Super-cycle in the Global Commodities Market, An Evolving Area of Technical and Market Innovation

Since the end of the 19th century, the global commodities market has experienced three long-term contractions and four expansions, and we are now going through the fourth expansion period. After World Wars I and II and the 1970s oil shock, commodity prices soared due to decreased energy supplies. However, the current super-cycle, which has lasted more than a decade, can be attributed to increased demand. At the center of this trend lies China.

Shim, Sang-hyung _ Senior Principal Researcher, POSCO Research Institute
shshim@posri.re.kr

Strong Demand for Global Commodities: Energy Revolution May Lead to Global Political and Economic Changes

In the decade since the peak of the Asian financial crisis in 1998, global commodity prices have doubled according to the Dow Jones-UBS Commodity Index that tracks 22 commodities futures contracts. Oil prices have quadrupled and iron ore and copper prices have risen sixfold while grain prices have more than doubled. Behind the increases lay the following events: When signs appeared in the early 2000s that the dot-com bubble was about to burst, the United States increased liquidity and, more crucially, China emerged on the global economic stage by joining the World Trade Organization in late 2001.

In 2002, China was the world's sixth-largest economy with a GDP worth USD 1.67 trillion (in 2005 USD). In 2012, China became the world's second-largest economy after the U.S., accounting for 12% of total global production with a GDP of USD 4.52 trillion. During this period, the Chinese economy grew at an annual average of 10.5%. China imported a large volume of raw materials and produced and exported goods for low labor costs, serving as the world's factory. China had a significant impact on the global commodities market.

China's iron ore imports grew from 111 million tons in 2002 to 746 million tons in 2012, making up 70% of global trade volume in iron ore. During the same period, the country's oil imports increased from 436 million tons in 2002 to 1.777 billion tons in 2012, accounting for 60% of global oil demand growth, with China overtaking the U.S. as the world's largest oil importer this year. China's copper imports also rose over the past decade from 1.18 million tons to 3.4 million tons while 50% to 70% of the increase in global demand for industrial raw materials such as copper, nickel, silver, and tin came from China. As of last year, China accounted for 33.2% of the increase in global demand for major 11 raw materials such as oil. Raw material prices dropped right after the 2008 global financial crisis, but rallied due to quantitative easing in advanced countries and China's massive stimulus package.

Against this backdrop, the Chinese economy has drawn keen attention in the global commodities market. World commodity prices have turned bearish since the middle of last year with Chinese economic growth holding steady at around 7%. This year the market fluctuated whenever there was a possibility that the Chinese economy would slow due to the new leadership's reforms. In the first half of this year, the commodity price index declined 10.5% while the prices of copper, iron ore, aluminum, and base metals fell around 20%.

The China Shock Has Been Absorbed by the Commodities Market

Some analysts forecast that the super-cycle will end considering that the Chinese economy, a great driver of the current super-cycle, is undergoing a transition from ten years of high growth to stable growth. However, in terms of commodity demand, China will continue to play a role as a growth engine as its urbanization and investment in infrastructure will drive up demand for raw materials. Even though production of steel, aluminum, and coal might be reduced due to the restructuring process, industries including automobiles, electric power and electronics, and heavy equipment and machinery will continue to grow, which indicates that demand for commodities will not decline. The global commodities mar-

ket, which had suffered a shock due to a sudden rise in demand, seems to have been normalized by China.

Even though emerging economies including India, Indonesia, and Brazil might be affected by the Chinese economy, no one would disagree with the assessment that those emerging countries with large populations and abundant resources, which have already entered a growth phase, will continue to grow in the long term. Advanced economies including the U.S. and Japan will also gradually recover from economic recession after hitting rock bottom. In other words, the power that supports global demand for commodities is still strong.

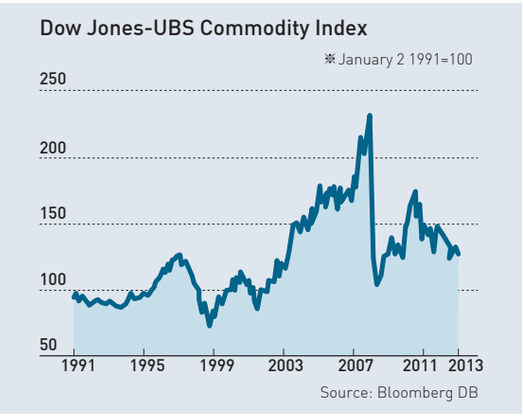
However, it is true that unprecedented signs have recently appeared in the global commodities market. First, the relationship between the dollar and commodity prices has weakened. In the past, commodity prices in U.S. dollars declined when the dollar was strong. Recently, however, both oil prices and the dollar have tended to rise together. Second, in the past, prices of most commodities fluctuated in the same direction; however, such a trend has also been changed as commodities became substitutes for gold, silver and the dollar and countries where individuals consume a large amount of commodities such as India and China have affected the commodities market. Oil prices are affected by a combination of increasing consumption caused by a rise in income and economic factors. The price of each industrial metal fluctuates differently according to different supply conditions. Third, the relationship between commodity prices and the Global Industrial Production Index, which had been considered the most reliable independent variable, has also become weak. The reason for the weaker relationship may be found in the fact that demand growth of emerging countries is higher than that of advanced countries, which account for a majority of global industrial production.

