

# Analyses Économiques

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## The Newsletter of the French Council of Economic Analysis

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## The Effects of High and Volatile Oil Prices

EDITORIAL

Report by Patrick Artus, Antoine d'Autume,  
Philippe Chalmin et Jean-Marie Chevalier

*Oil prices are rising as a long-term trend, and the movement is subject to considerable volatility.*

*The purpose of this report is threefold: to analyse the causes of these trends; to determine their impact on the real economy (growth, employment, etc.); and to make a number of recommendations for public policy.*

*While there is a broad consensus about oil price swings and their excessive «financialisation», the consensus breaks down when it comes to establishing responsibility.*

*The other part of the report addresses the impact of oil shocks. The macroeconomic effects are ultimately limited by the structural changes that follow oil crises, though this contrasts with the significant impact on certain sectors. A number of recommendations are made, regarding for example consumer awareness, maintaining France's essential presence in international energy projects, a green growth strategy and ways of reducing the financialisation of the oil markets.*

**Christian de Boissieu**  
Executive Chairman of the CAE

*Oil prices have undergone major swings in recent years: from \$9/barrel in December 1998, they reached a peak of \$145 in July 2008, then dropped to \$32 in December 2008 before rising to \$86 in early May 2010. In this new energy environment, should the French economy fear high and volatile oil prices?*

*The authors of the report make four main points in response to this question:*

- *the upwards trend in oil prices is inevitable and will be accompanied by significant volatility, reflecting uncertainty over real fundamentals and speculative swings on the oil market;*
- *oil now plays a smaller role in the French economy. As well as this decline in oil intensity, three other phenomena can explain the attenuation of the negative effects on the economy: the appreciation of the euro, the high proportion of tax in the prices paid by consumers, and a better response from macroeconomic policy;*
- *even if the impact of high oil prices seems less consequential than it was during the first oil shocks of the 1970s, the authors encourage us not to underestimate the effects of this negative supply shock. A rise in prices from \$80 to \$150 would knock one or two points off French GDP;*
- *economic policy should encourage and accompany the supply-side adjustments and redeployment needed. An indistinct policy of supporting demand would be ineffective. The authors put forward a number of recommendations in this respect.*

*The report was discussed in the presence of Christine Lagarde, French Minister for the Economy, Industry and Employment at the Council of Economic Analysis' plenary session of 9 July 2010. This newsletter, which is published by the permanent committee, reviews the authors' main conclusions.*

### A high and volatile oil price

Forecasting work carried out by a number of institutions shows how difficult it is to accurately predict trends in oil prices. The authors of this report do not carry out this forecasting exercise, but they share the same conclusions about the main features of oil price trends in the near and medium term: a rise in oil prices is inevitable, and will be accompanied by significant volatility. This expectation is based on detailed analysis of oil price determinants, their past variations and forecasts as to their future trends.

On the supply side, like with all goods, the price of oil reflects production costs: extrac-

tion, transport and refining costs. Alongside this essentially technological component, more specific determinants are at play: the non-competitive economic rent, which largely stems from OPEC's hold on the market, the scarcity rent on all non-renewable natural resources (this rent increases at a rate equal to the real interest rate according to Hotelling's rule), various taxes (mainly the TIPP domestic tax on oil products in France) and a new component that is set to gain importance in the years ahead, namely the implicit price of carbon emissions (which may take the form of a carbon tax or the cost of emission permits). It is difficult to isolate these different components and even more

difficult to quantify them, but the authors' detailed analysis shows that most predictable supply-side developments will concur to bring about a rise in oil prices.

On the demand side, too, forecasts and projections converge towards a rise in oil prices. Demand trends depend on crude oil prices, taxes, economic growth and energy and environmental policies. In most developed countries, the trend is towards a slowdown in demand growth and some countries are even seeing a decline in demand. In addition to the economic crisis, two explanations are put forward. The levels reached by crude oil and fuel prices in July 2008 clearly brought the price-elasticity of demand into play (this is estimated at around 0.2 in the short term and around 0.4 over the longer term for fuel demand) and possibly caused behavioural changes such as those seen in France and described in the report. The other explanation is related to energy and environmental policies, which have helped reduce oil demand. However, the strong growth expected in emerging markets is likely to increase global demand for oil by several million barrels per day by 2014. This reflects the expectation that the number of cars on the road worldwide will double by 2030, and it seems unlikely that tougher environmental constraints will contain these trends. Half of this growth will come from Asia. Such an increase in global oil demand will only be sustainable if it is accompanied by higher prices that will enable the exploitation of new unconventional oil fields or fields with high production costs.

