

Energy Price & Japanese Economy

By Hiroshi YOSHIKAWA

1. Introduction

For the last five years, the world prices of oil, raw materials and foodstuffs have increased sharply. In the spring of 2004, the price of crude oil was only \$36 per barrel. In 2006, it almost doubled to \$66, and only two years later, in June 2008, it reached \$134 (Chart 1). The dramatic price hike was not confined to oil, but prices of almost all other energy resources, raw materials and food rose worldwide. Though the oil price had fallen to around \$70 per barrel by October 2008, plainly the prices of raw materials and food, relative to those of manufactured products, have risen sharply for the last few years.

The event is not new to the world. Remember that we experienced two oil embargos, or “oil shocks,” during the 1970s. The oil price quadrupled from \$3 per barrel to \$12 during 1973-75. And then it almost tripled from \$14 to \$37 from 1978 to 1981. The oil shocks reminded us of the simple fact that natural resources are exhaustible and, therefore, the prices of these natural resources are bound to rise as they become scarcer.

Some 200 years ago, Robert Malthus, a British economist, predicted a global problem caused by limitations of nature. The problem is particularly serious to many resource-poor advanced economies. In fact, as early as in 1923, British economist John Maynard Keynes saw this difficulty, namely worsening terms of trade facing Europe after the First World War.

“Up to about 1900, a unit of labor applied to industry yielded year by year a purchasing power over an increasing quantity of food. It is possible that about the year 1900 this process began to be reversed, and a diminishing yield of nature to man’s effort was beginning to reassert itself. . . . Before the eighteenth century mankind entertained no false hopes. To lay the illusions which grew popular at that age’s latter end, Malthus disclosed a devil. For half a century all serious economical writings held that devil in clear prospect. For the next half century he was chained up and out of sight. Now perhaps we have loosed him again.” (Keynes, J. M. (1923) *Economic Consequence of the Peace*)

In what follows, I first explain challenges caused by the current hikes of energy, raw material and food prices, and then discuss the future of the Japanese economy.

2. Challenges

A rise in the energy price is equivalent to technical regress in the macroeconomy. No wonder there are difficulties facing the economy. Those difficulties must be borne by labor and capital. That is, real wages earned by workers and firms’ profits must be lowered when the energy price rose.

If the economy is rich in resources, then the problem may be mitigated by redistribution of income in the economy. It cannot, howev-

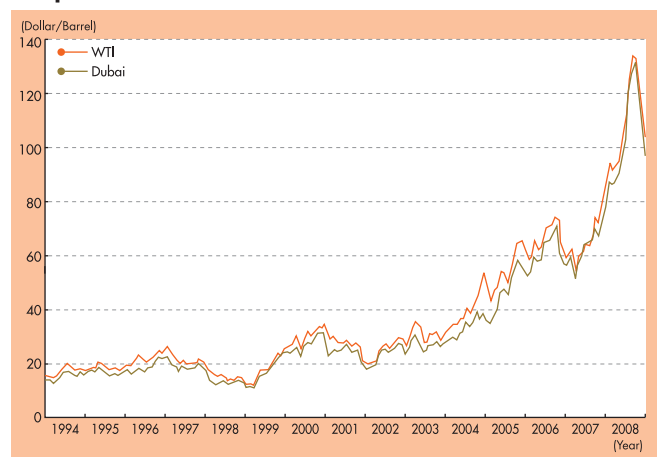
er, be the case for the Japanese economy. The Japanese economy depends virtually 100% on imports for its energy and other raw materials. At the same time, Japan exports manufactured products. Thus, a rise in the world energy price is equivalent to deterioration of the terms of trade for Japan (Chart 2); here, the terms of trade are the prices of exports divided by those of imports.

