Impact of Rising Oil Prices on the Macro Economy

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Summary

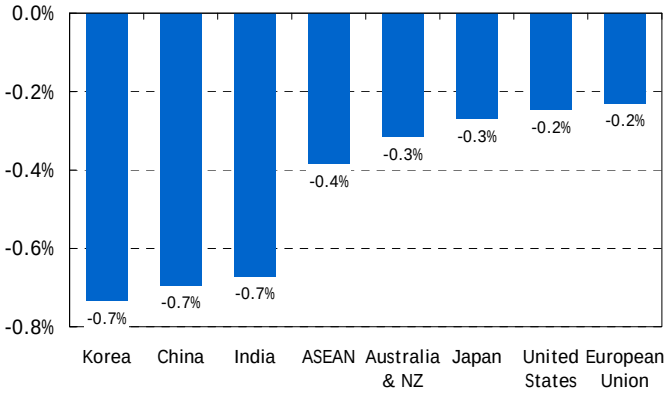
Despite the deep shadows being cast on the global economy by the European debt crisis, crude oil prices are soaring against a backdrop of increasing tensions around the situation in Iran and further monetary easing. The price of Brent Crude has gone past $120/bbl, an increase of $20/bbl from the most recent lows. This jump in the price of crude oil greatly increases the energy costs of each country, and has become of even greater concern as a risk factor in a fragile global economy.

The impact of rising oil prices on the macro economies of various countries differs depending on the individual economies and their energy supply and demand structures. Those countries most likely to be adversely affected can be characterized as having the following:

- *High net imports of oil per GDP*
- *Large marginal propensities to consume and invest; small marginal propensity to import*
- *A high ratio of exports as a portion of GDP*
- *A low level of exports to oil exporting countries*

Typically, non–oil producing developing countries, and the Asia—with its significant dependence on exports—tend to meet these conditions. At the same time, the developed countries of Europe are thriftier in their use of oil and enjoy a significant backflow of oil money. They are thus well–positioned to see an easing of the adverse effects of a rise in oil prices.

Impact of a $10/bbl Rise in Oil Prices on Real GDP



Today, a rise in the price of crude oil may have a negative economic impact along paths and to a degree that would not be cause for concern in normal times. A worsening of current accounts comprising balance of trade will, by definition, lead to deteriorating treasury budgets and a worsened balance between savings and investment. Moreover, economic deceleration will see treasury budgets deteriorate further through reduced tax revenues and other factors. The world now faces major challenges due to the economic crisis originating from Europe, in which treasury budgets have shaken the real economy through the financial sector. The expansion of imbalances caused by the rise in crude oil prices in the midst of these challenges threatens to push the world economy further into crisis.

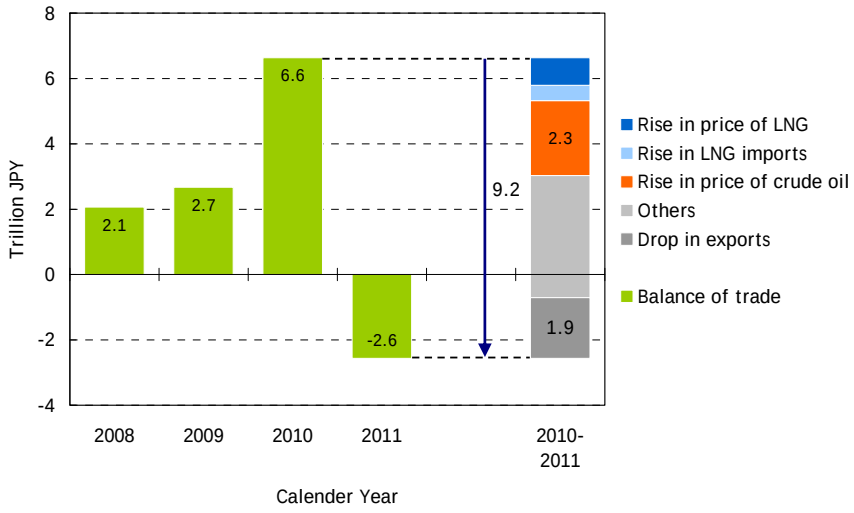
Keywords: Crude oil prices, global economy, GDP

Soaring Crude Oil Prices

Despite the deep shadows being cast on the global economy by the European debt crisis, crude oil prices are soaring against a backdrop of increasing tensions around the situation in Iran and further monetary easing. The price of ICE Brent Crude has gone past $120/bbl, rising more than $20/bbl from the most recent low marked in October of 2011. Further, in January 2012 Saudi Arabia, considered a moderate among OPEC member countries, announced it would favor a price of $100/bbl, an increase of $25/bbl over its previous target of $75/bbl.

