ARTICLES

OIL PRICES AND THE EURO AREA ECONOMY

Oil plays an important role in the economy owing to its widespread use both as an input factor in the production process and as a final consumption good. As a result, any major change in oil prices affects the economy in various ways. On the price side, direct price effects via energy items in the consumer basket are unavoidable following an oil price shock, and indirect effects may emerge on account of higher input costs being passed on to consumer prices via the domestic production chain. Of particular importance is the avoidance of second-round effects through appropriate wage reactions to oil price increases. With regard to real economic activity, output is negatively affected by an oil price increase as a result of higher production costs and a decline in real purchasing power. Empirical estimates from large-scale macroeconomic models generally suggest that strong oil price changes have a noticeable effect on euro area inflation and, albeit to a somewhat lesser extent, on activity. It is important to bear in mind that these results are surrounded by uncertainty, as standard models cannot take into account all the ways in which oil prices affect the economy. Moreover, the full impact of oil price changes on prices and economic activity largely depends on the actual reaction of wages as well as fiscal and monetary policy. As for the containment of price pressures, a high degree of credibility and the appropriate monetary policy reaction are essential.

As regards recent oil price increases, when compared with the dramatic oil price shocks of the 1970s, they appear to be of a more limited magnitude, particularly in real terms. Moreover, structural changes, such as a decline in oil dependency and increased labour and product market flexibility, point to an oil price shock having a smaller impact on the euro area economy now compared with the past. Nevertheless, while euro area growth seems not to have been significantly affected so far by the recent oil price increase, persistently high levels of oil prices or even further increases would be a reason for concern. With regard to price developments, the oil price increase has already had a significant direct impact on euro area inflation. Against this background, monetary policy has to ensure that this direct effect does not fuel inflationary expectations and has to remain vigilant against the emergence of second-round effects.

1 INTRODUCTION

Recent oil price developments have raised the question of whether they would cause effects similar to the large oil price shocks in 1973-74 and 1979-80, which led to both an economic downturn and rising inflation. However, the characteristics of recent oil price increases may be somewhat different to those observed in the past. Moreover, a number of factors may have changed the way oil prices affect the economy. For example, differences in the structure of the economy and in policy reactions could have changed the functioning of the various channels by which oil price shocks are transmitted to economic developments. This article discusses the above-mentioned issues, focusing in particular on the euro area economy.

Section 2 gives an overview of oil price developments since the 1970s and looks at the current oil price increase against the background of previous episodes of rising oil prices. Section 3 describes the various channels through which, in principle, oil prices are transmitted to economic growth and inflation. Empirical evidence from macroeconomic models on the impact of an oil price shock on the euro area economy is also presented. Additionally, this section discusses certain characteristics of oil price shocks which influence the impact on prices and activity. As the transmission can also be affected by structural factors, Section 4 analyses to what extent such factors are relevant for the euro area economy. Section 5 discusses the role of macroeconomic policy and its implications for the transmission of oil prices to the economy, while Section 6 gives some concluding remarks.

2 DEVELOPMENTS IN OIL PRICES SINCE THE 1970s

This section reviews developments in oil prices over the last 30 years and compares recent developments with the major oil price movements of the past.

HISTORICAL OIL PRICE DEVELOPMENTS

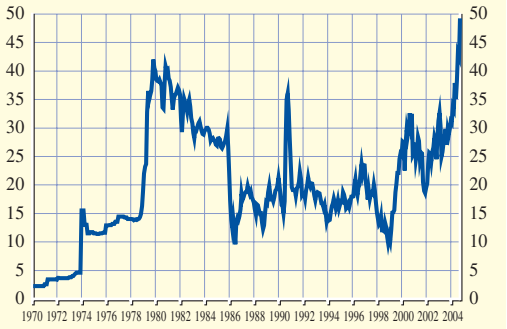
After decades of relatively stable oil prices, the first oil price shock occurred in the wake of political and military tensions in the Middle East, resulting in an increase in oil prices from USD 4.6 in October 1973 to USD 15.5 in March 1974 (see Chart 1).

The second oil price shock, also brought about by political and military conflict in the Middle East, pushed oil prices from USD 14.4 in October 1978 to USD 42.0 at the height of the crisis in November 1979. Oil prices declined steadily in the first half of the 1980s, but remained well above pre-1978 levels.

The oil price shocks of the 1970s led to energy saving and energy product substitution (see Section 4). Combined with a global recession in the early 1980s, this depressed demand for oil and put downward pressure on oil prices. The price of oil remained relatively low until August 1990. Oil prices rose sharply to USD 36.1 after Iraq's invasion of Kuwait but returned to pre-invasion levels when the war ended in February 1991. Between 1991 and 1997 the price of oil averaged USD 18.3. In 1998 oil prices plummeted in the aftermath of the economic crisis in Asia, falling to USD 9.8 by December 1998. Thereafter, oil prices tripled between January 1999 and September 2000, which more than reversed the fall in prices witnessed in previous years. Despite the economic slowdown of 2001-02, political and geopolitical tensions kept upward pressure on oil prices throughout 2001-03.

