Semiconductor sector

Tariff uncertainty finally alleviated

Key message

1. Negative to tier-two foundries & consumer electronics.
2. Positive to TSMC's capex play; uncertainties can finally be priced.
3. US production costs 27-45% higher; tariffs will force production relocations.
4. TSMC should be able to pass on tariff costs, but structural inflation is inevitable.

Event

US President Trump announced the imposition of a 100% tariff on semiconductor imports to the US. The details have yet to be released, but foundries which have production in the US, or commit to investing in the US, will enjoy exemptions.

Impact

Negative to tier-two foundries & consumer electronics. We are still waiting for details from the US Bureau of Industry Section 232 investigation (based on the the Trade Expansion Act of 1962), and the conditions of exemptions. However, based on current information, tier-one foundries all have US fabs and expansion plans in the US (including Intel (US), TSMC (2330 TT, NT$1,180, OP) and Samsung (KR)) and therefore should qualify for exemptions, whereas tier-two foundries (such as UMC (2303 TT, NT$40.40, U), Vanguard (5347 TT, NT$95.7, N) and PSMC (6770 TT, NT$14.85, NR)) will likely be hit by the new tariffs. GlobalFoundries (US) may benefit from order transfers for mature nodes. Even tier-one foundries may see mature node sales suffer, due to a lack of US production. Cost pass-through may be possible for AI products, but not for consumer electronics. Within TSMC's clients, Apple (US) will see the greatest impact, because Apple's AP are produced on the most advanced nodes (currently N3, N2 in 2026F), and TSMC will not produce N3 in the US until 2028F. In addition, iPhone users may be unwilling to face steep price increases on new models.

Positive to TSMC's capex play; uncertainties can finally be priced. Due to a higher-than-expected semiconductor tariff rate and potential tax credits for investments before 2027F, we expect TSMC will need, or be forced by clients, to speed up the firm's US expansion, which will benefit related equipment vendors, but mostly front-end equipment vendors such as ASML (NL), rather than Taiwanese equipment vendors. Even if TSMC is able to pass-through 100% of the tariffs to clients, the new taxes will be negative for global semiconductor demand.

US production costs 27-45% higher; tariffs will force production relocations. According to our calculations, production costs for N4 were 100% higher in the US (AZ Fab P1) than in Taiwan (Fab 18A) initially. With yield improvements and de-bottlenecking, we believe the cost gap can be narrowed to 45%, with construction costs, labor costs and overhead, including back-end equipment and facilities, being the three major contributors to high production cost. Scale is the key for cost comparisons - if the Arizona fab is scaled up to the same size as the Taiwanese facilities, the cost gap could be reduced to 27%. However, no matter the scenario, production relocation to avoid tariffs seems inevitable, and TSMC may need to increase prices for semiconductors produced in Arizona by 30% to protect the firm's long-term gross margin target.

TSMC should be able to pass on tariff costs, but structural inflation is inevitable. TSMC believes its clients will bear higher costs, whereas UMC claims they will work with clients closely to mitigate the impact. We believe that whether foundries can fully pass-through tariff costs depends on their competition landscape. TSMC's top US clients Nvidia (US), Apple, Broadcom (US), Qualcomm (US) and AMD (US) will see significant cost increases. We believe OEMs will tend to increase global prices instead of only increasing prices in the US market, making structural inflation inevitable.

Stocks for Action

Tariffs will be a negative to the industry from cost and demand perspectives. In the absence of further negatives, such as an agreement by TSMC to invest or collaborate with Intel, the alleviation of uncertainty is likely to be positive for overall investment sentiment. We foresee a limited impact to TSMC's earnings in 2025-26F, but a slower cyclical demand recovery can be expected. We dislike tier-two foundries and fabless design firms with high US or consumer electronics exposure. MediaTek (2454 TT, NT$1,355, OP) should see limited impacts due to high China exposure. We evaluate the impact on TSMC as neutral, save for pushing up the US expansion, which may result in greater margin dilution. Equipment vendors should benefit from TSMC's expansion.

Risks

Global recession, further escalation of trade war.

US President Trump has announced the imposition of a 100% tariff on semiconductor imports to the US. The details have yet to be released, but foundries which have production in the US, or commit to investing in the US, will enjoy exemptions.

