



The View

# **SUPERPOWER CHIP COMPETITION - MACRO AND MARKET IMPLICATIONS**

Rory Green

- **Covid-19 is accelerating the already existing structural shift in demand for integrated circuits**
- **As the world becomes more interconnected, more automated and greener, each unit of GDP growth will contain a higher content of semiconductors**
- **Growing economic and national security importance, coupled with superpower rivalry, is likely to cause a bifurcation of the current supply chain and eventually chip production in US and China blocs**
- **American defence (reshoring) and offence (tech IP controls) lay the foundations for long term US + allies dominance of semiconductor production**
- **China is ramping up low end chip output, but will remain well behind global leading edge capabilities**
- **In the near to medium term (1-3 years), the winner of the shift in demand, supply chain and geopolitics is East Asia**

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## Summary

Covid-19 is accelerating the already existing structural shift in demand for semiconductors. As the world becomes more interconnected, more automated and greener, each unit of GDP growth will contain a higher content of semiconductors. Integrated circuits are becoming the key commodity input for economic activity.

The demand shock is triggering huge political tremors as governments acknowledge their dependence on external supplies of the “new oil” and scramble to launch reshoring initiatives. Like oil, chip output is concentrated in a few key geographies that face growing geopolitical risks. The location of advanced semiconductor supply in China’s backyard is a major issue for corporate and military planners.

Growing economic and national security importance, coupled with superpower rivalry, is likely to cause a bifurcation of the current supply chain and eventually chip production in US and China blocs. Washington is driving the change and government reshoring initiatives complement a corporate effort led by Intel, which is making a bid to become the West’s geopolitically secure manufacturer. Meanwhile, the tech war continues. Preventing China gaining the tech know-how to leapfrog ahead in economic dominance and therefore political influence is a priority on both sides of the aisle. US defence (reshoring) and offence (tech IP controls) lay the foundations for long term US + allies dominance of semiconductor production.

Over the next 3-5 years, the winners of the shift in demand, the supply chain and geopolitics will be countries with a physical integrated circuit trade surplus and/or a technical one. East Asia has both, while the US, through its dominance of design tools and inputs into advanced manufacturing equipment, possesses the former. Taiwan and Korea are clear winners and will continue to profit from very strong external demand and an increase in geo-economic power.

China is a semiconductor twin-deficit country, with insufficient domestic production and a dearth of advanced IP. Beijing recognizes this acute vulnerability and has mobilized political and financial capital to support domestic industry. A classic government-led expansion is under way in China. The development model of state subsidized low-end capacity growth, followed by consolidation around a number of national champions, is likely to play out over the next five years. Amid the inevitable misallocation of capital, China will progress up the value chain.

But it is not all good news for East Asia. Taiwan, in particular, is vulnerable to Chinese military pressure, which will continue to rise in response to gains in Taipei’s geo-economic power. We see early signs of “Dutch disease”: Korea and Taiwan’s economic and political fortunes are increasingly tied to the electronic component cycle. Shifts in technology, a breakthrough in Beijing or a misstep by TSMC pose grave threats to Taipei. Taiwanese equities and FX will become even more closely tied to the tech cycle.

The trends explored here will persist through the 2020s; nevertheless, at this stage of the cycle, valuations seem stretched across listed semiconductor stocks. A near-term peak for the first wave of the semi-cycle looks close. A “buy on dips” approach is warranted for leading semiconductor capital equipment providers and firms with clearly unassailable monopolies (TSMC, ASML, etc.). Conversely, we would avoid producers at the lower end of the technology spectrum, which are vulnerable to PRC moves up the value chain, NAND memory is a prime example. On FX, we are structurally bullish KRW and TWD but cautious near term as the dividend payment season tends to drive outflows.

## The new oil

Covid-19 is accelerating the already existing structural shift in demand for semiconductors. As the world becomes more interconnected, more automated and greener, each unit of GDP growth will contain a higher content of semiconductors. Integrated circuits are becoming the key commodity input for economic activity.

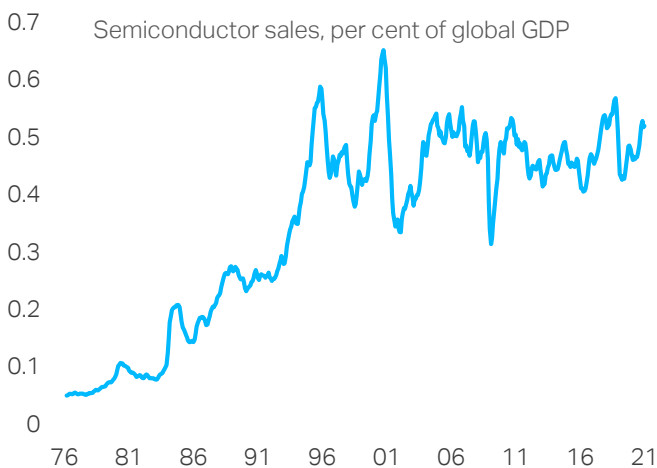
The current severe shortage of semiconductors, which is halting automotive production worldwide, underscores the speed and scale of the changes under way. Chips have always been an important part for manufacturing and consumer electronics, but their use will broaden to transport and digital services. By 2030, electronic components will account for half the cost of a vehicle (see Chart 2 below), as electric and autonomous driving becomes standard and, indeed, mandated by law in most developed countries. For services, more remote working and a greater use of outsourced processing power and cloud computing will embed semiconductors into a wider range of consumer and business activity. Concurrently, 5G and the rapid acceleration of the “internet of things” will move semiconductors alongside (and eventually beyond) oil as the world’s key commodity input for growth.

At the same time, the demand shock is triggering huge political tremors as governments acknowledge their dependence on external supplies of the “new oil” and scramble to launch reshoring initiatives. Like oil, chip output is concentrated in a few key geographies that face large and growing geopolitical risks. The location of chip supply in China’s backyard is a major issue for corporate – and military – planners.

The growing importance of semiconductors has far-reaching implications for macroeconomics, politics and markets. The price of chips will become an important driver of current account surpluses and may help create “silicon currencies” similar to OPEC’s petrocurrencies. Meanwhile, the structural shift in demand for integrated circuits is already moving the focus of global geopolitics from the Persian Gulf to East Asia.

In this note, we begin by examining the semiconductor global value chain, the domination of this market by a handful of producers, supply bottlenecks and indicators of future political disruption. Semiconductor nationalism is already reshaping the industry, and we expect a bifurcation between US and China supply chains and eventually the creation of separate production blocs.

