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‘Poverty, pollution, and mortality: The 1918 Influenza Pandemic in a developing German economy’

Assessing the likely costs and consequences of the Covid-19 Pandemic is difficult, as pandemics of this scale are rare events. As a consequence, researchers have studied historical pandemics to draw lessons for today. Closest in parallel to the Covid-19 Pandemic is the 1918 Spanish Flu, the most deadly influenza pandemic in modern history. This paper studies the local determinants of pandemic mortality in South-West Germany, using exceptionally detailed vital statistics for 1,762 municipalities of the German Kingdom of Wuerttemberg. The analysis focuses on the impact of poverty and air pollution on mortality. Both factors have received a lot of attention also in current debates on regional differences in pandemic mortality.

The paper makes three contributions to the small but growing literature on regional differences in pandemic severity during the 1918 influenza pandemic. First, I study the determinants of pandemic severity at an unusually disaggregated level: the median land area of municipalities in the sample is just 8.6 square kilometers. The analysis thus complements the existing literature on urban pandemic severity with comprehensive evidence from mostly rural municipalities. Second, I provide, to the best of my knowledge, the first analysis of regional pandemic severity for Germany-and one of the first for continental Europe. This is important as existing evidence points to large differences in pandemic severity between Europe and the US (Bootsma and Ferguson, 2007). Moreover, in contrast to the analysis for the US (Clay et al., 2018, 2019; Grantz et al., 2016), recent studies focusing on Europe provide mixed evidence on the effect of socio-economic factors on influenza mortality (Karlsson et al., 2014; Dahl et al., 2020). Third, I assess the link between air pollution and regional pandemic mortality, motivated by considerable evidence that air pollutants can increase the susceptibility to influenza infections.

For the analysis I use annual data on vital statistics (all-age and infant mortality, births) for the universe of municipalities in Wuerttemberg in 1914-1925. I combine this data with rich socio-economic data from various population and occupation census, which were already digitized for an earlier project (Braun and Franke, 2019). In addition, I link the data with available information on the location of coal-fired power plants, a major source of air pollution in the early 20th century.

The empirical analysis is based on an event study approach to estimate the effect of poverty and air pollution on pandemic mortality. The approach compares mortality changes in poor (highly-polluted) municipalities to mortality changes in rich (less polluted) municipalities. Preliminary result suggests that across municipalities in Wuerttemberg, the average mortality was 3.5 death per 1000 persons during the pandemic, corresponding to a mortality increase of 40% relative to baseline. Middle and high income municipalities (as classified by taxable income per capita) indeed recorded significantly lower excess mortality rates than low income municipalities. Moreover, the mortality rate in 1918 was significantly higher in highly polluted municipalities compared to low and medium polluted municipalities. Or in other words, the spike in 1918 mortality was particularly large in poor and highly polluted municipalities.