OPINION | COMMENTARY

Semiconductor Dependency Imperils American Security

The U.S. Innovation and Competition Act is only the first step in preventing Chinese dominance.

By Graham Allison and Eric Schmidt
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Taiwan Semiconductor Manufacturing Company Chairman Morris Chang poses during an interview in Hsinchu, Taiwan Oct. 5, 2017.
PHOTO: EASON LAM/REUTERS

Morris Chang, founder of Taiwan Semiconductor Manufacturing Co. , gave a rare interview in April. He believes Congress's current effort to provide $50 billion in subsidies to American semiconductor companies, in the hope that they will become industry leaders, is "a very expensive exercise in futility." While he may be correct that U.S. firms are unlikely to overtake TSMC, that isn't the point: Complete dependence on Taiwan for advanced semiconductors puts American national security at risk.

TSMC manufactures 92% of the advanced semiconductors necessary for every smartphone, laptop and ballistic missile. U.S. firms such as Nvidia, Qualcomm and

Apple outsource almost all their manufacturing to Taiwan. If Taiwan's chip manufacturing capacity went offline or fell into China's hands, America's technology sector would be devastated. As former Deputy Defense Secretary Robert Work has warned, conflict in the Taiwan Strait could spark a national-security crisis over chips: "We're 110 miles"—the distance from Taipei to the mainland—"away from going from two generations ahead to maybe two generations behind."

Washington recognizes the need to deter Beijing from seizing the chips that power American electronics. Nevertheless, policy makers are struggling to prevent China from capturing the semiconductor market with the same tactics it used to dominate the markets for telecommunications infrastructure, solar panels and electric vehicles. While the Biden administration has proposed a $50 billion investment in semiconductor manufacturing through the U.S. Innovation and Competition Act, Congress continues to discuss the legislation but not pass it. If Congress enacts the bill, U.S. investment would still be only a third of what the Chinese government will spend.

From 1990 to 2020, China built 32 semiconductor megafactories, compared with 24 megafactories in the rest of the world. None were built in the U.S. According to Mr. Chang, U.S. firms are no longer able to build cutting-edge chips because it costs half as much to operate a semiconductor plant in East Asia as it does domestically. Even with ideal policies, it is unlikely that U.S. companies can overtake TSMC's leadership in advanced chips.

Meanwhile, China has made impressive gains in its semiconductor sector. China is on track to overtake Taiwan as the world's largest manufacturer of chips as soon as 2025. It already prints more than half the world's circuit boards, which are necessary to install chips in devices. China controls critical raw materials that create choke points in the supply chain: It produces 70% of the world's silicon, 80% of tungsten and 97% of gallium, each of which is essential in semiconductor fabrication.

If Beijing develops durable advantages across the semiconductor supply chain, it would generate breakthroughs in foundational technologies that the U.S. cannot match. Tailor-made chips for deep learning, for instance, would transform society and make possible technologies such as autonomous vehicles and state-of-the-art vaccines.

The U.S. can't spend its way out of this predicament. In addition to President Biden's proposed $50 billion investment in semiconductor manufacturing, three policies are necessary for the U.S. to win the chip competition.

First, the U.S. should double down on its strength in the manufacturing of less-advanced semiconductors. Advanced semiconductors are essential for smartphones and laptops, but represent only 2% of the global semiconductor market. U.S. companies such as Intel and GlobalFoundries excel at producing slower chips that are used in everything from televisions to tanks. The administration can support these firms by fast-tracking permits for factories and providing tax credits for investments in research, development and manufacturing.

Second, the U.S. should use its political leverage with the governments of Taiwan and South Korea to persuade TSMC and Samsung to form partnerships with U.S. chip designers and manufacture advanced semiconductors in America. Both South Korea and Taiwan depend on security commitments from the U.S. military. Joint ventures with U.S. firms such as Qualcomm and Nvidia would ensure the U.S. defense establishment is capable of fulfilling its commitments to those nations. A push from their governments, along with a pull from U.S. tax incentives and subsidies, could persuade TSMC and Samsung that building more chips in the U.S. is in their interests.

Third, the U.S. should tighten the links between R&D and manufacturing. Most technological innovations come from the interaction between the two. The U.S. Innovation and Competition Act makes strides here by creating incentives for investment in both R&D and manufacturing.

America is on the verge of losing the chip competition. Unless the U.S. government mobilizes a national effort similar to the one that created the technologies that won World War II, China could soon dominate semiconductors and the frontier technologies they will power.

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