

THE VULNERABILITY OF EUROPEAN UNION POWER MARKET IN THE CONTEXT OF ENERGY INFLATION

CIPRIAN NIMARĂ *

ABSTRACT: *The economic activities of developed countries have influenced oil price and the oil price itself affects the economic variables in the world. When the demand for oil decreases, its price in the global market will drop down. On the other hand, an increase in oil price in these countries leads to inflation, the decrease of production and productivity. The energy inflation reached a record level in the European Union following Russia's invasion of Ukraine. The European governments have allocated significant support to households and businesses to mitigate the impact of larger energy bills, but the power market vulnerability of the European countries is still at high level. This paper aims to highlight the main key factors of vulnerability and the different national measurements taken to reduce the energy inflation.*

KEY WORDS: *power market, energy, inflation, marginal pricing, EU.*

JEL CLASSIFICATIONS: *J2, J6, R0, R1.*

1. INTRODUCTION

When facing energy price fluctuations, central banks must understand their nature and how they will propagate through the economy to affect output and prices. The nature of energy price fluctuations refers to their driving forces, whether they are driven by fundamental demand, supply-side factors or financial market activity and to their persistence. An increase in international energy prices can, for example, be a short-term phenomenon (as witnessed in 1990 during the Persian Gulf War) or a medium to long-term change in the terms of trade driven by structurally rising demand, as seems to have been the case over the past decade (Mehdi, 2013).

The transmission of energy price shocks is shaped by the real adjustments in the economy in the short and medium to long run, as well as structural determinants of the pass-through to consumer prices. The combination of these factors and the policy

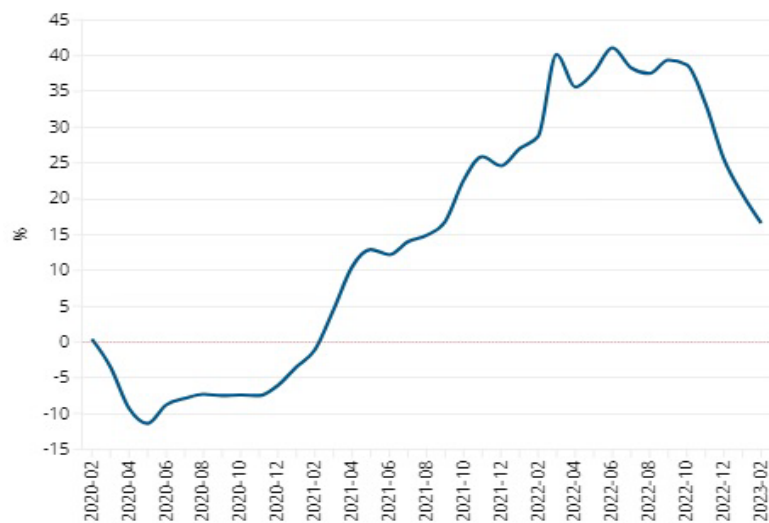
* Lecturer, Ph.D., University of Petroșani, Romania, ciprian.nimara@yahoo.com

response of central banks eventually explain the transmission of energy price fluctuations to overall inflation (Hansen, et al., 2023).

Consumer gas price levels differ markedly across countries and, with the exception of Slovakia, are generally higher than in the United Kingdom, a country often taken as a benchmark because of its early liberalised and well-developed gas market. Considering electricity prices for households across the euro area, price dispersion is even larger than for gas and does not show clear signs of convergence.

Gas and electricity are industries for which a substantial portion of costs derive from the construction and maintenance of networks to deliver the end product to consumers (Bohi & Toman, 1996).

The energy inflation reached a record level in the European Union following Russia's invasion of Ukraine (Nimară, 2022). The annual energy inflation rate exceeded 40% in June 2022, and then prices began falling gradually (figure 1). In February 2023, energy inflation was considerably lower (16.6%) compared to the same period in the previous year (28.7%). However, many households and businesses still struggle with the cost of energy. European governments have allocated significant support to households and businesses to mitigate the impact of larger energy bills in the midst of overall cost-of-living crises (www.ec.europa.eu).



