

Chapter 2

Energy and the price of oil

Why has growth of the Community's income and output slowed down so markedly since 1973? Although various different answers have been given to this question, the world price of oil has usually received some mention. Ever since the rise in the price of oil at the end of 1973 there has been recession, not only in Europe, but in most oil-importing parts of the world. Since the Community exports manufactures all over the world and is a large importer of oil and raw materials, world events have considerable influence on its internal economic situation. The main purpose of this chapter, therefore, is to examine developments in the world economy which may have contributed to the Community's present difficulties. The particular issue that will be addressed is how far changes in the world energy situation and the price of oil have been a cause of world-wide recession since 1973. The next chapter will examine the effect of world developments on the European Community as such and Chapter 4 will trace causes of recession in individual member-countries.

The first part of this chapter reviews explanations of the Community's recession which emphasise internal rather than external factors and suggests that they focus on symptoms rather than causes of the slow-down in growth. The second part examines why energy has become relatively scarce and how far increases in the world oil price have helped to alleviate the scarcity. The third part looks at financial implications of the world oil price. The final part suggests that global economic development may now in a general sense be held back by energy scarcity and considers possible ways in which the scarcity might in future be eased or overcome.

2.1 Internal explanations of recession

It is widely believed that by the early 1970s the European Community had run into internal economic problems which would have slowed down the growth of its income and output even in the absence of a rise in the world oil price. The European Commission, for example, in its fifth medium-term economic policy programme, states

that:

Our present economic problems first appeared at the end of the 1960s when the inflation rate began to increase under the pressure of rising costs, especially labour costs. (*European Economy*, July 1981, p.21)

Recognising the stimulus to inflation given by the rise in the oil price, the Commission goes on to argue that higher and more variable rates of inflation have directly reduced growth by increasing uncertainty and undermining confidence. In particular;

inflation has discouraged investment by reducing profit margins, raising nominal interest rates and fostering uncertainties as to future capital costs, the long-term outlook for demand and the real rate of return. (*ibid.* p.26)

According to the Commission the decline in investment has been associated with a reduction in productivity growth which in turn reflects 'insufficient progress made in adapting the structures of industrial production' (*ibid.* p.21). Such structural change, it is argued, has been impeded by the failure of the Community to achieve a freely competitive market, unhindered by the distortions caused by government support for uneconomic industries and interventions which restrict the mobility of capital and labour. In the Commission's view this failure has not only adversely affected productivity, but has been an important cause of unemployment.

The large increase in unemployment reflects the delay with which the Community's production structures and the behaviour of economic agents have adapted to the many pressures to which they are subject. (*ibid.* p.27)

The 'sharp growth in public-sector spending, especially on health care and social security' in the 1970s is also seen as contributing to the Community's problems by pushing up tax rates and hence production costs, so worsening the international competitiveness of European industry. At the same time, higher public sector deficits 'have

reached such a size as to represent a serious threat to financial stability' (*ibid.* p.21).

In summary, therefore, the slow growth of the European economy is attributed to inflation, excessive public spending and market imperfections which impede structural change. It is accepted, however, that oil-price increases have made the recession worse. They have added to inflation and have entailed a loss of real income since they worsen the Community's external terms of trade.

The opinions expressed by the Commission are typical of those advanced by governments and other institutions in Europe. They are not entirely convincing as explanations of recession since most of the internal phenomena to which attention is drawn appear to be consequences, rather than independent causes, of the slow-down in growth. This is clearly the case as regards low profits, lack of investment, low productivity growth and reduced training. Increased government intervention, too, has usually been a response to problems arising from recession. The rise in government spending as a share of aggregate income reflects slow growth of the whole economy, not accelerated expansion of the public sector. Government finances have been put into disarray by stagnation in taxable income and by the cost of coping with social and industrial problems. The financial difficulties of governments have been the cause of rising tax rates which in turn have contributed to the acceleration of inflation. Indeed inflation is more generally reinforced by stagnation in aggregate real income if money wages and prices as well as tax rates are pushed up in the attempt to compensate for real-income losses.

