Joint Economic Committee
Republicans
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REPUBLICAN STAFF COMMENTARY

Japan after the Earthquake and the Tsunami

May 4, 2011

THE DISASTER

Japan is an island nation the size of Montana in area but with a population of 127 million, more than 40% that of the entire United States. The capital, Tokyo, is located about 140 miles southwest of the Fukushima Daiichi nuclear power plant that was severely damaged by a tsunami resulting from a 9.0 Richter scale earthquake off Japan's northeastern coast on March 11. More than 27,000 people are dead or missing. With an estimated height of 46 feet, the tsunami crashed over a 20-foot-high seawall at the power plant and shut off the diesel generators that pump water into the reactor vessels to cool them. Overheating caused explosions and the release of radioactive steam into the atmosphere despite improvised efforts to cool the reactor cores with seawater. Contaminated water also has leaked from the structure. Japanese authorities quickly established a 12-mile evacuation zone around the plant and recently added selected communities to it beyond that radius. On March 19, diesel-generated back-up power was partially restored and as of March 23 the plant was fully reconnected to off-site electrical power. Japan endured 61 aftershocks of a 6.0 magnitude or higher through April 12. (Please refer to the maps on page 2 for population density, locations of nuclear power plants, major cities, and the area of greatest damage.)

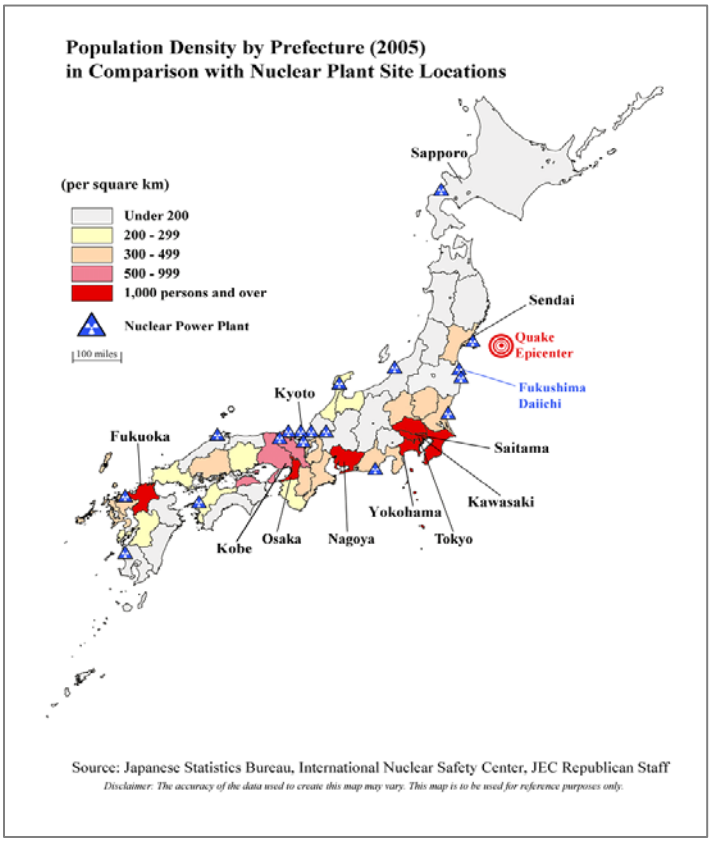
The U.S. Food and Drug Administration has banned spinach and *kakina* (a leafy vegetable) imports from the prefectures of Fukushima, Ibaraki, Tochigi, and Gunma and milk from Fukushima prefecture only. The Japanese government has raised the accident's severity rating on the International Nuclear Event scale from that of the Three Mile Island accident in 1978 (5), to that of the Chernobyl accident in

