

Pricing

We price our products on either a per die or a per wafer basis, taking into account the complexity of the technology, the prevailing market conditions, the order size, the cycle time, the strength and history of our relationship with the customer and our capacity utilization. Because semiconductor wafer prices tend to fluctuate frequently, we in general review our pricing on a quarterly basis. As a majority of our costs and expenses are fixed or semi-fixed in nature, fluctuations in our products' average selling price historically have had a substantial impact on our margins. Our average selling price decreased by approximately 3.4% from 2017 to 2018, and further decreased by 2.9% in 2019, reflecting the continuing nominal price erosion in 2018 and 2019.

We believe that our current level of pricing is comparable to that of other leading foundries in each respective geometry. We believe that our ability to provide a wide range of advanced foundry services and process technologies as well as large manufacturing capacity will enable us to compete effectively with other leading foundries at a comparable price level.

Capacity Utilization Rates

Our operating results are characterized by relatively high fixed costs. In 2017, 2018 and 2019, approximately 69.0%, 68.6% and 67.5%, respectively, of our manufacturing costs consisted of depreciation, a portion of indirect material costs, amortization of license fees and indirect labor costs.

If our utilization rates increase, our costs would be allocated over a larger number of units, which generally leads to lower unit costs. As a result, our capacity utilization rates can significantly affect our margins. Our utilization rates have varied from period to period to reflect our production capacity and market demand. Our average capacity utilization rate was 94.4%, 93.1% and 88.7% for the years ended December 31, 2017, 2018 and 2019, respectively. Utilization rates were primarily affected by global macroeconomic factors. Other factors affecting utilization rates are efficiency in production facilities, product flow management, the complexity and mix of the wafers produced, overall industry conditions, the level of customer orders, mechanical failure, disruption of operations due to expansion of operations, relocation of equipment or disruption of power supply and fire or natural disaster.

Our production capacity is determined based on the capacity ratings of the equipment in the fab, provided by the engineers, adjusted for, among other factors, actual output during uninterrupted trial runs, expected down time due to set up for production runs and maintenance, expected product mix and research and development. Because these factors include subjective elements, our measurement of capacity utilization rates may not be comparable to those of our competitors.

Change in Product Mix and Technology Migration

Because the price of wafers processed with different technologies varies significantly, the mix of wafers that we produce is among the primary factors that affect our revenues and profitability. The value of a wafer is determined principally by the complexity and performance of the processing technology used to produce the wafer, as well as by the yield and defect density. Production of devices with higher levels of functionality and performance, with better yields and lower defect density as well as with greater system-level integration requires better manufacturing expertise and generally commands higher wafer prices. The increase in price generally has more than offset associated increases in production cost once an appropriate economy of scale is reached.

Prices for wafers of a given level of technology generally decline over the processing technology life cycle. As a result, we have continuously been migrating to increasingly sophisticated technologies to maintain the same level of profitability. We began our volume production with 65-nanometer and 40-nanometer technologies in 2006 and 2009, respectively. We introduced our 28-nanometer technology to customers in 2011 and started large-scale commercial production in 2014. Our 28nm and below technologies contributed approximately 17.1%, 15.2% and 11.3% of our foundry revenue in 2017, 2018 and 2019 respectively.

The table below sets forth a breakdown of percentage of our wafer sales by process technologies in 2017, 2018 and 2019.

Process Technologies	Years Ended December 31,		
	2017	2018	2019
	%	%	%
14 nanometers and under	0.9	2.6	0.0
28 nanometers	16.2	12.6	11.3
40 nanometers	28.4	25.3	23.1
65 nanometers	12.3	12.5	14.7
90 nanometers	4.9	8.3	13.6
0.11/0.13 micron	11.5	11.6	12.6
0.15/0.18 micron	12.4	13.7	13.1
0.25/0.35 micron	10.0	10.1	8.7
0.50 micron or higher	3.4	3.3	2.9
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Manufacturing Yields

Manufacturing yield per wafer is measured by the number of functional dice on that wafer over the maximum number of dice that can be produced on that wafer. A small portion of our products is priced on a per die basis, and our high manufacturing yields have assisted us in achieving higher margins. In addition, with respect to products that are priced on a per wafer basis, we believe that our ability to deliver high manufacturing yields generally has allowed us to either charge higher prices per wafer or attract higher order volumes, resulting in higher margins.

We continually upgrade our process technologies. At the beginning of each technological upgrade, the manufacturing yield utilizing the new technology is generally lower, sometimes substantially lower, than the yield under the current technology. The yield is generally improved through the expertise and cooperation of our research and development personnel and process engineers, as well as equipment and at times raw material suppliers. Our policy is to offer customers new process technologies as soon as the new technologies have passed our internal reliability tests.

Investments

Most of our investments were made to improve our market position and for strategy considerations, a significant portion of which are in foundry-related companies including fabless design customers, raw material suppliers and IP vendors. Historically, we also made investments in companies in the solar manufacturing and LED industries.

We have, from time to time, disposed of investments for financial, strategic or other purposes in recent years. See “Item 4. Information on the Company—B. Business Overview—Our Investments” for a description of our investments.

Treasury Share Programs

We have from time to time announced plans, none of which were binding on us, to buy back up to a fixed amount of our common shares on the Taiwan Stock Exchange at the price range set forth in the plans. On March 7, 2018, our board of directors resolved to purchase up to 200 million common shares on the Taiwan Stock Exchange at a price between NT\$9.85 and NT\$21.30 per share during the period from March 8, 2018 to May 7, 2018 for cancellation. On November 5, 2018, our board of directors resolved to purchase up to 300 million common shares on the Taiwan Stock Exchange at a price between NT\$7.55 and NT\$20.80 per share during the period from November 6, 2018 to January 5, 2019 for cancellation. Our board of directors further resolved to repurchase up to 200 million common shares on the Taiwan Stock Exchange during a two-month period from April 26, 2019 for cancellation. We repurchased the total of 200 million common shares from April 26, 2019 through June 13, 2019 at a price between NT\$8.40 and NT\$18.10, with an average price of NT\$13.21 per share. Subsequently, on June 19, 2019, we executed the cancellation of the 200 million treasury shares.