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Intereconomics

Suggested Citation: Matthies, Klaus (1993) : Lessons from three oil shocks, Intereconomics, ISSN 0020-5346, Nomos Verlagsgesellschaft, Baden-Baden, Vol. 28, Iss. 2, pp. 55-60, <https://doi.org/10.1007/BF02928104>

This Version is available at:

<https://hdl.handle.net/10419/140388>

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Klaus Matthies*

Lessons from Three Oil Shocks

Two years ago, in early 1991, the third oil shock since 1973 came to an end. On this occasion, by contrast with the previous crises, the increase in prices that had begun when Iraqi troops occupied Kuwait was only short-lived. Why did oil consumers get off so lightly? Have they drawn the right lessons from the events of the seventies?

All the sudden market disturbances of worldwide significance in the last two decades have concerned oil. The reasons for this lie in the nature of this commodity and of the market on which it is traded. The oil market displays specific supply-side features that differentiate it from other markets:

- oil reserves, and especially oil exports, are heavily concentrated in politically volatile regions; and
- the market is oligopolistic, with substantial quantities of oil being exported by a small number of producers, often state-owned or quasi-state-owned.

Demand factors also contribute to the market's high sensitivity, namely:

- oil's predominant role in energy supply;
- its low short-term substitutability, with the consequence that the short-term price elasticity of oil consumption is also low;
- large commercial storage capacity and stocks, so that market demand for oil fluctuates much more sharply than consumption, and shortages – or gluts – can appear more severe than they really are over a fairly long period.

Oil's Key Role

In view of the central importance of oil in the supply of energy, events that affect oil supplies are registered very acutely. The consequences an oil shortage will have depend basically on the relative importance of the changes in the volume of supply and on the conditions for macroeconomic adjustment to the changed situation.

Whether a change in the supply should be regarded as a perceptible "shock" therefore depends first on the scale of the volume and price changes and on the scope for rapid reaction, by drawing on oil reserves or making greater use of other energy sources, for example. As far as the

economic effects are concerned, it is then important how the economic adjustment process proceeds; this depends, among other things, on the economic policy response and the flexibility of income distribution.

Sudden market disturbances that warrant the use of the term "oil shock" may present themselves as volume or price shocks or a combination of both. A volume shock in the form of a surge in oil supplies – such as the substantial expansion of Saudi Arabian oil exports in 1986 – is regarded as unproblematic, at least by consuming countries, as adjustment can be handled relatively easily; such developments are therefore not usually perceived as a shock at all and will not be considered further here. A reduction in supply, by contrast, can cause difficulties. If it is temporary, its impact will depend primarily on its severity and duration, but also on whether these factors can be predicted. A temporary reduction is disturbing, but it is not necessarily a serious problem, since there is no need for the adjustment that would have to take place if it were permanent. A price shock is not independent of a volume shock, but it is also influenced by the supply policy pursued either by a dominant supplier or by means of cartel agreements.

The latest sudden disturbance in the world oil markets, which was triggered by the Middle East crisis in the late summer of 1990, caught both oil consumers and oil producers unawares. It brought to an end a period of relative calm in the oil markets, during which it had become the accepted view that there was ample supply capacity to meet rising world demand for oil. The UN embargo on oil supplies from Iraq and Kuwait imposed within days of the occupation of Kuwait cut the world oil supply by around 7%. Imports from these two countries accounted for 10% of Western Europe's oil consumption and 8% of Japan's, and they met 5% of North America's oil requirement (cf. Table 1).

Within a few weeks, stockpiling of oil in view of uncertainty about future supplies had raised the price of

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North Sea Brent oil from \$ 18 to \$ 30 a barrel. In October 1990 spot prices occasionally even went above \$ 40. The sharp increases in oil prices hit the world economy at a time when growth was already slowing down in some important countries. A lasting rise in the price of oil would undoubtedly have reinforced these recessionary tendencies.

