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# US Semiconductors

## The Analog Recovery Primer – Why We’re Bullish, How High Can EPS and Stocks Go, Why TXN is Our Top Pick and a Brief Tutorial



### CITI'S TAKE

We are bullish on the analog sector as we believe inventory is low, margins and EPS are close to a trough, and a recovery in sales is imminent which should drive upside to Consensus estimates. With sales, gross margins and EPS estimates almost back to pre-COVID levels, we believe a recovery will drive 70% average growth to EPS by 2H26 and we are beginning to see signs of such a recovery with multiple analog companies experiencing an increase in bookings such as TXN, ADI and IFX. We are Buy-rated on all the analog names in our coverage, with TXN as our top pick with the best risk-reward ratio, followed by MCHP, ADI and NXPI.

**Inventory is low – second-worst correction in the last 20 years** — Sales from the analog companies declined 33% from peak to trough, the second-worst correction since the Financial Crisis where sales fell 44%. Analog units fell 27% peak to trough, the second-worst unit correction since the Financial Crisis where units fell 43%.

**Gross margins and EPS almost back to pre-COVID levels** — Gross margins for the analog group have declined over 10% on average, and quarterly EPS estimates have declined roughly 60% on average, almost back to pre-COVID levels.

**Signs of broad-based recovery from Industrial end market** — Analog sales to the Industrial end market (roughly 35% of analog sales) have declined roughly 35% from the peak and are well below trend line. For the first time in years, multiple companies such as TXN and ADI are guiding for above-seasonal growth in the Industrial end market and/or book to bill above 1.0 in every Industrial vertical.

**Could be more Auto weakness but Industrial recovery, seasonality offsets** — While we expect sales from the Auto end market (roughly 45% of analog sales) to decline further, we believe the recovery from the Industrial end market and seasonality from the Consumer and Data Center end markets would offset the Auto weakness.

**TXN commentary will likely be the next catalyst** — We expect TXN to comment they are seeing a broad-based recovery during 1Q25 earnings – similar to ADI. MCHP also mentioned that January/February bookings are meaningfully higher.

**Analog sales typically increase 60% during an upturn** — Analog sales increase roughly 60% on average during an upturn which usually lasts for about 10 quarters. We are modelling quarterly sales for the analog companies to grow 30% from the trough to 2H26, in line with the more modest upturns in 2011-2014 and 2016-2018. We expect upside to our estimates once end demand recovers.

**Elevated multiples but expect quarterly EPS to grow 70%** — While multiples are elevated, we expect quarterly EPS for the analog companies to grow roughly 70% by 2H26. We would cite [rule #1](#) – Never buy or sell purely based on valuation.

**TXN our top pick based on best risk/reward** — Texas Instruments is our top pick in analog based on the best risk/reward. While MCHP has more upside to EPS, we acknowledge more risk/time needed versus TXN.

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See Appendix A-1 for Analyst Certification, Important Disclosures and Research Analyst Affiliations.

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# The Analog Recovery Primer – Why We’re Bullish, How High Can EPS and Stocks Go, Why TXN is Our Top Pick and a Brief Tutorial on Analog

We are bullish on the analog sector as we believe inventory is low, margins and EPS are close to a trough, and a recovery in sales is imminent which should drive upside to Consensus estimates. With sales, gross margins and EPS estimates almost back to pre-COVID levels, we believe a recovery will drive 70% average growth to EPS by 2H26 and we are beginning to see signs of such a recovery with multiple analog companies experiencing an increase in bookings such as TXN, ADI and IFX. We are Buy-rated on all the analog names in our coverage, with TXN as our top pick with the best risk-reward ratio, followed by MCHP, ADI and NXPI.

## Inventory is low – second-worst correction in the last 20 years

Sales from the analog and mixed-signal companies declined 33% from peak to trough, the second-worst correction since Financial Crisis where sales fell 43% from peak to trough. We note that sales for ADI and TXN troughed in 1Q24 and sales for Renesas and Infineon appear to have troughed in 4Q24. As such, we believe we are at the cusp of a broad-based recovery.

