

**Box 3****THE PASS-THROUGH OF GLOBAL ENERGY PRICES TO THE EURO AREA HICP ENERGY COMPONENTS**

Energy prices contributed 1.0 percentage point to the overall HICP inflation rate of 2.2% in December 2005 (see table). This relatively high contribution reflects developments in primary energy prices, in particular those of oil and natural gas, which have risen significantly over the past year. In this context, this box investigates the relationship between developments in primary energy prices and developments in the energy components of the HICP.

**Recent developments in primary energy prices**

The prices of crude oil and natural gas rose considerably in 2005, the effect of which was magnified by the appreciation of the US dollar over the same period (see Chart A, which shows the evolution of prices in euro). In euro terms, the price of Brent crude oil stood 62% higher in December 2005 than one year earlier. The current crude oil price shock differs from previous oil price shocks. While the latest increase has been sizeable, it has also been more gradual and persistent, as unexpectedly strong growth in demand in 2004 triggered capacity constraints throughout the oil supply chain. Geopolitical concerns over the security of future crude oil supplies added further upward pressure.

Historically, natural gas prices tend to follow developments in crude oil prices. However, in the fourth quarter of 2005, there was a noticeable decoupling between the prices of these two sources of primary energy as a result of the damage caused by the hurricanes in the US Gulf of Mexico, which had a greater impact on natural gas prices than on crude oil prices. In December 2005, the price of natural gas as measured by the one-month forward contract traded on the Intercontinental Exchange stood 153% above its level one year earlier. The behaviour of coal prices has been historically different from that of crude oil and natural gas prices. Indeed, the price of coal fell by 13% in the course of 2005.

**The response of HICP components to developments in primary energy prices**

There is a strong direct correlation between the prices of liquid fuel and petrol, which together represent more than half of consumer expenditure on energy items, and developments in the price of crude oil. However, the pass-through factor from oil prices to final consumer prices is relatively low. In the case of liquid fuel, it was approximately one-quarter in 2000, when the

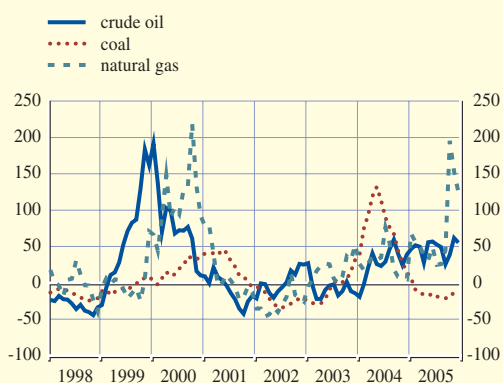
**Contribution of energy prices to overall inflation in December 2005**

	Rates of change/ contributions	Weight in the HICP (%)
Overall inflation ( <i>year on year rate</i> )	2.2	
Energy		8.6
<i>contribution to overall inflation</i>	1.0	
<i>year on year rate</i>	11.2	
<i>Of which (contribution to energy year on year rate):</i>		
Electricity	0.7	2.0
Gas	2.1	1.4
Liquid fuels	2.3	0.8
Solid fuels	0.0	0.1
Heat energy	1.0	0.4
Fuels and lubricants for personal transport equipment	5.1	3.9

Sources: Eurostat and ECB calculations.

Chart A Primary energy prices

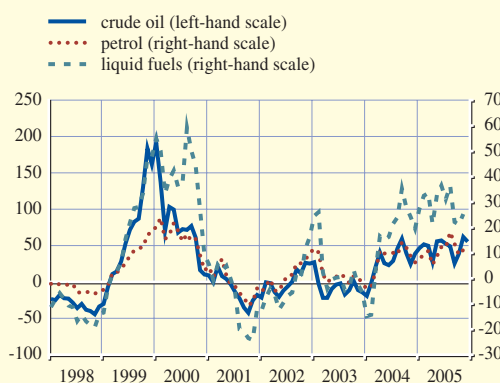
(annual percentage changes)



Sources: Eurostat, Datastream and HWWA.  
Note: Prices are in euro terms.

Chart B Consumer prices: petrol and liquid fuel

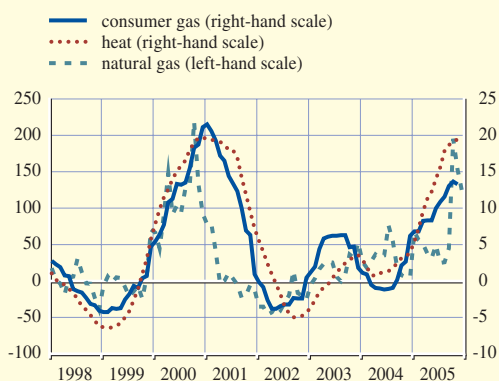
(annual percentage changes)



Sources: Eurostat and Datastream.  
Note: Prices are in euro terms.