Chart 1 Brent crude oil prices in USD

(USD per barrel)



Sources: IMF and Bloomberg.

RECENT DEVELOPMENTS IN PERSPECTIVE

While the price of oil has surged over the last year, the situation differs from previous oil price shocks in several respects. First of all, the recent increase has been considerably smaller than those observed during other major oil price shocks. Oil prices in October 2004 stood 67% higher than one year previously in USD terms, compared, for example, with a rise of 237% during the first oil price shock (see Table 1). As a result of the overall appreciation of the euro against the US dollar, oil prices in euro terms have risen less than dollar prices over the last 12 months.

Table 1 Increases in oil prices over specific periods

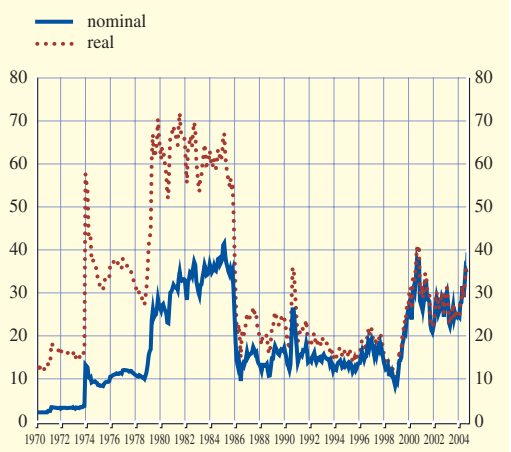
(percentage changes)

	Oct. 1973 - Mar. 1974	Oct. 1978 - Nov. 1979	July 1990 - Oct. 1990	Jan. 1999 - Sep. 2000	Oct. 2003 - Oct. 2004
in USD	237	193	111	198	67
in EUR	270	187	97	297	56

Sources: IMF and ECB calculations.

Chart 2 Brent crude oil prices in euro

(EUR per barrel)



Sources: IMF and ECB calculations.
Note: Real oil prices allow a comparison of the impact of oil price developments on purchasing power over time. They are computed by deflating nominal oil prices with the euro area HICP. Price data before 1990 refer to national CPI data.

Second, after taking inflation into account, oil prices are currently significantly lower than the levels reached during earlier periods of high prices. For example, expressed in September 2004 prices, the real price of oil stood at €58 during the first oil price shock and €72 during the second oil price shock (see Chart 2). This compares with €39 in October 2004.

Third, the factors driving the price increase over the last year also differ from earlier oil price shocks. The oil price increases of 1973, 1979, 1990 and 1999 were mainly caused by sizeable disruptions to the supply of oil. By contrast, a variety of factors have had an impact on the current increase. Demand for oil has been buoyant on the back of improving global economic conditions, led by the United States and China, and has systematically surpassed expectations. In addition, dwindling global spare capacity has left only a very limited cushion to cater for unexpected oil market disruptions. Consequently, oil prices reacted strongly when, despite rising supplies of oil, supply-side concerns emerged from several oil producing countries.

3 IMPACT OF OIL PRICE SHOCKS ON PRICES AND ECONOMIC ACTIVITY

Oil plays an important role in the economy, on account of the widespread use of oil and refined oil products both as an input factor in the production process and as a final consumption good. As a result, any major change in its price affects the economy in various ways. All of these transmission channels are closely linked and interdependent. It is important to bear these interrelationships in mind when the different channels are discussed separately for presentation purposes, as is the case below. The perspective taken in describing the transmission channels through which an oil price shock affects prices and output is that of a net oil-importing economy like the euro area. On the price side, direct, indirect and second-round effects of oil price shocks can be distinguished. Regarding real economic activity, oil price shocks work via traditional supply and demand channels, although additional channels can also play a role. The discussion on the transmission channels is followed by empirical evidence on the impact of oil price shocks on inflation and output from various large-scale macroeconomic models. The impact on the economy generally depends also on the characteristics of the oil price shock. In this respect, the supply or demand-side nature of the shock and its duration, for instance, appear to be relevant.

IMPACT ON PRICES

A stylised overview of the main possible transmission channels through which an oil price shock influences prices is provided by Chart 3. Oil price increases directly affect consumer prices, as energy is part of the households' consumer basket. Furthermore, they may have an indirect effect on consumer prices via higher producer prices. Moreover, there may be further repercussions for consumer prices if the price increases owing to higher oil prices are reflected in higher wages or, more generally, in inflation expectations.