Inflation and other internal problems of the Community have not been due solely to the recession, but they have been exacerbated by it.

2.2 Global energy supply and demand

To some readers it may seem obvious that a general scarcity of energy (of oil in particular) has depressed growth in the world economy since 1973. But any such proposition needs careful examination. After all, other resources and products have from time to time become relatively scarce without apparently reducing world economic growth. Such scarcities are usually resolved by price changes which provide an incentive to consumers to use less of whatever is in short supply and encourage producers to expand production or develop substitutes for the scarce product. The price of oil has increased greatly relative to prices of most other commodities and although there have been localised shortages of oil, there has usually been some margin of excess supply in the world oil market. The relationships, if any, between energy scarcity, the price of oil and world economic growth therefore need proper examination. We start by considering how energy flows have changed in physical terms, leaving wider economic implications for discussion in the

next section.

Energy in physical terms

The flow of energy is conventionally measured, albeit crudely, by the volume of flows of oil and other primary sources of energy (natural gas, coal, hydro and nuclear electricity) regarded as potential oil substitutes. A common method is to convert flows of different forms of energy into 'oil-equivalents' measured, for example, in million tons. Although not all fuels can easily be substituted for one another in particular uses, the energy system as a whole has proved flexible during past decades as, for example, oil and natural gas have replaced coal (and gas manufactured from coal) in many applications. In the short run if there is spare capacity in energy-using equipment (notably electricity-generating power stations) the mix of fuels can be switched rapidly in response to changes in the availability and relative prices of different energy sources. The considerable scope for substitution in fuels makes it necessary to look at the problems of oil and the price of oil in the context of the supply and use of all major sources of energy taken together.

Although energy sources may often be substituted for one another, the total amount of energy used cannot so easily be varied at any given level of economic activity. Nearly all modern production, distribution and consumption activities use energy, often in large quantity. An energy-intensive pattern of living is in many respects built into the physical infrastructure of factories, offices, transport systems and homes as well as into the organisation of production and habits of daily life. Given this infrastructure, many activities simply cannot be undertaken without a more-or-less predetermined input of energy, while people who are used to conveniences of travel and heating (or air-conditioning in hot countries) do not easily forgo those conveniences when energy becomes more expensive. It is hardly surprising, therefore, that total energy use tends to be inflexible.

To examine the relationship between real income, or economic activity in general, and flows of energy we shall concentrate attention on the world outside the Middle East (which has a large excess of energy supply relative to its own needs) and the centrally planned economies (which as a group are more-or-less self-contained and self-sufficient in energy). The countries under consideration here will be termed collectively 'the rest of the world' to distinguish them from the Middle East; they include three developed oil-importing areas, Western Europe, the USA and Japan, as well as several oil exporters outside the Middle East (Nigeria, Libya, Algeria, Venezuela, Mexico and Indonesia) and a large number of oil importing developing countries.

Consider this group of countries in aggregate, their physical energy flows may be represented by the equations

$$EQ + EM = ED = eY \quad (1)$$

The World Economy: statistical definitions and sources

Data are derived from an updated version of accounts for the world economy described in the Cambridge Economic Policy Review Vol. 6 No. 3, December 1980. The main difference here is that, in the presentation of trade data, intra-bloc transactions have been excluded.

1980^e Data for 1980 have been estimated from partial information.

\$ 1975 Trade is measured in current dollar values, divided by a world price index for exports of manufactures (base 1975 = 1.00).

Middle East Excludes Israel.

Africa Excludes South Africa.

Asia Excludes China and other Asian centrally planned.

Other developed

Income

Imports

Energy supply and demand

Canada, Australia, New Zealand, Israel and South Africa.

Real income is an estimate of the purchasing power of GDP compared at 1975 exchange rates.

Imports are measured on the same basis as exports so that world trade flows balance. Conceptually imports are valued fob and are allocated between years on the basis of the date of shipment rather than the date of arrival.

Energy supply and demand are measured in million tons of oil equivalent. Data shown in \$ 1975 are multiplied by the 1975 world oil price.