A New Round of Competition for Energy Hegemony between the U.S. and China

Over the past decade, skyrocketing commodity prices have been a heavy burden on importers. Even though they were helpless at the beginning of this period, China, which is now the world's largest importer, and the United States, which is struggling to maintain hegemony, have worked hard to address the problem. China attempted to secure resource independence by buying mine exploration rights in Africa while providing aid to the region. It also built an oil and gas pipeline that links a Myanmar port to mainland China and the Central Asia-China oil pipeline.

In addition, China has worked hard to buy companies engaged in natural resources such as iron ore, nickel, copper and aluminum while also developing mines. Industrial & Commercial Bank of China has taken the initiative in raising funds to develop 100 mines across the world. China has also made efforts to break the oligopoly of three major iron ore companies, which account for 65% of the world's total iron ore production, as well as 80% of trade volume in iron ore and more than 40% of related operating profits. China even tried to close an M&A deal with Rio Tinto, one of the three major companies, but without success. China also set up a steel-trading platform in Shanghai in an effort to make steel supply and demand, inventory, and prices transparent.

A new game has already begun between China with its resources and the U.S. with its soft power



While China has worked to secure physical resources and influence, taking advantage of its substantial foreign reserves, the United States has used its soft power. The U.S. has also begun to develop alternative energy sources that can replace conventional oil through the so-called "shale gas revolution."

The United States developed shale gas drilling technology in the late 1990s and began to produce shale gas in 2008. Since 2010, the U.S. has produced shale oil (also known as "tight oil"). The U.S. production of shale gas led to a decrease in international natural gas prices, thus contributing to Russia's economic slowdown. The U.S. is expected to overtake Russia as the world's largest gas producer. Shale gas production has continued to grow as shale gas reserves in the U.S. are said to be as large as oil reserves in the country. The U.S. is highly likely to achieve energy independence by 2020 and to become the world's largest oil-producing country and oil exporter by 2030. Of course, the current global energy supply structure centered on the Organization of the Petroleum Exporting Countries (OPEC), an oil cartel, will be transformed. We need to take a close look at how the United States, a country that has controlled global energy distribution in the name of bringing peace and order to the Middle East, will intervene in the region.

If the U.S. manufacturing industry can be revived thanks to lower energy prices, a shift will occur in the structure of international division of labor that was formed after the emergence of China. The discovery of oil fields in the U.S. state of Texas in the 1920s ushered in an age of mass production of automobiles, mass consumption and rapid development of the manufacturing industry. A shift in industrial structure and international politics may have already begun. This time again, the shift seems to come from the U.S., a hegemon with soft power built on technology and innovation.

Choi, Seok-won _ Head of Hanwha Investment & Securities Research Center
sw.choi@hanwha.com

Gold Prices to Fall in the Short Term, Industrial Material Prices to Rise: "Super-Cycle Will Persist in the Long Term Given Global Demand"

Is the global commodity super-cycle really coming to an end?

The super-cycle mechanism is different from that of a short-term business cycle. Two factors, the direction of the U.S. dollar and supply and demand for commodities, have the largest impact on the super-cycle. Even though the dollar may fluctuate in the short-term according to U.S. government policy, its long-term status will increase. This rise in status does not mean the dollar will be stronger, but rather that the U.S. may be able to position the dollar as a key currency. The U.S. may continue to maintain the dollar as a weak currency in an effort to promote economic recovery. Despite the impact of the global financial crisis, demand for commodities has not decreased. Moreover, it will not fall significantly in the future. Commodity prices are expected to continue to grow after 2015.

Can you provide a more detailed demand forecast for commodities?

It is important how we see China in terms of the global commodities super-cycle. After all, demand in emerging economies including China will continue to grow. Even though Chinese economic growth may slow to 7% due to Beijing's strategy to focus on the domestic market, demand for raw materials will expand. China's influence on the global market will also increase. Meanwhile, other emerging countries such as India will see demand for commodities increase with continued economic development. It is not surprising to see such increasing demand in emerging countries that continue to invest in infrastructure.

