

Impacts of COVID-19 and recovery packages on climate change mitigation action

First results from the NAVIGATE project

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Preface

The COVID-19 pandemic, lock-down restrictions and other measures that have been put in place have potentially far reaching implications for inequality within and between countries, for energy demand in different sectors, and for structural change and economic growth. These factors are highly relevant for climate action. In response to the COVID-19 crisis, the EU H2020 funded NAVIGATE project, which aims to improve the capabilities of integrated assessment modelling to support climate policy making, has undertaken rapid responsive research activities in these three areas.

Firstly, we empirically looked at past pandemics to estimate the historical socioeconomic and environmental response in the years after pandemics. Based on five pandemics since 2003, we find significant and persistent increases in inequality, unemployment, and government debt, while GDP levels are about 4 percent below its counterfactual values even after five years. Historically, pandemics also led to substantial reductions in energy demand and emissions, however, most of this decrease has been short-lived and has not led to systemic improvements in the energy system. Projecting those trends out for the COVID-19 pandemic hints to a deeper and more persistent economic shock than presented in the World Economic Outlook and a persistent increase in inequality and poverty.

Secondly, we have tracked the impacts of the pandemic on energy demand, particularly in buildings and transport sectors. Some impacts have proven to be transient - like the dramatic reduction in private vehicle use during lockdowns, but now rebounding as a substitute for public transport. Other impacts may yet to have

emerged - like a possible weakening or reversal of urbanisation trends. The NAVIGATE team will continue to monitor these impacts over the next year to inform the next wave of long-term scenario modelling of climate action to achieve EU targets. But the impacts now on energy demand - both for better and for worse - have opened up a critical policy window to prevent backsliding on efficiency gains and progress on low-carbon transition made over recent years.

Thirdly, we have explored the macro-economic impacts of the pandemic and related green recovery packages. We investigate how the shock may affect economic growth, structural change, and emissions. Against this backdrop, we compare proposed and hypothetical recovery packages to analyse the scope for a green recovery. Preliminary results show that large-scale green recovery measures can reduce employment loss and at the same time lead to a persistent substantial drop in emissions, but are not enough to ensure the transition to net emission neutrality by mid-century.

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Impacts of COVID-19 on inequality

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Key research insights

Past pandemics have led to substantial implications in many dimensions of economic and environmental sustainability. Even dating back 2000 years, researchers have found, besides the death toll, significant adverse and long-term impacts on poverty in the affected countries. With more recent available data on past pandemics in the second half of the 20th century, we estimate an increase in inequality by, on average, about 0.4 points of the Gini index (0-100), and being persistent even after five years. Similar and persistent impacts on GDP, public debt, and employment are found. In terms of emissions and energy intensity, however, we find only small reductions indicating that the changes are mostly demand-driven, not leading to energy efficiency improvements and only around one third of the emissions reductions are due to decarbonization of the energy system, mainly through switches to electricity and to some extent, increases in renewables. Applying the empirical results to COVID-19, we estimate an additional 75 million of absolute poor at the global level in 2020 (Emmerling et al., 2020). Moreover, by looking at household surveys in several developing countries in 2020, both before and after lock-downs, we are able to quantify the actual and momentary impacts on inequality. We find a large increase in monthly income inequality in most countries by up to 3 points of the Gini index. India is the exception with income inequality increasing by 22 points (consumption inequality by 7 points). Moreover, we find strong evidence that income losses are significantly higher for households with female, less educated household heads with lower pre-pandemic incomes (Dasgupta & Emmerling, 2020).