(the letter E stands for energy). These identities state that the energy output of the rest of the world, EQ, plus net imports of oil from the Middle East (and on a small scale from the centrally planned economies), EM, must be equal to total energy use in the rest of the world, ED. This in turn is equal to the level of their real income, Y, multiplied by an energy coefficient, e. The energy coefficient represents influences such as infrastructure and habits of energy use as well as commercial and government responses to the price and availability of energy supplies.

The equations do not tell us anything about causal relationships. They merely provide a classification of changes in energy flows relative to the level of real income by means of which historical developments and the present situation can be conveniently summarised.

Table 2.1 gives figures for 1965 and 1973 and estimates for 1980 based on data from United Nations sources from which, as described in an earlier study*, we have constructed accounts for trade, energy and income in the world divided into nine blocs or country groups. Between 1965 and 1973 real income, Y, outside the Middle East and the centrally planned group grew by an average of 5% a year while energy output, EQ, grew by about 4% a year. The ratio of energy use to income, e, rose by about ½% a year. Imports of oil from the Middle East, which in 1965 made only a very marginal contribution to total energy use in the rest of the world, grew in volume by an average of 13% a year up to 1973, increasing by a factor of 2½ in the eight-year period; they eventually supplied nearly one quarter of the total energy used in the rest of the world. Being only a marginal source of supply, the Middle East's oil exports had to respond much more than in proportion to energy shortfalls in the rest of the world. They increased

* 'World Trade and Finance: prospects for the 1980s', *Cambridge Economic Policy Review*, December 1980, vol. 6 no. 3.

by 150% to meet an expansion of energy use which only exceeded the growth of energy output in the rest of the world by 1½% a year, or 13% cumulatively, between 1965 and 1973.

At the end of 1973 and beginning of 1974 oil exporting countries, grouped as OPEC, increased the world price of oil fourfold within the space of a few months. More recently, late in 1979, they again increased the price of oil almost threefold. The real price of oil (relative to a price index for world exports of manufactures) was 3 times higher in 1974 than it had been in 1973. After falling 15-20% in the next few years the real price of oil has almost doubled again; it is now some 4½ times higher than it was in 1973.

What changes in energy flows have taken place following oil price increases? Growth in Middle Eastern oil exports halted in 1973; the volume of exports fell almost 10% to the trough of the world slump in 1975 but soon recovered and remained at its former level up to 1979. The second price increase coincided with another fall in the volume of Middle Eastern oil exports, this time by about 20%, partly due to events in Iran and Iraq.

Energy output in the rest of the world (excluding the centrally planned economies) has increased on average by almost 2½% a year since 1973, a slower rate of growth than in the period before the price of oil went up. The reason for this surprising development will be considered shortly. Total energy use in the rest of the world has grown by an average of barely 1% a year since 1973 as compared with 5½% a year previously. This reflects slow growth in income (2½% a year as compared with 5% a year before) and a decline in the average ratio of energy use to income, e, which has fallen about 1½% a year.

The most crucial question about these developments is why there was such a marked slow-down in growth of income and whether it was in any sense necessary to accommodate energy scarcity.

Table 2.1 Energy supply and growth of income (world, excluding the Middle East and centrally planned)

	1965	1973 (\$ 1975 billion)	1980 ^e	1965-73 (growth rates, % per year)	1973-80 ^e
EM : imports from Middle East centrally planned	30.4 4.7	81.1 8.3	65.3 7.9	13.0 7.4	-3.1 -0.7
Total imports	35.1	89.4	73.2	12.4	-2.8
EQ : energy output	189.9	255.9	299.9	3.8	2.3
ED : total energy use	225.0	345.3	373.1	5.5	1.1
e : average energy coefficient (%)	7.0	7.2	6.5	0.4	-1.6
Y : aggregate real income	3,228	4,780	5,764	5.0	2.7

Note: energy supply and use are expressed here in oil-equivalents valued at the 1975 world price of oil. Supply figures have been adjusted to make them consistent with the evidence of trade data on net imports or exports. They therefore differ slightly from data on energy production in Table 2.2.
Middle East excludes Israel.

