War, Oil and Economic Growth

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The Economic Impact of War

One of the greatest risks surrounding the world economic outlook is a possible U.S.-led war in Iraq. Assessing the impact of such a war precisely is extremely difficult, however. The outcome of such a war would depend on, for example, the type of war fought, the length of the war, the possible repercussions it could have in the form of future terrorist attacks, and its implications for stability in the Middle East.

A war would undoubtedly lead to a weakening in business and consumer confidence regarding future economic developments. On the other hand, it would also boost military spending. Moreover, a war in the Middle East could raise expectations about a disruption in the supply of oil, and thus have a strong bearing on oil prices. The combined effect of these factors is very difficult to predict, especially since economists still disagree about the economic impacts of previous wars.

Although most economists tend to agree that war raises output growth, how it does so is still widely debated. Keynesian explanations for wartime expansions focus on the multiplicative effects of military spending on aggregate demand through wage and price rigidity. For example, Vernon (1994) suggests that World War II fiscal policies were the main contributor to the U.S. recovery from the Depression. The neoclassical approach, on the other hand, argues that wartime expenditures can affect the economy through intertemporal substitution, but only when the increase in military expenditure is temporary; see, for example, Barro (1981). If expenditures increase permanently, then private consumption and investment would decline, thereby offsetting the positive effect of military expenditure growth on the economy.

Wars are also linked to inflation, mainly by creating excess demand through military spending. Wars can also lead to commodity price shocks, with a direct impact on inflation. Moreover, the mere fact that wars are generally associated with higher inflation tends to raise inflationary expectations and thus also creates indirect inflationary pressures. The initial state of the economy also matters; when output is considerably below potential, war-related expansionary fiscal policy should not generate a major inflationary shock. (Dornbusch, 2001).

Stylized Facts of War and the Economy

Although considerable empirical research has been conducted on the economic impact of wars, the results of many studies are flawed because they treat domestic and foreign wars as if they were the same; see, for example, Braun and McGrattan (1993). To correct for this, Caplan (2001) carefully examines data covering 66 countries, separating between domestic and foreign wars. Doing so, yields much more robust stylized facts about the economic impacts of war, four of which the author lists as follows:

1. Real GDP growth declines noticeably during domestic wars, although rises somewhat during foreign wars.
2. Inflation is higher during domestic wars than foreign wars.

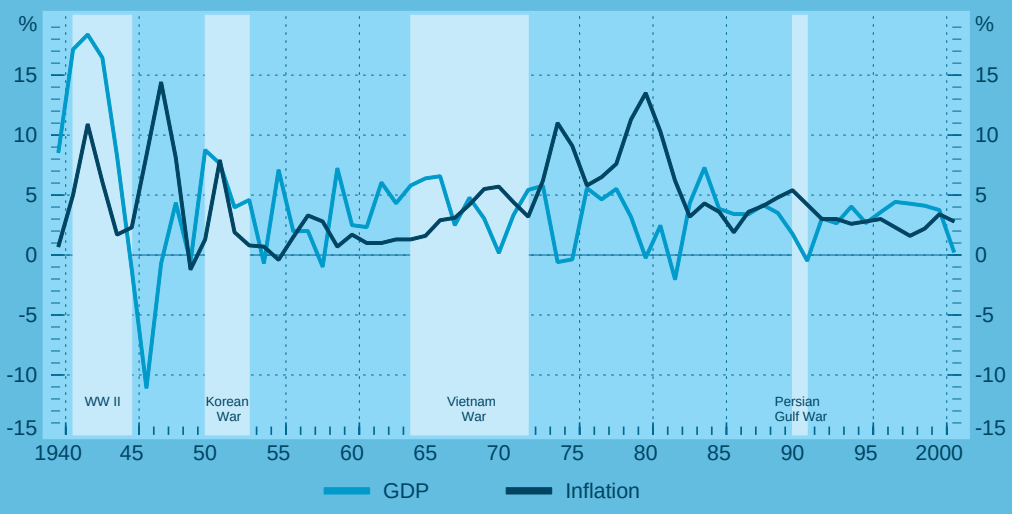
3. Government spending as a percentage of GDP rises in the advanced industrialized countries during both domestic and foreign wars.
4. Taxation as a share of output rises during foreign wars, but remains unchanged or falls during domestic wars.

