, and proactive testing", Jama 323 (14) ,1341-1342.

World Bank (2020), Physicians (per 1,000 people) – Germany [data set], World Bank Data, Available at: https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=DE&most_recent_value_desc=true.

## EconPol Europe

EconPol Europe - The European Network for Economic and Fiscal Policy Research is a unique collaboration of policy-oriented university and non-university research institutes that will contribute their scientific expertise to the discussion of the future design of the European Union. In spring 2017, the network was founded by the ifo Institute together with eight other renowned European research institutes as a new voice for research in Europe. A further five associate partners were added to the network in January 2019.

The mission of EconPol Europe is to contribute its research findings to help solve the pressing economic and fiscal policy issues facing the European Union, and thus to anchor more deeply the European idea in the member states. Its tasks consist of joint interdisciplinary research in the following areas

1) sustainable growth and 'best practice',

2) reform of EU policies and the EU budget,

3) capital markets and the regulation of the financial sector and

4) governance and macroeconomic policy in the European Monetary Union.

Its task is also to transfer its research results to the relevant target groups in government, business and research as well as to the general public.