Table 2.2 Energy output (world excluding the Middle East and centrally planned)

(oil equivalents, million tons)

	1965	1973	1979	Changes	
				1965-73	1973-79
<i>Oil and natural gas</i>					
USA and Canada	898	1230	1130	+332	-100
Western Europe	40	146	289	+106	+143
Africa	107	290	329	+183	+39
Asia	37	103	150	+66	+47
Latin America	265	307	328	+42	+21
Other	6	44	49	+38	+5
Total	1353	2120	2275	+767	+155
<i>Coal ^a</i>					
USA and Canada	325	364	436	+39	+72
Western Europe	313	220	210	-93	-10
Other	138	156	199	+18	+43
Total	776	740	845	-36	+105
<i>Hydro and nuclear electricity ^b</i>					
USA and Canada	81	144	207	+63	+63
Western Europe	80	110	159	+30	+49
Other	46	77	131	+31	+54
Total	207	331	497	+124	+166
Total	2336	3191	3617	+855	+426

^a Includes lignite, peat etc.

^b Approximate equivalents in terms of oil input required to generate same amount of electricity.

The answer to this question must involve consideration of economic and financial issues as well as the physical conditions of energy supply and use. But before the wider issues are discussed it will be useful to examine physical energy supply and use in more detail to see what presumptions can be established about reasons for the slow growth of output outside the Middle East since 1973 and about the potential for energy saving.

Table 2.2 gives data on the main sources of energy supply outside the Middle East and the centrally planned bloc. It will be seen that up to 1973 the biggest source of additional supply was the rising production of oil and natural gas in North America. This was supplemented, principally, by African oil and by natural gas from the North Sea in Western Europe. Coal production declined in Europe. World-wide, hydro and nuclear electricity made a growing but still small contribution to total supply.

Since 1973 production of oil and natural gas in North America has fallen considerably and coal production in Europe has remained roughly con-

stant. Both these developments may be attributed to physical exhaustion of reserves and the high cost and long gestation periods involved in developing new sources within those areas.

Oil production in developing countries outside the Middle East has also increased very little since 1973. In some cases this may again reflect exhaustion of reserves. It may also be due to the extremely uneven distribution of oil fields. Nearly all existing production is accounted for by a few countries some of which, like Nigeria, earn enough from exports for their present needs but have an interest in conserving reserves for the future.

Natural gas has been little developed outside Europe and North America. The main reason is probably that it is difficult to transport over long distances and that its use requires an elaborate network of distribution pipelines and user equipment with overhead costs which few developing countries are ready to meet. With a high-enough price of oil there must be potential for future development. If the experience of North America and Western Europe is anything to go by natural gas may come rapidly into use but may, however, be exhausted comparatively quickly. North American production passed its peak in 1973 and

production in Western Europe appears to be passing its peak now, in both cases slightly less than twenty years after the start of substantial development.

Since 1973 coal production has increased outside Western Europe, although not by very much. There are varied problems including not only the high capital costs of deep mines and the environmental unpopularity of mines and coal-burning processes, but also uncertainty about whether coal should in the long run be distributed in the form of gas or electricity. Long-term commitments would have to be made simultaneously to the extraction, conversion and distribution of coal before large-scale development became possible. Hydro and nuclear electricity have continued to expand but they present environmental difficulties and have very high capital costs.

The general slow-down of growth in energy supply outside the Middle East thus reflects, on the one hand, the onset of exhaustion of easily accessible energy sources in the main consuming areas, North America and Western Europe and, on the other hand, a range of obstacles to development of alternatives there or in other parts of the world.

Energy use relative to income

A more encouraging feature of developments since 1973 has been a trend of energy saving, indicated by a fall in the ratio of total energy use to income. Table 2.3 gives data for various parts of the world. The figures in the table are not closely comparable across countries or country groups because climatic and geographical conditions vary and the measure of real income is inevitably a crude one*.

*The series for real income are estimates of GNP in constant 1975 purchasing power, compared at actual 1975 exchange rates.