The U.S. Historical Experience

With respect to the U.S. historical experience, most of the results listed above hold with some exceptions. During World War II, a war fought on foreign soil, fiscal policy was much more expansionary than during other wars, reflected in the rapid growth of GDP of almost 12 percent per annum during 1941-1945. Government expenditures during this war were financed mainly by issuing debt, with inflation accelerating as a result of excess demand to slightly more than 5 percent. During the Korean War (1950-53), government expenditures were financed by higher capital and labor taxes, and GDP growth and inflation averaged around half their World War II levels. During the Vietnam War (1964-1972), military spending supported economic growth until 1969, but also fueled inflation to an annual average rate of almost 6 percent in 1970. Military expenditures during the Vietnam War were financed by issuing debt, although to a less extent than during World War II. (Ohanian, 1997.)

The growth effect of the Persian Gulf War contrasted sharply with previous wars in that, instead of embarking on a war boom, the U.S. economy slipped immediately into recession following the Iraqi invasion of Kuwait in August 1990. One reason for this was that the fiscal stimulus was very small, while, on the other hand, private sector confidence eroded sharply. Oil prices rose sharply over the next two months, with Brent crude oil reaching a monthly average of 36 dollars per barrel in October, which helped contribute to the 1990 recession. Stock prices also fell sharply, as witnessed in the 15-percent decline in industrial share prices between August and October 1990. However, shortly thereafter it became clear that there would not be a significant impact on oil supplies to industrial countries and that a quick victory over Iraq was imminent. As a result, in November, oil prices started to fall and equity prices rise, and by March 1991 the recession had officially ended.

U.S. GDP Growth and Inflation during Selected Wars



Sources: Bureau of Economic Analysis, Bureau of Labor Statistics. ETLA S02.4/f65

What Does a War Cost?

At present, there are two "official" estimates (conducted by the Congressional Budget Committee and House Budget Committee) of the direct military costs of a short war in Iraq, based on varying assumptions and using different methodologies. These estimates, which are outlined in Nordhaus (2002), show that the costs of a short and successful war, lasting approximately 30 days followed by 2.5 months of U.S. presence in the region, would cost around USD 50 billion, or around 0.5 percent of GDP. A significantly higher, although unofficial, estimate was given by Larry Lindsey, former Economic Adviser to President Bush, suggesting that the costs of a war could run as high as

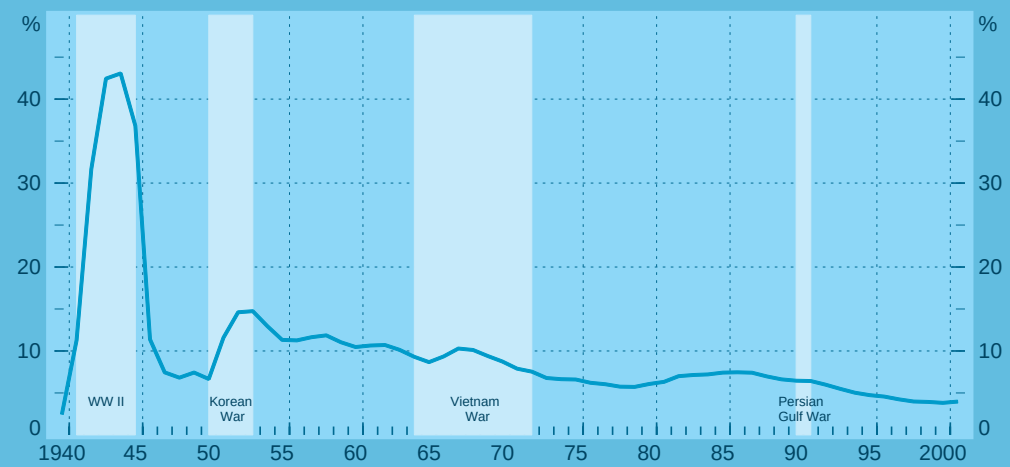
Direct Costs of U.S. Wars

	Direct (Budgetary) Costs			
	Current USD bill.	1990 USD bill.	% of GDP	Per capita 1990 USD
World War I (1917-18)	26	197	24	1 911
World War II (1941-45)	288	2 091	130	15 655
Korean War (1950-53)	54	264	15	1 740
Vietnam War (1964-72)	111	347	12	1 692
Persian Gulf War I (1990-91)	61	61	1	235
*Persian Gulf War II (2003-?)**	44-60	34-47	.4-.6	119-165

*The range estimated pertains to a war lasting only 30 days followed by 2.5 months of U.S. forces in the region

Sources: The United States Civil War Center (www.cwc.lsu.edu/cwc) and Nordhaus (2002).

U.S. Defence Budget as a % of GDP during Selected Wars



Source: Bureau of Economic Analysis. ETLA S02.4/f66

USD 100-200 billion, or approximately 1-2 percent of GDP (Wall Street Journal, September 15, 2002).

