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Understanding How the Coronavirus Affects the Global Economy: A Guide for Non-Economists

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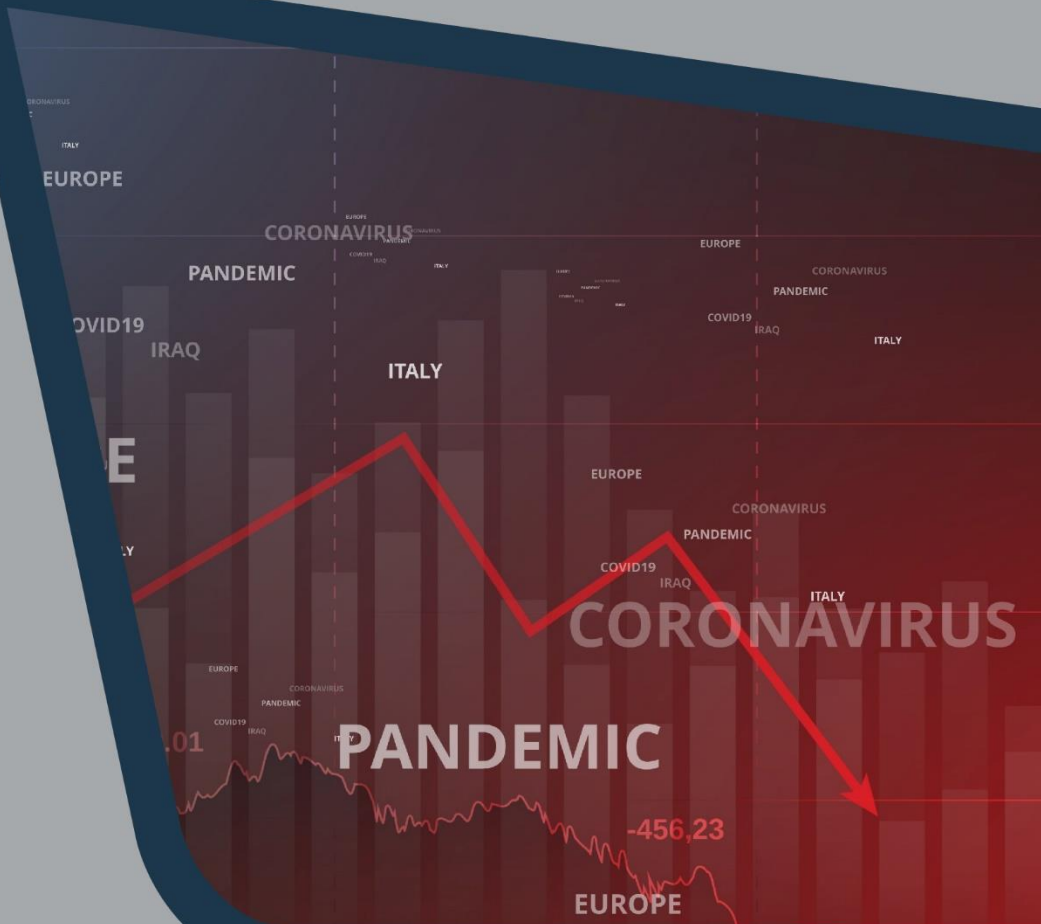
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Abstract

The coronavirus is causing considerable damage to the global economy, and the potential damage is continuing to grow. Unlike many other crises, evaluating the economic impact of the coronavirus is extremely challenging, due to the complexity of the ways in which it affects economic activity. This paper explains the main channels that economists think about when attempting to gauge the virus's economic fallout, and then presents some of the most recent assessments being circulated in the research community. It is written in a manner that is accessible to non-economists, while still making use of the cutting-edge contributions made in the academic literature.

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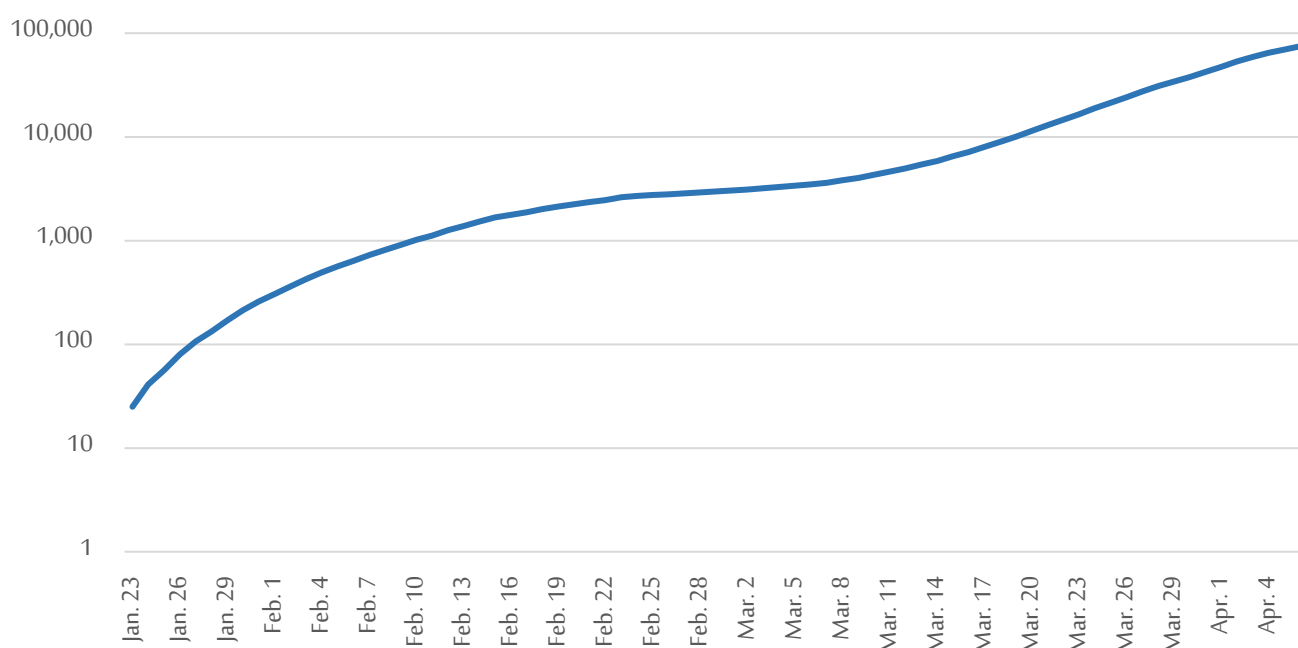
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1. Introduction

At the end of 2019, an outbreak of a respiratory disease known as the coronavirus was detected in Wuhan, China. Shortly afterward, in January 2020, the World Health Organization (WHO) declared the outbreak to be a Public Health Emergency of International Concern, and by early March 2020, it was officially designated as a global pandemic. The virus has spread aggressively throughout the world, and by the start of April 2020, the total cases reported globally exceeded 800,000, occurring in over 200 countries and territories, and resulting in approximately 40,000 deaths. The progress of cumulative deaths can be seen in Figure 1.1 below (Worldometer, 2020).

Figure 1.1: Total Deaths of Novel Coronavirus (2019-nCoV)



Source: Worldometer

While the health consequences of the coronavirus are grave, the economic consequences are also potentially devastating. GDP data is usually compiled on a quarterly basis, and it takes three months to produce the data; for that reason, it will take until the summer months for the impact on the world economy to be reflected in the GDP figures. However, a preview of the incoming damage was provided by the US unemployment figures released at the end of March 2020, wherein the number of unemployment benefit claims rose by 3.3 million (Rushe and Holpuch, 2020), representing a four-fold increase over the previous record during 1982; subsequent rises have been even worse. These quantitative indicators complement the compelling qualitative evidence shown on our TV screens: the world's leading capitals with empty streets, commuter trains shut down completely, and tourist destinations deserted.

Economists working in a wide variety of organizations, such as universities, think tanks, and governmental entities, have been working hard at providing estimates of the economic impact of the coronavirus. This paper explains the primary mechanisms linking the coronavirus to the economy, and goes on to present the most up-to-date estimates of the effects of the virus on the global economy. At the start of April 2020, in terms of short-term effects, predictions of the effects were typically of the order of a decrease in economic growth for 2020 of 3%, though there is a great deal of variation in the forecasts, due to the complexity of the crisis.

This paper also highlights some of the longer-term economic consequences that are not captured by these GDP-centric, short-term estimates. These include the adverse effects on the global economy stemming from deglobalization, as countries become fearful of economically integrating with other countries. The long-term consequences also include the likely growth slowdown brought about by the sharp rises in public debts, as governments scramble to support their economies through aggressive fiscal policies. This paper is written in a manner that is accessible to non-economists, while still making use of the cutting-edge contributions made in the academic literature. Readers looking for a summary of the principal conclusions can skip to the paper's last section.

2. Mechanisms Linking the Coronavirus to the Economy

While there are many possible taxonomies for the economic consequences of the coronavirus, we begin by presenting the short-term impacts, and then go on to describe the policy responses that are designed to stimulate the economy, followed by the long-term impacts, emphasizing those that are not addressed by the policy interventions.

2.1. Short-Term Mechanisms

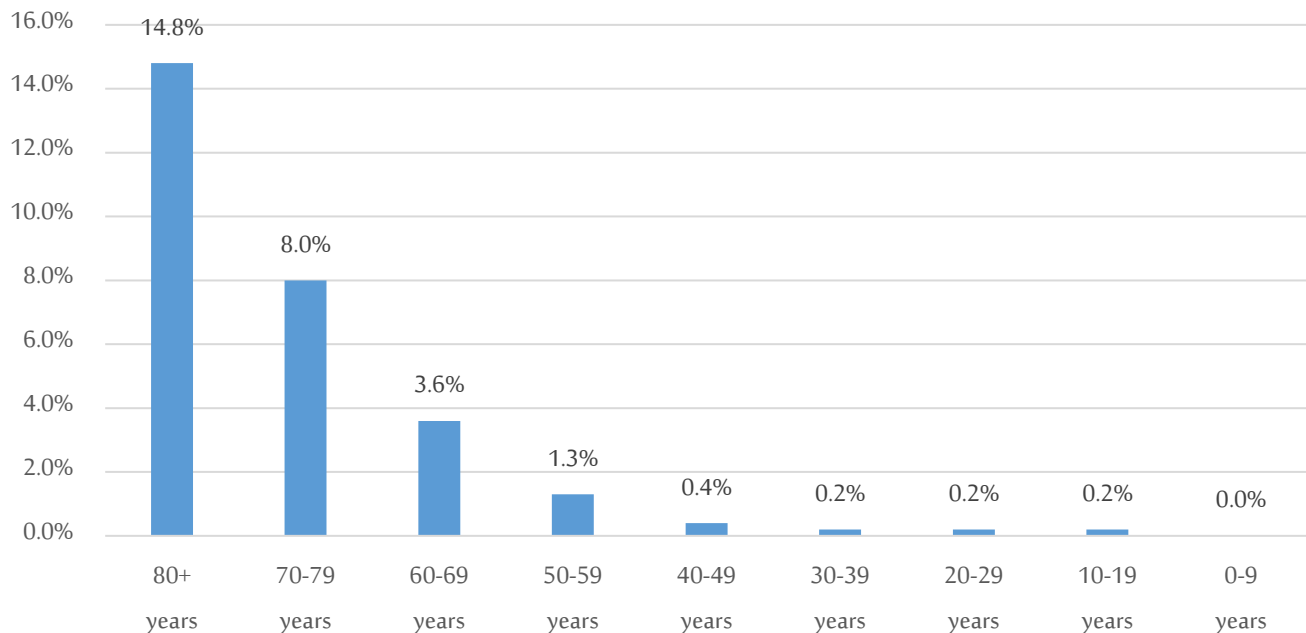
2.1.1. Direct Health-Related Costs

The departure point for the economic damage caused by the coronavirus is the direct health-related costs. People who contract the coronavirus have a significantly diminished capacity to contribute to the economy (with the exception of those who are simultaneously asymptomatic and unaware of their being ill), including being unable to go to work, or to travel, visit the cinema, play sport, and so on. In the case of those unfortunate enough to succumb to death, then these effects are evidently permanent.

Figure 2.1.1.1a shows the mortality rate by age group. It indicates that for those under 50 years of age, it is relatively low, being essentially zero for children under 10 years of age. However, above 50 years of age, which includes many

people in the workforce in an advanced economy, the mortality rate rises considerably, and it equals 15% for those above 80 years of age.

Figure 2.1.1.1a: Coronavirus Mortality Rate by Age Group

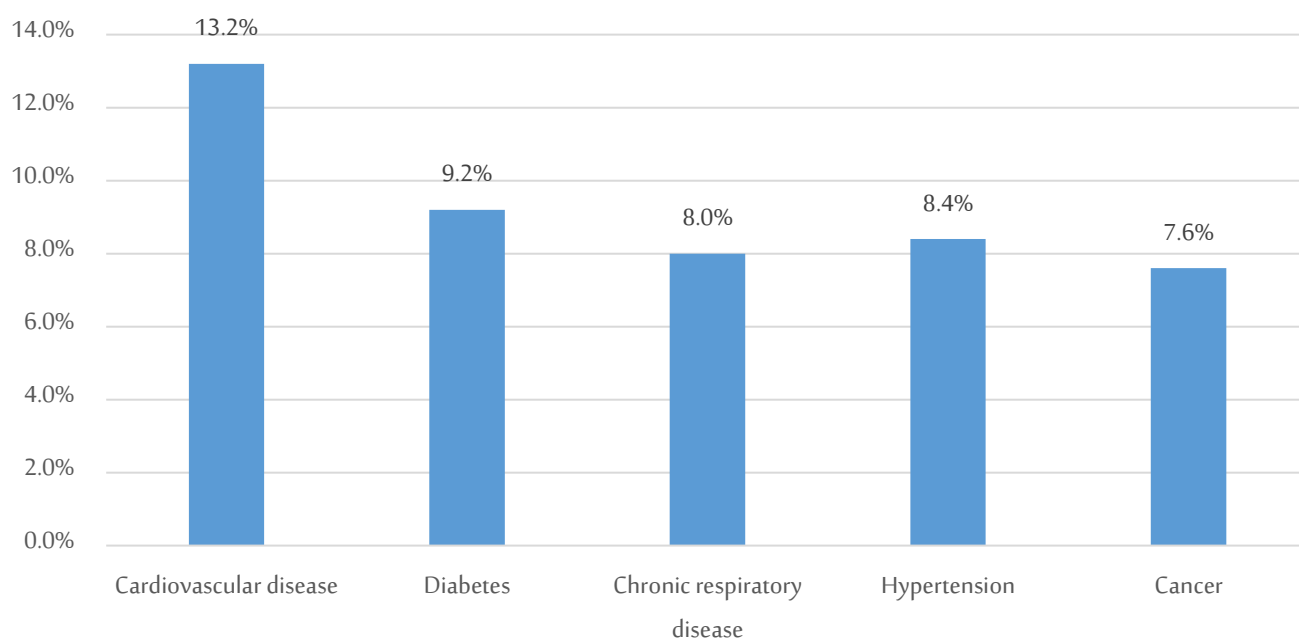


Source: Worldometer (2020)

Figure 2.1.1.1b shows the mortality rate by comorbidity. Again, many active members of the workforce have conditions such as diabetes and hypertension; thus, these data confirm that one of the direct channels through which the coronavirus has an adverse effect on the economy is by taking people out of the workforce due to death. And for those fortunate enough to recover, depending on the patient’s specific characteristics, recovery time can take as few as seven days, and as long as one month (Dhal, 2020).

There are significant treatment costs associated with the coronavirus, though precise data are hard to come by. The test reportedly costs \$50-100 (Court, 2020). The treatment depends upon the severity; in many cases, there is no treatment, as the patient’s immune system must act alone. However, for severe cases, especially the elderly, hospitalization may be necessary, which costs hundreds of dollars a day, and can last for weeks. Moreover, due to the fact that it is a pandemic, the demand for treatment is exceeding the supply, forcing medical facilities to make investments in medical devices such as ventilators to increase their capacity (Hogan, 2020). In extreme cases, such as China and Italy, impromptu field hospitals have been temporarily built to rapidly create extra capacity. Staff are being forced to work overtime, and there is an elevated demand for medical equipment such as surgical masks and sterilizers, both of which amplify the regular treatment costs (O’Brien, 2020). With global demand for these medical products rising sharply, supply chains are under significant strain, leading to shortages and rising prices (Wood, 2020).

Figure 2.1.1.1b: Coronavirus Mortality Rate by Comorbidity



Source: Worldometer (2020)

Significant resources are currently being allocated to the development of a vaccine. Even under accelerated procedures, the vaccine is expected to take until the second half of 2021 to appear (Spinney, 2020). While estimating the cost ex ante is difficult, some experts have estimated a development cost of \$1 billion (Dunn, 2020).

The treatment cycle of the coronavirus also has an adverse effect on the availability and quality of treatment for other medical conditions, as medical facilities have to redirect their resources to dealing with the coronavirus. Unrelated surgeries, clinical appointments, and other medical procedures are being delayed and possibly canceled, with economic consequences that are virtually impossible to estimate.

2.1.2. Shrinking Aggregate Demand

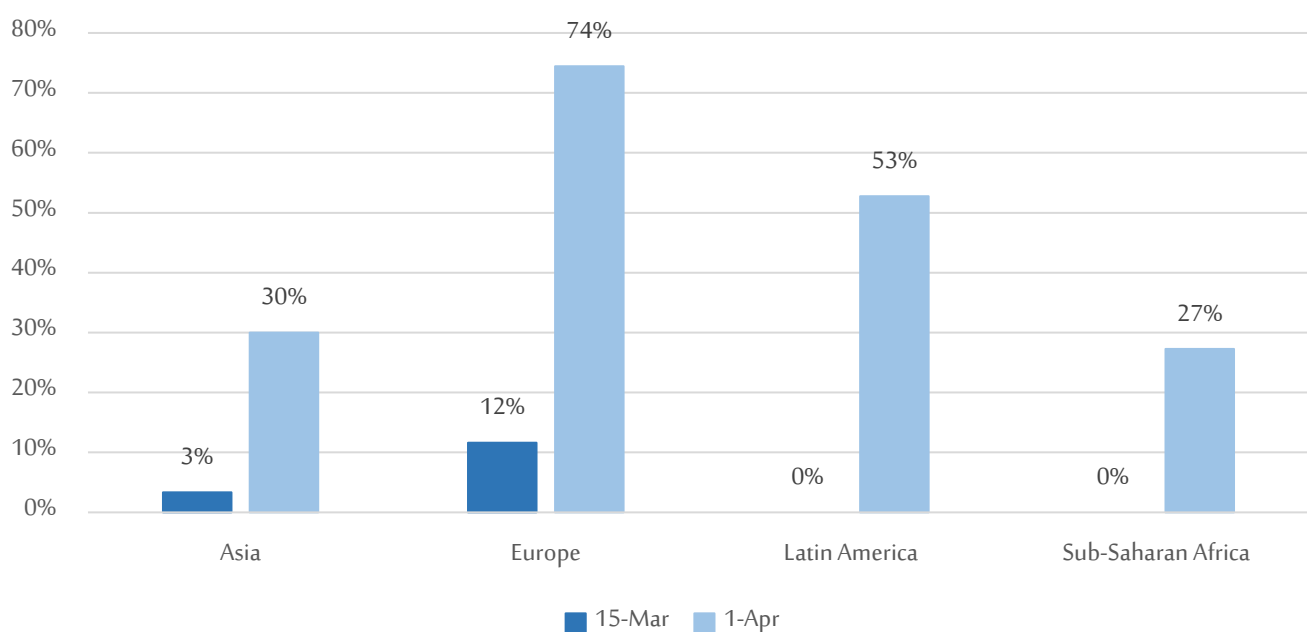
While the direct health-related costs alone are considerable, the majority of the economic damage caused by the coronavirus relates to its impact on the broader economy. Much of it revolves around the currently intractable problem of economic interactions—such as purchasing goods and services, or producing output—requiring close physical proximity between humans; while the desire to decrease infection risk requires humans to avoid crowds and to maintain significant distances between themselves and others.