Source: Eurostat

Figure 1. Annual energy inflation in the European Union from February 2020 - 2023

In February 2023, residential electricity prices including taxes in the European Union varied from 9.2 c€/kWh in Hungary to 49.9 c€/kWh in Ireland. These prices reflect the costs in the capital cities of each country rather than the average rate.

Ireland was followed by Germany (49.5 c€/kWh), United Kingdom (48.5 c€/kWh) and Italy (48 c€/kWh). At the bottom of the list is Hungary, followed by Malta (12.3 c€/kWh), Croatia (14.4 c€/kWh) and Bulgaria (15.3 c€/kWh).

The European Union average was 28.3 c€/kWh. Prices were lower in France (26.7 c€/kWh) and Spain (24.1 c€/kWh) than the European Union average (figure 2 and 3).

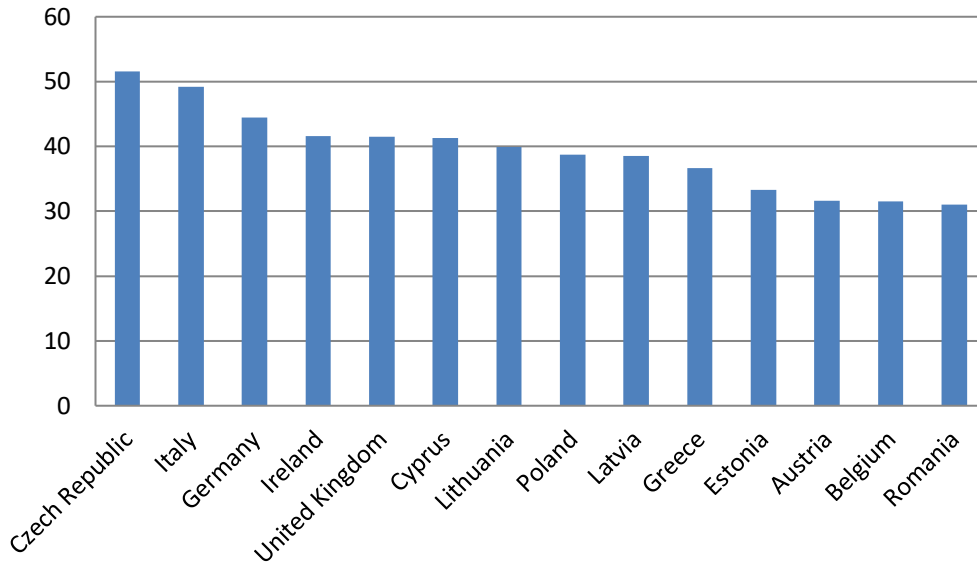


Figure 2. Residential electricity prices including taxes (February 2023)