The initial reaction of the oil markets to the outbreak of the conflict shows clear parallels with the two oil price crises of the seventies. Then too, the danger of a reduction in the supply of oil led to dramatic price increases:

- in 1973-74, after the Arab oil-producing countries had imposed an oil embargo on the USA and the Netherlands, the oil price quadrupled within a few months to \$ 10 per barrel;
- from the end of 1978 onwards, as a result of the loss of Iranian oil exports due to strikes during the revolution, the spot price rose from \$ 14 to \$ 40 in the space of a year; during the next year the average oil price remained above \$ 35 (cf. Fig. 1).

The two oil shocks of 1973-74 and 1979-80 had a lasting effect. Between the first oil price jump and the next five years later, oil prices even continued to rise, and the reverberations of the second oil shock were still being felt until 1986, when oil prices fell substantially owing to the change in Saudi Arabian policy.

Economic growth in Western industrial countries slowed down considerably after the first oil price shock; the annual average rise in gross domestic product fell from 4.5% in the five years before the shock to 2.5% in the years from 1974 to 1978. The recovery that had begun in the second half of the seventies ended after the second price surge from 1979 onwards. Between 1979 and 1982 the GDP of the industrial countries increased by an average of only 0.8% a year.

The experiences of the oil-importing countries in the seventies and early eighties aroused similar fears after the outbreak of the latest Gulf crisis. In the more pessimistic scenarios sketched out for the world economy it was assumed that the price of oil would rise to \$ 60 or more and that growth would be permanently curtailed. However, the

oil market soon came to the view that the reduction in supply would be confined to the loss of shipments from Iraq and Kuwait, given the military superiority of the USA, and that the increase in oil prices would be only temporary. The sharp rise in prices that began in August 1990 came to an end after about two and a half months, and calm returned to the oil market by January 1991, even before the conclusion of military hostilities. Oil prices fell back to almost the levels seen before the outbreak of the conflict.

Overall, the third oil price explosion since 1973 therefore had only a slight and temporary adverse effect on growth. In May 1991 the International Monetary Fund estimated that the GDP of the industrial countries had been reduced by a quarter of one per cent in 1990 and forecast further declining losses in 1991 and 1992 and a resumption of "normal" growth.¹

Reduced Importance of Oil and Energy

There are basically three ways in which oil-importing countries can mitigate the effects of oil shocks; they can

- permanently reduce oil consumption by bringing about structural changes in their economies and thus increasingly immunise themselves against shocks;
- create instruments that reduce oil demand temporarily in the event of market disruption; and finally
- build up oil reserves to tide them over reductions in supply.

All of these options have been used in the industrial countries.

When the consumer countries established the International Energy Agency in 1974, they set themselves the objective of reducing their dependence on oil. Indeed, the total oil consumption of Western industrial countries at the beginning of the nineties was 10% lower than at the onset of the first oil crisis in 1973, whereas in the rest of the world it had increased by more than half over the same period. The OECD countries' share of world oil consumption declined by a fifth during this time (cf. Fig. 2). The reduction in oil consumption is even more impressive when viewed in relation to output. Since the first oil crisis oil consumption per unit of gross national product has fallen by almost half, whereas the specific consumption of other energy sources has hardly changed.

The reduction in specific consumption was due not so much to energy policy as to lasting conservation and substitution efforts, especially in industry, in response to the sharp rise in the real price of oil and other energy sources. Taking as the base year 1972, the last year in which oil cost just under \$ 2 per barrel on the world market, the real price of oil in relation to the average price of

Table 1

Crude Oil Imports of the OECD Countries from the Middle East in the Second Quarter of 1990

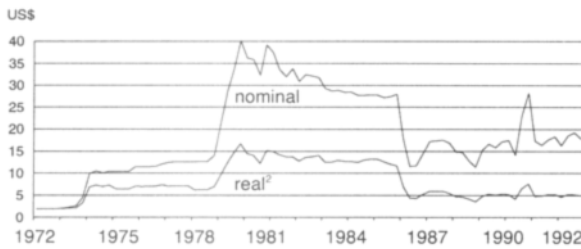
(in millions of tons, with percentage of total oil consumption in brackets)

	Middle East	Iraq/Kuwait
OECD total	104.6 (24.6)	29.5 (7.0)
Europe	46.5 (32.0)	14.5 (10.0)
North America	26.0 (12.3)	9.5 (4.5)
Pacific	32.1 (47.1)	5.6 (8.2)

Source: Calculated from IEA: Quarterly Oil Statistics.