Highlights

- Disasters often give rise to fears of economic paralysis and misplaced blame, and so it is with the March 11 earthquake and tsunami in Japan.
- Ironically, the notion that random destruction is good for the economy also can arise. GDP—which measures economic activity but not wealth—may increase with reconstruction and those who believe in fiscal stimulus now look with hope to more deficit spending on infrastructure.
- Both reactions are off the mark. The size and sophistication of Japan's economy position it to overcome this crisis as it did the 1995 Kobe earthquake, but massive destruction makes a country poorer, not richer.
- Deficit spending will not speed Japan's recovery. On the contrary, its huge public debt from past unsuccessful stimulus measures is an obstacle to economic growth, especially now that it will be harder to decrease the debt.
- Vilifying nuclear energy after Fukushima makes no more sense than vilifying oil after the Macondo spill in the Gulf of Mexico. Without oil and nuclear energy Japan would not have the world's 3rd largest economy, but it still would have a large population to support and would have to endure earthquakes and tsunamis.
- The loss of life and the destruction in Japan from this disaster are enormous. Appropriate reactions are to offer help and hone strategies for coping with future disasters.

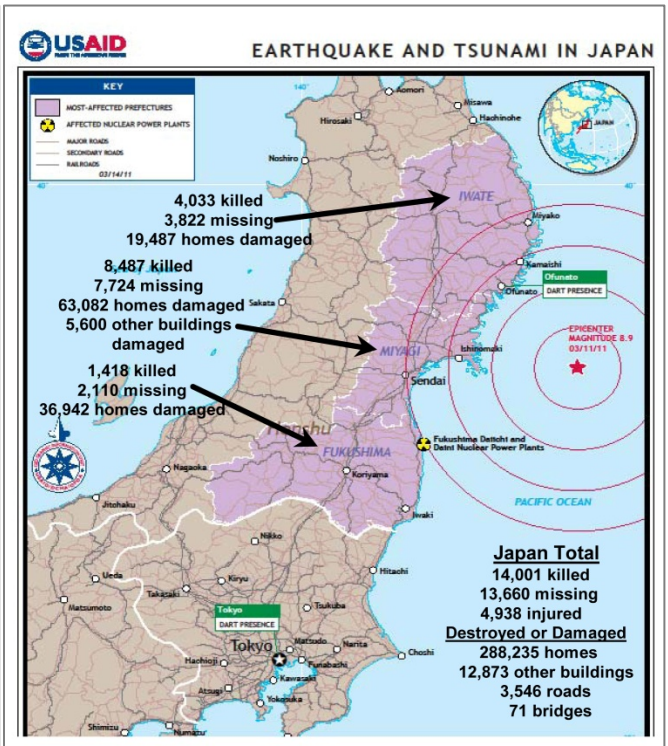
1986 (7). However, at Chernobyl the reactor damage was worse, the release of radiation far greater, and there was a loss of life. At Fukushima, the containment buildings have largely performed their function, and only a small number of workers was briefly hospitalized for radiation exposure and released with no signs of lasting injury. At Chernobyl, 29 people died of short-term radiation exposure.

One can think of the disaster's impact in three parts: (1) the loss of life and the devastation caused by the earthquake and the ensuing tsunami; (2) the effects on the Japanese and the global economy; and (3) the lessons for energy policy and the use of nuclear power from the tsunami's breach of a nuclear power plant. (The map to the right is from a Congressional Research Service Report of April 20, 2011.[1])



Source: Japanese Statistics Bureau, International Nuclear Safety Center, JEC Republican Staff

Disclaimer: The accuracy of the data used to create this map may vary. This map is to be used for reference purposes only.



Source: Underlying map from U.S. AID.
Casualty and damage data from Japan, National Police Agency.

