Energy retrofit in a post natural disaster context: effective driver of resilient growth?

Elisa Valeriani, University of Modena and Reggio Emilia, +393388645355, elisa.valeriani@unimore.it
Maria Giovanna Bosco, Bocconi University, +393485178778, mariagiovanna.bosco@unibocconi.it

Overview

Studies concerning the energy retrofit of public and private heritage usually focus on the results of such investments in terms of energy consumption saving of the assets, and consequently on the reduced economic burden for investors, or on the costs of public incentives and on the accrued number of investments undertaken.
Studies trying to link energy retrofit investments to economic performance are less frequent. Most of the times, these analyses use energy consumption or investments in the energy sectors as proxy variables for an increased openness to foreign direct investment, or for a more investment-friendly attitude of the institutional context.
Only few studies evaluate the economic impact of the energy investments on local GDP and employment. considering the intersectoral linkages. Some of them consider the variation of the "energy consumption" as the instrumental variable as well as the total value of investment in the energy sector as proxies for lower operative costs, innovation of the physical accumulation and better institutional context for more productivity and economic growth.
In addition, the economic literature is quite poor in terms of empirical studies based on accurate firm level data, allowing for not just a mere approximation, but for a precise observation of investment in energy retrofit, enabling the researcher to measure the related economic impact in terms of productivity or employment.
The energy retrofit investment can supposedly benefit the economy doubly: first, as an investment per se, leading to an economic return; secondly, the value of energy consumption reduction is not only strictly economic but social and political. The responsibility originating from energy consumption management implies a duty to preserve the environment, to fight the climate change and to generate positive spillovers, not only economic ones.
On one side it is supposed to benefit an economic return from the energy retrofit investment, but on the other side the value of energy consumption reduction is not only strictly economic but social and political. The responsibility originating from the cultural endowment means a duty to preserve the environment and fighting the climate change, its value, and its ability in generating positive spillovers, not only economic ones.
Should we consider energy retrofit as a source of income or as a composite asset of material and immaterial values or simply a responsibility and common good, useful for the society, the history and for the weel-being of citizens?
To answer this question, we analyzed the events in a specific Italian region. In May 2012, a truly catastrophic earthquake hit Emilia-Romagna, an area belonging to the group of top regions in Europe for economic performance, number of firms and per capita revenue. The earthquake broke into the industrial districts of automotive, textiles and biomedical engineering, sectors featuring the presence of both domestic and multinational, small and medium firms. The economic support by the national government and by European institutions, together with tailored regional interventions, allowed for the total make up of the earthquake damages and for the reconstruction of all the affected buildings.
In the economic branch including industry, trade and craftmanship, 2849 applications concerning the affected buildings for energy retrofit were collected; of these 2849, 386 obtained the required financing for a total of 1303 buildings and for a total investment of Eur 26.911,005.27.
These firms are currently operating in the area and their economic indicators are available. We also have data on employment at firm level, in terms of contract types and duration.
Our hypothesis is that those firms being awarded the financial support to implement an energy retrofit reached a higher-than-the-average performance in terms of productivity and value added, if compared to the remaining firms .

Methods

We propose an empirical work on energy requalification supported by micro-based and administrative data that allow not an approximation but a punctual detection of the investment decisions at a firm-level, considering firm-specific, spatial and time-period variables. This approach is better qualified to evaluate the changes of TFP and reasons of regional heterogeneous responses to common shocks as we may consider the incentives to energy savings and requalification of buildings.

In total we have detailed technical and economic data and information for 2849 buildings (unit of research) and a total value of investment of 26.9 million euro disbursed in the period 2013-2017. The dataset has been organized to include

other economic data measuring the performance and the productivity of the subsidized firms, wich is a step forward to measure the overall performance of energy investments, compared to other firms of the region.

