

Why Taiwan is at the heart of a microchip struggle

Geopolitical contests between the US and China hinge on technology more than the ability to deploy a gunboat

By Marshall Auerback – August 8, 2020 – Asia Times

The media like to dabble in war-game fantasies between the 21st-century great powers China and the US, but it's a distraction from the hybrid economic warfare that is under way – from President Donald Trump's tariff hikes to the shores of the advanced economy.

Here in a nutshell is the problem facing the United States. The country that used to be a world leader in all forms of high tech, especially semiconductor chips, now spends its time redesigning chocolate chips. By contrast, Taiwan, officially a "rogue province" of China, but in reality, operating as an independent nation of 23 million people, ranked 22nd as a world economy (right behind Switzerland), is now a leading global player in the production of semiconductor chips.

As such, it has emerged as the key supply link to a multiplicity of American and Chinese high-tech companies at a time when the Trump administration is working hard to cut China's access to Taiwan's semiconductors.

For all of China's significant technological advancements, the country still lags in the production of semiconductor chips.

Memory chips are principally made by two South Korean companies, Samsung, and SK Hynix, and one US company, Micron. Intel, another US company, also makes some memory chips for its own use. Memory chips are a big issue for China. Beijing has deployed considerable fiscal resources into producing them and last year set a goal of producing 5% of the world's total production by the end of 2020.

That's ambitious. It's one thing to produce memory chips, another to get a usable "yield," that is, the percentage of output that actually works. It is a singularly challenging industry in which to attain industrial self-sufficiency.

Taiwan Semiconductor Manufacturing Company (TSMC) produces customized semiconductor chips "for use in various types of electronics, such as digital cameras, smartphones, and the new technologically sophisticated 'smart' cars." It is a "fabless chip maker," meaning it "designs and sells the hardware and semiconductor chips but does not manufacture the silicon wafers, or chips, used in its products; instead, it outsources the fabrication to a manufacturing plant or foundry."

TSMC also produces chips for the military, and for 5G (fifth-generation telecom) base stations. China's leading telecom equipment manufacturer, Huawei, had been a large customer for TSMC.

But in May, the Trump administration mandated that all semiconductor chip manufacturers using US "chipmaking equipment, intellectual property or design software will have to apply for a license before shipping chips to Huawei," as Nikkei Asian Review reported, thus forcing TSMC to stop taking fresh orders from Huawei, as TSMC's manufacturing process uses equipment from US companies such as Lam Research and Applied Materials.

The wisdom of so many companies relying on manufacturing facilities located in Taiwan is debatable. Intel and Micron locate fabrication plants ("fabs") around the world, in part to diversify risk (earthquake, weather, politics) and to access skilled labor pools.

Intel has long had production facilities in Ireland, Israel, and China itself; it has also purchased Israeli companies for their research and development. But it also has retained significant production facilities still in the United States.

Similarly, Micron has fabs both abroad – in Singapore, Japan, and Scotland – and in the US, in Boise, Idaho; Utah; and Manassas, Virginia (right near the Central Intelligence Agency and Pentagon).

TSMC is important because it is pretty much the only place to get processor chips fabricated unless you're Intel. In that regard, Intel's second-quarter earnings announcement on July 23 that its planned launch of the company's next generation of chips will be delayed by six months is most concerning.

News of the production delay (which now pushes the production of the company's latest central processing unit – aka the "brain" of the computer – out to early 2023) generated considerable market anxiety, as evidenced by the 17% fall in the share price in the wake of the disclosure. From a long-term perspective, however, the more alarming aspect is Intel's decision to consider outsourcing its manufacturing capacity, a sharp break from the company's historic practice.

Intel has been one of the few leading American high-tech companies that has hitherto largely resisted the panacea of offshoring its production. As the Indian Express has written: “The Santa Clara, California-based company has been the largest chipmaker for most of the past 30 years by combining the best designs with cutting-edge factories, several of which are still based in the US.”

Much of this is a product of the corporate culture established by former chief executive officer Andy Grove, who had warned that Silicon Valley risked “squandering its competitive edge in innovation by failing to propel strong job growth in the United States,” according to a New York Times op-ed by Teresa Tritch written shortly after Grove’s death.

Tritch explains Grove’s belief that the lower cost to companies that outsourced to Asia actually “masked the high price of offshoring as measured by lost jobs and lost expertise. Silicon Valley misjudged the severity of those losses, he wrote, because of a ‘misplaced faith in the power of start-ups to create US jobs.’” She continues:

“Mr Grove contrasted the start-up phase of a business, when uses for new technologies are identified, with the scale-up phase, when technology goes from prototype to mass production. Both are important. But only scale-up is an engine for job growth – and scale-up, in general, no longer occurs in the United States. ‘Without scaling,’ he wrote, ‘we don’t just lose jobs – we lose our hold on new technologies’ and ‘ultimately damage our capacity to innovate.’”

The expectation is that Taiwan’s TSMC would be the likely beneficiary if Intel were to embrace the offshoring option, which, according to Grove, would ultimately undermine its capacity to innovate.