Figure 1. Sales for Analog Companies declined 33% from the peak

	Peak	Qtr	Trough	Qtr	Peak to Trough
MCHP	2,289	2Q23	960	1Q25E	-58%
STM	4,431	3Q23	2,645	1Q25E	-40%
ON	2,193	3Q22	1,400	1Q25E	-36%
Renesas	2,981	1Q22	1,929	4Q24	-35%
ADI	3,263	1Q23	2,159	1Q24	-34%
TXN	5,241	3Q22	3,661	1Q24	-30%
Infineon	4,531	1Q23	3,554	4Q24	-22%
NXPI	3,445	3Q22	2,800	1Q25E	-19%
Average					33%

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Source: Citi Research, FactSet

Sales for the analog companies on average corrected 44% from the peak during the 2008 Global Financial Crisis.

**Figure 2. Sales for Analog Companies were down 44% during the Financial Crisis**

	Peak	Qtr	Trough	Qtr	Peak to Trough
Infineon	2,526	3Q07	973	1Q09	-61%
TXN	3,663	3Q07	2,086	1Q09	-43%
Renesas	1,590	2Q08	913	1Q09	-43%
STM	2,696	3Q08	1,675	1Q09	-38%
Maxim	540	4Q07	340	1Q09	-37%
MCHP	270	3Q08	173	1Q09	-36%
ON	582	3Q08	379	1Q09	-35%
ADI	661	3Q08	475	1Q09	-28%
Average					-44%

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Source: Citi Research, FactSet

Sales corrected roughly 20% on average from the peak during COVID. We believe the sharper decline in sales in this current correction was driven by a sharp fall in pricing, in addition to unit inventory correction.

**Figure 3. Sales for Analog Companies were down roughly 20% during 2019 Downturn/COVID**

	Peak	Qtr	Trough	Qtr	Peak to Trough
NXPI	2,445	3Q18	1,817	2Q20	-26%
TXN	4,261	3Q18	3,239	2Q20	-24%
ON	1,542	3Q18	1,214	2Q20	-21%
STM	2648	4Q18	2087	2Q20	-21%
ADI	1,597	3Q18	1,304	4Q19	-18%
MXIM	649	1Q18	533	3Q19	-18%
Renesas	1,864	2Q18	1,550	2Q20	-17%
MCHP	1,513	3Q18	1,287	4Q19	-15%
Infineon	2,381	3Q18	2,121	4Q19	-11%
Average					-20%

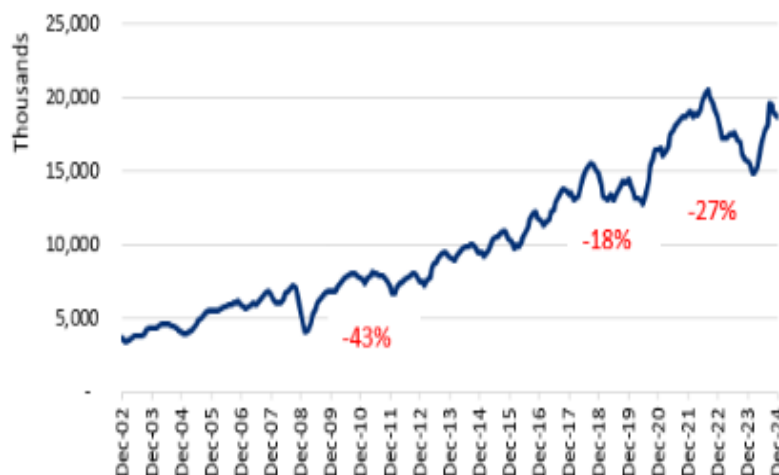
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Source: Citi Research, FactSet

## Analog units corrected 27% from the peak

Similarly, based on data from WSTS, the 3-month moving average analog units fell 27% from peak to trough, the second-worst unit correction since the Financial Crisis where units fell 43%.

