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Covid-19 as a real life lab to observe the alleviation of climate change at local level

Digitalisation has opened substantial perspectives for a changing working life and quality of life in general. Teleworking, as an opportunity implied by digitalisation, is meanwhile a technologically feasible avenue for regular employment in many sectors and with positive impacts on health, resource consumption and the environment. Within the EU funded research project Rural-urban Outlooks (ROBUST)[1], researchers of PRAC addressed the issue of commuting in the Frankfurt/Rhein-Main region, the associated congestion effects and their resulting detrimental impact on the environment.

Two consecutive studies were carried out. The first one was based on local data available and rough averages of CO_2 emission equivalents of different engine types. The central interest of that study was to show how a 20 percent reduction of commuting would affect CO_2 emissions. The second study (just few weeks later) was not scheduled but prompted by a major current event. It addressed the emerging Corona crisis as a situation where epidemiological evidence forced working people, where possible, to switch to teleworking. The prevailing potential of teleworking, i.e. the regional teleworkability, is directly related to the sectoral structure of local economies (notably the weight of the service sector). A rough simulation based on calibration parameters, executed in the first study, could now be tested in a real-life lab environment, namely the Corona lockdown with its varied spatial effects. A global secondary perception analysis of teleworking and a subsequent analysis for Southern Germany at district level by using four consecutive spatial econometric models (SEM, SAR, SLX and SDEM)[2] was executed to shed light on the short-term impact of teleworking and infection incidence on NO_2 emissions. The data base consisted of two consecutive Copernicus-Sentinel 5P satellite images showing moving averages of NO_2 emission after controlling for seasonal and trend influences (for the dependent variable), spatial infection incidence data of the Robert-Koch-Institute, a teleworkability index merged with Eurostat regional production data and data on short-term work from the German Federal Agency of Labour (covariates). The seasonal influence of the change of emissions shown by the satellite images March to April 2020 proved to be negligible, so that the difference of the two images could be taken as the dependent variable of the models.

During the Covid-19 pandemic most private and public sector entities have made use of teleworking, and subsequently there has been a dynamic change in the perception of „working from home“ among employers and employees within few weeks. Consequently, the greehhous gas (GHG) emissions have dropped abruptly during the few months since the beginning of that year because of the global economic slowdown. Based on estimations, published by Corinne Le Queré et al. in a Nature paper[3], the daily global CO_2 emissions have decreased by around 17 percent, due to the worldwide forced confinements. The average magnitude can be confirmed by the analysis on Southern Germany; at district level there are, however, pronounced variations. The southern German Bundeslaender have shown remarkable different levels of adaptability toward the pandemic and the lockdown. The GHG emissions dropped much more in the Rhein-Main region than in other regions of Bavaria, Hessen and Baden- Württemberg. This can be explained by the substantial share of teleworkable sectors (services, public administration). Still, overall evidence suggests that more efficient use of the potential of teleworkability of a regional labour market has a strong and significantly positive influence on GHG reduction. The estimates of the SDEM show that a one percent increase of teleworking in a district and on average in its neighbour

[1] Horizon2020 Project Grant No. 727988

[2] Spatial Error Model, Spatial Autoregressive Model, Spatial Lag of X Model and the Spatial Durbin Error Model

[3] Le Quéré C, Jackson RB, Jones MW et al. (2020) Temporary reduction in daily global CO2 emissions during the COVID-19 forced confinement. Nat Clim Chang 2020. https://doi.org/10.1038/s41558-020-0797-x

districts will imply further roughly three percent of the relative reduction of greenhous gas emissions. Further to that, the infection incidence has had a significantly negative impact on reduction of the emissions. This might reveal that in those regions with a high incidence of Covid-19, there were probably less opportunities to react timely with protection measures and teleworking. The results also show that teleworkability makes many urban jobs footloose; it thus appears to constitute a potential supporting factor for public health, at the moment specifically protecting against infectious diseases such as Covid-19, and at the same time increasing economic and environmental resilience of local economies. Teleworking thus potentially relieves congestion, urban sprawl and pollution and strengthens the functional role of rural and peri-urban space in terms of efficient resource allocation in the generation of gross value added. The challenge for policy is however not confined on just propagating teleworking but notably to support digitalisation, adequate legal frameworks for teleworking and to increase welfare through adjusting the „prices" of a clean environment and public health. Both public goods have been strongly underprized in the past. In the end, teleworking can be a potential instrument of safer public infrastructure in the urban-rural functional relations.

