Dear Dr. Korinek,

Thank you for sending us your paper and giving us the chance to consider your work as part of our collection on Covid-19 and artificial intelligence. We sent it out for external peer review, as for all the articles in this collection, and discussed it at our editorial committee meeting on 6 August. Present were Paul Simpson, Cat Chatfield, Henry Scowcroft, and myself.

We sought advice from two peer reviewers, whose comments are enclosed below. I hope you find the reviews constructive. In the editorial meeting, the editors agreed that we would like to consider this paper further for inclusion in the proposed Covid-19/AI collection. However, we did consider that some changes would need to be made to address the specific issues highlighted at the end of this letter.

Therefore, we would like to invite a revision, addressing the reviewers' and editors' comments below, which would then be considered for potential publication in this collection.

We hope that you will be willing to revise your manuscript and submit it within 4 weeks by Friday, 11 September 2020. Either I or the other editors would be happy to liaise with you to discuss deadlines and how to address reviewers' or editorial feedback on this timescale if there are any issues.

When submitting your revised manuscript please provide a point by point response to our comments and those of the reviewers. We also ask that you keep the revised manuscript within the word count of 1800-2000 words.

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I hope you will find the comments useful. Please don't hesitate to contact me if you wish to discuss this further.

Yours sincerely,
Diana

Diana Lucifero, PhD
Associate editor, The BMJ
dlucifero@bmj.com

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**Editorial Committee’s Comments to the Authors:**

The editors would like to acknowledge the commendable efforts made in the preparation of this manuscript. We thought that this was an interesting article and we hope that these comments will be helpful to the authors.

Specific points:

- The intro paragraph feels like mostly a lead in to set the parameters for the paper "We describe how...", so paragraph two may be a better starting point. The intro might flow better if the first paragraph is deleted and recast the ending of paragraph four (which would be the nutgraph) so readers have a better sense of the direction of the paper.

- Please consider narrowing your view and further clarifying how AI is being defined and why this is the focus. Much of the discussion appears to relate to technological innovation in general. Similarly, the covid context sometimes feels like an unnecessary add-on as not much of what is argued is specific to covid.

- Please reconsider the tendency to minimise telemedicine - the change for general practice has been profound. "(with the small exception of telemedicine)"

- Please substantiate this: "Medical providers have also experienced tremendous income losses as patients were advised to postpone non-essential visits and procedures." Also, there are many different models of healthcare around the world and this has the feel of being focused on the US context.

- Is reconnaissance here within the military context (more drones, less spies?) could the authors clarify if this is meant in a different way as it seems a little odd to highlight amongst clinical care and logistics. "...areas of clinical care, logistics and reconnaissance..."

- "the old ones that were destroyed", although I like the visual language I wonder whether jobs become redundant rather than destroyed (at least in the first instance that it is used)
- “In the music industry, for example, the superstars have millions of fans and reap in proportionate rewards, but few people listen to musicians who are ranked say #1000.” Please reconsider this comparison (eg, “Cigarettes After Sex” who are ranked #1000 on Spotify have had ~720 million listens, while the top superstars on Spotify get billions of listens: https://chartmasters.org/most-streamed-artists-ever-on-spotify/)

- “Since the cost of processing an additional set of images is close to zero, any earnings after the initial investment in the system has been recouped would be pure profits” Is “pure” a bit strong? Presumably there are costs associated with ongoing business even after recouping initial investment. I don’t think it distracts from the point that the profit margin can be very big (even if not 100%).

- Title/standfirst: The standfirst is closer to what we’re looking for in a title. However, please consider whether it should read “will” rather than “is” as the article doesn’t really answer the question yes or no. Also, the title should include ‘economic’ or perhaps ‘labour’ so that it is distinct from any of the other articles in the collection. Please look at the standfirsts of other analysis articles as a guide for style.

- Please add affiliations including position held, key messages, contributors and sources, acknowledgements, COIs, and license information (analysis template attached for reference).

- Please format your references using the BMJ’s preferred style (Vancouver).

Reviewers’ Comments to Author:

Reviewer: 1

Recommendation:

Comments:
This is an interesting and important article that highlights the potential for COVID-19 to increase automation, reduce wages, and increase inequality. The key economic idea is that COVID-19 has generated a shadow cost on labor that involves people to be in close proximity. This extra cost increases incentives for automation, so that workers are not exposed. Because automation is happening during an economic contraction, it may have particularly negative effects on the people who would like to work.

The article provides suggestions on how to reduce the impact of these forces on medical workers. The key idea is to intervene in the market, increasing distribution and incentivizing human-centred types of innovation.

I have three comments that I think could clarify which claims are widely accepted, and which claims depend on the models used:

1) The article is more pessimistic than I think the evidence suggests. While the language is appropriately cautious, using "could" and "might" to describe the potential impact, the tone is that automation will be bad for workers and for society generally. That outcome is possible. It is also possible that automation will lead to large productivity gains and that these will benefit workers. It is very much an open question whether AI-driven automation is good or bad for workers and for income distribution. Prominent economists including Joel Mokyr and Jason Furman have publicly emphasized productivity gains from automation as important.

