

Intensification of the Prices Volatility for Oil and Natural Gas

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Abstract: Energy prices are generally more volatile than the prices of other commodities. This is because short-term energy demand responds more quickly to the impact of economic growth than to price changes. This paper aims to analyse this phenomenon. Therefore, when an energy shock occurs, an important price change may be necessary to influence the market. Currently such shock has been caused by the COVID-19 pandemic, which has produced the biggest sustained change in demand since World War II. In the medium to long term, energy prices will rise if investment will not be on an upward trend, which seems unlikely given the current environmental protection guidelines adopted by many countries around the world. In our paper we argue that supply and demand shocks and high price volatility are likely to continue to weigh on the energy market and the global economy.

Key-words: energy, volatility, prices, policies

JEL: Q41; Q43; Q48

1. Introduction

The term "price volatility" is used to describe the amplitude of fluctuations in the price of a commodity over the course of a day, week, month, quarter, but as a rule, the daily fluctuation interval is taken into account. Volatility is measured by the daily percentage difference in the price of the commodity. The degree of change, not the price level, defines a volatile market. Since price is a function of supply and demand, the volatility is a result of the basic characteristics of supply and market demand. Therefore, high levels of volatility reflect out-of-the-ordinary characteristics of supply and/or demand.

The prices of basic energy (crude oil, petroleum products, natural gas, electricity) are generally more volatile than the prices of other commodities. One reason why energy prices are so volatile is that many consumers are extremely constrained in their ability to replace other fuels when the price, for example, of natural gas, fluctuates strongly. Residential customers usually can't quickly replace their heating system — and in the long run, it may not be economical to do so. So while consumers can easily replace some food products with others when food prices change, most do not have this option to secure the heating of their homes, but even industrial consumers cannot easily replace one primary energy source with another. Volatility indicates the degree of price uncertainty in the markets. When volatility increases, firms may delay investment and other important production decisions or intensify their risk management activities. The costs associated with such activities tend to increase the costs of securing the supply and consumption of hydrocarbons.

2. Oil

Price volatility is something usual for stock market traders, but in oil the volatility has become excessive over the past three years, taking some players out of the market and making it harder for many companies that

normally use hedging operations for oil to benefit from some price stability, which is vital to their operations. A recent analysis by Reuters Agency (Reuters, 2022) shows that oil prices in 2022 have become extremely volatile through their large daily fluctuations that ordinary actors such as hedge funds have left the oil market, their activity falling to the lowest level in seven years (Slav, 2022). So one could appreciate that discouraging speculation would be a good thing up to a point when daily price range five times higher than usual. According to Reuters Agency analysis, between February 24 and August 15, 2022, the daily fluctuation range of the price of Brent crude oil was on average \$5.64 per barrel compared to \$1.99 per barrel last year.

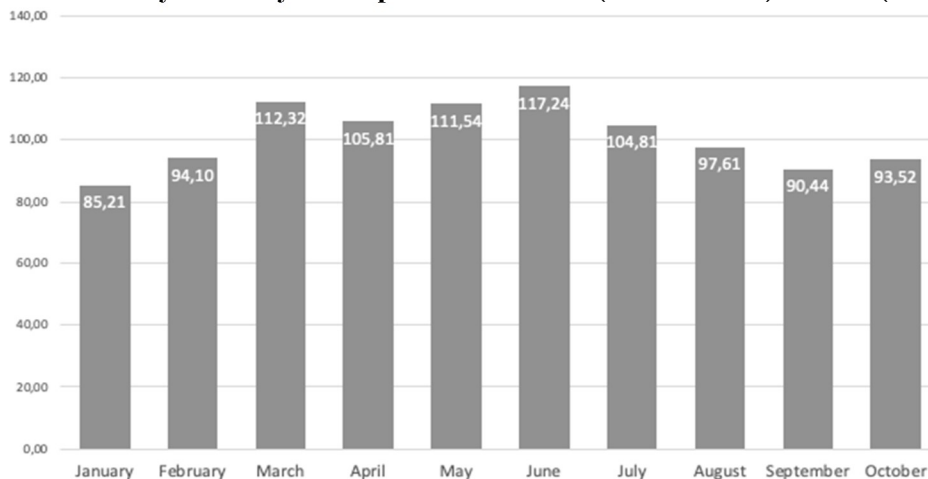
The withdrawal of speculators from the stock market is just one of the problems related to the high volatility of the oil price. But large and often unpredictable fluctuations also affect the affairs of the oil industry itself. An analyst quoted by Reuters Agency Arjun Murti explained that oil companies are still afraid to make large capital expenditures due to excessive volatility in oil markets. And because they are cautious, these companies are postponing projects that could help balance the oil market again.