DAMAGE ESTIMATES

With a large number of people swept away by the flood and missing, the death toll may approach 30,000—far greater than in U.S. disasters of recent memory such as Hurricane Katrina (over 1,200) and the 9/11 attacks (3,000). The earthquake and the tsunami destroyed or damaged more than 300,000 homes and other buildings. Japan is located in an earthquake-prone area that stretches around the Pacific Rim (the "Ring of Fire," which also includes active volcanoes) and has experienced many serious earthquakes in its history. The most recent disastrous one had a magnitude of 6.9 and struck the city of Kobe near the center of the country in 1995; it cost 6,400 lives and caused $100 billion of damage, about 2% of GDP. There is a higher population density and industrial concentration around Kobe than in the northern part of Japan, but there was no tsunami. On March 21, the World Bank released an estimate of the damage from the current disaster in the range of $120 billion to $235 billion, or 2.5% to 4% of Japanese GDP; but some estimates are higher, in the range of $195 to $305 billion.[2]

THE ECONOMY

What are the economic repercussions? A substantial contraction of the Japanese economy is expected in the second quarter, -2.83% on an annualized basis compared to the prior year according to a recent survey of economists. Japan's Economy Minister hopes that a recovery begins by year-end, although damage to power plants may cause shortages in electricity supply posing a risk to resumption of production.[3] The region hit by the tsunami and the ensuing nuclear crisis likely contributes between 4% and 7% to Japanese GDP. Most economists do not believe that supply disruptions in Japan will have a major effect on the global economy. While individual industries are experiencing delivery problems given Japan's key role in supply chains, particularly in Asia, and the widespread efforts to hold inventory costs to a minimum, the share of global trade impaired and the time to find workarounds are not great enough to throw the world economy off kilter. Over the last five years, developing East Asia's trade with Japan has accounted for about 9% of the region's total external trade, according to the World Bank.[4] In 2010, Japan accounted for 6.3% of U.S. imports and 4.7% of U.S. exports, much lower percentages than, say, 15 years ago. U.S. stock indices fell initially but have since recovered. Of much greater potential concern are developments in the Middle East and North Africa that have driven the oil price above $100 per barrel. A confluence of crises, of course, is not helpful to the economic recovery, more so in terms of uncertainties created than necessarily in actual impairments to supply of products or resources. Japan's economy is large and strong enough (see insert) to overcome a $300 billion or even greater loss, but a loss in this order definitely is a hardship on the local population and a detriment to the Japanese economy.

Japan's Economy in Brief

GDP: $5.47 trillion (2010)
Largest Sectors Shares:
Services 23%
Manufacturing 18%
Real estate 13%
Wholesale & Retail Trade 12%
Government Services 10%

Exports: $770 billion (2010)

Foreign Reserves:
$1.04 trillion (March 2011)

Current Acc't Balance (monthly):
$14.7 billion (Feb. 2011)

Population: 127.4 million
Labor Force: 66 million
Unemployment: 4.6% (Mar. 2011)

Gov't Debt-to-GDP Ratio: 192%

Do economic losses spur economic activity? Japan will experience a decline in GDP as a result of interruptions to economic activity, but reconstruction may raise GDP. GDP statistics measure what has been produced during a given period of time; they do not capture changes in the capital stock. When the rate of economic output accelerates to make up for a major destructive event, it sometimes leads to the mistaken belief that the destruction was good for the economy. Some confuse the issue further with the Keynesian argument that increased government spending on infrastructure reconstruction will accelerate recovery from the recession.