As the terms of trade worsen, the income is transferred from Japan to resource-exporting countries. The rise in the energy price is, therefore, a “tax” on the Japanese economy as a whole. The aggregate income loss is estimated to be ¥5 trillion for 2004, but doubled to ¥10 trillion for 2005, tripled to ¥15 trillion for 2006, and finally reached ¥21 trillion for 2007. Because Japan is resource-poor, its income loss is greatest among the advanced economies. For example, the share of the income loss in GDP as of 2006 is about 3% for Japan as against less than 1% for the United States and the EU. Clearly, Japan is one of those countries hardest hit by a rise in the energy price.

The loss of income must be borne by lower real wages and corporate profits. Here, we must point out that increases in energy and food prices are regressive, meaning that low-income groups are hit hardest. The OECD recently compiled a report which says that the Gini coefficient of most countries has risen; namely income inequality has worsened. Japan is no exception. In fact, *kakusa* or inequality is currently regarded as one of the most important issues in Japan. It is important how the loss of income is ultimately borne by various groups of people.

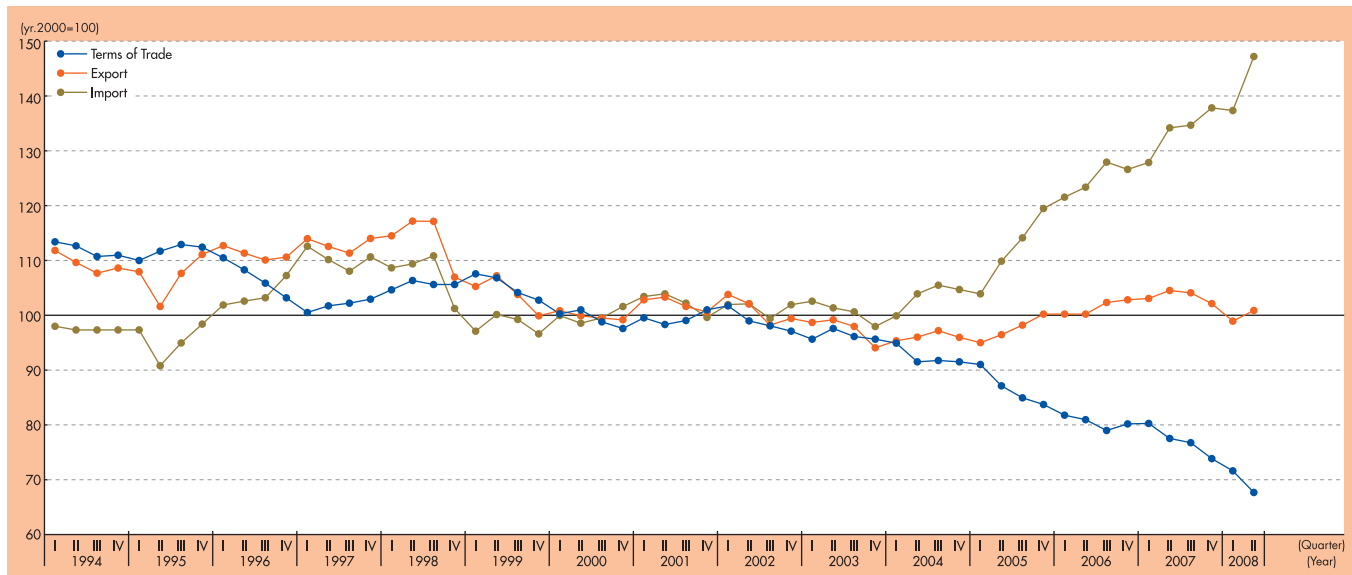
The price hike causes another problem. There is a good consensus that the cyclical peak of the Japanese economy was in October/November 2007. The Japanese economy is now in a cyclical downturn. Because it had enjoyed a long period of sustained expansion beginning in February 2002, many economists had anticipated a cyclical peak. What policymakers and economists had not

CHART 1
Oil price trends



Source : Cabinet Office

CHART 2
Export/import price indices & terms of trade



Source : Cabinet Office

recognized is the seriousness of the world financial troubles. The Japanese economy must solve the problem of energy price hikes amid a recession inflicted with the global financial crisis.