2) I don’t think there is consensus among economists that low interest rates hurt workers. While the authors’ models have suggested this, the article should recognize that it is not a universally accepted view.
3) The discussion of superstar effects in radiology misses some important nuance. It isn't the machine per se that becomes the superstar. It is the designers of the machine and the trainers of the data. In the radiology context, what already appears to be happening is that radiologists at top hospitals are training AI systems that are then to be deployed globally. In effect, this enables the top radiologists in the world to diagnose patients at a much larger scale. Top radiologists become superstars.

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Reviewer: 2

Recommendation:

Comments:
Dear Editor,
Thank you for the opportunity to review this article on the relationship between technological progress and inequality. The paper’s specific topic is the impact that the adoption of AI and automation for preventing the diffusion of Covid19 may have on jobs, wages, and inequality. The Authors build on very recent contributions in the economic literature to present their concerns on the risks ahead and offer interesting policy recommendations. In particular, they raise awareness on the role that institutions and norms have in determining the socio-economic impact of technological progress (also in the context of medicine), especially in the light of the interaction of such institutions and norms with market incentives and other economic forces.

The article is well written and properly addresses a number of controversial and important societal issues. The main point that the Authors make is undisputable. Technical progress has productivity-enhancing effects but also strong redistributive effects, and its overall impact on occupations, jobs, sectors, workers, and people is determined by several factors, among which regulations and policy-driven incentives. The Authors recommend that the process of technical change and structural transformation, accelerated by the necessity to respond to Covid19, should not be left to market forces alone, in particular because of the observed tendency towards industry concentration. Moreover, as safety measures impose a shadow cost on labour, the Authors call for policy interventions that offset the incentives for companies to replace labour through AI and automation.

I recommend considering this article for publication in the series ‘BMJ Analysis articles’. However, to offer a fair account of the debate, I recommend that the Authors acknowledge some relevant existing literature (details below). Moreover, I suggest them to address, at least in passing, two issues of possible relevance: tasks creation (which is connected with labour intensity) and international trade (which is tightly related to technology, inequality, and policymaking).

My specific recommendations are the following:

A. Acknowledgement of the opposing views

A.1 I suggest that the Authors acknowledge that there exist some issues with the measurement of the labour shares, industry concentration, and superstar companies. Moreover, the extent of each phenomenon and the relations among them vary considerably across countries. While I concur with the Authors that policymakers and regulators should act to prevent (or, at least, not favour) market concentration in the medical sector (and others too), it is important to acknowledge that superstar companies are only one among the many factors responsible for the rising inequality and for the fall in labour share around the world.

For instance, Cerre et al (2020) discuss three biases in the literature on labour share. Schwellnus et al (2018) show that technological dynamism (i.e. entry of firms with low labour shares into the frontier) is a relevant force at play, possibly more than the decline of the labour share in incumbent frontier firms. Abraham and Bormans (2020) show that, in Belgium, the rise of market concentration and the decrease of the labour share characterize only a few sectors. Similar conclusions are reached for Italy by Lotti and Sette (2019).

A2. A number of scholars hold a more positive view on the future of technology and on its impact on society, and their works should be cited. The Authors should not consider them only for the sake of offering a balanced account of the existing views on the matter, but also to show that the debate on the issue is lively. They could consider, for instance, the (balanced) discussion offered by Joel Mokyr, Chris Vickers, and Nicolas L. Ziebarth, 2015, “The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different?” Journal of Economic Perspectives, 29(3), pp. 31-50.

The Authors acknowledge that technological progress has historically been benign on average: “Overall, technological progress since the Industrial Revolution has been labor-using – it increased labor demand at pre-existing wages by leaps and bounds, leading to a massive increase in average wages and material wealth in advanced countries over the past two centuries.” Accordingly, the sentence in which they maintain that the commonly held expectation that technological progress has beneficial effects is “a false belief” appears as too extreme and not backed by undisputable empirical evidence (yet). This could be tuned down: even assuming that the effect of technical progress on average/aggregate values is either neutral or positive, all the concerns regarding its distributional effects on jobs, wages and income remain entirely valid.

B. Further relevant issues to consider

B1. Task creation, technology and labour demand

Acemoglu and Restrepo (2019) (“Automation and New Tasks: How Technology Displaces and Reinstates Labor” Journal of Economic Perspectives, 33(2), pp. 3-30) show that the extent to which technological progress creates new tasks is important to determine labour intensity in production and, thus, the overall effect of technological advances on labour demand and labour share. The Authors could address the issue, at least for what concerns medicine.

B2. International trade, technology and inequality

I think that the Authors could acknowledge two aspects regarding international trade that are relevant to their discussion.

First, they could mention that the recent political push towards re-shoring manufacturing in advanced economies (in the attempt to partially reverse the delocalization of production occurred during the last decades) risks creating further incentives for companies to adopt labour-saving solutions: companies solicited to re-shore production may preserve their profitability by reducing labour costs through automation and AI. This is relevant because several authorities, most notably the European Commission and various European governments, have suggested to increase domestic resilience and robustness to pandemics by regionalizing key value chains, particularly in the medical sector.

Second, the Authors could refer to the work by Richard Baldwin (2019, The Globotics Upheaval: Globalization, Robotics, and the Future of Work, Oxford: Oxford University Press) on the implications that AI and other technological advances may have on the international exchanges of services in the medical sector (e.g., telemedicine): contrary to reshoring, new ITC solutions could imply more, rather than less, globalization (in services), but they would still have a negative impact on jobs and wages in the advanced countries. The Authors mention telemedicine twice, and the discussion could be expanded.

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