CBO STAFF MEMORANDUM

EFFECTS OF THE RECENT OIL PRICE RISE ON THE ECONOMY

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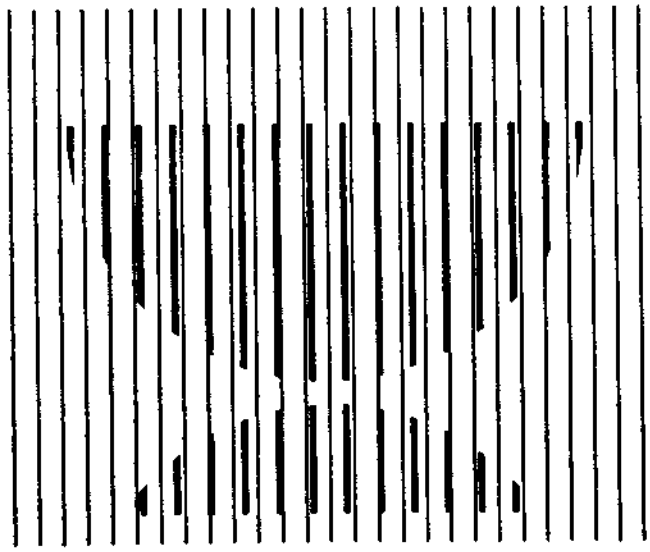

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PREFACE

This staff memorandum was prepared as part of CBO's internal review of the economic outlook following the invasion of Kuwait by Iraq. It has not undergone CBO's normal review and editing process.

Douglas Hamilton, George Iden, and Warwick McKibbin gave valuable comments. Dorothy Kornegay, Linda Lewis, and Rae Roy typed the drafts.

INTRODUCTION

The invasion of Kuwait by Iraq has sharply raised oil prices in world markets. It is too early in the hostilities for speculation about outcomes to be very useful, so that the best we can do is to examine the economic impact of some reasonable-looking scenarios. All these scenarios suggest that the crisis will significantly cut real GNP in the U.S. by amounts ranging between 0.5 percent and 1.3 percent in 1991; they also suggest that there will be at least a temporary sharp increase in the rate of growth of consumer prices, of up to 4 percentage points in the third quarter of 1990.

Since the crisis began on August 2, world financial markets have been in a turmoil, with large drops in many stock markets and large changes in exchange rates. Some of this movement is undoubtedly related to the Gulf crisis, but some of it may be caused by other things going on in the world. For example, the Japanese stock market may be experiencing the bursting of the speculative bubble that Samuelson warned about several years ago at a CBO advisers' meeting. In East Germany, the change in the economic system seems to have brought about economic collapse faster and more completely than many had hoped. The UK risks recession, the result of its extraordinarily high interest rates of the past year. Australia is experiencing its own counterpart of our S&L crisis: but because there is no deposit insurance, drops in property values due to high real interest rates have led to bank runs and the collapse of several building societies. In the United States, revised BEA data indicate that the economy has been growing more slowly than previously thought, even before the Gulf crisis, and no decisions have yet been made on how to resolve the budget deficit.

This paper addresses the expected effect of higher oil prices on the U.S. economy. It does not address other aspects of the Gulf crisis, such as the implications of military action both for the U.S. budget and for confidence of consumers and investors; and it does not address the events in the U.S. and in other countries outlined in the previous paragraph. Thus this paper does not contain an account of why financial markets have behaved as they have since August 2, an account that would have to take seriously these other factors. Some of the recent events--such as the sharp drop in the dollar--indeed are not easily related to the oil price increase.

HOW THE OIL PRICE INCREASE AFFECTS THE ECONOMY

A large and sharp increase in the price of oil, such as we are currently experiencing, affects the economy directly in four main ways:

- It raises prices to consumers of oil, reducing their real incomes;
- It increases what we have to pay for oil imports, thus increasing incomes of foreign oil producers;
- It also raises the incomes of domestic oil producers;
- It increases prices in general, reducing the real money supply and raising real interest rates unless the Federal Reserve takes offsetting action.

These direct impacts have consequences in the oil market, where higher prices will curtail consumption and stimulate domestic production if they are expected to remain high; they also are likely to lead to a substantially worse general economic outlook. In the short run, inflation is likely to be higher and real GNP lower than would otherwise have been the case. If high oil prices were to persist, the long-run potential output of the U.S. economy would be reduced.