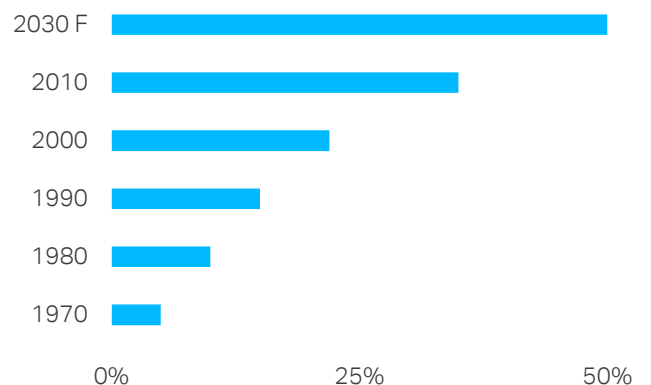
**Chart 1: Chips to become key input to growth**



Sources: World Semiconductor Trade Statistics, TS Lombard.

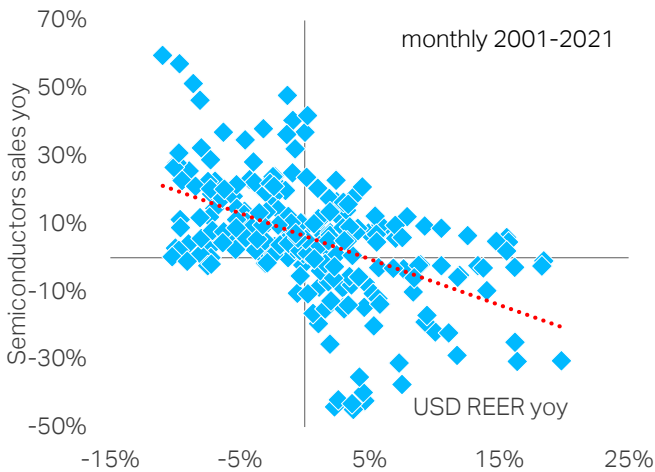
**Chart 2: Electric vehicles raise demand**

Electronic systems as % of total car cost



Sources: IHS Markit, Deloitte.

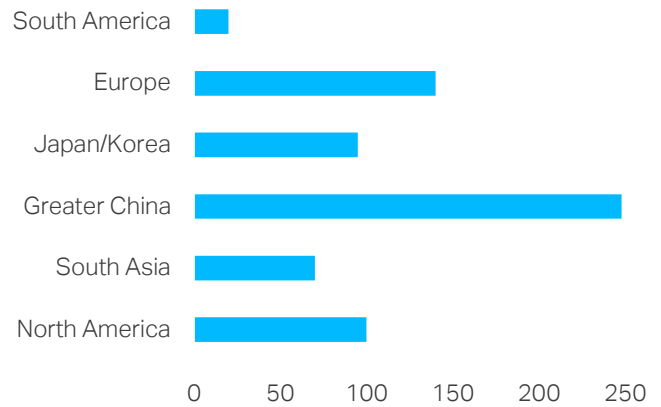
**Chart 3: A semi-commoditized product**



Sources: CEIC, TS Lombard.

**Chart 4: No chips = no cars**

Estimated vehicle production lost Q1/21 (1000)



Source: IHS Markit.

We then analyse the role and influence of the two superpowers, USA and China, and the growing power of Taiwan and South Korea. Washington is the driving force behind the nascent industrial reorganization. As America experiences a “Sputnik” moment, Washington and Silicon Valley are combining to lay the foundation for long-term US dominance of semiconductor production.

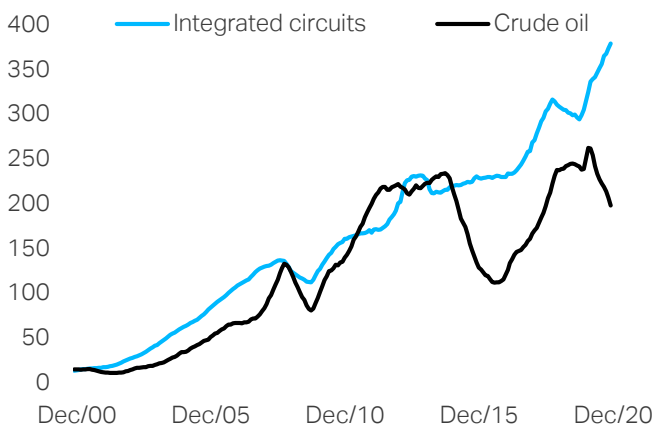
China is on the defensive. Beijing views semiconductor dependence as a “knife at China’s throat”. Massive amounts of political and financial capital are being deployed to boost the domestic industry; a classic state subsidized push to expand production and create cutting edge technologies is under way. Amid the inevitable misallocation of capital, we think China will make slow progress up the value chain, which will supports its current account surplus.

Unprecedented demand provides a strong tailwind for Taiwanese and Korean growth. We remain bullish on East Asia equities and FX. However, shifts in geo-economic power will lead to increased Beijing-Taipei-Washington tension. Taiwan is showing early signs of Dutch disease: the economy is becoming dangerously dependent on a sole politicized locomotive for growth.

We conclude this note with near term- and long-term trading recommendations. With equity valuations stretched on even our bullish assumptions, we provide an investment roadmap for market participants that can take a longer view.

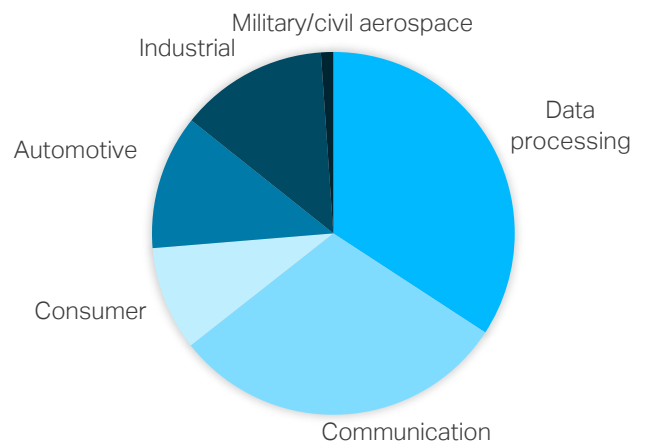
**Chart 5: Semiconductors are the new oil**

China imports US\$bn, 12m trailing sum



Sources: CEIC, TS Lombard.

