Do Renewables Create Local Jobs?

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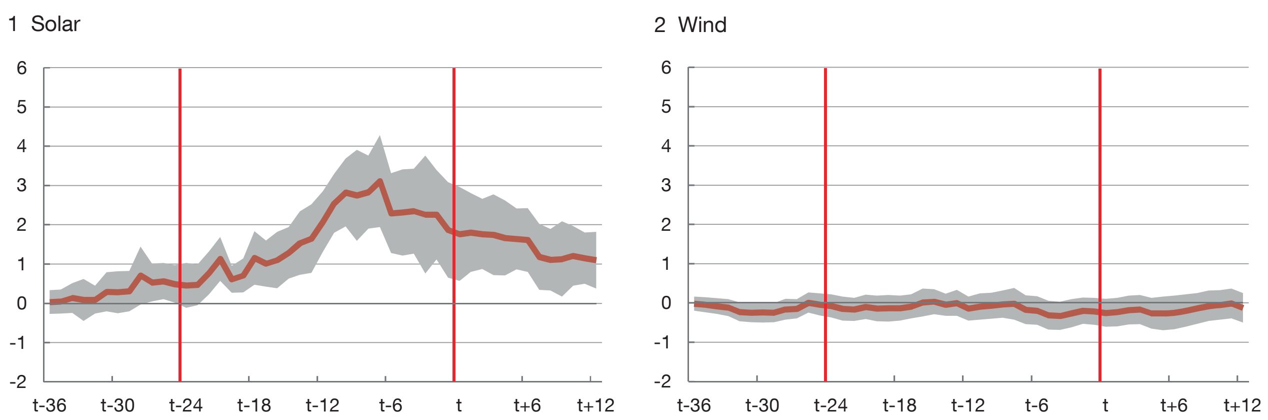
A technological revolution has driven the costs of investing in renewable energies to record lows. For instance, over the last decade, the costs of investing in solar photovoltaics and onshore wind have fallen by 88% and 68%, respectively (IRENA, 2022; Newberry, 2018). Together with the need to reduce fossil fuel consumption for environmental and security of supply reasons, these cost reductions have fostered a massive roll-out of renewable energy investments around the globe. However, a new, unexpected obstacle has emerged: the opposition of the local communities where the investments are located. This movement, known as NIMBY (Not in My Backyard), is responsible for blocking solar and wind developments globally.

Several papers have analyzed the costs imposed by renewable energy projects on local communities; e.g., their adverse effects on land conservation, biodiversity, and some economic activities such as agriculture or tourism (see for instance, Germeshausen et al., 2022). However, little attention has been devoted to understanding the other side of the equation: the local benefits. Do hosting communities oppose renewable investments because of the local costs or because they do not benefit enough to offset those costs? It is widely recognized that renewable energies bring about socio-economic benefits. Indeed, the post-pandemic recovery plans rely on green investments as a lever for economic growth and employment. If those benefits are present but local residents do not perceive them as such, does it mean that the local benefits are not enough to compensate for the costs?

In recent work (Fabra et al, 2022), we use local employment and unemployment impacts as proxies for the local economic benefits of renewable investments. We exploit variation in the timing and size of the investment projects across more than 3,200 Spanish municipalities using 13 years of monthly data (from 2007 to 2020) that witnessed two major investment waves. As far as we know, our work is the first application of Dube et al. (2022), who propose a new estimator for staggered Differences-in-Differences analysis that extends the local projections approach (Jordá, 2005) with clean controls.

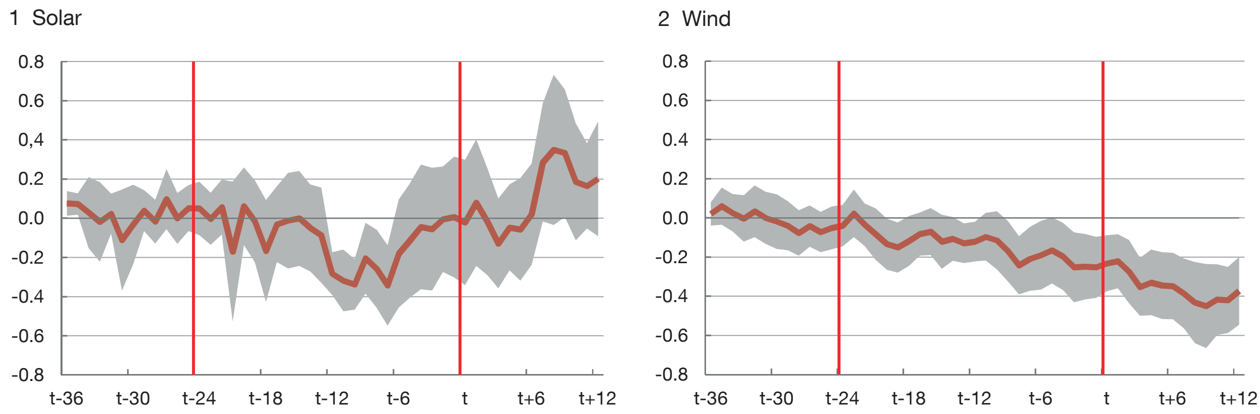
Figure 1
Local employment effects of solar and wind investments