The discussion in the remainder of this paper is based on previous CBO work on the effects of oil price changes on the economy[1] and on examination of simulations of four models: the DRI and WUMM quarterly macroeconomic models of the United States, and two annual global models (MULTIMOD and MSG) that are capable of representing forward-looking expectations. In the present context, forward-looking expectations make it possible to examine what difference it makes if people expect the oil price increase to be temporary.[2] (Because MULTIMOD is new to CBO, only certain insights from this model are reported.)

The next few paragraphs explore what can be said in general about oil price increases and their impacts on real GNP, prices, interest rates and exchange rates, and exports, paying attention to whether the price increase is temporary or permanent, and whether it is expected to be temporary or permanent. Where numbers are cited, they refer to an arbitrary $5 per barrel (bbl) increase, or a little more than 25 percent, in the price of crude oil. This is about half as big as the recent increase in, say, West Texas Intermediate crude. More realistic scenarios are discussed in the next section.

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1. *The Effect of OPEC Oil Pricing on Output, Prices and Exchange Rates in the United States and Other Industrialized Countries*, Congressional Budget Office, February 1981; *The Economic and Budgetary Consequences of the Recent Oil Price Decline, Staff Memorandum*, Congressional Budget Office, March 1986.

2. DRI is the quarterly macroeconomic model of the U.S. developed by Data Resources, Inc. WUMM is the quarterly macroeconomic model of the U.S. developed by Laurence Meyer and Associates. MULTIMOD is a global model at annual frequency developed at the International Monetary Fund. MSG is the McKibbin-Sachs Global Model, also at annual frequency, developed by Warwick McKibbin of the Brookings Institution and the Reserve Bank of Australia and Jeffrey Sachs of Harvard and the National Bureau of Economic Research.

Why real GNP is reduced

Real GNP falls for three reasons. First, higher oil prices reduce aggregate real incomes in the United States--consumers' income falls more than producers' income rises, because we import about half our oil. The loss of real income cuts spending on non-oil goods and services. Second, unless the Federal Reserve allows for greater money growth, higher prices will increase the demand for money and could raise real as well as nominal short-term interest rates, cutting interest-sensitive expenditure such as housing. We return below to the Federal Reserve's management problems. These two effects are relatively short-run in nature. The third effect is more persistent; the "supply shock" reduces potential output of non-oil goods and services. This comes about because costs of substitution accelerated equipment scrapping, and increased unemployment. Producers of non-oil goods and services will reduce their use of oil and substitute other factors of production, a process that is costly and uses up resources of capital and labor. Then the higher price of oil, if it persists, may accelerate the scrapping of capital equipment that is energy-intensive. Finally, people may become unemployed, at least temporarily, as economic activity shifts to oil-producing states and out of oil intensive sectors.

The short-run impact of consumers' real income losses on real GNP can be substantial. A $5/bbl price increase involves transferring about $14 billion, or 0.3 percent of GNP, to foreigners; this is the first-round change in aggregate real income in the United States. Using a standard multiplier of 1.5 to reflect how consumers' spending might be affected, this would lead to a loss of real GNP peaking of about 0.5 percent, if the price increase were maintained. But such demand shocks do not have permanent effects: the natural dynamics of the economy would bring the economy back to close to its baseline level, or even above, in less than three years if there were no productivity shock.

The longer-run impact of the productivity shock could also be substantial. Two models that are capable of representing the productivity shock put the long-run GNP loss at nearly 1 percent in the case of a persistent $5/bbl increase in oil prices.[3]

Some analysts have been skeptical that changes in the price of crude oil--which accounted for only about 2 percent of GNP before the latest price increase--could be so important to the productive potential of the economy.[4] In the case of the

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3. The two models are DRI and MSG. In the DRI model, a permanent oil price increase has little impact on potential GNP until about the fifth year: then potential declines progressively for another 10 years or so when it converges on about a 1% decline for each $5/bbl oil price increase. This behavior is the result of sharply lower capital formation from the fifth year on. The MSG model has a similarly large impact on investment and real output, but in this case it occurs almost immediately, since the model has forward-looking expectations that bring about equilibrium processes quickly.