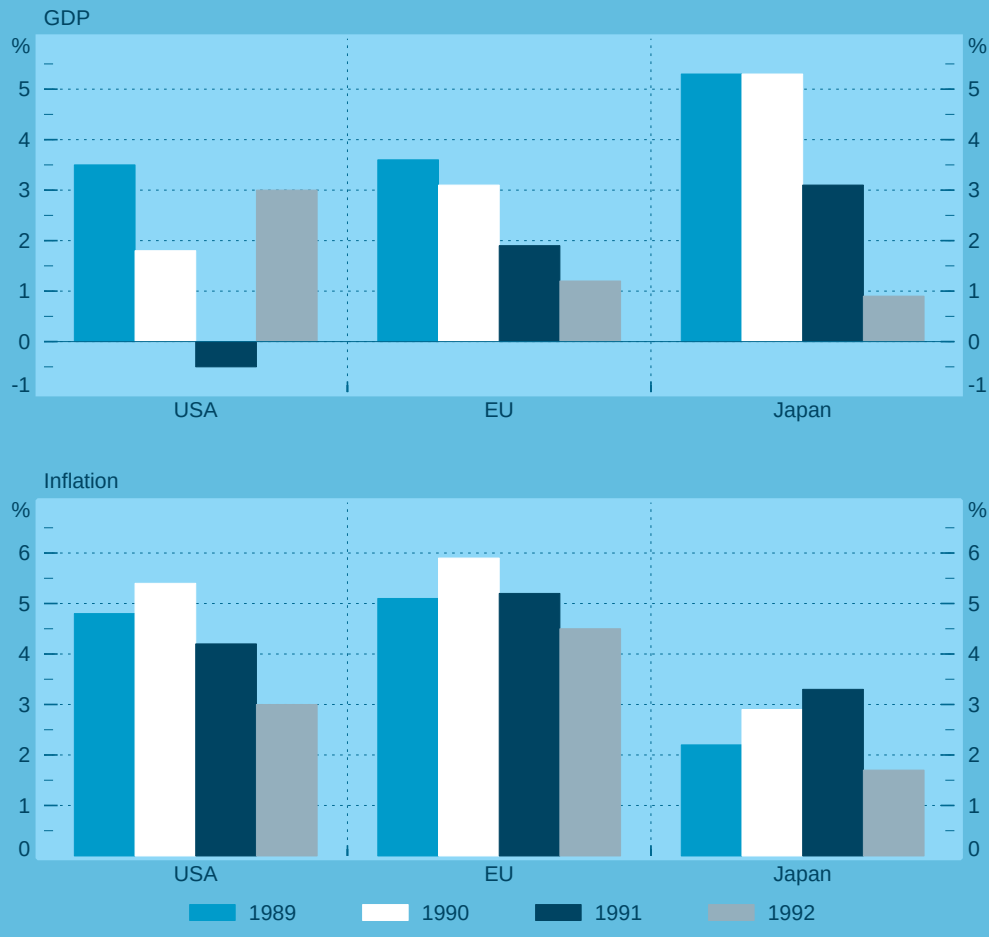
Another Persian Gulf War is the Greatest Risk Facing the World Economy

A Third Oil Shock?

The availability of crude oil remains an important factor driving world economic developments, even though the importance of crude oil in production has declined. A war could disrupt the availability of crude oil, and thus trigger a sharp rise in oil prices. Admittedly, Saudi Arabia currently has the capacity to raise its own production levels by more than Iraqi exports.

However, in a less favorable setting, the conflict could easily spread. A war could disrupt world oil supplies significantly, if, for example, Iraq's own oil production facilities as well as those in Kuwait, Iran and Saudi Arabia are damaged. Other possible disruptions could occur through an OPEC boycott, or if the war were to spread to other oil-producing countries. Indeed, the risk of a third oil-price shock cannot be ruled out.

GDP Growth and Inflation in the USA, EU and Japan, before and after the Persian Gulf War of 1990-1991



Source: OECD.