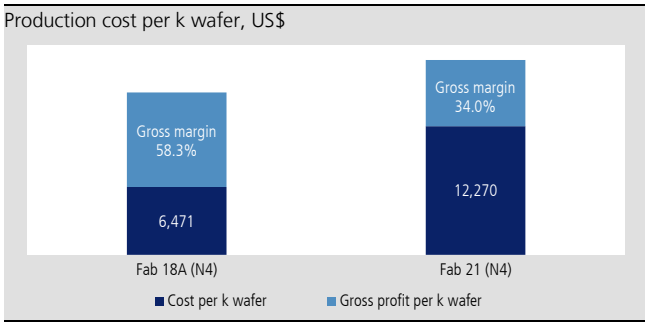
However, even if TSMC's announced investment of US$165bn for US expansion could all be spent today, the result would only account for 10-15% of TSMC's current capacity, and TSMC's clients would still see negative impacts for most advanced nodes (N2/ N3) and mature nodes (N7 and above). TSMC should be able to pass-through tariff costs to clients.

Based on our back-of-the-envelope calculations, TSMC's production cost per wafer in the US fab (Fab 21) may have been 100% higher than in the F18A fab (Tainan) initially, with the product selling for only about 20% more. As a result, gross margin in the US is only 34% by our estimates, versus 58-60% in Taiwan. Three major factors of higher US production costs are: (1) higher construction costs (5x higher); (2) higher labor costs (10x higher, given learning curves); and (3) back-end tools and others (including shared facilities, water purification systems, etc.). The wages for US labor are 20-30% higher than in Taiwan, but overall labor cost per wafer is 10x higher, owing to: (1) more shifts needed in the US; (2) higher training costs from flying trainers from Taiwan to the US; (3) more workers needed for new overseas fabs; and (4) some costs can't be shared amongst facilities, as in Taiwan, due to scale. Most importantly, the scale of Taiwan production facilities is much greater than the Arizona fab, so US overhead cannot be distributed amongst production clusters.

Assuming de-bottlenecking increases Arizona production to 25 thousand wafers per month (kwpm) from the current 20kwpm and production yield improvements continue, we expect the cost gap between the US and Taiwan to narrow to 45%. In addition, if we assume similar scale in Taiwan and in the US to make a fair comparison, then the cost of production in the US would be 27-30% higher, based on our calculations.

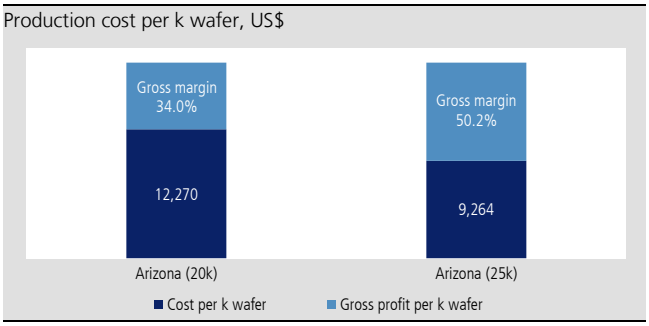
We expect TSMC will be forced to speed up the firm's US expansion under this 100% semiconductor tariff rate. TSMC may increase prices by 30%, together with de-bottlenecking, to bring gross margin to the firm's long term target of 53%. It might take time for TSMC to optimize US production, so we believe TSMC will likely increase pricing for the US market soon.

Figure 1: Cost comparison estimates of Taiwan (F18A) vs. US Fab (F21)



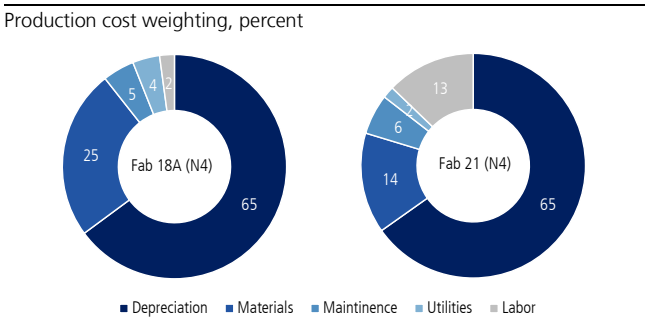
Source: KGI Research estimates
Note: the calculation reflects higher initial costs due to smaller scale of production and learning curves