Figure 4. Industry 3MMA Analog Units are down 27% from the Peak



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Source: Citi Research, WSTS

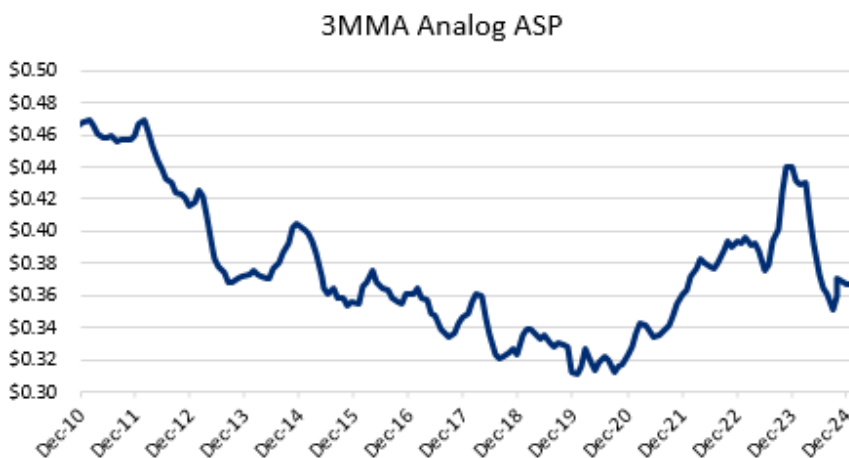
## Analog units are rebounding but pricing continues to fall

As shown in Figure 5, analog units have rebounded 24% in 2H24 and are now roughly 10% below prior peak. However, pricing has continued to decline, and as such, sales have not yet seen a similar rebound.

As shown in the table below, analog pricing rose roughly 40% from roughly \$0.31 in 1Q20 to roughly \$0.44 in 4Q23, before falling 20% last year to about \$0.35.

Analog pricing is showing signs of stabilization in recent months. While we expect analog pricing to see a mid-single digit decline in 2025, we believe we are almost through the worst of the ASP declines.

Figure 5. Industry 3MMA Analog Pricing



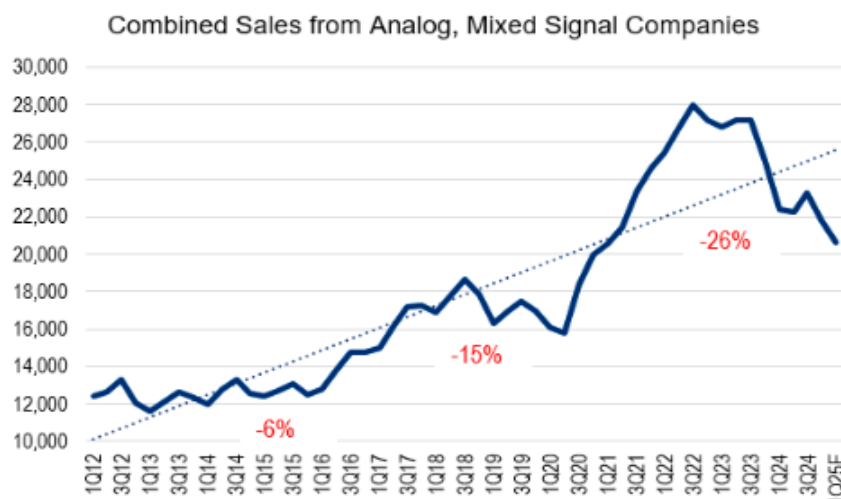
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Source: Citi Research, WSTS

## Current sales are still roughly 25% below peak

Despite some stabilization from ADI, TXN, Infineon and Renesas, combined sales from the analog, mixed signal companies are roughly 25% below peak, and back to 2020 level, which we believe provides some near-term impetus for inventory replenishment.

Figure 6. Quarterly Combined Sales Analog and Mixed Signal Companies



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Source: Citi Research, Company Reports, Factset. Companies include ADI, MCHP, MXIM, NXPI, ON, TXN, Infineon, STM, MPWR, Renesas

## Gross margins almost back to pre-COVID levels

Gross margins for most analog companies in our coverage are down more than 10 percentage points from the peak, driven by falling pricing, underutilization and inventory write-offs.

