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REVISITING AN ECONOMIC MIRACLE

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Taiwan's Economy and the Big Chip on its Shoulder

The island nation of Taiwan, located at the center of great power rivalry between China and the United States, owes much of its stellar growth to the glowing fortunes of its leading chipmaker, Taiwan Semiconductor Manufacturing Company (TSMC), which is at the forefront of the global tech race, even outpacing China. The author wonders aloud whether China's semiconductor companies, under Beijing's control, may leapfrog their Taiwanese rival via a potential corporate acquisition, barring a military takeover, or a longer-term reunification option.

Taiwan, formally known as the Republic of China, stands out as an interesting case study of an emerging Asian tiger that has aged well into one of Asia's most successful, capitalist democracies. Having enjoyed a real Gross Domestic Product (GDP) growth of 7.5 percent in the 1980s and the 1990s on the back of a world class electronics manufacturing sector, Taiwan's economy has matured

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to chalk up an annualized growth of 3.5 percent in the last twenty years (2000–2020).

But apart from the traditional challenges that a developed economy like Taiwan faces, such as an ageing population and a fairly limited domestic market, Taiwan is at the center of superpower rivalry between China and the United States with the Beijing government aiming to reunify with the island in the not-too-distant future. The tensions coupled with the post-pandemic global shortage of semiconductor chips have intensified with the chipmaker, Taiwan Semiconductor Manufacturing Company (TSMC), at the forefront of the global tech race. Before considering the geopolitical ramifications of this tech giant that is listed on stock exchanges in Taiwan and New York, we have to understand Taiwan's economic success story.

The Taiwan Miracle Revisited

During the global pandemic when almost all economies were devastated by governmental lockdowns, Taiwan was among the few countries that emerged not only unscathed but with a slightly higher real GDP growth of 3.1 percent in 2020, up from 3 percent in 2019. This year, the island economy's growth is on track to hit a 23-year high of 5.5 percent amid a 20 percent rebound in exports.

How was it possible for a densely populated island of just 23.6 million people to become the world's 15th largest exporter and 22nd largest economy producing a GDP of US\$759 billion in 2020? The answer is two-fold: an auspicious evolution of political leadership and sound economic policy.

Apart from South Korea, Taiwan is one of those exceptional economies that was jumpstarted with autocratic regimes under Chiang Kai-shek and his son, Chiang Ching-kuo. Taiwan's industrialization



started in the 1960s but it was in the 1980s' more democratic environment that a group of Taiwanese small- and medium-size enterprises ventured into mainland China, producing cheap goods for re-exports and eventually turning into major multinational companies in electronics, machinery, and information and communication sectors.

Like the Asian tigers of the 1980s-1990s, Taiwan's successful export model was based on the clever strategy of earning foreign income that allowed the nation to invest in new factories and roads which, in turn, were crucial to improving productivity. Rising foreign exchange reserves also enabled Taiwan to be insulated from currency crises. As a result, Taiwan's capitalist, democratic model coupled with sound industrial policies have helped build up one of the most competitive electronics manufacturing sectors in the world. Taiwan's electronic exports, accounting for 63 percent of the country's GDP, have grown by an annualized 7 percent in the last five years.