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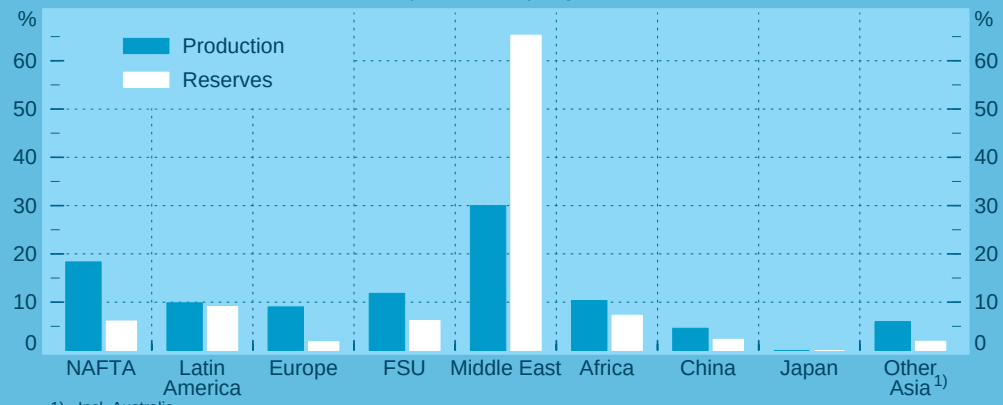
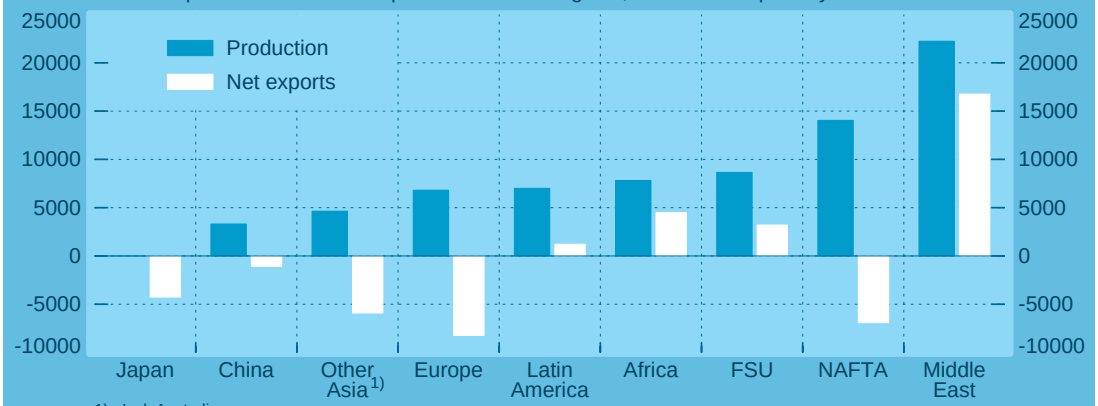
World Oil Supply Dominated by Middle East

Share of world crude oil reserves and production by region, %



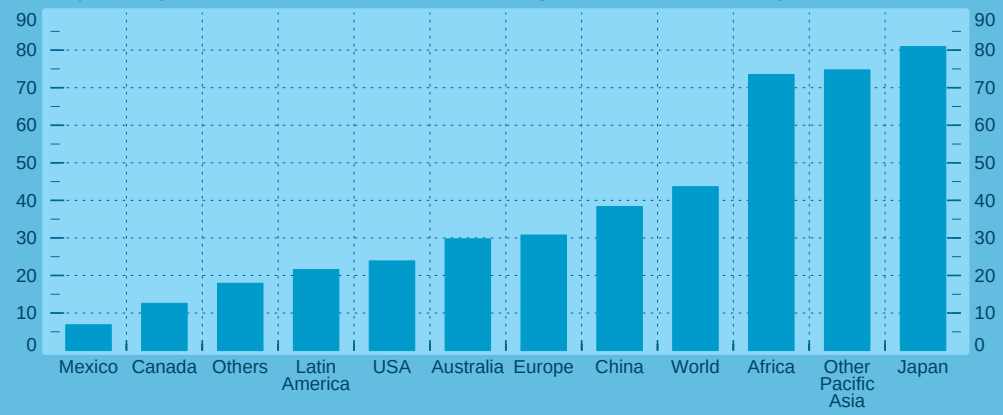
1) Incl. Australia.

Crude oil production and net exports in selected regions, 1000 barrels per day



1) Incl. Australia.

Dependency on Middle East crude oil in selected regions, share in total oil imports, %



Sources: BP, ETLA.

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On the other hand, crude oil prices could plunge if the weapons inspections in Iraq proceed smoothly and if OPEC production restraint remains weak following quota overruns in recent months.