Figure 7. Gross Margins for the Analog Companies Declined > 10%

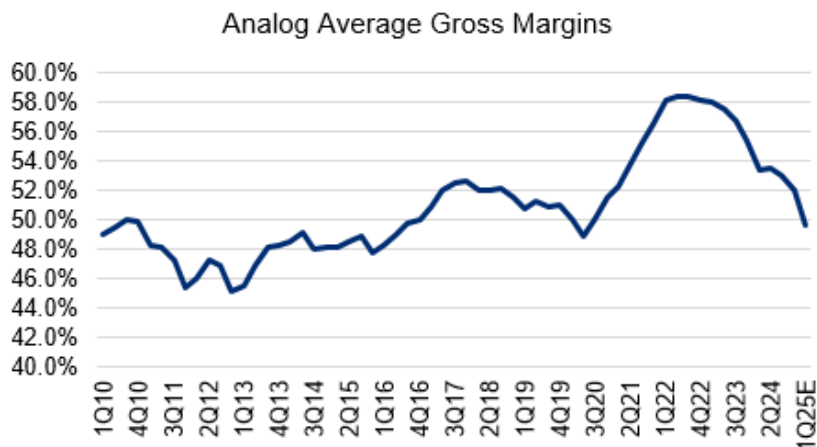
	Peak	Qtr	Trough	Qtr	Decline (bps)
TXN	70.2%	1Q22	54.5%	1Q25E	-1567
MCHP	68.1%	2Q23	52.5%	1Q25E	-1559
STM	49.7%	1Q23	34.7%	1Q25E	-1497
ON	49.7%	2Q22	38.0%	2Q25E	-1174
Infineon	47.2%	4Q22	37.4%	1Q25E	-987
Renesas	58.6%	2Q22	53.1%	1Q25E	-546
ADI	74.2%	1Q22	69.0%	1Q25E	-520
NXPI	58.1%	3Q23	55.5%	1Q25E	-262
Average					-1014

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Source: Citi Research, Company Reports

As shown below, the average gross margins of the analog, mixed-signal companies are almost back to pre-COVID levels in 2019.

Figure 8. Gross Margins for the Analog Companies Declined > 10%

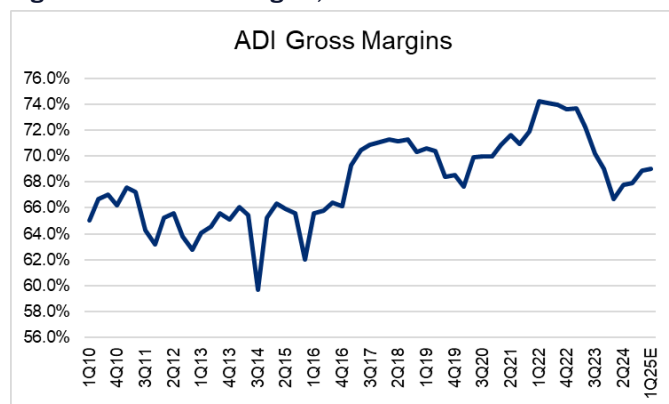


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Source: Citi Research, Company Reports

Similar trends can be observed on a company-specific level. ADI gross margin is now 69.0%, back to its pre-COVID levels. On the other hand, MCHP gross margin has fallen to the 15-year low at 52.5% due to underutilization and write-offs. During the latest [business update call in March 2025](#), MCHP mentioned that they could easily see 1000 basis points of gross margin expansion as they lower inventory, reduce write-offs and consolidate manufacturing.