Related to the oil industry, not only the current high price volatility negatively influences potential production growth, but also uncertainty about the dynamics of future demand as the energy transition increases in intensity. In a recent article for the Houston Chronicle, James Osborne said that the forecast of oil demand is becoming increasingly difficult amid developments such as the Inflation Reduction Act adopted by the US Congress in early August 2022 (Osborne, 2022). With the incentives given to the electrification of transports and the transition to the generation of electricity from renewable resources, the future of oil demand becomes uncertain, even in the view of the big international oil companies (Big Oil). It could be argued that most of them are heavily involved in the energy transition, which could cast a shadow over the credibility of their oil demand forecasts. However, the truth remains that many governments are determined to make a green transition, no matter how much it costs, and this has a depressive impact on oil demand. The latest momentum for the energy transition in both Europe and the US has already worsened the situation of high price volatility through the high uncertainty over the prospects for demand, while everyone can see that still the demand for oil, at the moment, is stronger than many observers expected, especially since some utilities in Europe are moving from natural gas to oil because of high gas prices. This proved too shocking not only for speculators, but also for industry players in the oil market, according to a Reuters Agency analysis. Open interest in trading in the oil futures market has declined by a fifth since Russia invaded Ukraine, traders seemingly tired of price fluctuations due to tight supply and fears of inflation.

What the future holds is – as always – impossible to predict, but it is quite unlikely that the price situation will change in the near future. This means that the negative effect that this price volatility has on companies in all industries will continue, fuelling the above-mentioned fluctuation in the price of oil. Businesses will continue to need energy that is affected by the restricted supply situation, but high prices for this energy will continue to threaten their growth prospects and the prospects for the development of their respective economies. Meanwhile, governments will continue to make legislation and invest money in the energy transition, further discouraging the oil industry from doing something important about the significantly increasing supply.

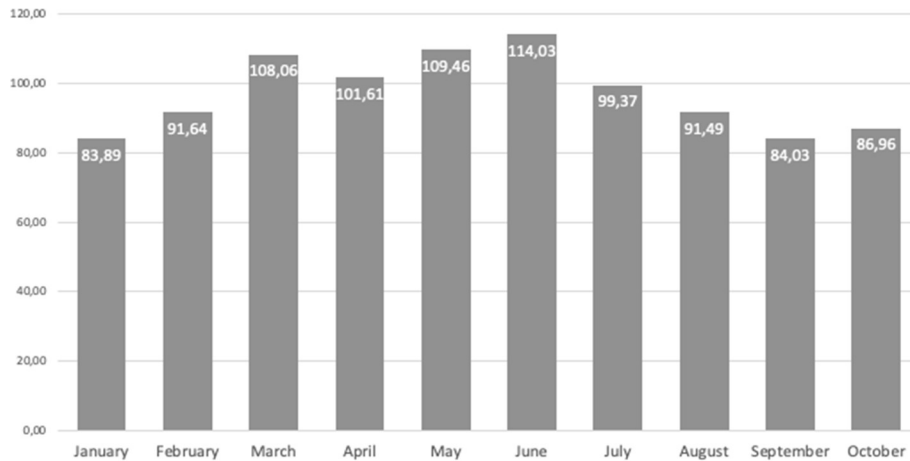
In the figures 1 and 2 we present the monthly volatility of the price of Brent and WTI oil in 2022 while in the figure 3 one can see daily volatility in crude oil prices in 2021 and 2022.