Consequently, pandemics cause people to voluntarily diminish their physical interactions with others, such as going out and traveling with lower frequency. Thus, prior to any top-down social-distancing measures, restaurants, cinemas,

aviation, and many other services that involve physical proximity between humans experienced a significant decrease in demand (Eichenbaum et al., 2020).

Moreover, the considerable voluntary efforts undertaken by humans are robustly reinforced by the containment and social distancing measures imposed by governments. These include: travel bans; home-based and formal quarantining measures for individuals and entire cities and/or countries; curfews; the forced closure of retail outlets; the cancellation of major conferences and sporting events; and so on. By the start of April 2020, for example, 74% of European countries had imposed a national lockdown (Figure 2.1.2.1).

Figure 2.1.2.1: Percentage of Countries Imposing National Lockdown by Region

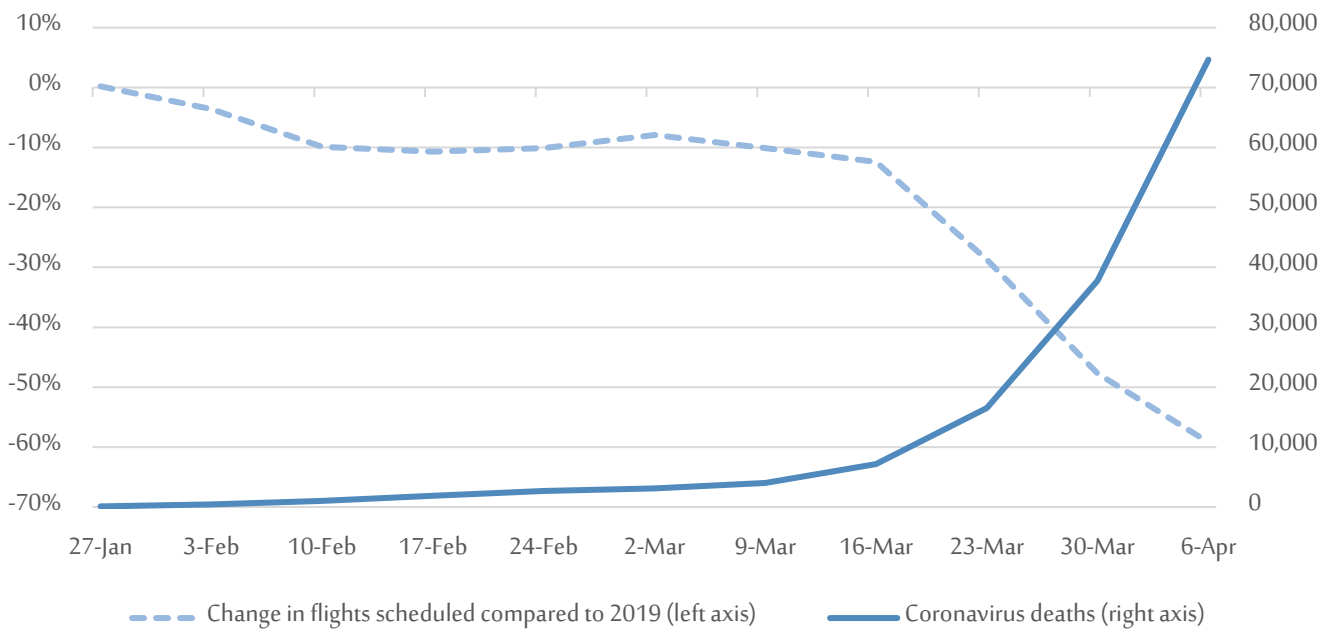


Source: BBC

Collectively, these behavioral changes bring about a large contraction in aggregate demand (Eichenbaum et al., 2020), which is defined as the total (at the level of the economy) willingness and ability of people to purchase goods and services. While virtually no sector is untouched by this wholesale contraction, five sectors are virtually crippled: aviation, tourism, restaurants, retail, and point-to-point transportation.

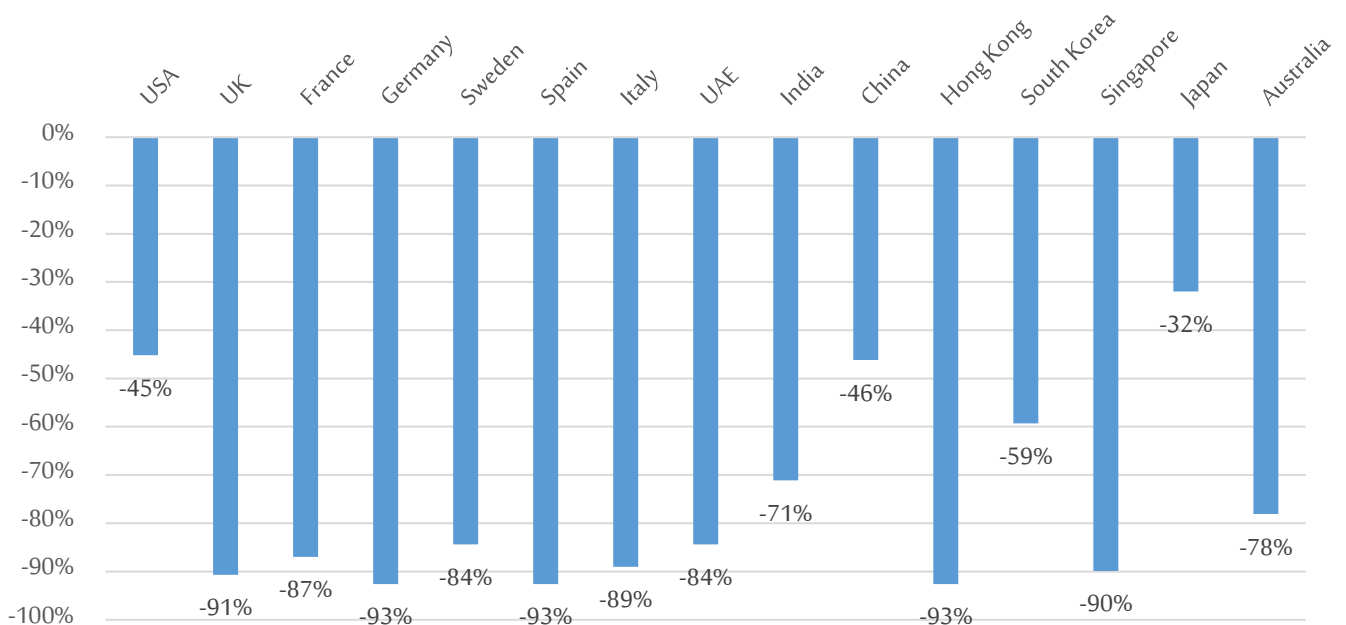
The decreased demand for these products and services then spills over on to all the other sectors that are upstream or downstream. For example, decreased demand for aviation means decreased demand for jet fuel, and this is one reason why global oil prices have fallen so dramatically during the crisis (BBC, 2020). Closing schools means diminished demand for stationery. While canceling major sports events, such as the Wimbledon tennis tournament, or the Chinese Formula 1 Grand Prix, cause large commercial losses for media companies invested in the events.

Figure 2.1.2.2a: Global Scheduled Flights Change (%) Year-Over-Year and Coronavirus Deaths



Source: OAG and Worldometer

Figure 2.1.2.2b: Scheduled Flights Change (%) Year-Over-Year for the First Week of April, 2020



Source: OAG

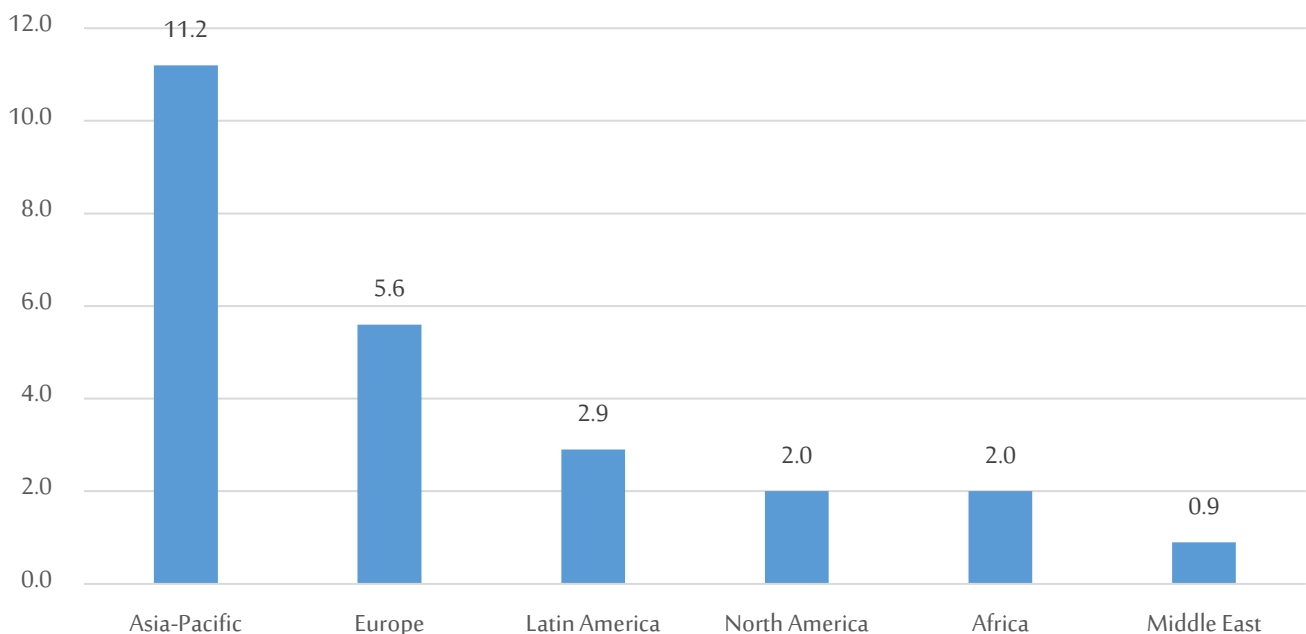
As an illustration, the aviation industry is expected to incur losses of the order of \$61 billion (IATA, 2020a) due to the organic decrease in travel, combined with stringent travel bans. Figure 2.1.2.2a shows the global change in scheduled

flights in 2020 compared to 2019. In the first week of April, there was a 59% decline in scheduled flights globally compared to the first week of April in 2019.

Figure 2.1.2.2b shows the reduction in scheduled flights for various major destinations in the first week of April 2020. Some of the world’s leading hubs have experienced massive declines: 93% for Germany, 92% for Hong Kong, 91% for the UK, and 84% for the UAE. For China, the April figure is lower than for other countries primarily because it has already commenced the recovery process, having been down by over 70% during the middle of February.

The IATA estimates that 25 million civil aviation jobs are at risk (IATA, 2020b). Figure 2.1.2.3 shows the expected regional distribution of those jobs, underscoring the industry’s importance to the Asian economy, where over 11 million jobs are threatened by the coronavirus.

Figure 2.1.2.3: Regional Distribution of Aviation Jobs at Risk (millions)



Source: IATA

Shopping malls are reporting huge losses. Figure 2.1.2.4 shows the share price of Simon Property Group Inc., one of the largest shopping mall companies in the US, during 2020, compared to that of the overall market (as measured by the S&P500). During the first three months of the year, the market lost 24% of its value, while Simon lost 68%.

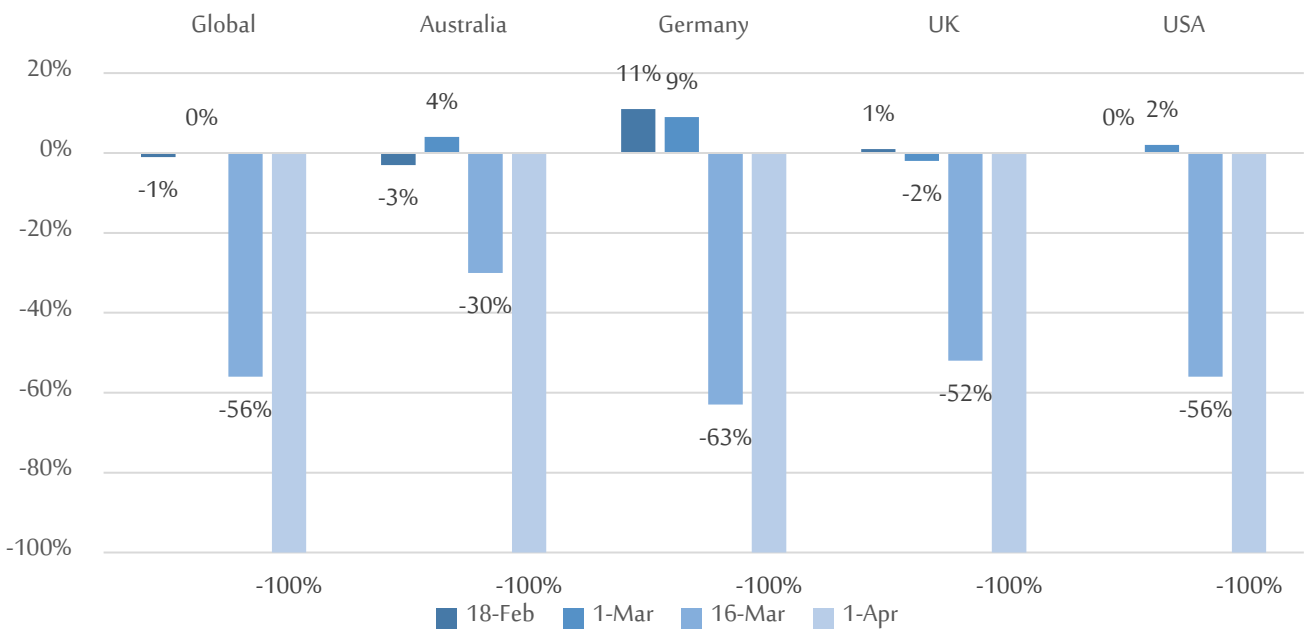
Figure 2.1.2.5 shows the yearly change in seated diners at restaurants in the OpenTable network of restaurants for four dates in 2020, for a selection of countries as well as the globe. At the start of March, at the global level, reservations were approximately equal to their level at the start of March 2019. Two weeks later, dining rates had halved, and by the start of April, restaurants had essentially ceased to function.

Figure 2.1.2.4: Indexed Share Price (1-Jan = 100) for 2020



Source: NYSE

Figure 2.1.2.5: Year-on-Year Change in Seated Diners at Restaurants in the OpenTable Network



Source: OpenTable

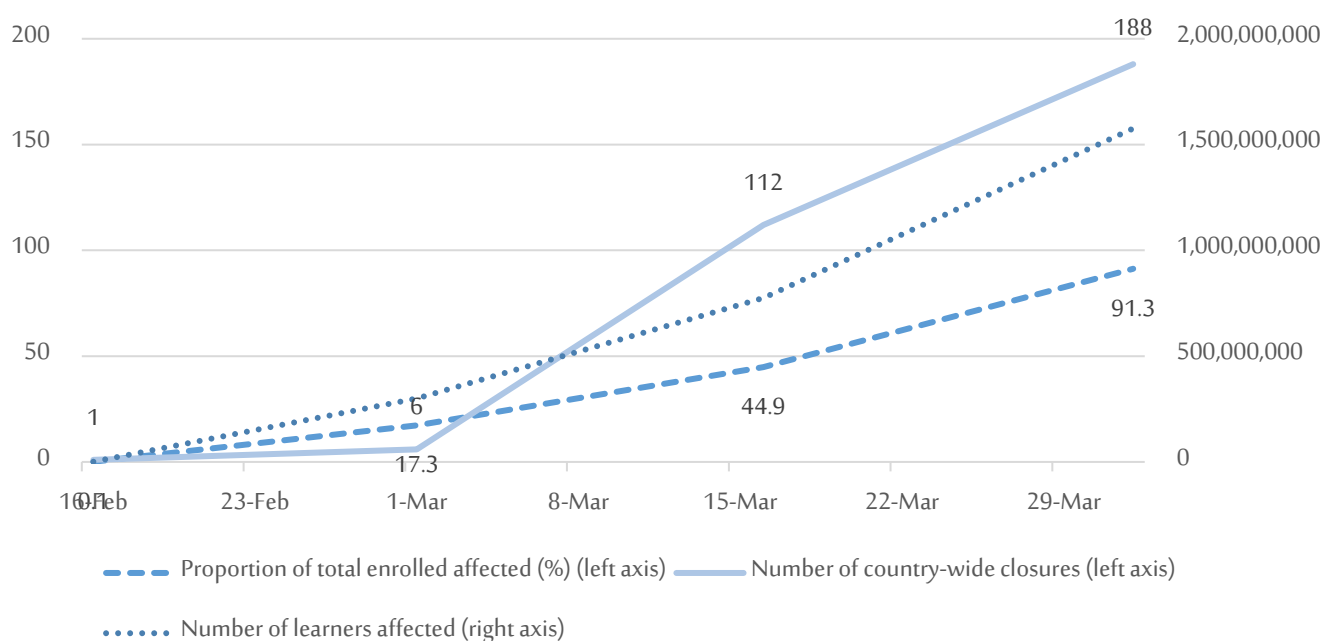
Moreover, as we will discuss below, for many in these adversely affected industries, including airlines, shopping malls, and restaurants, there is the chilling prospect of many of these losses becoming long-term in nature, as economic activity

restructures in an unfavorable manner. In contrast, as we elaborate upon below, other sectors will benefit from the switch to economic interactions that are compatible with social distancing protocols.

2.1.3. Shrinking Aggregate Supply

In addition to experiencing a contraction in people’s aggregate willingness and ability to *purchase* goods and services, the economy also witnesses a contraction in people’s aggregate willingness and ability to *produce* goods and services (Eichenbaum, 2020). In a pandemic, the primary mechanism relates to the supply of labor.

Figure 2.1.3.1: Data on Coronavirus-Related School Closures



Source: UNESCO

As mentioned above, those who contract the coronavirus are unable to work for considerable amounts of time, which is reinforced by significant prophylactic absenteeism. Moreover, the social distancing measures mean that many others are unable to go to work: transportation systems are offline, and workplaces such as factories are themselves forcibly closed by the government, as well as being voluntarily closed on commercial grounds by their owners.

Further, school closures mean that many workers are forced to stay at home and supervise their children, and in some cases, actively teach them. Figure 2.1.3.1 shows various data related to school closures throughout the coronavirus crisis. In the six weeks between the middle of February and the start of April, the number of countries with country-wide school closures went from one to 188, leading to almost 1.6 billion students being out of school, representing 91% of learners. Teleworking offers some respite from the most stringent forms of social distancing, but they remain an

imperfect substitute for most jobs, and for a large variety of occupations, they are completely ineffective (Taskin and Edwards, 2007).

Non-labor inputs to production are also disrupted by the coronavirus. Within countries, social distancing policies adversely affect supply chains, especially in the extreme cases where curfews are imposed, as raw materials and intermediate goods face significant transportation impediments. This is especially true in large countries with different geographical regions that are experiencing different levels of exposure to the coronavirus; thus, for example, in China, when trucks transport goods between cities, drivers have to undergo 14 days of quarantine in each direction of travel, slowing ground transportation down to a snail's pace (Chao, 2020).

