

Results of Operations

Consolidated Results

For the year ended	2019		2018		2017	
Revenue	\$23,406	100 %	\$30,391	100 %	\$20,322	100 %
Cost of goods sold	12,704	54 %	12,500	41 %	11,886	58 %
Gross margin	10,702	46 %	17,891	59 %	8,436	42 %
Selling, general, and administrative	836	4 %	813	3 %	743	4 %
Research and development	2,441	10 %	2,141	7 %	1,824	9 %
Other operating (income) expense, net	49	— %	(57)	— %	1	— %
Operating income	7,376	32 %	14,994	49 %	5,868	29 %
Interest income (expense), net	77	— %	(222)	(1)%	(560)	(3)%
Other non-operating income (expense), net	(405)	(2)%	(465)	(2)%	(112)	(1)%
Income tax (provision) benefit	(693)	(3)%	(168)	(1)%	(114)	(1)%
Equity in net income (loss) of equity method investees	3	— %	(1)	— %	8	— %
Net income attributable to noncontrolling interests	(45)	— %	(3)	— %	(1)	— %
Net income attributable to Micron	<u>\$ 6,313</u>	27 %	<u>\$14,135</u>	47 %	<u>\$ 5,089</u>	25 %

Total Revenue

Total revenue for 2019 decreased 23% as compared to 2018 primarily due to pricing declines resulting from the challenging memory market environment in 2019. Sales of DRAM products for 2019 decreased 28% as compared to 2018 primarily due to declines in average selling prices of approximately 30% resulting from supply and demand imbalances, customer inventory corrections, and CPU shortages. Sales of NAND products for 2019 decreased 12% as compared to 2018 primarily due to declines in average selling prices in the mid-40% range resulting from supply and demand imbalances, which were partially offset by significant increases in sales volumes. In addition, demand for our NAND products was adversely affected by the transition from SATA SSDs to NVMe SSDs. The higher NAND sales volumes in 2019 were driven by increases in sales of high-value mobile managed NAND products as well as discrete NAND products enabled by our execution in ramping 64- and 96-layer TLC 3D NAND.

Total revenue for 2018 increased 50% as compared to 2017. Higher revenue in 2018 for both DRAM and NAND as compared to 2017 were driven by strong execution in delivering high-value products featuring our 1Xnm DRAM and 64-layer 3D NAND technologies combined with strong demand for products across our primary markets. Sales of DRAM products for 2018 increased 64% from 2017 primarily due to an increase in average selling prices of approximately 35% and an increase in sales volumes of approximately 20% as a result of strong market conditions, particularly for cloud, enterprise, mobile, and graphics markets, combined with increased sales into high-value markets. Sales of NAND products for 2018 increased 20% from 2017 despite declines in average selling prices primarily due to an increase in sales volumes of approximately 30% driven by increases in sales of high-value SSD and mobile managed NAND products enabled by strong demand and our execution in delivering 3D NAND products.

Overall Gross Margin

Our overall gross margin percentage decreased to 46% for 2019 from 59% for 2018 primarily due to declines in average selling prices partially offset by cost reductions resulting from strong execution in delivering products featuring advanced technologies and from continuous improvement initiatives to reduce production costs. Underutilization of IMFT assets adversely impacted our gross margin by a per-quarter average of approximately \$100 million in 2019 and \$65 million in 2018, and we anticipate the adverse impact of underutilization at IMFT to increase to approximately \$150 million per quarter beginning in the first quarter of 2020.