Table 1: Macro Statistics of Taiwan's Economy & TSMC

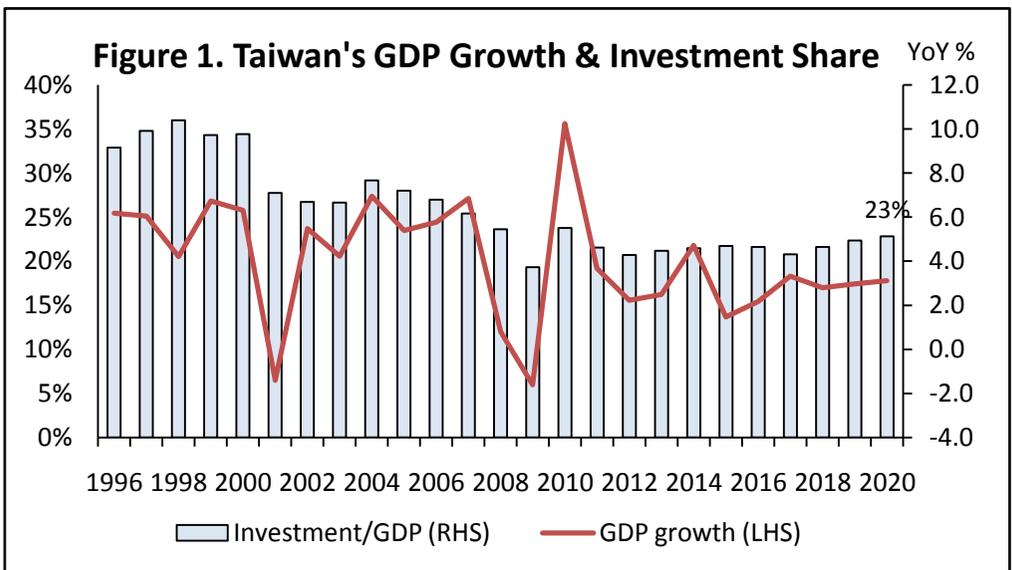
% year-on-year	2018	2019	2020	5-year Annualised Growth
Real GDP growth	2.8	3.0	3.1	2.9
Electronic exports growth	4.6	-3.0	25.3	7.0
Exports/GDP	66.3	65.2	63.0	-2.0
TSMC Revenue growth	5.5	3.7	25.2	9.7
TSMC Market Cap change	-1.7	46.8	60.1	30.0
TSMC Market Cap/GDP	34	31	47	27.8

Source: National Statistics, Republic of China (Taiwan).

Nevertheless, Taiwan's successful export-dependent model is predicated on years of robust investment spending. Morgan Stanley's

global strategist Ruchir Sharma explains in his book, *The Ten Rules of Successful Nations*, that countries that invest a reasonably high proportion of their GDP tend to enjoy sustainable growth. The sustainable sweet spot for investment is between 25 percent and 35 percent of GDP, especially if the investment is going into manufacturing projects. In the 1990s, Taiwan maintained an investment spending share of GDP of above 30 percent, and even in the last five years it kept the ratio at a healthy 22 percent on average.

By far, the leading proxy of Taiwan's manufacturing success is the chipmaker TSMC which controls 54 percent of the US\$84.6 billion global semiconductor market. As a contract manufacturer, TSMC supplies high-end semiconductors to industry giants like Apple, Qualcomm, and MediaTek. Since last year's pandemic, there has been an acute shortage of integrated chips that was worsened in 2021 by pent-up demand for consumer goods amid the reopening of the economies in the United States and Europe.



Source: National Statistics, Republic of China (Taiwan).



For a company as important as TSMC, it is useful to get a macro perspective of the relative significance of TSMC to Taiwan's economy. In 2020, TSMC saw its revenues rise 25.2 percent to NT\$1.3 trillion. Just making a rough assumption that most of that revenue is generated from abroad, it represents 58 percent of Taiwan's electrical and electronic exports in 2020. Moreover, following a 60 percent surge in TSMC's stock price in 2020, its market capitalization expanded to NT\$13.7 trillion. Compared to Taiwan's GDP of NT\$9.6 trillion, TSMC's market value is nearly half the size of the economy (Table 1).

Geopolitical Implications of the Chip Giant

In recent years, the two unexpected driving forces that have impacted TSMC's business and Taiwan's economy are the worsening of U.S.-China relations and the global chip shortage. The tech and trade war between the United States and China, launched by former U.S. President Donald Trump in 2018 has evolved into the current cold war under the Joe Biden administration. As integrated chips power key electronic devices (including telecommunication networks and fighter jets) that are crucial to the national security of countries, the U.S. administration imposed export control rules in May 2020 that cut off not only TSMC's orders to China's Huawei but also constrained the supply of advanced chip machinery from Dutch company ASML to Chinese companies.

In the face of the global shortage of chips that emerged following the reopening of economies in the United States and Europe, many wafer fabricators are expanding their capital investments to ramp up capacity. TSMC, a major supplier to the

chip-starved auto industry, has raised its capital spending to US\$30 billion this year. The company's leading-edge chip technology (5 nanometre chips evolving towards 3 nanometre chips) is said to be more than a decade ahead of China's leading chip company, Semiconductor Manufacturing International Corp (SMIC).

But the global chip shortage is not only a matter of increasing expenditure by the five major players (Taiwan, South Korea, China, Japan and the United States). The dominant marketshare of TSMC has made many countries and companies dependent on just one company in Taiwan for their supply chain. Both economically and geopolitically, it is prudent to diversify their sources of semiconductor supply. Seeing the profitability of the foundry business amid a global shortage, Intel, led by a new CEO, is spending US\$20 billion this year to build wafer plants in the United States. On top of designing and making most of its own chips (currently at 10-nanometre), Intel will be producing chips for other companies in direct competition with TSMC and Samsung Electronics.