**Chart 6: Semiconductor end use**

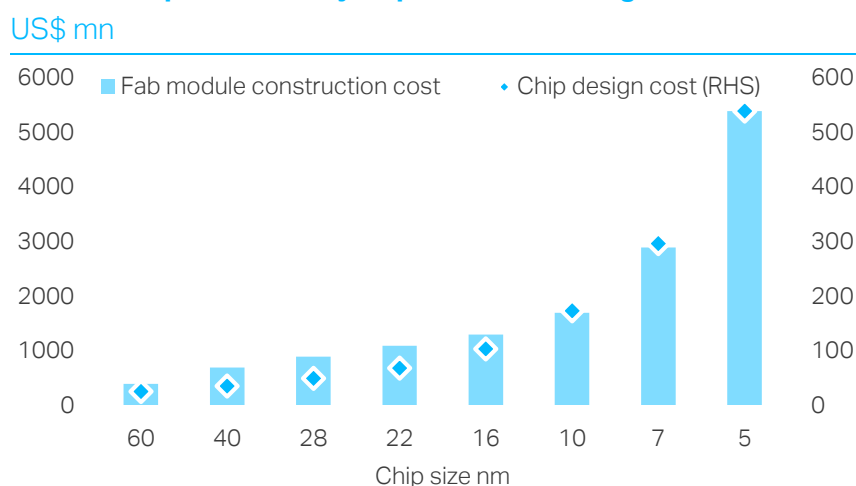


Sources: Deloitte, McKinsey, TS Lombard.

## Choke points everywhere

Almost all market participants need at least a basic understanding of oil production and price, in addition to an awareness of political risk in core hydrocarbon-producing regions. Going forward, a similar knowledge of semiconductor supply chains will be an important – if not, indispensable – input into geopolitical, macroeconomic and market assessments. Although chip production is not fixed by geology, the current supply chain is highly concentrated in a few key geographies and this is unlikely to change significantly in the next five years owing to the long lead time for building new foundries.

**Chart 7: Capital intensity of production rising**



Sources: IBS, McKinsey.

Over the past 20 years, Moore's Law – the observation that the number of transistors in a dense integrated circuit doubles about every two years – has broken down. The increased technical and capital intensity of investment needed to advance semiconductor design and production into smaller nodes led to a specialization of production processes. An industry previously characterized by vertically integrated firms split into single-purpose specialists often located in country clusters. National comparative advantages and government support were key initial drivers. For instance, contract manufacturing in East Asia favoured a foundry model, while the software prowess of Silicon Valley encouraged a design one. Once an early speciality is formed, network and spill-over effects, plus a continued willingness to invest, maintain the advantage.

**Table 1: Then there were two**

### Number of semiconductor manufacturers working at each process node

Process node (nm)	180	130	90	65	45/40	32/28	22/20	16/14	10/7	5	3
US	24	18	11	4	4	4	4	4	1	1*	
South Korea	4	4	3	2	2	2	2	2	2	1	1
Taiwan	9	9	6	6	6	6	5	3	1	1	1
Japan	18	10	7	6	5	1	1	1			
China	19	18	16	13	8	6	3	1	1		
Other	20	13	5	1	1	1	1				
<b>Total</b>	<b>94</b>	<b>72</b>	<b>48</b>	<b>32</b>	<b>26</b>	<b>20</b>	<b>16</b>	<b>11</b>	<b>5</b>	<b>3</b>	<b>2</b>

Sources: CRS, McKinsey, TS Lombard. \*Intel is expected to begin production in 2023-24.

The slow death of Moore's Law enhanced an existing industry structure geared towards high-volume monopoly producers, with only a handful of firms securing the volume and revenue needed to fund R&D, maintain a technical lead and thereby entrench their market share (see Table 1 above). The combined revenue of the top five semiconductor firms exceeds that of the next largest 249 firms.

The aforementioned industry dynamics have created a complex global supply chain with multiple choke points and near-monopoly producers at each stage. We provide a schematic overview of the supply chain with particular emphasis on supply constraints, country control and leading indicators of political risk (see Table 2). The automotive chip famine has sharpened focus on the fabrication stage of semiconductor production and its concentration among near monopoly producers in East Asia. TSMC and Samsung are the only companies capable of producing semiconductors at nodes as small as 5nm or 3nm. Intel is at least five years behind the leading edge. TSMC and Samsung are reaping the rewards from consistent high levels of R&D, capex and government support over the past 10 years. The two Asian firms bet big on the foundry model (contact chip manufacturing), riding the wave of outsourcing and accepting the higher production costs imposed by the death of Moore's Law. By contrast, most US firms gave up their fabs, outsourced manufacturing and now focus on higher-margin design and software.

The automotive chip shortage is underscoring another important feature of the semiconductor industry; it is highly cyclical and characterized by periods of under- and, to a lesser extent, over-capacity. The massive amount of capex (US\$10-20bn) needed for facility construction and the relatively cheap material inputs mean that the marginal production cost is low; and once they have been built, fabs rarely go offline. Therefore, there is typically little excess capacity in the industry. Semiconductor production has very little slack and is vulnerable to demand shocks.

**Table 2: Simplified supply chain**

Stage of semiconductor production	Key choke point	Physical supply constraint	Risk indicator
Design/design tools	US firms: 90% of electronic design automation tool revenue	None	US supply chain security review (concludes early June)
Equipment	ASML (Netherlands): sole producer of EUV  3 US, 1 EU and 1 JP firm have 75% market share	<u><a href="#">~45 EUV machines per year</a></u>	Commerce Dept. restrictions and waivers on China sales
Materials (non-wafer)	Japan: 80% of photoresist market	Limited	<u><a href="#">Korea 2022 presidential election: Korean Supreme Court ruling on seized Japanese assets: Opinion poll ratings for PM Suga</a></u>
Materials (wafer)	Japan: 60% of silicon wafer production	Limited	Low risk
Production	Taiwan + Korea: 83% of foundry market share  TSMC + Samsung: sole producers of 5nm & 3nm chips	Two-year fab build time	Comm Dept. restrictions on China sales; Location of TSMC/Samsung fabs; TSMC/Samsung share of revenue from China
Assembly & testing	Taiwan: 54% of outsourced testing market	Limited	Low risk

Sources: CRS, SIA, IC insights, TS Lombard.