3. Future

How do energy price hikes affect the future of the Japanese economy? Here, I would like to look at the bright side. Necessarily, I draw on the past experiences after the two oil shocks during the 1970s.

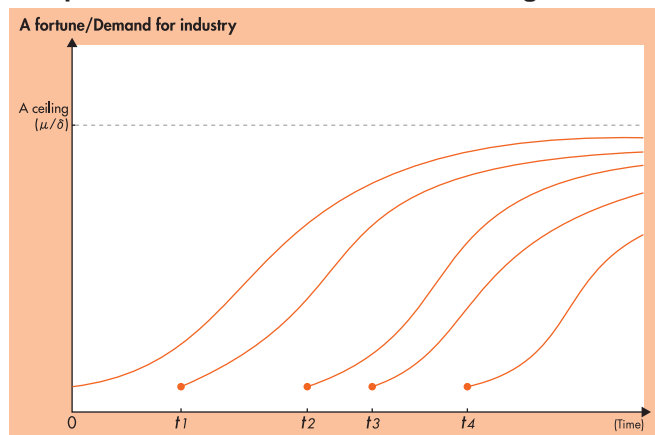
The energy price rose permanently. The key to solving this problem is technology – energy-saving and energy-efficient technology. In this respect, the Japanese economy made a remarkable achievement after the two oil shocks.

For example, I estimated the energy coefficient – namely the amount of energy used for producing a unit of output – for Japan’s export industries in 1973-87 (Yoshikawa, H., “On Equilibrium Yen-Dollar Rate,” *American Economic Review*, June 1990). It was 0.030 for 1974, but had declined to 0.012 by 1981, and fallen to 0.004 by 1987. Thus, in less than 15 years after the first oil shock, the energy coefficient for Japan’s export industries was almost one-eighth; in other words, the energy efficiency improved almost eight times in those industries. Incidentally, such a dramatic decline in the energy coefficient, together with a parallel decline in the labor coefficient, was a fundamental factor causing a sharp appreciation of the yen against the US dollar. In turn, it brought about aggregate income gains.

Technical progress not only saves energy in production processes, but also creates new energy-efficient products. A primary example would be fuel-efficient cars. Before the 1970s oil shocks, there had been little demand for fuel-efficient cars. An increase in the oil price let people realize the necessity of fuel-efficient cars. Arguably, one might doubt whether the Japanese automobile industry would have established itself as a world leader without the oil shocks.

Globally, an increase in energy prices, by way of inducing people to save energy, contributes to sustainable growth. Development of energy-saving/efficient technology is imperative regardless of the level of energy prices. If Japan succeeded in developing energy-efficient technology as it did during the past 30 years, it would provide Japan with a great advantage for its future growth.

CHART 3
The pattern of new demand & economic growth



Note: $t_1, t_2, t_3, t_4, \dots$ A new fortune/A point in time when industry was born
Source: Aoki, M. and H. Yoshikawa, “Demand Creation/Saturation, and Economic Growth,” *Journal of Economic Behavior and Organization*, vol. 48, 2002

It is important to recognize that a once-and-for-all increase of energy prices lowers the *level* of real income, but that it does *not* necessarily lower *the rate* of economic growth. After all, the economic growth rate, particularly an economy with low population growth such as Japan, depends ultimately on total factor productivity or technical progress. Technical progress has many aspects. Professor Masanao Aoki and I presented a theoretical model in which the ultimate factor to cause economic growth is *product innovation* (Aoki, M. and H. Yoshikawa, “Demand Creation/Saturation, and Economic Growth,” *Journal of Economic Behavior and Organization*, vol. 48, 2002). The pattern of economic growth is illustrated in *Chart 3*. Demand for existing goods/services necessarily saturates, but new products occasionally emerge. Product innovation generates growth.

New energy-efficient products provide new S-shaped curves, and thereby lead economic growth. In summary, high energy prices are a serious challenge to the Japanese economy, but at the same time, they provide an opportunity. JS

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