

# A “new normal” as a “new essential”? COVID-19, digital transformations and employment structures<sup>1</sup>

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## Abstract

This paper explores the new policy challenges that have emerged as a result of the coronavirus disease (COVID-19) pandemic. The “new normal” should acknowledge the “new essential” in terms of jobs and sectors. First, the paper examines the trade-off between health policies and anti-recessionary policies. It studies the economic impact of lockdown on households and firms and, relatedly, the slowdown in global value chain-related trade. It then examines lessons that can be learned from this crisis in areas that were topical before the outbreak and are likely to be even more so after it. These include the need to steer digital transformation so as to minimize negative impacts on jobs and sectors while reflecting critically on their “essentiality” and the need for concerted policy action to ensure good governance of health data.

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## Keywords

COVID-19, essential services, viruses, epidemics, economic aspects, employment, international trade, global value chains, labour market, digital technology, capacity-building, working conditions, data governance

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## I. Introduction

In 2018, Bill Gates predicted that “given the continual emergence of new pathogens, the increasing risk of a bioterror attack, and the ever-increasing connectedness of our world, there is a significant probability that a large and lethal modern-day pandemic will occur in our lifetime”. He believed that “the world needs to prepare for pandemics in the same serious way it prepares for war. This preparation includes staging simulations, war games and preparedness exercises so that we can better understand how diseases will spread and how to deal with responses such as quarantine and communications to minimize panic” (Gates, 2018).

Gates’s argument should not be accepted uncritically, as, arguably, policy priorities ought to be preventing pandemics (and, incidentally, wars) from occurring in the first place and then investing in public health to better deal with them if they do. Two years later, though, the coronavirus disease (COVID-19) pandemic is causing a significant number of excess deaths and still seems far from having been contained, as the world awaits the distribution of the vaccine. And, debatable though the use of war metaphors for government interventions may be,<sup>2</sup> simultaneous global actions of the magnitude of a post-war reconstruction might indeed be needed. Some of the fiscal interventions of governments around the world, for instance in Europe, have indeed been substantial (for a brief summary, see Castellarin, 2020), and a wealth tax has been proposed to fund the response to the pandemic (Landais, Saez and Zucman, 2020).

However, some have argued that properly tackling the current crisis might require more than throwing money at it. We need to “build back better”, as ECLAC has courageously argued in its policy recommendations (ECLAC, 2020), or, as others have argued, “build forward” (Agarwala and others, 2020).

Since the outbreak of the COVID-19 pandemic, there has been an unprecedented output of (grey) literature in the fields of the natural (biomedical, epidemiological) and social sciences; often simply opinion pieces rather than academic studies. Remarkably, some of these contributions were being published even before the virus had fully spread across the Atlantic and really affected economies (Gans, 2020; Baldwin and Weder di Mauro, 2020).

Within this augmented space for discussion, the intended contribution of this brief paper is to selectively unpack the impact of COVID-19 on the economy, with a particular focus on digital transformation and the sectoral and occupational dimensions. It argues that the so-called “new normal” is the result of a structural transformation of modes of production and consumption, aided by digital technologies, that has been imposed by governments to contain the outbreak. From a normative perspective, these structural transformations are forcing us to consider what the “new essential” might be, in terms not only of jobs but of policy priorities, and arguably how it might be possible to “build back better”.

The paper is structured in four sections and attempts to draw lessons not only for policy, but also for research agendas, while unpacking a selection of ingredients that can contribute to the aim of building back better. Following this introduction, section II examines the supposed policy trade-off between containing the pandemic and trying to avoid a global economic recession, reflecting on the employment impact of national lockdowns and shutdowns of firms and sectors and the associated slowdown of global value chain (GVC)-related trade. Section III then looks at opportunities to learn from this crisis in areas that were topical before the outbreak and are likely to become even more so in the aftermath of the pandemic, including the need to steer digital transformation so as to minimize the negative employment and underemployment impacts on particular jobs and sectors, alongside a critical reflection on their “essentiality”, and, in a global context and at a time in history when data-intensive sectors are gaining momentum, the need for concerted policy action to ensure good governance of health data. Section IV concludes.

<sup>2</sup> See [online] <https://www.theguardian.com/commentisfree/2020/mar/21/donald-trump-boris-johnson-coronavirus>.

## II. Coping with the emergency: there should not be a policy trade-off between public health and economic recovery

### 1. Minimizing exposure to contagion and the shutdown of economic activities

At the outset of the pandemic, most governments across the globe intervened with lockdown restrictions on households and shutdowns of economic activities as an emergency response to the pandemic, in an attempt to contain the outbreak. Making public health the priority, these policies had a negative effect on both supply and demand.

A plethora of studies have been produced since to assess the economic, employment and inequality impact of government restrictions brought in to contain the pandemic. This evidence would ideally be used to fine-grain policy interventions in response to subsequent waves of the pandemic and avoid any need for trade-offs between public health and economic recession in any national context or, as discussed in the following section, internationally.

At the macroeconomic level, Guerrieri and others (2020) argue that the COVID-19 pandemic fits the theory of Keynesian supply shocks. This posits that supply shocks linked to shutdowns, layoffs and firm exit trigger aggregate demand shocks larger than the initial supply shocks. Keynesian supply shocks happen in multisectoral economies subjected to lockdown interventions in a context of incomplete markets and consumer liquidity constraints. In this context, aggregate demand shocks amplify the supply shocks in a cascade of direct and indirect effects.