> "Even though Chinese economic growth may slow to 7%, demand for commodities will continue to increase."

The U.S. is expected to finish disposing of non-performing assets and regain economic health, thus paving the way for growth around 2015, seven to eight years after the 2008 financial crisis. The U.S. could achieve 2.0-2.5% growth if it successfully reduces its budget deficit.

Japan is carrying out policy experiments to address the problem of losing growth engines caused by its long-term recession, budget deficit, and super-aging society. Japan is using the weak yen and inflation to enhance industrial competitiveness and economic vitality while raising taxes to compensate for decreased consumption by the elderly. Therefore, Japan's weaker yen policy is not a short-term populist fix but a desperate measure to boost its economy. Through such measures, the Japanese economy will improve.

In conclusion, continued demand for commodities in emerging economies in combination with the economic recovery of advanced countries will drive up commodity prices.

Supply-side Factors such as Development and Speculative Demand

Since the market entered the super-cycle in the 2000s, technology development has been accelerated to respond to not only high prices and energy shortages but environmental problems as well. The development of renewable energy such as solar cells and wind power as well as shale gas has been underway. With more diversified energy sources, the energy market is expected to stabilize. However, it is difficult to predict the grain market, which is in constant supply-side fluctuations. Uncertainty about grain supply has increased due to climate change and because the market is controlled by large suppliers who can shake it up at will.

Over the past five years, quantitative easing by advanced countries has caused the expansion of liquidity, resulting in an increase in speculative demand. However, as signs of an end to quantitative easing have driven down gold prices, speculative demand caused by possible fluctuations in the dollar will be reduced. In the short term, jewelry prices are expected to decline while prices of base metals will remain high due to strong demand. The energy market will remain stable, as various alternatives to oil have been developed.

"Shale Gas Revolution" in the U.S. Causes a Paradigm Shift

Joo, Young-keun _ Principal Researcher, POSCO Research Institute
(youngkjoo@posri.re.kr)

Shutter Stock

Technically Recoverable Potential Tight Oil Reserves (Unit: 100 million barrels)

Country	Reserves	Country	Reserves
Europe	129	Libya	261
Australia	175	Mexico	131
Russia	758	Argentina	270
Pakistan	91	China	322
U.S.	581	Venezuela	134

*TRR: Technically Recoverable Resource

Source: IEA (2013)

In 1956, American geophysicist Marion King Hubbert said that oil production would increase geometrically before peaking and then declining due to oil field depletion and energy wars. According to Hubbert's peak theory, oil production follows a bell-shaped curve. However, today not many experts factor in the notion of "peak oil" when they forecast the supply and demand of energy sources including crude oil. This is because the production of unconventional energy has been rising.

The International Energy Agency (IEA) categorizes unconventional energy sources into unconventional gas (e.g., shale gas, coal-bed methane (CBM), tight gas, and gas hydrate) and unconventional oil (e.g., oil sand, oil shale, and extra-heavy oil). Unconventional energy reserves are greater in size, found in more parts of the world, and developed in more varied ways than conventional energy reserves. Unconventional energy sources are not new sources of energy; rather, they had not been developed well due to low profitability caused by a lack of drilling technology and high development costs. However, the latest technologies such as horizontal drilling, hydraulic fracturing and 3D seismic wave exploration, as well as high oil prices over USD 100 per barrel, have helped increase the profitability of unconventional energy development. The IEA has forecast that conventional oil reserves could supply the world for 86.4 years while unconventional oil could supply the world for 103 years. At the same time, conventional gas reserves could meet global demand for 141.3 years and unconventional gas reserves 100.3 years.

China to Become World's Largest Oil Consumer by 2036

From 2000 to 2012, global oil consumption rose 1.4% per year on average. In particular, emerging countries such as China and India have driven up consumption as their growing populations have industrialized and urbanized, with annual oil consumption for the two giants rising 7.2% and 4.5%, respectively. In contrast, the consumption of traditional large energy consumers including the U.S., Europe, and Japan has declined (by -0.5%, -0.4%, and -1.5%, respectively). This year the IEA forecasts that global oil consumption would grow an annual average of 0.9% from 2010 to 2040. It projected that consumption among OECD countries including the U.S. and Japan would fall (by 0.1% and 0.4%, respectively) due to the expansion of new renewable energy sources, energy efficiency and energy saving while consumption among countries with growing heavy chemical industries such as China, India, and Brazil would continue to rise (2.5%, 3.1%, and 1.2%, respectively). China is also expected to overtake the U.S. as the world's largest oil consumer by 2036.