But they give a broad indication of the variation in intensity of energy use. It will be seen that Japan has achieved the greatest energy saving and now has the lowest energy coefficient of the four developed blocs shown in the table. Very great energy savings could clearly be made if others, particularly the USA, were to achieve the same energy coefficient as Japan. There appears to have been significant energy saving in Latin America but the coefficient has continued to rise since 1973 in developing Africa and Asia.

The cumulative reduction in the ratio of energy use to income since 1973 has been about 10%. This sounds impressive but it is not very much when compared with plausible objectives for economic growth. For example, if world growth had continued between 1973 and 1980 at the 5%-a-year rate achieved before 1973, total energy supply would have had to rise by 3½% a year, given this rate of energy saving.

What would have happened if world economic growth had continued at the pre-1973 rate? One possibility is that the Middle East would have supplied more oil. Another is that the price of oil would have risen faster and further, inducing more rapid development of new energy sources and greater energy saving. The final possibility is that there would have been widespread physical shortages of energy, putting pressure on governments to enforce energy saving and make maximum efforts to promote expansion of domestic supplies. In practice it seems certain that the price of oil would have risen more. Without an additional stimulus to energy-saving and new sources of supply, Middle Eastern oil exports would have needed almost to double in volume to meet the higher level of energy demand implied by 5% economic growth. And unless Middle Eastern oil exports had been capable of meeting demand at the official OPEC price, many producers would

Table 2.3 The ratio of energy use to income (world excluding the Middle East and centrally planned)

	1965	1973	1980 ^e	1965-73	1973-80 ^e
	(1973 average = 100)			(percentage changes)	
USA	124	132	117	+6	-11
Western Europe	78	81	75	+4	-8
Japan	75	78	61	+4	-22
Other developed ^a	124	120	112	-3	-7
Latin America	85	94	81	+10	-13
Africa	41	45	52	+9	+15
Asia	72	87	95	+20	+9
Average	96	100	90	+4	-10

^a Canada, Australia, New Zealand, Israel and South Africa.

Note: income is measured by the estimated purchasing power of GDP, compared at 1975 exchange rates.

have taken advantage of oil shortages to raise their selling prices.

2.3 The price of oil and recycling

Increases in the price of oil have important economic and financial implications because the value of energy flows is quite high relative to world income. In 1973, for example, the cost of energy (valued at the world oil price) was equivalent to 2¼% of income in the world outside the Middle East and centrally planned countries. With a higher price of oil the cost of energy reached about 11% of total income in 1980. Changes in the price of a commodity which accounts for such a large fraction of total income can have significant effects on the distribution of income, particularly when production is unequally shared between countries.

The rise in oil prices has evidently much increased the income of countries with large oil exports. It has no direct effect on the aggregate real income of countries which are self-sufficient in energy and tends to cut the real income of energy-deficit countries. A rise in the price of oil and other forms of energy also alters the distribution of income within countries; in some northern countries, for example, it has produced the phenomenon of 'energy poverty' among low-income people living in badly-insulated housing.

The direct effects of the rise in oil prices on the real income of different countries are amplified or offset by many indirect consequences. As already mentioned, a high oil price may induce energy saving and the development of new sources of supply. For some countries, therefore, it could provide the opportunity to move from energy deficit to energy surplus. A rise in the oil price also affects world markets for other commodities. For example, since 1973 there has been a boom in non-oil imports by oil-exporting countries, providing new export markets for many industrial countries. The various effects on trade and trade balances may be further compounded by difficulties of

adjustment (discussed more fully in the next chapter); for example, there may be a general fall in internal demand and production within countries whose trade balances are hit by a rise in the cost of oil imports.

It would be a complex if not impossible task to trace the detailed ramifications of a rise in the price of oil as its effects feed through the network of international trade and influence demand, production and income in virtually all countries of the world. But it is possible to gain some impression at least of changes in trade between the main oil exporting area, the Middle East, and the rest of the world (excluding centrally planned economies) taken as a whole.

Such an analysis is useful because it bears on the best-known and most extreme manifestation of changes in income distribution brought about by oil price increases – that is the Middle Eastern trade surplus and the related problem of recycling surplus funds.

