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October 20, 2021

Taiwan Semiconductor Manufacturing Company Ltd. (TSM) Earnings Quality Update- 9/21 Qtr.

6- Exceptionally Strong
5- Strong
4- Acceptable
3- Minor Concern
2- Weak
1- Strong Concern
+ quality improving
- quality deteriorating

We are raising our earnings quality rating of TSM to 5+ (Strong).

For an explanation of the EQ Review Rating scale, please refer to the end of this report.

Summary

TSM is through much of the new fab start-ups and results have returned to norms. For much of the macro discussion of semiconductor shortages, it is worth noting that TSM's DSI (Days of Inventory) has rebounded to normal levels above 80 days on higher sales, which may be evidence that the situation is being resolved and could help TXN and NATI as well.

The strong demand has enabled TSM to reverse inventory write-downs early in 2021. We do not know the 3Q21 figure yet (that document hasn't been posted yet), but here is what it was in 2020 vs 2021 and the impact on EPS and gross margin:

	3Q20	2Q21	2Q20	1Q21	1Q20
Inventory Change	2182.3	-469.6	457.7	-476.4	-184.0
Impact on Gross Margin	-61bp	+15bp	-15bp	+13bp	+6bp
Impact on EPS	-1.3 cents	+0.3 cents	-0.3 cents	+0.3 cents	+0.1 cents
Beat by	4-cents	1-cent		3-cents	

It is possible that TSM had a very easy comp in this area for 3Q21 y/y. This account swing is normally less than 1-cent and the beat was 4-cents, so the beat may have been solid.

Other than that, the primary driver of earnings was stronger sales, which enabled TSM to leverage R&D and SG&A costs as well as post 0.4-cents in higher income from affiliates which are also benefitting from stronger demand for semiconductors. We are moving the company to a 5+ rating from 5- as we believe TSM's overall accounting quality is very strong and the rising level of capital spending does not appear to pose as much of a margin headwind now as it did at the end of 2019.

What to Watch?

Depreciation Remains a Volatile and Significant Expense for TSM

Most of depreciation flows through Cost of Goods Sold. In 2019, TSM switched its depreciation assumptions for machinery and equipment from 2-5 years to 5-years. This along with building an expensive new line production allowed depreciation to actually decline in 2019 on higher sales and then really push gross margins up in 4Q20 and 1Q21 before the new equipment came online:

NT$	3Q21	2Q21	1Q21	4Q20	3Q20	2Q20	1Q20	4Q19	3Q19
Sales	414.7	372.1	362.4	361.5	356.4	310.7	310.6	317.2	293.1
Depreciation	97.9	94.7	92.2	89.3	86.6	62.6	60.8	60.0	59.3
Deprec % Sales	23.6%	25.5%	25.4%	24.7%	24.3%	20.1%	19.6%	18.9%	20.2%
Gross Profit	212.8	186.2	189.8	195.2	190.5	164.7	160.8	159.2	139.4
Gross Margin	51.3%	50.0%	52.4%	54.0%	53.4%	53.0%	51.8%	50.2%	47.6%

- Depreciation of 97.9 for 3Q21 is our estimate, the document that carries that information has not been published yet.

- The depreciation figure is only for that amount recorded in Cost of Goods Sold to influence Gross Profit.

- From 2016-2019, depreciation in COGS was 21%-25% of sales largely accounting for 400bp swing in gross margin.

- Gross margin rose as more new equipment in PP&E was installed in 2019, but had not begun depreciation as it had not been turned on.

Higher sales growth is leveraging the rising depreciation at this point and helping gross margin. TSM came in at the high range of 3Q guidance for gross margin. For 4Q, the company is guiding to 51%-53% for gross margin, which should be a further improvement over 3Q.

Equipment Under Installation and Capital Spend Are Worth Watching

TSM expects to spend $30 billion on capital expenditures in 2021 vs. $18 billion in 2020. It is basing this on forecasted demand for new chips to continue rising at strong rates. What happens is there is a long lead-time between the start of a new plant and it beginning operation. Construction and Equipment being installed represent PPE that exists, but is not being used in manufacturing yet. TSM does not depreciate this PPE until the plant turns on.

Equipment Under Installation is growing again, but not at 2019 levels. With TSM having a fast depreciation rate, having a high percentage of new equipment and construction not in operation reduces the amount of equipment that is being expensed.