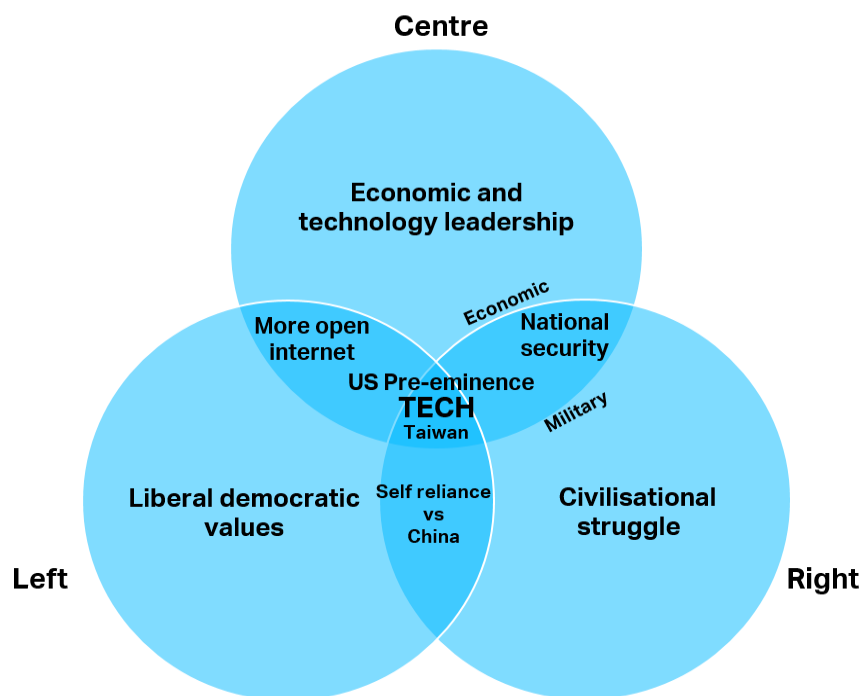
## Superpower chip competition

Two primary factors will shape supply chains development over the coming 10-20 years, the greater importance of semiconductors for economic activity and the US-China superpower rivalry. In the near to medium term, industry is diverging into China- and US-focused supply chains. On a longer time horizon, distinct production blocs for each superpower are likely to emerge. The speed of the transformation will be determined by Washington's inclination to restrict China's access to advanced IP and the ability of Silicon Valley to out-innovate East Asia.

US concerns about the national security implications of reliance on foreign production for critical electronic components have been made clear, first by the disputes over Huawei 5G infrastructure and now by the ongoing supply crunch that threatens the post-Covid recovery of vehicle-producing nations. Going forward, the importance of advanced integrated circuits for economic activity and national security will only increase. We believe that as this happens, growing awareness of national security risks will multiply for an increasing number of governments – not just the US and China. Such risk perceptions will influence how governments devise policies to lessen such risks by imposing greater control over global supply chains.

America is the driving force behind supply chain reorganization. From a political perspective, all the various strands and sources of [US reactions to the rise of China now converge on the tech sector](#). If anything, the convergence is even starker under the Biden administration: China is the sole bi-partisan issue in Washington. The Venn diagram below attempts an oversimplified summary of this important reality. The common denominator is the unacceptability of China taking the lead in general-purpose technologies for the global economy. In line with their particular sensibilities and priorities, US politicians have different ways of rationalizing the policy of contesting, preventing, reversing and generally neutralizing any Chinese technological leadership. The tech war continues regardless of White House occupant.

### Bi-partisan tech war



Source: TS Lombard.



America is unique in its technical ability to push semiconductor supply-chain decoupling. US control of electronic design automation (EDA) software (the tools used to design semiconductors) and the IP for certain complex components in the machines that make integrated circuits is central to the entire supply chain. The most advanced design tools are produced by just four American firms (one of which is now owned by Siemens but with R&D occurring in the US), which, together, account for 90% of the market. American control of the apex of the semiconductor supply chain embeds US IP at every stage of the production process. The importance of American technology in conjunction with Washington's soft (and sometimes heavy) diplomatic power endows Commerce Department sanctions with a large degree of extraterritoriality. When a Chinese firm is placed on the Commerce Dept. blacklist, equipment makers in Europe, foundries in Taiwan and material providers in Japan must all comply.

President Trump made multiple uses of this extraterritoriality, which led to many difficulties for Chinese firms and their suppliers. The current automotive chip shortage is at least partly attributable to sanctions on SMIC and Huawei; these have reduced the ability of the former to supply semiconductors (SMIC had an 11% share of the foundry market) and caused the latter to stockpile supplies (accounting for approximately 15% of TSMC's capacity in Q3/21).

While President Biden's policy is still forming, there is a clear focus on securing domestic supply chains (more on this in the next section) but few indications of an imminent escalation in the tech war. In terms of the offensive inclination of the new US administration the key indicator to watch is allied countries ability to sell to Chinese firms, particularly SMIC and Huawei. ASML, the Dutch maker of advanced lithography devices essential for semiconductor manufacturing (see Table 2), was allowed to sell deep ultraviolet lithography (DUV) devices to SMIC but is blocked from providing its most advanced equipment. Similar conditional exemptions were granted to other foreign and US vendors. President Biden appears focused on slowing Chinese technological progress and out-competing China rather than aggressively ramping up sanctions.

The tech war is temporarily on the back-burner, but the secular drivers of supply chain reorganization remain. What is important is that the political will in Washington to slow Chinese development and leverage US tech IP dominance is gaining momentum. Looking further ahead, as security concerns multiply, production and research at leading semiconductor firms could split into separate China- and US-based units. A complete break into separate production blocs is possible only if major economies – the US, China and Europe – invest heavily and persistently (+10 years) in localized production. Growing semiconductor nationalism is supporting an initial surge in reshoring and state-led capex in China, East Asia, the US and Europe, the implications of which we examine in the next section.

# Semiconductor nationalism

## A Sputnik moment

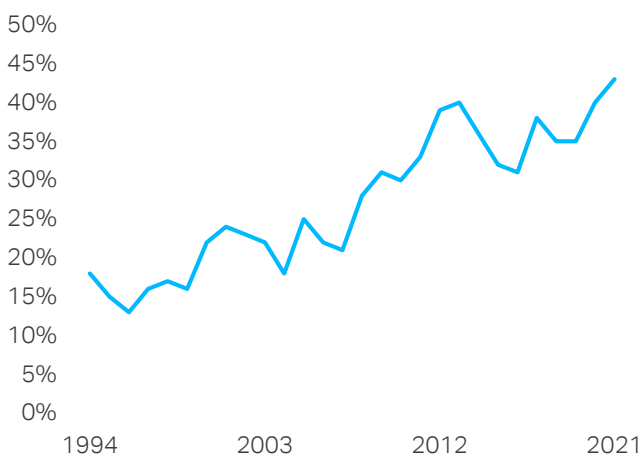
America is the only nation able to play both offence (slowing PRC development) and defence (reshoring production). In the preceding section, we outlined efforts to curb China upgrading. Under Biden, Washington is also focused on reshoring advanced semiconductor production. The combination of offence and defence lays the foundations for long term US + allies dominance of semiconductor production.

The “China threat” and the semiconductor shortage are bringing about the return of American state-led capitalism for the first time since the 1980s. In January 2020, Congress passed the CHIPS act, providing an initial fund of US\$35bn to support US-based production. Biden launched a 100-day supply chain review (which will conclude in June) with heavy emphasis on integrated circuit manufacturing. Trump pressure on Samsung and TSMC led to new capacity expansion in the US. Intel, America’s leading producer, recently unveiled a radical shift in focus, vowing to enter the foundry market and committing to “Made in America” chips.

The change in Intel is particularly striking. New CEO Pat Gelsinger explicitly referred to geopolitics and national security when outlining his strategic vision. He stated that: “The majority of leading edge foundry capacity is concentrated in Asia, while the industry needs more geographically-balanced capacity.” And he added; “We (Intel) are committed to ensuring this capacity will support commercial customers, as well as address unique government and security requirements in the U.S.” The American IDM is making a play to be the safe foundry in the West.