4. e.g., Edward Denison.

models we have examined, the large losses in potential come about because the oil price increase not only induces substitution of labor and capital for energy: it also reduces the profitability of non-oil investment and thus reduces the capital stock in the long run.[5] With less capital and a higher capital-gross output ratio, output must fall significantly.

Oil company investment: an offsetting factor. The general effects in real GNP discussed in the last few paragraphs are uniformly negative, but they do not reflect how oil company investment in drilling and exploration might be affected by an oil price rise that is expected to be permanent. A DRI model simulation of a permanent $5/bbl increase increased investment in oil drilling increased by about 20 percent--or 0.1 percent of real GNP--in the first few years of this simulation. After about 5 years, however, after oil companies have done the drilling appropriate to the higher oil price, drilling expenditure drops and ceases to be an important factor.

Price impacts

An oil price increase of about $5/bbl directly increases the cost of goods and services sold to final demand--consumers, business investment, government and exports--by about $30 billion, or 1/2 percent of the current value of final demand, if other producers do not change their profits. To a first approximation, therefore, this is the average direct price increase due to a $5/bbl oil price increase. The price increase will be smaller to the extent that non-oil profits fall, and larger to the extent that other energy prices rise in concert with oil prices, and that workers seek to maintain their real wages in the face of the oil price rise, possibly starting a wage-price spiral.

The macroeconomic models we have looked at suggest that price increases could be substantially larger than 1/2 percent for a $5/bbl increase, though there may be reasons to doubt their results. Three models--DRI, WUMM and MSG--predict that prices would rise between 1 and 1 3/4 percent after one to three years, even if the Federal Reserve does not follow an accommodating monetary policy. In the case of the DRI model, which has detail on competing energy prices, increases in the price of natural gas are an important part of the story (see Table I); other energy prices are implicit in the other models. All of these models, however, follow the usual practice in macroeconomic modelling that all price changes are treated similarly in the determination of wages, so that oil price increases lead to persistent growth in nominal wages unless choked off by monetary policy. Empirical work at CBO however, costs some doubt on the usual wage-price spiral explanation. For this reason, the large price increases predicted by these models should be regarded with caution.

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5. *Economics of Worldwide Stagflation*, M. Bruno and Jeffrey Sachs, Harvard University Press, 1985; *Macroeconomic Interdependence and Cooperation in the World Economy*, Warwick J. McKibbin and Jeffrey Sachs, Harvard University and National Bureau of Economic Research, May 1990.

TABLE I. SIMULATED EFFECT OF $5 CRUDE: OIL PRICE INCREASE ON OTHER ENERGY PRICES (Percent increase)

	1990:3	1990:4	1991	1992	1993
Refiners' Acquisition Cost					
Crude Oil	27	27	27	27	27
Producer Price Indexes for:					
Coal	0.1	0.3	1.0	1.6	1.8
Natural Gas	6.8	11.2	13.7	15.8	17.2
Electricity	0.4	1.2	1.9	2.4	2.7

SOURCE: Simulation of DRI model.

The increases in the CPI due to oil price increases could be expected to occur quickly, and this is reflected in the models. The WUMM model shows about three-quarters of the three-year CPI increase occurring in the first two quarters, while the DRI model shows half in that time-frame. (The MSG model is an annual model: it shows about 1/2 in the first year.)

Financial implications: interest rates and exchange rates

Interest rates and exchange rates are determined jointly and affected by several factors that will be changed by an oil price increase. The main ones to look at are what is likely to happen to the worldwide balance between investment and saving, and what is likely to be the response of monetary authorities here and abroad to the oil price increase. Nominal interest rates are likely to rise in the short-run, because of higher expected inflation. The change in real interest rates and exchange rates cannot however be tied down theoretically, and the macro models we have examined differ widely in their results.

In the long run, world real interest rates are set by the balance between investment and saving. Non-oil investment is likely to fall, for reasons described above, though this may be offset somewhat by increases in drilling. With respect to saving, the two global models we have examined--MULTIMOD and MSG--assume that an increase in oil prices will reduce world saving because foreign oil producers on average have a lower marginal propensity to save than oil consumers. In the current case this is a plausible assumption because Kuwait--a high saver--is no longer selling and Saudi Arabia--another high saver--is spending a great deal of money on military defense. However, it is hard to say whether as a result world saving falls more than world investment, thus increasing equilibrium real interest rates, or whether the opposite is true and real interest rates will fall.