In the past two years, China's aggressive military actions in the Taiwan Strait, South China Sea, and Japan's exclusive economic zone has led to a prediction made by Admiral Philip Davidson, Commander of the U.S. Indo-Pacific Command, that China could take military action against Taiwan within the next six years, i.e. up to 2027. Reunification with Taiwan, be it by military or peaceful means, is one of Chinese President Xi Jinping's cherished goals in his road map to China becoming a global superpower by 2050.



So with SMIC having a current market share of 5 percent of the global chip industry, will the Chinese government be able to invest heavily in new foundries to catch up with Samsung Electronics' 17 percent market share, let alone TSMC? The nature of the semiconductor manufacturing process is just too complex for any player to replicate or re-engineer as foundry companies work closely with clients to meet their specific needs.

Meanwhile, the tech war has intensified with Washington insisting that TSMC stop supplying Huawei in July 2020. China, on behalf of SMIC, is boosting self-sufficiency in the semiconductor supply chain by investing US\$9 billion into a new sub-14-nanometer wafer plant.

While acquiring TSMC through the open market by China is not politically viable, the option of gaining control over the company through a military invasion of Taiwan poses many risks. First, the semiconductor foundry business is dependent on engineers who are increasingly recruited from different countries. Getting these people, let alone the Taiwanese staff who are anti-reunification, to continue their high precision work will be a human resources challenge. Nevertheless, this has not prevented Chinese companies from poaching TSMC engineers with high salaries and bonuses.

Second, it is also highly likely that a China-controlled TSMC stands to lose a major bulk of its American business (TSMC derives two-thirds of its business from the North American region) given Washington's sanctions, thereby impacting the company's market share. Nonetheless, the prize of acquiring or controlling the world's leading chipmaker is clearly a strategic advantage for China.

Third, in a strategic move to reduce its proximity and dependence on China, TSMC has started building a new US\$12 billion

foun dry in Phoenix, Arizona to produce 5-nanometer wafers by 2024. As the company diversifies its production and client base away from mainland China, it would be increasingly difficult for any Chinese take-over to be successful.

Strategic Timing Depends on the Economic Trajectory

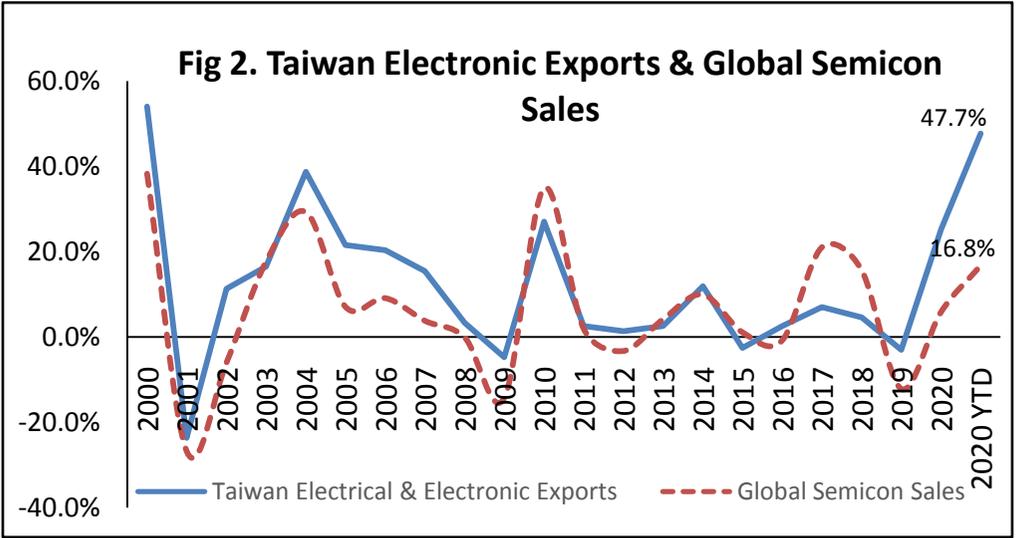
Looking ahead, the future of Taiwan's economy and health of its semiconductor industry depends indirectly on the stability of U.S.-China relations based on a long-standing mutual agreement that Washington sticks to its "One China" policy while China continues to seek peaceful reunification. As mentioned, the mutual understanding is being tested by the escalation of a new cold war since 2017. But, should the peaceful reunification scenario become increasingly unattainable, the strategic timing for Beijing to seriously make a move for Taiwan would likely be between 2030 and 2040.

