

The Impact of COVID-19 on Transport Demand, Modal Choices, and Sectoral Energy Consumption in Europe

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Current trends in transport demand amid COVID-19

A cluster of pneumonia of unknown origin was identified in Wuhan, China, in December 2019. Since then, the related disease (COVID-19) has spread in most world regions¹. As of mid-April 2020, Europe is the continent with the highest number of reported cases and fatalities². Disease spread containment policies have locked most of the population at home³ – albeit with fragmented responses by countries –, bringing significant repercussions on the demand and supply for services.

One of the most rapidly impacted sectors is the transport sector, and chiefly passenger mobility. Time-series from mobile phone location data suggest that urban transport demand has plunged^{4,5} (Figure 1), while a recent aviation report⁶ reveals that commercial flight operations have fallen dramatically worldwide, with over two thirds less flights than in the same period of 2019. Another report by a mobility-as-a-service provider⁷ highlights declines of public transit usage (compared to the pre-COVID period) of about 90% in Italy and France, 85% in Spain, 75% in the United Kingdom and 70% in Germany, with some variability across cities. Overall, a generalised heavy contraction of the passenger transport demand is observed worldwide and mode-wide, although with some heterogeneity. Freight transport is also being affected in different ways by COVID-19: while supply chains are

being discontinued due to factory shut-downs, a robust increase in home deliveries is being experienced⁸.

In the last years the transport sector was responsible for a quarter of total greenhouse gas emissions, and it consumed alone almost 60% of the total global oil demand⁹. A strong halt in the demand and supply for transport services will thus be directly responsible for a severe decline in the demand for energy products consumed by the transport sector throughout 2020 and beyond. These dynamics are however not linear, because they imply a transformation of the available supply options as well as the consumer preferences affecting transport modal shares. Amid the concrete risk that a universal vaccine coverage will not be reached before mid-2021¹⁰, it is meaningful to discuss what challenges decision-makers in the transport sector will need to face, and how these can be addressed in ways that are not detrimental to the global energy markets, environmental pollution, and the greenhouse gas emission reduction targets that are in place.

In this commentary we discuss how these complex dynamics might shape the final energy consumption in the transport sector over the short and longer runs through their impact on both the final transport demand and mode choice decisions, with a particular focus on urban environments in European countries, where public and active mobility often displays high usage rates.

Potential long-run impacts on total travel demand

The duration of the current lockdown is challenging to estimate. On top of the present uncertainty, it is possible that additional virus waves will hit different countries, resulting in additional measures of travel restriction in the future. While this situation is causing severe health, social and economic issues to the population, it may also offer people and companies the opportunity of evaluating alternative ways of living and working. For instance, by experiencing everyday routines that are far from what considered “normal” only few months ago.

A large share of the European population is experiencing the opportunities and the challenges of

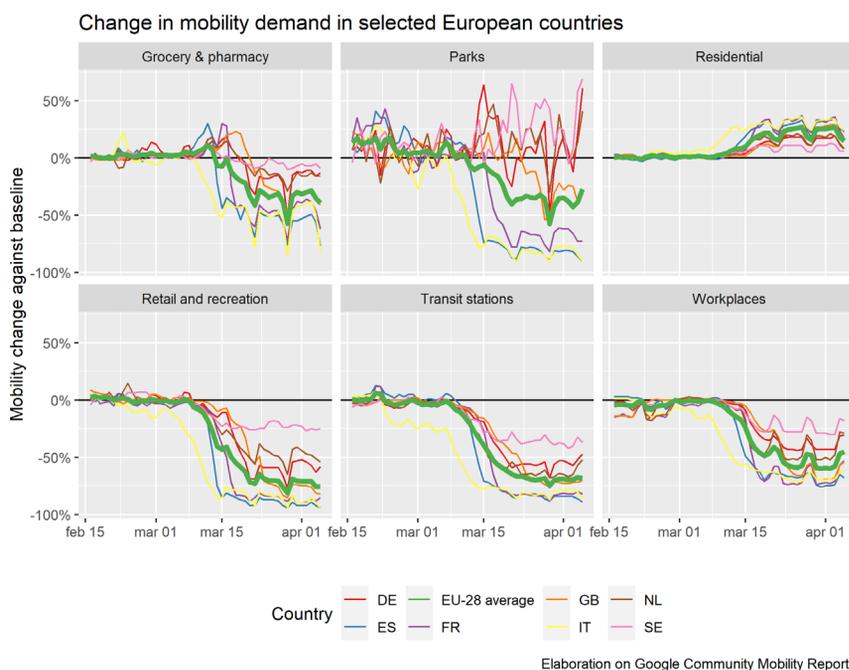


Figure 1: Total mobility demand change (Google estimate) in selected European countries, by journey destination.

teleworking. The lessons learnt from this involuntary experiment may prove useful in implementing permanent solutions to cut costs and optimize workers' life balances, and therefore companies' productivity. While numbers are challenging to estimate, experts agree that the use of telework will significantly increase even after the end of the emergency¹¹. This regular travel demand contraction will mostly be experienced in rush hours, with benefits on environmental pollution as well as on urban congestions.

