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GAS AT THE SUNSET? PERSISTENT AND TRANSIENT IMPACTS OF THE CRISIS ON THE ITALIAN GAS DEMAND

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Overview

After a prolonged slump in both demand, and prices, autumn 2021 began with an unexpected and steady growth of wholesale prices for natural gas in Europe. The upward trend continued throughout the winter and further exacerbated after the Russian invasion of Ukraine. Unprecedented price peaks were observed in spring and summer 2022, with an astonishing spike above 300 EUR/MWh for TTF in August 2022, and a fast decrease to much lower, but still relatively high price levels over the colder months, thanks to the high level of storage inventories. Throughout 2023 natural gas prices in Europe traced back, but still remained mostly above the levels observed in the five years before the war.

Despite several measures introduced in most European countries to protect end consumers from high gas prices, at least part of this price signal was passed to the retail segment, with different magnitude and timing depending on the supply contracts signed by each consumer. At the same time, most European governments promoted energy-saving measures and launched information campaigns emphasizing that every cubic meter saved was crucial for the security of the national energy supply. They also implemented supply diversification strategies, such as increasing the volumes of LNG from the US.

Price signals and campaigns for saving energy, together with mild weather, lead to a significant decrease in energy and gas consumption in Europe. For natural gas, the European Union exceeded the 15% target set for winter 2022/2023, hitting a 18% decrease with respect to the five-year average. While the EU policy makers hope for a similar result for winter 2023/2024, it is unclear what share of this demand reduction is going to last over the next years, witnessing a structural change in natural gas consumption, and what is going to bounce back to pre-crisis levels, net of the impact of changing weather and economic conditions.

We focus on the case of Italy and assess the reduction in natural gas demand following the energy crisis. We divide Italian gas demand into three segments: gas-fired power generation, gas-intensive manufacturing, and households and small and medium-sized enterprises (SMEs). The aim of our study is to measure actual gas savings in these three segments, accounting for the impact of weather conditions and economic dynamics, and to evaluate if and to what extent this demand reduction is likely to persist over the long term.

Methods

After the appropriate statistical checks, we apply ordinary least square regressions to the following data series:

- Monthly data published by the Italian gas transmission system operator, Snam Rete gas, for withdrawals of gas-fired power generation, gas-intensive manufacturing, and households and SMEs;
- Monthly data for heating degree days computed based on Eikon Refinitiv data for average daily temperatures in some Italian macro-regions;
- Monthly data for industrial production published by Istat.

We test several specifications including a time trend and two dummies, one for the Covid-related restrictions, and one for the gas crisis. The dummy variable representing the gas crisis is our variable of interest, as it allows us to estimate, ceteris paribus, the impact of the gas crisis for each sector and month.

For the time being, we do not include gas prices in the model. This decision is connected on the one hand to the difficulties in correctly addressing endogeneity, on the other hand to the risk of incurring into measurement errors due to the heterogeneous ways in which wholesale gas prices impact the actual price paid by end customers.

Results

Our preliminary results identify three different trends for each sector included in the analysis starting from February 2022:

- For households and SMEs, the energy crisis led to significant gas savings between October 2022 and March 2023, with demand reductions often above 1 billion cubic meter (Bcm) per month, and lower but still significant savings between October and December 2023. We found instead no impact of the gas crisis between April and September in both 2022, and 2023. As a term of comparison, the yearly demand of this segment in 2019 was around 32 Bcm.
- For gas-intensive manufactories, the energy crisis induced significant gas savings starting from February 2022 and until December 2023, with demand reductions hovering around 0.2 Bcm/month, compared with a yearly demand around 14 Bcm in 2019. The impact of the energy crisis for this consumption segment hit its record between September 2022 and February 2023, with monthly savings well above 250 million cubic meters per month.
- For gas-fired generation the gas crisis induced a mixed reaction, with only some months recording significant demand reductions, and a stronger, but still erratic trend from September 2023 onwards. Monthly savings in the second half of 2023 average 0.3 Bcm/month, compared to a yearly demand around 25 Bcm in 2019. The dynamics observed in this sector clearly reflects the fact that gas-fired generation managed to cover its higher production costs through higher electricity prices, thanks to the drought that hit Italy and Europe and the temporary decrease of nuclear productions in France in 2022.
- All in all, our preliminary results suggest that the gas crisis yielded a demand reduction of around 13 Bcm between February 2022 and December 2023, with the strongest impact between October 2022 and March 2023, when gas demand was around 8 Bcm lower than expected.

Conclusions

We place our analysis within the literature concerning the structural changes in energy demand possibly induced by energy crises. Our preliminary results suggest that the crisis might have induced a structural change among households and SMEs, especially in the heating season, and among gas-intensive manufactories. There is instead no evidence of a similar trend for gas-fired generation. The analyses we plan to conduct over the next months will focus on:

- Monitoring the persistency of these trends over time,
- Exploring what lies behind these (persistent) savings, also considering the general trend toward a shift from fossil fuels implied in the decarbonization effort in which Italy is engaged.

While recognizing the insights in the behaviour of gas consumers provided by the (few) studies focussing on the price elasticity of gas demand, or on the cross-price elasticity among different energy commodities, we do not plan to focus on price elasticity of gas demand, as the magnitude of the price spikes observed during the energy crisis is such that any point estimate of price elasticity would be of minor help.

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