Chart 3 Main transmission channels of an oil price shock to prices

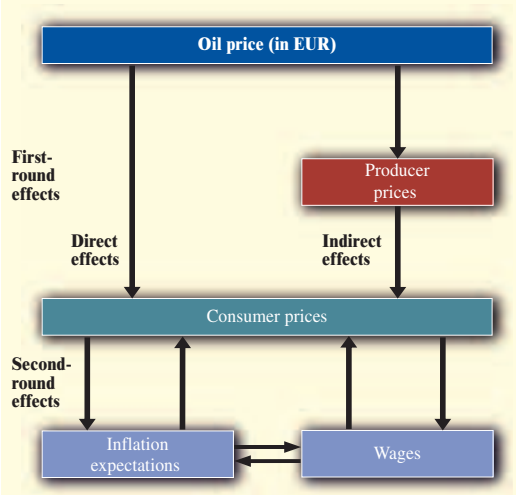
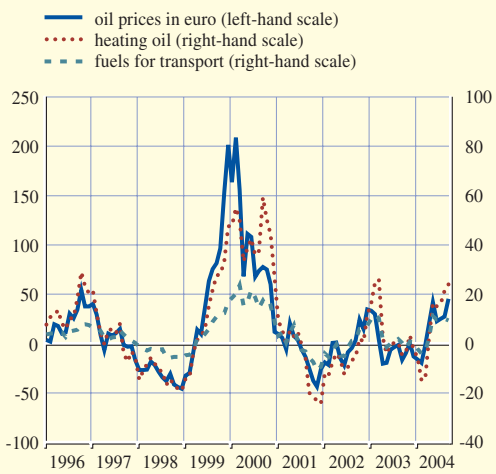


Chart 4 Oil prices and selected HICP energy items

(annual percentage changes)



Sources: Eurostat and Thomson Financial Datastream.

With regard to direct effects, Chart 4 illustrates the close link between movements in oil prices and the oil-related items – heating oil and fuels for transport – that are included in the energy component of the euro area HICP. Prices of these two items react almost immediately to oil price increases, i.e. during the month of the shock or in the following month, which could be partly related to the price collection period. Prices of other energy products which are oil substitutes, such as gas, also follow oil price developments, but are usually affected with some delay. Looking at the total energy component of the HICP, 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 consumer prices of energy within about half a year. 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.

As indicated above, consumer prices may also be indirectly affected, as firms facing higher input prices for oil will attempt to pass these cost increases on to their selling prices (i.e. producer prices) in order to maintain or restore their profit margins. Eventually, these more general price increases may also feed through to prices of other (non-energy) goods and services included in the consumer price index. The degree to which the cost increases are passed on to subsequent price stages is affected by factors such as the competitive pressures in the market and the business cycle situation. As the transmission of a cost increase to prices along the supply chain is not immediate, the indirect impact of an oil price shock on consumer prices is more delayed and takes longer than the direct effect. Both the direct and indirect effects of a permanent oil price increase have a lasting impact on the level of the consumer price index, while the inflation rate is, in the first place, only temporarily affected. However, while the impact on the annual inflation rate resulting from the direct effect is relatively short-lived, the impact from the indirect effect is more protracted on account of its slower and more gradual transmission.

In addition to direct and indirect effects, usually summarised as first-round effects, there is a risk of so-called second-round effects, which may put further upward pressure on consumer prices. Second-round effects typically refer to a situation in which the first-

round price increases are taken into account in the subsequent wage-bargaining process, so as to compensate for the decline in real income. This might in turn increase inflation expectations and further influence price-setting behaviour. Should employees manage to obtain stronger wage increases as a result of the oil price shock, a wage-price spiral may occur. Firms facing higher wage claims may be forced to further increase their prices, which would again fuel inflation expectations, spilling over to the next round of wage negotiations. Hence, in the presence of second-round effects, a shock to oil prices not only permanently affects the price level but could also trigger more persistent effects on inflation.

The likelihood of second-round effects varies according to the general macroeconomic situation and depends on the credibility and reaction of the central bank. In an economic downturn, indirect and second-round effects should be less likely to occur than in boom conditions, where the labour market is tight and price pressures are high. Likewise, while the "mechanical" direct impact of higher oil prices on the energy component of consumer price indices is unavoidable, possible price pressures related in particular to second-round effects depend crucially on the credibility of the central bank as well as on the actual monetary policy response. With a credible monetary policy directed towards maintaining price stability over the medium term, employees are more likely to accept the reduction in real income and inflation expectations are more likely to be unaffected by the temporary increase in inflation brought about by the oil price rise. However, should inflation expectations rise, monetary policy has to raise interest rates so as to contain inflationary pressures resulting from indirect and second-round effects over the medium term. Obviously, an appropriate wage reaction, i.e. acceptance of the effects of an oil price increase on real income, is most conducive to avoiding an inflationary spiral and losses in output.

IMPACT ON ECONOMIC ACTIVITY

One of the most important explanations of the impact of an oil price shock on real economic activity comes from the supply-side channel. Oil represents an important input factor in the production process. A rise in the price of oil entails an increase in the costs of production, as the ability to substitute oil is limited. This is particularly the case in the short term. As a result of the increased cost of oil, the level of output may be reduced, which may also lead to lower demand for other production factors such as labour.

On the demand side of the economy, an increase in oil prices entails a deterioration of the terms-of-trade of net oil-importing economies like the euro area. As a consequence, income will be redistributed from net oil-importing to net oil-exporting economies. The decline in real income in net oil-importing countries associated with the oil price shock translates into lower domestic demand to the extent that it is not compensated for by reduced saving or increased borrowing. Moreover, if a country's trading partners are predominantly net oil-importing countries, the decline in domestic demand is likely to be accompanied by lower export demand. From the perspective of the world economy, the net impact on demand is also likely to be negative if many net oil-exporting countries, benefiting from an oil price shock, have a lower propensity to consume than net oil-importing countries and are likely to adjust their demand only gradually.