Coincidentally, the current price of $120/bbl is the same level pointed out a year ago by Deutsche Bank, Morgan Stanley, and others as being a threat to the world economy. While it is debatable whether breaching the $120/bbl level will bring on rapid recession, soaring crude oil prices increase nations' energy costs. This has become of even greater concern as a risk factor in a fragile global economy. For example, in 2011 Japan marked its first trade deficit in 31 years, as its balance of trade worsened by JPY 9.2 trillion, of which JPY 2.3 trillion was attributable to rising crude oil prices. The downward pressure this placed on business activity exceeded the contribution of global economic deceleration and the Great East Japan Earthquake (JPY 1.9 trillion) to the drop in exports.

Fig. 1 Contributions to Changes in Japan's Balance of Trade, 2010–2011



Source: Computed from Ministry of Finance Trade Statistics

The Economic Impact of Rising Oil Prices

Impact on the Domestic Economy

Given oil's strong characteristic as a vital commodity, demand, particularly in the short term, is inelastic versus price. This is why, when oil prices rise, the value of oil imports by importing nations will increase at about the same rate as the rise in price. For example, with Japan's net imports of oil at approximately 4.5 Mb/d, a $10/bbl increase in oil prices will increase net import value by about $16.0 billion annually (equivalent to approximately 0.3% of GDP). This is the first blow rising oil

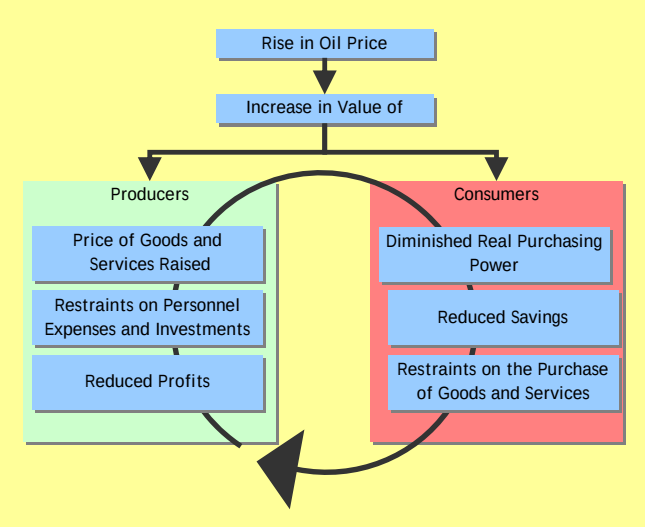
prices strike against the economies of oil importing nations. It is also why the ratio of the value of net oil imports to nominal GDP can be an indicator for understanding the impact of oil price fluctuations.

Companies and other producers in importing nations facing increased costs due to rising oil prices find themselves confronted with (1) having to raise the prices of the goods and services they produce; (2) reduced profits; and (3) restraints on personnel expenses, investments, and other outlays. Seen by other producers, these lead to reduced revenue and increased costs, with a broad impact extending even to industries whose direct oil consumption levels are low.

At the same time, for the consumer, a rise in the price of goods and services and falling wages diminish real purchasing power. This in turn forces consumers to respond with (1) reduced savings; and (2), restraints on the purchase of other goods and services.

A direct drop in profits and wages, or an indirect rise in prices? Which path comes to the fore will depend on circumstances at the time. Nevertheless, for oil importing nations as a whole, the fact remains that producers and consumers must cope with and bear the burden of the increase in import values, while the wealth generated flows to exporting nations. For importing nations with their diminished purchasing power, the multiplier effect acts as a mechanism for further economic deceleration.

Fig. 2 Path of Impact of Rising Oil Prices on Economies of Importing Nations



Impact on Oil Exporting Nations

In oil exporting nations, a rise in oil prices has the opposite effect of a rise for importing nations, working to expand the economy. In other words, an increase in the value of exports brings increased profits and wages. And, because domestic oil prices in oil exporting nations are typically heavily subsidized, a rise in international prices has only a limited impact. The multiplier effect further invigorates the domestic economies of oil exporting nations. Indeed, the economies of many oil

exporting nations expanded rapidly with rising oil prices in 2004 and beyond, with the economies of countries in the Middle East and North Africa, for example, nominally tripling in size, increasing by nearly 50% in real terms. In that sense, the economic acceleration brought by a $10/bbl rise in prices actually represents a significant deterioration compared to the past.