Chart C Consumer prices: gas and heat

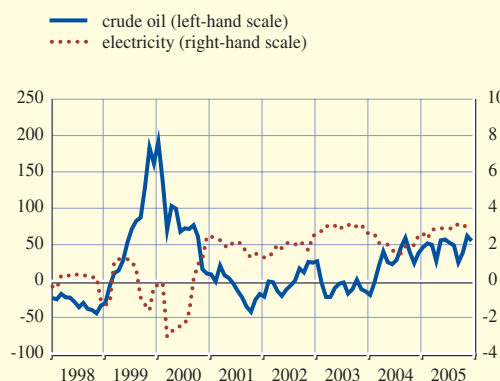
(annual percentage changes)



Sources: Eurostat and Datastream.  
Note: Prices are in euro terms.

Chart D Consumer prices: electricity

(annual percentage changes)



Sources: Eurostat and Datastream.  
Note: Prices are in euro terms.

200% increase in oil prices translated into a 50% rise in liquid fuel prices. The pass-through to petrol prices was even lower (see Chart B). Obviously, the precise magnitude of the pass-through may also vary in time. However, most of the impact occurs very quickly, within a few weeks of the rise in crude oil prices.

By contrast, the correlation of consumer gas prices and heating energy (hot water and steam) with developments in natural gas prices is less direct (see Chart C). Developments in consumer gas prices are generally smoother than developments in primary energy prices. They also react with a significant lag. In 2000, a pass-through factor of only one-tenth applied.

Last, electricity appears to be a special case, as no obvious short-term correlation can be made between its price at the consumer level and primary energy prices (see Chart D).

### Possible factors influencing the responsiveness of consumer energy prices

There are several factors explaining the various degrees of elasticity of consumer price developments to primary energy prices. From a general point of view, the pass-through factor depends first on the production structure of the energy delivering companies: the final impact of a change in primary energy prices is moderated by the weights of fixed costs (for instance infrastructure) or variable costs (such as wages), and by the margin behaviour. An additional reason is that the final price at consumer level – as reported by the HICP indices for gas or electricity for instance – has a fixed component that is not linked to the volume of energy consumed. Such a fixed charge is often paid for the connection to the delivering infrastructure.

Turning to institutional factors, the tax structure – notably the weight of excise taxes – is also a decisive factor in explaining the only partial pass-through of primary energy prices to energy prices for consumers. A high level of excise tax, which is fixed per unit of consumption, lowers the proportional impact of primary energy prices on the price paid by consumers. Given the relatively high share of excise taxes on energy in the euro area, this factor is particularly relevant in explaining the limited responsiveness of petrol and gas prices at the consumer level to changes in primary energy prices.

In addition, in several euro area countries, consumer gas and electricity prices for households can be considered as “regulated” or “administered”. Such direct regulation of consumer prices can certainly also contribute to a reduction in the volatility of consumer price developments or at least delay the impact on consumer energy prices. In particular, regulatory arrangements often entail legal contracts that define periods during which no adjustment of final prices to developments in primary energy prices can take place. Moreover, gas and electricity markets in many euro area countries are concentrated, creating additional scope for incumbent operators to influence prices and possibly disconnect them further from input prices.

Finally, institutional choices may have also led to a supply structure in which there is a relatively low sensitivity of electricity prices to primary energy prices. In particular, the electricity produced in the euro area mainly depends on energy sources whose prices are not directly or immediately linked to volatile oil and gas prices. According to the International Energy Agency, oil and gas only represented 6% and 17%, respectively, of the sources used for the production of electricity in euro area countries in 2003. The weight of coal represented 27% of the electricity produced, whereas the weight of inputs whose prices were independent of all three primary energies was close to 50% (34% for nuclear energy, 11% for hydroelectricity and 4% for other energy sources). In addition, for the purpose of electricity generation and residential and commercial heating, oil, natural gas and coal are, to a certain degree, substitutes for each other as the primary energy source. This substitution therefore diminishes the impact on electricity prices of a shock that would be specific to one of the three primary energy sources.

To summarise this information in a quantified way, a commonly used rule of thumb suggests that a 10% increase in oil prices in euro terms leads to a rise of 1½ percentage points in the annual rate of change in energy consumer prices within approximately six months. As energy has a weight of roughly 8-9% in the overall HICP, this translates into a direct increase in total consumer price inflation of 0.1-0.2 percentage point (see the article entitled “Oil prices and the euro area economy” in the November 2004 issue of the Monthly Bulletin). Of course, in addition

to this initial direct effect, when assessing the overall impact on the inflation outlook, lagged indirect effects through the impact on non-energy consumer prices as well as possible second-round effects on wage and price-setting behaviour must also be taken into account.