In the span of half a year, American political and business interests have aligned behind a common goal. The importance for chip supply chains is the eventual emergence of non-Asian producer of advanced semiconductors. Reforming the current supply chain, which is the result of factor endowments and decades of intensive investment compounded by local network and knowledge spill-over effects, will be incredibly difficult and time-consuming. It is by no means guaranteed that Intel will catch up with TSMC anytime soon; the remainder of the 2020s belongs to TSMC and Samsung, which will profit from heavy investment over the last five years (Charts below). Nevertheless, the powerful Silicon Valley-White House alliance will help to reshape the new global supply chain in America’s favour. If Washington wishes to dominate the industry, it will need to provide substantial and sustained political and financial support to domestic firms.

**Chart 8: Top two firms share of total semi capex**



Source: IC Insights.

**Chart 9: Top two spending leaders by capex**

Years	Largest	Second
94-95	Intel	Motorola
96	Intel	Samsung
97-98	Intel	NEC
99-01	Intel	TSMC
02-03	Intel	Samsung
04-08	Samsung	Intel
09	Intel	Samsung
10-14	Samsung	Intel
15	Samsung	TSMC
16-19	Samsung	Intel
20-21	Samsung	TSMC

Sources: IC Insights, company reports.

## China – Oil and chips determine trade surplus

In China, state involvement in semiconductor development is nothing new. Domestic leading-edge integrated-circuit manufacturing capability has been a long-standing goal of the CCP since at least the 1980s. Amid the Sino-US technology conflict, political support for the industry is at unprecedented highs. That Party rhetoric now characterizes the struggle to produce “Made in China chips” as similar to efforts to develop a nuclear bomb in the 1960s and provides a good indication of the government’s policy priorities.

Beyond the rhetoric, Beijing has set out clear targets for the sector. Last year’s central economic work conference set domestic innovation and securing technology supply chains as the top two objectives for 2021. At the recently concluded National People’s Congress, the 14th Five-Year Plan placed heavy emphasis on domestic innovation, prominently raising the country’s R&D spend as a per cent of GDP. The FYP left out numeric chip targets, which are likely to be included in an industry-specific plan later this year. In the meantime, ambitious goals set by the “Made in China 2025” document and the National Integrated Circuit plan still apply.

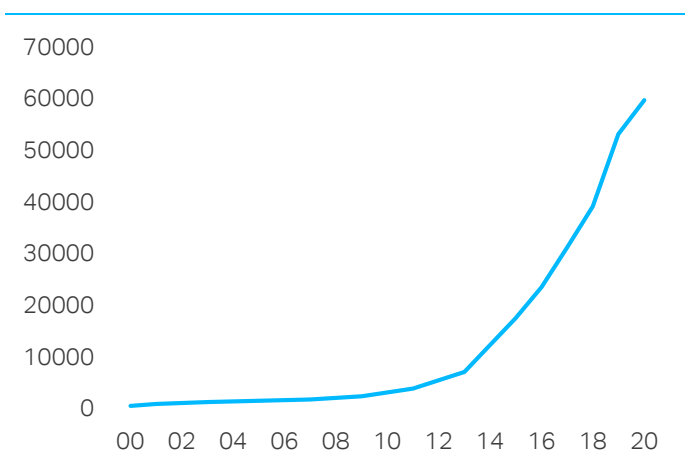
Beijing aims to produce 70% of the semiconductors it consumes by 2025. The country is far from achieving this objective. Based on current production, fabs under construction and those in the pipeline, China will miss the target by a wide margin. The failure is partly due to excessively ambitious goals, but it also highlights the classic problems of state-led innovation in China. Until recently, efforts to promote the industry were broad, non-targeted and led by local and central politicians rather than technicians.

This sclerotic approach produced a lot of waste (the recently uncovered HSMC fraud succeeded in attracting at least US\$2bn in central and local government funding) but at the same time led to a number of companies approaching global competitiveness. China now has solid competence (albeit several years behind the leading edge) at nearly every stage of the semiconductor production process – from design and materials to manufacturing. Of particular note is SMIC moving towards 7nm production. In addition, YMTC’s NAND memory chips are on a technical level with leading firms, although production yield is still lacking.

The tech war is forcing a change of strategy. Leading edge is still an important focus, but the de-Americanization of technology supply chains is now a greater priority. China aims to use domestic components where possible and source from non-US (primarily Taiwan, Korean and Japan) if PRC production is insufficient. At the same time, Washington is intervening directly to

**Chart 10: Chip investment follows politics**

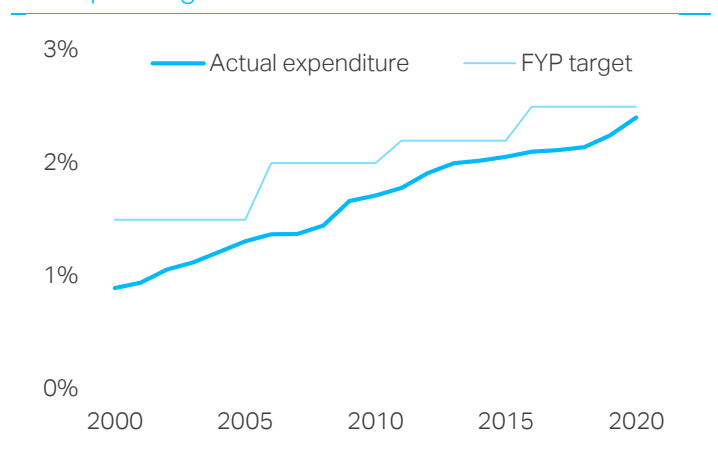
Number of semiconductor firms in China



Source: Tianyang Research.

**Chart 11: R&D spending growth will accelerate**

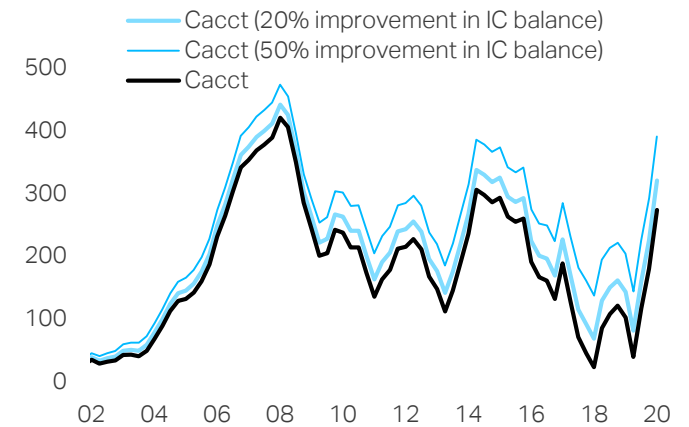
R&D spending % of GDP



Source: Chinese government work report.