Interest rates and exchange rates will also be affected by how monetary authorities resolve the dilemma caused by the oil price increase. The dilemma exists because on the one hand prices are rising sharply, while on the other hand output losses loom. A central bank that accommodates the oil price increase, allowing money to grow sharply in the short run, might be able to avoid a short-run loss in real output but would risk larger overall price increases. On the other hand, no accommodation risks adding to the demand shock caused by the loss of real consumer income a second one caused by inadequate credit and high short-term interest rates.

While the goals of central banks differ between countries and from one time to another, in many advanced countries they have leaned towards little or no accommodation of past oil price changes. In the case of the United States, monetary tightness in the face of the 1973-74 and 1979-80 oil shocks was almost inevitable, given the rapid inflation for other reasons that was already going on (though in the earlier case it was partially suppressed by price controls). Nevertheless, the cost in terms of lost output of the deep and long recessions that followed those two previous shocks was very large. Thus, some analysts suggest that a more

accommodative stance might be justifiable, particularly in the case of the United States which is already growing very slowly and is attempting to cope with an extraordinary budget crisis and fragile financial institutions--problems whose resolutions would be greatly complicated by a recession.

So far it is difficult to detect that any of the major central banks, including the Federal Reserve, has taken any strong steps following the oil price increase. Short-term interest rates have changed little except in Germany. This could be taken as evidence of accommodation, but its evidentiary value is greatly confused by the multitude of other things going on at the same time that were cited above.

Because the likely responses of monetary authorities are not yet clear, it is similarly difficult to predict how interest rates and exchange rates will move. Indeed, models differ widely, with some predicting appreciation and some depreciation for the U.S. dollar. There are, however, some straws in the wind:

- In past periods of turmoil, capital has fled to "safe havens" which has usually meant U.S. government securities. To the extent that this occurs, it will both tend to push up value of the dollar and help to keep down U.S. interest rates. But there is not much evidence that it has occurred in the current crisis: some analysts suggest that the uncertainty over U.S. fiscal policy is so great as to make the U.S. a less attractive haven for foreign capital.

- Because the U.S. is an oil producer as well as a consumer, its real GNP loss from an oil price increase is likely to be less than that suffered by other countries (despite the high per-capita energy use). This should tend to increase U.S. interest rates relative to other countries and appreciate the dollar.

- Since trade in petroleum is based in dollars, higher dollar prices increase the demand for dollars to finance the trade, and this too should tend to appreciate the dollar. But the effect is probably minor.[6]

These arguments, while not conclusive, suggest that the dollar should have risen following the oil price rise. In fact, it has fallen, reducing somewhat the impact of the price rise on other countries. Whether the drop in the dollar since early August is directly related to the oil price increase, to other aspects of the Gulf crisis (such as the possibility of shooting war) or to other factors is not clear.

For the record, MSG and DRI predict increased real interest rates in the U.S. following an oil price increase, while WUMM and MULTIMOD predict lower real

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6. The demand for dollars is increased appreciably only if oil traders hold on to dollars for a while before and after making their trades. In today's computer-linked trading, however, currency exchanges can be made very rapidly, and traders do not need to acquire dollars long before trades.

rates. MSG and MULTIMOD predict nominal dollar appreciation, while DRI and WUMM show a depreciation.

How exports might change

Since the oil price increase implies a substantial increase in the cost of our imports of oil, it is natural to ask if there is any reason to expect offsets that could mitigate worsening of the balance of payments. Two such offsets can be identified: exports to some oil-producing countries, the ones such as Nigeria and Indonesia that use oil revenues promptly to finance increased imports, would likely be increased; and profits of U.S. oil companies with foreign oil-producing operations would be increased--these also generate receipts, like other exports,, in the balance of payments. However, the economies of many of our trading partners will be weakened, much as is ours, by the oil shock. Non-oil-producing developing countries such as Brazil, in particular, will be hard hit not only by the higher cost of oil but also by higher nominal interest rates they must pay on their debt: these countries will have to reduce their imports from the United States and other industrial countries. Overall, the balance of payments is likely to deteriorate sharply as a result of the oil-price increase. The uncertainty over the likely movement of the exchange rate means that little more can be said about the balance of payments.