During that period, I estimate that Taiwan's GDP per capita would be around just 1-1.5 times larger than China's instead of the present 3.8 times at US\$29,541 versus China's US\$10,484 (Figure 3). Based on my conservative assumptions on long-term GDP growth and the United Nations' population projections for both countries, China's GDP per capita will only exceed Taiwan's by 2045.

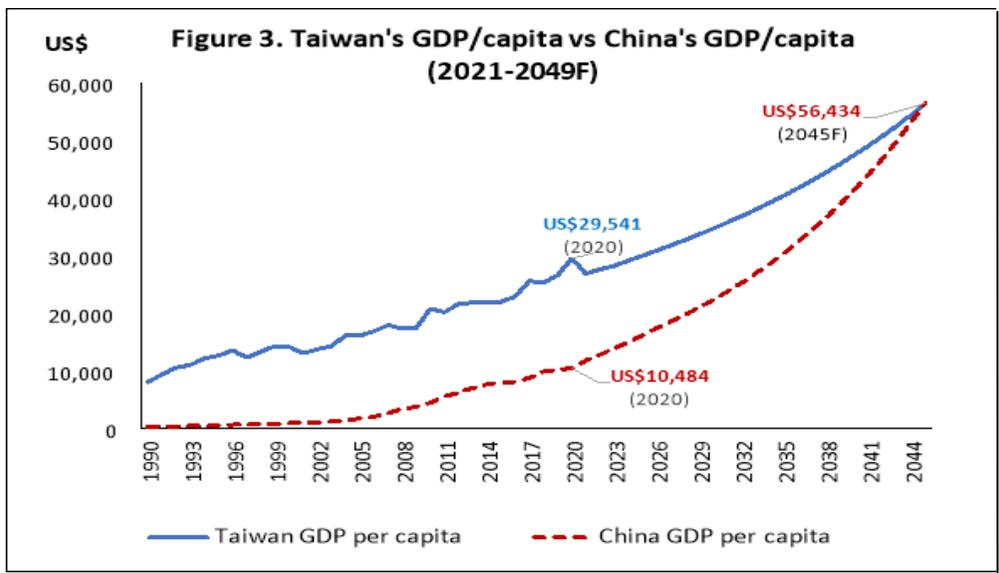
From an economics and optics perspective, China would not wish to be seen to be taking over Taiwan as an economic prize instead of reclaiming it purely as its rightful sovereign territory (Taiwan was administered by China's Qing dynasty from 1683 to 1895, before it was ceded to Japan for 50 years after China lost the first Sino-Japan war). By the same token, in a decade's time, China's semiconductor capabilities may be able to narrow the technology gap with Taiwan.



Whatever the outcome of the rivalry in the semiconductor industry, Taiwan’s position as a leading player is expected to significantly impact the industry and the geopolitics of the region in the years ahead.



Source: National Statistics, Republic of China (Taiwan). Semiconductor Industry Association (<https://www.semiconductors.org/resources/>).



Source: United Nations World Population Prospects 2019 report/IMF.

Note on the Author

S.R. Long, born in Singapore and raised as a Malaysian citizen, studied and lived in England and France throughout his primary school years before returning to Kuala Lumpur, Malaysia to complete his secondary schooling. In 1984, Long obtained a Bachelor of Science (Economics) honors degree, majoring in International Economics & Development at the London School of Economics & Political Science. He started his career in auditing at PriceWaterhouse Kuala Lumpur before venturing briefly into business journalism for two years, first at the *Star* daily newspaper in Malaysia and then at the *Business Times* of Singapore. Between 1989 to 1998, he worked as a senior equity analyst with various international investment banks ranging from OCBC Singapore to Deutsche Morgan Grenfell in Kuala Lumpur. After the Asian Financial Crisis, Long went back to journalism as the chief editor of *Smart Investor*, one of the leading financial magazines in Malaysia. During his five years at *Smart Investor*, he wrote cover stories on economics and investment topics including interviews with Nobel Prize Economics laureates Robert Mundell and Joseph Stiglitz in one issue on an Asian common currency regime. Long returned to the research line in 2003 with his current position as head of economics research at Public Mutual Bhd. Backed by a team of analysts, he oversees the macroeconomic research on the United States, China, and the Association of Southeast Asian Nations.