The negative impact of an oil price shock on activity resulting from the basic "cost-push" and demand-side effects may be exacerbated through a number of additional channels. For example, an oil price shock may have a further impact on activity via its effect on confidence. A rise in oil prices increases uncertainty about future oil price developments and hence the economic outlook in general. In view of the increased uncertainty, consumers may refrain from making major purchases and firms may

decide to postpone or extend irreversible investment projects. Similarly, an oil price shock may negatively affect consumption and investment via its impact on stock markets or, more generally, by making financing conditions worse. The upward shift in the price level on account of an oil price shock, other things being equal, reduces real balances. In order to restore portfolio equilibrium, people tend to shift their portfolios toward liquid assets. As a result, long-term interest rates may rise.

However, the impact on output is mitigated by the credibility and the appropriate reaction of monetary policy. By stabilising inflation expectations, a credible monetary policy geared to price stability reduces the output losses. Moreover, while in the short run the possibility of substituting oil with other inputs in the production process is limited, this represents a viable option beyond that horizon. Hence, if an oil price increase is perceived to be permanent, firms may decide to switch to a less oil-intensive production plan. Likewise, a persistent oil price shock is likely to cause a reallocation between more and less oil-intensive sectors, making the economy more resilient to future oil price shocks.

EMPIRICAL RESULTS FOR THE EURO AREA ECONOMY

This section presents, for illustration purposes, empirical evidence of the impact of a permanent 50% increase in the level of oil prices on euro area inflation and real GDP growth as estimated by several large-scale macroeconomic models. These estimates are surrounded by a high degree of uncertainty related to model calculations; this should be borne in mind when interpreting the results.

Looking first at the impact on inflation, the estimates suggest that a permanent 50% rise in oil prices adds to overall inflation by 0.3 to 0.6 percentage point within the first year (see Table 2) when excluding the IMF Multimod, which is described below. This first-year impact should, to a large extent, reflect direct effects. In the second year, overall inflation would be 0.1 to 0.4 percentage point and in the third year 0.0 to 0.1 percentage point higher compared with a situation of unchanged oil prices. While most macroeconomic models do not disentangle indirect and second-round effects, their combined impact could be approximated by the second and third-year results. This impact is largely in line with results of models estimating the impact on non-energy consumer prices, thereby excluding direct effects. For example, using the HICP excluding energy, the area-wide model (AWM) of the ECB points to a combined second and third-year effect of 0.4 percentage point, which reflects the sum of indirect and second-round effects.

The IMF Multimod is not included in the above ranges, as it is a model geared more towards longer-term relationships and is based on annual data, which is difficult to compare with the models using quarterly data. It yields much stronger effects than the other models. This is due to a high first-year impact, reflecting a relatively high estimated direct effect. Moreover, expected inflation, which plays an important role in the determination of inflation in this model, is estimated to be significantly affected by oil price changes in the euro area.[1] The Multimod results are also based on the assumption of real wage resistance, implying strong second-round effects. However, in reality these effects should be dampened by a credible monetary policy.

Regarding economic activity, the various macroeconomic models (including the IMF model) suggest that a 50% increase in oil prices would lead to real GDP growth declining by 0.1 to 0.8 percentage point in the first year. Likewise, these models predict an impact of between -0.3 and 0.2 percentage point in the second year and of between -0.1 and 0.4 percentage point in the third year. The

1 See Hunt, B., P. Isard and D. Laxton (2001), "The macroeconomic effects of higher oil prices", IMF Working Paper WP/01/14.

Table 2 Impact of a 50% increase in oil prices on euro area inflation and real GDP growth

(percentage points)

	Inflation [1]			Real GDP growth		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Quarterly models						
ECB AWM	0.5	0.4	0.1	-0.1	-0.2	-0.1
EC QUEST [2]	0.4	0.1	0.1	-0.6	-0.2	-0.1
NiGEM [2]	0.3	0.2	0.0	-0.8	0.0	0.1
OECD Interlink	0.6	0.2	0.1	-0.4	0.2	0.4
Annual model						
IMF Multimod	1.6	1.1	0.5	-0.1	-0.3	0.1

Sources: ECB AWM: Dieppe, A. and J. Henry (2004), "The euro area viewed as a single economy: how does it respond to shocks?", Economic Modelling 21, pp. 833-875. EC QUEST: European Commission (2004), "How vulnerable is the euro area economy to higher oil prices?", Quarterly Report on the Euro Area, 3(2), pp. 15-20. NiGEM: Barrell, R. and O. Pomerantz (2004), "Oil prices and the world economy", NIESR Discussion Paper No. 242. OECD Interlink: Dalsgaard, T., C. André and P. Richardson (2001), "Standard shocks in the OECD Interlink Model", OECD, Economics Department Working Papers No. 306. IMF Multimod: Hunt, B., P. Isard and D. Laxton (2001), "The macroeconomic effects of higher oil prices", IMF Working Paper WP/01/14.
1) HICP inflation for the ECB AWM; CPI inflation for the other models.
2) The original results for the EC QUEST and for the NiGEM are based on simulations of a 25% and 20% oil price increase respectively. These results have been adjusted in this article, assuming linearity.

positive impact from the second year onwards suggested by some models may be related to the assumption that net oil-exporting countries, linked to the euro area economy via third country effects, have a relatively high propensity to consume. That means that the higher income owing to the rise in oil prices in these countries translates into stronger euro area export demand in these models.