#### (a) What empirical evidence is needed to protect vulnerable jobs and mitigate the recessionary effects of lockdowns?

A macroeconomic analysis must be complemented with an appreciation of sectoral input-output relationships to make sense of how the supply shock is propagated across sectors, depending on the country-specific economic structure and the exposure to risk linked to specializations that are more likely to suffer from shutdowns (i.e., critical intermediate sectors, or sectors that depend on critical intermediate suppliers in other countries).

Several studies have looked at the sectoral and firm-specific impact of supply and demand shocks in different countries. Del Rio-Chanona and others (2020) provide an estimate of the first-order effects of the COVID-19 pandemic on employment in the United States. They examine individual occupations and sectors and classify them as “essential” and “non-essential” by the feasibility of their being conducted remotely and the likelihood of their suffering from supply and demand shocks (see also Dingel and Neiman, 2020). With the analysis limited to first-order effects, the authors find that a full lockdown of households and a total shutdown of firms would bring about a reduction of income associated with the greater of the demand or supply shock, as most of the immediate effect is due to the inability of people to work rather than consume. The findings show that high-wage occupations suffer substantially less than low-wage occupations, very much in line with what is found by Adams-Prassl and others (2020) on the basis of real-time surveys for the United Kingdom, the United States and Germany.

Estimating second-order effects means developing an input-output framework that reflects the health and economic criticality of different jobs and sectors, as has been done for France, the United States, Germany and Japan (Barrot, Grassi and Sauvagnat, 2020; Barrot and Sauvagnat, 2016)

and internationally by taking into account the presence of GVCs in some sectors (see next section). These contributions seem to show that second-order effects contribute up to 50% of the total negative economic impact of supply shocks.

## (b) Is there a way to fine-tune interventions by lifting restrictions at different points in the pandemic to mitigate the trade-off between public health and the economy?

Further empirical evidence is needed for policymakers to alleviate the trade-off between containing the pandemic and avoiding a harsh recession in the medium and long term along the lines proposed in Pichler and others (2020). The authors take into account the essentiality of inputs, the input-output structure of the (United Kingdom) economy and inventory dynamics and analyse different scenarios for the reopening of selected sectors of the economy, including public services such as schools and social care, on the basis of occupation-specific data and information on epidemiological spreading (Pichler and others, 2020). When considering the increase in  $R_0$  and GDP, they find that a reasonable trade-off is achieved when “all non-consumer facing industries reopen, schools are open only for workers who need childcare, and everyone who can work from home continues to work from home” (Pichler and others, 2020, p.1).

Here we make two important pleas for future research that can yield useful evidence for decisions impacting both public health and the severity of economic recession, which policymakers should be aware of.

First, Pichler and others (2020) recognize that standard models for production functions are not adequate to account for the short-term effects of lockdown. Nor, it might be added, are they adequate to account for the medium- and long-term effects, for which input-output models are needed.

Second, as recently suggested by Haldane and Turrell (2018), agent-based models (ABMs) are crucial to devise simulation scenarios for different lockdown and shutdown interventions. ABMs have been extensively used to examine how economic agents interact and react to micro and macro signals, in order to model the evolution of the economic structure (Ciarli and Valente, 2007; Ciarli and others, 2019) or the environment (Ciarli and Savona, 2019). When used for policy, ABMs can simulate scenarios based on fine-grained policy variables that affect individuals, firms and sectors as complex systems and, ultimately, macroeconomic trends.

ABMs in an input-output framework would provide a better understanding of what the macro-level outcomes of a complex combination of effects are. Depending on the firms and sectors shut down, it is important to ascertain which downstream sectors are likely to be affected and what effects are transmitted on to income and consumption patterns, going by the distinction between essential and non-essential workers (see below). For instance, in an extreme scenario, shutting down all essential services would probably result in full containment of the outbreak, as there would be no workers exposed. This would be achieved at the cost of a complete shutdown of the economy, with essential goods and services not available. In the opposite scenario, prioritizing a full economic recovery would most likely increase the spread of the disease and have deleterious long-term effects on public health, resulting in subsequent recessions. ABMs would make it possible to simulate different scenarios on the basis of intersectoral linkages and different degrees of “essentiality” for jobs and sectors, in terms both of their position along the value chain and of risk exposure. In sum, this is what is needed to fine-tune public policy across sectors and jobs and over time.

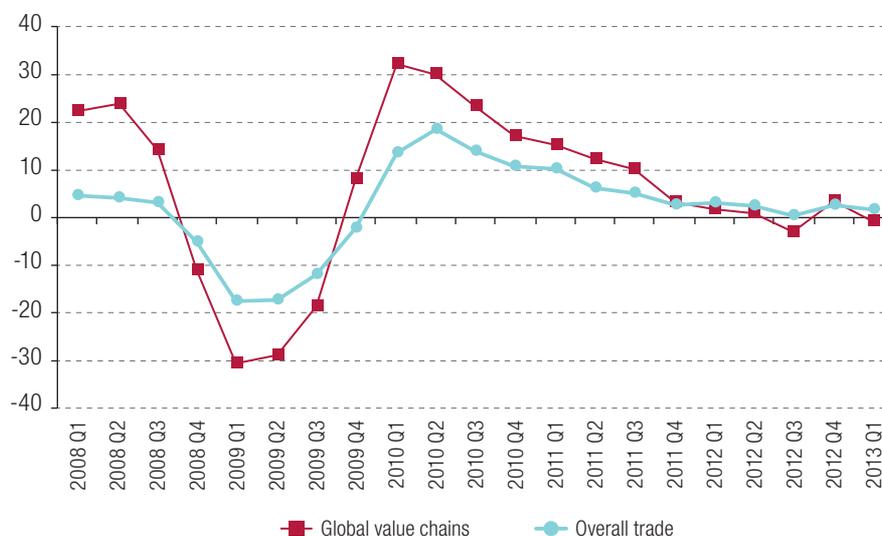
## 2. Are we heading towards a crisis of global value chains?