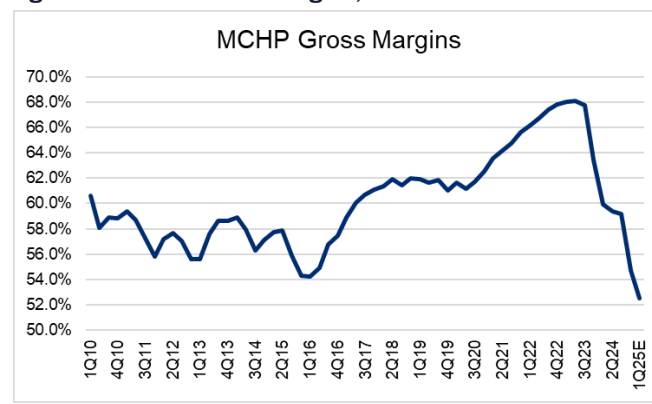
Figure 9. ADI Gross Margins, 2010–Present



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Source: Company Reports and Citi Research Estimates

Figure 10. MCHP Gross Margins, 2010–Present

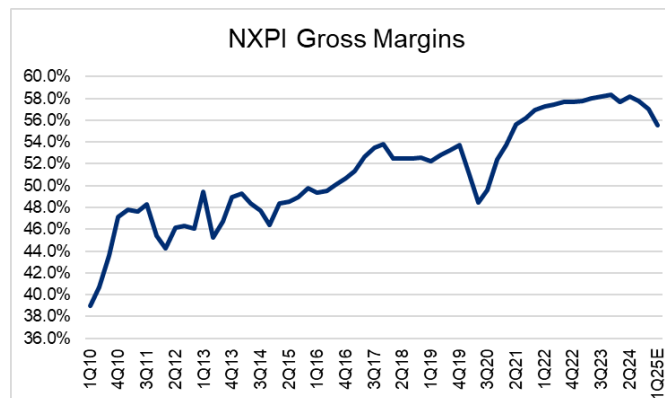


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Source: Company Reports and Citi Research Estimates

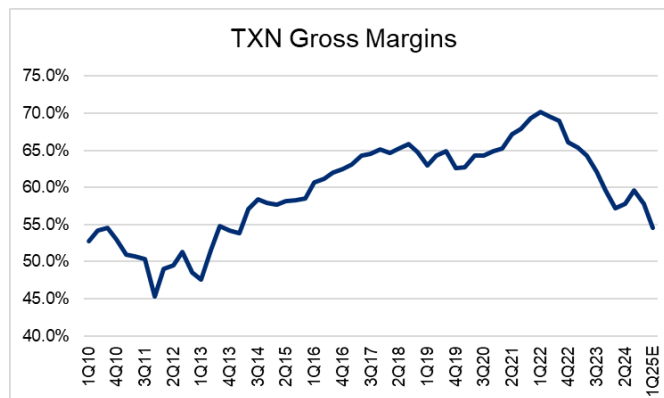
NXPI gross margin declined 262 basis points to 55.5% and is back to 2020 levels. TXN gross margin, on the other hand, is back to the 2015 level of mid-50s%, partly driven by higher depreciation expenses.

Figure 11. NXPI Gross Margins, 2010–Present



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Source: Company Reports and Citi Research Estimates

Figure 12. TXN Gross Margins, 2010–Present



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Source: Company Reports and Citi Research Estimates

## Quarterly EPS estimates are also almost back to pre-COVID levels

As shown in the table below, quarterly EPS for the analog companies have declined roughly 60% from the peak, and as such, we believe we are very close the bottom of the earnings cycle.

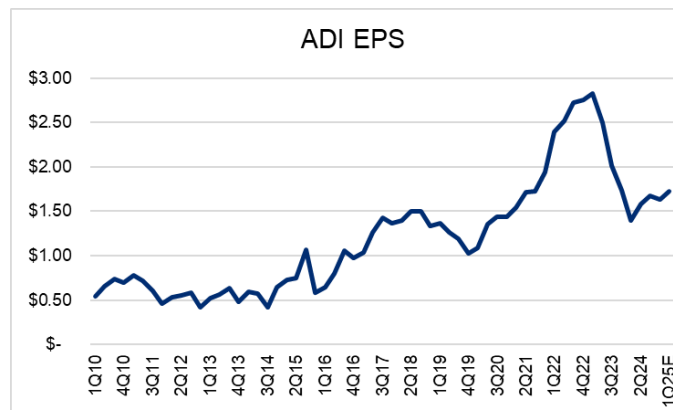
Figure 13. Quarterly EPS for the Analog Companies Declined 60% on Average