**Chart 12: Semiconductor impact on surplus**

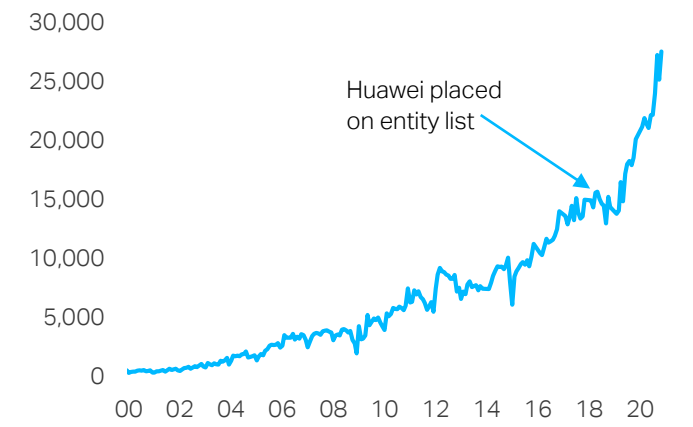
12m trailing sum US\$bn



Sources: CEIC, TS Lombard.

**Chart 13: China ramps up production**

Integrated circuit production (mn)



Source: CEIC.

halt sales of cutting edge IP and devices. The combination of access to less advanced tech and active import substitution is likely to funnel capacity expansion at the lower end of the semiconductor technology spectrum.

Even with a clearer goal and US imposed limits on development, the enormous political and financial support to the industry guarantees capital misallocation and unproductive investment. Beijing has committed US\$1.4trn in funds for the domestic industry over the period 2020-25, (this figure excludes local government subsidies). A version of the classic China development model of state subsidized low-end capacity expansion swamping the market ahead of consolidation around a number of national champions is likely to play out. In just the last three years, the number of semiconductor start-ups in China has increased by more than 50%. Moreover, the amount of investment has increased six fold – from US\$946mn in 2018 to US\$6.16bn in 2019. In the first half of 2020, investment reached US\$8.46bn. As regards global capex plans for 2021 and 2022, China is leading the way in expanding production at above 14 nm and YMTC is poised to take a 4-7% share of the global NAND market.

State procurement and patriotic purchasing mean that China does not need to produce at the top end to make a significant improvement to the current account surplus. As long as the product is “good enough”, it can substitute for foreign input. A 20% reduction in China’s 2020 integrated circuit trade balance plus, say, a 10% drop in imports and a similar rise in exports would add close to US\$50bn or 17% to the current account surplus. While a one-fifth reduction in the deficit may seem farfetched, it is important to note that China needs to expand production only at existing technology levels; no bleeding-edge innovation is required, to start reducing its semiconductor imports. Beijing can move quickly, as Chart 13 above shows: 18 months after the first threat to ZTE, arguably the initial salvo in the tech war, PRC integrated circuit production doubled in response. Import substitution is likely to provide a tailwind to the Mainland goods surplus over the coming three to five years.

Meanwhile, true semiconductor independence is still many years away. As we note above, leading-edge design, equipment and production is the result of decades of investment and industry specialization. China factor endowments indicate success at the lower level of fabrication is possible. US sanctions and technical difficulties will keep advanced production – and thus global leadership – beyond the grasp of the PRC for the foreseeable future.

## Economic opportunities and geopolitical threats for East Asia

Exceptionally strong demand for Taiwan and Korea’s top export product will continue to drive growth in 2021. We have been positive on the East Asian economies since April last year owing to virus containment and our anticipation of very strong demand for semiconductors and electronic components.

Leading indicators of external demand point to sustained export-led growth, which, in turn, will support investment, employment and consumption. Even with relatively high base effects, the two economies will record strong expansions in 2021 – Korea 4% and Taiwan 3.8%.

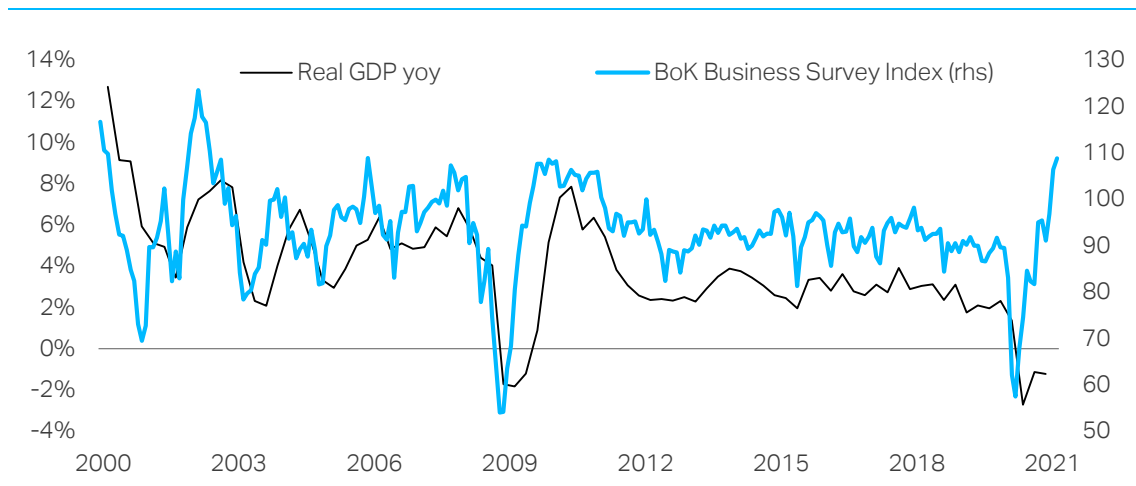
Electronic component-led export growth is not new, even if the level of demand is unprecedented. The key change is that with greater demand for semiconductors comes new geopolitical heft. Taiwan and Korea are on the frontline of the US-China confrontation: reliant on China for growth but on the US as guarantor of national security. Nevertheless, chip manufacturing dominance means they can leverage their increased strategic importance for political gains.

Taiwan is benefiting from a relative increase in geo-economic strength thanks to its near-monopoly position in advanced semiconductor fabrication. In a bid to tackle the automotive chip shortage, world leaders, particularly those of major vehicle-producing nations, have made well publicized overtures to the Taiwanese government. Biden, Merkel, Macron and Suga have all committed to resolving supply difficulties. As noted above, there is little the supply side can do to ameliorate shortages in the near term. Nevertheless, top-level political involvement gives Taiwan an opportunity to leverage its chip prowess to gain concessions from DM governments. Taiwan’s Economic Ministry has asked firms to help “like-minded economies” alleviate the shortfall.