Figure 1: Monthly volatility of the price of Brent oil (ICE London) in 2022 (USD/Bbl)



Source: Authors according to IWE database, 2022

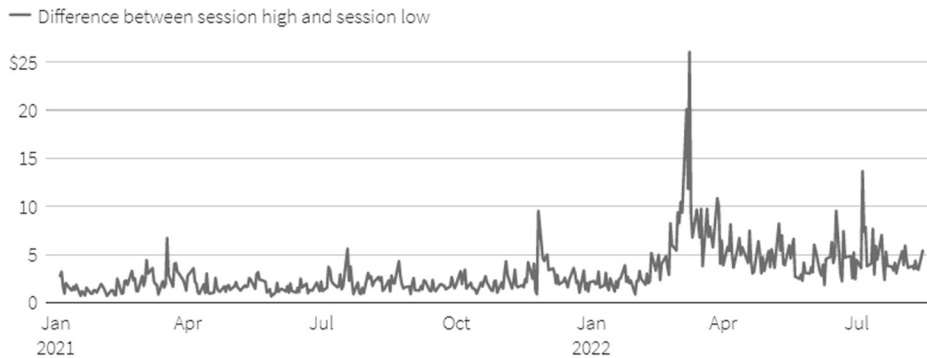
Figure 2: Monthly volatility of the price of WTI crude oil (NYMEX-New York) in 2022 (USD/Bbl)



Source: Authors according to IWE database, 2022

As shown by the Figure 3 oil prices have seen massive swings between session highs and session lows while this volatility has harmed companies that need energy market stability for their operations.

Figure 3: Daily volatility in crude oil prices (2021 - 2022)



Source: Reuters, 2022

While the oil price continues to be clouded by concerns of a potential recession-driven demand the OPEC further trimmed its global oil demand growth forecasts for 2023, due to the current economic challenges such as high inflation, rising interest rates, and supply chain disruptions.

3. Natural gas

U.S. natural gas price volatility reached its highest level in 20 years, while setting a record in the first quarter (January-March) of 2022. The historic 30-day volatility in U.S. natural gas prices averaged 179% in February, compared to 57% in the first quarter of 2021. Historical volatility is a measure of the daily changes in closing prices for a commodity at a certain point in the past. During July 2022, historical volatility was lower mainly due to the fact that natural gas prices were higher compared to the first quarter of the year.

The futures price at Henry Hub in July was 61.21% higher compared to the February price. Natural gas price volatility averaged 124% in the first quarter of 2022 and 75% in the second quarter. High uncertainty about market conditions affected the supply and demand for natural gas and also results in increased price volatility. Among the events that have contributed to the change in market conditions are:

- Stopping production;
- Storms;
- Unplanned maintenance activities of pipelines or various interruptions;
- Unusual weather for that time of year;
- Changes in stock levels;
- Availability of replacement fuels;
- Changes in the import/export activity;
- Other unexpected changes in demand.

U.S. natural gas prices are normally more volatile in the first quarter of the year due to fluctuating demand for natural gas used to heat homes, given the weather conditions at this time of year. Among the factors that contributed to the increase in volatility in the first three months of the year were the following:

- Fluctuations in natural gas demand caused by weather;
- The declining natural gas production in January and February;
- The sharp increase in LNG exports from the US to Europe in order to compensate for the low supply of Russian gas.

The historic Henry Hub price volatility fell to an average of 56% in April, but rose in the following months, averaging 109% in July. Temperatures higher than the average of the period and the increase in domestic supply have contributed to this increase in volatility. The temporary closure in June of the Freeport LNG terminal decreased the growth of gas for processing by 50 million cubic meters/day, generating a surplus of natural gas on the domestic market. Henry Hub futures prices fell by 39% from June 10 to June 30. In July, however, higher than normal temperatures led to increased demand for natural gas within the electricity sector, which absorbed a significant amount of the surplus Freeport LNG. As a result, the futures price of natural gas has increased by 52% in July compared to the previous month.

According to Natural Gas Intelligence (NGI), the U.S. natural gas market has become increasingly volatile in recent years as LNG exports have grown exponentially and as natural gas has occupied an increasing share in the U.S. electricity mix. At the moment, the export capacity is about 368 million cubic meters/day. The increase in demand has led to less market flexibility, making it more difficult to respond to difficult situations due to extreme weather conditions and other anomalies.