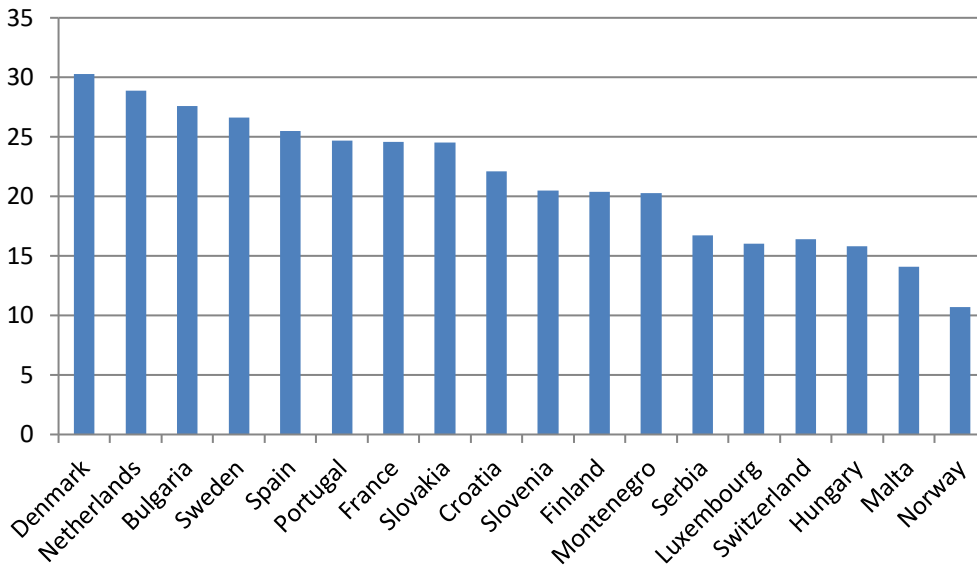


Figure 3. Residential electricity prices including taxes (February 2023)

Energy inflation in the Euro area decreased to -11.10% in October from -4.60% in September of 2023. Energy inflation in Euro area averaged 4.08% from 1991 until 2023, reaching an all-time high of 44.30% in March of 2022 and a record low of -14.40% in July of 2009 (www.ec.europa.eu).

2. THE MARGINAL PRICING IN POWER MARKET

The immense bill shock that European energy consumers have witnessed for the last year and a half could be the last straw to convince those who kept on arguing that long-term markets for electricity could ever “naturally” work. In summary, the main reasons behind the power market incompleteness that led to the need for some sort of market reform are:

- lack of demand-side participation in long-term markets, partly due to transaction costs but mainly due to the trust in governmental intervention in times of stress;
- vertical integration between generation and retail, combined with an asymmetric distribution of diversified generation portfolios.

The idea of marginal pricing is that when satisfying the demand for electricity, a watt-hour produced by one generation technology is undifferentiated from a watt-hour generated by another technology. On the assumption that market power is absent, no seller has an incentive to sell their watt-hour under the cost of production of the marginal unit. Hence, the price for each watt-hour delivered at a particular location shall be priced the same in real time. Any deviation from this principle will lead to uneconomical decisions on the supply side and the usage of cross-border interconnectors. Inefficient spot prices multiply along the sequence of markets and lead to significant additional costs. In the longer run, the evolution of marginal prices should also indicate which technologies are most valuable to add to the existing resource mix (European Federation of Energy Traders, 2022).

Marginal pricing means that all the cheapest possible sources of electricity will be used and the wholesale electricity price will be set by the price of the last selected offer, to meet demand. This price is paid or received by every successful participant in the auction.

It is a method used to price electricity in the wholesale market, more specifically in the day-ahead auction. Marginal pricing means one price set by the last selected electricity generation offer to meet demand is paid or received by every successful participant in the day-ahead auction. Marginal pricing has many advantages, including:

- cost minimisation by tapping on the cheapest sources of electricity production;
- reduction of carbon intensity by prioritising low-carbon energy sources in the mix;
- viability for existing and future investments thanks to the recovery of part of the investment costs;
- contribution to the energy transition by providing signals for innovations (battery storage, conversion to and from hydrogen etc.) and consumption adaptation;
- optimal allocation of resources and security of supply at European level by allowing cross-border coupling mechanisms to function;
- transparency of the day-ahead price signal that is used in long-term (forward) markets to help absorb short-term price shocks for consumers.

Marginal pricing is not unique to the power sector, but the standard approach in all commodity markets, such as gas, oil, coal, copper, or grain. A complexity that is specific to the electricity sector is that electricity is not (or hardly) storable, at least not yet in many jurisdictions. This implies that short-term trade directly determines production. This is less the case for other commodities, such as gas, coal, and oil, which can more easily be stored and transported. Considering this reality, one could argue that efficient pricing is (even) more crucial for electricity than for these other commodities. Marginal pricing is in place in the spot markets everywhere in the world where the power sector is liberalized: Europe, the United States, the majority of Latin-America and Oceania.

3. THE VULNERABILITY OF THE EURO AREA ECONOMY

The vulnerability of the euro area economy to large energy price changes in international markets, is determined by two factors: energy intensity; energy dependency.