These problems are amplified in international supply chains, due to the added logistical complexity of international trade, as well as the geo-political aspects. Customs procedures have become significantly more cumbersome, and in some cases, large restrictions have been imposed upon trade with certain countries (Murphy, 2020). This represents a considerable threat to the efficiency gains associated with the just-in-time production model, a point to which we return further below when discussing the long-term consequences of the coronavirus pandemic.

2.1.4. A Contractionary Spiral

While nominally distinct, the aggregate demand and supply shocks actually serve to reinforce each other, creating a contractionary spiral (Guerrieri et al., 2020). Thus, for example, when developers working in Silicon Valley are housebound or furloughed, that contributes to the initial supply shock, as the production of the software that they code is disrupted. In addition, these workers can no longer purchase coffee and snacks at the cafes that operate near their offices, contributing to the demand shock.

Similarly, in the case of public transport, the demand shock caused by social distancing measures will lead to a large contraction in demand for public transport. This may lead managers to suspend the majority of travel options on purely commercial grounds, independently of any health concerns. This inadvertently contributes to the supply shock, as people who are still going to work but are reliant upon public transportation, such as those who use trains to travel between cities, are now unable to do so, leading to a contraction in production.

This contractionary spiral is an amplified form of the recessionary cycles proposed by in the 1930s by Keynes (2018), that were motivated partially by his witnessing of the Great Depression in the early 1930s (Carabelli and Cedrini, 2015). They represent a widespread failure of markets to coordinate actions. Classical critiques of the Keynesian model often cite that, over time, markets will autocorrect, as prices respond flexibly (real wages fall) to the circumstances, bringing the economy back to its productive capacity (Pigou, 1936).

Setting aside questions regarding the plausibility of this critique and of subsequent theories inspired by it (Gordon, 1990), at present, due to the special circumstances surrounding the coronavirus pandemic, the applicability of the Keynesian model is surely higher. This is because the critical factor in the classical model and its successors is the ability to exchange goods and services without restriction, whereas at present, due to the social distancing protocols, many markets are either de jure or de facto non-operational. Moreover, the suspension of trading is indefinite with a significant degree of uncertainty, meaning that the economy cannot simply “move on” from these markets permanently and begin the path toward a new equilibrium.

As an illustration, consider the cases of an airline or a restaurant chain. It is very difficult for market actors to make a decision regarding the volume of resources to allocate to these activities due to the uncertainty, and prices provide them with very little guidance, due to the supply and demand disruptions. Moreover, the organic uncertainty is exacerbated by the significant uncertainty associated with the government policy response (Baker et al., 2016), which we discuss further below.

2.1.5. Is the Cure Worse than the Disease?

As is evident from the preceding analysis, the social distancing policies effected by governments as they seek to control the pandemic have considerable direct costs. Are such economic sacrifices justifiable, or should economies be allowed to continue “as normal”?

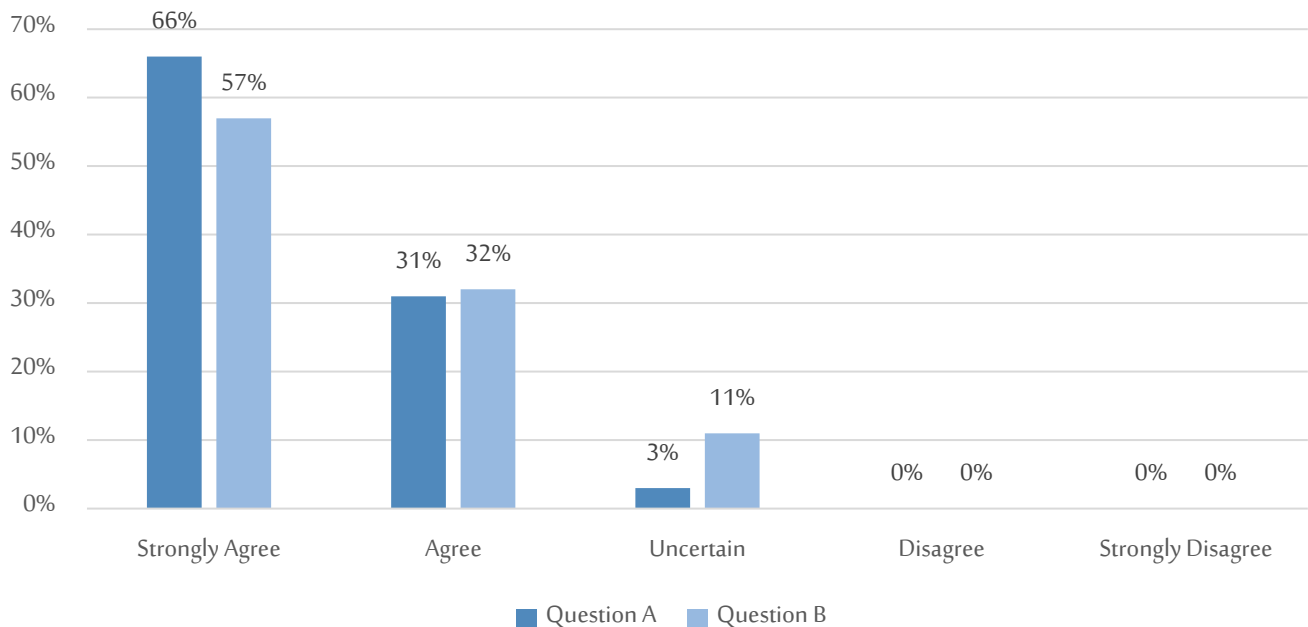
The staggered implementation of social distancing policies offers some insights; thus, for example, the UK has been slower to close schools than Ireland. Some countries have overtly selected more laissez-faire policies, choosing to depend more on citizens exhibiting social responsibility in their actions; Sweden falls under this category, as compared to its Scandinavian neighbor, Denmark. While some countries have managed the issues of testing and tracking more adroitly than others, such as South Korea and Singapore, allowing them to avert the need for wholesale “lockdowns”.

As a consequence of these policy variations, at this relatively early stage in the pandemic, in the social distancing domain, those acting later, or less stringently, have in some cases experienced lower levels of economic damage. For example, at the start of April, restaurants in Sweden remained open for business, and while earnings were down, they were surely higher than the zero earnings in neighboring Denmark, where all restaurants were forcibly closed.

Such experiences have led to some analysts wondering if the “cure is worse than the disease”. In a New York Times op-ed published on March 23rd, 2020, Nobel prize-winning economist Paul Romer and the MD Ph.D. provost of Harvard University, Alan Gerber, alerted policymakers and the general public to the possibility that, should social distancing measures continue for 12-18 months, the damage to the economy will be catastrophic and irreparable (Romer and

Garber, 2020). While their article’s focus was on alternative tactics that could deliver superior outcomes, the article’s sub-title was poignant: “If we keep up our current strategy, our economy will die,” coming from two respected figures who do not have a reputation for polemics or alarmism.

Figure 2.1.5.1: Economists’ Views on the Optimal Response to the Coronavirus



Question A: A comprehensive policy response to the coronavirus will involve tolerating a very large contraction in economic activity until the spread of infections has dropped significantly.

Question B: Abandoning severe lockdowns at a time when the likelihood of a resurgence in infections remains high will lead to greater total economic damage than sustaining the lockdowns to eliminate the resurgence risk.

Source: IGM Forum (2020)

Building on this view, there is a growing lobby that argues that the tradeoff between economic performance and the minimization of virus-related mortality during a pandemic, analyzed by Eichenbaum et al. (2020), has potentially gone too far in favor of minimizing mortality, and that a rebalancing is required to decrease the economic cost.

At present, economists in general still overwhelmingly favor addressing the pandemic with reference only to health factors (IGM Forum, 2020), rather than explicitly trading off mortality with economic damage (Figure 2.1.5.1). Instead, most see the incentives being aligned, as they emphasize that the success of countries such as South Korea and Singapore is the result of superior testing and tracking systems, rather than on a lower weight being assigned to the population’s health in policy decisions. And, for the most part, it appears that many governments with limited social

distancing policies have acted out the weakness of state capacity, rather than due to an overt prioritization of the economy's well-being.

However, in the long run, as we will discuss below, the government spending required to keep businesses solvent, and to ensure that millions of people in the economy do not starve to death because they have no income, will no longer be tenable, as fiscal buffers will be depleted. If the pandemic has not been suppressed by that point, then a starker tradeoff will materialize between maintaining lives and livelihoods.

2.2. Economic Stimulus Responses

The majority of government policy efforts have been directed toward managing the pandemic as a public health problem. However, in tandem with these policies, governments have also been pursuing economic stimulus policies, to ensure that when social distancing measures are partially or fully lifted, people still have jobs to go back to. The policies come in two forms: monetary, and fiscal. We discuss the risks associated with these policies in the next section on long-term mechanisms.

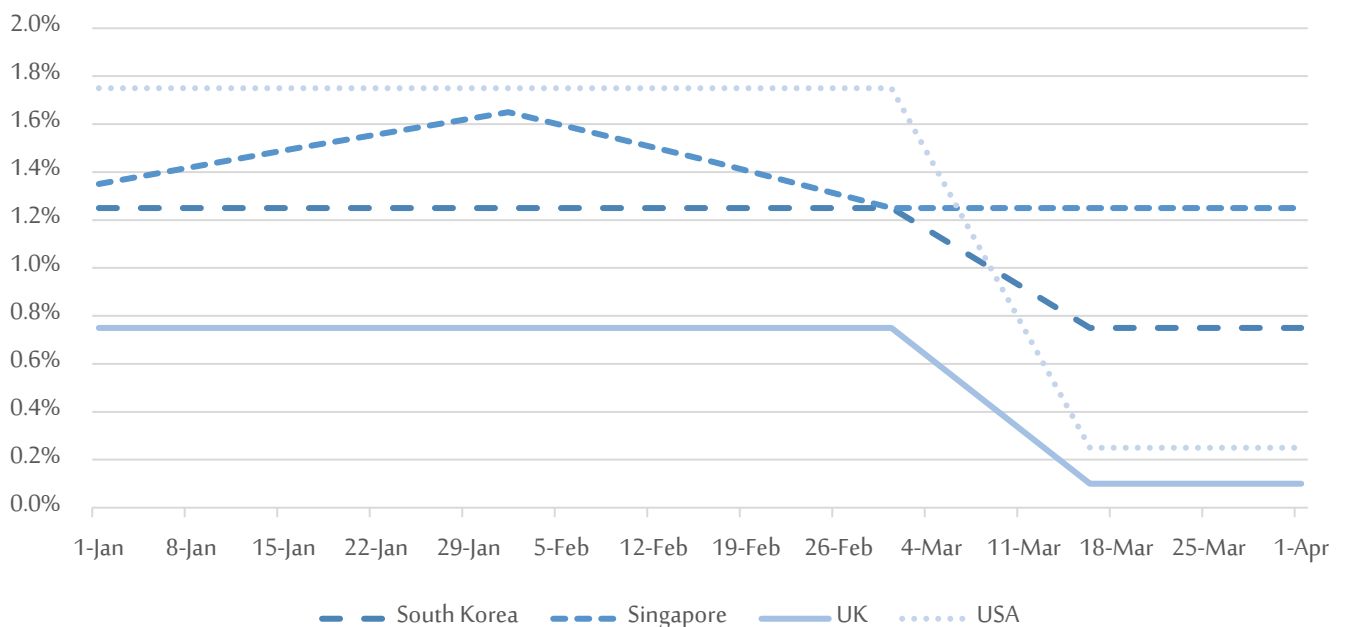
2.2.1. Monetary Policy

Coronavirus-related monetary policy has two primary goals. The first is ensuring that a liquidity crisis does not materialize. As businesses' revenues contract sharply, or even approach zero, they will need to exploit credit facilities provided by financial institutions to pay their bills, including wages, material inputs, insurance, power, and so on. If such credit is not forthcoming, these businesses will either go bankrupt, or they default on their financial obligations, simply shifting the problem further along the commercial chain. Moreover, businesses will begin to draw down their existing assets, and under fractional reserve banking, this will create serious pressure on banks' balance sheets. Thus, financial authorities will be looking to make it easier for banks to supply the credit required by businesses and banks alike.

The second goal is stimulating the economy, i.e., encouraging businesses and individuals to keep spending, be it investment or consumption. This is the traditional Keynesian function of monetary policy. In many cases, the same technique can be used to realize the two goals, whereas in some cases, there is clearly an emphasis on one of the two goals in particular. Moreover, while there has been significant international variation in the policies (the goal of this paper is not to review those differences in detail), we here describe the most salient policies that have been adopted in most cases.

The first policy is lowering interest rates to near-zero levels, in an attempt to encourage borrowing and spending. The US Federal Reserve cut interest rates from 1.75% to 1.25% at the start of March 2020, and again to 0.25% two weeks later. The Eurozone has had a drastically smaller range of options, with interest rates being set to zero since 2016. This has also been coupled with a relaxation of reserve requirements, allowing banks to further lend. These restrictions were originally tightened after the global financial crisis in 2008 to curtail banks' abilities to leverage their assets (Vestergaard and Wade, 2012). Figure 2.2.2.1 shows the path of interest rates for four major economies (the Eurozone had 0% interest rates throughout the entire period).

Figure 2.2.2.1: Interest Rates in Various Economies in 2020



Source: Trading Economics

Various central banks have also announced asset-purchase programs, whereby the central bank buys assets from commercial banks at supra-market prices to boost the commercial banks' balance sheets (Goldman, 2020), and to provide them with the cash flow necessary to maintain operations. While some central banks have announced transparent limits to the volume of lending and asset purchases they are willing to undertake, the US Federal Reserve has explicitly avoided declaring a ceiling, signaling their willingness "to do whatever it takes".

Notably, monetary policy is easier to execute than fiscal policy, due to its more centralized and technocratic decision-making structure, especially in advanced economies. In contrast, western governments seeking to boost spending have to present their plans to parliament for vetting, have them debated (if necessary), before rollout can commence. Moreover, expansive fiscal policy requires coordination between a much larger number of agencies, slowing implementation considerably. However, despite its advantage in implementation speed, monetary policy remains

secondary in its importance compared to fiscal policy in terms of keeping the economy afloat for the duration of the pandemic, and the US Federal Reserve chairman Jerome Powell explicitly declared this (Rugaber, 2020).

2.2.2. Fiscal Policy

In a widely-read blog post at the outset of the coronavirus crisis in the US, economist Greg Mankiw laid out a series of important principles regarding the optimal fiscal policy response (Mankiw, 2020). The first is that, despite the large contraction in aggregate demand brought about by the social distancing measures, the goal of the fiscal stimulus is not to boost aggregate demand; it is to provide social insurance, i.e., to support the income of those whose livelihoods are most threatened by the rapidly receding economy. This is because the social distancing measures mean that a lot of efforts at increasing aggregate consumption are futile—many goods and services are not available.

Second, due to the fact that the economy is facing an existential threat, and due to the desire to avoid some of the hysteresis (long-run) effects to be discussed below; considerations relating to the magnitude of the public debt are secondary, and policymakers should focus on immediate, effective measures, whatever the cost.

Third, fiscal stimulus measures should also incentivize people to comply with social distancing measures; thus, it should reinforce any government directives that require people to stay at home and avoid public gatherings. Societies should minimize situations where people leave their homes and go to work because they need to earn a living.

Ultimately, the goal is to avoid the contractionary spiral described in section 2.1.4 causing irreparable damage to the economy. With these principles in mind, governments have unveiled a series of fiscal stimulus measures, including the following (Douglas and Hannon, 2020).

First, policies that support the granting and take-up of sick leave. These include regulations that provide all those who need to self-quarantine with the necessary sick leave; and financial support, including direct transfers and tax waivers/exemptions, for their employers.

Second, augmenting the budgets of social insurance programs, such as unemployment benefits and food vouchers, in anticipation of a large increase in the demand for them.

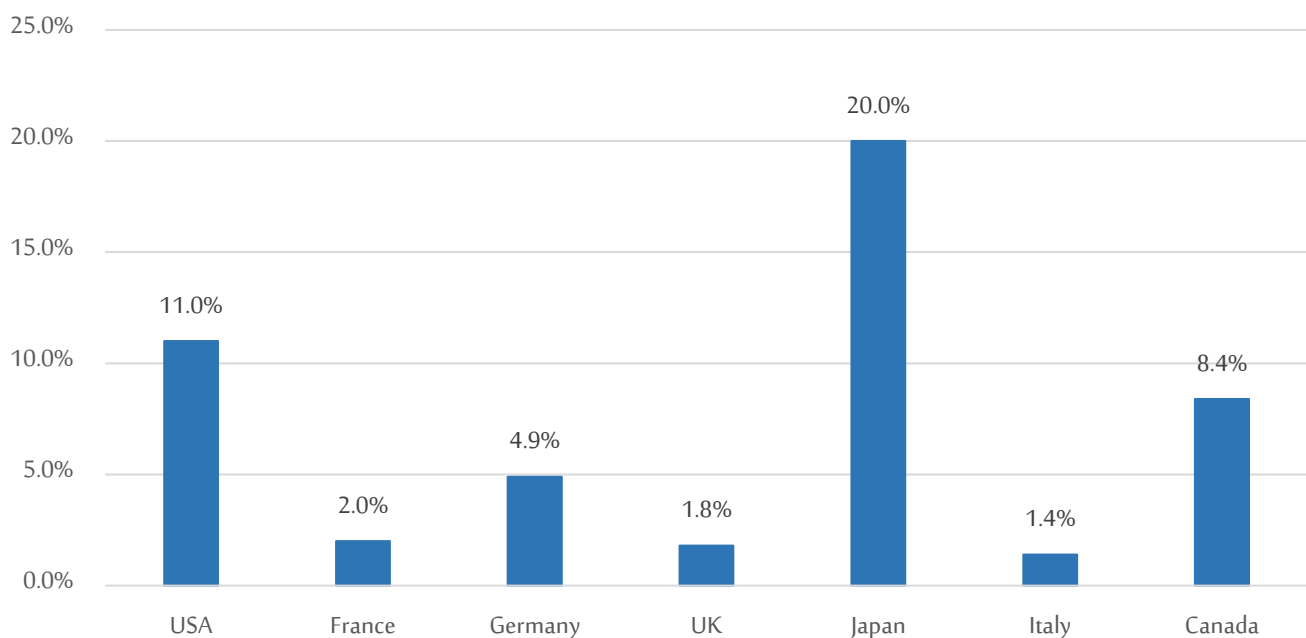
Third, direct financial transfers from the government to households and companies, with few or no conditions. In the case of companies, building on the first policy, they include the paying of employees' wages so that businesses can stay open, and to avoid the need for mass redundancies. These also include deferrals and cancelations of outstanding tax liabilities.

Fourth, increasing the budgetary allocation of health, in light of the sharp increase in demand for health services, both to cover the salaries of medical personnel, and the cost of the critical equipment, field hospitals, and other inputs described in section 2.1.1.

Finally, nationalizing large companies that are threatened with bankruptcy. One of the most visible examples has been the Italian government's decision to renationalize its national airline, Alitalia, to protect the jobs of thousands of Italians, and also due to the strategic importance of maintaining an airline (see the discussion of the long-term issues below).

Figure 2.2.2.1 shows the value of the fiscal interventions as a percentage of GDP for the G7 countries. Notably, since we remain at an early stage in the crisis, these figures should be seen as provisional.

