

Box 2

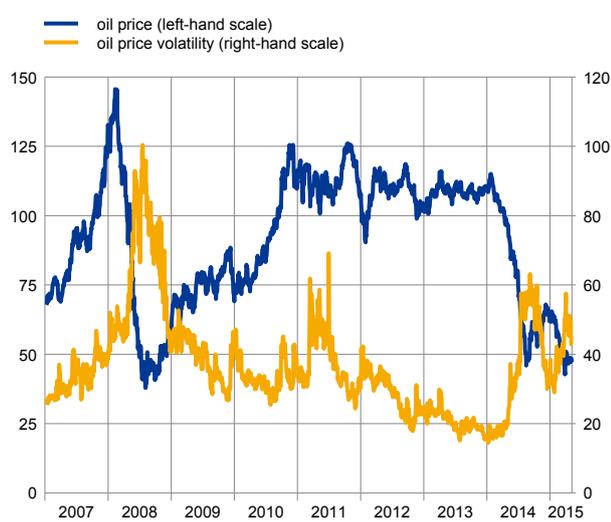
Explaining the drivers of the recent increase in oil price volatility

After reaching historically high levels during the global financial crisis, oil price volatility decreased gradually in recent years before rising again in 2014 and 2015. Although current volatility is not particularly high by historical standards,

Chart A

Oil prices and oil price volatility

(USD per barrel)



Source: Datastream.

Notes: Daily data, latest observation is 5 October 2015. Oil prices are nominal Brent crude oil prices. Oil price volatility is measured by the Chicago Board Options Exchange (CBOE) Crude Oil Exchange-Traded Fund (ETF) Volatility Index (OVX). The OVX is strongly correlated with realised oil price volatility.

oil price volatility in itself may weigh on economic prospects.¹ Understanding the factors driving changes in oil price volatility is therefore important. This box discusses the general determinants of oil price volatility and focuses on the likely causes of the recent increase.

Time-variation in oil price volatility can be driven by a number of factors. Three main possible explanations of higher oil price volatility are (i) large shocks to oil demand and supply, (ii) an increased sensitivity of oil prices to changes in demand and supply and (iii) an increased use of oil as a financial asset. These three potential drivers of time-variation in oil price volatility could all have an impact at any given point in time.

Higher oil price volatility can simply be caused by large shocks to oil demand or supply. The drop in global oil demand triggered by the 2008 global financial crisis is an example of how large shifts in demand and supply fundamentals can cause higher oil price volatility (see Chart A).

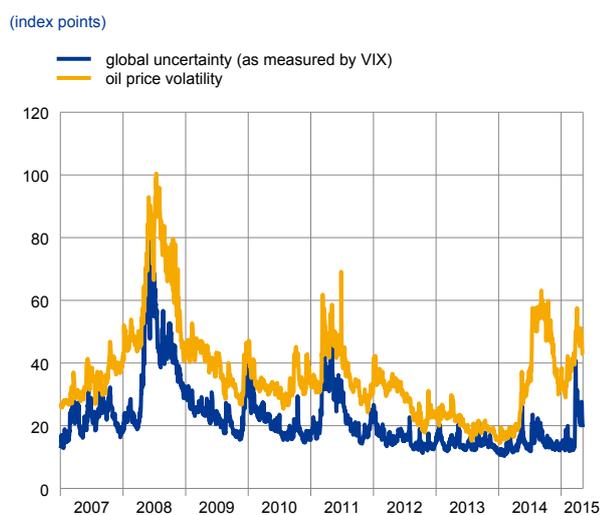
Oil prices can become more sensitive to changes in oil demand and supply as a result of lower price elasticity of demand and supply, causing higher oil price volatility. Lower price elasticity of oil demand and supply means that both demand and supply react less to oil price changes induced by shocks. As this implies that the quantity adjustment following shocks is lower, the price response is magnified, thus causing increased price volatility.