Temporary and permanent increases

The discussion so far has assumed that the oil price increase is permanent, and has explored the short-run and long-run economic implications on that basis. Obviously, the long-run implications of an oil price increase are different if it is quickly reversed. Moreover, if the increase is expected to be temporary, or if people suspect that it might be, the short-run economic consequences can also differ.

If people expect the increase to be temporary, the economic response will differ in a number of ways. First, people who experience a temporary income loss are not likely to cut their consumption spending as much as if the loss were permanent, so that the demand shock will be smaller. Second, while oil users will likely take some cheap steps to cut energy use, such as restricting driving, they are unlikely to undertake significant expenditures to, for example, buy more fuel-efficient cars. Third, oil producers are unlikely to commit to increased drilling. Finally, prices of other goods are not likely to adjust in the same way to higher energy prices.

In two models we examined that are capable of capturing different expectations, an oil price increase expected to be temporary has a much smaller impact on the economy than one expected to be permanent. In the MSG model, the first-year real GNP loss, for example, is only about half as big as when the price increase is thought permanent, while in MULTIMOD a temporary oil price increase does not reduce real GNP at all.

In the real world, it is unlikely that people are confident of any oil price forecast. Thus their behavior is unlikely to be as clearcut as these model results suggest. Nevertheless, if people think that there is some significant probability that the oil price increase will be quickly reversed (and if it is in fact reversed!), it is likely that the loss of real GNP will be significantly less than if the increase is expected to be (and is) permanent.

SOME SCENARIOS AND THEIR LIKELY OUTCOMES

The analysis below refers to three alternative oil-price scenarios. Their main purpose is to elucidate the ways in which oil prices affect the economy.

The first scenario assumes that oil prices rise by about $10/bbl above the path that seemed likely prior to the crisis, remain high for a period of about 6 months, and then fall back to only a moderate increase of about $3/bbl above baseline. Market prices (for delivery next month) rose at their recent peak by a little more than $10/bbl. The drop in 6 months or so could come about both as a result of lessening of tensions in the Gulf and because of increased oil production from other OPEC members.

The second scenario assumes that the recent level of oil prices in the futures market overstates what will happen to the cost of imported oil. The futures market is always more volatile than the average cost of imports, and currently reflects in part expectations of the outbreak of a shooting war. The military buildup and diplomatic manoeuvres are assumed to succeed in quickly reducing the probability of actual fighting. Under this scenario, oil prices average only about $5 above baseline for the next six months, falling to $3 above baseline after six months.

The third scenario is pessimistic, assuming that tensions remain at about their current level and that Saddam Hussein is successful in intimidating other OPEC countries so that they do not in fact take up the slack in oil production. In this scenario, oil prices remain about $10/bbl above baseline for the foreseeable future.

Other scenarios are of course possible. At one extreme, shooting war in the Gulf is likely to raise oil prices at least temporarily well above the levels considered here. At the other, an end to the crisis on the terms of the Security Council resolution would imply oil prices no higher than they would have been without the crisis--and if the episode has weakened OPEC, perhaps even lower.

Methods. As the first part of this memorandum made clear, the several models we examined all provide some insights to how oil prices affect the economy, but none encompasses all the insights. Moreover, some of the most important insights come from models that yield results at an annual frequency only. For this reason, rather than simply reporting average results, we report a "best guess" that is based on examination of all the model results together with a great deal of judgement.

In each case, we assumed that monetary authorities do not accommodate the oil price increase with substantially faster money growth.

First scenario: $10 persists for 6 months, then drops to $3. In this scenario (see Table II), oil prices remain $10 above baseline for six months, then drop back to $3 above baseline. If, during these first six months, no price fall were anticipated, real GNP might drop about 0.7 percent from its baseline level as early as the fourth quarter of 1990 (thus reducing the annualized growth of real GNP by about 1 1/2 percentage point from baseline in the second half of 1990) (see Table II). If the price fall were fully anticipated, however, the loss in real GNP would be less--only 0.3 percent below its baseline level, and growth in the second half of the year would be reduced by only about 0.6 percentage points below baseline. It is most likely, of course, that people do not confidently expect either prices stable at their current level, or a price fall, so that the "best guess" outcome is between these two extremes.

