SMT PROSPECTS & PERSPECTIVES

New Year Outlook: What Can We Expect in 2015?

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Once again, it is the time to look at the year ahead. This is a relished tradition as I am on the spot to think more intensely about the next 12 months and then have the opportunity to cross-check my predictions 12 months later. My 2014 outlook was, by and large, on or close to target (*Year-in-Review*, December 2014). In this column, I will take a long view on market thrusts in the anticipated global economic landscape, as well as mega-technological trends in selected areas deemed timely and relevant to the industry and tailored to the audience of this magazine, specifically: macro-economy, oil dynamics, China factor, cybersecurity, and grand challenges in technology and the path forward. Each of these areas will be highlighted, but more detailed discussions will be addressed in my future publications and speeches.

Global Economic Outlook

It is certainly not an easy time to look into the economic crystal ball, especially from a non-economist's perspective. Geopolitical risks have risen and show no signs of abating. On top of the continuing low commodity prices, additional market trends—dropping oil prices and the rising dollar—are setting in, which may have ripple effects on the global economy. China's slowdown relative to the last 25 years of fast-track growth manifests the power of a basic

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principle that dictates the global market—the interplay of supply, demand, price and economics.

For the last several years, the U.S. economy was marked by consumer spending that's stuck in the ditch and growth, albeit tepid, being powered by non-import-dependent sectors, such as capital investment in oil and gas exploration. 2015 appears to be a year of change in main driving forces for the U.S. economy by falling energy prices and a stronger dollar. It is also entering into an uncharted territory that unemployment has dropped to around 5.5%, yet the inflation rate stays low (below the Federal Reserve's 2% target). And considering the slower growth in emerging markets, strengthening dollar, anticipated low commodity prices, not to mention the new force of low oil prices, the inflation outlook is expected to remain low.

The Eurozone's recovery continues to be sluggish, facing the danger of deflation. Japan's Abenomics, combining both monetary and fiscal stimulus programs, is yet to show its muscle, but, as an oil importer, the precipitous oil price plunge may benefit Japan's GDP (reportedly, Japan spends more than 3% of its GDP to pay for imported oil). Overall debt level in developed markets remains high, and the low growth and low inflation will not help reduce debt.

On both sides of Atlantic, central banks face tough decisions. Both U.S. and U.K. debate on monetary policy in terms of interest rate (i.e., when to raise, how much and how fast). With low inflation and low growth, a baby step could be most likely.

In emerging markets, the lower demand and lower prices of commodities are hurting the countries that produce minerals and metals. The economies of Russia and the Middle East depend on energy prices. Africa, a commodity producer, lives and dies on the swings in prices of raw materials. Some of the BRICS countries, such as Brazil and Russia, will look to meager GDPs compared to recent years. As the BRICS countries constitute 40% of the world's population, 20% world GDP and 17% world trade, a slow growth in the BRICS does not send good news to the world economy. However, in terms of growth, a couple of brighter spots may start to shine. Indonesia, with more stable political climate and infrastructure, and India, with the pragmatic and flamboyant new prime minister, may make better than historically typical contributions to the global growth rate.

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In corporate America, the several years' rising tide (stimulus and low interest rates) has raised all boats in the equity market. S&P is trading at a multiple of 16, above the 10-year average of 14. The respective stock prices fluctuate far more than logic can justify. Going into 2015, as corporate austerity cost-cutting has been and should have been done, a new effort to garner top line growth is becoming prevalent, justifiably so—better products, better services, organic growth and critically thought-out acquisitions. For the companies that have not adroitly carried out the necessary cost cutting measures, 2015 will be a much more challenging year. Outside the oil and gas sector, cheap energy prices do not necessarily translate into corporate earnings. The stronger dollar and slower emerging market growth will make corporations face a heightened competitive global market and drive harder-to-get earnings.

Facing the triple whammy, there are all kinds of potential downside risks, and prudence is important. To mitigate controllable risks, I follow my "5-3 rule" of investments— stay with countries offering the macro-economic and market condition of less than 5% inflation and higher

than 3% GDP (not a hard number). Needless to say, political stability is crucial.

If we bet on this dynamic, the 2015 global economy is not felt as robust as desired. The U.S. economy perhaps will be the brightest spot on the globe (above 3% GDP). The impact of oil prices, more complicated and elusive than is obvious, is yet to evolve.