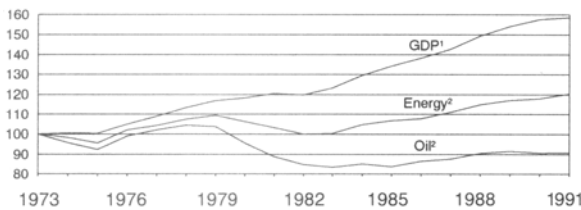
¹ Cf. International Monetary Fund: World Economic Outlook, May 1991, p. 22.

Figure 1
Crude Oil Prices¹ 1972-1992



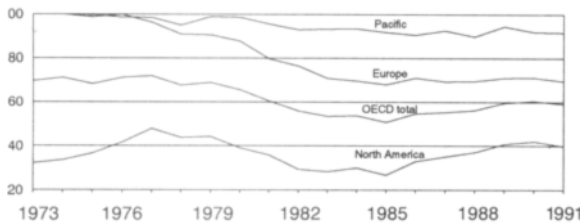
¹ Spot barrel price of Arabian Light, fob; quarterly averages.
² Base year: 1972; deflated with the price index for manufactured goods exports of industrialised countries.
Sources: OPEC, UN.

Figure 2
Gross Domestic Product, Total Primary Energy Supply and Oil Requirements in the OECD 1973 - 1991 (1973 = 100)



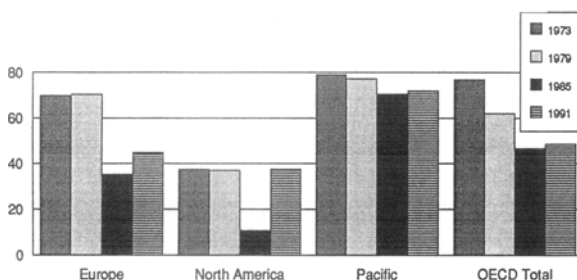
¹ US\$ at 1985 prices and exchange rates. ² Tons of oil equivalent.
Source: IEA: Energy Balances of OECD Countries.

Figure 3
Import Dependence¹ of the OECD Oil Supply 1973 - 1991



¹ Net imports as percentage of total requirement.
Source: IEA: Energy Balances of OECD Countries.

Figure 4
Share of Middle East Oil in OECD Crude Imports from Third Countries (%)



Source: OECD.

exports of manufactures from industrial countries rose to \$ 7 during the first oil crisis and to around \$ 15 during the second, in other words around eight times its original level. By 1992 the real oil price on this basis had fallen back to \$ 5, mainly as a result of the price crash of 1986 (cf. Fig. 1). Meanwhile, oil's share of the industrial countries' total energy consumption declined from 55% at the outbreak of the first oil crisis to 43% in 1991.

In absolute volume terms, however, the industrial countries' oil consumption only declined until 1985; between then and the end of the decade it rose by 9% as a result of the strong rise in output. The oil intensity of production in OECD countries decreased only slightly over this period, in other words the decoupling of oil consumption from national product slowed down sharply. The greatest progress with decoupling was made in the first half of the eighties, when oil prices were particularly high in the wake of the second oil shock and the after-effects of the first price shock were still being felt.

Shifts in the Composition of Energy Consumption

Imports cover a substantial part of the industrial countries' energy requirement, and the main energy import is oil. In 1991 the dependence on imported fuels – defined as the ratio of net imports to total energy consumption – was just under 30% in the OECD area. In that year almost 60% of the area's oil consumption was met by imports from the rest of the world (cf. Fig. 3), around one-tenth being in processed form. About half of the oil imports from third countries came from the Middle East.

Significant shifts have occurred since 1973, however. The OECD's energy self-sufficiency has generally risen, from 30 to 41% in the case of oil. For Western Europe, the increase in North Sea oil production was especially important in this regard. In the USA, by contrast, the oil import ratio is again higher than in 1973 owing to rising demand and falling oil production.