It is now well documented that, over the last few decades, global trade has undergone a structural transformation involving an increase in trade in intermediates relative to trade in final products; an increase in countries' interconnectedness, as these intermediates are produced in different countries; and an increase in global trade elasticities relative to global income, most likely because of this international fragmentation of production (Escaith, Lindenberg and Miroudot, 2010; Ferrantino and Taglioni, 2014; Baldwin and López González, 2015).

There is still a heated debate about the extent to which countries should actively seek to be engaged in GVCs and the conditions under which this should happen, in both manufacturing and business services activities (Savona, 2016; Sturgeon and Memedovic, 2011; López González, Meliciani and Savona, 2019), and what the consequences are in terms of employment growth and structure (Bontadini and others, 2020). For emerging countries, the conditions for beneficially joining GVCs in order to upgrade domestic economies have not yet been identified unanimously (López González, Meliciani and Savona, 2019), as countries might join under costly conditions, get stuck in low-technology specialization traps and find themselves unable to benefit from opportunities for technological upgrading. This explains current world trade flows and a global landscape heavily polarized between “headquarters” and “factory” economies (Baldwin, 2011; Baldwin and López González, 2015; Taglioni and Winkler, 2016).

In this context, a global downturn in demand, such as the 2008 financial crisis, can affect GVC trade in multiple ways, owing to the higher elasticity of trade to global income and the dual channels (the final and intermediate products traded) through which the crisis spreads across GVCs (Ferrantino and Taglioni, 2014). Needless to say, crises increase uncertainty and the risk of being affected by a slowdown, depending on which macro regions of the world a country is most tightly linked to in terms of trade flows. The global trade slowdown that followed the financial crisis saw a particular trend unfolding (see figure 1). The deep slump in global trade in 2009 was amplified in GVC trade, though the recovery in GVC trade was also more rapid and consistent. Interestingly, this was followed by a steady decline in both overall trade and GVC trade which is still ongoing.

**Figure 1**  
Real year-on-year growth in total trade and trade in global value chains,  
first quarter of 2008–first quarter of 2013  
(Percentages)



**Source:** World Bank, Datastream, cited in M. Ferrantino and D. Taglioni, “Global value chains in the current trade slowdown”, CEPR Policy Portal, 2014 [online] <https://voxeu.org/article/global-value-chains-current-trade-slowdown>.

Some scholars have in fact detected additional forces at work in this decline. For instance, Seric and Winkler (2020) argue that there were rumblings of a GVC crisis long before the COVID-19 pandemic. GVC trade was curtailed as a way of mitigating supply chain risks resulting from demand shocks, high import tariffs and some export restrictions. These early symptoms of a GVC slowdown included some firms reshoring parts of their production processes, or replacing some of their (low-segment) suppliers with automated, in-house or local sources of supply, and shortening the length of GVCs overall (Dachs and Seric, 2019; Seric and Winkler, 2020). The effect of robotization and automation on GVC participation seems to be negative, especially in emerging and low-income countries, and they are likely to contribute further to GVC-related income polarization (Seric and Winkler, 2020).

In sum, global trade and GVC trade trends were already unfavourable when the COVID-19 pandemic struck.

### (a) How has COVID-19 affected trade, and GVC trade in particular?

In a context of weakened GVCs, the impact of the COVID-19 pandemic on overall and GVC trade is expected to be very different from the after-effects of the 2008 financial crisis, and is likely to have very different long-term consequences.

Baldwin and Freeman (2020) and, from a more general perspective, Baldwin and Weder di Mauro (2020) effectively summarize what they call the effects of “COVID-19 concussion” on manufacturing GVCs since the outset of the pandemic.

First, countries shut down trade with different time lags, the first to do so being the Asian and Chinese world “factories”. This affected the supply of intermediates to the United States and Germany, which shut down trade later, when the virus reached Europe and crossed the Atlantic, spreading the trade slowdown to other importing countries. The result is that the shock has had an exponential effect on trade (Baldwin and Everett, 2020).

Second, in addition to the non-synchronicity of the effect, which is a feature of COVID-19 as compared to previous epidemics, the shock has simultaneously affected both the supply side (as described above) and the demand side of trade. People forced into lockdown have put on hold not only their working patterns but their consumption patterns too as a result of recession, risk aversion, investment delays and wait-and-see strategies (Baldwin and Freeman, 2020). This has for the first time affected service GVCs in addition to manufacturing ones, extending the recessionary effects to the reduction of service imports and exports between trading partners (see López González, Meliciani and Savona, 2019, for the underlying rationale).

Third, a sort of reverse supply chain contagion has occurred: even as China got back to work in March-April 2020, the rest of the globe shut down. This resulted in a pendulum propagation, including direct and indirect effects that depended on the density, composition and country source and destination of the intermediates imported and exported. This sort of pendulum mechanism is likely to reappear if and when subsequent waves of the pandemic hit economies.