The Middle East's surplus

The trade surplus of the Middle East may be expressed by the equations

$$p.EM - M_o = B_o = D \quad (2)$$

These identities, which we shall use to classify historical changes, state that the Middle East's surplus, B_o , is equal to the real value of its oil exports (the price, p , times the volume, EM) less the real value of net Middle Eastern imports of other commodities, M_o . The Middle East's trade surplus is also equal to the combined trade deficit of the rest of the world, D , since the latter's collective trade balance is the mirror image of that of the Middle East.

Table 2.4 sets out historical data (measured in 1975 US dollars). In 1965 the value of Middle Eastern oil exports was a trivial fraction (about ¼%) of the rest of the world's income. Even in 1973, while the price of oil remained low, the value of Middle Eastern oil exports was little over ½% of

Table 2.4 The price of oil and the Middle East's trade surplus

(\$ 1975 billion)

	1965	1973	1974	1978	1980 ^e
EM : volume of Middle East oil exports	30.4	81.1	83.2	89.9	65.3
p : real price of oil (1975 = 1.00)	0.32	0.38	1.10	0.92	1.70
p.EM : real value of Middle East oil exports	9.6	30.7	91.7	73.8	111.2
M _o : Middle East net imports of other commodities	6.5	16.2	26.2	51.0	51.7
B _o : Middle East trade surplus	3.3	15.7	67.3	24.5	62.7

Note: EM here excludes the small net exports of energy by the centrally planned economies (cf Table 2.1).

the rest of the world's income. In 1974, after the oil price increase, the value of Middle Eastern oil exports suddenly jumped to 2% of the rest of the world's income; having fallen back a little, it again reached this level in 1980 following the second oil price increase. This fraction, 2%, of the rest of the world's income, may not sound very large. It is approaching \$200 billion in today's money. What is more important is that it is large relative to the Middle East's imports and to normal rates of international lending and borrowing.

Purchases of Middle East oil can be financed with little difficulty if the money spent on oil is returned to the rest of the world through Middle Eastern spending on imports. In 1965 non-oil imports by the Middle East offset two-thirds of the value of oil exports and in 1973 the fraction returned in this way was still over a half. But in 1974, despite a large increase in Middle East imports, the fraction fell below 30% leaving more than two-thirds of the value of oil exports to be recycled by other means. Since then Middle East imports have grown continuously (apart from a hiatus in 1979 following the revolution in Iran). Almost one half of the value of oil exports is now offset by non-oil trade. If the real price of oil and the volume of Middle East exports both remained constant from now on, the Middle East's trade surplus would fall as its non-oil imports continued to increase. But the Middle East's non-oil imports will not necessarily rise indefinitely because its oil-exporting countries are eager to diversify their economies. They are in a strong position to guarantee markets for new domestic industries not only by restraining growth of imports but also, if they wish, by obliging the rest of the world to accept exports of the products of those industries as a *quid pro quo* for continued access to oil.

Financial recycling

The excess value of Middle East oil exports over the net value of its non-oil imports has been financed, or recycled, by a variety of means including imports of services, financial aid given by the Middle East to countries elsewhere, and invest-

ment of surplus funds in international financial markets where they are borrowed by governments and other institutions in the rest of the world. It is difficult to obtain accurate data on all these different forms of recycling and here we shall only present data for the balance of all such transactions by other blocs, without distinguishing services and current transfers from external lending or borrowing. The composite balance on services, transfers and capital flows of each bloc can be measured by its surplus or deficit on trade (since the balance of payments of each country must necessarily balance – i.e. sum to zero). The largest part of imbalances in trade, and particularly of changes through time in those imbalances, is in general offset by external lending or borrowing (net income from services and current transfers is usually small and rather stable, especially at the level of groups of countries or blocs)*.