The timing is particularly opportune with regard to the Taipei-Washington diplomacy. Biden is slowly building a US-Taiwan relationship that is much closer than that of the Obama era and more substantial than Trump’s high-profile but erratic diplomacy. There is scope for Taipei to gain ground on long-standing political and economic objectives, including a US-Taiwan FTA, greater sovereign recognition and leeway for FX intervention.

Viewed from Beijing, the moves by Washington are rapidly chipping away at the One China Policy, the bedrock of post-1970s US-China relations. Since Biden took office, a slew of

**Chart 14: Korea growth momentum strong into 2021**



Sources: BoK, CEIC, TS Lombard

measures has bolstered the case of hawks in Zhongnanhai. The US has, among other actions, welcomed Taiwanese officials to the White House, signed agreements with the nation's coast guard and upgraded economic ties via the Trade and Investment Framework Agreement. And late last month, Secretary of State Blinken called the President of Paraguay to emphasize the importance of maintaining full diplomatic relations with Taipei, in response to Beijing pressuring the South American country. Paraguay is one of the 15 countries that officially recognizes Taiwan.

China would normally retaliate with tough economic sanctions. However, such is PRC dependence on Taiwanese silicon that Beijing is unwilling to apply economic pressure to the island. A ban on pineapple imports is all the PRC could muster. Instead, China has adopted "grey zone" warfare tactics. The new strategy is to wear down the island's military. Last year, the number of sorties by PLA fighters more than doubled. Taiwan spent more than 20% of its 2020 military budget on scrambling fighter jets alone. Overworked personnel and machinery was the reason for the loss of two planes in separate training exercises in H2/20. The pace and scale of air and naval incursions continue to rise this year, as China responds to US-Taiwan rapprochement. Two ROC fighter jets crashed in March. The risk of a misstep is growing.

We still think war over Taiwan is highly unlikely, not least because invasion and the ensuing sanctions would cripple Taiwanese and Chinese chip production. Nevertheless, the potential for China-Taiwan-US political and economic friction increases as Taiwan's power grows.

To the north, Korea is attempting to have its cake and eat it, remaining a core pillar of the American military network in Asia while at the same time drawing closer economically to China. During the trade war, Seoul and Taipei stayed on the fence, continuing to supply Huawei until Commerce Department sanctions came into force last September. In contrast with President Tsai who has moved firmly towards America, President Moon is committed to cakeism.

Biden's efforts to build a league of democracies is bearing fruit: the US alliance system consolidating and taking steps to contain China will lead to a steady reduction in Seoul's room for manoeuvre between opposing economic and geopolitical interests. [Washington is working to create a secure chip supply chain with Korean, Taiwanese and Japanese government involvement.](#) Nevertheless, in the near term, Samsung et al stand to gain from growing concerns in China that PRC firms may lose out to rivals from "like-minded" countries in the competition for Taiwanese output. Korea – the only real alternative and soon to be a lower-cost producer thanks to RCEP tariff reductions – is likely to gain market share.

### Early signs of Dutch disease

Last year Korea and Taiwan became arguably the largest single-commodity exporters in the world as their integrated circuit sales surpassed that of Saudi Arabian crude. IC is a semi-commoditized product, fungible (to a degree) and invoiced in USD at a price set by global supply and demand. Or, put differently, the foundry production process is commoditized. It does not matter to a purchaser that the chip is TSMC branded; what does matter is that it fills the design function. IC as a commodity export is a useful framework to examine the impact of a sustained increase in demand on the Korean and Taiwanese economies. The two countries, already highly dependent on the tech cycle for growth, are showing early symptoms of a very modern form of Dutch disease.

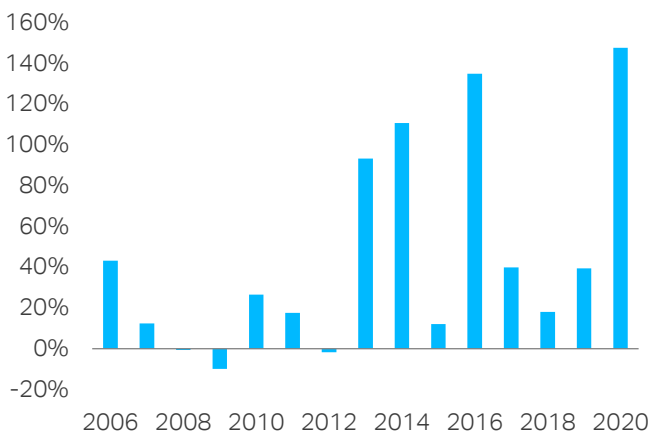
In the classic case of Dutch disease, demand for a USD-denominated commodity drives up the current account surplus, causing the domestic currency to appreciate and making other exports less competitive. The relative competitiveness of the commodity leads to the allocation of human, capital and land resources towards the increasingly dominant sector. The eventual result is an economy increasingly tied to the fortunes of one industry. Holland after the discovery of the large Groningen natural gas field in 1959 is the eponymous example.

Taiwan is showing early symptoms of the disease. Over the past seven years, electronic component sales have accounted for 74% of Taiwanese export growth on average (see Chart 15 below), and in 2020 they accounted for 146% of the current account surplus. The sector's share of total manufacturing lending is 36%, a percentage that understates the allocation of capital to the industry, which can count on equity and direct financing for funding. Meanwhile, the TWSE is already a semiconductor index (see Chart 16 below).

Second-order growth derived from the semiconductor sector is immense, too. Last year, 50% of total land purchases in Taiwan were by chip firms. Such is the capacity buildout underway that construction salaries rose by 25% in 2020. TSMC alone uses a large chunk of Taiwan's power and water supply, accounting for 5% of total electricity usage in 2019. Water is a particular issue this year: as droughts have threatened chip production, Taipei has started to reduce [water supply to households in parts of central Taiwan](#). Water and power problems will worsen: EUV machines used to produce 5nm and 3nm integrated circuits require 20 times more energy than older DUV equipment. And we outlined above how, apart from purely economic considerations, Taipei is leveraging chip production for geopolitical gain.

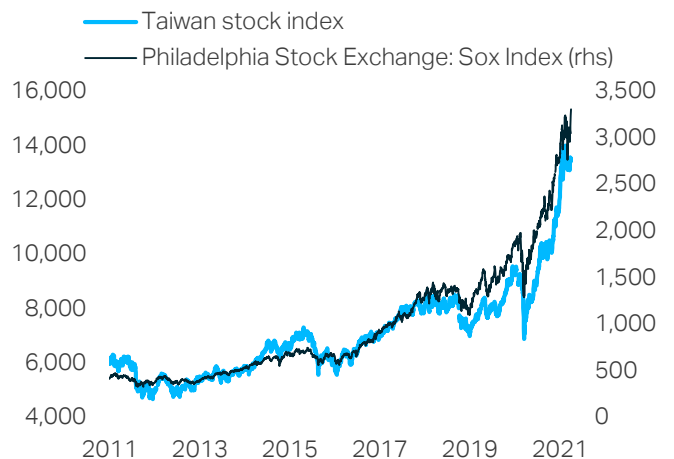
**Chart 15: Taiwan dependent on chip exports**

Electronic component share of export growth



Sources: CEIC, TS Lombard.