As regards volatility, the authors first repeat that there are real determinants at play: the level of oil prices encourages or discourages investment in production capacity. Low oil prices slow capacity investments and therefore limit future supply, which then causes prices to rise, thereby providing an incentive to invest and develop supply. However, neither these (endogenous) irregularities in the

investment programmes of oil companies and exporting countries nor changing demand trends alone can account for the sharp rise in prices between 2002 and 2008 and the very sudden drop that followed in July-August 2008. A number of observers believe that the explanation lies in speculation on the oil market. The report's authors sift through all the arguments for and against this theory. While it is undeniable that speculation has developed on the oil futures market, the authors question two key points: was this speculation really focused on an oil price rally, and could it have such a significant retroactive effect on spot prices? Their conclusions recognise that speculation was indeed at play, but that it was limited, mainly due to restricted storage capacity, which is rapidly saturated. The debate is therefore not closed, but for the authors there is no doubt that the overlapping of these real and financial elements augurs for greater oil price volatility. Uncertainties over demand and production capacity and the globalisation of financial flows combine in making it difficult to forecast price trends, while the reaction of economic agents placed in this environment could accentuate this unpredictability.

### **An attenuation of the effects of oil shocks on the French economy?**

France, which imports its oil, must be prepared to deal with high and volatile oil prices. What capacity does the economy have to handle this? Should it fear the economic effects of the expected shocks?

A rapid comparison of the macroeconomic impact of the two oil shocks of the 1970s and the shock that followed the gradual rise in prices over the past decade suggests that the French economy has adapted. While the oil crises of 1973 and 1979 had a significant impact on growth, employment and inflation, the situation was different in the 2000s. French growth picked up at the end of the decade and created a lot of jobs. The fall in the unemployment rate was not

hindered by the rise in crude oil prices and inflation stayed under control. The report makes several suggestions to explain this new situation: the protection provided by the appreciation of the euro and the importance of taxes in the prices paid by consumers for oil products, better macroeconomic policies and, most significantly, the French economy's reduced oil dependency. Why did French consumers see petrol prices rise from  $\square 1$  to  $\square 1.50$  (+50%) between January 2004 and July 2008 while US consumers suffered an increase of over +166% (from \$1.50 per gallon to \$4) over the same period? The explanation is twofold. First, the euro's appreciation enabled the economy to buy oil, which is invoiced in dollars, less expensively; second, the importance of the TIPP in the prices paid by consumers introduces considerable inertia into pump prices. A better definition of macroeconomic policy in response to the oil crisis, characterised by reduced wage indexation and the stronger credibility of monetary policy limited the formation of inflation expectations. Above all, what mostly explains the French economy's reduced vulnerability to oil price shocks is its diminished oil dependency. The nature of the country's primary energy consumption has changed considerably with the development of nuclear energy. Electricity accounted for 42% of primary energy consumption in 2007, compared with just 4% in 1973. Over the same period, oil saw its share halved, from 67% in 1973 to 33% in 2007. The economy's oil intensity has declined considerably since the first oil shock. Today, it only takes 1/3 of a barrel of oil to produce  $\square 1,000$  of GDP in France, compared with one barrel in 1973. But this decline in oil intensity varies greatly between sectors: industry and agriculture fare better than households, as the transport and residential-tertiary sectors have made less progress in this area. Housing and vehicle fuel efficiency has improved, but to a lesser extent than the size and comfort of homes and the growth in car transport.

However, the authors ask to be cautious in interpreting this apparent attenuation of the impact of high oil prices, and encourage us not to underestimate the negative effects they can have. On the one hand, the effects may not have had enough time to reveal themselves in full. The economic environment was badly affected by the financial crisis that hit Europe in mid-2007 and by the economic crisis that followed. In these circumstances it is difficult to accurately quantify the economic impact attributable to oil prices. On the other hand, looking at sectors rather than the whole economy gives rise to a more nuanced –and more pessimistic– conclusion. Some sectors, including fishing and road transport, found it hard to bear the rise in the price of oil products.

### **The impact of an oil price shock at a macroeconomic and sector level**

With the aim of better understanding the nature, effects and extent of an oil shock, the authors describe in detail the principal mechanisms through which the shock is transmitted to the economy, emphasising the problems and adjustments required, rather than focusing on the timetable.

In principle, high oil prices only deteriorate the French economy's terms of trade. The country must pay more for this imported commodity, and must therefore export more of its own products. The economy permanently suffers crises of this type, and adapts by modifying its production/consumption balance. Such a crisis stands out merely due to the extent of the shock it has on the French economy. Yet oil still has a very large place in the economy. It remains an essential intermediate consumption that French companies cannot do without, as well as representing final consumption by households, in particular for transport. Price fluctuations affect all parts of the economy. The effects of an oil shock are therefore of a macroeconomic nature.

An oil shock is above all a supply shock: high oil prices raise companies' production costs and reduce their capacity to produce, or more specifically their capacity to distribute wealth. The key question is who will pay: the oil price rise can only be factored into wages or profits. The solution is to try to limit the decline in production rather than the repercussion on general prices.