It is consistent with recent historic trends, but Intel’s decision comes at a time when American policymakers are finally beginning to appreciate the adverse economic and strategic consequences of such moves. Were Intel to follow through on its outsourcing threat, it too would further exacerbate America’s strategic reliance on Taiwan for customized semiconductor manufacturing (as well as eviscerating what is left of America’s industrial base).

Additional outsourcing will not only undermine the impact of recent legislative attempts to rebuild America’s semiconductor manufacturing capacity, but also likely enhances the prospect of intellectual-property theft, via sabotage or “hidden back doors” that could facilitate external surveillance. This would also constitute a national security risk, particularly as production gets more automated.

A key thing to do in dealing with China (or Taiwan) is something like the economic patriotism bill that Democratic presidential candidate Joe Biden has proposed: namely, one that would reward companies for insourcing.

Research-and-development tax credits on their own are unlikely to induce the requisite shift (as these can easily be matched by the recipient investment country’s government), as I’ve written before: “The state can and must drive this re-domiciling process in other ways: via local content requirements (LCRs), tariffs, quotas and/or government procurement local sourcing requirements.”

The Biden proposal doesn’t go that far, but it represents a good step in the right direction and definitely is preferable to a military response to solve what is essentially a strategic industrial vulnerability.

By contrast, economic competition that degenerates into out-and-out war would be a disaster for all sides. As David Arase, resident professor of international politics at the Hopkins-Nanjing Center of the Johns Hopkins University School of Advanced International Studies, contended in a July 20 Asia Times article, “Even an unsuccessful invasion of Taiwan would cause a supply chain disruption.”

By the same token, actively upgrading diplomatic relations with Taiwan to something akin to the old mutual defense treaty that existed prior to Washington’s recognition of Beijing in 1979 as the one sovereign government representing China would almost certainly provoke a more aggressive response from Beijing. In that regard, Secretary of State Mike Pompeo’s hawkish speech, seemingly exhorting China’s population to rally against the Communist Party leadership, on July 23 was profoundly misguided.

US goals should be far more modest: not to underwrite the freedom aspirations of another country (even a vibrant multiparty democracy such as Taiwan) but, rather, to fix a key vulnerability in the global supply chain that currently renders the US so reliant on Taiwan. Even TSMC has implicitly acknowledged its own geographical shortcomings, as it announced plans in May to build a new US\$12 billion chip manufacturing facility in Arizona. Consider this a form of political risk insurance.

A full-scale defense of Taiwan would cost thousands of lives, and potentially entrench the US military in a long-term quagmire; it would also represent a logistical nightmare in terms of supplying such a force over so many thousands of kilometers (while the

Chinese army only needs to cross a mere 160km to reach Taiwan). This is to say nothing of the risks posed to numerous substantial American multinationals already operating in China.

A key conceptual problem that US policymakers and business leaders have today is an addiction to 19th-century concepts that are anomalous in the context of a 21st-century economy. The “comparative advantage” (“an economy’s ability to produce goods and services at a lower opportunity cost than that of trade partners”) of David Ricardo’s 1817 book has less relevance at a time when such advantage can be largely created as a by-product of state policy.

Countries such as Taiwan, South Korea and now China itself can dominate any number of targeted industries by subsidizing them aggressively, whether the industry is steel production, cars, or semiconductor chips. Because of increasing returns to scale, there is a winner-take-all pattern in which at any given time, a limited number of nations tends to dominate a huge global market share of the underlying product.

We’ve seen this pattern manifest itself repeatedly in Asia since the 1970s through today, as Robert Wade illustrated in his work *Governing the Market*. This strategy has also created huge employment opportunities in high-quality jobs for the countries as they scale up production. This was also a key insight of Andy Grove.

None of these countries had a natural “comparative advantage” in semiconductor production; they just followed the classic pattern of subsidizing their growth via substantial government support (creating them out of nothing over a matter of a few decades, in the case of South Korea and China), relentlessly driving down cost inputs to push other marginal and less efficient manufacturers out of the industry.

The incessant focus on market share usually comes at a cost of short-term profitability (a no-no for Wall Street, which focuses on quarterly earnings as intently as an audience waiting for the white smoke to emerge from a papal election). However, businesses usually recoup these costs later once they’ve established dominant market share.

The semiconductor industry is one with a great high-value-added, high-tech manufacturing platform that has employed lots of people and has a huge, growing global market, and a significant multiplier effect on the domestic economy. It represents an area that should be prioritized by the US, not de-emphasized (as Intel’s proposed move threatens to do).

The road back to manufacturing relevance is a long one, but the perpetuation of the current policy risks exacerbating longstanding pathologies in the US economy, while simultaneously creating new national-security vulnerabilities.

Taiwan is a vibrant multiparty democracy that constitutes a model of economic development. But those virtues could be threatened if we short-sightedly try to rush turning it into a US protectorate to address problems that should be resolved much closer to home.