	EPS				
	Peak	Qtr	Trough	Qtr	Decline
MCHP	\$1.56	2Q23	\$0.04	1Q25E	-97%
TXN	\$2.56	3Q22	\$1.05	1Q25E	-59%
ADI	\$2.83	1Q23	\$1.63	4Q24	-42%
NXPI	\$3.81	3Q22	\$2.52	1Q25E	-34%
Average					-58%

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Source: Citi Research, FactSet

ADI's EPS has fallen roughly 42% from the peak in 1Q23 and now back to pre-COVID levels. MCHP's EPS has fallen 97% from its peak and is currently at 15-year lows.

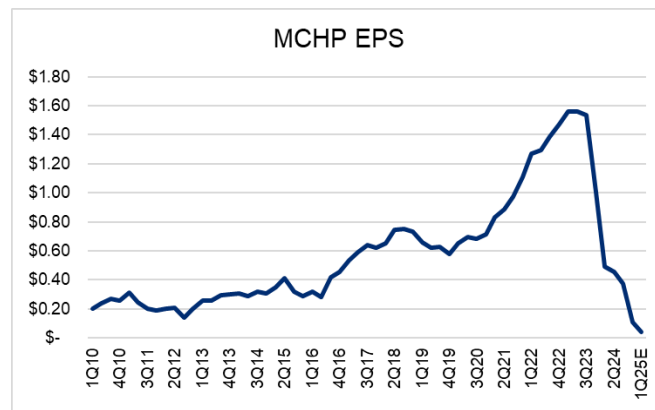
Figure 14. ADI EPS, 2010–Present



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Source: Company Reports and Citi Research Estimates

Figure 15. MCHP EPS, 2010–Present

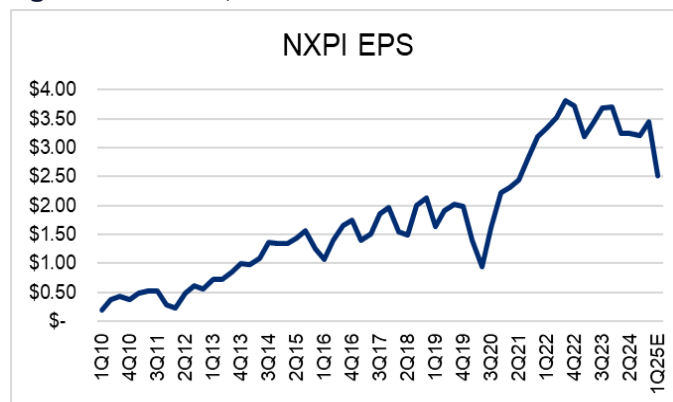


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Source: Company Reports and Citi Research Estimates

NXPI's EPS has fallen roughly 34% from the peak in 3Q22 while TXN's EPS has fallen roughly 59% from the peak in 3Q22 and is back to pre-COVID levels.

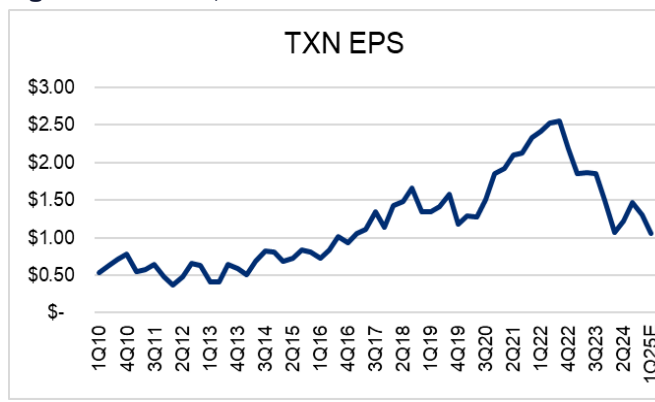
Figure 16. NXPI EPS, 2010–Present



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Source: Company Reports and Citi Research Estimates

Figure 17. TXN EPS, 2010–Present



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Source: Company Reports and Citi Research Estimates

## Sales from the Industrial end market fell 40% from peak to trough

Sales from the Industrial end market declined 40% from the peak to the trough, roughly the same magnitude in sales decline that occurred during the Financial Crisis. We believe the Industrial end market is shipping well below consumption given the sharp decline in sales.