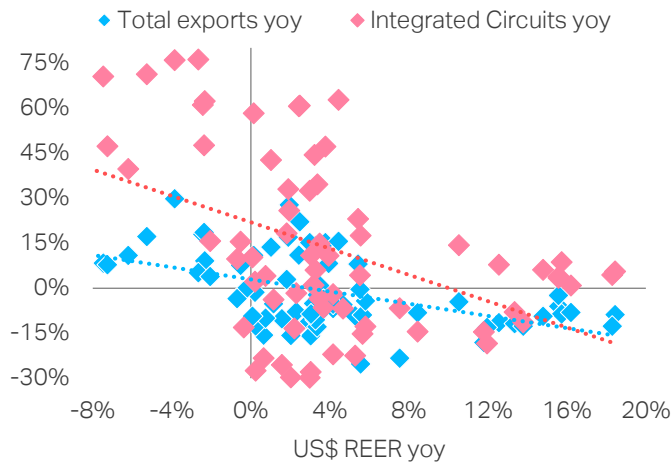
**Chart 16: Taiwan equities and SOX in lock step**



Source: Bloomberg.



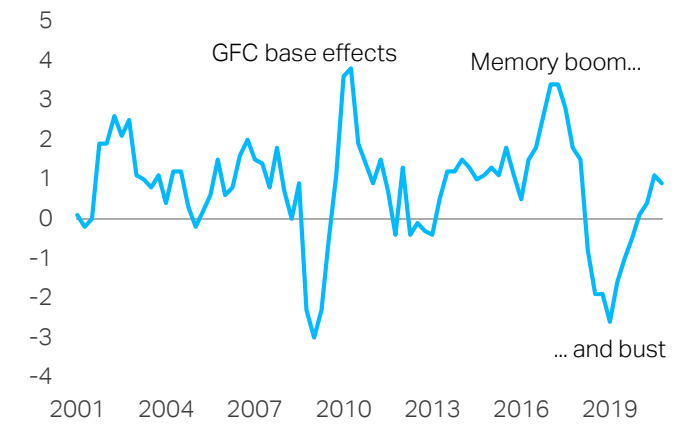
**Chart 17: Korea's memory boom and weaker US\$**



Sources: CEIC, TS Lombard.

**Chart 18: Memory demand spurs private capex**

Korea private GFC cont to GDP growth %pts



Sources: CEIC, TS Lombard.

Both economically and politically, Korea is less dependent on semiconductor sales. However, the recent memory-chip boom-bust cycle (2016-18) is illustrative of how quickly reliance on semiconductor exports can impact the economy occur. Chart 17 above shows real Korean export growth plotted against change in the dollar REER over the 2015-20 period. Contrary to expectations, a stronger dollar (weaker Won) hurt export growth, particularly that of semiconductor commodity exports ([the report here explains some of this phenomenon](#)). Chip sales accounted for 92% of Korean export growth in 2018 and helped drive private gross fixed capital formation to a record high (see Chart 18 above). It is only now, thanks to the current demand surge, that exports and private fixed asset investment are recovering from the 2018 peak. Similar trends are evident in Taiwan.

With the structural shift in semiconductor demand underway, the two economies are likely to become even more highly specialized technology exporters. The result will be an even greater impact on respective equity, FX and rates of the semi-cycle. In a few years' time, we may be classifying TWD in the same basket as Middle Eastern petrocurrencies. In the medium term, structurally strong demand for chips and East Asia's technological lead protect against disruption of the status quo. Nevertheless, increased reliance on a politically charged, rapidly changing commodity raises regional growth and asset volatility.



## Conclusion – Trading the new oil

This issue of “The View” has examined the mounting importance of semiconductors to global growth and highlighted the complex and concentrated supply chain on which chip production relies. The centrality of chips to economic activity is combining with US-China superpower competition to reshape the integrated circuit industry. The combination of US offence (China sanctions) and defence (the Washington-Silicon Valley alliance) is laying the foundation for American and allied dominance of leading-edge chip production.

Over the next three years, the winners of the shift in demand, supply chain and geopolitics are countries that have a physical integrated circuit trade surplus and/or a technical one. East Asia has both, while the US, through its dominance of design tools and inputs into advanced manufacturing equipment, possesses the former. Taiwan and Korea are clear winners and will continue to profit from very strong external demand and an increase in geo-economic power.

China is a semiconductor twin-deficit country, with insufficient domestic production and a dearth of advanced IP. Beijing is investing heavily to make up the shortfall, and we expect large capacity expansion at the lower end of the technology spectrum. However, leading-edge production prowess will remain beyond the grasp of China for the foreseeable future.

We have largely excluded Europe from the analysis, as the continent does not have a clear semiconductor strategy. The EU has set ambitious targets and provided financing for domestic industry but remains well behind Beijing and Washington in its political and capital commitment to integrated circuit production.

For chip leaders in East Asia, it is not all good news. Taiwan, in particular, is vulnerable to Chinese military pressure, which will continue to rise in response to gains in Taipei’s geo-economic power. We see early signs of Dutch disease as Korea and Taiwan’s economic and political fortunes are increasingly tied to the electronic component cycle.

The trends explored here will persist through the 2020s; nevertheless, at this stage of the cycle, valuations appear stretched across listed semiconductor stocks. The chip shortage will persist for several more quarters, bringing with it higher prices and profits. However, the past month saw a slew of high-profile capex announcements from the industry’s leading players, which pushed the SOX index to a new all-time high. A near-term peak for the first wave of the semi-cycle appears close.

A “buy on dips” approach is warranted for leading semiconductor capital equipment providers and firms with clear unassailable monopolies (TSMC, ASML, etc.). Chinese national champions are worth considering, too. PRC chip leaders are now “too big to fail” from a political and national security perspective, guaranteeing extensive and extended government support. Conversely, we would avoid producers at the lower end of the technology spectrum, as these are vulnerable to PRC moves up the value chain, NAND memory is a prime example. Looking beyond the early peak, as production capacity comes on line in two to three years, fab-less firms are likely to outperform pure foundry plays.

For short-term trading ideas, we turn to FX. Early signs of Dutch disease may be a risk for East Asia, but they point to a strong secular tailwind to TWD and KRW. The upcoming Treasury currency report and the dividend payment season in Korea and Taiwan tend to drive outflows, and FX weakness provides an entry point for long KRW and TWD positions against EUR.

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