Figure 2.2.2.1: Total Value of Coronavirus Fiscal Interventions (% of GDP) for G7



Source: IMF Policy Responses to Covid-19

As alluded to in the conclusion to the discussion of monetary policy, these measures require much higher levels of state capacity than the monetary interventions. For example, for a state to transfer money to households, it has to have an accurate, up-to-date register of households, it needs to be able to know their bank account details so that it can transfer the money to them, and it needs to have a treasury unit that has enough staff to execute the transfers and to check that they went through correctly. There needs to be a system in place for appeals, as gaps will inevitably appear. The complexity of the required systems is several orders of magnitude larger in the case of paying the salaries of workers on behalf of companies, or enforcing top-down sick leave, as both require coordinated actions between multiple

government agencies. And in addition to all of these logistical considerations, there is also the issue of the legislative process, which includes potentially time-consuming parliamentary vetting of proposals and so on.

2.3. Long-Term Mechanisms

Once the pandemic ends, and social distancing measures are lifted, in principle, all of the short-term mechanisms described above should cease to apply, and the possibility of a return to “normality” exists. However, there are two broad reasons why we should not expect this: first, some of the short-term costs have long-term consequences, known as “hysteresis effects”; and second, governments are likely to modify their economic strategies, and societies are likely to evolve their cultural norms, in an attempt to diminish the disruption caused by potential future pandemics.

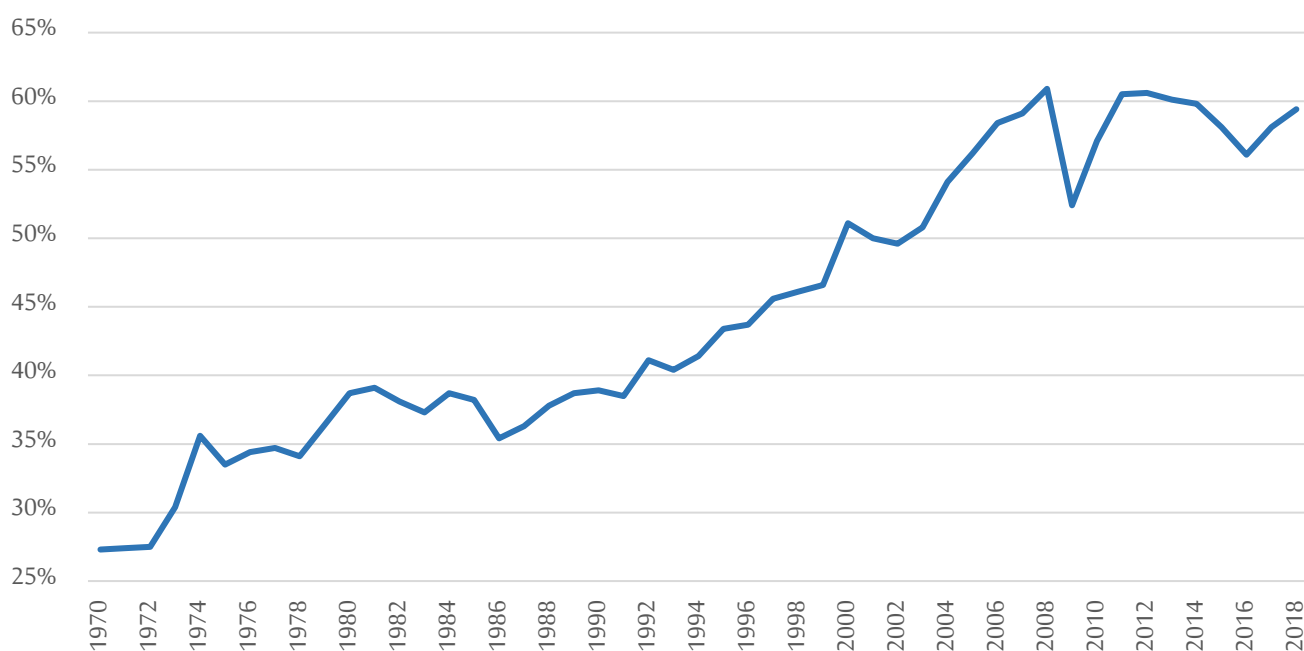
2.3.1. Deglobalization and Relocalization of Production

In 1970, trade as a percentage of world GDP was equal to 27%; by 2018, this figure had reached 59% (Figure 2.3.1.1), reflecting a steady and broadly uninterrupted increase in the international exchange of goods and services (World Bank, 2020). The international community has been removing trade barriers for a large part of the postwar era (Irwin, 1995), in an attempt to exploit the gains from trade; and this globalization trend has contributed to the large improvement in living standards across the world that has materialized throughout the same period (Sachs, 1998).

However, there has been a perception (though there remains controversy regarding the reality) that globalization has also contributed to increased internal inequality in western economies, and in some cases to diminished living standards of low-income households in those countries (Autor et al., 2016). This has fueled a political backlash against globalization, and it started having a tangible effect on global trade policies in the wake of the global financial crisis of 2008 (Brown, 2018). In recent years, we have witnessed an increasing incidence of populist leaders securing electoral victories based on programs that emphasize economic nationalism, and that reject the purported benefits of global trade (Colantone and Stanig, 2018). The result has been increasing tariffs and a stagnation of global trade as a percentage of global GDP (World Bank, 2020).

In terms of the fundamental causes of this demand for deglobalization in western countries, the coronavirus is a non-contributor. However, the coronavirus will likely accelerate the processes already underway, through three mechanisms.

Figure 2.3.1.1: World Trade (% of GDP)



Source: World Bank Database

First, the coronavirus has already taken a considerable economic toll (see below), and the cumulative cost could be devastating. Historically, declines in living standards tend to spawn nationalistic economic policies and the rejection of global governance systems, including entities such as the World Trade Organization (Baccini and Kim, 2012), due to the fact that psychologically, humans are predisposed to attributing the problems that they face to outgroup members, as they close ranks with ingroup members (Krosch et al., 2017).

Second, the economic disruption brought about by the coronavirus has been amplified by globalization. Production chains are highly internationalized, with intermediate products being shipped across the world in an attempt to minimize production costs (Das and Handfield, 1997). With the public health-based restrictions on international travel, these chains have been disrupted, resulting in a sharper decline in the operational capacity of many companies than would have occurred had production been localized (Alicke et al., 2020). Moreover, certain strategic goods have faced production shortages, such as civil aviation, generating national security concerns.

Third, regardless of the biological accuracy of the view, there is a perception that goods being exchanged across borders increases the likelihood of a virus being transmitted, and so countries that believe that they have superior systems in place for preventing the outbreak of an epidemic will rationally tighten their borders with countries that they believe have inferior systems in place.

Therefore, as argued by Davies (2020a), the coronavirus aftermath will likely witness a continuation of the deglobalization processes that started in earnest in 2008, with an emphasis on relocalizing production under the pretext of protecting national strategic interests.

Due to a combination of all three mechanisms, China could be one of the biggest losers from this trend. Since the 1970s, China has been one of the largest beneficiaries (and causes of) of the increase in global trade, as its living standards have grown rapidly, and its poverty has shrunk remarkably (Yao, 2014). Export-led growth has been a key driver of its economy (Jarreau and Poncet, 2012), and while the government has been actively trying to diminish the reliance on foreign trade (Lardy, 2016), it remains an important source of jobs.

While social media contains plenty of conspiratorial chatter about the ultimate source of the coronavirus, the professional consensus is that it started in China, creating xenophobic dislike of the Chinese (Wen et al., 2020). Moreover, China has become the manufacturing workshop of the world, with many production chains being dependent on China-based links, meaning that it will suffer disproportionately from the relocalization of production. Finally, this is especially true for several goods that are perceived to have strategic importance, and reflects a broader accusation leveled toward China that it is attempting to expand its geopolitical influence by monopolizing the market for various critical goods (Demiryol, 2019). This could increase global efforts to check the expansion of China's geopolitical influence.

Whether or not the deglobalization trend succeeds in diminishing inequality within western countries remains to be seen. However, it is almost certain that the process will decrease the average rate of global economic growth, due to the extremely strong arguments that exist regarding the impact of global trade on *gross* prosperity (Lee, 1993). But this must be tempered by the fact that the high levels of economic integration do make the system quite susceptible to pandemic-based disruptions, and so the final appraisal of these trends requires an understanding of how likely future pandemics are, an issue of public health that lies beyond the scope of this paper.

2.3.2. Change in the Structure of the Economy

Deep economic contractions bring about large increases in unemployment (Kroft et al., 2016). Unemployment is known to exhibit hysteresis effects, meaning that short-term, transient unemployment can mutate into long-term, persistent unemployment due to the decay of labor market skills (Coles and Masters, 2000), disenchantment and loss of hope among the unemployed (Frese and Mohr, 1987), and labor market discrimination against those who have been out of a job for a significant amount of time (Kroft et al., 2013).

Therefore, due to the coronavirus crisis looking like it will cause a deep recession (see below), there is fear that it will bring about a significant increase in the level of long-term unemployment, which would entail a wide range of long-run socio-economic problems (Blanchard and Summers, 1986), including social and political instability, along with depressed levels of future economic growth.

Another possibility is a financial crisis, if monetary authorities fail to supply the financial sector with sufficient liquidity, either due to mismanagement or other constraints. The aforementioned increasing demand for credit brought about by companies experiencing cash flow problems (also due to the demand shock) causes liquidity problems in banks, and these are exacerbated by deteriorating balance sheets in the wake of falling asset prices (see below). Should a sufficient number of banks reach bankruptcy, a banking crisis may ensue, with large potential knock-on effects (Goodhart et al., 2012).

While the problems associated with the rise of long-term unemployment, and of concomitant financial crises, are common to all deep recessions, the coronavirus variant of economic crisis brings a selection of more idiosyncratic changes in the economy's long-term structure, many of which are described in Davies (2020b).

First, there will be a significant decrease in international travel. Initially, this will reflect an extension of the current controls as countries seek to overcome the threat posed by the coronavirus; subsequently, many of these controls may well become near-permanent as the coronavirus keeps returning (Yong, 2020). Moreover, many organizations have now forcibly developed systems for teleworking and for efficient video-conferencing, diminishing the need for work-related long-distance travel. As Davies (2020b) argues, among the worst-hit sectors will be the already fragile airline industry, as well as cruise holidays, as several cruise ships have regularly seized headlines due to coronavirus outbreaks on their decks. These trends will also be reinforced by the deglobalization trend discussed above, as general attitudes become more parochial.

Second, in the pursuit of maximal efficiency, production processes have become more concentrated, including the emergence of products that have virtually one supplier. In a similar vein, just-in-time production systems (and their descendants) have been gradually increasing in prevalence since the 1960s. Both trends are likely to be reversed, as they imply an elevated likelihood of production disruption from adverse events such as pandemics elsewhere. In the international domain, this is equivalent to the deglobalization trend described above; but the process of decentralizing production and rolling back just-in-time processes will potentially occur at the sub-national level, too, as all economic units seek to insulate themselves.

Third, there will likely be an increasing incidence of teleworking, and even distance learning (tele-education), for two reasons: many of the requisite physical investments have been made as a rational response to the social distancing

measures; and, through direct learning-by-doing, practitioners have gained valuable experience on how to optimally work, manage, teach, and learn remotely, as well as overcoming any cognitive biases that may have impeded adoption prior to the coronavirus crisis.

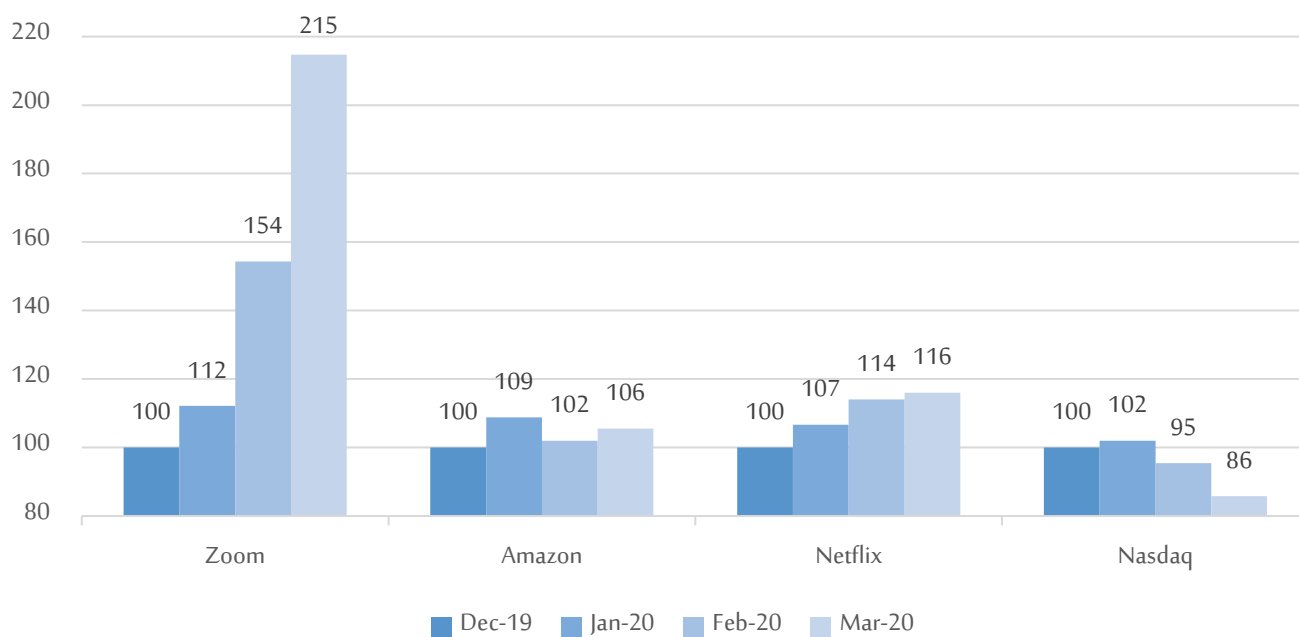
Beyond the psychological and sociological consequences that are beyond the scope of this paper, the increasing incidence of remote interactions could have important broader consequences for the economy. These include decreased carbon footprints for the in-person interactions that have been displaced by remote ones, due to decreased power consumption, transport demand, traffic congestion, and so on. Moreover, as Davies (2020b) argues, the fundamental structure of property markets could change, as the need for physical proximity diminishes: real estate prices and rents have traditionally been highest in the centers of cities; though the rent curve might not be reversed, its steepness may commence a secular decline, with knock-on effects for wealth inequality at the societal level.

Finally, as explained above, the large losses experienced by certain sectors will be partially compensated for by substantial gains in other sectors. Wade (2020) highlights five main winners.

1. E-commerce marketplaces: people will increase the rate at which they shop in a manner consistent with social distancing directives. In Wuhan, the starting place of the coronavirus, Chinese e-commerce giant JD.com has been using drones to deliver.
2. Pharmaceuticals: the coronavirus is ultimately a health crisis, and the solution to it will ultimately revolve around health interventions, including treatments and vaccinations.
3. Logistics/delivery: since social distancing measures limit people's ability to move to acquire the goods and services that they seek, the goods and services will have to reach them in their homes. Companies have been developing no-contact drop-off services to minimize the likelihood of transmission from using the delivery services.
4. Video-conferencing: teleworking, tele-education, and other forms of remote interaction require video-conferencing infrastructure.
5. Entertainment streaming and gaming: as people are confined to their homes, and traditional entertainment services (restaurants, cinemas, shopping malls) are hit hard, services such as Netflix and Disney+ will play a larger role in keeping the masses entertained, as well online gaming platforms.

Figure 2.3.2.1 shows the share price movement for several companies drawn from the above sectors, along with the overall market index. As can be seen, at the end of March 2020, the overall market was down 14% compared to the end of December 2019; however, Zoom (video conferencing) had increased by 115%, Amazon (e-commerce) by 6%, and Netflix (home entertainment) by 16%.

Figure 2.3.2.1: Selected NASDAQ Share Indices, December 2019-March 2020



Source: NASDAQ

Wade (2020) also draws attention to the likely losers; beyond those described above (tourism, aviation, etc.), he predicts a tough time for professional sport, as a large percentage of revenues in these activities come from stadium attendance.

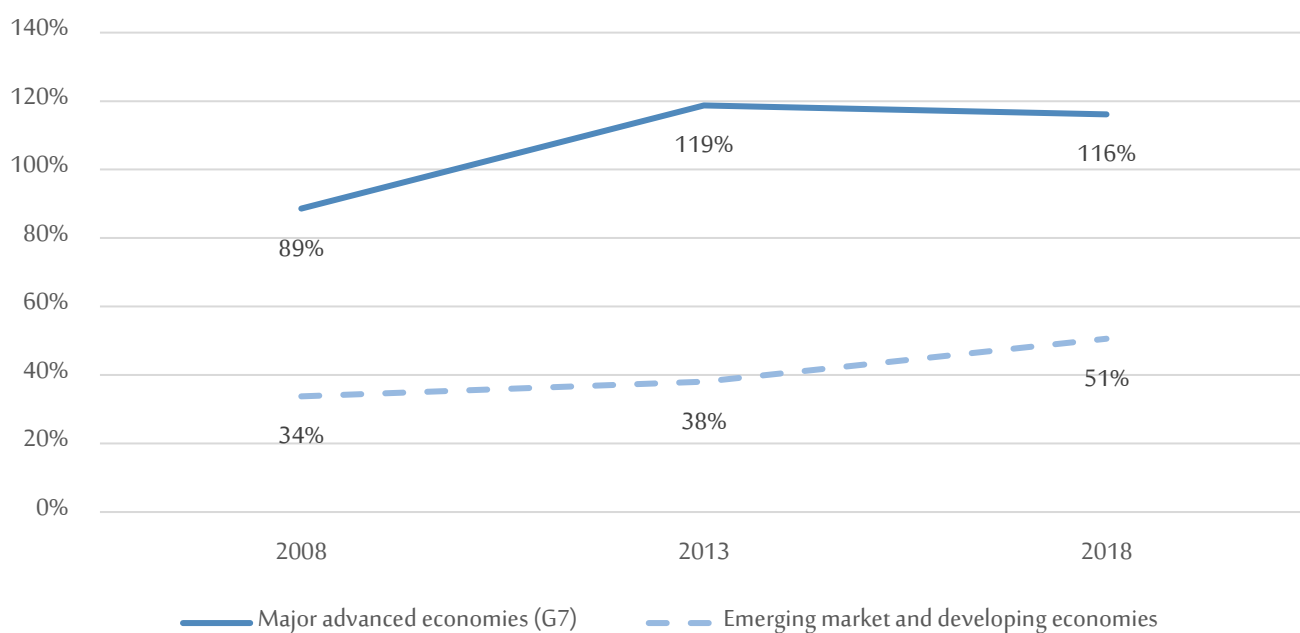
2.3.3. Rising Debt and Other Financial Problems

On the eve of the coronavirus pandemic, in much of the world, both private- and public-sector balance sheets were in a bad state. Figure 2.3.3.1a shows the public debt of advanced and emerging economies as a percentage of GDP at three points during the decade that followed the global financial crisis.

As can be seen, compared to 2008, public debts were considerably higher in 2018. In the case of the G7 economies, the rise was equal to 27 percentage points, equaling trillions of dollars, and reaching 116% of GDP in 2018. In the case of emerging and developing economies, the rise was 17 percentage points, reaching 51% of GDP in 2018. (Public debts are in general lower in emerging economies because they have to pay higher interest rates to attract capital, and thus the interest burden becomes untenably high at a lower level than in the advanced economies of the G7.) Figure 2.3.3.1b provides a regional breakdown.