This shift in wealth resulting from fluctuations in the value of the oil trade may be a zero sum when seen at a global level. Nevertheless, increased purchasing power in the few oil exporting nations brings economic expansion. Differences in propensity of consumption cannot, however, completely make up for the economic shrinkage caused by a loss of purchasing power in the many oil importing nations.

Impact on the International Economy and Effects on Individual Nations

The impact of the shift in wealth from oil importing nations to oil exporting countries does not stop at the domestic economy. Diminishing purchasing power in oil importing nations reduces the demand for other imported goods and services, and restrains global trade. This causes a drop in production activity in countries exporting those goods and services for which demand has fallen, putting even further pressure on economic deceleration.

At the same time, increased demand for imported goods and services among oil exporting nations supports, to a certain extent, production of those goods and services in countries that export them (through a backflow of oil money). Again, however, at a global level the impact of economic deceleration remains greater.

Nations Particularly Affected

From the above, we can see that nations on which the burden of a rise in oil prices has a particularly significant impact would include those having:

- High net imports of oil per GDP
  Poor energy efficiency, high dependence on oil, low self–sufficiency in oil...
- Large marginal propensity to consume and invest. Small marginal propensity to import.
  Results in a larger multiplier effect.
- A high ratio of exports as a portion of GDP.
  More susceptible to the effects of reduced global trade.
- A low level of exports to oil exporting nations.
  Little relief from a backflow of oil money.

Typically, non–oil producing nations, and the nations of Asia—with their significant dependence on exports—tend to meet these conditions. At the same time, the developed countries of Europe are thriftier in their use of oil and enjoy a significant backflow of oil money. They are thus well–positioned to see an easing of the adverse effects of a rise in oil prices.

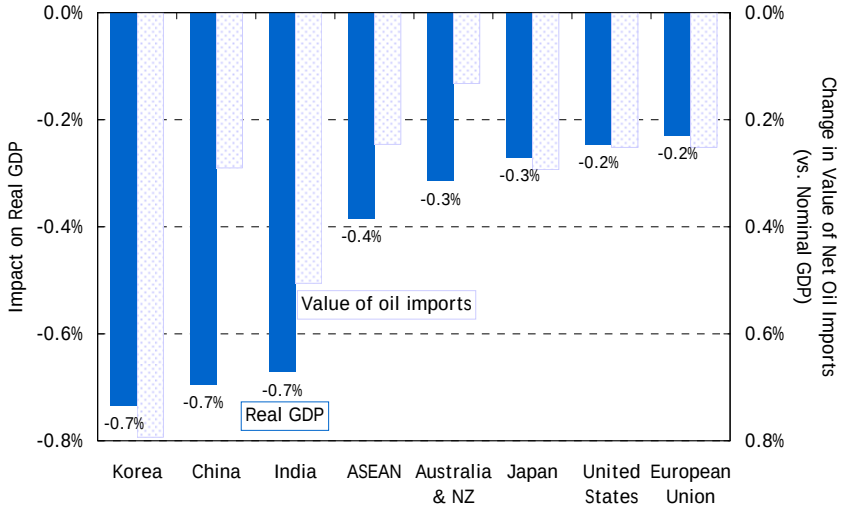
The Impact of a $10/bbl Rise in Oil Prices

By building a general model based on the above mechanism, we estimated the impact of a rise in oil prices on the real GDPs of various nations and regions. The results of a $10/bbl rise in the price of oil are shown in Fig. 3. Note that, for example, the IMF estimates place an embargo on Iranian crude in the absence of alternative supplies could result in a 20% to 30% —equivalent to about $20 to $30/bbl— increase in crude oil prices (January 2012).

While the U.S. is the world's largest oil consuming nation, it produces approximately 40% of that oil itself (this self–sufficiency ratio has climbed higher in recent years with increased production of crude oil through expansion of shale gas production, and with improvements to automobile fuel economy). Thus, the impact of an increase in the value of net oil imports resulting from a rise in oil prices remains small. The low weight exports carry in the U.S. economy has also contributed to holding the impact on real GDP to -0.2%.