Table 2.5 shows the changing pattern of trade balances year by year since 1973. It will be seen that the Middle East has not been the only bloc to earn a surplus, although its surplus has always been the largest. Japan had substantial trade surpluses in the late 1970s (partly offset by its deficit on services) and Africa as a whole has tended to move into surplus after oil price increases because its three big oil-exporters (Nigeria, Algeria and Libya) account for a large proportion of its total exports. All blocs except the Middle East, the centrally planned economies and Africa moved into deficit immediately after oil price increases. They differed in their later responses to the first oil price increase (it is too soon to know what will happen the second time round). Japan's surplus was quickly restored. Western Europe incurred a large deficit for three or four years before securing a surplus in 1978. The USA at first moved into surplus in 1975 as its economy plunged into recession and its imports fell, but then incurred large deficits in 1977-78 when its economic growth was rapid and other developed blocs had moved into

*Cf. data in Chapters 3 and 4 on the European Community and individual member countries.

Table 2.5 Trade balances, 1973-80^e

(\$ 1975 billion)

	1973	1974	1975	1976	1977	1978	1979	1980 ^e
Middle East	+16	+67	+38	+46	+40	+24	+49	+63
USA	+1	-3	+13	-4	-24	-22	-22	-9
Western Europe	-12	-44	-10	-31	-16	+2	-26	-42
Japan	+4	-1	+5	+10	+17	+22	+5	+5
Other developed	+1	-8	-8	-4	-2	-1	+5	+5
Latin America	-4	-8	-12	-10	-8	-8	-9	-14
Africa	0	+6	-8	-2	-5	-11	+1	+3
Asia	-5	-9	-11	-2	-1	-7	-6	-12
Centrally planned	0	-1	-8	-4	+1	0	+3	+2

Note: trade balance calculated as exports fob less imports fob at time of shipment. Trade balances defined in this way sum to zero for the world as a whole.

surplus. Developing countries outside the Middle East generally increased their deficits as developed countries collectively returned to surplus. In 1978, in particular, recycling of the Middle East's surplus was much reduced (as compared with the first years after the oil price increase) but developed countries taken together no longer made any contribution to recycling. The combined deficit of developing countries, although small in world terms, was high relative to their income (3% for Latin America, Africa and Asia as a whole, with much higher levels in some individual countries).

Recycling and the demand for oil

When there is a large increase in the world price of oil, most countries do not in practice immediately cut the volume of their oil imports by nearly enough to offset the rise in price. Necessarily, therefore, the Middle East's surplus rises in the short run. What happens in the longer run depends on the sequence of adjustments of spending and income throughout the world which ultimately determines whether demand for Middle Eastern oil falls and, if so, by how much. As far as oil-deficit areas are concerned these adjustments are influenced by the willingness and ability of governments, companies and individuals to borrow so as to maintain their spending. The ultimate level of the combined deficit of the rest of the world is determined by the outcome of all such borrowing decisions taken together (see Chapter 3 for a fuller discussion). If governments, companies and consumers in the rest of the world react to a rise in the price of oil by collectively cutting back spending to avoid higher borrowing, the short-run increase in their combined deficit may be reversed. In other words, the Middle East's surplus can only remain high so long as the rest of the world continues to borrow on a sufficient scale.

The adjustment of trade deficits through cuts in government and private spending depresses economic activity and reduces demand for oil. The relationship between the overall deficit and the demand for Middle Eastern oil can be derived from equation (2) above. Given the combined trade deficit of the rest of the world, D , and Middle East spending on non-oil imports, M_o , the value of Middle Eastern oil exports must be equal to

$$D + M_o$$

and given the price of oil, p , the volume of Middle East exports, EM , must be equal to this quantity divided by p , i.e.

$$EM = \frac{D + M_o}{p}$$

Therefore if the Middle East enforces a very high price of oil without spending enough on imports from the rest of the world while the rest of the world cuts back its combined trade deficit, the volume of demand for Middle Eastern oil will fall,

causing a glut in the world oil market. On the other hand if the rest of the world borrows very heavily in an attempt to maintain its spending and if Middle Eastern imports are high enough, the volume of demand for Middle Eastern oil may exceed what the Middle East is ready or able to sell, making a rise in the price of oil inevitable. The more the rest of the world borrows, the higher the price of oil may have to rise.