**Figure 18. Sales from Industrial Semi Market Declined 40% from Peak to Trough**

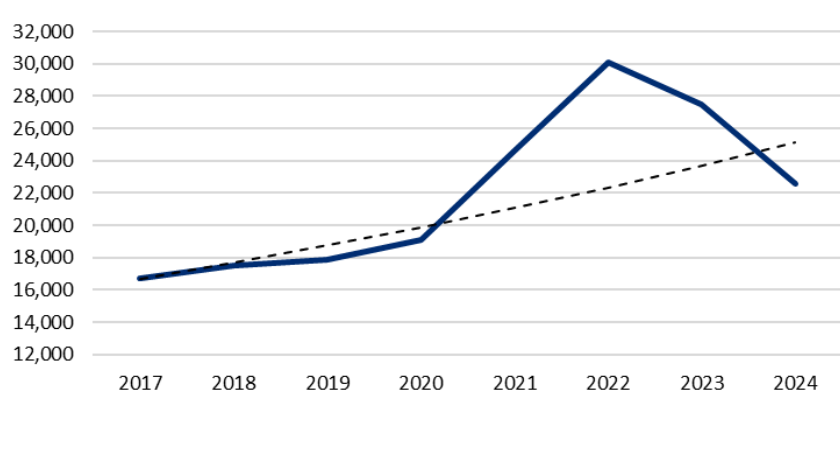
	% of sales	Peak	Peak Quarter	Trough	Trough Quarter	Peak to Trough
STM	20%	\$2,071	3Q23	\$1,099	1Q25E	-47%
Renesas	47%	\$1,697	2Q22	\$945	4Q24	-44%
ADI	47%	\$1,745	1Q23	\$1,015	1Q24	-42%
ON	28%	\$616	3Q22	\$367	2Q25E	-40%
TXN	34%	\$2,072	2Q22	\$1,293	4Q24	-38%
Infineon	34%	\$1,865	3Q22	\$1,218	4Q24	-35%
NXP	18%	\$713	2Q22	\$503	2Q25E	-29%
Avg						-40%

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Source: Citi Research, Company Reports

On an annual basis, sales from the Industrial end market have corrected roughly 25% from the peak in 2022 and sales are now below a conservative long-term growth forecast of 6% CAGR, giving us confidence that we are close to the bottom.

**Figure 19. Annual Sales from Industrial End Market, 2017-2024**



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Source: Citi Research, Company include ADI/MXIM, Infineon, NXPI, MCHP, Renesas, ON, TXN

## Signs of broad-based recovery from the Industrial end market

We believe the Industrial end market is exhibiting concrete signs of recovery. For the first time in years, multiple companies such as TXN and ADI are guiding for above-seasonal growth in the Industrial end market and/or book to bill above 1.0 in every Industrial vertical.

We would note that areas of strength extend from China to North America. Arrow mentioned that they are seeing sequential improvement in the Industrial end market in 4Q24 driven by strength in Asia and North America. ADI similarly mentioned strength from North America.

Figure 20. 4Q24 and 1Q25 Industrial Sales Sequential Growth/Decline vs Seasonality

	4Q24 QoQ Actual	1Q25 QoQ Guide	1Q25 QoQ Seasonal	Above/ Below Seasonal
ADI	+1%	Up 6%	LSD% growth	Above
Infineon	-19%	20%	Flat	Above
NXPI	-8%	Flat	LSD% decline	Above
STM	+9%	-20%	LSD% growth	
TXN	LSD% decline	seasonally strong	growth	Above