"As the U.S. exports a significant percentage of its domestic production in the form of LNG, U.S. natural gas prices are likely to become more volatile in the short and medium term, especially as the global natural gas market grows tighter," said Patrick Rau, director at NGI. He also noted that U.S. natural gas is currently one of the most volatile commodities on the CRB Index. Patrick Rau also pointed out that this high volatility is due to a lack of investment in infrastructure, but also noted that events outside the US have a significant impact.

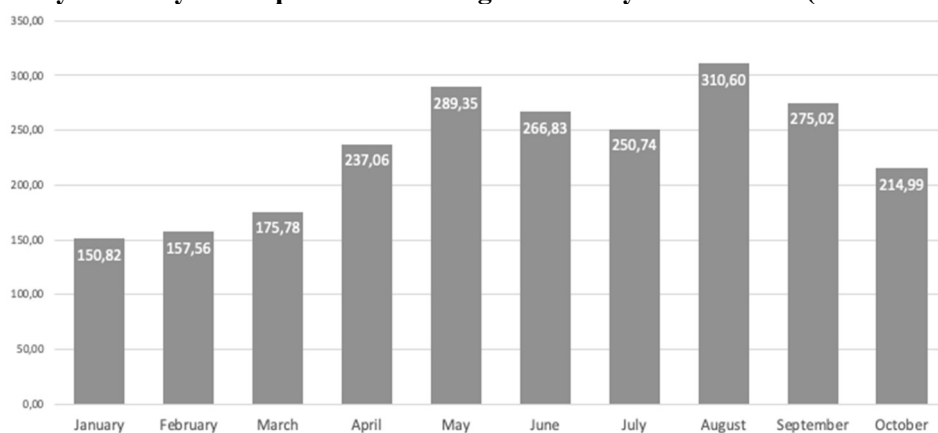
Exports, both to overseas countries and to Mexico, have continued to grow, creating the ground for additional volatility, especially as international markets become increasingly interconnected. By 2025, U.S. LNG exports will exceed 500 million cubic meters/day, should the Golden Pass and Plaquemines LNG projects come into operation.

According to Bloomberg, the annual volatility at Henry Hub is about 70%, compared to 80% at Title Transfer Facility, 83% at Japan-Korea Marker and 97% at National Balancing Point. "Natural gas prices in the U.S. are currently correlated with TTF, NBP and JKM prices, and any movement within them can cause Henry Hub to react accordingly," said Patrick Rau.

The volatility of natural gas prices at the Henry Hub (USA) and the CEGH Vienna Hub in the EU is shown in Figures 4 and 5.

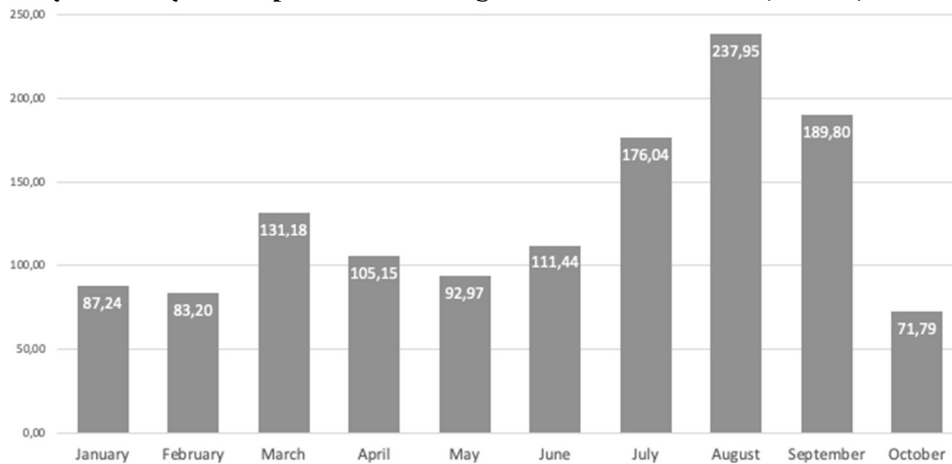
The quarterly reports of the European Commission (DG Energy) highlight the volatility of gas prices, both in the first quarter of 2022, but especially in the 3rd quarter, observing how spot prices have increased in the main hubs.