Oil Dynamics

No one can make a precise call of the oil prices for next month or at the end of 2015. But we do know what are in play. The decision made by OPEC last November to keep up their production output sent the crude oil prices tumbling. This decision appears to be a substantive deviation from OPEC's historical mandate—to keep price high by limiting global oil production. Another new force is the booming U.S. shale oil output during the last five years as the result of increased efficiency and ample financial capitals. According to the International Energy Agency (IEA) report, the new U.S. shale fields have made the U.S. the top oil producer in 2014, generating 12.4 million barrels/day (Russia 11.0 million barrels/day, Saudi Arabia 9.5 million barrels/day, Canada 4.2 million barrels/day, China 4.1 million barrels/day).

Advanced technology and smart engineering deployment make lower cost and higher output shale oil possible. Lower cost and sustained output could push the price down further. Most OPEC countries' economies need to sell oil above $100/barrel to balance their budgets[1]. Yet Saudi Arabia officials indicated their economy can survive for at least two years with low prices partly to its huge energy reserve[2]. Canadian oil sands producers have not indicated their willingness to reduce production from the existing established operations. At this point, it seems that everyone looks to others to cut production. And the oil continues to pile up.

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The declining oil price indeed is picking its winners and losers. Losers include major oil exporters, oil producers, and oil fields service providers. Countries heavily relying on oil exports, such as Russia, Iran, Nigeria, Venezuela, as well as, aspiring oil exporters, such as Brazil, are facing severe economic challenges. On the other side of the spectrum, lower oil prices benefit consumers, transportation sector and manufacturing costs, as well as the oil importing countries (e.g., Japan, Germany).

As to individual companies, this is a shake-up process. Many less efficient companies will be driven out of the market. The extent of impact, simply put, varies with the industry sector that is directly or indirectly linked to the oil industry. Within oil industry, the prominent among the variables include where the business is positioned in the food chain—upstream to downstream, the efficiency of core engineering/technology associated with the business, the level of the balance sheet, and the market duration of low oil prices. The shakeout would be largely linked to the operation efficiency, thus the break-even cost is $35 or $55 or $70.

How long the low prices market will last is a billion-dollar question. Although oil prices constitute a small fraction of the global economy, its trickle-down impact and underlying implications can be profound.

How will the evolving oil price play out? Is this low oil price a transitory passing or a longer-term trend? How long will it take to reach the stabilized price and what is the stabilized price? More importantly, is this a transient supply glut or a sustained declining demand or both? It is anyone's guess. Nonetheless, here is my take: Barring substantial geopolitical events and other shocks, oil price would likely stay at

the trough in the range of $45–$60 (plus/minus $10) until the market is stabilized and the equilibrium price will not return to over $100 for awhile (unlikely in 2015). And it seems reasonable to position oneself by assuming that the stabilizing process would continue throughout 2015.

China Factor

Again, China continues to be a factor!

Contributing to 38% global growth, China plays a significant role in global economic growth. However, China's economy with the double-digit growth rate as demonstrated over the last two decades is the way of the past.

Working on its next 5-year Strategic Plan (2016–2020), China deliberates on the specific technologies to own. The country wants to move from investment to consumption, while retaining its market share and its position as the low-priced exporter. The country is catching up its investment in R&D, hovering around annual 20+% increase in R&D spending. The rise of China's innovation is in sight, building up a critical mass of expertise and financial firepower that could potentially realign the power structure of the technology industry going forward.

While the country's stability is at the top of the new leaders' list of wants and needs, the central government leadership has set a new national theme—"rejuvenation," aimed at establishing global wealth, power, and respect.

Following its 5-Year-Strategic-Plan (2011–2015), major structural overhauls are being implemented. In short, in the coming year(s), China's mega priorities go to the following overhauls:

1. Government: implementing anticorruption measures
2. Economy: converting from investment-led economy to consumption-driven; refreshing state-owned enterprises; shifting to high technology sector
3. Market: aligning with the market, moving toward free market
4. Technology : growing investment in R&D; urging innovations
5. Environment: making deliberate efforts to fight pollution
6. Social: creating enough jobs
7. Business: reducing the reliance on imported components/parts that are strategically important

Although its efficiency and financial systems rank lower than desired, China continues to play an important role in manufacturing prowess. However, the focus areas in hardcore manufacturing are shifting. The strategically important industries range from infrastructure-related sectors to semiconductor to software. E-commerce and social network-related technologies are of interest. China's broadband project intends to give 95% of the country's urban population access to high-speed broadband networks.

