COVID-19 pandemic had a devastating effect on both lives and livelihoods in 2020. The arrival of effective vaccines can be a major game changer. However, vaccines are in short supply as of early 2021 and most of them are reserved for the advanced economies. We show that the global GDP loss of not inoculating all the countries, relative to a counterfactual of global vaccinations, can be higher than the cost of manufacturing and distributing vaccines globally. We use an economic-epidemiological framework that combines a SIR model with international production and trade networks. Based on this framework, we estimate the costs for 65 countries and 35 sectors. Our estimates suggest that up to 49 percent of the global economic costs of the pandemic in 2021 are borne by the advanced economies even if they achieve universal vaccination in their own countries.

Rolling out a vaccine to stop the spread of a global pandemic doesn’t come cheap. Billions of dollars have been spent developing drugs and putting in place a program to get those drugs into people’s arms. But amid an uneven distribution of vaccines – with poorer countries lagging far behind richer nations – another concern presents itself: the economic cost of not vaccinating everyone.

We sought to find out what the total hit to the global economy of uneven vaccination distribution might be. Our results published as a working paper by the National Bureau of Economic Research and the Center for Economic Policy Research, and were presented at World Health Organization press briefing lead by Dr. Tedros on January 26, 2021.
To do so, we analyzed 35 industries – such as services and manufacturing – in 65 countries and examined how they were all linked economically in 2019, before the pandemic. For example, the construction sector in the U.S. relies on steel imported from Brazil, American auto manufacturers need glass and tires that come from countries in Asia, and so forth. We then used data on COVID-19 infections for each country to demonstrate if coronavirus crisis were to disrupt global trade, curbing shipments of steel, glass and other exports to other countries, all countries lose. The more that a sector relies on people working in close proximity to produce goods, the more disruption there will be for that sector due to higher infections.

Our results showed that if wealthier nations are fully vaccinated by the middle of this year – a goal that many countries are striving for – yet developing countries manage to vaccinate only half of their populations, the global economic loss would amount to around US$4 trillion and the U.S., Canada, Europe and Japan would shoulder almost half this burden.

Our research underscores that no economy is an island and it is in rich countries’ direct economic interest to ensure poor nations are fully vaccinated as well. Widespread vaccinations in wealthier nations will certainly help domestic businesses like restaurants, gyms and other services. But, industries such as auto, construction and retail that depend on outside countries for materials, parts and supplies will continue to suffer if vaccines are not made available worldwide. A full global economic recovery will come only when every economy recovers from the pandemic. We already have a glimpse of this scenario during first quarter of 2021 with the uneven recoveries in the world.

It is primarily a humanitarian responsibility to produce and distribute vaccines to the whole world. Our results also highlight that this is not an act of charity but an act of economic rationality from the perspective of advanced economies.

**Figure 1: International Trade Linkages**

Notes: In this network, we show a summary of international linkages. Each node corresponds to a country, with the node sizes proportional to the GDP of the country. The node color represents the openness of the country where openness is defined as the ratio of imports and exports to GDP. The vaccinated countries are denoted by black borders. We show the trade linkages as lines between nodes. The line gets thicker as the ratio of trade to GDP increases. In total, there are 65 nodes and 168 lines shown on the network. The trade values, openness calculations, and the GDP values are all based on OECD (2020) Tables.
**Figure 2: Inter-industry Trade Linkages**

Notes: In this network, we show aggregated inter-industry linkages. Each node corresponds to an industry. The node size represents the total intermediate usage of the industry. The smallest node corresponds to 184 billion USD for Mining Support industry and the largest node corresponds to 5.9 trillion USD in Construction industry. The node color represents the share of imported inputs in the industry. The lightest shade represents 5.9% in Real Estate industry and the darkest shade represents 37% in the Coke & Refined Petroleum industry. We show the trade linkages from the supply industry to the target industry with directed lines. The thickness of the lines show the strength of the relation based on: (i) the intermediate input from the supply industry constitutes at least 10 percent of the inputs of target industry; or (ii) the supply industry is among the top two suppliers of the target industry. In total, there are 35 nodes and 72 lines shown on the network. Inter industry linkages are based on OECD (2020) Tables.