Industrialized Countries Vulnerable To Oil Market Disturbances

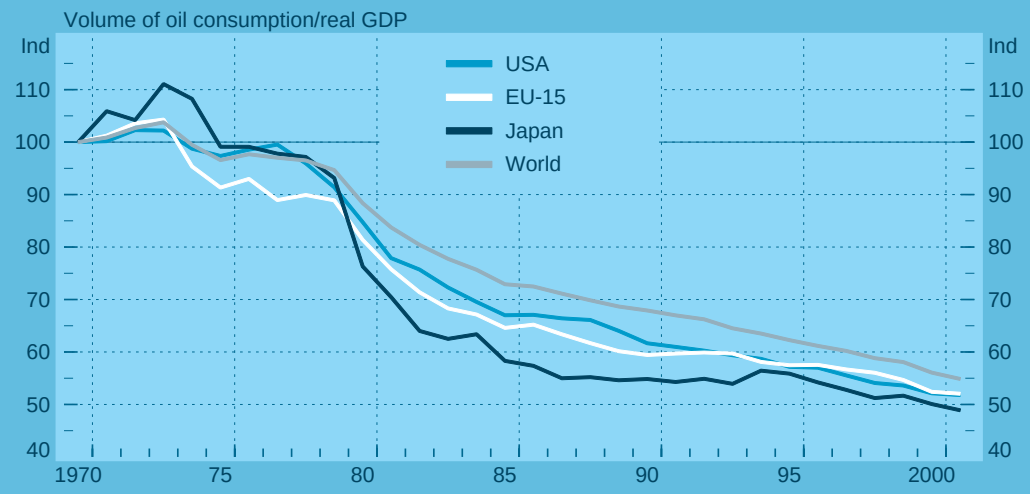
The relative importance of crude oil in the industrialized economies has declined substantially since the oil crises of the 1970s. The oil intensity (defined as the ratio of oil consumption to real GDP) of the industrialized countries has declined steadily over the last few decades, falling in 2001 to half the peak level seen in the early 1970s. The sharp increase in oil prices witnessed in 1970-80 led to greater energy efficiency and conservation and promoted the use of alternative energy sources.

Even though the oil intensity of the industrialized economies has declined substantially during 1970-2001, oil consumption nevertheless increased by 66 percent over the same time period. This decline in oil intensity implies that the economic effect of a given oil price fluctuation has, in general, weakened in recent years. However, oil price fluctuations during political conflicts can be extreme, thereby also possibly inflicting significant economic damage. Between 1980 and 2001, for example, annual fluctuations in oil prices ranged from a low of –60 percent to a high of 50 percent. Monthly changes during the same time period ranged from 10 dollars to more than 40 dollars a barrel.

Improved Adequacy of Oil Supplies since the Oil Crises

The adequacy of proven oil reserves has improved over time thanks to declining oil intensity and to the exploitation of new economic oil reserves. New technologies and advances in oil exploration have made it possible to extract more oil from given fields than before while also facilitating the discovery of additional fields. The ratio of proven reserves to annual production rose to around 40 percent in 2001 from 30 percent in 1981. Proven oil reserves are sufficient to maintain 40 years of consumption at current rates, which is not to say that oil reserves will be depleted in 40 years.

World Oil Intensity, 1970 = 100



Sources: IMF, BP.

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The discovery of new oil reserves will also foster further improvements in the adequacy of oil in coming years. Estimates of when the size of oil reserves will peak vary. According to the U.S. Energy Information Administration (EIA), oil reserves will peak in 2030 if world oil production increases at an average annual rate of three percent. Technological advances will also raise oil adequacy through more efficient oil usage. Moreover, greater efforts to conserve energy will temper the growth of oil consumption.

The Middle East Is a Major Producer and Net Exporter of Oil

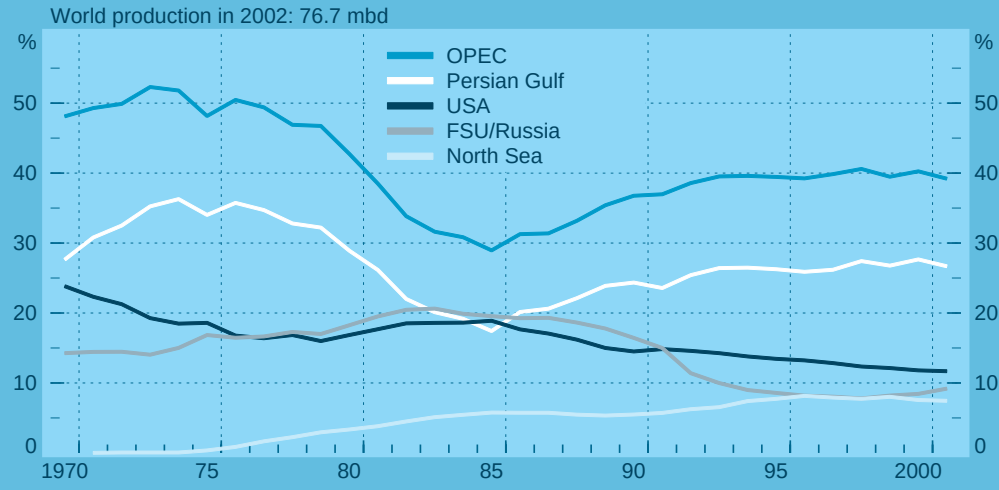
Crude oil production and reserves are concentrated in the Middle East. The Middle East accounted for 30 percent of world crude oil production last year, while its share of global proved oil reserves was 65 percent. The combined share of OPEC oil producers in world production and reserves stood at 41 and 78 percent, respectively, last year.