In parallel to teleworking, people are also increasingly relying on home deliveries, resulting in a shift from the mobility of people going for shopping towards last-mile freight delivery. The COVID-induced lockdown is accelerating a trend that was already rising in the last decade, with customers getting used to the benefits of waiting at home for the goods and services that they purchase. This may result in an overall increase in freight transport demand, but delivery companies may still have room for improving the efficiency of their logistics.

It is however the crisis caused by this worldwide halt of industrial supply chains that will likely exert the largest impact on global transport demand, with huge impacts on the globalized economic system. Companies may reorganize their structure giving priority to resilience, due to the fragility of global supply chains both against the pandemic and the ongoing trade war between China and the U.S. Some companies may strengthen local supply chains, especially in specific sectors, possibly supported by governments. These choices may hamper a quick rebound of the economy, with strong consequences on international freight transport.

Finally, the crisis may have a similar adverse impact on international travel for leisure. Tourism is one of the sectors that have been hardest hit by the current emergency. While many companies will likely promote low-cost offers to try to trigger a quick recovery of the tourism demand, especially in areas where this represents a large share of the economy, recovering people's interest for international travelling will not be obvious. For months people might decide to minimise the risk of getting infected while also reducing their unnecessary expenses to cope with the harsh economic situation. In addition, tourists might decide to support national or local businesses by shifting their preferences away from international travelling, at least in the medium-run.

Potential long-run impacts on modal shares

In addition to the passenger-kilometre demand, the final energy demand depends on the shares of modes chosen to meet such demand. COVID-19 is an airborne, highly infectious disease, which is likely to proliferate in human-dense environments including light rail, buses, trains, and planes. Therefore, a social

stigma towards the use of these transport option is likely to last also when social lockdown measures will be relaxed over the next months. This attitude is likely to have a pervasive impact on both the modal choice of individuals and on how commercial transport companies shape their offer. Transit is already the modal choice that is seeing a stronger decrease across European countries (Figure 2), and mostly where lighter travel restrictions have been imposed, such as in the Netherlands and Sweden, where people are preferring other transportation modes. This tendency is likely to persist in the months after the end of the emergency.

For instance, many may revert to car commuting, irrespective higher private costs. Conversely, carpooling trips might fall significantly, especially when organized with strangers via online platforms. At the same time, strong impacts on ride-hailing and car-sharing companies business models are expected. The negative social effects will be particularly hard in urban mobility at peak hours, since in many cities congestion was already a problem even with a significant modal share of public transport. The increased use of private vehicles may often compensate the demand decrease triggered by teleworking.

Because of these dynamics, substantial public funding will be required in support to public transport, which will face a strong decrease in ridership and revenues, but it will still need to ensure an acceptable level of service for people that cannot afford a private transport mode. Besides crowd-out from transit to private vehicles, active mobility may prove to be a viable alternative for public transportation in cities. This shift would however require strong policy actions that support the deployment of the necessary infrastructure that allow people walking and biking in safety.

Long-run repercussions for transport energy consumption and emissions

The combined effect of the evolution of transport

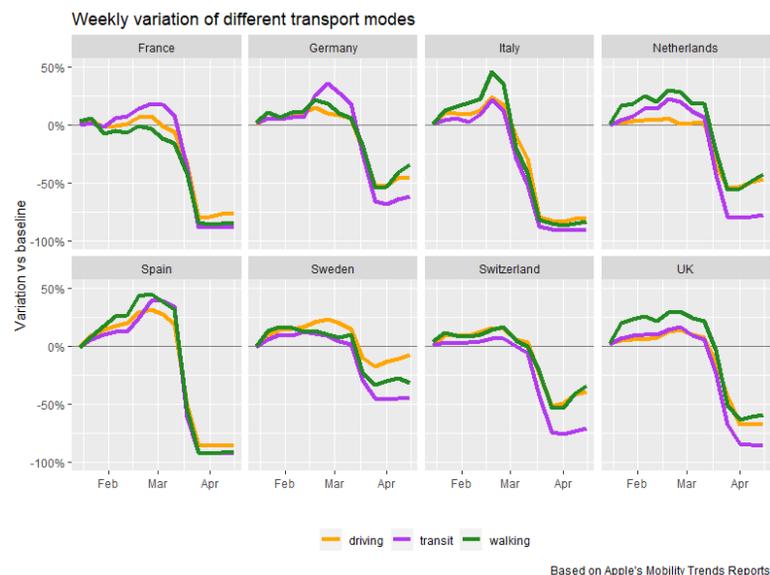


Figure 2: Estimated mobility demand change in selected European countries, by transport mode (Authors' elaboration on Apple data).

demand and modal share will shape the energy consumption of the transport sector. It is early to speculate about which of these two trends will dominate over the other, but this trade-off might also differ across countries and cities. Moreover, further shocks may play an additional role. For instance, in an attempt to support the recovery of automotive industries, some countries may loosen the environmental standards for new cars (like recently observed in the United States¹²). These political decisions might have repercussions over the long-run, depending on the average lifetime of new vehicles. The economic crisis may also result in a slower renewal of the vehicle fleets, with older, more energy-consuming and polluting vehicles being used for longer time before being replaced by newer models.