Figure 4: Monthly volatility in the price of natural gas at Henry Hub in 2022 (USD/1000 cubic meters)



Source: Authors according to IWE database, 2022

Figure 5: Monthly volatility in the price of natural gas at the Vienna Hub (CEGH) in 2022 (euro/MWh)



Source: Authors according to IWE database, 2022

Spot prices at European gas hubs remained high and volatile in the first months of the year, registering a five-fold increase from year to year, in the range of €95-100/MWh. EU gas consumption decreased by 8% (-11.6 billion cubic meters) compared to the previous year in the first quarter of 2022. For the Vienna Hub (CEGH), a significant price increase is observed in March and a particularly strong increase in July and August, after the rebound in the 2nd quarter.

The Central European Gas Hub – Virtual Trading Point (CEGH-VTP) is a market area located in Austria. It is a virtual trading hub that puts natural gas buyers and sellers in contact. Powernext offers CEGH-VTP derivative contracts for the next 5 months, the next 4 quarters, the next 4 seasons and the next 4 calendar years.

4. Difficult situation at the European energy markets

In 2022, the turmoil on energy markets intensified amid rising price volatility and the effects of geopolitical factors. On oil markets, long net speculative positions – the difference between growth-focused and falling bets – at Brent and WTI narrowed to a very low level in early August due to fears of recession and a slowdown in global economic growth, the SEB bank said in a note. The physical oil market is also losing momentum due to fears of an economic slowdown or recession, traders told Reuters in the second week of the month. "The market is very weak at the moment. No one is in a hurry to buy," a Singapore-based trader told Reuters (Paraskova, 2022).

According to Reuters, Europe's energy sector is facing a perfect storm, as a dysfunctional futures market can lead to a deepening crisis with rising prices due to a liquidity crisis. Sudden changes in gas and electricity prices in the market after Russia's invasion of Ukraine have left some oil and gas companies without the funds needed to cover their physical transactions because they could not meet margin calls, an exchange requirement for additional collateral to guarantee trading positions when prices rise." We have a dysfunctional futures market, which then creates problems for the physical market and leads to higher prices, to higher inflation," said a leading trader. In March, the lack of liquidity became apparent when trading firms, utility firms, oil companies and bankers sent a letter to governments and financial institutions, such as the European Central Bank, for emergency liquidity support to support energy markets as prices rose. Several traders who hedged their physical positions with short financial exposure in derivative markets were constrained by rising spot prices due to the Russian invasion and were forced to hedge as increased exchange requirements forced margin calls. Usually, players in the stock market borrow to build short positions in the futures market, with 85-90% of the funds coming from banks. Approximately 10-15% of the value of short positions (shorts), known as minimum margin, is covered from traders' own funds and deposited into a broker's account. But if the funds in the account fall below the minimum margin requirement, in this case 10-15%, a "margin call" is triggered. The difficult situation around winter is that increased margin requirements to secure transactions absorb capital from major natural gas companies, commercial firms and electricity utility firms (ZeroHedge, 2022). Some firms and trading desks have given up on this due to high margin requirements, which has led to a decrease in market participants, eventually causing liquidity to fall, creating even more volatility that could lead to higher prices.

Bankers and major traders stated that exchanges, clearing houses and brokers increased the initial margin requirements to 100%-150% of the contract value from 10-15%. For example, the ICE London stock exchange required margin rates of up to 79% for gas futures contracts at the Dutch hub TTF in Amsterdam. The letter sent by the European Federation of Energy Traders in March said that "the same company that normally expects to experience daily marginal cash flows related to price movements of around 50 million euros, now faces marginal variation requirements of up to 500 million euros in a business day."