Oil consumption, on the other hand, is concentrated in the industrialized countries. Japan's oil consumption is met completely by imports, of which the Middle East accounts for 81 percent. Of the industrialized countries, only the United States, Great Britain and Norway produce a significant amount of crude oil. Of these countries, only Norway is a net exporter of crude oil.

On a regional basis, Europe, NAFTA and Asia (excluding China) account for a majority of world crude oil imports. Around 30 percent of Europe's large net crude oil imports come from the Middle East, while a slightly higher share comes from the Former Soviet Union region. Nevertheless, oil production in the North Sea helps reduce Europe's dependency on imports. Japan and other East Asian countries are the most dependent on Middle East oil.

Industrialized countries remain highly sensitive to oil price shocks. The political instability in the Middle East will ensure that the risk of oil market disturbances remains high, particularly since the region accounts for most of the world's oil reserves, production and exports. Disturbances to the supply of oil could easily trigger a new energy crisis, with serious effects on the world economy.

Share of World Crude Oil Production by Region



Sources: BP, ETLA.

ETLA S02.4/f72

Iraq and the Oil Market

Iraq accounted for 10.7 percent of world proven oil reserves in 2001. The country's share in world production, UN export controls notwithstanding, stood at 3.3 percent, or 2.4 million barrels a day. According to a recent estimate by the IEA, Iraq's sustainable oil production capacity is well above its current level of output (IEA 2002). In principle, the OPEC countries could raise production by approximately double the amount of Iraq's current production, given that OPEC production levels are already being curbed to support prices. Saudi Arabia alone has enough spare capacity to make up for a complete shortfall in Iraqi production.

Iraqi oil production has fluctuated widely recently, with Iraq even limiting its own production from time to time. According to the EIA, the country has also used various methods to circumvent the export controls.

The U.S. has made it clear that it seeks to strip Iraq of weapons of mass destruction and to change the regime. The threat of war raised crude oil prices during the course of last summer and autumn, with changes in the probability of war clearly reflected in oil price fluctuations. Prices would have risen even further if OPEC production had not exceeded quota levels by as much as it did.

The UN Security Council resolution, calling on Iraq to give up its weapons of mass destruction, triggered a decline in crude oil prices. ETLA's baseline forecast assumes that the weapons inspections in Iraq will result in a short war, in which Iraq clearly loses, in the beginning of next year. Such a war would not reduce the world's supply of oil by more than the current level of Iraqi exports. Oil prices are expected to rise substantially before the war, but then decline once the political situation eases and the availability of oil improves. The price of Brent crude oil is assumed to settle at 25 dollars per barrel by the end of 2003, in the middle of OPEC's targeted price band of 22-28 dollars.

Large Risk of a Sharp Movement in Oil Prices

The explosive political situation in the Middle East will unlikely ease over the next few years, keeping oil market uncertainty high for quite some time.

There are two risks surrounding ETLA's baseline forecast in the near term. First, a short war could lead to a sharp decline in oil prices once the conflict is resolved, assuming OPEC quota compliance remains weak. This would be favorable from the perspective of the industrialized countries, in that their economies would receive a much-needed stimulus to growth.

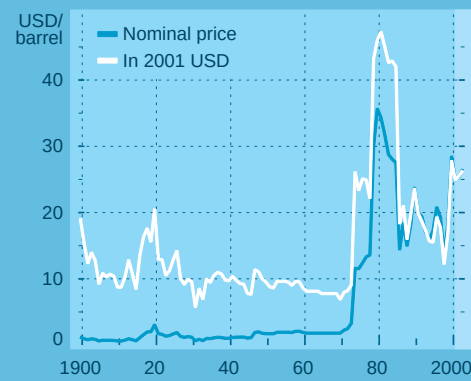
The second risk is a downside one, where the war is prolonged and a disturbance in oil production reduces world oil supplies significantly. Crude oil prices would surge as a result, leading to a period of stagflation for the industrialized countries, reminiscent of the situation following the oil crises in the 1970s.