In addition, it is important to underline that in some contexts, energy consumption will not be linearly correlated with transport demand. In some transport segments, such as long-haul aviation, a lower demand may result in lower load factors rather than lower flights, depending on the complex economics and regulations: in some cases, companies are forced to operate empty flights to avoid losing flight slots (just like what happened in Europe few weeks ago¹³, although now this rule has been temporary suspended). Regulation and rules will require to be revised to be more resilient and avoid such backlashes.

To add a further level of complexity, the evolution of oil prices may represent an additional aspect impacting the energy demand in transportation. Low oil prices (as witnessed in the first quarter of 2020) may support a recovery of international transport operations, such as aviation and shipping, while also delaying investments on energy efficiency and better performance of transport modes. On the other hand, it is not clear how long the current prices will last, depending on the ability of oil producers to reach and maintain a deal on scheduled production rates.

Conclusions and policy implications

Overall, our discussion suggests that high uncertainties characterise the longer-run impacts of COVID-19 on energy demand from the transport sector. This is because the supply and demand sides are each reacting in complex ways, with a prominent role of digital telecommunications in reducing the need for transport of people.

Our key conclusion is that passenger transport demand will remain lower than a counterfactual case of no-COVID19 beyond year 2020. The main reasons are an increase of the role of teleworking and a decrease of international travel, especially for leisure. Yet, we argue that if properly channelled by policy and investment, this transformation might become structural and persist even when the global economy will recover. There is in fact large potential for learning from the current "living lab" that different solutions exist and work well if properly deployed. COVID-19 is also offering an unprecedented opportunity of learning to further improve solutions (e.g., better organization and planning instead of emergency, for teleworking, e-commerce, etc.). Still, an adverse side-effect of the current economic recession is likely to be the lower

investment in new and clean vehicles, resulting in an overall lower improvement of the efficiency of the fleets, both for personal private transport and for freight transport.

What remains more uncertain is the pace at which freight transport demand will recover, since it will depend on the duration of the economic crisis and on the strategic choices of companies and governments to develop more resilient supply chains, in particular in specific sectors.

On the policy side, a relevant question is if there will be the need of supporting local municipalities, which will face the challenge of lower revenues (including those from parking fees, highway tolls, etc.) but with the same operational expenses (road maintenance, etc.). The same is true for transport companies, which are facing lower revenues for ridership with the need of avoiding cutting service levels. It is of crucial importance that public authorities ensure equal access to transport, invest on resilient infrastructure (factoring in also environment and health externalities), especially supporting active mobility. Building on the opportunity of triggering an increased use of active transportation when possible is likely to provide people with the experience of a new mobility paradigm that may remain after this crisis, with strong impacts on future energy demand and pollution

References

1. Spiteri, G. et al. First cases of coronavirus disease 2019 (COVID-19) in the WHO European Region, 24 January to 21 February 2020. *Euro-surveillance* 25, 2000178 (2020).
2. Dong, E., Du, H. & Gardner, L. An interactive web-based dashboard to track COVID-19 in real time. *The Lancet Infectious Diseases* S1473309920301201 (2020) doi:10.1016/S1473-3099(20)30120-1.
3. Country policy responses (COVID-19 and the world of work). <https://www.ilo.org/global/topics/coronavirus/country-responses/lang--en/index.htm#DZ>.
4. COVID-19 Community Mobility Report. COVID-19 Community Mobility Report <https://www.google.com/covid19/mobility>.
5. COVID-19 - Mobility Trends Reports. Apple <https://www.apple.com/covid19/mobility>.
6. Worldwide, O. A. Coronavirus and the impact on airline schedules. <https://www.oag.com/coronavirus-airline-schedules-data>.
7. Moovit Public Transit Index. https://moovitapp.com/insights/en/Moovit_Insights_Public_Transit_Index-countries.
8. Ecommerce sales increase after Covid-19 outbreak France 2020. Statista <https://www.statista.com/statistics/1102648/online-shopping-sales-increase-corona-virous-outbreak-france/>.
9. Oil 2020 - Analysis. IEA <https://www.iea.org/reports/oil-2020>.
10. Francesco De Rubertis: «Un médicament contre le Covid-19 pourrait être disponible avant la fin de 2020». *Le Temps* (2020).
11. Sawhill, K. G. and I. V. Telecommuting will likely continue long after the pandemic. Brookings <https://www.brookings.edu/blog/up-front/2020/04/06/telecommuting-will-likely-continue-long-after-the-pandemic/> (2020).
12. Trump administration deregulates to fight COVID-19 but also guts other rules. NBC News <https://www.nbcnews.com/politics/donald-trump/trump-admin-relaxes-regulations-fight-coronavirus-also-loosens-environmental-rules-n1177761>.
13. Bienkov, A. Airlines are burning thousands of gallons of fuel flying empty 'ghost' planes so they can keep their flight slots during the coronavirus outbreak. *Business Insider* <https://www.businessinsider.com/coronavirus-airlines-run-empty-ghost-flights-planes-passengers-outbreak-covid-2020-3>.