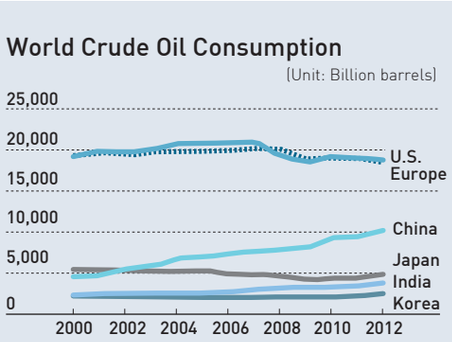
From 2000 to 2012, global crude oil production grew at an annual average of 1.3% fueled in large part by Russia (4.5%) and China (2.2%). However, over the last five years, U.S. oil output rose 5.6% per year on average due to production of tight oil. The IEA predicts that global production of oil and oil products would grow 0.9% per year by 2040. The Middle East, particularly Iraq, is expected to expand crude oil production 1.4% while Canada is expected to increase oil sand production 1.8%.

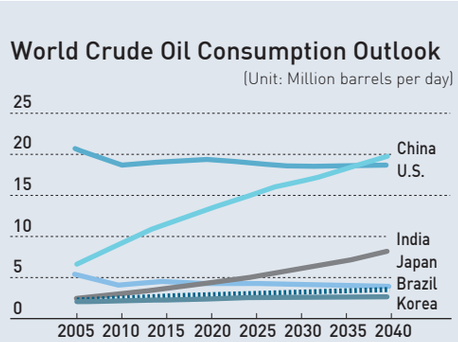
"Saudi America": U.S. to Become World's Largest Oil Producer

The world's recoverable tight oil is estimated to be 345 billion barrels. It is scattered across a relatively broad area worldwide: 22% in Russia, 17% in the U.S., 9% in China, 8% in Argentina, 8% in Libya, and 5% in Australia. Currently, the U.S. is the only country with the technical capability to commercialize tight oil.

In the U.S., oil production has increased since 2009 due to tight oil production even though the country has reduced conventional oil production in order to ensure energy security. Between 2010 and 2012, tight oil production rose by 144% to 2 million barrels per day, accounting for 31% of U.S. crude oil production. In other words, conventional oil production fell while overall oil production rose due to tight oil output. In 2012, U.S. oil imports declined to 8.7 million barrels per day, down 4.3% from 2010. Meanwhile, the country's crude oil inventories remain high at 4 billion barrels.

With decreasing oil imports due to expanded





Chances are that OPEC's influence will be weakened. Middle East countries are eyeing Asia with a view to boosting demand.

tight oil production and improved energy efficiency, the U.S. was overtaken by China as the world's largest oil importer in late 2012. In December 2012, the U.S. imported 6 million barrels of oil a day while China imported 6.1 million barrels. U.S. daily oil production is expected to reach 11 million barrels by 2020 fueled by tight oil production, which indicates that the U.S. will overtake Saudi Arabia as the world's largest oil producer. Furthermore, the U.S. could turn into a net oil exporter by 2030. In the fourth quarter of 2012, the U.S. produced 9.8 million barrels of crude oil a day, surpassing Saudi Arabia, which produced 9.5 million barrels. In the first quarter of this year, U.S. daily oil production stood at 9.8 million barrels and Saudi Arabia's reached only 9.3 million barrels. Against this background, *The Economist* has called the U.S. "Saudi America."

The U.S. tight oil boom following the shale revolution is likely to continue in the mid- and long-term. The U.S. is estimated to have large tight oil reserves in many parts of the country including North Dakota and Texas. In addition, tight oil is cost competitive in this time of high oil prices. While the production cost of tight oil in the U.S. is between USD 50 and 80 per barrel, higher than that of Russia (USD 14-40) and China (estimated to be above USD 50), the U.S. is still competitive because of its production technology and experience dealing with environmental problems. The U.S. does not lag behind other nations in cost competitiveness as well considering that the production cost of extra heavy oil in Venezuela is between USD 39 and 79 and that of oil shale in Israel is USD 62 and 129. In addition, it is difficult to obtain extra heavy oil produced in Venezuela due to the country's resource nationalism. Moreover, oil shale is difficult to mass produce due to environmental issues and the high development cost of pyrolyzing kerogen, a solid mixture of organic chemical compounds. Many organizations forecast that the marginal cost of tight oil production may reach USD 70 per barrel, indicating that tight oil will continue to be produced at high prices. Even though the production of unconventional oil such as tight oil may expand, international oil prices are not likely to fall sharply due to relatively high production costs.