Recycling and the level of income

How much does the rest of the world need to borrow in order to sustain a given level of income? So long as the Middle East meets additional demand for oil without raising the price, the rest of the world's deficit need only increase to support a higher level of income by an amount proportionate to the additional volume of oil imports. The additional borrowing needed, at the present oil price, would be of the order of 1% of income, or \$100 billion, for each 10% addition to the level of income (taking the energy coefficient and energy supply outside the Middle East as given).

Through time the rest of the world can expand its income at the rate warranted by energy saving and growth in energy supply outside the Middle East without increasing its overall deficit at all. If it can buy more oil from the Middle East without provoking another price increase, it can grow faster than this provided borrowing increases to finance additional supplies of Middle Eastern oil. But once the level of income raises the volume of demand for Middle Eastern oil beyond what the Middle East will supply, the borrowing required to sustain income in the rest of the world will escalate sharply as the price of oil goes up. Such a rise in the price of oil may well improve growth prospects for the future by accelerating energy saving and the development of new sources of supply. However it may not achieve much in the short term because of the rigidity of existing supplies and patterns of energy use. Indeed once a price increase has occurred, recession will for a time be made worse unless the rest of the world maintains its spending by borrowing enough to cover the price increase in full.

2.4 Energy as a constraint

The analysis and evidence presented above leads us to suppose that economic growth in the world as a whole, excluding the Middle East (and centrally planned economies, whose problems we have not examined), has been slowed by increases in the price of oil and low growth of the energy supply. The energy constraint would be absolute if and only if energy use and energy supply were entirely unresponsive to price increases. In that case attempts to keep economic activity growing in the world as a whole by higher borrowing would merely force up the price of oil without securing any improvement in real income and production.

For the non-OPEC world increases in the price of oil would serve only to accelerate inflation.

In practice the energy constraint has not been continuously binding since in most years the rest of the world could have purchased more oil from the Middle East if it had borrowed more to sustain spending and pay for the additional imports. The constraint is certainly not immutable since increases in the world price of oil and incentive policies could increase the rate of energy saving and achieve a faster development of new sources of supply.

Nevertheless the hypothesis that energy problems restrict world economic growth has important implications and presents some dilemmas to the world community in general and the European Community in particular. Evidently policies which accelerate energy saving and additions to supply are unambiguously beneficial for the world as a whole. But a good part of the benefits may pass from the country where they occur as a rise in the country's own economic activity induces higher non-oil imports from other countries, enabling them to buy some of the additional energy which has become available. Moreover any one country may partially or wholly evade energy constraints if it can out-compete other countries in non-oil trade and earn enough to pay for all the oil imports it needs.

The implication is that governments concerned for the welfare of their own countries will not necessarily choose policies which contribute much to the relaxation of energy constraints in the world as a whole. Some mechanism is needed to increase the priority attached to energy saving and expansion of the energy supply. The obvious candidate for this role is the world price of oil. But here

further difficulties are encountered. A rise in the price of oil may harm particular countries, some of which are already very poor. The most powerful developed countries are themselves heavy net oil importers and fear the immediate consequences for themselves of a rise in the price of oil even though it will almost certainly improve their longer-run growth prospects. Finally a rise in the price of oil has in the past, and might again in the future, cause a short-term deepening of recession and a failure to make full use of the oil supplies currently available if there is an insufficient rise in borrowing in the world as a whole to cover the higher cost of oil exports by surplus countries.

The immediate prospects for faster world economic growth do not appear very good. New supplies of oil are being exploited in developing countries (notably Mexico) and there are steady additions to the supply and use of coal and primary electricity. But there are no new oil or gas developments on the scale of Alaska or the North Sea coming on stream in developed countries. The main hope must be that the high price of oil will keep up the pressure for energy saving and long-term supply developments. It seems possible that the price of oil will increase further. Middle East imports are rising steadily (making recycling less necessary) while Western Europe may reduce, but seems unlikely to eliminate, its deficit because of fears that this would make recession and unemployment even worse. Continuing deficits, together with rising Middle East imports, would generate a high level of demand for Middle Eastern oil, providing OPEC with the opportunity to raise the price yet again. This may be what is needed in the long run to ensure that the energy constraint is overcome.