### (b) How should the GVC crisis be tackled?

Baldwin and Freeman (2020) and Baldwin and Everett (2020)<sup>3</sup> provide a compelling series of suggestions for avoiding a GVC crisis arising from “contagion and reinfection” dynamics that might perhaps also be exacerbated by the automation and reshoring trends which preceded the spread of the

<sup>3</sup> See also OECD (2020) for a focus on GVC interconnectedness around specific COVID-19-related goods.

pandemic (Seric and Winkler, 2020). Baldwin and Freeman (2020) argue that “international coordination on containment exceptions could help. All nations make exceptions to lockdown policies for essential goods. Realizing the extent to which trade partners are dependent upon key inputs should broaden the definition of ‘essential’. This would be a matter of enlightened self-interest. The United States may need China and India to keep their ‘active pharmaceutical ingredient’ plants open, while China and India may need the United States to keep its semiconductor plants open.”

The concept of what is “essential” will be returned to in the next section. For now we shall just touch on the question of how, in this context, countries should pursue their own “enlightened self-interest” when it comes to GVC trade. There is no bullet-proof answer to this. Lessons from earlier crises in history might be drawn on here. An intermediate scenario is likely to be the most plausible: it might be premature to talk about a radical GVC reversal involving a strong push for reshoring and nearshoring in an attempt to limit risks, i.e., to turn “inwards” at this stage of the crisis. Resilience to shocks might therefore rely on a fine balance between improving the quality of GVC participation and ensuring a virtuous presence of regional and global value chains. In the long term, this might mean a more beneficial kind of participation in GVCs.

### **III. Learning from the emergency: rethinking policy for “essential” jobs and sectors**

#### **1. Steering digital transformation towards inclusive labour markets**

##### **(a) How essential are the “essential services”? Is there still a productivity burden of essentiality?**

As mentioned in section II.1, opportunities for remote working have large occupational and sectoral specificities (Dingel and Neiman, 2020; Del Rio-Chanona and others, 2020). Some anecdotal evidence seems to suggest that remote working is either for privileged, highly skilled and well-paid workers or for precarious, self-employed gig workers. The global lockdowns have accelerated the pace of remote working and exacerbated these differences (Adams-Prassl and others, 2020; Haldane, 2020).

Stuck in the middle are all the “essential services” that are unsuited to remote working. Wholesale and retail services, including delivery services, transport and services auxiliary to transport, personal care, social services and health care are the essential services that have played a crucial role during the first lockdown and are likely to do the same in the next ones. Essential service occupations cannot be carried out from home “by design”, and yet are indispensable for the economy to retain a minimum of functioning when most economic activities are shut down.

While some 50% of information and communication service workers, 45% of professional and scientific service workers and 40% of finance and real estate service workers could turn to home working during the pandemic in the United Kingdom, for instance (Haldane, 2020; ONS, 2020; Pichler and others, 2020), essential services are structurally unsuited to remote working.

For a scholar who has dealt with the economics of services for some years, it is poignant to see sectors that have traditionally been labelled as low-technology, low-productivity and low-skilled and (ironically) as spreaders of cost disease (Baumol, 1967; see Grassano and Savona, 2020, for a review) suddenly upgraded to “essential”.

It is hard to reconcile the oxymoron of essentiality: in pandemics, the very notion of essentiality comes back to that of basic needs; in normal times, these are the very activities that are seen as the main drag on productivity growth and the main source of cost disease. Either productivity performance should not be a consideration where essential services are concerned, or decades of productivity mismeasurement in services have misconstrued or ignored the feature of essentiality. This is not just an academic issue: it has consequences for the mechanisms and structure of remuneration in these activities. If we had to rethink the mechanisms of wage formation for essential jobs, we could perhaps start by ignoring the link with productivity and making wages for essential services commensurate with the well-being they provide.<sup>4</sup>

More generally, there are two further important aspects of the impact the COVID-19 pandemic has been having on remote working and on the challenges of managing the effects of digital transformations on working conditions.

The first aspect are the long-term consequences of the global shift towards smart (remote) working, from which, as argued here, essential services are most likely to be excluded. The second aspect is the extent to which digital home working, in both its traditional and emerging forms, can be made more inclusive.

Haldane (2020) suggests two interesting potential long-term negative effects of home working. First, the lack of face-to-face interactions might lead to the loss of a fertile environment for the creative and novel ideas that are at the very core of innovation. Second, the loss of social networks and the opportunity to exchange ideas informally might lead to a loss of social capital as existing social capital is eroded and new social capital does not get formed. “Whether it is creative sparks being dampened, existing social capital being depleted or new social capital being lost, these are real costs and costs which would be expected to grow, silently but steadily, over time. They weigh on the other side of the ledger when it comes to assessing the case for home working. They cast doubt on whether it will lead to the promised land of improved productivity and greater happiness” (Haldane, 2020).

This is all very plausible, and applies to non-essential but highly valued services. Services which are very essential but on which a low value is set will most likely be immune from the risks of creative sparks being dampened or social capital lost, simply because they did not enjoy these things in the first place. Acknowledging the costs of home working is undoubtedly forward-looking, but recognizing that the value of essential services is not reflected in their wages would be revolutionary.

## (b) How can digital transformation be managed to ensure employment inclusion?

Remote working and digital jobs are only a symptom of a much deeper and longer-standing transformation of occupations and working models, long predating (but accelerated by) the current pandemic and the restrictions imposed by governments on some occupations. Digital transformations have in fact profoundly modified the structure of jobs and skills (see, among others, Goos and Manning, 2007; Mokyr, Vickers and Ziebarth, 2015).