Despite the fact that all businesses entities are concerned about the "China slowdown," China still stands as an important trading partner and a formidable marketplace. Going into the new year, its GDP at 7.0% plus/minus 0.2% is expected.

Cybersecuity

In this cyber age, stable, resilient and safe cyberspace is crucial to doing business and running our daily lives. As cyber intruders are increasing in number and intensity, 2015 is the year that cybersecurity takes the front and center seat.

Cybersecurity requires 360-degree attention and effort from the front office to the middle-office to the back office, or from the factory floor to the CEO suite to the boardroom[3].

As much as needed and desired, there is no panacea to totally prevent cyber attacks. Nonetheless, exercising the best practices is the way to mitigate the risks of attack and its consequences through several key areas:

1. Recognize the risk
2. Embrace the risk
3. Carry out a cyber-risk assessment
4. Plan and prioritize protective measures
5. Implement state-of-the-art technologies
6. Treat it as an on-going, company-wide effort (not just an IT department's function)

Grand Challenges in Technology—Path Forward

Advanced materials that offer unique properties, be it a polymer, a metal or a ceramic, to deliver revolutionary performance, will be one grand technological challenge. A class of new materials using layer-by-layer assembly as a versatile bottom-up nanofabrication technique is being pursed. Resorting to tuning the materials at the atomic scale in conjunction with multi-scale modeling enables the design of the target materials properties, opening breakthrough and rewarding application and business opportunities.

Advanced manufacturing including 3D printing cannot go unnoticed. In 2015, further technology development will materialize. And increasing number of products/components/parts manufactured by using 3D printing will be rolling out across industries.

In last year's "Outlook" column, I stated five words that cover the essence of electronics hardware: smart; mobility; connectivity; wearability; and innovation.

Wearability is one of the main thrusts within electronics and beyond. The fruits of the collaboration between Google and Intel, to thrust themselves into wearable devices (e.g., Google Glass), will materialize in 2015 as it offers cooler products to consumers as well as to businesses, propelling from mobility to wearable mobility. The level of coolness has a lot to do with the extent of wearability (e.g., the wearable time before recharging the battery). The ability to synchronize the battery technology with the semiconductor technology will be another rewarding path forward.

IBM pledged to spend $3 billion over five years on semiconductor research toward two major tasks: tackling technical obstacles to the miniaturization of circuitry on conventional silicon chips, and developing alternative materials and technology to keep boosting computing speed while consuming less energy, e.g., replacing silicon with graphene (a thin film of pure carbon or structure called nanotubes). Other research includes neurosynaptic computing—a departure from the conventional computer designs that is expected to work more like a human brain.

The Internet of Things (IoT) will dictate the innovation and growth of the cool gadgets, and striking new products are expected to be introduced. SMT

References

1. International Monetary Fund.
2. The Wall Street Journal, December 22, 2014.
3. "Cybersecurity—From Factory Floor to Boardroom," July 2013.

Appearances

Dr. Hwang will present a lecture on "Preventing Manufacturing Defects and Product Failures" at IPC APEX EXPO, February 22, 2015 in San Diego, CA.

Dr. Hwang, an international businesswoman and speaker, and business and technology advisor, is a pioneer and long-standing contributor to SMT manufacturing since its inception, as well as to the lead-free electronics implementation. Among her many awards and honors, she is inducted to the WIT International Hall of Fame, elected to the National Academy of Engineering, and named an R&D-Stars-to-Watch. Having held senior executive positions with Lockheed Martin Corp., Sherwin Williams Co., SCM Corp, and IEM Corp., she is currently CEO of H-Technologies Group, providing business, technology and manufacturing solutions. She serves as Chairman of Assessment Board of DoD Army Research Laboratory, Commerce Department's Export Council, various national panels/committees, international leadership positions, and the board of Fortune 500 NYSE companies and civic and university boards. She is the author of 450+ publications and several textbooks, and an international speaker and author on trade, business, education, and social issues. Her formal education includes four academic degrees as well as Harvard Business School Executive Program and Columbia University Corporate Governance Program. For further info, visit JennieHwang.com. To read past columns, click here.