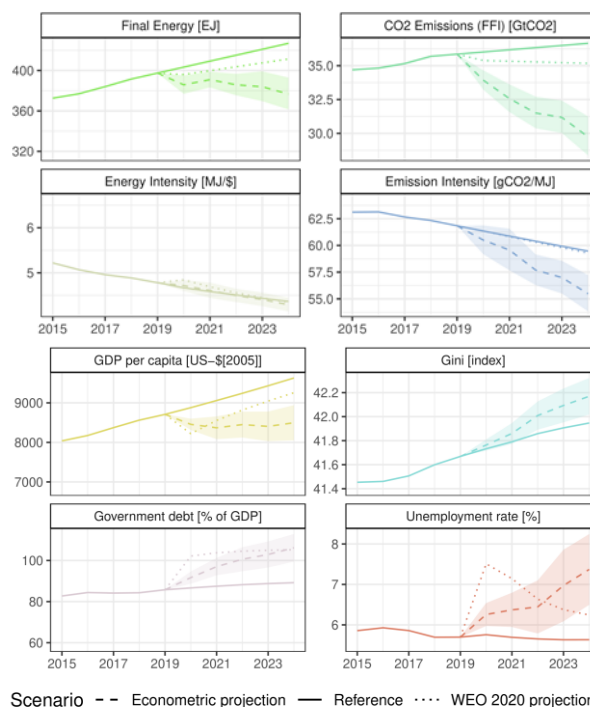


Figure 1: Counterfactual scenarios (solid lines), estimated impact of COVID-19 (dashed lines), and IMF/IEA WEO projections (dotted lines)

Policy implications

Altogether, absent policy changes, the outlook in terms of overall economic and environmental sustainability after the pandemic is relatively gloomy based on these results. Policies to address the current pandemic should be designed to achieve stronger, equitable, and sustainable growth. Policymakers should simultaneously aim to mitigate climate change and bolster the recovery from the COVID-19 crisis while ensuring that the most vulnerable are protected. This highlights the need for a “green” design of stimulus packages, to not only address economic and social impacts, but also to ensure medium- and long-term trends in line with an improvement in energy and emission intensity, including alleviating the costs of future climate mitigation. Moreover, strong evidence on distributive impacts on poorer households implies a further need for redistributive policies, putting further pressure on public budgets.

References

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- Emmerling J., Furceri D., Libano Monteiro F., Loungani P., Ostry J., Pizzuto P., Tavoni, M. (2020) *A Historical Perspective on Pandemics Highlights Risks for Sustainable Economic Progress*. Submitted.

Long-term impacts of COVID-19 on energy demand

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Key research insights

The IEA recently published energy demand data for transport, buildings and industrial sectors in 2020 with an analysis of COVID-19 impacts (IEA, 2020b). These impacts have been profound particularly in transport. Compared to 2019, overall activity has fallen sharply in aviation (down 60% in 2020) and public transport incl. rail (down 30%). Remaining air, rail and bus services have lower load factors so their energy intensity per passenger transported has increased. Public and shared modes have been substituted by private vehicle use and active modes, particularly in cities (ITF, 2020; IEA, 2020a). New car sales are down 10%, slowing the transition to electric vehicles. Impacts on energy demand in buildings and industry are also clearly evident although less extreme. Energy-intensive industrial output like basic metals (down 15%) has been less affected than higher value-added manufacturing like automotive manufacturing (down 30%). In buildings, overall activity has shifted from offices and retail to homes. In the first half of 2020, residential electricity use increased by around 20-30%, only partially offset by 10% reductions in office buildings for which essential services like heating and ventilation are energy-intensive (IEA, 2020b). Smart gas meter data shows an increase in home heating activity throughout the day given higher occupancy levels (Octopus Energy, 2020). Two positive impacts are the increase in do-it-yourself home renovations incl. sales of insulation products, and increases in online purchases of new appliances (up 20-40%) at least some of which should replace older, inefficient models (IEA, 2020b).

References

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Policy implications

Whether these impacts of COVID-19 on energy demand will persist is highly uncertain. But as the IEA concludes: “... in the absence of targeted government policies, a return to pre-pandemic behaviours is likely” (IEA, 2020b). This has two important implications. First, the persistence of COVID-19 impacts should be monitored and tracked over the next 12-18 months to enable robust long-term analysis and modelling of net-zero pathways and required policy responses. Just as some 2020 impacts may prove transient, other slower-to-emerge impacts may prove important - for example a shift in consumer investments from efficiency to digital, health and comfort technologies (Boumphrey, 2020). Second, and more immediately, the post-COVID recovery opens up a critical policy window for managing adverse effects on energy demand while strengthening and embedding beneficial effects (see tables for examples for transport and residential sectors).