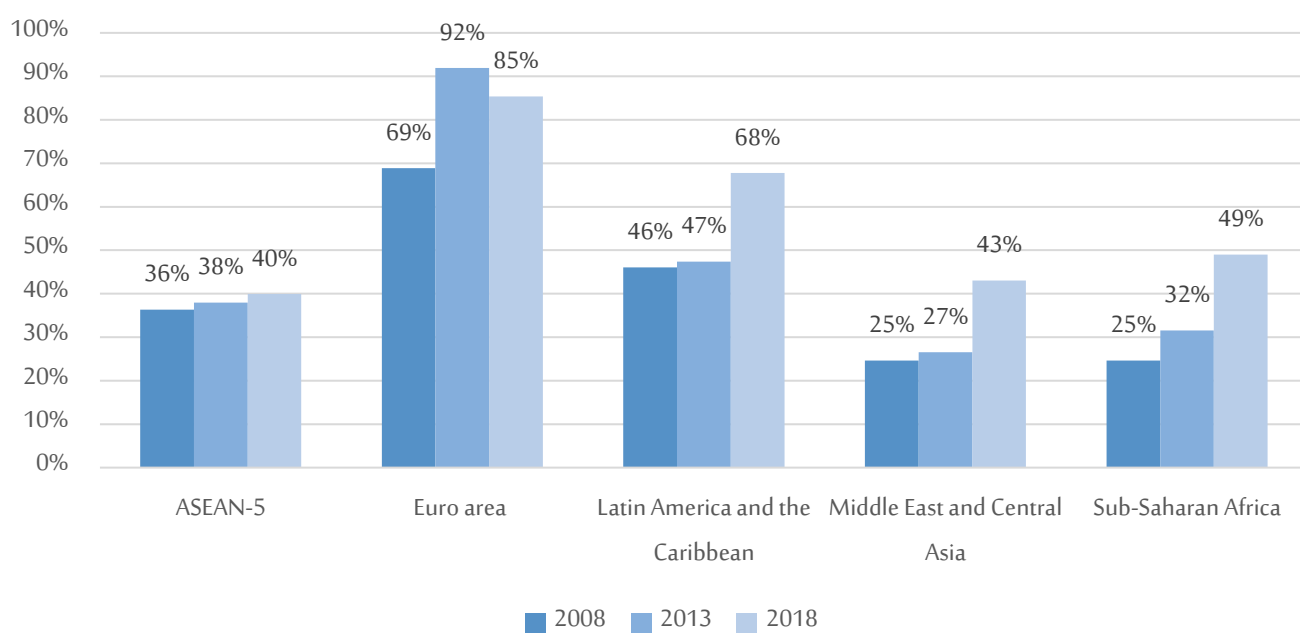
The region-level data follow a similar pattern to those in Figure 2.3.3.1a: large and persistent rises in public debts. Of particular concern are the sharp rises during the last five years in both Latin America and the Middle East.

Figure 2.3.3.1a: Public Debt (% of GDP) in Advanced and Emerging Economies



Source: IMF WEO Database

Figure 2.3.3.1b: Public Debt (% of GDP) for Various Regional Groupings



Source: IMF WEO Database

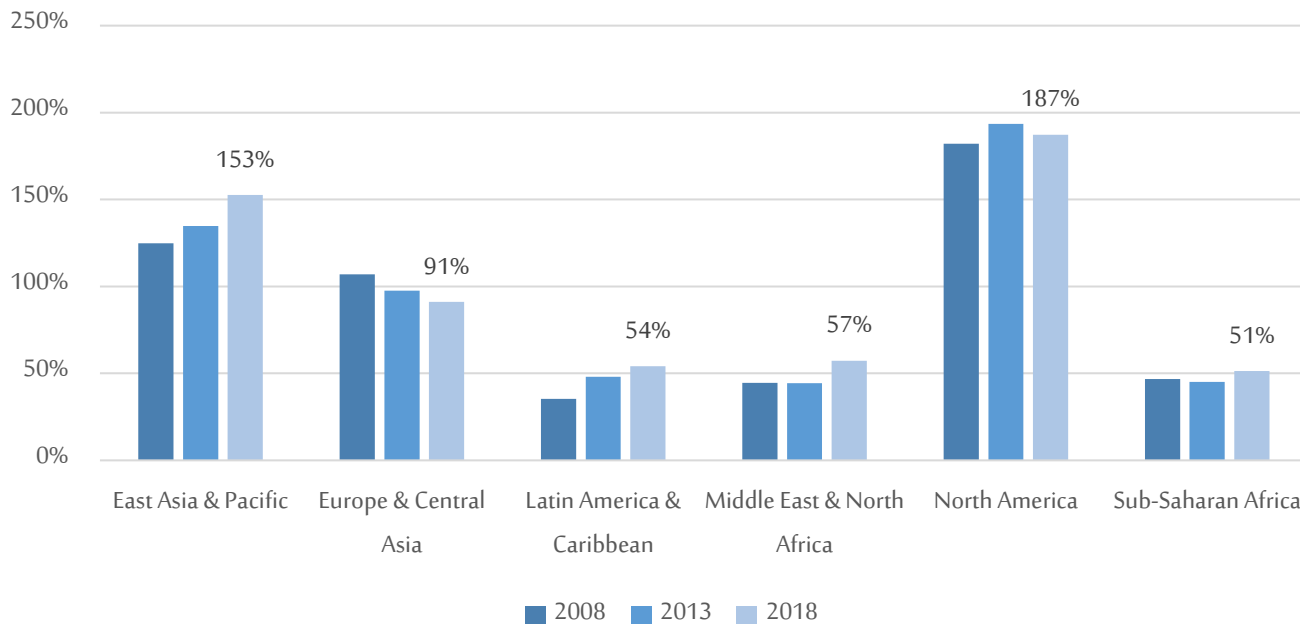
There is no specific level of public debt which is considering alarming or economically damaging; however, it is worth noting that on the run-up to the launch of the single European currency, the euro, the governments agreed that member states' public debts should not exceed 65% of GDP, in the pursuit of "fiscal responsibility". This line of thinking was

driven by the fact that in general, large public debts have adverse consequences for the performance of the economy (Reinhart et al., 2012): interest payments become crushingly high, whereby a very large percentage of tax revenues are required just to service debt rather than to contribute to the economy meaningfully; investors start to become wary of making long-run investments, as they fear the impending need to raise taxes; and the government’s flexibility in dealing with short-term crises, such as the coronavirus, is impeded because of creditors’ reluctance to provide further loans.

With this in mind, the figures shown in Figure 2.2.2.1, which represent the size of the fiscal stimuli that have been proposed by the G7 governments, are a cause for concern. Had public debt to GDP levels been below 50% of GDP, then a potentially one-off increase of 5-10% would have been easily digestible. However, the G7 figure exceeds 110% of GDP, and it is over 200% in the case of Japan. Therefore, in addition to all of the short-run costs described above, governments combating the coronavirus have to also contend with the adverse impact on long-run economic growth caused by rising public debts.

As explained above, a key plank of monetary policy is extending credit to private sector enterprises at favorable (including zero) interest rates. Like its public cousin, the accumulation of private debt also has adverse consequences for the economy, with the added concern that it can lead to a financial crisis, because most of it is domestically held.

Figure 2.3.3.2: Domestic Credit to Private Sector (% of GDP)



Source: World Bank Database

To see this more clearly, note that public debts that grow large are usually (though not always) funded by foreign investors. Therefore, in the event of a default, the economic damage to the local economy does not include the direct

effect of the default on the balance sheet of the creditors. (In fact, defaults and debt restructurings by one country can cause a financial crisis in another, which happened in the case of Cyprus during the Greek financial crisis, due to Cyprus' over-exposure to Greek government debt.) In contrast, private sector debt is more likely to be domestically funded, and so bankruptcies or defaults are more likely to trigger a domestic financial crisis. This was the main reason why governments across the world, include the US, had to launch huge domestic bailouts during the global financial crisis of 2008, as the financial system unraveled due to a weak link in the chain (mortgage-backed derivatives). With these risks in mind, Figure 2.3.3.2 shows the levels of domestic credit to the private sector as a percentage of GDP at the regional level across the world.

The data follow a similar pattern to the public debt data: with the exception of Europe and Central Asia, the levels of private sector indebtedness are significantly higher in 2018 than they were in 2008, and they are worryingly high in North America (187%) and in East Asia and the Pacific (153%). Thus, should the economy fail to resume a vibrant growth path following the passing of the pandemic, and the lifting of social distancing measures, the large levels of debt that the private sector will have taken on to survive the pandemic could turn into the source of an inevitable financial crisis. Moreover, due to the already high levels of public debt, the governments' capacity to provide bailouts and financial support will be significantly lower than in the past, due to the accumulated public debt. Finally, this problem is compounded by the fact that all countries are facing the same problem, meaning that small and medium-sized countries cannot even rely on external entities to bail them out. In contrast, in many previous financial crises, such as the Asian crisis of 1997, or the Argentine crisis of 2000, a large number of the world's biggest economies were unaffected directly, meaning that they could contribute to the rebuilding effort. In the case of the coronavirus pandemic, everybody is sailing on the same, large ship.

There exist additional risks that extend beyond the problems associated with rising private- and public-sector debt (Joyce et al., 2011). First, any massive quantitative easing program brings with it the risk of hyperinflation, especially if social distancing measures prevent the monetary stimulus from generating actual production: more money chasing a fixed volume of goods and services means higher prices. Notably, similar concerns were present during the global financial crisis in 2008 when authorities were drafting the monetary and fiscal bailouts, due to the unprecedented magnitude of quantitative easing, and it turned out that these concerns were ultimately without merit, as consumer price inflation never accelerated.

However, the excess liquidity did find its way to financial markets, and contributed to a massive asset bubble that is yet to fully explode, though bourses do seem to have switched to bear market territory. Consumer and asset price inflation present a wide range of risks to the economy, which are beyond the scope of this paper, but they must be kept in mind by policymakers seeking to navigate the current crisis (Casella and Feinstein, 1990; Berkman et al., 2012).

Second, there is a risk of the return of moral hazard problems in the financial sector. The primary cause of the global financial crisis in 2008 was financially irresponsible decision-making by individuals, companies, and governments, due to a variety of perverse incentives and informational lacunae, i.e., large-scale moral hazard (Dowd, 2009). Consequently, the Basel III regulations sought to diminish the incidence of these moral hazard problems, in an effort to fortify the financial system and the economy (Duran and Lozano-Vivas, 2015). However, some of the monetary policies implemented to combat the coronavirus represent a rolling-back of these efforts, most notably the extension of cheap credit, and the loosening of reserve requirements for financial institutions.

While these decisions may still be optimal, due to the existential threat posed to the economy by the coronavirus, that does not imply that the likelihood of moral hazard problems reemerging is negligibly small or absent. It simply means that there is an even bigger crisis at hand. Since these waters are genuinely uncharted, rehabilitating the financial system will require a herculean effort from central banks and financial authorities across the world, including extremely vigilant monitoring, and high levels of coordination with the banks and the private sector to deleverage in a responsible manner once the pandemic has passed. The failure to do so could lead to a large financial crisis, with further long-term repercussions for the already battered global economy.

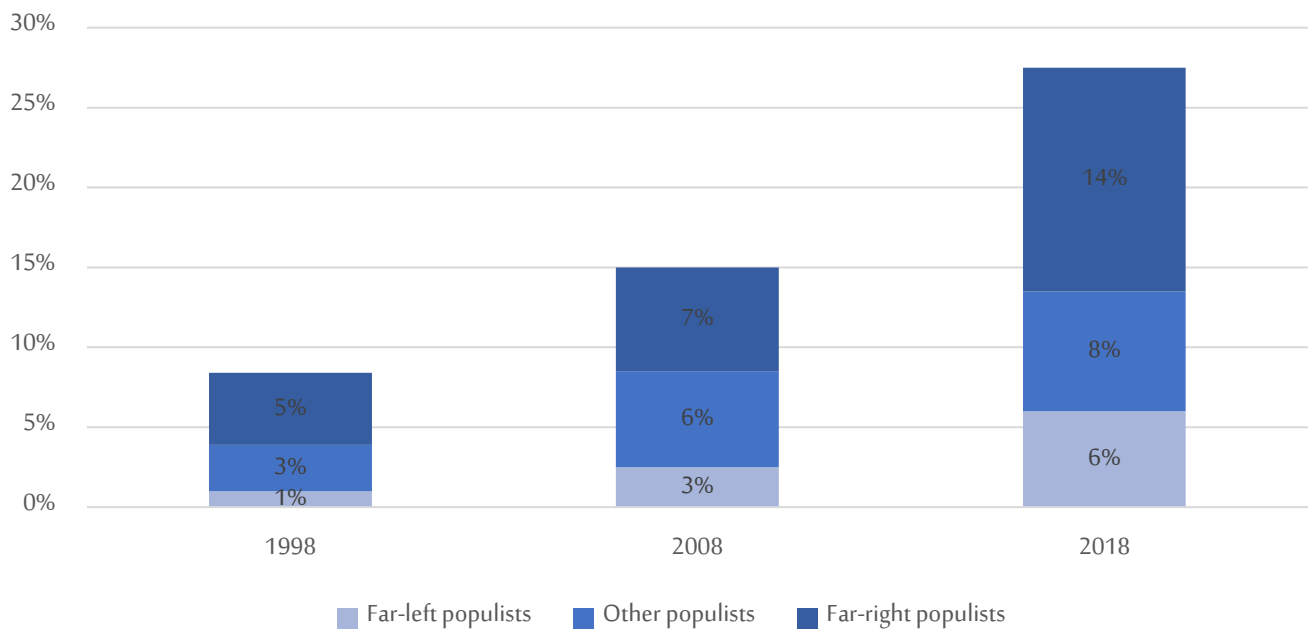
2.3.4. Nationalism, Populism and Political Mutation of the Economic Right

Political systems and political currents are not economic phenomena, but they do have consequences for the economy, because they contribute to the mechanisms for selecting economic policies. As mentioned above, one of the political trends that has been underway for some time, and that has accelerated in the wake of the global financial crisis, is the rise of economic nationalism (Colantone and Stanig, 2018), which is based on a suspicious and generally negative view of the impact of international trade and other forms of economic integration on the domestic economy. This has been reflected in increasing political support for nationalist and isolationist parties, and even for radical right-wing parties. Figure 2.3.4.1 shows the combined vote share earned by populists of different stripes (which are ideologically highly aligned with economic nationalists) for 31 countries in Europe for 1998, 2008, and 2018.

The data in Figure 2.3.4.1 confirm the rising popularity of all variants of populists, who have witnessed their parliamentary vote share triple in 20 years, exceeding a quarter of the total votes by 2018. The coronavirus is neither caused by this trend, nor it is the cause of it. However, as Davies (2020b) argues, it is likely that the coronavirus will reinforce this trend, because electorates will view it as further evidence of the need for isolationist policies, and for strong states to protect citizens from foreign threats.

Therefore, the coronavirus will likely further enhance the political power of those advancing a nationalist economic agenda. Davies (2020b) points out that in the UK, this has led to the mutation of the Conservative party from a party that traditionally supports fiscal conservatism and free markets, into economic nationalists whose policy priorities include withdrawal from the European Union, and higher levels of government spending in an attempt to improve living standards for low-income groups.

Figure 2.3.4.1: Overall Populist Parliamentary Vote Share in Europe, 1998 to 2018



Source: Lewis et al. (2018)

The implications of the increasing popularity of economic nationalists for the economy are threefold. First, as discussed above, there will be further deglobalization, including rising protectionism and a resurrection of mercantilist mindsets of the pre-modern era, which view global trade as a zero-sum game.

Second, as a corollary, there will a further diminution of the strength of international institutions, such as the World Trade Organization, the International Monetary Fund, the World Bank, and others. Electorates will increasingly feel that “going it alone” is preferable to cooperating under the umbrella of formal global institutions. The consequences are likely to be quite negative, since all of these entities serve specific, useful functions. Thus, we should expect increased, destabilizing inequality between rich and poor countries; increased trade disputes and beggar-they-neighbor trade policies; and decreased financial stability as the IMF’s power diminishes and its warnings are ignored. The political and economic instability of the interwar era gives a highly concerning preview of what to expect.

Third, a greater role of the state in the domestic economy. This may include reversing the privatization trend, and a reemergence of nationalization, with states starting with strategic national assets (railways, utilities, airlines). Davies (2020b) expects welfare state reform, with potentially greater acceptance of newer proposals such as universal basic incomes. The higher levels of government involvement will almost surely require higher gross levels of taxation, though the burden may well fall on the middle and upper classes, depending on the latter's ability to evade taxes by moving money internationally.

None of these developments are conducive to higher levels of economic growth. However, they may imply higher living standards for low-income households within those countries, as that is the mandate under which these populist parties are being elected. It is too early to determine if these policies will be successful in this regard, but the coronavirus has increased the likelihood of societies adopting these policy configurations.

3. Estimates of the Expected Economic Impact

This section is divided into three sub-sections. The first looks at what the data reveal on the economic impact thus far. The second explains why it is so difficult to model what the expected economic impact will be. The third presents what those estimates are at the time of publication.

3.1. Retrospective and Real-Time Estimates of the Economic Impact Thus Far

The previous sub-sections have contained various illustrations of the coronavirus's economic impact at the microeconomic level. In this sub-section, we explore what some of the macroeconomic data have revealed thus far.

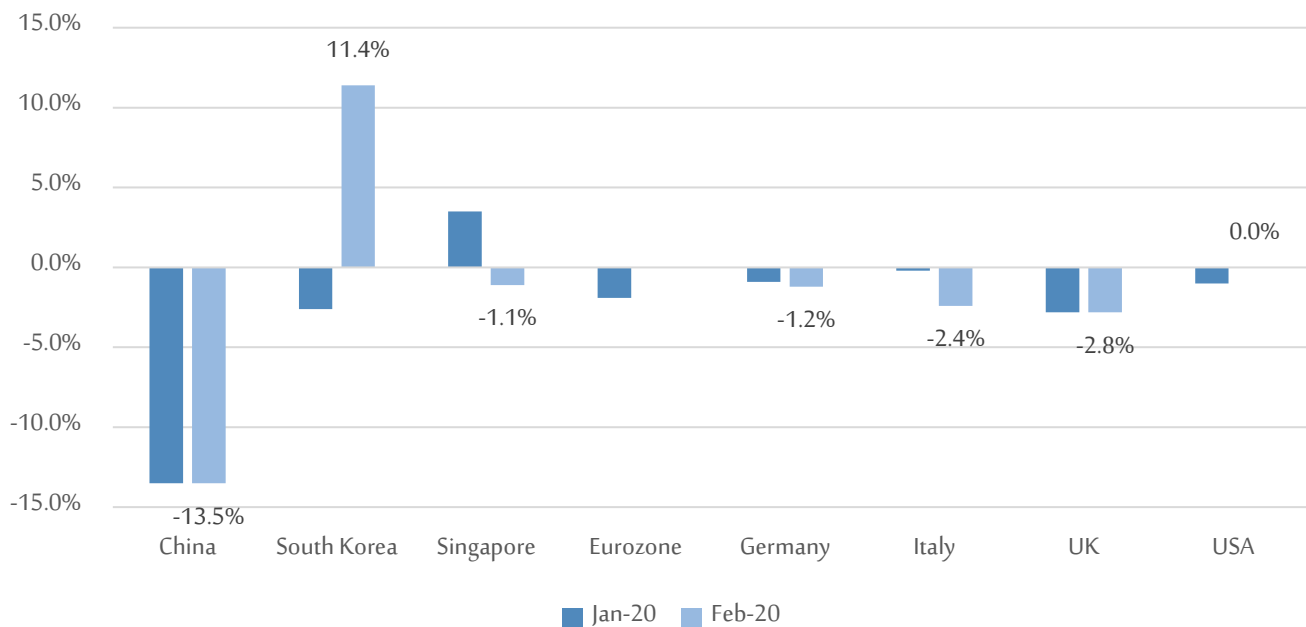
3.1.1. Output and Employment

The most important data series at the level of the economy is GDP. However, GDP data are collected on a quarterly basis, and first-quarter data are unlikely to be available prior to the end of May 2020 at the earliest. We therefore present data on various economic phenomena for which monthly data are available. Figure 3.1.1.1 shows the growth of industrial production for a range of countries during the first two months of 2020.