The model results for both inflation and real GDP growth should not be taken at face value. In fact, several caveats should certainly be borne in mind, as these could affect the strength of the impact. First, the assumptions made by the various models about exchange rate and interest rate reactions are not identical, and this can have a significant impact on the results.[2] Second, most models use an aggregation of the impact on the individual euro area countries, while the ECB AWM and the IMF Multimod are based directly on euro area-wide data. Third, such models typically show the average historical impact of oil prices. However, several studies claim that the impact of oil prices on the economy has changed over time (see Section 4). It can also be argued that second-round effects should be smaller now than in the past, reflecting a low inflation environment and credible monetary policy. Fourth, the models do not include all possible transmission channels. For example, most macroeconomic models do not use different sectors to represent the supply side, so any reallocation of resources following strong oil price shocks is not fully reflected in the simulation results. The impact through confidence and equity markets is also absent. Moreover, some models, such as the IMF Multimod, place more emphasis on the expectations channel than do other models. Fifth, third country effects are included in all models except the ECB AWM. Finally, the shock in these models is usually defined as a percentage change in oil prices and the models generally assume a linear relationship between oil prices and the economy. A number of problems related to this approach are explained below. Overall, the model results are of an illustrative nature, and any real time analysis would need to take into account all relevant factors, many of which cannot be captured by such models.

2 For example, the results for the ECB AWM and the OECD Interlink are based on the assumption of constant real interest rates. The EC QUEST, the IMF Multimod and the NiGEM include a Taylor rule type of monetary policy reaction. Different assumptions about monetary policy reactions lead in particular to different indirect and second-round effects, as they should be embedded in expectations.

THE IMPACT ON THE ECONOMY DEPENDS ON THE NATURE OF THE OIL PRICE SHOCK

In any discussion on how oil prices affect the economy it is important to bear in mind that the impact also depends on the nature of the oil price shock. In particular, a number of arguments suggest that the overall impact may not be proportional to the size (in percentage terms) of the change in oil prices, i.e. the impact may be non-linear. Several factors, such as the direction, duration and cause of the shock and the absolute level and variability of oil prices, are likely to play a role.[3]

The effect of increases and decreases in oil prices on the economy may be asymmetric on account of factors like rigidities or adjustment costs. The box below describes the possible reasons for asymmetries in more detail. It could also be that the level of oil prices (whatever the change leading to it) plays a role in terms of the impact on activity, giving rise to so-called threshold effects. For instance, if oil prices reach a high level, some investment projects may be judged unviable. Moreover, the absolute level change in oil prices could be more relevant than the percentage change. If oil consumption is relatively price-inelastic and the total budget is fixed, the absolute rise in oil prices would determine the amount of additional money which households and companies would need to spend on energy bills. The duration of the period over which oil prices increase or remain high could also influence the economy's response to the shock. The more persistent the increase, the less likely companies and households are to absorb the shock by reducing profit margins and savings. It is also more likely that a permanent oil price shock will affect the structure of production in the economy, as firms may replace their capital stock with less oil-intensive equipment or seek to diversify their energy consumption (see Section 4). The variability in oil prices may also have a role to play, as increases which reverse earlier declines in oil prices may not have a significant impact on the economy. Moreover, in an environment of volatile oil prices, consumers and firms may be more likely to regard a change as temporary. Finally, the cause of an oil price shock plays an important role in terms of the overall impact. Oil price shocks related to supply disruptions usually lead to a fall in output and to higher inflation. However, oil prices can also increase in response to a strong pick-up in world demand. Then, the negative output effect would be mitigated by accelerating world demand while inflationary pressures would increase more than in the case of a supply-driven shock.

3 See for instance Hamilton, J. D. (2003), "What is an oil shock?", Journal of Econometrics 113, pp. 363-398.

Box

HOW COULD OIL PRICE INCREASES HAVE A STRONGER IMPACT ON THE ECONOMY THAN OIL PRICE DECLINES?

Many empirical studies find that inflation and output react more strongly to oil price increases than to oil price declines.[1] Various explanations for this asymmetric response have been proposed in the literature.[2]

One frequently suggested explanation for this asymmetric impact is that *prices for fuel and other petroleum products* change more on account of oil price increases than as a result of

1 See for example Jiménez-Rodríguez, R. and M. Sánchez (2004), "Oil price shocks and real GDP growth: empirical evidence for some OECD countries", ECB Working Paper No. 362, May 2004.