NOTES: These figures show the effects of investing 1 MW on employment by firms located at the municipalities where the investment occurs in the period February 2006-January 2018, h months before or after the start-up date (marked with a vertical red line). Panel 1 shows the results for solar investments and panel 2 for wind investments. Error bonds depict the 95% confidence interval. Standard errors are clustered at the municipality level.

Figure 2

Local unemployment effects of solar and wind investments



NOTES: These figures show the effects of investing 1 MW on unemployment by residents in the municipality where the investment occurs in the period June 2008-January 2018, h months before or after the start-up date (marked with a vertical red line). Panel 1 shows the results for solar investments and panel 2 for wind investments. Error bonds depict the 95% confidence interval. Standard errors are clustered at the municipality level.

Our analysis uses highly detailed data on individual renewable projects, including their location, technology, and start-up date. These data are combined with employment and unemployment data at the municipality level: whereas employment data capture the number of jobs by local firms, unemployment data reflect the number of local residents without a job. Combining these data sources with the local-projections approach provides a rich picture of the heterogeneous local labor market effects caused by renewable investments.

Importantly, we find big differences in the local job multipliers across renewable technologies. Whereas investment in solar photovoltaics has sizeable multipliers, investment in wind triggers no statistically or economically significant local job creation. This finding aligns with IRENA's (2021) assessment: "The integration of local content and local employment remains a challenge, particularly in wind energy." Indeed, in the case of wind, investments are front-loaded and not necessarily local as high-skilled workers are required to carry out the projects, which they often do from elsewhere. Solar investments require less specialized skills, allowing the project developers to hire workers locally. Furthermore, the construction of solar farms, which has a strong local component, bears a higher weight in the project's total cost. Consistently with this, we also find that the labor market effects of solar investments concentrate primarily during the construction phase and become milder during the maintenance phase.

Figure 1 illustrates the employment effects across technologies and periods. The x-axis reflects the number of months before or after the start-up date (marked by a solid red line). By then, the plant must be ready to produce electricity, so treatment must have started approximately 24 months before (marked by a dashed red line), consistently with the normal duration of the construction phase. The precise month when the construction starts, even if unobserved, can be inferred from when the multipliers become positive. The y-axis shows the value of the job multipliers per MW invested (a similar pattern is found per Million€ invested).

In the case of solar investments, multipliers become positive and significant approximately 22 months before the start-up date, and peak at around 7 months before that date, which is when all the major construction work is done. Later multipliers become lower but do not fully vanish, reflecting the labor needs during the maintenance phase. The average local multiplier one year before the end of the construction is 2.5 workers/MW (or 0.8 workers/Million€ invested) and 1.5 workers/MW during the maintenance phase (or 0.2 workers/Million€). In the case of wind, the local employment multipliers are not different from zero, both during the construction and maintenance phases. Using a more standard event-study design delivers broadly similar results.

As can be seen in Figure 2, the effects on employment tend to be larger than those on unemployment, suggesting that local firms tend to hire workers living in other municipalities or counties. This is consistent with difficulties in finding skilled workers in the rural municipalities where most of the projects are located. The weak unemployment multipliers also reflect that the labor market effects are mostly confined to sectors directly linked to the construction or maintenance of the plants, in line with our sector-level analysis. Interestingly, in the case of solar, after the start-up date, there is a slight surge in unemployment of previously employed workers in the construction sector, even relative to the pre-construction period. This finding is consistent with the project attracting new residents to work on the plant's construction, who become unemployed once it ends.

The relatively small magnitude of the local effects, particularly in wind investments, does not mean that renewable investments do not create jobs on a broader scale. Indeed, it is plausible that a significant fraction of the employment benefits accrue away from the municipalities where the investments occur. However, since the opposition of the local communities may become a bottleneck for the broader deployment of renewable energies, it is fair and efficient to distribute the gains from the renewable investments with the hosting municipalities. Promoting local energy communities for residents to have stakes in the new projects, reducing the electricity price for local residents, increasing the local taxes paid by renewable investors, and prioritizing grid access to those projects that promise greater local benefits… These and other options should be considered to obtain greater social acceptability of renewable projects by the local communities.

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