Figure 2: Cost comparison estimates; initial vs. optimal level (25kwpm)



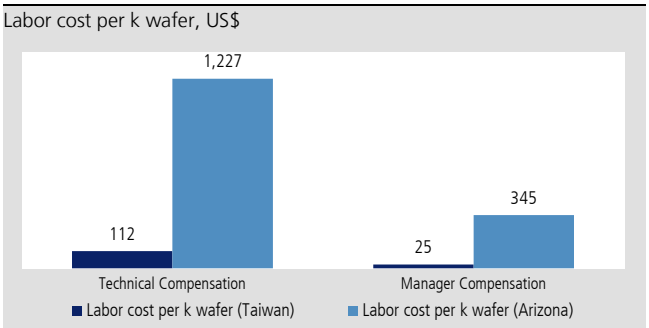
Source: KGI Research estimates
Note: the calculation reflects higher initial costs due to smaller scale of production and learning curves

Figure 3: Cost structure breakdown estimates



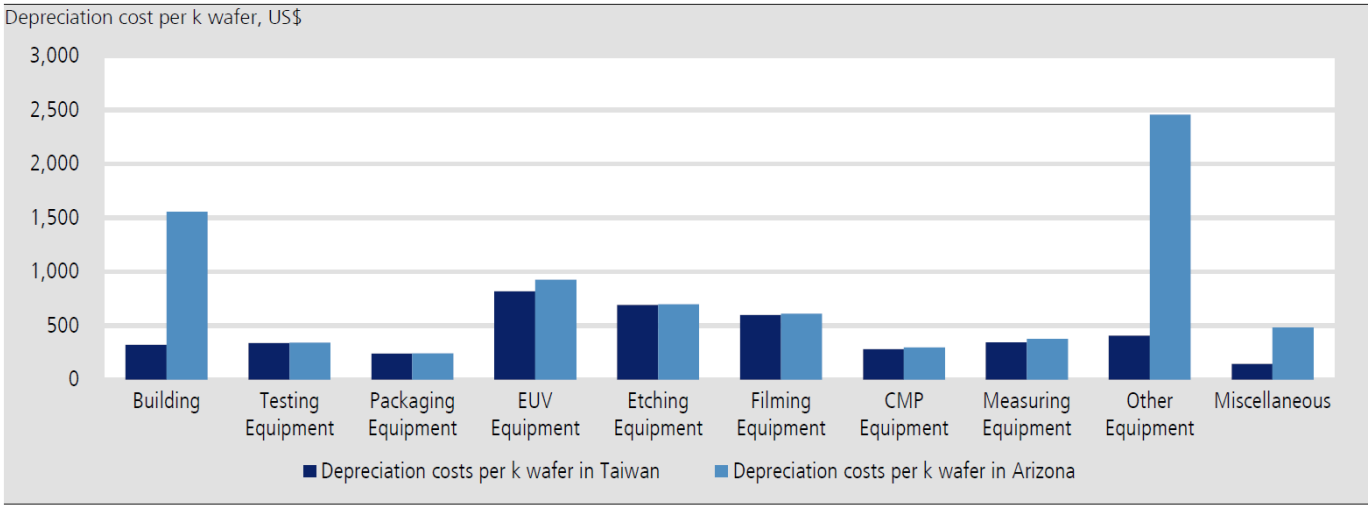
Source: KGI Research estimates
Note: the calculation reflects higher initial costs due to smaller scale of production and learning curves

Figure 4: Labor costs are expected to be 10x higher in the US due to inefficiency



Source: KGI Research estimates
Note: the calculation reflects higher initial costs due to smaller scale of production and learning curves

Figure 5: Depreciation breakdown estimates F18A (Taiwan) vs. F21 (US)



Source: KGI Research estimates
Note: the calculation reflects higher initial costs due to smaller scale of production and learning curves

All the above named KGI analyst(s) is SFC licensed person accredited to KGI Asia Ltd to carry on the relevant regulated activities. Each of them and/or his/her associate(s) does not have any financial interest in the respectively covered stock, issuer and/or new listing applicant.