Mobility

COVID-19 impact	Strengthening policies
Increase in active travel & micro-mobility within cities	Municipal infrastructure for walking, cycling & low-traffic neighbourhoods, fast-track licensing for micro-mobility providers
COVID-19 impact	Counteracting policies
Slowdown in vehicle fleet turnover and new EV sales	EV purchase and road tax incentives, stimulus support for EV manufacturing, regulatory phase-out of petrol and diesel vehicles

Homes

COVID-19 impact	Strengthening policies
Increase in new appliance purchases	Scrappage programme for old ICTs and domestic appliances, purchase incentives for A+++ rated equipment
COVID-19 impact	Counteracting policies
Increase in occupancy and thermal comfort levels	Retrofit programmes and rollout of smarter zonal heating technologies to reduce heated floor area

Macro-economic impacts of the COVID-19 pandemic and green recovery packages

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Key research insights

The COVID-19 pandemic has led to the worst economic downturn of the last decades with profound implications on employment, trade, investment and sectoral demand. To curb the economic slowdown and address environmental concerns, politicians and economists are advocating climate friendly policy initiatives in the form of “green” recovery packages. Using two well-established macro-economic models (GEM-E3-FIT and E3ME), we assess the macro-economic, employment and emission impacts of green recovery options, in particular supporting the increased deployment of renewable energy and electric vehicles. The implementation of green recovery packages boosts growth worldwide triggered by increased low-carbon investment, offering strong economic development with global GDP increasing by 2.2% in 2025 and 1.7% in 2030 with long lasting impacts mostly due to the accelerated learning-by-doing of low-carbon technologies. The global economy benefits from improved productivity of workers and capital enabled by investment in new infrastructure, like electricity grids and energy-efficient buildings. Green recovery packages would create about 20 million new jobs over 2025-2050 mostly in the construction sector (triggered by the increased installation of renewable technologies and retrofitting of buildings) and in the manufacturing of electric vehicles and batteries, while other economic sectors would indirectly benefit from the cascade effects through inter-industrial relations captured by the models. Emissions in all economies are likely to be lower in 2030 compared to the pre-COVID scenarios, but this is not enough to ensure the transition to net zero emissions by mid-century as this is not the result of structural changes or stronger decarbonisation efforts.

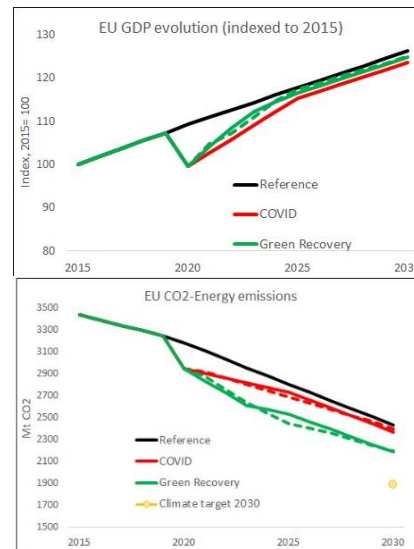


Figure 2: EU emission and GDP impacts of Green Recovery (solid lines represent GEM-E3 results, dotted lines represent E3ME results)

Policy implications

The assessment of economic impacts of COVID-19 and the green recovery packages is subject to deep uncertainty. It is clear though that the pandemic and the general lockdowns have negative impacts on jobs, incomes, businesses and economic activity. However, green recovery packages can stimulate economic growth through increased investment and productivity and may also lead to structural changes in the economy through increased participation of clean energy industries and reduced production of fossil fuel supply sectors, which are more vulnerable to crises. Green recovery packages can effectively close the emission gap in 2030 between current national policies with the cost-optimal mitigation pathways to well-below 2°C targets and to the ambitious EU Climate Plan target for 2030. However, they cannot deliver the long-term emission reductions compatible with the Paris goals, so a significant upscale of climate policies is required after 2030 towards net-zero emissions by mid-century. Governments worldwide have a unique opportunity today to create new jobs, boost economic growth and reduce GHG emissions, but should also ensure that public spending and support is directed towards competitive firms, sectors and production factors. Ignoring this moment to scale up climate action would continue to lock many into high-carbon economies, and thus governments should seize this occasion by integrating climate change and clean energy transition at the core of their policy decisions.

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