In the short run, prices will be sharply affected by the oil price increase under all circumstances. The annualized growth of the CPI could be boosted by as much as 4 percentage points above baseline in the third quarter of 1990, with further increases of about 1 1/2 percent in the fourth quarter. Next year, with oil prices falling, the inflation impact would be reversed.

As we discussed above, there is no consensus on what might happen to interest rates, and theory also gives little help. We assume in our "best guess" that both short and long interest rates would rise modestly (by no more than 30 basis points above baseline) initially, dropping back to around 10-20 basis points when the oil price falls again. This pattern implies a sharp reduction in real ex-post short-term interest rates for two quarters then a sharp increase when prices fall. Later, it means a small (about 10 basis points above baseline) increase in real rates. It is consistent with a slightly restrictive Federal Reserve policy, and with a slight decline in world saving.

The other area where the models do not agree and theory give little help is the exchange rate. The "best guess" assumption used is that exchange rates will change little.

Second scenario: $5 persists for 6 months, then drops to $3. This scenario assumes that current market prices persist very little longer, so that the average oil price for the third quarter of 1990 is only $5 above previous forecasts, and that the price stays at $5 above baseline through the end of the year before dropping to $3 above baseline. Under these circumstances real GNP is likely to drop only about 0.3 percent below its baseline level by the fourth quarter of 1990 (reducing second-half growth by about 0.6 percentage points below the baseline rate) (see Table III). The impact on inflation in 1990 is of course about 1/2 as big as in the first scenario.

Third scenario: $10 price increase persists indefinitely. In this scenario, we assumed that prices stay high and that people do not expect them to come down. This is the most unpleasant combination of circumstances, yielding the largest GNP losses. By

TABLE II. BEST-GUESS RESULTS FROM FIRST SCENARIO: OIL PRICES ARE $10 ABOVE BASELINE FOR TWO QUARTERS, THEN $3 ABOVE BASELINE
(Percent difference from baseline, except where noted)

	1990:3	1990:4	1991:1	1991:2	1991:3	1991:4	1992:1	1992:2
Real GNP								
Surprise	-0.3	-0.7	-0.9	-0.9	-0.6	-0.5	-0.5	-0.4
Expected	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5	-0.4
Compromise	-0.3	-0.5	-0.6	-0.7	-0.5	-0.5	-0.5	-0.4
Prices								
Surprise	1.0	1.2	0.7	0.8	0.7	0.7	0.7	0.7
Expected	0.9	1.5	0.4	0.5	0.5	0.5	0.6	0.6
Compromise	1.0	1.4	0.6	0.6	0.6	0.6	0.7	0.6
Inflation[a]								
Surprise	4.1	0.8	-2.0	0.2	-0.1	-0.1	0.1	-0.2
Expected	3.6	2.4	-4.3	0.2	0.1	0.1	0.1	0.0
Compromise	3.9	1.6	-3.1	0.2	0.0	0.0	0.1	-0.1
Three-Month T-Bill[b]								
Surprise	18	30	17	9	14	19	19	17
Expected	20	30	9	9	10	12	13	14
Compromise	19	30	13	9	12	16	16	15
Bonds[b]								
Surprise	20	20	10	16	18	19	19	17
Expected	7	7	7	9	10	12	13	14
Compromise	14	14	9	12	14	15	16	15

NOTE:

Surprise: 1991 decrease in oil prices is unexpected.
Expected: 1991 decrease in oil prices is expected.
Compromise: Split between unexpected and expected decrease in oil prices.

a. Percentage-point-difference from baseline.

b. Basis-point-difference from baseline.