World Natural Gas Reserves (Unit: Cubic meters)

Category	Conventional gas	Unconventional gas				Total
		Tight Gas	Shale Gas	CBM	Subtotal	
North America	47	11	47	9	67	114
Eastern Europe/Russia	144	11	12	20	44	187
Middle East	125	9	4	-	12	137
Africa	49	10	30	0	40	88
South America	32	15	33	-	48	80
Asia	43	21	57	16	94	137
World	462	81	200	47	328	790
Recoverable Years	141.3	24.8	61.2	14.3	100.3	241.0

Source: IEA(2012)

World Crude Oil Reserves (Unit: Billion barrels)

Category	Conventional gas			Unconventional gas				Total
	Crude Oil	Liquefied Gas	Subtotal	Extra-heavy Oil	Kerogen	Light tight	Subtotal	
North America	253	57	310	809	1000	70	1878	2188
Eastern Europe/Russia	352	81	433	552	20	14	586	1019
Middle East	982	142	1124	14	30	4	48	1172
Africa	255	52	306	2	0	33	35	341
South America	245	32	277	498	3	37	538	815
World	2245	433	2678	1880	1073	240	3193	5871
Recoverable Years	72.4	14.0	86.4	60.6	34.6	7.7	103.0	189.0

Source: IEA(2012)

Extra-heavy Oil: Including bitumen and oil sand
Kerogen: A highly polymerized compound formed from bacteria and catalytic water, which includes shale oil and releases crude oil.

China Will Take Five to Ten Years to Develop and Commercialize Its Shale Beds

The IEA estimated that China may have the world's largest shale gas reserves, estimated at 1,115 trillion cubic feet and the world's third-largest tight oil reserves at 32.2 billion barrels. Areas including Sichuan, the Xinjiang Uyghur Autonomous Region, Guizhou, Hubei, Hunan, and Shanxi are estimated to have 68.9% of China's total shale gas deposits. The Chinese government and companies are working hard to develop these reserves. In 2012, China announced the 12th Five-Year Plan on Shale Gas with a goal of developing 300 billion cubic meters of shale gas and producing 6.5 billion cubic meters, which is 2% of the country's total natural gas production by 2015. According to the plan, China will produce more than 60 billion cubic meters by 2020.

China drew bids for shale gas reserves in 2011

and 2012 to attract foreign capital and technology. Chinese state-run oil giant PetroChina has been jointly developing shale gas with Shell in the Fushun-Yongchuan block, and plans to carry out a joint project with U.S. multinational energy corporation ConocoPhillips. Sinopec (China Petrochemical Corporation) is also working in cooperation with British energy company BP and the U.S. company ExxonMobil. The Chinese government has come up with preferential policies to promote shale gas development. According to the plan, companies will receive a subsidy of CNY 0.4 per cubic meter of shale gas production and be exempted from resource taxes, duties on imported facilities, and value added taxes. Since 2010, PetroChina has implemented a project to develop oil fields in Daqing, China with the U.S. oil company Hess. In the meantime, tight oil is being commercially produced in Ordos in south-central Inner Mongolia. Since 2012, China has developed tight oil aggressively in cooperation with foreign companies because the country does not have its own technology.

However, increasing tight oil production in China may not be easy. Since many of the country's shale beds are buried deep underground amid rough, mountainous terrain, it is difficult to apply U.S. technology to China. As Chinese companies do not have horizontal drilling technology, they must bear high resource development costs. China also lacks sufficient water resources and even though its central and western regions hold vast tight oil deposits, most shale beds are prone to earthquakes and tectonic shifts. In addition, China does not have hydraulic fracturing technology and has not yet devised technology or supervision standards. It also lacks adequate infrastructure including pipelines and roads to transport shale gas and tight oil. Analysts project that it will take five to ten years for China to develop and commercialize shale gas, which indicates that China may not achieve the targets stated in its 12th Five-Year Plan.