Various factors, such as the level of spare capacity or inventories, can explain why the price elasticity of oil demand and supply might be lower in specific periods. On the one hand, a reduced flexibility to alter oil supply following price changes might be triggered by low levels of spare capacity or limited inventory holdings. In mid-2012, for example, oil prices reacted strongly to news about ongoing and potential supply disruptions in the wake of the Iranian oil embargo as

¹ Jo, S., "The effects of oil price uncertainty on global real economic activity", *Journal of Money, Credit and Banking*, Vol. 46, No 6, pp. 1113-1135, 2014.

spare capacity among members of the Organisation of the Petroleum Exporting Countries (OPEC) was low and inventory holdings were below historical averages, indicating that supply could not easily increase to compensate for any further decline in production. On the other hand, a reduced price sensitivity of oil demand might, for example, be related to a reduced potential to replace oil with alternative energy sources. The gains in energy conservation following the oil price shocks of the 1970s might have caused higher oil price volatility as demand became less sensitive to price changes.²

Chart B
Oil price volatility and global uncertainty



Source: Datastream.
Notes: Daily data, latest observation is 5 October 2015. The Volatility Index (VIX) is based on the implied volatility of S&P 500 index options.

Global uncertainty is another factor that might cause reduced price elasticity of oil demand and supply.

Higher uncertainty can change the price elasticity of both oil demand and oil supply.³ In an environment of greater uncertainty, oil producers and consumers have a less marked reaction to oil price changes as they have a so-called “option-value-to-wait”.⁴ This reduced responsiveness lowers the quantity adjustment following shocks and magnifies the oil price effect, thereby increasing oil price volatility. Previous episodes of elevated global uncertainty, as measured by the Volatility Index (VIX), indeed coincided with higher oil price volatility. This happened, for example, during the European sovereign debt crisis in 2011 (see Chart B).

Finally, it is often argued that the increased use of oil as a financial asset causes oil price volatility to be higher, although the empirical evidence on this remains mixed.

Since the early 2000s, oil has increasingly been used as a financial asset; a process

referred to as the “financialisation” of oil futures markets. The increased use of paper oil for financial investment, hedging and speculation purposes might have intensified the sensitivity of oil prices to investor sentiment. However, the empirical evidence on the significance of this factor is not clear-cut.⁵

Focusing on the recent period, a combination of a large oil supply shock and higher global uncertainty are the probable causes of the increase in oil price volatility since the end of 2014. First, the decline in oil prices in the second half of 2014 was accompanied by large increases in oil supply; the year-on-year increases in global production were substantially above historical averages. Combined with weak demand and the decision by OPEC not to cut its production, this led at the end of 2014 to a strong decline in oil prices and increased oil price

² Baumeister, C. and Peersman, G., “The role of time-varying price elasticities in accounting for volatility changes in the crude oil market”, *Journal of Applied Econometrics*, Vol. 28, pp.1087-1109, 2013.

³ Van Robays, I., “Macroeconomic uncertainty and the impact of oil shocks”, *ECB Working Paper*, No 1479, 2012.

⁴ Bernanke, B.S., “Irreversibility, uncertainty, and cyclical investment”, *The Quarterly Journal of Economics*, Vol. 98, No 1, pp. 85-106, 1983.

⁵ See, among others, Singleton, K. J., “Investor flows and the 2008 boom/bust in oil prices”, *Management Science*, Vol. 60, pp. 300–318, 2012 versus Fattouh, B., Kilian, L. and Mahadeva, L., “The role of speculation in oil markets: What have we learned so far?”, *Energy Journal*, Vol. 34, No 3, pp. 7-33, 2013.

volatility. More recently, the renewed increase in oil price volatility coincided with a spike in global uncertainty at the end of August 2015 (see Chart B) which was mainly linked to concerns over the strength of Chinese growth. In contrast, changes in oil inventory holdings and spare capacity probably did not drive the increase in oil price volatility as inventories are at historic highs and total OPEC spare capacity is not far below past averages.

Given that global uncertainty is likely to remain elevated in the near-term, oil prices will continue to be sensitive to any new information about oil demand and supply developments.