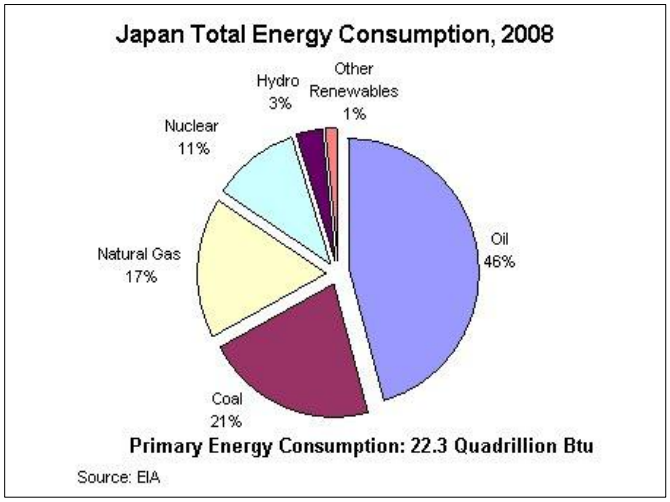
This is wishful thinking. The loss of property and productive capacity represents a reduction in wealth and a setback to economic growth. The rebuilding effort may increase GDP, but the resources employed could have created greater wealth rather than merely restore what has been lost. With respect to Japan's longer term economic growth rate, it had been slow to stagnant for structural reasons and due to the government's policy choices since the financial and real estate crisis of 1992. A series of stimulus

measures has failed to sustain robust economic growth; instead it built up the largest public sector debt in the developed world—twice the size of Japan's GDP. In the wake of the current disaster the government presumably will increase the debt even more to finance infrastructure reconstruction, but this will not rejuvenate the economy.

Japan's fiscal condition is a hindrance. Japan is a highly industrious country. It is among the most technologically advanced producers of motor vehicles, electronics, machine tools, ships, and chemicals, among other products, and its GDP is the third largest in the world, roughly 37% that of the United States. Japan is a large exporter, $770 billion worth in 2010, or 14% of its GDP. It also consistently generates a trade surplus and has large accumulated foreign reserves. As such, the nation can well afford to rebuild. Indeed, the yen appreciated as it had after the Kobe earthquake, because the Japanese are expected to finance reconstruction in part by repatriating, i.e., converting to yen, holdings in foreign currency. Poorer countries could expect to see the value of their currency drop following such a costly disaster. G-7 central bank intervention as of mid-March has reduced the yen's exchange value again, since an appreciating currency (and higher prices of Japanese goods abroad) would represent an additional challenge for Japanese exporters at this difficult time. However, the larger Japan's government debt grows, the more onerous the repayment burden on its private sector becomes. Even though the government debt is denominated in yen and is held almost entirely domestically, Japan's private sector faces the chore of repaying the holders of government debt for many years into the future. This repayment obligation is a drag on entrepreneurial initiative, risk taking, and investment, and therefore will slow long-term growth.

The debt build-up in the United States has been compared with that in Greece and other Eurozone countries at risk of sovereign debt defaults. But a more apt comparison may be with Japan. Both countries have large productive potential and their sovereign debt is denominated in the home currency, but their private sectors have to service these large debts and that will dampen economic growth. The disaster in Japan is a cautionary tale about a country facing an emergency while weighed down by a mountain of government debt.

ENERGY



Nuclear power. Japan had 54 operational nuclear reactors that supplied about 11% of its total energy consumption in 2008 and 27% of its electric power generation in 2009, according to the Energy Information Administration (EIA)[5]. Over 12 gigawatts of nuclear capacity at the Fukushima, Onagawa, and Tokai facilities, the four nearest the quake epicenter (see map on page 2), ceased operation after the earthquake and tsunami hit. These facilities represent about 24% of Japan's nuclear capacity and over 4% of its total electricity generating capacity. Some or all of the nuclear reactors at Fukushima may be out of commission permanently. However, Japan operates its nuclear capacity at comparatively low rates of utilization and favors extended shutdowns for maintenance. Transmission facilities also have been

disrupted and it remains to be seen how quickly the power grid can be restored and reconfigured, but one should not assume that a decline in Japan's electricity supply is anything but temporary.[6]

Energy import dependence. Japan very likely will need to import more oil, natural gas, and coal in the near term to make up for the loss of nuclear power, but it remains to be seen how its energy mix going forward will change. Japan is highly import-dependent for its energy supply. According to the EIA, the island is only 16 percent energy self-sufficient. Japan has followed an "all of the above" energy policy, as the chart on page 4 shows. Oil and natural gas account for over 60% of energy consumption, nuclear for 11%. Two nuclear plants are under construction and another 12 in planning stages. These efforts likely will be delayed following the problems at the Fukushima power plant. However, two observations are important: (1) If there is a country eager to avail itself of alternative energy sources to escape its import dependency, it would be Japan, yet only 1% of the energy it consumes derives from renewable sources. (2) Japan is known for sophisticated engineering, but has not made its economic development contingent on government-funded energy technology breakthroughs. Instead, this densely populated, earthquake-prone country has built 54 nuclear reactors to which it was about to add 14 more.