In the project team there has been the conviction that such empirical studies will unfold their utility for prudent policies only if being sufficiently reflected by public stakeholders and decision makers. Therefore, in November 2020 results of the study on „Effects of the Covid-19 pandemic in the area of tension between the economy and climate change: A case study at rural and city district level in Southern Germany" were disseminated and discussed in a feedback survey procedure to reflect supporting and hampering factors revealed by the research, both, in terms of results as well as methodology (data, econometric techniques). The Living Lab Frankfurt team listed up the most important policy relevant conclusions from that study and asked stakeholders from civil society organisations to critically comment on that. Findings were structured along supporting and hampering factors, both for the methodological approaches (data and analytic procedures) as well as for the results. Conclusions put forward were structured in supporting and inhibiting factors of teleworking.

Supporting factors for local planning and politics

In terms of statistical methodology we could show that the combination of daily updated satellite data and circular data on the occurrence of infections and teleworking potential as well as the consideration of statistical influencing factors from neighbouring sub-areas can contribute to the spatial accuracy of local politics and planning in climate protection.

In terms of study results we could show that the Covid-19 crisis could enable a regional laboratory experience of how important the strong teleworking potential in a region (due to the high proportion of services and administration) could be for the alleviation of climate change (especially the Rhine-Main region). Related to this, teleworking appears to strengthen the resilience of the regional economy, besides its positive effect on the climate, and - apart from that – might reduce health risks in working life (accidents, infections, air pollution).

(Still) inhibiting factors

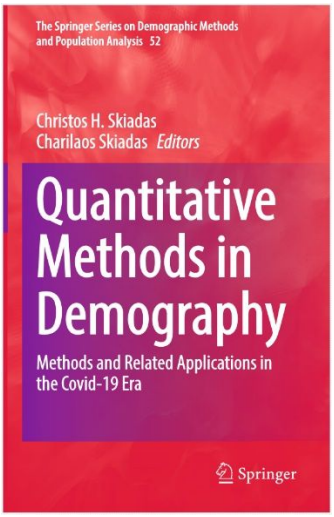
Even though the empirical results proved to be insightful it is not to be expected that policy can easily adopt those results for a straightforward re-orienation of policy. A number of important hurdles are still to be removed. Decision processes in policy and policy implementation are, however, time-consuming. To mention just a few issues to address: (i) technical deficiencies in the broadband infrastructure, (ii) limited suitability of private living space for teleworking in connection with the compatibility of work and family, (iii) inadequate legal framework for teleworking (costs, insurance issues, working time management), (iv) interest groups who support individual traffic and make maximum use of the infrastructure and (v) reservations on the part of employers and employees including a psychology of emotional rejection. This list is certainly not exhaustive.

Learning

The feedback from the survey was largely positive and confirmative. The major concern expressed by stakeholders has been the issue of feasibility of those reform processes that are desperately needed.

Given the enormously short time horizon of global policy to keep the world climate in a sustainable balance and – at the same time - the poor preparedness of policy and civil society to undertake such courageous reforms it appears not yet clear whether there are anyway realistic chances to unleash such important reform processes in a timely and effective manner. Awareness of those needs among important stakeholders of civil society might be one of the few but still most powerful tools to facilitate such reform processes.
To conclude it is worth to explicitly quote from the feedback from the local Network initiative Living in Community (Netzwerkinitiative Leben in Gemeinschaft) confirming policy relevance of the results:

> „I find the results really exciting, even if they only address a very short period of time to be related to. For me it's amazing what happened there. Who thought of the environment in connection with Corona? You are now presenting very interesting results in several ways: a proof that the homeoffice is working and has also happened dazzlingly fast …".



Link:
Issa M, Bergs R (2022) Effects of the Covid-19 pandemic in the area of tension between the economy and climate change: A case study at rural and city district level in Southern Germany". In: Skiadas CH, Skiadas C (eds.) Quantitative Methods in Demography - Methods and related applications in the Covid-19 era. Springer Series on Demographic Methods and Population Analysis, Springer-Nature, Cham (Switzerland)
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