There have been very pronounced changes in the regional pattern of energy imports. In 1973 three-quarters of all OECD crude oil imports from third countries came from the Middle East, but by 1991 the share was down to about half (cf. Fig. 4). The sharpest decline was in Western Europe, which obtained around 90% of its imported crude from that area in 1973 but in later years was able to rely increasingly on its own oil from the North Sea. Relatively little has changed in North America, which then and now imports oil primarily from Latin America, which is geographically closer. Nevertheless, Saudi Arabia has now become by far and away the most important single foreign supplier of oil to the USA, and the USA is the largest buyer of Saudi oil.

Contingency Measures through the IEA

A reduction in oil dependence to minimise the adverse effects of market disruptions can be achieved only over the medium-to-long term. In order to be able to respond quickly to crises, the industrial countries have therefore developed a set of instruments under the auspices of the IEA, through which they have co-ordinated their national strategies since 1974. The centre-piece of state precautionary measures is the holding of strategic oil reserves. In order to guard against unforeseen interruptions of supply, member countries have agreed to build up sufficient oil stocks to meet oil requirements for a minimum of ninety days in the event of a total halt to net imports. As a rule, this objective has been achieved since 1981, although not all of the time by every single country.

The bulk of the stocks are held by the oil sector, which (in the European Community, at least) is obliged to hold certain minimum volumes. In some countries – Denmark, Germany, the Netherlands, Austria – the compulsory reserves are managed by separate stockpiling organisations funded by the oil companies. Around one-quarter of the total reserves in IEA countries consists of state crude oil reserves, which have been built up primarily by the USA, Japan and Germany.

An emergency in the supply of energy is defined as an actual or expected reduction of more than 7% in the IEA countries' normal oil consumption; the same threshold also applies to individual member countries.

The following steps are foreseen if an emergency is declared:

- requirement for member countries to curb oil demand;
- release of emergency reserves for use in accordance with predetermined rules;
- diversion of supply flows, i.e. essentially diversion of tankers.

The measures are intended to ease the market situation in a crisis and damp the rise in oil prices by reducing consumption, releasing reserves for use and largely eliminating competition between member countries for the reduced supply of oil.

Problems in the Use of the Instruments

The IEA system has stood the test in several trial runs, but this does not answer the question of whether it would live up to expectations in practice, as an emergency has never been declared so far. The reduction in supply in the two oil crises of the seventies has been estimated at about 5%.² In the summer of 1990 very speedy action was taken

to counteract the threat of bottlenecks by drawing on the oil industry's reserves and other stocks. More important, however, was the response of the oil-producing countries. Within two months world oil production was back at its pre-conflict level, mainly thanks to an increase in production in Saudi Arabia, but also in the United Arab Emirates and Venezuela.

As the 7% threshold was not reached during the latest Gulf conflict or in the two oil crises of the seventies, the IEA regards the disruptions of supply as minor in volume terms. Even in these circumstances the IEA can act, and indeed it has repeatedly intervened. However, there is no set plan of action for such cases, only voluntary ad hoc measures. In the past these took the form of agreements to restrict consumption, recommendations to the companies to show restraint in purchasing additional quantities of oil or the release of reserves to influence the spot markets, a measure that was originally not foreseen. In the light of experience in 1979, when the overthrow of the Shah brought chaos to the international oil markets, the member states agreed in 1984 after long debate that in the event of a significant disruption of supply they would decide quickly on the co-ordinated release of oil reserves and other measures, irrespective of whether the 7% threshold had been reached or not. The aim of this was to take greater account of the price effects of supply constraints.

During the latest Gulf conflict, the question of when to release oil reserves led to renewed controversy over the adequacy of response in crisis situations. For example, it was widely seen as contradictory that in the late summer of 1990, when oil prices doubled in a matter of weeks owing to the increased risks to future oil supplies, the IEA did not respond to calls for action – from OPEC, among others – on the grounds that supply was adequate, but in January 1991 announced the release of oil reserves without there being any shortage of oil, and thus helped put downward pressure on prices.