Due to the timing of the westward spread of the disease, for most of the world, March 2020 is the first month where significant economic damage will appear in the figures, which is why Germany, Italy, the UK, and the USA all exhibit minimal contractions in industrial production during January-February 2020. However, official government data from

China indicates a decline in industrial production of 13.5% for both months. Despite its proximity to China, South Korea managed to record a large increase in industrial production during February 2020 because it was not until the middle of the month that it had more than 30 cases, and so March is expected to be the first full month of output disruption. In contrast, Singapore had over 70 cases by the middle of February, and this is reflected in a 1.1% decline in industrial production during February.

Figure 3.1.1.1: Year-on-Year Industrial Production Growth, 2020

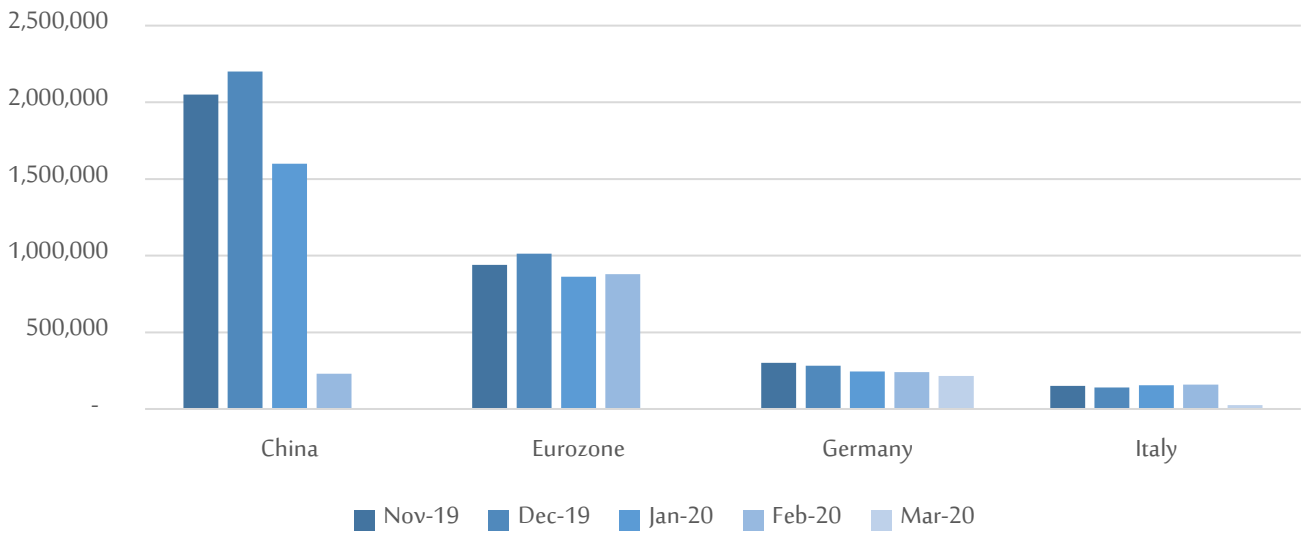


Source: Trading Economics

On the consumption side, consumer activity relating to cars is usually a good proxy for movement in aggregate consumption. Figure 3.1.1.2a shows new car registrations for various countries during the period November 2019-March 2020.

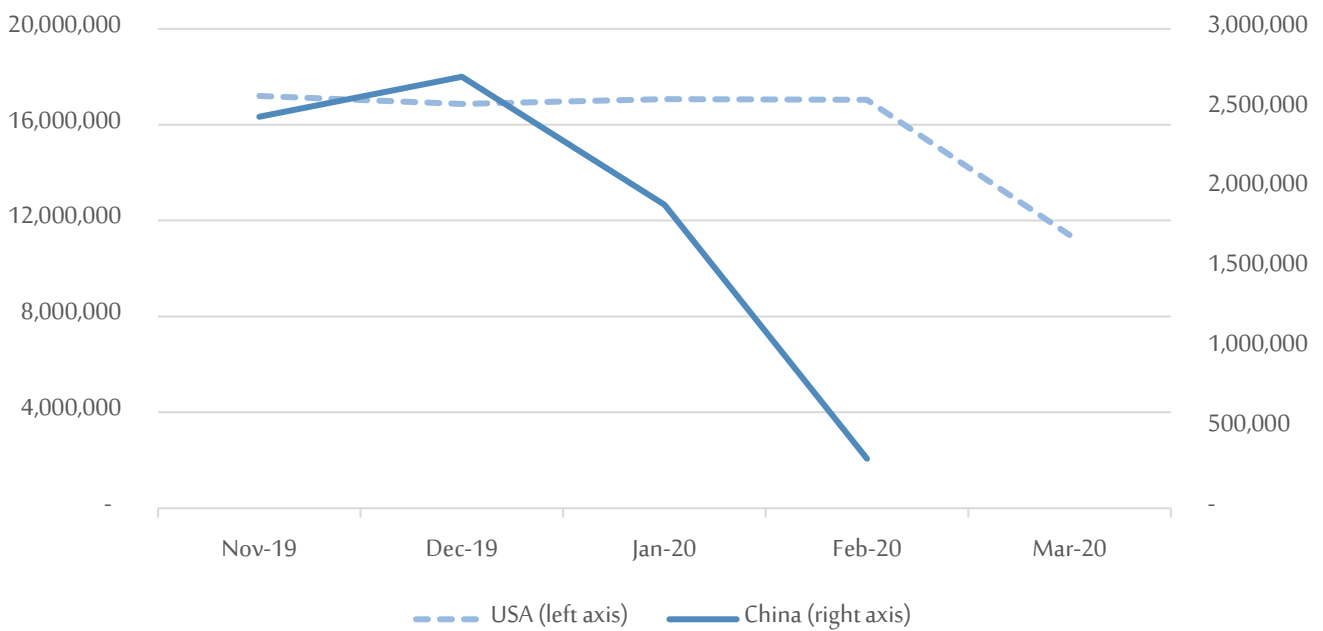
Again, due to the chronology of the coronavirus, China is the worst hit, with new car registrations decreasing from over 2,000,000 in December 2019, to below 230,000 in February 2020, equal to 89%. Germany witnessed a 28% decline in vehicle registrations during March 2020 compared to November 2019. Italy, which was crippled by the coronavirus during March 2020, saw a collapse in new car registrations during March 2020, as they declined by 84% compared to the preceding month. Figure 3.1.1.2b shows car sales. In the case of China, sales mirror registrations: an 88% decrease in December 2019-February 2020. For the USA, which had below 100 cases for all of February 2020, and did not see a rapid acceleration until March 2020, there is a 33% decline in car sales during March compared to the previous month.

Figure 3.1.1.2a: New Car Registrations



Source: Trading Economics

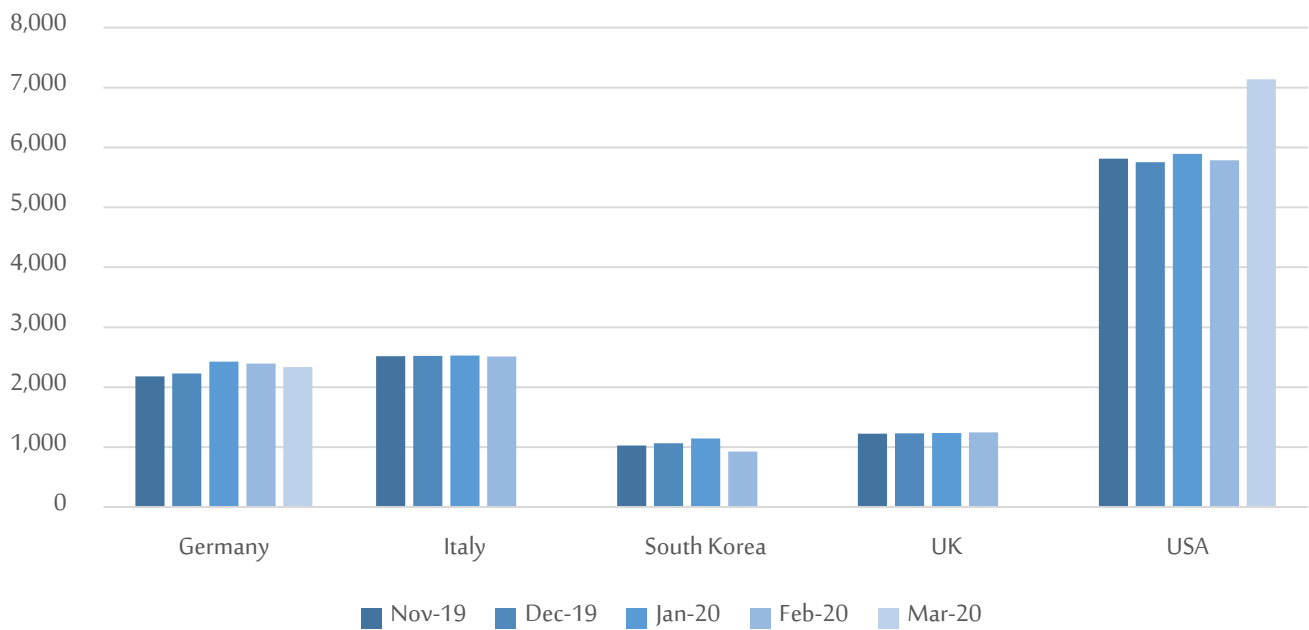
Figure 3.1.1.2b: Car Sales for China and the USA



Source: Trading Economics

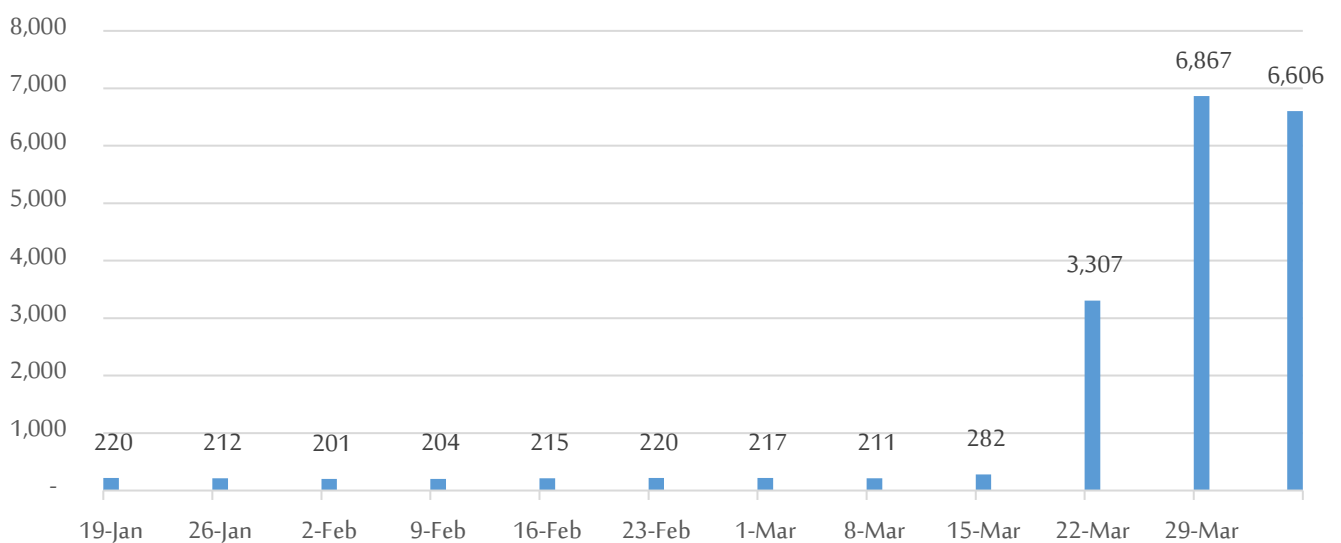
Taken together, the available data on the constituents of—and proxies for—aggregate output indicate that a combination of the coronavirus’s direct impact and the impact of the social distancing measures is considerable. Figure 3.1.1.3a shows the total number of unemployed persons in a selection of countries.

Figure 3.1.1.3a: Unemployment (thousands)



Source: Trading Economics

Figure 3.1.1.3b: Initial Joblessness Claims in the US



Source: Trading Economics

Only Germany and the US have data available for March 2020. In the case of Germany, there is no perceptible impact on labor markets, as unemployment actually declines in March compared to the previous month. Up to February 2020, it is either flat or decreasing in Italy, South Korea, and the UK, reflecting a combination of the slowness of hiring/firing decisions, and of the general lack of impact of the virus up to that point. However, the US data indicate a sharp increase

in unemployment during March 2020, rising by 24% from 5.8 million to 7.1 million. Figure 3.1.1.3b shows the initial claims for unemployment benefit in the US on a weekly basis.

In the week ending 22 March, the number of new claims exceeded three million, which was over five times the previous record for any week in the history of the database for the US. This record was itself shattered merely one week later, with 6.9 million new claims, followed by 6.6 million claims in the first week of April.

It is tempting to expect a similar picture to emerge in European countries once data for March and April become available, but this is unlikely to be the case, for two reasons. First, due to the nature of labor market regulations, layoffs are far more straightforward in the US than they are in other advanced economies (Blanchard and Wolfers, 2000). Second, the US fiscal package is yet to feature a commitment to paying the wages of workers on behalf of companies, or other systems explicitly designed to avert the need for redundancies, unlike that of many other advanced economies (Tilford, 2020). The situation remains fluid, as the US government may well change course, especially with a presidential election looming. Moreover, once an economic recovery initiates, the ease of firing in the US is generally mirrored by the ease of hiring, meaning that labor markets should experience a rapid improvement.

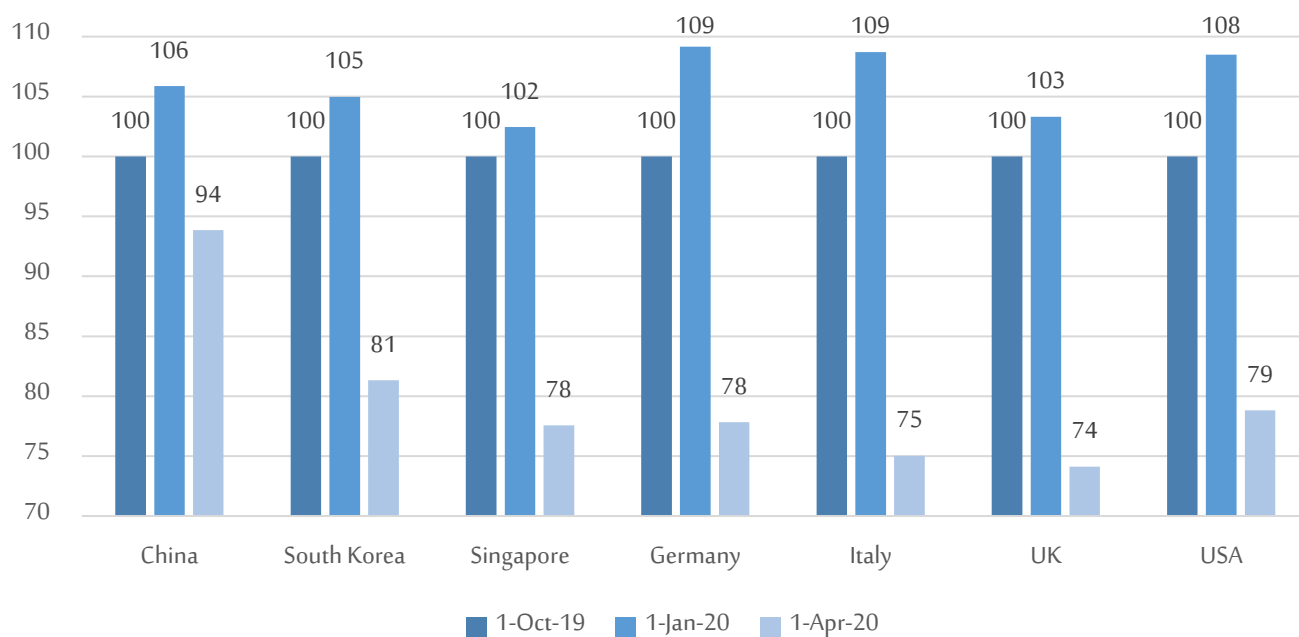
3.1.2. Financial Markets

Financial markets, most notably the prices of financial assets, are important for the economy in several regards. First, stock prices tend to comove with actual and expected corporate earnings, and therefore they give a good indicator of the overall health of the private sector. Second, the balance sheets of banks, businesses, and households typically feature a large exposure to stocks; consequently, sharp declines in stock prices usually generate liquidity pressures on all of these parties, helping to explain the aforementioned monetary policy interventions undertaken by financial authorities. Third, when the economy is performing poorly, investors tend to switch from the relative risk of stocks to the relative safety of bonds; the rising price of the latter is reflected in decreasing bond yields in long-term government securities. Consequently, falling bond yields are generally an indicator of investor pessimism.

Figure 3.1.2.1 shows the leading stock market indices for a selection of countries, presented in a manner where the indices equal 100 on the first of October 2019. The data present an unequivocal picture across the world.

With the exception of China, in the period of October 2019 – April 2020, stock prices have fallen by 20% or more. The declines are even sharper when compared to the start of 2020: 31% in the case of Italy, which has been one of the most badly affected countries. China is already on the path to recovery; however during the peak of the crisis, the stock market drop-off peaked at around only 10%. In the rest of the world, further declines may well be on the cards once corporate earnings data for the first quarter emerge, and the true extent of the carnage becomes evident.