**Figure 3: Relative Decline if GDP due to Domestic Costs (% GDP)**

Notes: This figure illustrates the domestic shocks under specification 3 of scenario 3. Here, we eliminated all the shocks associated with the pandemic except within a given country. We run our simulations for 65 countries separately. The shades of yellow correspond to relatively lower ratios and the shades of red correspond to higher relative losses. Vaccinated countries are highlighted with light gray borders. GDP loss values are shown on the map for selected countries.
Reference


About the authors

Cem Çakmaklı received her Ph.D. from Tinbergen Institute at Erasmus University Rotterdam in 2012. Dr. Çakmaklı has worked at University of Amsterdam as an Assistant Professor of Econometrics. In 2013 he received the prestigious AXA post-doctoral research grant and, currently, Dr. Çakmaklı is an Assistant Professor at Koç University. His main research areas include (Bayesian) time-series econometrics and its applications in macroeconomics and finance. His publications appeared in journals including International Journal of Forecasting, Journal of Applied Econometrics, Journal of Economic Dynamics and Control and Review of Economic Dynamics, among others.

Selva Demiralp is Yapı Kredi Professor of Economics at Koç University and Director of the Koç University-TUSIAD Economic Research Forum. She was an economist at the Federal Reserve Board between 2000 and 2005, after which she joined the Economics department at Koc University. Over the past decade, Demiralp had extensive interactions with several central banks, including the Federal Reserve, European Central Bank, and the Central Bank of Turkey. She worked as a consultant for the ECB. Demiralp received highly competitive grants for her research on monetary policy, including the European Commission’s International Outgoing Fellowship (IOF), Scientific and Technological Research Council of Turkey (TUBITAK) Recognition Grant (Teşvik Ödülü), and the Turkish Science Academy (TUBA) Young Scholar grant (GEBIP). Demiralp’s research has been published in leading economic journals, including The Journal of Money, Credit, and Banking and The Journal of Economic Dynamics and Control. She currently writes for BBC Turkish News. Her research and views on the Turkish economy have a sizable social impact and appear in the local media and major international media outlets such as The Wall Street Journal, The New York Times, The Financial Times, The Economist, Reuters, and The Associated Press.

Şebnem Kalemli-Özcan is Neil Moskowitz Endowed Professor of Economics at University of Maryland, College Park. She is a Research Associate at the National Bureau of Economic Research (NBER) and a Research Fellow at the Center for Economic Policy Research (CEPR). She was the Duisenberg Fellow at the European Central Bank in 2008 and held a position as Lead Economist/Adviser for the Middle East and North Africa Region at the World Bank during 2010-2011. She was the Houblon-Norman Fellow of Bank of England and CFR International Affairs Fellow in International Economics in 2017-2018. She is the co-editor of Journal of International Economics and serves at the editorial board of American Economic Review, Journal of European Economic Association and Journal of Development Economics. She is the first Turkish social scientist who has received the Marie Curie IRG prize in 2008 for her research on European financial integration. Her current research focuses on the links between capital flows and macroeconomic fluctuations and growth. She works with big data from firms and banks worldwide to identify the linkages between financial and real sectors both in advanced countries and in emerging markets. Currently, she serves at the advisory scientific committee of ESRB and works as the assistant director/policy advisor at the research department of the IMF.

Dr. Sevcan Yeşiltaş is an Assistant Professor of Economics and Finance at Koc University. Currently, she also works as a researcher for the Koc-TUSIAD Economic Research Fund. She received her bachelor’s degree in Economics from Bogazici University in 2006, and her master’s degree in Economics from Bilkent University in 2009, and then her PhD
in Economics from Johns Hopkins University in 2016. During her doctoral studies, she worked as a consultant for the National Bureau of Economic Research (NBER), and the World Bank. She received grants and honorarium for her research from the NBER, and the Scientific and Technological Research Council of Turkey (TUBITAK). Her research in the areas of Applied Macro-Finance, International Finance and Corporate Finance has been published in journals such as Journal of International Economics.

**Dr. Muhammed A. Yıldırım** is an Assistant Professor of Economics at Koç University in Istanbul, as well as an associate at the Center for International Development at Harvard University (CID). He obtained his Ph.D. in Applied Physics from Harvard University and BS degree from California Institute of Technology. After his graduate studies, he was a postdoctoral fellow at CID between 2011 and 2014. His research is focused on understanding network and spillover effects in multitude of research areas including industrial policy, international trade, productivity, economic growth and matching. His research has appeared in high-impact economic journals and prestigious working-paper series. Dr. Yıldırım’s Ph.D. research revolved around using tools and concepts from complexity, network science and evolution to understand complex biological and the pharmaceutical industry. His research in these areas has been published in high impact journals including Science, Nature, Nature Biotechnology, and Cell and has been cited extensively.

**SUERF Publications**

Find more **SUERF Policy Briefs** and **Policy Notes** at [www.suerf.org/policynotes](http://www.suerf.org/policynotes)