2 For a recent summary of the literature see Brown, S. P. A., M. K. Yücel and J. Thompson (2003), "Business cycles: the role of energy prices", Federal Reserve Bank of Dallas Working Paper 0304.

declines. More specifically, the literature finds that fuel prices are adjusted more quickly and, partly as a result of this, more strongly following oil price increases than after oil price declines. Thus, if an oil price increase translates into a larger change in fuel prices in the period following the shock than an oil price decline, it would also have a quicker and stronger impact on inflation and output.

Furthermore, the asymmetric impact of oil prices on inflation and output may be related to *downward rigidities in wages*. This refers to a situation where workers would push for higher nominal wages to compensate for the decrease in their real purchasing power resulting from oil price increases, while they would not accept declining nominal wages in the case of oil price decreases.

Adjustment costs may also help to explain asymmetries in the output reaction. Any change in oil prices, whether a rise or fall, always implies some adjustment costs. In the case of oil price increases, the adjustment costs would be an additional burden for firms and consumers and would thus amplify the direct dampening effects on output via the increase in production costs. When oil prices fall, however, adjustment costs would partly offset the direct beneficial effect via other channels. Therefore, the impact of a rise in oil prices on the economy would be stronger than that of a comparable fall in oil prices.

Asymmetric reactions in output can also be attributed to *uncertainty and financial stress*. Oil price changes, regardless of their direction, are likely to cause uncertainty concerning future oil prices and, more generally, future economic developments. Moreover, adverse shocks usually make it more difficult for firms to obtain external finance. Like adjustment costs, uncertainty and financial stress would make the negative impact on activity caused by rising oil prices even worse, while reducing the positive impact of decreasing oil prices on activity. As a result, aggregate economic activity reacts asymmetrically to oil price shocks.

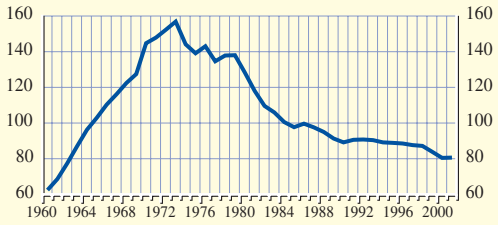
4 DO STRUCTURAL FACTORS INFLUENCE THE IMPACT OF OIL PRICE SHOCKS?

A number of structural factors may influence the impact of oil price shocks on economic activity and inflation. First, long-term trends regarding the oil dependency of the euro area and the degree of substitutability between oil and other primary energy sources are relevant. Second, the overall impact is influenced by the sectoral composition of the euro area economy. Third, the impact of oil price shocks depends on the way in which product and labour markets function.

Regarding long-term changes in oil dependency, the euro area has become considerably less dependent on oil since the 1970s because of inter-industry shifts and the substitution of oil by other energy sources. This is a trend which is shared with other industrialised economies, such as the United States and the United Kingdom. In 2001 the oil intensity of the euro area, measured as oil consumption in relation to real GDP, was almost 50% lower than the peak recorded in 1973 (see Chart 5). This reflects inter-industry shifts from more oil-intensive sectors, such as manufacturing, to less oil-intensive sectors, such as services (excluding transport), as well as the utilisation of less oil-intensive technologies. The euro area has also reduced its non-oil energy intensity since the 1970s, albeit to a lesser extent than its oil intensity. This is due to the substitution of oil by other primary energy sources (see Chart 6). Oil accounted for 42% of total euro area primary energy demand in 2000, compared with 59% in 1971. The use

Chart 5 Oil consumption relative to real GDP in the euro area

(Tonnes of oil per one million of GDP at 1995 prices)



Sources: International Energy Agency and European Commission.

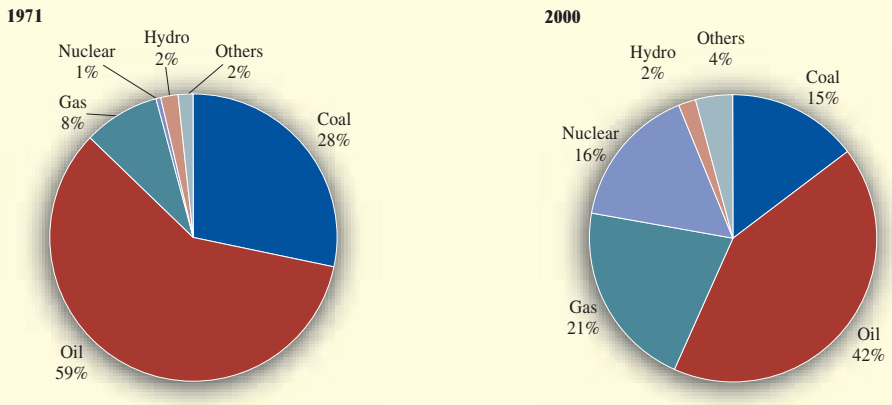
of renewable sources of energy has increased over the last 30 years, and this trend is likely to continue in the future with the advance of new technologies. Increased substitution of oil by other energy sources, together with reduced overall oil dependency, is helping to make the euro area economy less vulnerable to an oil price shock than it was in the early 1970s.

The sectoral composition of the economy is of relevance in terms of the impact of an oil price shock on the overall economy, as economic sectors can react differently to an oil price shock. Therefore, resources need to be reallocated from one sector to another in order to restore equilibrium. This is not a short-term process, and output is hence likely to fall below potential for some time before a new long-term equilibrium is reached.