Measuring the effects of energy retrofit investments requires counterfactual estimates, which should consider the reasons of changes (not only the temporary damages of the earthquake) such as the timing of output responses, the treatment of energy subsidies and R&D and the resource inputs. The overall performance of these firms will be compared with non-damaged firms with appropriate econometric methods (f.i., matching methods, propensity-score, marginal structural models, double-difference with panel data and fixed-effect methods)

Results

In this respect, total factor productivity enables us to identify the basic sources and directions of influences, comparing damaged and non damaged firms. The econometric estimation that will be carried out in this paper will help in the identification of total factor productivity development as the main driving force of economic growth of the damaged firms. Using a sectoral quarterly data set, estimates will be obtained by controlling for qualitative (or quantitative) changes in production factors and assuming a mechanism for capturing changes in the utilisation of labour and capital. The likely reasons for this strong influence will be also outlined.

Conclusions

The principal conclusion emerging from a preliminary analysis is a positive effect on TFP and value added while the effect on the employment is non significant. This may suggest that energy investment need more attention: they should consider the relevant consequences of a 10 year long slow-down of the economic cycle, the structural changes of the local economy and the limitation to highlight the impact only in term of value added but not in term of labour market.

References

- Agnolucci P., Stochastic Trends and Technical Change: The Case of Energy Consumption in the British Industrial and Domestic Sectors, The Energy Journal, Vol. 31, No. 4 (2010), pp. 111-135
- Albala-Bertrand, J.M. *Political economy of large natural disasters*, (1993), Clarendon Press, Oxford.
- Aldrich, D., Building resilience: social capital in post-disaster recovery, (2012), *University of Chicago Press*.
- Cavallo, E. and I. Noy, Natural disasters and the economy – a survey, *International Review of Environmental and Resource Economics*, (2011), 5: 63-102.
- Eyraud, L., Clements, B., Wane, A., Green investment: trends and determinants. Energy Policy 60 (C), (2013) 852–865. http://dx.doi.org/10.1016/j.enpol.2013.04.039.
- Forsund F. R., Hjalmarsson L., Choice of Technology and Long-Run Technical Change in Energy- Intensive Industries *The Energy Journal*, Vol. 9, No. 3 (1988), pp. 79-97
- Griffith-Jones, S., Cozzi, G., Investment-led growth: a solution to the European crisis. In: Jacobs, M., Mazzucato, M. (Eds.), Rethinking Capitalism. (2016), Wiley Blackwell.
- Landi M.G., Matera M., Telesca P. e Benanti C., Valeriani E, I Contratti di prestazione energetica (EPC) – Aspetti giuridici degli EPC e ipotesi per il superamento dell'incertezza normative sulla regolazione degli elementi essenziali del contratto", (2017), Enea Techincal Report ENEA-RT-2017-39
- Mazzuccato M, Semieniuk G., 2017, Financing renewable energy: Who is financing what and why it matters, Technological Forecasting & Social Change, 127 (2018), 8 – 22
- Menassa CC., 2011, Evaluating sustainable retrofits in existing buildings under uncertainty. Energy Build 2011; 43: 3576–83.
- Murillo-Zamorano L.R., The Role of Energy in Productivity Growth: A Controversial Issue? Vol. 26, No. 2 (2005), pp. 69-88.
- Piet GM. Boonekamp. Evaluation of methods used to determine realized energy savings. Energy Policy 2006; 34:3977 - 92.
- Roy J., Sathaye J., Sanstad ., Mongia P., Schumacher K., Productivity Trends in India's Energy Intensive Industries, The Energy Journal, vol. 20 No 3, (1999), pages 33-61.
- Skidmore, M. and H. Toya, Do natural disasters promote long-run growth? *Economic Inquiry*, (2002), 40: 664-687.
- Train, K.E., Incentives for Energy Conservation in the Commercial and Industrial Sectors, The Energy Journal, Vol. 9, No. 3 (1988), pp. 113-128
- Valeriani E, Bertelli A., L'attività del Commissario Straordinario ed il futuro della ricostruzione del Centro Italia: una strategia sostenibile, (2017), Italian Prime Minister Technical Report.