Asia, by comparison, has few oil resources, and relies heavily on imports to meet demand. The impact of an increase in the value of net oil imports is thus significant. The impact of import values is smaller in China and ASEAN, where oil self–sufficiency is relatively high, and in Japan, where energy conservation is advanced. Nevertheless, given the economic importance of exports, the impact on real GDP is as much as -0.3% to -0.7%. In particular, given that domestic economic growth rates in Japan in the seven years since crude oil prices began rising have averaged no more than 0.3% annually, the rise in oil prices represents a relatively large burden.

Fig. 3 Impact of a $10/bbl Rise in Oil Prices on Real GDP



Note that in Asia, there is a strong tendency to link natural gas prices to the price of crude oil. In other words, as oil prices rise, these countries will suffer the side effect of a concomitant rise in the price of natural gas imports. This results in an even greater risk of adverse economic impact when compared to North America or Europe.

In Summary

Rising crude oil prices can do more than limit the economic options available for curbing inflation. Given the current situation, they may also result in adverse economic impacts along paths and to a degree that would not be a concern in normal times. A worsening of current accounts comprising balance of trade will, by definition, lead to deteriorating treasury budgets and a worsened balance between savings and investment. Moreover, economic deceleration will see treasury budgets deteriorate further through reduced tax revenues and measures for economic stimulation. The world today faces major challenges due to the European economic crisis, in which treasury budgets have shaken the real economy through the vector of the financial sector. Soaring crude oil prices threaten to become a factor in further worsening the global economy. A grave economic crisis was brought on by the nations of southern Europe, difficult to explain given the size of their economies. By the same token, the concerns raised by the enormous negative impact on a fragile world economy of the expanding imbalance brought on by a rise in crude oil prices cannot be brushed off as groundless.

Appendix: Model Structure

An econometric model was used in estimating the impact of a rise in crude oil prices on the global economy. In doing so, to avoid the model becoming a black box, we took particular care to ensure good visibility. Because the model is comprised only of real expenditure components, and because each behavioral equation is linear, it can be solved algebraically. The actual system is as shown below. Note that each vector is ranged by country and region.

[GDP]

$$\boldsymbol{y} = \boldsymbol{c} + \boldsymbol{i} + \boldsymbol{g} + \boldsymbol{x} - \boldsymbol{m} + \boldsymbol{r}$$

[Gross Domestic Income]

$$\boldsymbol{z} = \boldsymbol{y} + \boldsymbol{t}$$

[Private Consumption]

$$\boldsymbol{c} = \boldsymbol{\alpha}_c + A_z \boldsymbol{z} + A_1 \boldsymbol{c}_{-1} + \boldsymbol{u}_c$$

[Investment]

$$\boldsymbol{i} = \boldsymbol{\beta}_c + B_z \boldsymbol{z} + \boldsymbol{u}_i$$

[Government Consumption]

$$\boldsymbol{g}$$

[Exports]

$$\boldsymbol{x} = T\boldsymbol{m}$$

T : Import share matrix with country of origin on the horizontal and importing country on the vertical.

[Imports]

$$\boldsymbol{m} = \boldsymbol{\gamma}_c + \Gamma_z \left(\boldsymbol{c} + \boldsymbol{i} + \boldsymbol{g} + \boldsymbol{x} + \boldsymbol{r}\right) + \boldsymbol{u}_m$$

[Statistical Discrepancies]

$$\boldsymbol{r}$$

[Trade Gain/Loss]

$$\boldsymbol{t}$$

Solving for these structural equations results in:

$$\begin{aligned}\boldsymbol{y} = &\{I - (I + (T - I)(I - \Gamma_z T)^{-1} \Gamma_z)(A_z + B_z)\}^{-1} \\ &\{(I + (T - I)(I - \Gamma_z T)^{-1} \Gamma_z)(\boldsymbol{\alpha}_c + \boldsymbol{\beta}_c + A_1 \boldsymbol{c}_{-1} + \boldsymbol{g} + \boldsymbol{r} + (A_z + B_z)\boldsymbol{t} + \boldsymbol{u}_c + \boldsymbol{u}_i) \\ &+ (T - I)(I - \Gamma_z T)^{-1}(\boldsymbol{\gamma}_c + \boldsymbol{u}_m)\}\end{aligned}$$

Here, I is the identity matrix.

The impact on GDP was estimated by applying the shift in wealth resulting from a rise in crude oil prices (the first blow) to the above formulas in the form of trade gains/losses.

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