While most sectors have decreased their share of oil consumption over the past 30 years, that of the transportation sector has increased greatly. For example, the oil consumption of the euro area industrial sector accounted for 9.8% of total final energy consumption in 2000, down from 21.6% in 1971 (see Table 3). The consumption of oil by the transportation sector, however, increased strongly over the same period, mainly on account of an increase in air passenger transportation and more widespread car ownership. In 2000 the total final consumption of oil by the transportation sector was roughly three times greater than oil consumption by other sectors, indicating that a negative oil price shock would have a much stronger direct effect on this sector than on the rest of the economy.

The negative effects of an oil price shock on output and inflation tend to be less pronounced the more flexible the economy, as this allows for a faster and smoother adjustment of resources towards a new post-shock equilibrium. The impact of oil price shocks depends in particular on the functioning of

Chart 6 Composition of total primary energy demand in the euro area



Source: International Energy Agency.

Table 3 Total final consumption of energy by sector in the euro area

	1971	2000	1971	2000
	Millions of tonnes		Share (%)	
Industry	235,709	266,754	42.0	32.7
of which oil	*121,039*	*80,195*	*21.6*	*9.8*
Transportation	109,004	251,631	19.4	30.9
of which oil	*104,079*	*246,642*	*18.5*	*30.3*
Other Sectors	216,673	296,632	38.6	36.4
of which oil	*121,550*	*82,281*	*21.7*	*10.1*
Total	561,386	815,017	100.0	100.0

Source: International Energy Agency.

product and labour markets, as the effects on economic activity and inflation vary with the degree of price and wage flexibility in the economy. This in turn is affected by the level of product market competition and by the extent of labour market flexibility.

The degree of labour market flexibility must be taken into account when considering the transmission of an oil price shock to the economy, because it determines both the ability to adjust to such shocks and the efficiency in the allocation of labour and other resources. Labour market flexibility is defined as the labour market's ability to adapt and respond to changing economic conditions through changes in prices, i.e. wages, and/or through changes in quantities, i.e. employment or hours worked. The responsiveness of wages to changes in the price level is of particular relevance (see the box), given that, following an oil price shock, workers may demand higher nominal wages to maintain their real purchasing power but are unlikely to accept a cut in nominal wages as a result of a decrease in oil prices. In other words, wages may be flexible upwards but sticky downwards (nominal rigidity), thus exacerbating potential output losses and increases in inflation resulting from an oil price shock. The responsiveness of wages to the rate of unemployment also plays an important role because real rigidities are likely to exacerbate the negative effects of an oil price shock. The necessary sectoral shifts may be hampered by employment protection legislation or other forms of job protection shielding part of the workforce from shocks. Likewise, insufficient wage differentiation – across sectors and firms – can make the necessary reallocation more difficult.

Given the importance of labour market flexibility, since the second half of the 1990s euro area countries have increased their efforts to promote structural reforms aimed at improving the functioning and flexibility of labour markets.[4] In addition, wage indexation appears to be less widespread at present compared with the 1970s, thus pointing to an increased resilience of the euro area economy to adverse shocks.[5]

The transmission of oil price shocks to the economy is also influenced by the flexibility of product markets, as the output loss and price increase following an oil price shock tend to be smaller in competitive markets than in markets with significant rigidities. In a very competitive market, a rapid reallocation of resources should guarantee that a new equilibrium in terms of output, employment and price level is reached swiftly when the economy is hit by an oil price shock. The existence of competitive energy markets is particularly important in this context to enhance energy price transparency and to absorb oil price shocks. The European Commission has

4 See the article entitled "The composition of employment growth in the euro area in recent years" in the November 2002 issue of the ECB's Monthly Bulletin.

5 See for example Checchi, D. and J. Visser (2002), "Pattern persistence in European trade union density", Università degli Studi di Milano, Working Paper No. 1, January.

launched a number of initiatives to improve the functioning of the Internal Market. Several product market indicators point to increased flexibility in the product markets of euro area countries,[6] including energy markets, which are currently subject to a significant regulatory reform process. The introduction of the euro is also likely to have contributed to this process by further increasing the degree of competition and price comparability between domestic and foreign firms.

5 OIL PRICE SHOCKS AND POLICY REACTIONS

Past experience shows that macroeconomic policies play an important role in shaping the aggregate effects of an oil price shock on the economy. Taking the first oil price shock in the early 1970s as an example, wages increased strongly and governments generally tried to cushion the negative effects on activity via expansionary fiscal policies, leading to significant and long-lasting budget deficits.[7] In many countries, monetary policy also took a relatively accommodative stance: this was reflected, for example, in generally negative real interest rates in the period following the surge in oil prices. The reaction of fiscal and monetary policies in most countries was largely inadequate, considering the rapid increases in consumer prices following the first oil price shock and the strong wage rises resulting from the prevalence of wage indexation and more general attempts of workers to recoup the associated real income losses. The policy responses at that time not only postponed the fall in real income necessitated by the rise in oil prices, but in fact added inflationary pressures, thereby increasing the eventual costs of disinflation. As a result of the experience with the first oil price shock, fiscal and monetary authorities generally adopted a much less accommodative stance thereafter. For example, after the second oil price shock in 1979, monetary policy was tightened more decisively in order to hold inflation down, and fiscal policy was less expansionary in many countries.