CONCLUSION

Japan has built one of the world's most advanced economies by fueling it with oil, natural gas, coal, and nuclear energy, even though it has to rely on 84% imports. The March 11 undersea earthquake and the tsunami it set off caused wide scale destruction and took thousands of lives, possibly approaching 30,000; it also damaged one of its nuclear power plants. On the strength of its highly advanced economy Japan will spare its population from suffering severe declines in economic and health standards.

It is safe to say that if Japan had tried to function on the 16% indigenous energy sources, let alone on so-called green energy, it would be a poor country. How then would it cope with the current devastation or how would it have coped with the devastation of the 1995 Kobe earthquake? Most observers do not ask that question. Some believe that using oil, natural gas, and coal is wrong. Some feel that Fukushima Daiichi proves that nuclear energy should be off-limits, though not a single person has died from radiation exposure there. Is this sensible?

Some fret about economic disruptions that could set back the global economy's recovery, and some of those same observers may claim the economy soon will be better off for having been struck by this calamity. Of course Japan will rebuild, but the resources it enlists to do so will be unavailable to build more power plants, hospitals, or schools—this is what it means to suffer a loss. For the Japanese government to borrow more money is not a good thing. If its budget were balanced or in surplus, it would be of little concern, but with government debt twice the size of GDP it is a big concern.

We should appreciate the indigenous oil and gas resources in the United States, study Japan's nuclear safety record, and learn what we can from the earthquake damage and the tsunami's breach of a nuclear power plant, but we should not reject nuclear energy because of this extraordinary event. And, we should keep our fiscal house in better condition in case an emergency strikes at home. Those are sensible lessons.

In the meantime, the United States along with other nations is extending assistance to help Japan cope with the crisis. The Defense Department relief effort has been designated *Operation Tomodachi* (Japanese for "friend"). Close to 40,000 U.S. troops are stationed in Japan.

[1] "Japan's 2011 Earthquake and Tsunami: Economic Effects and Implications for the United States," Dick K. Nanto, William H. Cooper, J. Michael Donnelly, and Renée Johnson, Congressional Research Service (CRS), R41702, April 20, 2011. Other sources for the information presented above include two additional CRS reports, "Fukushima Nuclear Crisis," Richard J. Campbell and Mark Holt, R41694, April 4, 2011, and "The Japanese Nuclear Incident: Technical Aspects," Jonathan Medalia, R41728, April 5, 2011 as well as articles in the *Wall Street Journal* " Japan Vows Emphasis on Caution," April 13, 2011 and "Japanese Declare Crisis at Level of Chernobyl," April 12, 2011.

[2] Japan, Ministry of Economy, Trade and Industry, *Japan's Nuclear Emergency—Update*, April 6, 2011. The high end of the range would be almost four times the physical damage caused by Hurricane Katrina.

[3] "Tokyo Says Economic Recovery Is Stalled," *The Wall Street Journal*, April 13, 2011.

[4] "The Recent Earthquake and Tsunami in Japan: Implications for East Asia," *World Bank East Asia and Pacific Economic Update 2011*, Vol.1, March 21, 2011, p.2.

[5] "Country Analysis Briefs, Japan," March 2011, Energy Information Administration.

[6] "Safety Formula Had More Reactors Doing Less," *The Wall Street Journal*, April 13, 2011.