In the recent High Level Group Report on the Impact of Digital Transformations on EU Labour Markets (European Commission, 2019), we unpacked the effects of digitalization trends on several occupations. While the literature dealing with the effects of digitalization on occupations and tasks has produced robust findings, what is missing is a systematic effort to devise policies that tackle potential side effects. The policy recommendations offered in the report will now be summarized, as they have proved to be somewhat prophetic in the context of the current crisis.

<sup>4</sup> There is no space here to develop this argument further, but we hope to initiate a debate and a fruitful research agenda around this topic, which the current crisis has allowed us to consider in depth.

### (c) A skilled workforce

The abrupt shift to home working and the need to shield at-risk categories, including those with hidden disabilities, have shown that one of the most important requirements for survival in current labour markets is for workers to acquire digital literacy and update digital skills. Workers might not be aware of the need or have the opportunities and access to invest in their digital skills. If so, policymakers can organize digital skills personal learning accounts that belong to workers and are portable from job to job. Details such as contributions, the number of hours per year, top-ups, eligible expenses and taxation schemes are important, and not much is known yet about their effectiveness.

### (d) New labour relations and a new social contract

The combination of the abrupt shift mentioned above and the effects of lockdown have put a dramatic strain on workers' mental health. The European Commission (2019) recommendations emphasized the need to avert occupational safety and health risks like mental health and stress-related issues resulting from digitalization and increased volatility in today's world of work. What is needed is to increase the focus on prevention in employee assistance programmes and improve uptake by increasing social acceptance of mental health issues through informed discourse. The crisis is an unprecedented opportunity to increase public expenditure in the health sector, and governments should plan a substantial expansion of mental health programmes.

Remote working has accelerated the pace of growth in platform working and alternative work arrangements, a trend which started before the crisis (Ciarli and others, 2019; Bell and Blanchflower, 2018). One of the most inclusive steps that governments could and should take in the wake of the crisis, as we proposed in the report, is to equalize the (administrative) treatment of standard and non-standard work arrangements, e.g., by providing equal access to government services and credit lines and limited benefits mobility regardless of employment status.

Along the same lines, it is important to ensure neutral social protection against unemployment, sickness and other life circumstances independently of employment status. The increasing number of workers with non-standard employment should have access to social protection, e.g., through portable benefits attached to the worker rather than the job, or the establishment of an "underemployment insurance" to smooth out fluctuating incomes in the gig economy.

These structural, forward-looking actions could well be spillovers from government spending on furlough schemes to tackle the COVID-19 crisis. What we are advocating is a combination of context-specific and structural interventions that not only cover the emergency but ensure long-term inclusivity in labour markets.

## 2. The use of digital technologies at times of crisis: learning from the succession of COVID-19 contact tracing applications

Digital transformations affect society at large, beyond the labour market effects discussed above. One of the characteristics of digital technologies is that they are ubiquitous in their applications, to the extent that they have been described as a new generation of general purpose technologies (Breshnan and Trajtenberg, 1995; Trajtenberg, 2018).

The COVID-19 pandemic has given rise to a very interesting instance of the implementation of digital technologies, namely COVID-19 contact tracing applications, bringing forward the need to regulate (or at least openly debate) some of the technical, legal and ethical issues arising from their use and spread.

In any disease outbreak, provided that people rely on their tested or diagnosed rather than self-reported status, a digital contact tracing application is supposed to be more effective than a manual contact tracing procedure, as it immediately identifies and informs all the contacted and potentially infected people in real time, and has the potential to reduce the R number. In addition, a digital application is meant to alert all those contacts who are unknown to the potential spreader, rather than relying on their memory of encounters, voluntary contact and self-reporting. The automation of the contact tracing procedure and the digitalization of information should do what technical change is ideally meant to: provide solutions to pressing societal challenges.

However, this pandemic has been forcing us to engage in much-needed reflection on the appropriateness of (digital) technology for devising tools to help contain the outbreak. In a recent note (Savona, 2020), we considered the case —or, perhaps more appropriately, the saga— of the development and use of contact tracing mobile applications, which we report here.<sup>5</sup>

At exceptional times of public health emergency such as the current one, Taiwan Province of China, the Republic of Korea and Singapore, among other East Asian countries, have managed to limit the spread of the first wave of contagion better than other countries. Besides immediate and strict lockdowns, they have had recourse to the digital tracking of individuals with symptoms, identifying and isolating their contacts, and managed a very effective combination of high rates of testing, contact tracing and immediate isolation or treatment. Most likely because of their experience of earlier outbreaks, these countries have done better than others that have reacted sluggishly and been largely unprepared, such as the United States and the United Kingdom.

For instance, Lanier and Weyl (2020) have examined the Taiwanese strategy and described the proto-model of the Taiwanese contact tracing application. This consisted of a platform developed in cooperation between the digital minister, a group of local entrepreneurs and the g0v<sup>6</sup> movement and used voluntarily by citizens to share their symptoms and locations, which were promptly verified by local health centres and collated in a centralized repository of individual health records.<sup>7</sup> The Taiwanese population has shown a shared sense of public purpose and a substantial degree of trust in the government, and most particularly in Audrey Tang, the country's young and industrious digital minister. This was on 20 March, in what may be considered the pre-history of the debate, given the unprecedented pace at which the pandemic has forced governments to mobilize in response to the geography of contagion.