Many companies find it increasingly difficult to handle margin calls. Norwegian state-owned firm Equinor, Europe's largest gas trader, recently warned that energy companies, with the exception of those from Great Britain, need at least 1.5 trillion euros to cover margin calls. A Governor of the European Central Bank challenged this figure and said that the losses are much lower in the worst-case scenario. Saad Rahim, chief economist at Trafigura, drew a warning signal due to illiquidity in commodity markets that can have a notable impact on the physical volumes that are traded because traders have to hedge margin calls. European officials have even discussed plans to suspend energy derivative markets as a form of intervention to prevent what some believe could trigger a collapse similar to Lehman Brothers." Helge Haugane, Equinor's vice president for gas and energy, said in an interview that "liquidity support will be needed." So far, countries like Germany have nationalized failed utilities such as Uniper SE. The question becomes how big the crisis is and whether the ECB will have to get involved this winter if prices rise due to the lack of liquid markets (ZeroHedge, 2022).

The link between the price of gas and the TTF (Title Transfer Facility) gas hub in Amsterdam, long considered the most representative European gas market, is proving to be the greatest catastrophe in the EU's regulatory systems, something recognised by the European Commission in September 2022, which through the EU Commissioner for Energy, Kadri Simson stated that the parameter used for the gas price, known as TTF, it is linked to a relatively small market based on pipelines, which does not reflect the current reality in the EU. Amsterdam's TTF is a virtual market, which mirrors at best the supply system in the north-east of the continent, created to manage the system of entry into the Netherlands through the gas pipeline originally managed by Gasunie Transport Services, 100% controlled by Gasunie, which is the energy body of the Dutch state. Large commodity traders, hedge funds and a small group of energy companies (including Gazprom) have increasingly adopted TTF as the benchmark for determining the price of gas at continental level, to the point of linking deliveries to the trend of the previous quarter of futures contracts (as was only noted in July 2022 by ARERA, Energy, Network and Environment Regulatory Authority).

Commission officials have admitted that the Dutch virtual market is small (born at best to be regional), with very high price volatility and that it is out of control. The non-official paper prepared by Commission officials shows that the TTF values were 30% higher than the average of the prices recorded in the virtual gas trading points in each country (British NBP, French Peg or Iberian PVB). It was proposed to freeze prices, cap them, make activities more transparent (quite opaque), index to the US Henry Hub index or LNG quotes, an analysis by ESMA of Dutch market conditions. Suspicions about outside influences of the market and prices were very high and targeted large exporters, Russia and Norway.

On October 18th 2022, the European Commission proposed to set up a price cap mechanism through the TTF gas exchange, to be triggered if necessary. The price correction mechanism would temporarily set a dynamic price limit for TTF transactions. Transactions at a price higher than the dynamic limit would not be allowed under TTF. This will help to avoid extreme volatility and excessive prices. In addition, in order to limit excessive price volatility and prevent extremely sudden price increases in energy derivatives markets, the Commission proposed to introduce a new temporary cap on sudden price increases over the course of a day, to be set by EU derivatives exchanges. This mechanism would protect energy operators against large fluctuations for prices during the course of a day.

The EC proposes a time-limited measure to manage excess volatility in gas and electricity derivatives markets, while preserving the price formation processes. The new temporary intra-day price spike cap mechanism will avoid excessive price volatility and prevent extreme price spikes in prices on energy derivative market (EC, 2022).

5. Conclusions

Oil and gas prices are volatile because short-term energy demand responds much faster to the impact of economic growth than to price changes and when there is an energy shock, it may take a big price change to strongly influence the market. And the pandemic has created a terrible shock, producing the biggest sustained change in demand since World War II (Rogoff, 2022). Before the Covid-19 pandemic, global oil demand stood

at around 100 million barrels per day, but lockdowns caused demand to drop to 75 million barrels a day, and suppliers could not collectively reduce supply quickly enough due to technical reasons. On April 20th, 2020, the price of oil briefly fell on the New York Stock Exchange to minus \$37 per barrel as storage capacities were overwhelmed. Subsequently, starting with the second semester of 2020 and especially in 2021, the strong recovery of demand was hit by the inertia of the recovery of oil supply and the effect was not only a sharp increase in prices but also a sharp volatility of their commodity markets. Within EU the liberalization of energy prices and markets, adoption of European Green Deal and Russia invasion in Ukraine has aggravated the energy crisis in the field of natural gas and electricity. In the medium to long term, energy prices will be on an upward trend if investment does not rise sharply, which seems unlikely given the current environmental guidelines. Supply and demand shocks and high price volatility are likely to continue to weigh on the energy market and the global economy.

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