

# Firms and Households during the Pandemic: What do we learn from their electricity consumption?

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In this paper we investigate how electricity consumption patterns have changed during the COVID-19 pandemic. Since electricity consumption has a strong correlation with economic growth, it has traditionally been used as an indicator of economic activity. However, as we show, changes in work and life habits triggered by the lockdown measures have implied a structural break in the relationship between electricity consumption and economic activity. In particular, we provide detailed evidence of a strong reduction in the amount of electricity consumed by firms, which was partly offset by an increase in the amount of electricity consumed by households. Therefore, to the extent that economic activity is better captured by firms' electricity consumption, using total electricity consumption would under-estimate the severity of the economic impacts of the pandemic.

Our analysis focuses on the Spanish economy, which has been hardly hit by the COVID-19 crisis. The fact that not all consumer types have access to the same types of tariffs, allows to decompose electricity consumption by firms and by households. Our empirical analysis captures the departure of (daily or hourly) electricity consumption from what one would predict using previous years' data, while controlling for temperature and seasonality. It shows that total electricity consumption fell substantially during the first wave of the pandemic, reaching declines of 18.2% under the total lockdown. Yet, the reduction in firms' demand was much stronger, 29.1% below its normal levels, which was partly offset by the increase in households' electricity demand, 9.0% above its normal levels. Subsequent waves repeated similar patterns, though the size of the effects was on average smaller. We also provide evidence of substantial changes in the hourly patterns of electricity consumption, which again differ across firms and households. In particular, we observe large declines in electricity consumption by firms during working times, which are paralleled by simultaneous increases in households' electricity consumption. Interestingly, we also find changes in households' electricity consumption consistent with longer sleeping times, which could have had positive health and productivity impacts.

The importance of decomposing total electricity consumption into consumption by firms and households will likely extend beyond the pandemic due to a change in people's working habits and the penetration of distributed solar and storage facilities. This paper illustrates how some of the current and future challenges of using electricity consumption as an indicator of economic activity can be, at least partly, overcome.

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