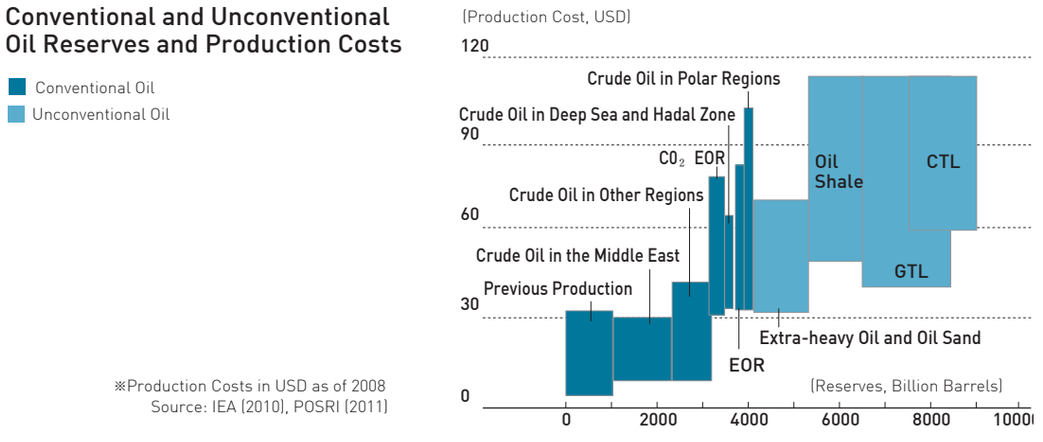
U.S. Shale Gas Revolution to Change Energy Landscape

The U.S. shale gas revolution is expected to cause geopolitical changes in the global crude oil market. A decrease in oil imports caused by the expansion of tight oil production in the U.S. might lead nations to lose interest in the Middle East. Chances are that as tight oil contributes to lowering international oil prices, the influence of OPEC will be weakened. Middle East countries are eyeing the Asian market with a view to boosting demand. Russia is also focusing on Asia due to decreased energy exports to Europe. Australia, which has expanded coal-bed methane production since the U.S. shale gas revolution, is also targeting the Asian market as a source of demand.

Shale gas production will lead to a decrease in U.S. natural gas prices, which will result in a decline in U.S. coal prices. The U.S. will export coal to Europe and Europe will attempt to reduce its dependence on Russian gas by using relatively low-priced U.S. coal. The flow of energy is changing as energy prices drop and energy supplies increase in the wake of the shale revolution, with new energy sources replacing conventional energy. A four-way competition among North America, Australia, Russia, and the Middle East is likely to occur in the Asian market.

Engineers connect gas pipes in the Eagle Ford Shale, a shale gas-producing site in the U.S. state of Texas. (JoongAng Photo)

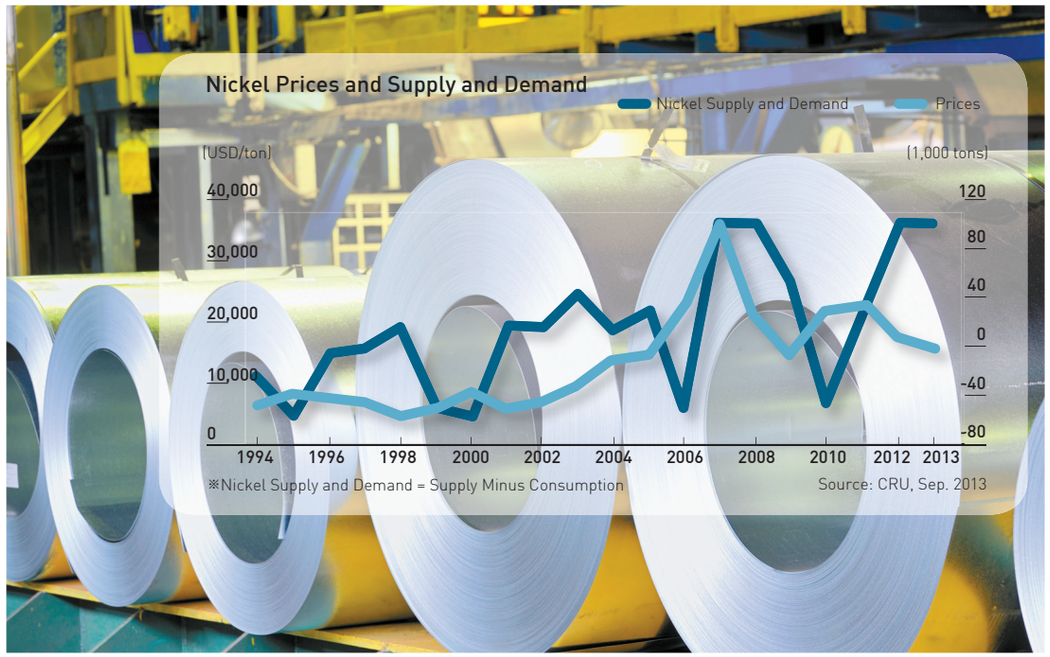
Conventional and Unconventional Oil Reserves and Production Costs



※Production Costs in USD as of 2008
Source: IEA (2010), POSRI (2011)

Park, Chan-wook _ Senior Principal Researcher, POSCO Research Institute
(pcw@posri.re.kr)

Indonesia Emerges as the "Saudi Arabia of Nickel": Increased Supply Brings Stability after Extreme Fluctuations



Nickel is a corrosion-resistant, malleable, ductile silvery-white metal. Eighty percent of the world's supply of nickel is used in stainless steel and alloys. Stainless steel is used in kitchen utensils, medical devices, petrochemicals, construction and coins while nickel alloys are essential materials in aerospace, nuclear power and offshore plant businesses. The importance of the metal, therefore, will continue to grow. Recently the nickel market has seen three changes.