Results of the Adjustment Process So Far

The aspects of developments in the industrial countries' supply of oil since the seventies that are relevant from the point of view of oil shocks can be summarised as follows:

- The three oil shocks since 1973 were primarily price crises, not volume crises. Fluctuations in oil prices have become more pronounced over this period.
- Alternatives to oil, especially natural gas, became more important for the industrial countries after the first oil shock, but these countries are still heavily dependent on

² Cf. D. Yergin: *The prize – the epic quest for oil, money and power*, New York 1991, p. 615.

oil, in most cases predominantly imported oil. Diversification into other energy sources occurred mainly from the mid-seventies to the mid-eighties, but slowed down considerably thereafter as oil prices began to fall again.

- The probability of serious disruption of oil supplies and damaging effects on the economies of industrial countries has been greatly reduced since the seventies by energy conservation, oil substitution, increases in domestic oil production, diversification of sources of supply and contingency measures. However, the economies remain quite highly vulnerable to disturbances.
- The oil shock during the recent war in the Persian Gulf was very mild by comparison with the first two oil price shocks mainly because the oil-exporting countries offset the shortfall of about 7% of world supply within a few weeks by increasing oil production, and because the United States' military superiority allayed fears of a wider disruption of production and supply.

Prospects for a Further Reduction in Oil Dependence

The risks inherent in the oil market will continue to be of significance for the industrial economies as long as they require large quantities of oil. Further energy savings must be made and oil replaced by other energy sources if the uncertainties are to be reduced further. An important incentive to reduce the industrial countries' structural dependence on oil was lost when oil prices began to fall in the mid-eighties.

Environmental policy is generating fresh impetus to restrict the use of oil. For example, oil consumption might be expected to fall if the long discussed plans to fight global warming by imposing heavier taxes on energy use – or at least on the use of fossil fuels according to their carbon content – come to fruition. The problem of the greenhouse effect is basically recognised, but not all countries yet consider it to be so urgent that incisive measures must be taken quickly. In particular, the former US Administration had set its face unequivocally against additional energy taxes. Under the new President, however, the introduction of a general energy tax to be borne by all consumers is being considered. Unless parallel steps are taken by important competitors in world markets, there is probably no chance that the EC Commission's plans to introduce a combined energy and carbon tax will be implemented.

The Gulf war again highlighted the vulnerability of the oil-rich Gulf states. One way of increasing the security of supply without curbing energy consumption would therefore be to further reduce the heavy dependence on suppliers in the Middle East. The search for alternative

sources of supply rapidly runs up against limitations, however, in view of the regional distribution of oil deposits in the world; in fact, the region's importance as a source of oil is likely to increase in future, given the fact that it has two-thirds of all proven reserves.

Developments in Saudi Arabia are of particular importance in this respect. For many years the country has been a key player on the supply side of the world crude market. Saudi Arabia occupies a pre-eminent position among the producing countries in view of its substantial reserves – one quarter of the world total – and the smallness of its own requirement. Co-operation with this important supplier is therefore of great value to oil-importing countries, while at the same time Saudi Arabia, whose production policy is accommodating towards oil consumers, helps to ensure the long-term preservation of its prime source of income by exerting a moderating influence on oil prices.

The Gulf conflict served as a reminder that oil, and especially oil from the Middle East, is still of extraordinary importance for the world economy. Calls for a dialogue between oil producers and consumers have therefore been renewed since the Gulf war. Many advocates of such a dialogue hope it would have a whole series of positive effects, including³

- greater stability in the oil market, and
- "sensible" oil prices.

The desire for greater stability in the oil market is understandable, given the wide price fluctuations in the seventies and eighties. However, only a very small part of the volatility of oil prices could surely be ascribed to a lack of dialogue between producing and consuming countries. The fluctuations were caused more by the reaction of market participants to particular, often politically determined, signals that led to expectations of a change in supply volumes. If such influences are not to have a price impact in future, it is not sufficient to revert to contractually agreed prices in place of market prices; there must be credible guarantees that an adequate supply is available at these prices. Apart from the fact that this is an economically dubious way of proceeding, the question of feasibility also arises.