Now, the use of digital technology as a tracing tool is likely to raise as many challenges as it overcomes, chiefly with regard to personal data collection and storage, user consent, and surveillance, particularly in the context of health data. These are matters of concern in a democracy, which should ideally be a safe space for public scrutiny and monitoring of government accountability. There are some historical precedents for exceptional public interventions in emergencies, with reduced space for public debate and a pervasive sense of menace that prevents actions from receiving proper scrutiny and favours emotional responses.

<sup>5</sup> There is not yet a proper academic literature on this specific subject, but there have been a number of contributions in the grey literature, blogs and public debates that have informed some reflections on the use of technology at times of crisis.

<sup>6</sup> See [online] <https://www.nytimes.com/2019/10/15/opinion/taiwan-digital-democracy.html>.

<sup>7</sup> In a nutshell, a contact tracing application based on a decentralized protocol allows individual data to be left on devices, whilst a centralized solution requires data to be collected in a central repository such as a public health authority. A decentralized protocol is more likely to adhere to the European Union General Data Protection Regulation principles of data minimization; purpose limitation; storage limitation; integrity and confidentiality; lawfulness, fairness and transparency; accountability; and accuracy (see Savona, 2020, for more details).

## (a) What can we learn from the saga of contact tracing applications for data governance? Towards good governance of health data

The rapid unfolding of the contact tracing saga since mid-March 2020 has provided material for a first-hand reflection on the wider issue of data governance for social scientists interested in the economic and social impact of digital technology. In addition, this debate has clearly shown that getting the narrative right needs multidisciplinary expertise.

For instance, Google and Apple are going to support a decentralized solution for contact tracing applications developed using the DP3T protocol (Troncoso and others, 2020). They will be technically unable to access any personal data, as these data will remain on adopters' devices. The partnership of Google and Apple will allow health-related applications to be adopted on a global scale, as virtually all smartphones run on either the Android or the iOS system. Google and Apple's involvement has gone unquestioned, and yet has been welcomed as a small step in support of privacy and public health (Waters, 2020).

Some preliminary surveys across the European Union and the United States have shown concerning evidence that, if further corroborated, shows a clear tendency for citizens to trust Google and Apple more than governments when it comes to data collection and use. This should lead us to reflect on the state of public awareness of what is, at least in principle, a public value as against a private interest. We should devote research efforts towards predicting with a reasonable degree of accuracy the consequences of the public conferring their trust on large technology firms more than on their own governments, when the degrees to which they are respectively accountable to society are compared. All this despite the recent history of private surveillance and the massive concentration of power and equity value, which has been well documented by several studies in the academic and grey literature, and which was discussed briefly in Savona (2019).

Transparency and accountability are the watchwords here, for trust is a key ingredient in the whole saga and will be desperately needed in the post-COVID-19 reconstruction. The development of digital tools for tackling emergencies should be a clear and transparent process. More specifically, the main points to consider, as summarized in Savona (2020), are technical, legal and ethical in nature.

Technically, the public should be in a position to understand the features, effectiveness and (hopefully limited) purpose of any digital tool they (hopefully voluntarily) adopt. Understanding "privacy by design" and the side effects of a centralized protocol or a back-end central data repository is crucial. Similarly, it is up to data scientists, privacy engineers and Internet law experts to explain the importance of interoperability, not only in the context of contact tracing applications, but within the system of digital platforms. Technical literacy is a fundamental ingredient to ensure that people make informed choices and ultimately that the minimum take-up rate required to make the tool effective in containing the outbreak is achieved.

Legally, as is now being discussed within the European Union institutions, safeguards governing the deployment of digital tools should be based on human rights rather than privacy rights alone. This requires an informed public debate in parliament, primary legislation and independent oversight bodies. Clarity and transparency in regulating "compatible purposes for secondary use" of personal health data are crucial ingredients in building public trust.

From an ethical perspective, it is important to first predict and then regulate for the potential side effects of digital exclusion and potential discrimination in the use of digital tools for tracking, tracing and certifying immunity. Vulnerable low-income citizens might not be in a position to access information and familiarize themselves with and develop agency over their personal health (and location) data. None of the digital solutions considered here should lead to discrimination or further polarize inequalities, whether in labour markets or in society at large.

Taiwan Province of China might be a first mover in the direction of health data governance based on a complex institutional architecture to regulate and manage an effective government response, though trust in public institutions seems to be a necessary (albeit probably insufficient) condition for this to be successful. A European Union-style, certainly fundamental, institutional safeguard of privacy seems not to be fully paralleled by the actual level of trust that citizens have in their governments. We should be asking why this is the case. This crisis seems to be an unprecedented opportunity to learn more in this area as well.

## IV. Conclusion

In a recent and, as it proved, far-sighted contribution, Jedwab, Johnson and Koyama (2019) considered the incidence of the Black Death on deaths in European cities between 1347 and 1352. The Black Death killed 40% of the European population. Although urban areas were worst hit, in the long run they recovered better as they were able to attract more labour migrants than rural areas, at a time when trade was developing. Both the effects and the recovery were heterogeneous.

The COVID-19 pandemic has hit some sectors and workers particularly hard, exacerbated the existing polarization of labour markets and accelerated the reversal of GVC trade. It has forced governments to face the policy conundrum of having to contain a deadly pandemic while trying not to plunge the world into the worst depression ever. It has forced civil society to debate more openly the consequences of digitalization, which promises solutions to public health emergencies but creates the threat of greater surveillance.