The Economic Impact of a Long War in the Persian Gulf

The current conflict differs significantly from that in the early 1990s, with the U.S. now seeking a change in the regime instead of merely inducing Iraq to pull out of Kuwait. There is a high risk that the current war will be longer and costlier than its earlier counterpart. Several factors that could prolong the war include (Strauss, 2002):

1. The Iraqi army could disperse itself among highly populated areas, thereby reducing the effectiveness of U.S. air power and re sulting in higher casualties and a longer war.

Nominal and Real Crude Oil Prices during 1900-2003



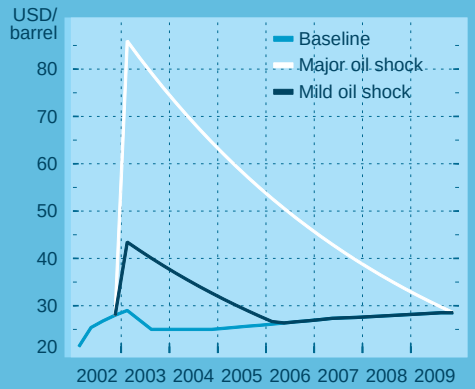
Sources: AIECE, ETLA, EIA. ETLA S02.4/f67

2. The war could spread rapidly, especially if Iraq were to use chemical weapons against, for example, Saudi Arabia or Israel.
3. The war could trigger possible terrorist at tacks in the U.S. or in allied countries.
4. A U.S. attack could enhance cohesion amongst Arab countries, lead to changes in regime outside of Iraq and intensify the conflict.

We employ the NIGEM global macroeconomic model to quantify the effects of two crisis scenarios, a major one and a more mild shock, and compare them to our baseline forecast.

In the first scenario, denoted "Major Shock," the current war takes one year, but the conflict spreads outside of Iraq with major consequences on oil production. The war is assumed to be followed by 2 and a half years of U.S. presence in the region. We follow the work of Nordhaus (2002) and Perry (2001) by assuming that a disturbance in world oil production reduces global supply by 7 million barrels per day. As a result, crude oil prices rise by a factor of three in the first quarter of 2003. The disturbance is assumed to ease gradually, and oil prices attain their pre-crisis level seven years later. For purposes of comparison, the reader should note that oil prices rose twentyfold following the two oil crises in the 1970s.

Crude Oil Price Assumptions in Different Scenarios



Sources: NIGEM, ETLA ETLA S02.4/f83

The second scenario, called here "Mild Shock," assumes that the war lasts only six months, followed by one and a half years of U.S. presence in the region. In this scenario, the crisis imposes a smaller shock on world oil production than in the "Major Shock" case. As a result, oil prices rise to just over 43 dollars per barrel in the first quarter of 2003, and ease thereafter to reach their baseline level in 3½ years.

Government military spending also increases in both scenarios using the benchmark estimates surveyed earlier in this article. Specifically, given the estimate mentioned above, a war lasting one year, followed by 2 and a half years of U.S. presence in the region, yields a total cost of USD 600 billion, or around 6 percent of GDP. In the second scenario, where the war lasts only 6 months, government spending increases by USD 300 billion, or 3 percent of GDP. Given that the NIGEM model is New Keynesian in its approach, increased spending provides a stimulus to aggregate demand and thus partly offsets the negative impact on output resulting from the war.

Standard monetary policy assumptions are used in the simulation. All central banks except the European Central Bank (ECB) adjust interest rates in response to deviations in inflation and nominal GDP from target levels. The ECB is assumed to follow its objective of maintaining price stability, changing its monetary policy stance primarily in response to domestic cost pressures. The ECB is assumed to react more moderately to an increase in external price pressures, such as that stemming from a surge in oil prices.

Simulation Results

The simulation results of the two oil price shocks are presented in the tables below. A longer war in Iraq, and its presumed impact on oil prices, takes the form of a major adverse supply shock. Most major economies slide into recession in 2003 while inflation accelerates, resulting in several years of stagflation. All central banks except that of Japan react to the inflationary shock by raising interest rates initially, which places further downward pressure on aggregate demand. A shorter war would be less damaging to the world economy, although GDP remains well below baseline in most countries for several years after the shock.

Higher oil prices affect the economy through several channels. When oil prices rise, firms reduce their use of energy, resulting in lower output produced for given quantities of capital and labor. As a consequence, capital and labor productivity weakens, resulting in lower private investment and employment. In the U.S., EU and Japan it takes more than a year for private investment to begin recovering following a major shock.

Households also react to the shock. As a result of weaker labor demand, real wages fall, and, with employment contracting, private consumption falls. In the case of a major oil shock, private consumption begins to recover gradually in 2004 in the U.S. and the EU, while in Japan it does so only in 2005.