TABLE III. BEST-GUESS RESULTS FROM SECOND SCENARIO: OIL PRICES ARE $5 ABOVE BASELINE FOR TWO QUARTERS, THEN $3 ABOVE BASELINE (Percent difference from baseline, except where noted)

	1990:3	1990:4	1991:1	1991:2	1991:3	1991:4	1992:1	1992:2
Real GNP								
Surprise	-0.2	-0.4	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8
Expected	-0.1	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5	-0.5
Compromise	-0.1	-0.3	-0.4	-0.6	-0.6	-0.6	-0.6	-0.6
Prices								
Surprise	0.5	0.6	0.7	0.8	0.9	0.9	1.0	1.0
Expected	0.6	0.8	0.4	0.5	0.5	0.5	0.6	0.6
Compromise	0.6	0.7	0.6	0.6	0.7	0.7	0.8	0.8
Inflation[a]								
Surprise	2.0	0.4	0.4	0.4	0.2	0.2	0.2	0.1
Expected	2.4	0.8	-1.5	0.2	0.1	0.1	0.1	0.0
Compromise	2.2	0.6	-0.6	0.3	0.2	0.2	0.2	0.0
Three-Month T-Bill[b]								
Surprise	9	15	15	15	18	20	22	23
Expected	10	15	9	9	10	12	13	14
Compromise	9	15	12	12	14	16	17	18
Bonds[b]								
Surprise	10	10	12	25	18	20	22	23
Expected	7	7	7	9	10	12	13	14
Compromise	9	9	10	12	14	16	17	18

NOTE:

Surprise: 1991 decrease in oil prices is unexpected .
Expected: 1991 decrease in oil prices is expected
Compromise: Split between unexpected and expected decrease in oil prices.

a. Percentage-point-difference from baseline.

b. Basis-point-difference from baseline.

the end of 1990, real GNP would be reduced by about 0.7 percent below its baseline level (cutting 1 1/2 percentage points off the growth rate for the second half of the year) (see Table IV). In 1991, real GNP losses would grow, falling to about 1.1 percent below baseline by the second half of the year. In the long run, the real GNP losses would be likely to continue to grow as a result of the reduction in potential GNP described in the first section of this paper: the long-run GNP loss could be as large as 2 percent below baseline. The "best guess" assumes that interest rates would be above the baseline levels by about 40 basis points by the end of next year, implying real rates close to their baseline levels.

TABLE IV. BEST-GUESS RESULTS FROM THIRD SCENARIO: OIL PRICES REMAIN $10 ABOVE BASELINE (Percent difference from baseline, except where noted)

	1990:3	1990:4	1991:1	1991:2	1991:3	1991:4	1992:1	1992:2
Real GNP	-0.3	-0.7	-1.1	-1.4	-1.4	-1.5	-1.5	-1.5
Prices	1.0	1.2	1.4	1.6	1.7	1.8	1.9	2.0
Inflation[a]	4.1	0.8	0.8	0.8	0.5	0.4	0.4	0.1
Three-Month T-Bill[b]	18	30	30	30	35	40	43	45
Bonds[b]	20	20	24	30	35	40	43	45

NOTE: It is assumed that oil prices are expected to remain $10 above baseline.

a. Percentage-point-difference from baseline.

b. Basis-point-difference from baseline.

Tables A-I through A-VII report the results of individual model simulations of a $5 oil price increase.

Table A-VIII is the result of a simulation performed by DRI using their model, which comes to substantially different conclusions from runs we did. DRI's results are imposed by adjusting the model in various ways, principally by assuming that the oil price increase affects consumer and business confidence to an unusual extent. We have taken these results into account in the formulation of our "best guess" since they reflect DRI's considered judgement, even though they are not model results.

TABLE A-I. WUMM $5 oil price increase, quarterly data (Percent difference from baseline, except where noted)

	1990:3	1990:4	1991:1	1991:2	1991:3	1991:4	1992:1	1992:2
Real GNP	-0.2	-0.5	-0.8	-0.9	-0.9	-0.9	-0.9	-0.8
Prices	0.6	1.0	1.1	1.2	1.2	1.2	1.2	1.3
Inflation[a]	2.6	1.4	0.7	0.1	0.1	0.2	0.1	0.1
Short Rate[b]	9	4	-2	-6	-5	-2	3	7
Long Rate[b]	4	4	1	-2	-3	-2	0	7
Exchange Rate	-2.2	-2.8	-2.8	-1.9	-1.1	-0.3	0.3	0.7

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-II. MULTIMOD temporary $5 oil price increase, annual data (Percent difference from baseline, except where noted)