First, nickel price fluctuations caused by China have been reduced. The current price of nickel is between USD 13,000 to 14,000 per ton. Considering that in May 2007 it had soared 2.5 times from the previous year to USD 52,000, the current level is considered stable. Behind this stability lies the fever to develop nickel mines spurred by China–the so-called "black hole of nickel"–along with increased nickel production capacity, growing demand for ferritic stainless steels (400 series) that contain no nickel, and sluggish nickel consumption since the global financial crisis.

Second, nickel price fluctuations over the past decade have contributed to the development of nickel pig iron (NPI) production technology and low-grade nickel mines. China is the absolute leader in NPI production. Even though NPI contains less than 15% nickel compared with up to 32% in ferronickel, its use helps reduce the cost of smelting. NPI can be produced in blast furnaces, electric arc furnaces (EAFs), and rotary kiln-electric furnaces (RKEFs). Among the three techniques, the production cost of the RKEF process is only USD 13,400, 92% of the cost of electric arc furnaces and 75% that of blast furnaces. The RKEF method was developed in China and is spreading rapidly. For instance, among the 620,000 tons worth of NPI projects to be implemented or currently under way in China, 90% use the RKEF process. Major NPI-producing areas in China include Shandong, Inner Mongolia, Jiangsu, Shaanxi, and Fujian, which make up 62% of China's total NPI production.

Lastly, the market has seen the emergence of Indonesia and the Philippines, with Indonesia being regarded as the "Saudi Arabia of the nickel market." The combined nickel ore production of the two nations in 2005 accounted for 13% of global nickel ore production, but increased to 39% last year largely because nickel imports soared in China, which alone accounts for 44% of global stainless steel production. Last year, China imported from Indonesia and the Philippines a combined 65 million tons of nickel ore, most of which was low-grade ore used in NPI.

> The global nickel market is expected to reach equilibrium with Southeast Asian supplies matched by Chinese consumption.

The global nickel market is expected to reach equilibrium with Southeast Asian supplies being matched by Chinese consumption. A shift to stability from the past decade's extreme fluctuations is expected, but Indonesia could serve as a wild card. Indonesia introduced nickel export quotas last year and is set to ban nickel ore exports from 2014, although it remains to be seen whether the policy will be implemented. China is considering investing 670,000 tons of NPI facilities in Indonesia and the Philippines. In short, Southeast Asia has emerged as a major player in the global nickel market.

Han, Suk-ho _ Researcher, Korea Rural Economic Institute
(shohan@krei.re.kr)

Growing Concerns Due to Increased Demand, Climate Change, and Speculation: Grain Prices to Stabilize at Low Levels in First Half of 2014

Growing interest in the global grain market comes from concern that future food supplies may be insufficient and costly due to increasing fluctuations in both world grain prices and grain supply and demand. From 2008 to 2011, in particular, access to food declined, leading to political and economic instability across the world.

In the 20th century, world grain prices soared several times with increased volatility. This trend has intensified since 2007. The global grain market is a "primitive market" where products are consumed first in major producing countries and then exported to foreign countries. It is also a "thin market" in which trading volume accounts for only 15% of total production (grains: 13.2%, fats and oils: 24.1%). As grain prices do not respond to demand, they fluctuate widely when there is a slight change in production. The price elasticity of demand for food grains, feed grains and industrial grains is between 0.2 and 0.25. In other words, if production decreases by one percent, prices increase by 4-5%. The grain market has few exporters but a large number of importers and is greatly affected by major grain companies including Cargill, ADM, Bunge, and Dreyfus as well as major producing countries.

Five Characteristics of World Grain Market

Five key characteristics of world grain prices in recent years can be summarized as follows: First, global grain prices dropped by two-thirds over a 20-year period beginning in 1980 but have doubled over the past decade. This phenomenon can be attributed to the launch of the World Trade Organization (WTO) as policies aimed at promoting agricultural production have since weakened, demand has risen in emerging economies, and production costs have increased. Second, prices for all grains are moving increasingly in lockstep as feed grains have served as substitutes for one another due to increased meat consumption.