One particular difficulty in talks between producers and consumers is in achieving agreement about the level of a reasonable oil price. From the mid-seventies to the early eighties events in the international oil markets were characterised by the fact that oil-producing countries

³ Cf. T. Stoltenberg: Building a new global energy policy interrelationship, in: OPEC Bulletin, Vol. XXII (1991), No. 7, p. 20.

considered the world market price to be too low, while consumers regarded it as too high. This simple juxtaposition began to grow complicated when OPEC's high price policy reached its limit in the first half of the eighties and member countries' market shares contracted significantly. The broad degree of unity within the organisation crumbled as some producers began to shake off the "resource nationalism" of the seventies and early eighties and to place increasing value on co-operation with oil-importing countries.

The oil-importing countries have always refused to hold a dialogue with the oil-producing countries on oil prices and volumes, no doubt to a large extent because of their bad experience with other raw materials. Even at the meeting of producers and consumers a year ago in Paris – at which the subject of market mechanisms was discussed as well as industrial co-operation, the exchange of information and the environment – prices and volumes were not on the agenda because, according to the IEA, the industrial countries considered they were better left to market forces.⁴

Even though differences in the assessment of the efficiency of market mechanisms remain and have merely been masked by excluding such "sensitive" subjects, the holding of several meetings between oil-consuming and oil-producing countries since the end of the Gulf war can be interpreted as an expression of the mutual wish to awaken understanding and reduce existing antagonism. Dialogue cannot, however, be expected to make a decisive contribution to avoiding or overcoming future oil shocks. It therefore remains to be asked what contribution the consumer countries' own contingency measures can make.

Future Tasks of Contingency Measures

The increases in production in the early months of the last Gulf conflict were almost the maximum that the producing countries could achieve. If further reductions in production and deliveries had occurred at the beginning of 1991 during the military campaign, oil supplies might have been threatened, but at the very least oil prices would have risen much more sharply, for there was little free capacity available at short term after the loss of two important producing countries and the increase in production in other countries, led by Saudi Arabia.

It is a hypothetical question whether the IEA, which declined to intervene in the market by releasing strategic oil reserves in the summer of 1990, had the means at its disposal to exert a decisive influence on market sentiment

and hence on oil prices. The dilemma lies in the fact that in times of uncertainty oil demand increases sharply owing to precautionary purchases and speculative operations in expectation of rising spot prices, and in such circumstances the price elasticity of demand is low.

It is tempting to call for strategic reserves to be used on a massive scale as soon as these circumstances arise in order to meet precautionary additional demand and thus ensure that oil price surges do not even happen. The chances of such market intervention being successful, however, are placed in serious doubt by experience with intervention in the markets in other raw materials and in the foreign exchange market.

For one thing, the reserves would probably have to be greatly increased in order to have significant price-stabilising effects in an emergency, as otherwise the very decline in the reserves could act as a signal to mark oil higher. It is almost impossible to estimate how much the reserves would have to be increased. In an emergency the necessary scale of reserves will depend crucially on market expectations as to the duration of the disruption, which may be far removed from reality.

However, to the extent that a rise in oil prices reflects an actual or expected reduction in supply, price-stabilising market intervention would suppress precisely the signals that would trigger an appropriate response from oil consumers. The primary purpose of strategic oil stocks should therefore continue to be as a reserve for emergencies, in other words to meet actual shortfalls.

This is not to say that reactions by the IEA such as in January 1991, when it released oil reserves at short notice to prevent a primarily psychological shock at the outbreak of hostilities in the Gulf, should generally be questioned. Indeed, the decision to be more flexible in influencing sentiment in the oil market, a decision that was taken in the light of experience in the second oil crisis, appears to be entirely sensible; this includes the possibility of releasing contingency reserves at an early stage. However, it is difficult to lay down hard and fast rules for measures below the crisis threshold, as member states hold differing views about the role of the market mechanism and state intervention when the situation becomes acute.

The debate about developing the contingency mechanism further must not lead to the assumption that existing or augmented reserves provide an adequate cushion against future market disturbances. A higher level of security in the supply of energy or oil requires continued efforts in other fields as well, such as diversification of the energy mix. Besides that, it is a fundamental necessity to reduce energy consumption for other reasons, too, namely environmental considerations.

⁴ Cf. Much about nothing?, in: Energy Economist, March 1992, p. 18.