	1991	1992	1993	1994	1995
Real GNP	0.2	0.3	0.3	0.2	0.1
Prices	-0.2	-0.3	-0.2	-0.1	0.0
Inflation[a]	-0.2	-0.1	0.1	0.1	0.1
Short Rate[b]	-1	-13	-17	-11	-1
Long Rate[b]	-9	-7	0	5	10
Exchange Rate	0.0	0.0	0.0	0.0	0.1

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-III. MULTIMOD permanent $5 increase in oil prices, annual data (Percent difference from baseline, except where noted)

	1991	1992	1993	1994	1995
Real GNP	-0.3	-0.2	-0.2	-0.1	0.0
Prices	0.5	0.4	0.4	0.3	0.2
Inflation[a]	0.5	-0.1	-0.1	-0.1	0.0
Short Rate[b]	28	24	15	5	-2
Long Rate[b]	14	8	4	2	4
Exchange Rate	0.24	0.18	0.15	0.15	0.19

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-IV. MSG temporary $5 increase in oil prices, annual data (Percent difference from baseline, except where noted)

	1991	1992	1993	1994	1995
Real GNP	-0.5	-0.1	0.0	0.2	0.3
Prices	1.0	0.4	0.0	-0.2	-0.4
Inflation[a]	1.0	-0.6	-0.4	-0.2	-0.2
Short Rate[b]	80	39	9	-10	-20
Long Rate[b]	-2	-12	-17	-19	-19
Exchange Rate	-0.1	-0.1	-0.2	-0.3	-0.3

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-V. MSG permanent $5 increase in oil prices, annual data (Percent difference from baseline, except where noted)

	1991	1992	1993	1994	1995
Real GNP	-0.7	-1.0	-1.2	-1.2	-1.2
Prices	0.8	1.3	1.6	1.8	1.8
Inflation[a]	0.8	0.5	0.3	0.2	0.0
Short Rate[b]	17	58	83	97	103
Long Rate[b]	2	88	89	87	84
Exchange Rate	0.7	0.8	0.8	0.7	0.6

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-VI. DRI $5 oil price increase, quarterly data (Percent, difference from baselineexept where noted)

	1990:3	1990:4	1991:1	1991:2	1991:3	1991:4	1992:1	1992:2
Real GNP	0.0	0.0	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2
Prices	0.3	0.5	0.6	0.7	0.8	0.8	0.9	0.9
Inflation[a]	1.2	2.0	2.4	2.8	3.2	3.2	3.6	3.6
Short Rate[b]	9	20	24	24	25	27	28	29
Long Rate[b]	15	14	17	23	26	27	29	30
Exchange Rate	0.1	-0.4	-1.1	-1.7	-2.4	-2.7	-3.1	-3.4

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-VII. DRI $5 increase in oil prices, annual data (Percent difference from baseline, except where noted)

	1991	1992	1993	1994	1995
Real GNP	-0.1	-0.2	-0.1	0.1	0.1
Prices	0.3	0.8	1.1	1.3	1.5
Inflation[a]	0.3	0.5	0.3	0.2	0.2
Short Rate[b]	13	26	30	40	50
Long Rate[b]	12	30	30	40	40
Exchange Rate	-7.2	-9.7	-3.5	2.2	8.9

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.

TABLE A-VIII. DRI simulation INTERIM0890 $5 oil price increase, quarterly data (Percent difference from baseline, except where noted)

	1990:3	1990:4	1991:1	1991:2	1991:3	1991:4	1992:1	1992:2
Real GNP	-0.1	-0.2	-0.3	-0.5	-0.5	-0.6	-0.6	-0.6
Prices	0.4	0.5	0.5	0.4	0.4	0.2	0.2	0.1
Inflation[a]	1.4	0.6	0.1	-0.5	-0.2	-0.6	-0.2	-0.4
Short Rate[b]	10	17	13	5	-2	-8	-15	-22
Long Rate[b]	10	11	11	8	5	2	-3	-8
Exchange Rate	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Memo: Oil price increase (dollar)	3.5	5.0	3.5	2.2	0.7	0.0	-0.7	-1.0

a. Percentage-point-difference from baseline in inflation rate.

b. Basis-point-difference from baseline.