What lessons can be drawn from the past? The most important lesson is that a net oil-importing economy such as the euro area cannot escape the terms-of-trade loss associated with an oil price increase. An oil price increase is generally associated with a transfer of wealth from net oil-importing countries to those exporting oil. This burden has to be absorbed within the economy in a way which minimises output losses and avoids the acceleration of inflation expectations. In particular, wage-setting in line with price stability over the medium term is important in helping to facilitate the necessary adjustment and limiting its associated costs.

The role of monetary policy geared to price stability is to ensure that the temporary and unavoidable direct effects of oil price increases on inflation do not fuel inflationary expectations and lead to the emergence of second-round effects. The credibility of monetary policy is pivotal in that context. As long as all economic agents are certain that monetary policy will act vigorously against the emergence of general inflationary pressures, forward-looking wage-setters are likely to behave accordingly. By anchoring inflation expectations, this strategy helps to reduce the output losses. Nevertheless, if there are indications that general inflationary pressures are increasing, central banks need to be ready to take action. In that respect, it is extremely important that monetary policy is vigilant against the emergence of second-round effects after an oil price increase, including a close monitoring of inflation expectations and developments in the wage-bargaining process. Central banks also have to assess the causes and nature of the oil price shock in combination with the current cyclical position of the economy and the likely developments in aggregate demand and supply. Moreover,

6 See for example Alesina, A., S. Ardagna, G. Nicoletti and F. Schiantarelli (2003), "Regulation and investment", OECD Economics Department Working Papers No. 352, which shows that product market regulation in 1975 was higher than in 1998 for a large number of countries.

7 See also the box entitled "Lessons to be drawn from the oil price shocks of the 1970s and early 1980s" in the November 2000 issue of the ECB's Monthly Bulletin.

monetary policy has to take into consideration the behaviour of other policy actors.

Fiscal policies can support the conduct of monetary policy geared to price stability by not trying to accommodate negative economic effects associated with oil price shocks and thereby prolonging the unavoidable real effects associated with such shocks. Generally, the underlying fiscal stance should remain broadly unchanged, although automatic stabilisers should be allowed to operate. However, if there are already significant imbalances and fiscal consolidation efforts are falling short of commitments, it is important that governments return to consolidation policies, particularly if the increase in oil prices is expected to remain for some time. In such a situation, an accommodative budgetary policy stance could have a destabilising effect, as it could delay structural adjustment and prolong inflationary pressures. Finally, structural policy also has to play its part in increasing the flexibility in euro area labour and product markets. Further structural reforms, particularly those related to the labour market, will facilitate the adjustment after an oil price shock and better shield the euro area against future shocks.

6 CONCLUSION

Given the intrinsic volatility of the oil market, as well as the importance of oil as a production factor and consumption good, oil price movements are likely to remain a significant factor for inflation and economic activity in the euro area. Standard macroeconomic models suggest that a strong rise in oil prices can have a non-negligible impact on the euro area economy by lifting inflation and, albeit to a somewhat lesser extent, dampening real GDP growth. Such estimates are, however, surrounded by considerable uncertainty and can only serve illustrative purposes.

Against this background, the oil price increase observed over the last year and, in particular, the fact that oil prices have remained at a higher than expected level for quite some time could entail risks to price stability and growth. However, when assessing the impact of this oil price shock, it should be noted that the recent rise in oil prices has been significantly smaller than in previous episodes, when such increases had a major impact on the world economy. This is not only true when looking at developments in oil prices in USD terms, but particularly when developments are expressed in euro terms, as the past appreciation of the euro has had some dampening effects. In addition, in real terms, oil prices are significantly below the peaks they have reached in the past. Moreover, while previous oil price increases have been driven mainly by supply factors, the recent increase is also due to a higher demand for oil as a result of the strong global expansion. All in all, the current rise should have a more limited impact on the euro area economy than the large oil price shocks of the past. Nevertheless, persistently high levels of oil prices or even further increases would be a reason for concern.

From a structural perspective, several factors suggest that the euro area economy is now more resilient to oil price shocks. When compared with the 1970s, the oil intensity of production and the share of oil consumption in total energy consumption have fallen significantly in the euro area. In addition, labour and product markets appear to have become somewhat more flexible, allowing for a smoother and faster reallocation of resources. However, further structural reforms are clearly needed to increase the ability of the euro area economy to adjust more smoothly and faster to future shocks.

The recent rise in oil prices has already had a visible direct impact on euro area inflation. It is important that monetary policy prevents the emergence of general inflationary pressures by anchoring inflation expectations. A credible monetary policy geared to price stability thereby reduces output losses. Vigilance is nevertheless needed to ensure that second-round effects do not materialise. Such effects would be prevented by wage-setting in line with price stability over the medium term.