The energy intensity of the euro area has, in common with other industrialised economies, generally fallen over the past fifty years owing to technological advances as well as sector shifts. On its own, this trend, coupled with the increased diversification of energy sources, would have served to attenuate the impact of international energy price changes.

Despite an increase in electricity generated within the euro area from nuclear and renewable sources, the overall energy dependency of euro area countries has remained high, with two-thirds of overall energy consumption being imported, and oil remaining the main component of final energy consumption (Altissimo, et al., 2006).

Country energy markets remain largely national or regional in nature, although their integration has increased. Further integration, in particular in gas and electricity markets, would not only have beneficial impacts on security, but could also help to cushion idiosyncratic energy price changes and improve overall efficiency and competition in European energy markets.

The impact of energy price changes depends not only on their driving force, but also on their persistence and how they are absorbed by the economy, including the monetary policy response. The adjustment costs are to a significant extent determined by the structure and the flexibility of the economy. In the short run, they cannot be easily countered by changes in the production process and impact on firms costs or households real income, thereby affecting investment and consumption.

Increases in the relative price of energy may lead to substitution effects and to a reduction in the overall energy intensity of production and consumption. Therefore, the impacts of long-run relative price changes are stronger the more energy intensive the economy and the less flexible the production process. In addition, the losses of output and labour input into the production process are less pronounced if wages and prices allow for a speedier adjustment process. Wage and price-setting behaviour and credibility of monetary policy are key determinants of how energy prices feed into inflation over a medium-term horizon.

4. NATIONAL MEASUREMENTS TAKEN IN THE EUROPEAN UNION

These measures are within the sovereign power of a Member State and financed directly or indirectly via the state budget. In some cases, part of the measures is backed by the increased revenue from the Carbon Emissions Trading Rights System (e.g. Germany, Greece, Italy and Spain).

There are two types of measures that are deemed outside of the European Union toolbox and, in general, outside of the European Union legislation: the taxation/capture of (alleged) windfall profits; mandated long-term contracts.

Regarding the latter, besides being mandated, the prices of these long-term contracts might not be necessarily set at competitive levels or obtained via sufficiently competitive mechanisms. In that sense, such long-term contracts could also be seen as an attempt to tax windfall profits.

Spain and Romania introduced a tax on alleged windfall profits, which is thought to be temporary. A similar measure has been discussed in Italy.

In Spain, the Royal Decree-Law of September 14, 2021 (RDL 17/2021) included a mechanism to reduce the income of non-carbon-emitting plants. The publication of the regulation immediately faced contestation from the affected generators, who argued that the regulation was a violation of the fundamental European legislation and announced that they would appeal it at the European courts.

The formula to calculate the cutback, based on the monthly income of the plants, severely interfered with the efficient dispatch of the plants (in off-peak hours, during which the price happened to be below the threshold, affected plants, if producing, would face a net loss). Also, generators argued that they were not actually benefitting from the price increase as they had already committed in annual contracts most of their output via their own retailing company. The government, on the 20th of September, tried to save the measure by clarifying that generation (already) committed through long-term bilateral contracts (signed before the entry into force of the Royal Decree) was exempt. However, this exemption did at first not apply to internal contracts between generators and retailers vertically integrated within the same holding.

It is important to recall that contrary to the French, Romanian and even Italian cases, where the main utilities are largely controlled by the state, the Spanish utilities are privately owned. Soon after the mechanism was enforced, the Government backtracked and amended the implementation of the windfall tax twice. Finally, after weeks of turmoil, in which the regulatory stability of the country was severely put into question, the material impact of the measure is reportedly expected to be negligible.

In Romania, the Ordinance 118/2021 that came into force on November 1st, 2021, also included a windfall profit tax for non-emitting power generators. More precisely, from November 1, 2021, until March 31, 2022, sales from renewable electricity, hydro, and nuclear power generation at prices above 450 LEI/MWh (app. 90 €/MWh) are taxed ex-post at 80%. However, it is worth pointing out that the Romanian government owns more than 80% of both Hidroelectrica and Nuclearelectrica.