Over the longer term, the U.S. seems somewhat less sensitive to the oil price shock than the EU. This partly reflects the fact that the U.S. is a smaller net importer of oil compared to Europe and the latter region's greater share of oil consumption in GDP. Interestingly, Japan seems to be the least sensitive to the oil price shock. One explanation for such an outcome is Japan's lower oil intensity. Another reason may be the initial state of Japan's economy. With prices already declining, the inflationary shock is not sufficient to raise Japan's inflation rate above the central bank's target. Therefore, inter-

Simulation Results: Impact of a Major Oil Price Shock on the World Economy

	U.S.		EU		Japan	
Percentage deviation from baseline level	GDP	Consumer prices	GDP	Consumer prices	GDP	Consumer prices
2003	-1.0	1.3	-0.6	1.8	-1.2	0.2
2004	-3.4	2.6	-2.3	3.8	-2.4	0.4
2005	-3.2	2.4	-3.3	4.8	-2.5	0.3
2006	-2.6	1.8	-3.5	4.9	-2.0	-0.1
2007	-1.8	1.1	-3.3	4.3	-1.6	-0.6
2008	-1.2	0.6	-2.7	3.2	-0.8	-1.0
2009	-0.8	0.2	-1.8	1.8	0.1	-1.3

Source: ETLA.

Simulation Results: Impact of a Mild Oil Price Shock on the World Economy

	U.S.		EU		Japan	
Percentage deviation from baseline level	GDP	Consumer prices	GDP	Consumer prices	GDP	Consumer prices
2003	-0.1	0.5	-0.1	0.5	-0.3	0.1
2004	-1.3	1.0	-0.7	1.0	-0.6	0.1
2005	-1.1	0.6	-0.9	1.1	-0.4	0.1
2006	-0.3	0.1	-0.7	0.9	-0.1	0.0
2007	-0.1	-0.1	-0.5	0.6	-0.1	-0.1
2008	0.0	-0.1	-0.3	0.3	0.0	-0.1
2009	0.0	-0.1	-0.1	0.0	0.0	-0.1

Source: ETLA.

est rates do not rise in response, reducing the overall impact of the shock on domestic demand.

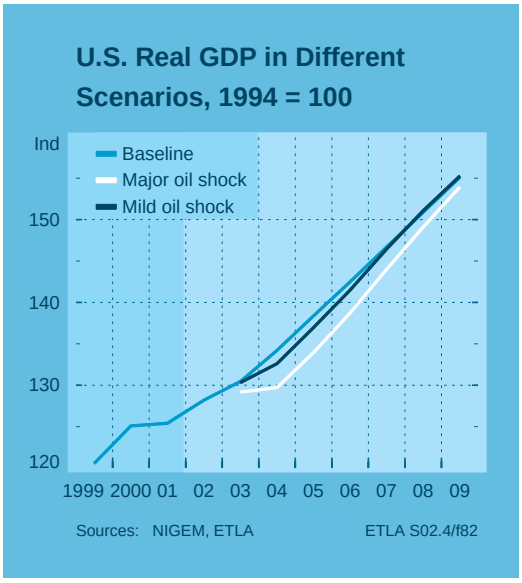
Obviously, the results of this simulation are a direct result of the assumptions made and model structure, and therefore provide only a tentative approximation of what a major oil shock could mean in terms of growth and inflation for the world economy. There are numerous other considerations that could be taken into account, such as the psychological impact of war on consumers and businesses and the economic consequences of terrorist acts of revenge.

Conclusions

Industrialized countries will remain sensitive to oil price shocks. Admittedly, the relative importance of oil as an input to production will continue to decline, through increased energy efficiency in production. On the other hand, the majority of the world's oil reserves are located in the politically unstable Middle East while oil consumption is concentrated in the industrialized countries and continues to grow. Hence, political conflicts, for example, may trigger strong increases in oil prices, with costly effects on the world economy. With the political situation in the Middle East remaining fragile over the next few years, the industrialized countries will continue to be vulnerable to fluctuations in oil prices.

An oil crisis would have a considerably negative impact on global economic prospects. Japan would weather the crisis slightly better than the U.S. and the EU, partly reflecting the weaker initial state of its economy. However, economic mechanisms would gradually steer the economies back on to a growth path, although it would take long to restore previous levels of output.

Needless to say, these simulations include a great deal of uncertainty, but nevertheless provide a useful framework of analysis for gaining perspectives on the possible implications of political and oil price shocks. If a war is averted, then oil prices will probably decline, thereby providing a boost to economic conditions in the industrialized countries.



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