In addition to the supply shock caused by high oil prices, there is also a demand shock, which is also negative and takes the form of a fall in demand for domestic products. High oil prices slash national revenues and therefore reduce domestic demand. But they have the opposite effect on external demand as they increase the revenues of OPEC nations and therefore support our exports. Overall, the first effect is greater as OPEC members have a lower propensity to spend their revenues than importing countries. High oil prices nonetheless generally favour the French economy as its production and exports are less oil intensive than those of its competitors.

The competitiveness of the French economy therefore improves when oil prices are high. Quantitative assessments show that the effect of an oil shock on French exports inverts and becomes positive after two years.

The negative impact of high oil prices on supply and demand for national goods has negative consequences on employment and wages. More expensive oil makes employment less profitable and reduces demand for labour. In the short term, two mechanisms bring about a decline in real wages: nominal wages are often fixed for one year, while a rise in oil prices reduces purchasing power and rapidly spreads to other prices; profit margins tend to be contract-cyclical, so they remain high in the weak economy that immediately follows the oil shock, and the sharing of national wealth shifts to the detriment of real wages. But this initial decline in real wages is insufficient to restore a

sustainable balance in the economy. The inflationary period that follows the shock therefore provides the economy and earnings with the means to adjust to the new output conditions. This process was particularly long in France after the first two oil crises, as everyone tried to avoid paying the high price of oil by obtaining wage and price increases, which were in fact purely nominal. The report emphasises the fact that macroeconomic policies, which are better managed today, now enable a faster adjustment, without causing a prolonged period of high unemployment.

Even though the impact of an oil crisis on the French economy has diminished as the country's energy dependency has declined and although certain empirical studies confirm that the effects are limited, the report's authors emphasise that the impact remains significant and that it should not be underestimated. To convince us, they build a theoretical model using French data, which has the advantage of highlighting the considerable interaction between variables and providing an order of magnitude of the effects that can be expected. The results confirm that the effects are not insignificant and that they are greater than those found in recent studies. A half-point or one-point impact on GDP for a 20% increase in oil prices is relatively significant, especially when a more substantial rise in prices can be expected.

After looking at the macroeconomic impact, the authors' exhaustive study of the economic impact of an oil price shock shifts its focus to the sector level and examines the situation for households. The authors show that a small number of business segments are directly major oil users (for example, the organic chemical industry, transport, fishing, etc.). The business segments with an oil intensity (ratio of oil consumption to production) of over 2.4% account for 62% of oil consumption but only 21% of national output. Therefore a rise in oil prices,

which affects all companies without exception, has a pronounced direct impact on a small number of them. To explain the situation of those segments that are heavily dependent on oil, the report describes in detail how the transport sector, and air transport in particular, has sought to adapt to high oil prices.

If we look at the categories of households the most exposed to high oil prices, two elements are decisive: the position on the revenue scale and the type of housing. Overall, households' energy bill can be considered as regressive in the sense that the energy budget of low-income households is proportionally higher, and it is they who suffer most from a rise in oil prices. A second area of inequality puts those living in rural areas or a long distance from town centres at a disadvantage to households in urban areas. Rural households devote a larger portion of their budget to fuel, which seems obvious, but also to energy consumption for their homes.

### Recommendations for a supply adjustment policy

The guiding principle of all the recommendations put forward by the authors is relatively simple and clear: we should not seek to subsidise the use of more expensive oil; on the contrary, we should encourage and aid the necessary supply-side adjustments. This does not rule out personalised support for the hardest hit sectors and households—though this support must not discourage these adjustments, but should instead encourage and support them. The adjustment support provided to the most vulnerable sectors must be limited in time, focused and temporary.

An indiscriminate policy for supporting demand in the face of a supply shock would be ineffective and would risk causing prices to rise without this having a significant impact on activity. The minor temporary benefits of such a policy would not justify the cost for public finances. The best macroeconomic

policy consists in accompanying and facilitating adjustments, which must inevitably be made in favour of those sectors that consume less oil; the policy should also maintain or improve the competitiveness of our businesses and reduce the economy's oil dependency.