France, Spain, Bulgaria, Portugal and Italy have discussed or implemented measures including mandatory contracting between generators and retailers or industrial consumers.

In the case of France, mandated long-term contracts are not new. Since 2011 alternative energy suppliers have access to about a quarter of Électricité de France nuclear electricity production (up to 100 TWh) at an administratively fixed price. The underlying objective is to guarantee that any French customer can actually buy a portion of its consumption, backed by the large nuclear fleet of Électricité de France, at a below-market price level. This mechanism is called ARENH and aims to be in place until 2025.

Bulgaria organized direct sales from the Kozloduy Nuclear Power Plant, a subsidiary of the state-owned Bulgarian Energy Holding, to small and medium-sized companies in September 2021 for delivery during October, November and December. 300 MW of baseload capacity were tendered, representing about a third of the operational capacity. The starting price in the auction was significantly lower than the market price - around 95 €/MWh (compared to the average on the Bulgarian power exchange in September of 125.3 €/MWh). However, due to the high interest in the purchase of these long-term contracts the final average price reached 121.3 €/MWh.

In Portugal, the national energy regulator (ERSE) announced the introduction of extraordinary Special Regime Production auctions on October 18, 2021. In these auctions, monthly contracts of a certain volume of renewable electricity, sourced by the supplier of last resort from third party project promoters under guaranteed feed-in tariffs (over 10 years), can be bought exclusively by smaller unhedged suppliers or industrial consumers. ERSE set the starting price at 90 €/MWh, a value much lower than the price in the Portuguese wholesale market during the relevant period. Three auctions have taken place so far. In the latest auction, 50 MW with delivery in February 2022 and 50 MW with delivery in March 2022 were auctioned. Similar to the Bulgarian case, due to high interest (the demand doubled the available supply), the weighted average price of the awarded purchases was significantly higher than the starting price (158.76 €/MWh and 140.53 €/MWh for delivery in, respectively, February and March; Sanlez, 2022). In early February, a fourth auction was announced to take place on February 17 during which another 50 MW for delivery in March will be auctioned.

5. CONCLUSIONS

In terms of price effects, the impact of energy price changes is often broken down into direct and indirect first and second-round effects. The direct first-round effects refer to the impact of changes in primary energy prices (e.g. oil and gas) on consumer energy prices. The indirect first-round effects refer to the impact of changes in consumer prices that occur as energy prices impact on producer and distribution costs.

An oil price increase can, for example, affect through higher producer costs the prices of goods which may include an energy-based input (such as chemical goods) or of transport services (such as aviation which have a significant oil input). Higher distribution costs can affect more broadly other consumer prices. First-round effects, either direct or indirect, of a one-off increase in oil prices only generate a rise in the price level, but no lasting inflationary effects (Sgaravatti, et al., 2023).

The second-round effects capture reactions of wage and price-setters to the first-round effects (direct and indirect) of a price shock, in an attempt to keep their real wages and profits, respectively, unchanged. Second-round effects magnify and extend the impact of energy price movements. The impact on wages may be further reinforced by additional upward pressure on the price level. Employers, being price-setters, will seek to pass rising labour costs on to consumer prices to try to maintain the real value of their profits, which are already penalised by the higher input prices. These dynamics can cause higher inflation expectations to become embedded in the economy's wage and price setting processes, eventually endangering price stability.

The energy intensity of the euro area has, in common with other industrialised economies, generally fallen over the past fifty years owing to technological advances as well as sector shifts. Euro area markets are extremely heterogeneous in terms of market characteristics, not only with regard to competition, but also cost factors and economies of scale. The national measurements taken in the European Union are within the sovereign power of a Member State and financed directly or indirectly via the state budget. In some cases, part of the measures is backed by the increased revenue from the Carbon Emissions Trading Rights System (e.g. Germany, Greece, Italy and Spain).

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