Figure 3.1.2.1: Stock Market Indices (1 October 2019 = 100)



Source: Trading Economics

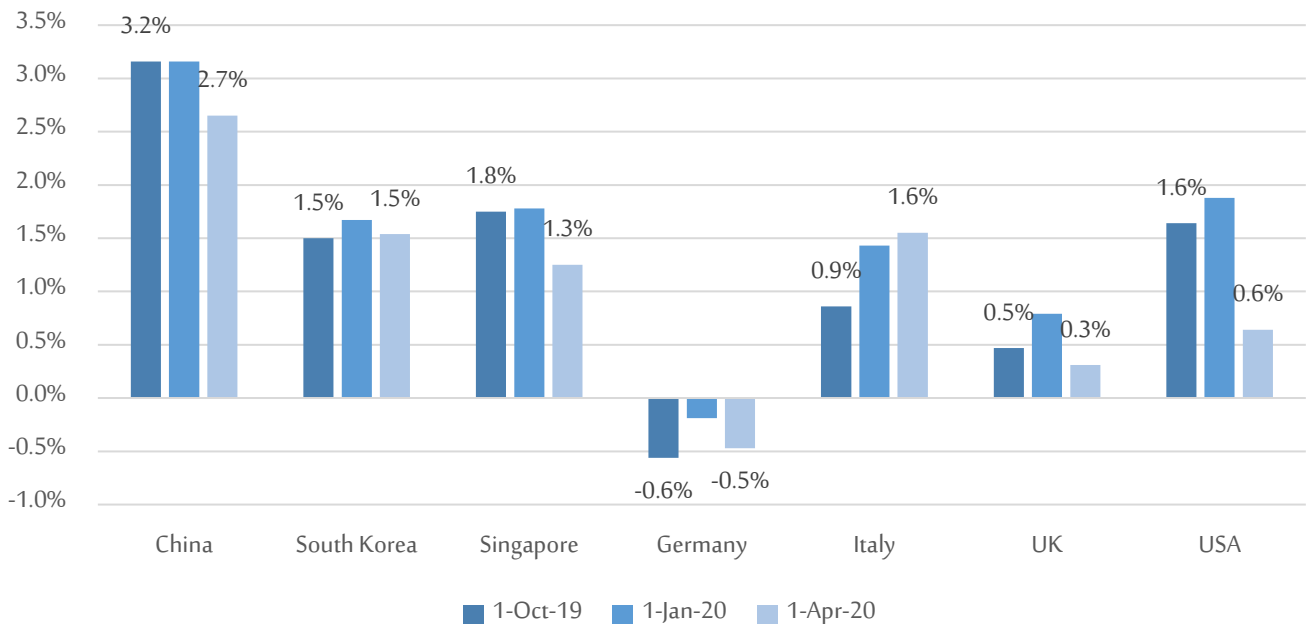
Figure 3.1.2.2 shows yields for 10-year government bonds for the same selection of countries. As expected, they indicate significant decreases in bond yields during the crisis, as investors seek sanctuary in government securities, and also in response to the interest rate cuts undertaken by central banks. In Germany, due to the aforementioned zero interest rate policy of the European Central Bank, we have the perverse situation of negative bond yields: the economy is deemed so risky that people are willing to lose money on their government bonds as an alternative.

Italy bucks the trend by actually seeing bond yields rise. Most likely this is the result of investors starting to become wary of the risk of default. Italy's public debt exceeded 130% of GDP in advance of the coronavirus pandemic; the economic damage caused by the pandemic, as well as the massive outlays expected from the stimulus package, combine to make the government's finances highly precarious, and explain why two countries with the same currency (Germany, Italy) can have such divergent yields on their securities.

Thus, financial markets present a negative picture regarding the economic impact of the crisis. A final remark concerns volatility. Analysts of all stripes, including economists and speculators, are highly uncertain about the economic impact of the crisis (see below for an elaboration on why economists are struggling). In the case of financial markets, uncertainty is usually reflected not just in decreased asset prices, but also in increased volatility, as speculators struggle on how to interpret the limited available data on the economy's trajectory. The volatility index for the US stock market (the Dow Jones Industrial Average) reached 67 during the end of March 2020. It is typically around 20, and has not exceeded 40 for over 10 years; in fact, the last time that the US stock market was so volatile was during the global financial crisis in

2008. Consequently, the data showed in Figure 3.1.2.1 could get a lot worse very quickly (or the reverse). This only adds to the adverse impact of the coronavirus on the economy, as governments, investors and consumers all dislike uncertainty.

Figure 3.1.2.2: Yields on 10-Year Government Bonds



Source: Trading Economics

3.1.3. Commodity Markets

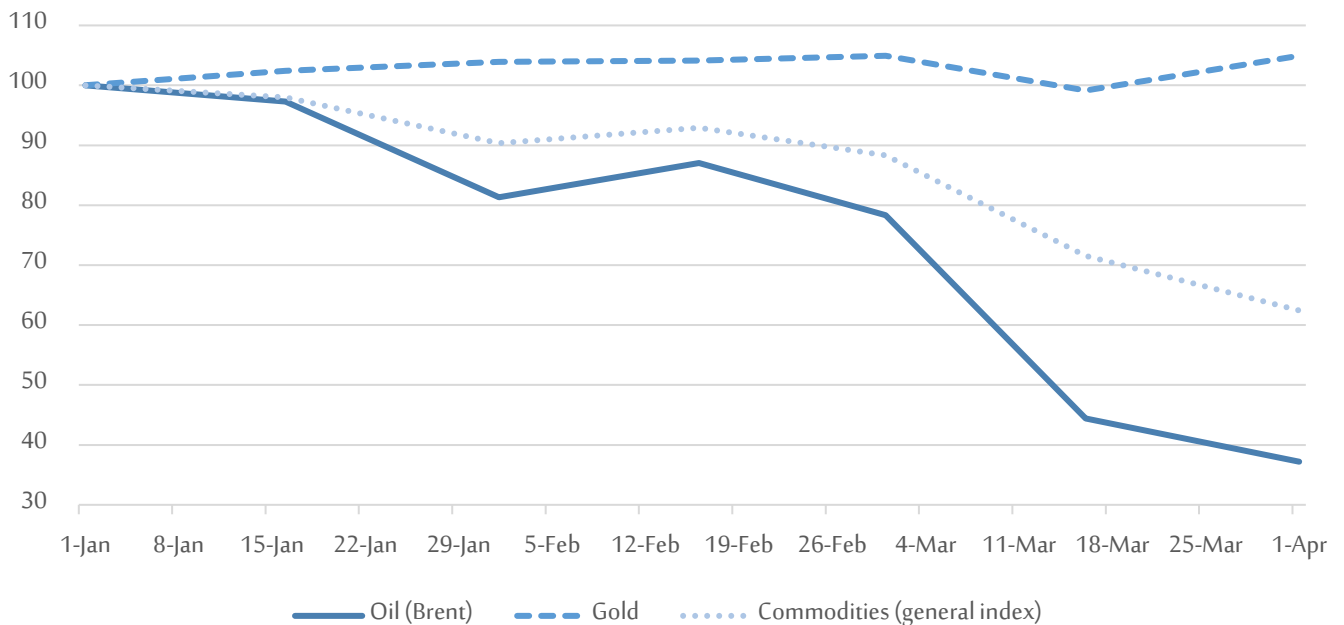
The health of the global economy is also reflected in various commodity markets, as the global demand for oil, copper, aluminum, and so on is derived from the demand for goods and services in general. Moreover, the performance of some economies is highly sensitive to the price of certain commodities, such as Russia, Saudi Arabia, and Venezuela in the case of oil. Under these circumstances, changes in commodity prices give a preview of the impact of the coronavirus in advance of the compilation and release of precise GDP data.

Gold is a special case, because of its historical role as a currency, and therefore its continual use as a store of value and as a backup for fiat currencies. Much like government bonds, it is considered a safe asset, and so fears of a recession are usually accompanied by rising gold prices. However, during global crises, interpreting the price of gold becomes difficult for two reasons.

First, part of gold's value is in its use as an input in various products, such as electronics and computers, as well as jewelry. Consequently, if demand for these products is shrinking rapidly due to a global recession, this will also create downward

pressure on the price of gold that partially or fully offsets the upward pressure brought about by investor fear. Second, in extreme crises, when the fundamental pillars of the economy are threatened, gold's value as an asset is undermined too, because it is of little value if the global economy is completely devastated. Nevertheless, it remains a useful additional indicator to assess.

Figure 3.1.3.1: Indexed (1 Jan 2020 = 100) Prices of Various Commodities



Source: Trading Economics

Figure 3.1.3.1 shows indexed prices for various commodities. The overall commodity index comes from the Commodities Research Bureau (CRB); the 38% decline since the start of the year mirrors that experienced by stock markets across the world, as well as the declines in industrial production.

Of grave concern for oil producers is the much more significant decline in oil prices, which fell by 63% during the first three months of 2020. Despite the much-publicized disagreement between members of the OPEC+ group of producers regarding production levels, the primary cause of the fall in oil prices has been the collapse in demand, brought about by the coronavirus. According to the US Energy Information Administration's forecasts, by the second quarter of 2020, oil consumption will have fallen by almost 15% from its level at the end of 2019, while production has been stable, resulting in a large oversupply (EIA, 2020).

Falling oil prices create significant fiscal pressures on oil exporters, compounding the effect of the aforementioned direct and indirect channels linking the coronavirus to the economy. Moreover, if low oil prices persist, they threaten the livelihoods of high-cost oil producers, most notably (from a geopolitical perspective) shale oil producers operating in

the US. This has led to US President Donald Trump threatening Saudi Arabia and Russia with sanctions unless it cuts output (Pasley, 2020) further reinforcing the protectionist and economically nationalist trends discussed above. Deals involving OPEC+ and other oil producers to implement coordinated cuts in output will help reverse some of the decline in the oil price, but they will do nothing to address the significant shortfall in demand caused by the coronavirus.

Finally, the price of gold has been stable throughout the crisis, as it continues to be a safe haven for speculators, tempered by the declining global demand for electronics and jewelry, and by fears of the existential threat posed to the global economy by the coronavirus.

3.1.4. Sentiment

The prices of various financial assets (stocks, bonds) and commodities (gold) are useful *indirect* indicators of investor sentiment. However, there also exist *direct* indicators, notably surveys of business and consumer confidence. These are historically quite accurate in predicting the future path of GDP, employment, and other important aggregate economic phenomena. Figure 3.1.4.1 shows business confidence in a selection of countries for the period of November 2019 – March 2020. When interpreting these data, it is important to note that sentiment survey methods imply very modest month-to-month variation in the sentiment index; changes of five points are large.

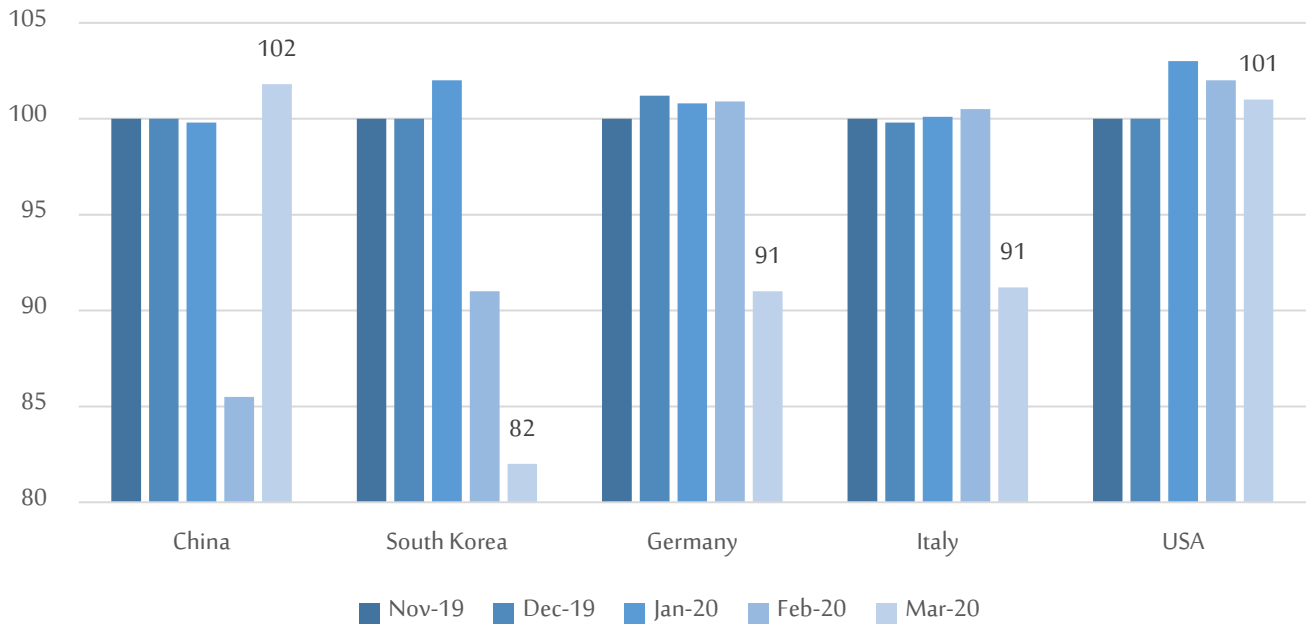
The large falls in business confidence in China, South Korea, Germany, and Italy are indicative of high degrees of pessimism, and possibly even panic, within the private sector. Beyond this, it is also noteworthy that China rebounded in March after a tough February, though this could reflect a patriotic desire to outwardly express confidence among survey respondents, rather than a genuine increase in confidence. Moreover, in March 2020, the business community in the US remained bullish, though this is probably due to the fact the survey is conducted throughout the month, prior to the sharp acceleration in coronavirus cases experienced during the end of the month.

Figure 3.1.4.2 shows consumer sentiment. Like business confidence, changes of a handful of points are significant, and therefore the data again confirm the growing pessimism among consumers in the economy, including in the US. The sharp rise in unemployment in the US is likely to drive consumer confidence even lower during April, as feelings of security about employment are a critical determinant of consumer sentiment.

Finally, under the sentiment category, one can also consider the assessments put out by global credit rating agencies, most notably Fitch, Moody's, and S&P. These credit ratings, especially the ones regarding sovereign debt (government bonds), are used as investors to evaluate the likelihood of default, which is strongly linked to the overall performance of the economy. However, at present, all of the major agencies are yet to revise their ratings for the major economies, most likely because they are continuing to analyze developments, and are yet to finalize their method for assessing the

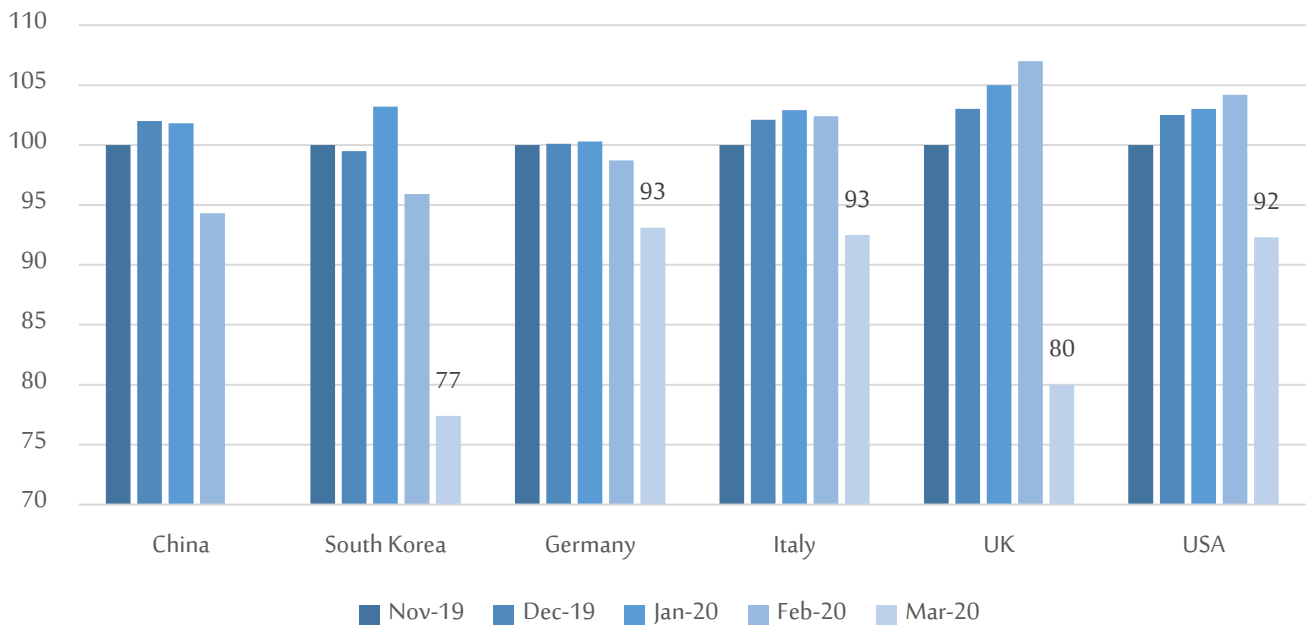
impact of the coronavirus. The next subsection explains some of the difficulties that they and other economists face in making accurate forecasts.

Figure 3.1.4.1: Business Confidence Index (November 2019 = 100)



Source: Trading Economics

Figure 3.1.4.2: Consumer Confidence Index (November 2019 = 100)



Source: Trading Economics

3.2. A Primer on the Difficulty of Prospective Estimates of the Cumulative Economic Impact

Accurate forecasts regarding the economy are a critical input for many important decisions at the governmental, commercial, and household levels, such as monetary and fiscal policy, companies' investment and hiring decisions, and households' mortgage decisions. Consequently, there is always a strong demand for accurate economic forecasts. Unfortunately, historically speaking, economic forecasters have a generally poor record of accuracy (McKnees, 1992; Leitch and Earnesttanner, 1995; Pons, 2000), especially for horizons that extend beyond one year. There are two primary reasons for this.

First, the economy is an incredibly complex phenomenon, due to the number of factors that determine its path. Aggregate variables, such as GDP and inflation, depend upon the decisions of millions of human beings in countless areas, in addition to innumerable external factors, such as the weather, seismic activity, ecology, and so on. Even with the assistance of supercomputers, modeling these phenomena in a tractable way remains incredibly challenging.

Second, humans respond to attempts to predict their behavior, and to attempts to act upon those predictions. In economics, this is known as the "Lucas critique" (Lucas, 1976), and it reflects the fact that humans differ from natural phenomena, such as cars or oil, due to their sentience; and also the fact that humans are highly intelligent compared to other living organisms. Thus, if a scholar devises a way of accurately forecasting the stock market, and publishes these forecasts, speculators will rationally modify their behavior in response, undermining the accuracy of the original forecasts (Fama, 1991). This makes predicting activities that humans undertake fundamentally more difficult than predicting natural phenomena that do not involve humans, such as the speed at which a ball rolls down a slope, or the temperature at which water evaporates.

Due to the large economic effects of the coronavirus, it is entirely understandable that policymakers, businesses, and households are all keen to have accurate forecasts of the long-run consequences. However, in addition to the two problems described above, there are three novel problems that render the production of accurate forecasts of the economic impact even more difficult in the case of the coronavirus.

First, while scientists have made significant progress in understanding the coronavirus, there remains much that we do not know regarding the virus's biology. For example, we still know very little regarding its seasonality; its ability to transmit in different ways; its responsiveness to various treatments; its propensity to mutate; the likelihood of people who recover being reinfected; and so on. This uncertainty is impeding the epidemiological study of the virus, which is a

necessary step for the study of its economic impact, and it accounts for the variation in public health policies pursued by different governments.

Relatedly, we have very little sense of how long it will take for a viable vaccine to be found, how much that vaccine will cost, the availability of the materials required for the vaccine; and so on. Without this piece of information, it is incredibly difficult to forecast the long-term diffusion of the virus.

Second, due to the uncertainty regarding the virus's biological traits, there is a large degree of uncertainty regarding the public health response that governments will undertake. Officials are genuinely unsure of when social distancing restrictions will be lifted, because they are still gathering and analyzing data regarding the spread of the virus, and its responsiveness to various interventions. This does not reflect any deficiency on the part of epidemiologists; they are simply struggling to fully understand a complex phenomenon in a complex environment.

Third, the uncertainty regarding the public health response is mirrored by uncertainty regarding the economic stimulus response. Will governments have enough funds to extend the stimulus indefinitely? Will they have the information and bureaucratic capacity required to assist businesses and households according to the plans issued by the ministries of finance? Will there be changes in the political leadership that will impact the chosen economic policies? Having a precise answer to these questions is a prerequisite to providing accurate forecasts regarding the economy, yet in fact, nobody has precise answers to these questions, because nobody really knows.

These difficulties do not imply that we should simply concede defeat and refrain from attempting to forecast the economic impact. Instead, they imply that we should be highly cautious in dealing with any sets of forecasts, because of the aforementioned challenges. Further, we should accept the reality of the inaccuracy of forecasts, and avoid denigrating those who attach high levels of uncertainty to their predictions, or even denigrating the science underlying those predictions. Similarly, observers should be especially suspicious of anyone claiming to have accurate forecasts, as they are likely selling fool's gold.