In modern times, pandemics can and should be tackled more effectively and hopefully more inclusively.

This brief paper has selectively considered a variety of areas which are of policy relevance to the COVID-19 emergency and in which lessons can be learned from this. They will hopefully provide some of the ingredients for the Building Back Better strategy, which is intended to identify areas that are of structural relevance. This paper has raised questions and provided some evidence on possible ways to:

- (i) cope with the need to contain the outbreak while attempting to mitigate a global recession due to lockdown and shutdown restrictions;
- (ii) mitigate the GVC trade crisis that the COVID-19 pandemic has accelerated;
- (iii) learn from the fast-forward digitalization of the labour market that the pandemic has brought about, in terms of the long-term effects of home working and the polarization of online workers;
- (iv) learn a lesson of inclusion by considering the gap between the value of “essential” services and the wages paid to them;
- (v) learn what the ingredients of health data governance are when the use of digital technologies has to be managed at times of emergency, as in the case of the deployment of digital COVID-19 contact tracing applications.

There is tremendous scope for making this crisis an opportunity to build back better in terms of inclusive employment and transparent and trustworthy use of digital technologies, while debunking myths about irresolvable trade-offs between public health and economic recovery. All that is needed is high-quality research and an open space for reflection and action, such as that provided by this special issue. We hope that the above considerations will spark some debate and further research in these areas.

## Bibliography

- Adams-Prassl, A. and others (2020), "Work tasks that can be done from home: evidence on the variation within and across occupations and industries", *Cambridge INET Working Paper*, No. 2023.
- Agarwala, M. and others (2020), *Building Forward: Investing in a Resilient Recovery. A Wealth Economy Project Policy Report to LetterOne*, Bennett Institute for Public Policy, University of Cambridge.
- Baldwin, R. (2011), "Trade and industrialization after globalization's 2nd unbundling: how building and joining a supply chain are different and why it matters", *Globalization in an Age of Crisis: Multilateral Economic Cooperation in the Twenty-First Century*, R. C. Feenstra and M. Taylor Alan (eds.), Chicago, University of Chicago Press.
- Baldwin, R. and B. Weder di Mauro (2020), *Economics in the Time of Covid-19*, CEPR Press, March.
- Baldwin, R. and R. Freeman (2020), "Supply chain contagion waves: Thinking ahead on manufacturing 'contagion and reinfection' from the COVID concussion", 1 April [online] <https://voxeu.org/article/covid-concussion-and-supply-chain-contagion-waves>.
- Baldwin, R. and S. Everett (2020), *Covid-19 and Trade Policy: Why Turning Inward Won't Work*, CEPR Press.
- Baldwin, R. and J. López González (2015), "Supply-chain trade: a portrait of global patterns and several testable hypotheses", *The World Economy*, vol. 38, No. 11.
- Barrot, J. N. and J. Sauvagnat (2016), "Input specificity and the propagation of idiosyncratic shocks in production networks", *The Quarterly Journal of Economics*, vol. 131, No. 3.
- Barrot, J. N., B. Grassi and J. Sauvagnat (2020), "Sectoral effects of social distancing", *HEC Paris Research Paper*, No. FIN-2020-1371 [online] <https://ssrn.com/abstract=3569446>.
- Baumol, W. J. (1967), "Macroeconomics of unbalanced growth: the anatomy of urban crisis", *The American Economic Review*, vol. 57, No. 3, June.
- Bell, D. N. F. and D. G. Blanchflower (2018), "Underemployment in the US and Europe", *NBER Working Paper*, No. 24927.
- Bontadini, F. and others (2020), "Technological regimes, global value chains and employment", *Handbook of Labour, Human Resources and Population Economics*, K. Zimmermann (ed.), Springer.
- Bresnahan, T. and M. Trajtenberg (1995), "General purpose technologies 'Engines of growth'?", *Journal of Econometrics*, vol. 65, No. 1.
- Castellarin, E. (2020), "The European Union's financial contribution to the response to the COVID-19 Crisis: an overview of existing mechanisms, proposals under discussion and open issues", *European Forum*, vol. 23, July.
- Ciarli, T. and M. Savona (2019), "Modelling the evolution of economic structure and climate change: a review", *Ecological Economics*, vol. 158.
- Ciarli, T. and M. Valente (2007), "Production structure and economic fluctuations", *LEM Working Paper*, No. 2007/02 [online] <http://hdl.handle.net/10419/89459>.
- Ciarli, T. and others (2019), "Structural changes and growth regimes", *Journal of Evolutionary Economics*, vol. 29, Berlin, Springer.
- Ciarli, T., M. Di Ubaldo and M. Savona (2019), "Innovation and self-employment", *SPRU Working Paper Series (SWPS)*, No. 2019-17.
- Dachs, B. and A. Seric (2019), "Industry 4.0 and the changing topography of global value chains", *Department of Policy Research and Statistics Working Paper 10/2019*, Vienna, United Nations Industrial Development Organization (UNIDO).
- Del Rio-Chanona, R. M. and others (2020), "Supply and demand shocks in the COVID-19 pandemic: An industry and occupation perspective", *COVID Economics Vetted and Real-Time Papers*, No. 6, CEPR Press [online] <https://cepr.org/content/covid-economics-vetted-and-real-time-papers-0>.
- Dingel, J. I. and B. Neiman (2020), "How many jobs can be done at home?", *Journal of Public Economics*, No. 189.
- ECLAC (2020), *Building a New Future: Transformative Recovery with Equality and Sustainability (LC/SES.38/3-P/Rev.1)*, Santiago.
- Escaith, H., N. Lindenberg and S. Miroudot (2010), "Global value chains and the crisis: reshaping international trade elasticity", *Global Value Chains in a Postcrisis World. A Development Perspective*, O. Cattaneo, G. Gereffi and C. Staritz (eds.), Washington, D.C., World Bank.
- European Commission (2019), *High Level Group Report on the Impact of Digital Transformations on EU Labour Markets*, April.