NT$	3Q21	2Q21	1Q21	4Q20	3Q20	2Q20	1Q20	4Q19	3Q19
EUI/CIP	n/a	332.5	308.9	224.0	157.2	153.6	606.5	528.3	355.9
Net PPE	1828.9	1722.1	1657.5	1554.6	1504.4	1493.5	1433.2	1352.3	1197.9
PPE in Deprec	n/a	1389.6	1348.5	1330.6	1347.3	1340.0	826.6	824.0	842.0
% EUI/CIP	n/a	19.3%	18.6%	14.4%	10.4%	10.3%	42.3%	39.1%	29.7%

- In 2017 and 2018 – the ratio was 16%.

- When EUI is a larger percentage of net PPE, gross margin tends to increase because depreciation is a smaller hit to margins.

- However, when a high EUI balance flips on, margins also tend to be pressured in the short term because the production level has to ramp up to fully leverage the new fixed depreciation costs.

- At this time factory utilization is very high, which is helping margin leverage too. It was 94% at the end of 2020 vs. 81% in 2019. Management has indicated that it expects utilization to remain high at this time.

Inventory Levels Have Returned to Healthier Levels

One of the biggest issues for the semiconductor industry has been low inventories as Covid lockdowns changed to rapidly growing business and consumer demand for new products. A lack of inventory hurt sales growth in recent quarters for many companies in the industry along

with logistical supply chain delays. On the positive side for TSM, inventories are now much higher than pre-Covid and when it was moving through the start-up of its new fabs:

	3Q21	2Q21	1Q21	4Q20	3Q20	2Q20	1Q20	4Q19	3Q19
Sales	414.7	372.1	362.4	361.5	356.4	310.7	310.6	317.2	293.1
COGS	201.9	185.9	172.6	166.3	165.9	146.1	149.8	158.0	153.6
Inventory	182.2	170.4	154.6	137.4	109.5	85.8	78.3	83.0	96.7
DSI	82.4	83.6	81.7	75.4	60.2	53.6	47.7	48.0	57.5

- Historically, DSIs have been between 60-77 from late 2017-2019

- It is worth noting that finished goods inventory was only 13% of total inventories in 2021 (we don't know 3Q21 yet), however, that figure is about 3x the level in 2020 quarters.

- With guidance for another 4.5% sequential revenue growth for 4Q21, it could be that more of the bottlenecks are being resolved which could keep pressure on finished goods inventory. However, the return to sales growth in 3Q and 2Q are good signs.

Explanation of EQ Rating Scale

6- (Exceptionally Strong)- Indicates uncommonly conservative accounting policies to the point that revenue and earnings are essentially understated relative to the company's peers. Higher possibility of reporting positive earnings surprises

5 (Strong)- Indicates the company has no areas of concern with its reported results and we see very little risk of the company disappointing due to recent results being overstated from aggressive reporting in recent periods.

4 (Acceptable)- Indicates the company may have exhibited a minor "red flag", but the severity of the issue is not yet a concern. Minimal risk of an earnings disappointment resulting from previous earnings or cash flow overstatement

3 (Minor Concern)- Indicates the company has exhibited either a larger number of or more serious warning signs than companies receiving a 4. The likelihood of an immediate earnings or cash flow disappointment is not considered to be high, but the signs mentioned deserve a higher degree of attention in the future.

2 (Weak) Indicates the company's recently reported results have benefitted materially from aggressive accounting. Follow up work should be performed to determine the nature and extent of the problem. There is a possibility that upcoming results could disappoint as the impact of unsustainable benefits disappears.

1 (Strong Concern)- Indicates that the company's recent results are significantly overstated and that we view a disappointment in upcoming quarters is highly likely

In addition to the numerical rating, the EQ Review Rating also include either a minus or plus sign. A minus sign indicates that our analysis shows the overall earnings quality of the company has worsened since the last review and there is a possibility the numerical rating will fall should the problem continue into upcoming quarters. Likewise, a positive sign indicates that the overall earnings quality is improving, and the company may see an upgrade in its numerical rating should the trend continue.

Key Points to Understand About the EQ Score

The EQ Review Rating is much more than a blind, quantitative scoring method. While we utilize proprietary adjustments, ratios, and methods developed over decades of earnings quality analysis, the foundation of all of our analysis is reading recent SEC filings, press releases, conference call transcripts and in some cases, conversations with managements.

The EQ Review Rating is not comparable to a traditional buy/sell rating. The Rating is intended to specifically convey the extent to which reported earnings may be over/understated. Fundamental factors such as forecasts for future growth, increasing competition, and valuation are not reflected in the rating. Therefore, a high score does not in itself indicate a company is a buy but rather indicates that recent results are a good indication of the underlying earnings and cash generation capacity of the company. A low score (1-2) will likely result in us performing a more thorough review of fundamental factors to determine if the company warrants a full-blown sell recommendation.

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