If the world economic recovery results in increasing demand for grains, it is always possible that we could see another oil shock and the return of food insecurity.

Grain prices are also associated with demand for bioethanol from corn and biodiesel from soybeans. Third, grain price cycles have shrunk. In the past, prices rose and fell in cycles of 7-8 years or 10 years; however, since 2008, the cycle has collapsed to 3.2 years or 1.1 years. Fourth, grain prices have shown downward rigidity. Since 2008, they have increased up to 60% but decreased by a maximum of 15%, which indicates that demand has continued to grow and grain prices are not likely to fall below a certain level. Fifth, since the launch of the WTO in 1994, agricultural policies have been transformed to promote free trade. As a result, grain price fluctuations have shown similar patterns in both exporting and importing nations. In other words, instability of supply and demand in one country necessarily spreads to the world.

Increased uncertainty and insecurity in the global grain market are fundamentally caused by excess demand, a situation in which consumption is greater than supply. Growing demand for bioenergy in advanced countries and rising consumption of food and meat in emerging economies have driven up global grain demand. In contrast, grain production has not remained constant due to restrictions on expanding production on limited land as well as climate change.

After experiencing a period of high oil prices, the world has been competing to develop biofuels. The United States and Brazil have concentrated on ethanol while the European Union (EU) has focused on diesel. In the U.S., one-fourth of the corn produced in the country is made into biofuel. Cultivation areas for food and feed have been reduced accordingly. Bioenergy production is expected to grow further due to biofuels mandates in advanced countries and growing demand in response to high oil prices.

Seven kilograms of feed grains are consumed to produce one kilogram of beef, and 3.5 kilograms and 2 kilograms of feed grains are required to make one kilogram of pork and chicken, respectively. In China, which accounts for half of global pork consumption, grain imports have jumped since 2000 as the country's meat consumption has risen sharply. China is now the world's second-largest importer of agricultural products (USD 81.4 billion in 2010) and depends heavily on imports for soybeans.

Reduced Incentives for Agriculture Since WTO Weaken Supply

A bigger problem is climate change caused by global warming. Many reports on global warming and food problems suggest that a rise in temperature of 3 degrees Celsius or more in the mid- to high-latitude regions or an increase of 1-2 degrees Celsius in the low-latitude tropical regions may lead to declining crop yields. In other words, an increase of a mere 1-3 degrees Celsius could threaten global food production.

In 2012, grain prices skyrocketed as the worst U.S. drought in 56 years and droughts in Russia and South America led to a sharp decline in grain production. In August 2012, corn and soybean futures prices reached record highs. What's more, expanded liquidity across the world led hot money to flow into the grain futures market, resulting in a sharp rise in grain prices.

After the launch of the WTO, global agricultural policies have changed significantly. Before the launch, cultivation areas had been expanded as governments encouraged production through measures such as price support schemes and procurement. As supply exceeded consumption, thus increasing inventories, each government began to provide export subsidies. Since the WTO was established in 1994, incentives to increase agricultural production have been reduced. Decreased grain production and stocks have made it difficult to respond to new demand and price increases. To stabilize grain prices, grain exporters began to ban exports, leading importers to have difficulty procuring grains.

Economic Recovery Could Cause Food Insecurity

This year, the global production of major grains (wheat, corn, beans, rice) rose by 7.9% to 2.41388 billion tons from last year, which might lead to a short-term decline in prices. The global grain stock-to-use ratio is estimated at 25.3%, up 2.7%p from last year while the ratios for wheat, corn, beans and rice are expected to increase 0.4%p, 5.1%p, 3.7%p, 1.1%p, respectively compared to last year. Wheat production for 2013 is expected to rise 8% from last year due to increased exports among major exporting countries including South America, Russia, and Ukraine but excluding the United States. With U.S. corn production projected to reach an all-time high, the price of corn futures has dropped the most. Bean production is also expected to increase 5% from last year, caused by expanded cultivation areas in the U.S. and the Southern Hemisphere. In conclusion, the grain price index , which stood at 260.5 in the third quarter of 2013, down 11.1% from the previous quarter, is expected to decrease by 2.6% in the fourth quarter of 2013 and by 0.8% in the first quarter of 2014.

Since the 1970s, the gap between international grain production and annual growth of the world's population has continued to shrink. Even though the stock-to-use ratio in the global grain market has fallen below the annual average, it is unlikely that supply will be insufficient in the long term. However, if climate change causes a decline in production, global grain prices could jump as they did in 2007 and 2010-2012. In particular, if the world economic recovery results in increasing demand for grains, it is always possible that we could see another oil shock and the return of food insecurity.