- Ferrantino, M. and D. Taglioni (2014), “Global value chains in the current trade slowdown”, CEPR Policy Portal [online] <https://voxeu.org/article/global-value-chains-current-trade-slowdown>.
- Gans, J. (2020), *Economics in the Age of COVID-19*, MIT Press First Reads, April.
- Gates, B. (2018), “Innovation for pandemics”, *The New England Journal of Medicine*, No. 378.
- Goos, M. and A. Manning (2007), “Lousy and lovely jobs: the rising polarization of work in Britain”, *Review of Economics and Statistics*, vol. 89, No. 1.
- Grassano, N. and M. Savona (2020), “Productivity in Services twenty five years on: a review and a way forward”, *Handbook of Research Methods and Applications in Industrial Dynamics and Evolutionary Economics*, U. Cantner, M. Guerzoni and S. Vannuccini (eds.), Edward Elgar.
- Guerrieri, V. and others (2020), “Macroeconomic implications of COVID-19: can negative supply shocks cause demand shortages?”, *NBER Working Paper Series*, No. 26918 [online] <http://www.nber.org/papers/w26918>.
- Haldane, A. (2020), “Is home working good for you? Speech given at the Engaging Business Summit and Autumn Lecture”, 14 October [online] <https://www.bankofengland.co.uk/speech/2020/andy-haldane-engaging-business-summit-and-autumn-lecture>.
- Haldane, A. and E. Turrell (2018), “An interdisciplinary model for macroeconomics”, *Oxford Review of Economic Policy*, vol. 34, No. 1.
- Jedwab, R., N. Johnson and M. Koyama (2019), “Pandemics, places, and populations: evidence from the Black Death”, *Discussion Paper Series*, No. 13523, Centre for Economic Policy Research (CEPR).
- Landais, C., E. Saez and G. Zucman (2020), “A progressive European wealth tax to fund the European COVID response”, CEPR Policy Portal [online] <https://voxeu.org/article/progressive-european-wealth-tax-fund-european-covid-response>.
- Lanier, J. and G. Weyl (2020), “How civic technology can help stop a pandemic. Taiwan’s initial success is a model for the rest of the world”, *Foreign Affairs*, 20 March.
- López González, J., V. Meliciani and M. Savona (2019), “When Linder meets Hirschman: inter-industry linkages and global value chains in business services”, *Industrial and Corporate Change*, vol. 28, No. 6.
- Mokyr, J., C. Vickers and N. L. Ziebarth (2015), “The history of technological anxiety and the future of economic growth: is this time different?”, *Journal of Economic Perspectives*, vol. 29, No. 3.
- OECD (Organization for Economic Cooperation and Development) (2020), *Trade Interdependencies in COVID-19 Goods*, 5 May.
- ONS (Office for National Statistics) (2020), “Coronavirus and homeworking in the UK labour market: 2019”, *ONS Technical Report* [online] <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/coronavirusandhomeworkingintheuklabourmarket/2019>.
- Pichler, A. and others (2020), “Production Networks and Epidemic Spreading: How to Restart the UK Economy?”, 21 May [online] <https://arxiv.org/pdf/2005.10585.pdf>.
- Savona, M. (2020), “The saga of the COVID-19 contact tracing apps: lessons for data governance”, *SPRU Working Paper Series* (SWPS 2020-10), June.
- \_\_\_\_\_(2019), “The value of data: towards a framework to redistribute it”, *SPRU Working Paper Series* (SWPS 2019-21), October.
- \_\_\_\_\_(2016), “Global sectoral structural change and value chains in business services. A reappraisal”, *SPRU Working Paper Series* (SWPS 2015-19), University of Sussex, July.
- Seric, A. and D. Winkler (2020), “COVID-19 could spur automation and reverse globalisation—to some extent”, CEPR Policy Portal [online] <https://voxeu.org/article/covid-19-could-spur-automation-and-reverse-globalisation-some-extent>.
- Sturgeon, T. J. and O. Memedovic (2011), “Mapping global value chains: intermediate goods trade and structural change in the world economy, development policy and strategic research branch”, *Working Paper*, No. 05/2010, Vienna, United Nations Industrial Development Organization (UNIDO).
- Taglioni, D. and D. Winkler (2016), “Making global value chains work for development”, *World Bank Publications: The World Bank*, No. 24426.
- Trajtenberg, M. (2018), “AI as the next GPT: a political-economy perspective”, *National Bureau of Economic Research*, January [online] <https://www.nber.org/papers/w24245.pdf>.
- Troncoso, C. and others (2020), “Decentralised Privacy-Preserving Proximity Tracing” [online] <https://github.com/DP-3T/documents/blob/master/DP3T%20White%20Paper.pdf>.
- Waters, R. (2020), “Big tech searches for a way back into healthcare”, *Financial Times Special Report on Future of AI and Digital Healthcare*, 17 May.