This does not mean that public policy should not consider the demand side. In an environment of intense international competition, strong foreign demand for French products seems the best possible response to rising oil prices. It will restore the trade balance and finance the oil cost. More fundamentally, it will improve the terms of trade and restore the competitiveness and the exporting capacity of French businesses, without obliging them to accept very low prices for their products. Improving the terms of trade comes down to increasing the purchasing power of national revenues. It encourages the development of supply and boosts employment. Adapting demand is therefore an essential component of a supply-side policy. As oil prices rise, it will be impossible to avoid initial downside pressure on the overall level of real wages. The re-adjustment of wages will depend on improving competitiveness and exporting capacity. The authors recommend that the French economy develop a production specialisation so it can export to oil-producing countries. Based on a detailed examination of the type of imports of oil-exporting countries, the authors conclude that this specialisation should focus on the equipment goods and transport materials sectors as well as the growth sectors of the future, which are related to energy and the environment (nuclear, energy efficiency, renewable energy, waste treatment, etc.). In the same vein, they recommend measures to reinforce France's comparative advantage in the production of fuel-efficient vehicles. For example, retaining the car scrappage scheme would provide a structural means of reducing the average age of cars on the road.

For the authors, the fundamental axis of the policy is to reduce the French economy's oil dependency. Efforts to replace oil with other energy sources must continue. Nuclear energy plays a considerable and original role in France. Greater use of gas is possible in certain sectors, and gas prices are likely to fall in relation to oil. Climate policy, which is evidently primarily justified by its environmental benefits, encourages technological developments and can considerably help reduce the French economy's exposure to high and volatile oil prices. The authors recommend the implementation of a carbon tax scheme at a European level, which must be sufficiently high and consistent with the European carbon permit market. To be effective, the taxation must extend to all sectors that consume energy and fuel, without exception. The authors also recommend stepping up the implementation of the so-called Grenelle environmental policies in France, which aim to reduce France's dependency on fossil fuels. More generally, they call for a major reform of energy and environment-related taxation at a French and European level. Taxes should not unnecessarily influence energy choices at a time when switching energy sources is justified and they should closely reflect the social costs of greenhouse gas emissions. This implies, for example, reducing the difference between petrol and diesel taxes.

As regards oil price volatility, the authors

recommend taking action at the source (reinforcing regulation of derivatives markets to limit speculation), rather than through taxation (such as the floating TIPP applied in the early 2000s or a modulated TIPP designed to offset oil price variations). This last idea, of a modulated TIPP, would provide a bad incentive for oil exporting countries, which would be encouraged to raise prices as much as possible, knowing that this will not affect prices for consumers and will therefore not dampen demand. Oil-producing countries would be in a position to capture all the revenues associated with their chosen target price. To improve regulation of commodity derivatives markets, the authors reiterate the main recommendations of the report of the working group on «Oil price volatility» chaired by Jean-Marie Chevalier, which was submitted to the Minister of the Economy, Industry and Employment in February 2010.

### Comments

**Benoît Cœuré** appreciates the comprehensive and interesting range of economic questions raised in connection with oil price swings. Regarding price determinants, he considers that the authors are overly optimistic on the level of reserves yet to be discovered, but that they are overly pessimistic about the world's ability to cut demand. To reduce volatility, he accepts the need to provide a satisfactory information system at a physical level and a financial level. He recalls the work carried out by the G20 and the particular interest shown by France, which produced several reports on this issue.

He is very interested in the economic analysis, but regrets that the different explanations of past experience do not rank the different factors of change by

importance. He is more guarded on the link between fluctuations in the euro and high oil prices, about which he believes there is no consensus. He is interested in the different impacts forecast by the *Mé-sange* model and the model created by the report's authors. In his opinion, the two results can be reconciled according to whether we examine the impact on GDP in volume terms, as measured in the models, or on distributable GDP, i.e. deflated by the prices paid by consumers. He supports the need to reform energy and environmental taxation, while recommending that projects need to be assessed in terms of their budget cost, with the objective of reducing dependency on fossil fuels and mobilising innovative sources of finance.

**Roger Guesnerie** emphasises that the subject covered by the report's authors is vast and involves looking at a large number of questions—possibly too many—at the risk of sometimes being superficial. The assessment of the development of green growth via the Grenelle package of environmental measures raises the intellectual problem of the relationship between the micro- and macro-economic aspects of the decisions that need to be taken. Work on this issue and its conclusions should be viewed with caution, as the link between the microeconomic calculation and the macroeconomic calculation is not always clearly formulated.

Regarding the report's content, Roger Guesnerie focused on two subjects: the appropriation of oil rent and speculation. The opposition of oil exporting countries to climate policies and in particular those that aim to introduce a carbon

tax reflects their fears that this tax will transfer rent to oil importing countries. This raises the question, which is implied but not explicitly addressed in the report, of modulating the effects of a harmonised carbon tax within the framework of a climate policy. Does speculation stabilise the market or not? In the case of the oil market, authorising speculation implies creating a futures market where participants other than storage capacity managers can intervene. As the risk would then be spread more widely, the futures market should reduce price volatility. But at the same time, the presence of speculators can reduce the plausibility of coordinating rational expectations and thereby open the door to a type of volatility that is more difficult to pinpoint. The successful choice of the right economic policy clearly depends on the quality of coordination between economic players.