Xi’s Visit Highlights U.S. and Chinese Expectations in the Semiconductor Industry

By Dieter Ernst

During Chinese President Xi Jinping’s U.S. visit this week, a long and complicated list of bilateral trade and investment issues are high on the agenda of policy discussions, a reflection of how interdependent the world’s two largest economies have become. U.S. National Foreign Trade Council Chairman Alan Wm. Wolff put it bluntly in a recent *Fortune Magazine* piece: “With Chinese growth slowing, a paramount issue for President Obama and American business will be learning what the direction of Chinese policy will be – toward greater opening of its market in the tradition of Deng Xiaoping, or much less welcome alternatives.”

One area of particular interest to U.S. industry is China’s new push in semiconductor design and fabrication. Since 2005, China has become the largest and fastest growing semiconductor market in the world, and by far the most important market for U.S. semiconductor firms. At least 80 percent of the semiconductors used in China’s electronics manufacturing are imported, including a large share of leading-edge devices designed by U.S. companies.

Based on a review of policy documents and interviews with China-based industry experts, our new East West Center study, *From Catching Up to Forging Ahead: China’s Policies for Semiconductors*, finds that U.S. firms are betting their future on the success of China’s policies. Intel, for instance, now depends on China for one-fifth of its revenues, while Qualcomm relies on the China market for nearly half of its income. In fact, U.S. and other foreign firms are quite explicit that they would be willing to accede to Chinese demands to transfer technology and form joint ventures with its firms, if only they could expand or at least sustain their share of the China market.

In short, leading global semiconductor companies seem to be resigned to helping China grow its own domestic competitors in exchange for short-term market access. Examples include Intel’s substantial investment in Spreadtrum, one of China’s leading integrated circuit, or IC, design firms, and Qualcomm’s investment in China’s leading IC fabrication company, SMIC. This raises the question to what degree foreign companies might act as an amplifier of China’s policies, and whether foreign firms in some cases may actually provide more effective support than the Beijing government in expanding China’s semiconductor industry.

China, however, faces a fundamental dilemma. As the world’s leading exporter of electronic products, it remains heavily dependent on the U.S. for imports of leading-edge semiconductors and technology. As a result, China’s trade deficit in semiconductors has more than doubled since 2005 and now exceeds the huge amount it spends on crude oil imports. To correct this unsustainable imbalance, China’s new strategy to upgrade its semiconductor industry calls for simultaneously strengthening domestic design and fabrication.
But in light of the mixed results of earlier support policies in this industry, how realistic are these objectives? And does China’s semiconductor strategy signal a resurgence of state-led mercantilist industrial policies, or are there signs of real adjustments as the government seeks to exploit global market transformations and the rise of domestic private firms.

Foreign observers largely agree that this time around China’s policy on semiconductors will work better than before, and that this will transform the global industry over the next few years. Officials with the Washington, D.C.–based Semiconductor Industry Association have argued that this new policy was a serious effort and that key policymakers knew precisely what they wanted. And officials of Semiconductor Equipment and Materials International, which is the industry association for U.S. semiconductor manufacturing equipment makers, argue that U.S. and other foreign companies in China have little choice but to adjust their strategies to China’s new semiconductor policy.

Our own research finds that China’s new semiconductor policy does not represent a radical break with its deeply embedded statist tradition. However, there are some important changes toward a more bottom-up, market-led approach to industrial policy. As a result, China’s chances to succeed in its new push in semiconductors show signs of promise.

China’s new policy does rely on private equity investment rather than subsidy as the tool of industrial policy. The government participates in equity investment but claims it will do so without intervening in management decisions. This is expected to reduce the cost of investment for a selected group of firms comprising a “national team” in the semiconductor industry.

In response to the rising complexity and uncertainty of the industry, the government seems more open to experimentation with new approaches to investment finance and flexible, bottom-up policy implementation. These policies provide an interesting example of Beijing’s current efforts to move away from foreign investment-driven manufacturing to a domestic innovation-driven development model.

A growing consensus among Chinese technology planners is that the country has reached a level of development where catching up through an investment-driven model is no longer enough to create long-term economic growth and prosperity. The closer China moves to the technology frontier, the less scope there is for imitation and low-level incremental innovation. Chinese firms now are encouraged to develop and protect their own intellectual property rights and accelerate the commercialization of new ideas, discoveries and inventions.

Top-down, state-led “old industrial policies” simply don’t work in a knowledge-intensive and highly globalized industry like semiconductors, in which the rising complexity of technology, business organization and competitive dynamics can cause basic parameters to change unpredictably on short notice. If China wants to forge ahead in the semiconductor industry, it needs to move further toward a bottom-up, market-led approach to industrial policy.

The rise of private firms in China’s semiconductor industry further underscores this point. China’s semiconductor production has come a long way from being a completely government-owned part of the defense technology production system, with state-owned enterprises, or SOEs, as the only players, toward a gradually more market-led model. The role of SOEs has dramatically declined, and a deep integration of China’s semiconductor industry into global networks of production and innovation, together with the rise of private firms, has transformed decisions on pricing and investment allocation, creating new space for more market-driven policies in this industry.
But while China’s progressive integration into the international economy has unshackled market forces in the semiconductor industry, Beijing’s policies to develop this industry still carry the legacy burden of the old top-down industrial policy. There still remains an unresolved friction between state and market, where policymakers and planners continue to prescribe desired outcomes (in terms of growth rates, technology and “indigenous innovation” products), but fail to take into account the need of industry, and in particular of private firms, for global technology sourcing.

Despite massive earlier support from the government, China’s achievements in semiconductors remain overshadowed by persistent weaknesses. The reason China is still playing second fiddle in this industry is that the state’s indigenous innovation policy collides with the global technology sourcing needs of Chinese semiconductor firms.

A key weakness of China’s indigenous innovation policy lies in its top-down implementation. Government continues to retain control over the selection of priority sectors, technologies and areas of public development. Industry participants complain that when push comes to shove, vested interests in government agencies tend to override recommendations from industry experts. As long as this approach to industrial policy prevails, China’s leadership may end up having only incomplete knowledge of the real and continuously evolving global knowledge sourcing needs of diverse private firms.

A second weakness is the focus on challenges facing China’s transition to innovation-led development, especially with regard to licensing costs and cybersecurity. Those challenges are real and need to be addressed. But in fighting them, China’s innovation policy tends to neglect the vast opportunities that result from its deep integration into the global semiconductor value chain. This can create an important barrier to innovation, because investors expect such policies, and act accordingly.

China’s leadership is very conscious that the United States is far ahead in advanced semiconductors and that China has a long way to go to close the gap. But at the same time, Beijing’s new semiconductor policies also convey a new sense of optimism. Global transformations in semiconductor markets and technology are no longer perceived exclusively as threats. In fact, China’s technology planners now seek to identify pathways to innovation-led development that could benefit from key global transformations, such as the demand for mobile devices and a new interest in strategic partnerships and mergers.

There are four factors that could derail China’s transition to innovation-led growth in semiconductors: overcapacity, a fragmented innovation system, the leadership’s cybersecurity objectives and the possible impacts of new international trade and investment agreements. Above all, the focus of Chinese policy needs to shift away from the selection of priority sectors and technologies toward the facilitation of an interactive learning process led by the private sector. In this new model of industrial policy, which is slowly taking hold in China’s semiconductor industry, the government role is to provide incentives and remove regulatory constraints to empower the private companies that are most capable of realizing China’s domestic innovation potential.

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