3.3. Prospective Estimates of the Cumulative Economic Impact

In light of the diversity of views on the economic impact of the coronavirus, and in the interests of parsimony, in this section, we focus primarily on GDP-related estimates. Broadly speaking, there are four types of organization that produce estimates:

1. Governments, including individual ministries and other government agencies.
2. Consultancies and banks, such as PriceWaterhouseCooper and Goldman Sachs.

3. Global institutions and think tanks (research centers), such as the IMF and the Brookings Institute.
4. University academics.

We begin by explaining the differences in approach, before presenting the actual estimates. Note that the estimates we report are not designed to be comprehensive; the goal is to provide readers with a good sense of the major estimates circulating in the media and in the research community.

3.3.1. How Do Different Knowledge Organizations Approach the Problem of Estimating the Economic Impact?

Each of the four organization types approaches the process of estimating the economic impact with different tools at its disposal, and with different goals. These differences imply that the output of each organization type comes with a special set of pros and cons that readers should keep in mind when comparing the output. There are seven main dimensions in which the predictions made by the four organizations differ. Table 3.3.3.1 summarizes the differences. Note that we will be making general arguments, and not definitive ones, since there exists a lot of variation within each class of organization.

First: **production speed**. Here, governments and consultancies/banks have the advantage, since their clients (policymakers and businesses) demand quick results, and so the production chain is organized accordingly. Global institutions and think tanks are also relatively quick, and sometimes just as quick, though think tanks can be a little slower, since they do not have the urgency that governments do, nor the resources of consultancies and banks. The slowest by far are university academics, as their work is generally at their initiative rather than in response to a commission, and targets their peers in the research community rather than governments.

Second, **access to high-quality data**. Here, again the advantages lie with governments and consultancies/banks. Governments generate much of the data that other organizations need, and government researchers will often have early or exclusive access to such data. Consultancies and banks can afford to either create their own proprietary data, or to purchase good quality data from other sources. International organizations are in a similar position to governments, especially entities such as the World Bank or the IMF, albeit not quite as well-resourced in general. Think tanks, depending on their links to certain governments, may have access to some high quality inside data through memoranda of understanding with government agencies. University academics usually have to rely on publicly available data, though on occasion they can get some high-quality data. Generally speaking, access to high-quality data is a critical determinant of forecast accuracy, and so this is a very important dimension.

Table 3.3.3.1: Differences in Economic Forecasts Made by Different Organizations

	Governments	Consultancies / Banks	Global Instit. / Think Tanks	University Academics
1. Production speed	High	High	High / Medium	Low
2. Access to high quality data	High	High	Medium	Low
3. Sophistication of modeling techniques	Medium	Medium	Medium	High
4. Familiarity with research frontier	Low	Low	Medium	High
5. Transparency of method	Low	Nil	Medium	High
6. Exposure to rigorous peer review	Nil	Nil	Medium	High
7. Conflict of interest	Low	Low	Low	Nil

Third: **the sophistication of modeling techniques**. Here, all three of governments, consultancies/banks, and global organizations/think tanks perform approximately equally. University academics have an advantage, because they have the strongest academic backgrounds in general, and the greatest knowledge of the techniques. Moreover, because they have lower time pressure, they can take the time necessary to produce the most sophisticated models, and hence the most accurate forecasts.

Fourth: **familiarity with the research frontier**. This is the dimension where academics have the biggest advantage. Knowledge of the cutting-edge methods circulated among those working on the research frontier requires access to the leading conferences and gatherings involving producers of that research. In general, access is only granted to those who contribute to that research. University academics are the primary qualifier; global organizations and think tanks will have some modest representation in such conferences, ensuring minimal familiarity; but researchers at governments and in consultancies/banks are generally too busy to be able to contribute to cutting-edge research, and are therefore

out of the loop. Generally speaking, whoever has knowledge of the research frontier will be able to produce higher quality forecasts.

Fifth: **transparency of method.** The business model of consultancies and banks is based on proprietary methods and data, and so they typically have zero or minimal levels of transparency: they merely present conclusions without showing modeling techniques. This can make it very difficult to evaluate potential flaws in the forecasting method, and also opens the door for conflicts of interest. Governments are usually slightly better, but not much so, especially if the techniques used are considered classified due to security concerns. Global institutions and think tanks will usually have intermediate levels of transparency, but the most transparent by far are academics, since the peer review process demands it, and it helps to minimize random errors or biases stemming from conflicts of interest. They will usually post detailed descriptions and their entire datasets online and make them freely accessible.

Sixth: **exposure to rigorous peer review.** Again, the advantage lies clearly with academics in this regard, as their job description revolves around the production of peer-reviewed research. Peer review, whether informally through the sharing of results in conferences, or formally through double-blind refereeing in academic journals, strongly contributes to improving the quality of the final product, and arguably represents the biggest advantage that academics have over any competing producer of knowledge that is not subject to peer review. Global organizations and think tanks welcome peer review, but sometimes their mandates—most notably the need for speed—mean that they cannot afford to go through rigorous peer review. In fact, the biggest disadvantage associated with academics' peer review is that it slows the process of making forecasts down considerably. Governments and consultancies/banks generally have no interest in peer review, with confidentiality concerns preventing the researchers from being able to subject their methods and results with professional peers outside their organization.

Seventh: **conflicts of interest.** University academics generally have no hidden agenda on issues such as forecasts regarding the economy, and they are professionally bound to publicly disclose potential conflicts of interest in their research, as part of the peer-review process. Each of the other three organizations suffers from potential conflicts of interest that may not be known to observers. For example, in an attempt to avoid inducing a state of global panic, the IMF may refrain from publishing highly negative forecasts, even if they are the most accurate forecast available. Think tanks may have funders that wish to push a certain agenda; for example, a politically-affiliated think tank may wish to make positive forecasts about the economy when the party it supports happens to be in power, and vice versa. Consultancies and banks may wish to keep clients optimistic and willing to invest by inflating forecasts, especially those that are published publicly. And governments researchers may be pressured by their overseers to produce forecasts that give a positive impression to voters, prospective investors, and other important stakeholders.

As can be seen, no source of forecasts dominates the others absolutely in all categories; each has its pros and cons. In general, governments and consultancies/banks are well-resourced and have access to high-quality data, but they do not have access to the best methods; while academics have the best methods but have low-quality data and are slow. Keeping these differences in mind is useful for understanding the variation in estimates.

A final remark is that this classification and analysis omits many subtleties and details that emerge upon closer inspection. For example, central banks, especially independent ones, are a hybrid, and come close to securing the best of all worlds, as they have highly qualified researchers working in a nearly academic environment. And some universities work closely with governments, allowing them to tackle most of their flaws.

3.3.2. Estimates by Governments

At the time of writing (mid-April 2020), to the best of our knowledge, no government had publicly disclosed its forecasts for the impact of the coronavirus on its economy. It is incredibly unlikely that this is due to the absence of such forecasts; in fact, the fiscal and monetary methods crafted were most likely calibrated by referring to the forecasts produced by their in-house models of the economy. However, a combination of security and political concerns have likely prevented governments from publicizing their forecasts. Eventually, governments will start to publish their forecasts, at which point readers will benefit from an awareness of the pros and cons mentioned above.

3.3.3. Estimates by Consultancies and Banks

Reinicke (2020) logs the predictions of several leading financial institutions regarding the performance of the US economy. Goldman Sachs predicts a 24% decline in US GDP during the second quarter, noting that this would be two-and-a-half times the size of the largest drop on record, which occurred in 1958. They are formally predicting that the US economy will enter a recession.

Deutsche Bank predicts weak US growth during the first quarter (0.6%), followed by a contraction of 12.9% during the second quarter. While acknowledging the degree of uncertainty, Deutsche stated with confidence that the fallout will be substantially worse than anything experienced since the conclusion of World War II at least. They also predicted a 31.7% contraction in Chinese GDP during the first quarter, followed by a sharp recovery during the second.

JP Morgan presented less dramatic forecasts for the US economy, owing to their releasing them earlier than other institutions, and hence before some of the more damaging developments. The bank foresees a first-quarter GDP

contraction of 2%, followed by a second-quarter contraction of 3%. Their corresponding figures for the Eurozone were 1.8% and 3.3%, respectively.

Bank of America predicted a full-year GDP contraction of 0.8% for the US, based on growth of 0.5% during the first quarter, and a 12% decline during the second. The length of the recession that they are predicting depends upon the aggressiveness of the government's fiscal response.

Morgan Stanley presented a more upbeat prediction, expecting global GDP growth to be 0.9% for the full year, due to a mild contraction during the first half of the year, followed by a rebound in the second half. They believe that the damage will be worse than that experienced in the 2001 recession, but not as bad as the 2008 global financial crisis.

UBS are much more pessimistic, predicting a 2.1% contraction of US GDP during the first quarter of 2020, followed by a 10% contraction in the second quarter. They expect the public health component of the crisis to be substantially improved by the end of April, but the social distancing restrictions to remain until the end of May, extending the economic damage.

Business statistics consultancy Statista, which has access to a rich selection of data, estimates that most major economies will lose at least 2.4% of their GDP over 2020 (Duffin, 2020); they stress that this prediction was made before the coronavirus was declared a global pandemic, and they expect that the next round of revisions will result in a more pessimistic forecast regarding the impact on global economic growth.

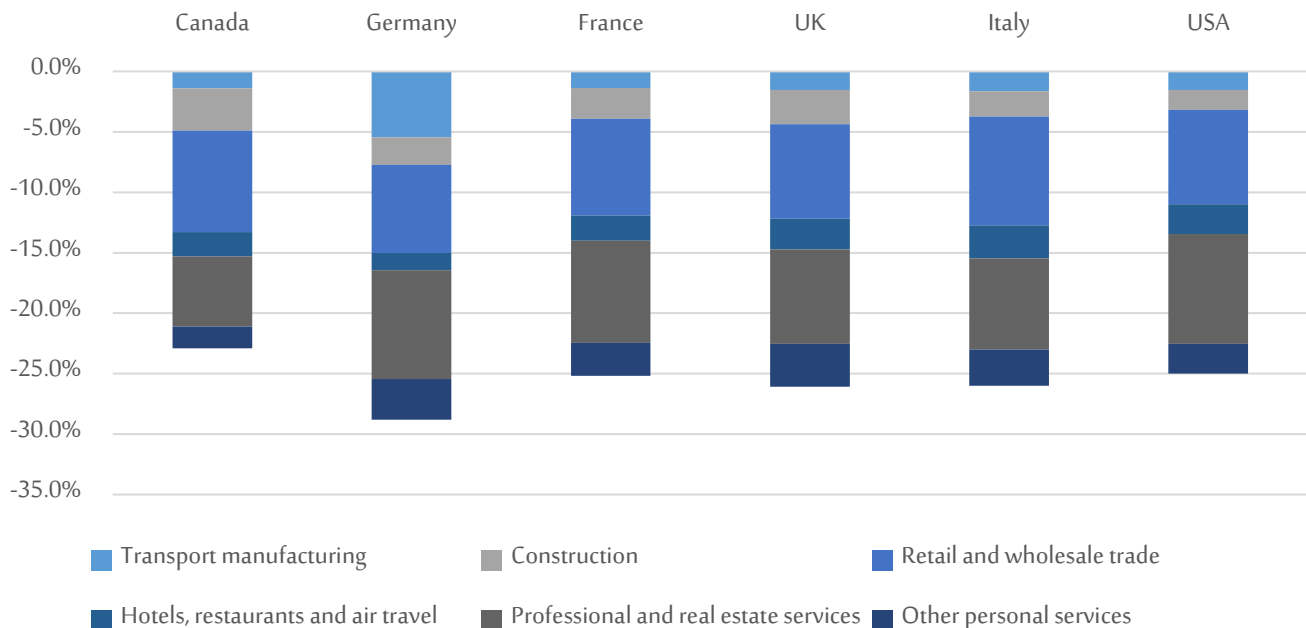
Finally, German global consulting firm Roland Berger forecasts a contraction in global GDP ranging from 3.1% to 5.2% compared to the baseline growth scenario, depending on the duration of the disruption (Roland Berger, 2020). In the case of China, they predict a 1.9% to 3.3% decline in GDP growth; for Europe, 3.4% to 5.8%; and for the US, 4.2% to 7.1%. Note that under the worst-case scenarios, the EU, the US, and the globe will all experience a net contraction during 2020, but China will still manage to grow at 2.7%.

It is worth noting the large variation in predictions among banks and consultancies. This is partially due to the forecasts being published according to a staggered schedule, meaning that each is based on a different amount of information regarding what has actually happened, and what is likely to happen, in terms of the public health component and the government response. But the primary reason is the overall uncertainty associated with the crisis, discussed in section 3.2. In contrast, during non-crisis times, there is a much higher level of convergence among the predictions of banks and consultancies, with the differences usually being of the order of tenths of percentage points at most.

3.3.4. Estimates by Global Institutions and Think Tanks

The IMF, the most prominent international organization focusing on the global economy, is yet to release its forecasts, though the first World Economic Outlook for 2020 is scheduled to be published in the middle of April, and will likely feature forecasts.

Figure 3.3.4.1: Initial Coronavirus Impact on GDP by Sector



Source: OECD

In its stead, the OECD has been providing comprehensive predictions for the world economy (OECD, 2020). Their method starts with assessing the initial impact of the coronavirus on GDP, based on an analysis of the affected sectors (the output approach); and then considering how long this initial impact might extend.

Figure 3.3.4.1 shows the breakdown for six of the G7 economies. The initial impact is forecast to equal around 25% of GDP in these economies, with the hardest-hit sectors being retail and wholesale trade, and professional and real estate services. Despite having low death rates and good management of the crisis from a public health perspective, Germany suffers heavily because of the dependence of its economy on international trade.

The OECD acknowledges the complexity of the crisis, and the absence of a basis for reliably forecasting the duration of the measures. Thus, rather than making the assumptions required for a numerical prediction, they explicitly acknowledge the informational gap, and refrain from making a prediction.

The WTO focuses its modeling efforts on predicting the impact on world trade. They forecast a contraction in world trade in the range 13% to 32% during 2020, and are confident that it will exceed the slump that occurred during the 2008 global financial crisis.

To the best of our knowledge, the leading economic think tanks have in general refrained from producing forecasts. The most likely reason is that they do not have the in-house expertise to deal with the complexities described in section 3.2. Think tanks typically have around 25 full-time research staff, whereas an exercise such as producing forecasts about the impact of the coronavirus on the global economy requires an entire team of dedicated researchers, which is usually beyond the means of a think tank.

3.3.5. Estimates by University Academics

Estimates by university academics are starting to emerge, but in general, as explained above, they are slow. In a paper that predates the coronavirus pandemic, but that applies generically, Smith et al. (2009) estimate the economy-wide impact of pandemic influenza on the UK economy. They find a cost in the range 0.5-to-1% of GDP in low mortality scenarios, and 3.3-to-4.3% of GDP in high mortality scenarios. Building on such papers, Fan et al. (2016) summarize the existing literature and find that estimates of the cost of pandemic influenza are of the order of 4-to-5% of global GNI; their model finds something closer to 0.7% of GNI per year for generic pandemic influenza.

Moving on to the present coronavirus pandemic, a popular source of inspiration for academics is the 1918-1920 Spanish Flu pandemic, which itself had a devastating effect on the economy (Fan et al., 2016; Beach et al., 2018). Barro et al. (2020) use this approach, with an emphasis on the mortality channel, i.e., what is the likely number of eventual deaths caused by the coronavirus, and what is the implied impact on GDP. They predict that a typical country will experience a GDP decline of 6%, and a consumption decline of 8%.

Gormsen and Koijen (2020) develop a model to analyze the impact of the coronavirus on stock prices and on growth expectations. Their method is based on examining the response of stock markets and dividend futures to the coronavirus at present, and using this to predict the future, based on the relationship between these variables in past events. They forecast that GDP growth in 2020 will decline by 2.6 percentage points in each of the US and the EU. Their estimates suggest an impact that is comparable to that of the global financial crisis in 2008.

Makridakis and Hartley (2020) produce estimates based on a simple model that assumes that industries will be able to continue to operate in proportion to their degree of digitization. Using this, they estimate that the real growth rate of US GDP will decline by 5 percentage points for each month of partial economic shutdown.

3.3.6. Synthesizing the Forecasts

Based on the above, several remarks are in order. First, governments and think tanks have largely refrained from providing estimates. In the case of governments, it is due to the confidentiality of the policymaking and crisis-response process. In the case of think tanks, it is because they do not have the resources to develop forecasts for such a complex scenario in such a short period of time.

Second, due to their commitment to transparency, and the desire to avoid making any embarrassing errors, global institutions have been either slow to make predictions, or have made ones that are modest in scope.

Third, due to the demands of their clients, and the absence of a need for transparency, banks and consultancies have been the fastest to produce definitive forecasts. Unsurprisingly, they report very large variation in the predictions of the outcome.

Fourth, due to the transparency of their methods, and the need for peer review, academics have delivered estimates that are more convergent than those of banks and consultancies. However, producing them remains slow, due to the lack of urgency on the part of academics.

4. Conclusion

This paper had three goals: first, to explain the mechanism through which the coronavirus pandemic affects the global economy; second, to provide estimates of the effects experienced thus far; third, to provide forecasts of the future economic impact. The main conclusions are as follows.

1. In the short term, there are three primary mechanisms through which the coronavirus affects the economy: the direct costs of the health measures, such as medicines, overtime salaries for medical personnel, ventilators, etc.; the decrease in the demand for goods and services, primarily caused by the social distancing countermeasures; and the decrease in the supply of goods and services, also caused primarily by social distancing.
2. Due to the expectation that such impacts will be large, governments have responded with combinations of monetary and fiscal interventions designed to maintain liquidity, and to avoid bankruptcy and redundancies stemming from the decreased economic activity.
3. In the long term, the coronavirus will have further effects, including those representing the long-run implications of the policy responses; almost all will be negative. These include: a continuation of the preexisting trend toward deglobalization and relocalization of production; a restructuring of the economy away from sectors such as tourism and aviation, and toward sectors such as e-commerce and digital entertainment; economic problems associated

with rising public- and private-sector debt, and with moral hazard in the financial sector; and increasing electoral success of political parties espousing economic nationalism, which includes the nationalization of strategically important industries, and the diminishing popularity of privatization.

4. At the time of writing (April 2020), data on the impact on GDP are unavailable as they take time to compile. However, a wide range of non-GDP data confirms the existence of a marked, negative impact of the coronavirus on the economy. These include contracting industrial production and car purchases; rising unemployment; falling stock prices coupled with exceptionally high levels of volatility; falling bond yields; falling commodity prices, including oil; and large deteriorations in business and consumer sentiment.
5. Estimating the impact of the coronavirus is exceptionally difficult, due to the large degree of prevailing uncertainty regarding the virus's biological and epidemiological traits, and regarding the government's public health and economic response, all which exacerbate the traditional suite of challenges faced by forecasters when making predictions outside the confines of an economic crisis.
6. In terms of GDP, there exists wide variation in the predictions that have emerged thus far. They generally forecast a decline in the growth rate of leading economies of the order of 3% during 2020, with most of the damage coming in the second quarter, followed by a recovery during the latter half of the year.

Finally, we note that the analysis and estimates focus exclusively on the economic impact; the paper does not attempt to quantify the impact of mortality beyond that which affects aggregate economic activity; thus, for example, the emotional toll of millions of people dying on their loved ones is excluded, in the interests of parsimony and because such considerations lie outside the author's area of specialization.

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