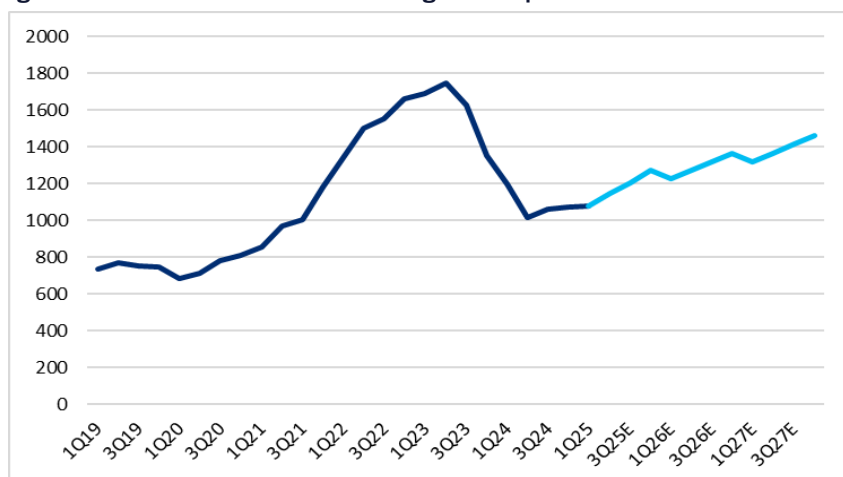
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Source: Citi Research, Company Reports

## ADI's Industrial business grew for four consecutive quarters

ADI's sales from the Industrial end market have increased consecutively for the last four quarters and are up roughly 13% from the trough in 1Q24. In its recent earnings report, ADI experienced an increase in bookings across the board and we believe the broad-based strength in the Industrial end market is indicative of the beginning of a recovery.

Figure 21. ADI Industrial Business Troughed in April 2024



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Source: Citi Research, Company Reports

## Industrial end market sales now down 35% below the peak – we expect every company to experience an upturn

In February, both the US and China manufacturing PMI were in expansionary territory, supporting our thesis of a recovery in the Industrial end market. [US ISM manufacturing](#) was in line with Consensus, falling from 50.9 to 50.3 in February. On the other hand, [China's manufacturing PMI](#) increased 1.1 percentage points to 50.2 above Consensus of 49.9 in February. [Global manufacturing PMI](#) rose to 50.6 in February, the highest level since June 2024, though we note that some of the strength was likely front loading ahead of potential tariffs.

We believe all the analog companies will eventually see the recovery in bookings that ADI, TXN and Infineon are seeing. We continue to monitor the global PMI as indication of a sustained recovery.

**Figure 22. Sales from Industrial Semi Market are still ~35% Below the Peak**

	% of sales	Peak	Peak Quarter	Current	Current Quarter	Peak to Current
STM	40%	\$2,071	3Q23	\$1,099	1Q25E	-47%
Renesas	47%	\$1,697	2Q22	\$996	1Q25E	-41%
ON	28%	\$616	3Q22	\$381	1Q25E	-38%
TXN	34%	\$2,072	2Q22	\$1,323	1Q25E	-36%
ADI	46%	\$1,745	1Q23	\$1,144	1Q25E	-34%
Infineon	34%	\$1,865	3Q22	\$1,461	1Q25E	-22%
NXP	18%	\$713	2Q22	\$503	1Q25E	-29%
Avg						-36%

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Source: Citi Research, Company Reports

## Could be more Auto weakness but Industrial recovery, seasonality offsets

While we expect revenue from the Auto end market (roughly 45% of analog sales) to decline further, we believe the recovery from the Industrial end market and seasonality from the Consumer and Data Center end markets will offset the Auto weakness.

## Sales from the Auto End Market have declined 22% from the peak

We note that Sales from the Auto end market have declined roughly 22% from the peak, indicating that we are closer to the trough than the peak. While we believe sales could further decline, we believe strength in other end markets can offset the declines.

**Figure 23. Peak to Trough Sales from the Auto End Market**

	% of sales	Peak	Peak Quarter	Trough	Trough Quarter	Peak to Trough
STM	24%	\$989	3Q23	\$549	1Q25E	-44%
ON	55%	\$1,158	3Q23	\$752	2Q25E	-35%
Renesas	52%	\$1,342	1Q22	\$999	4Q24	-26%
TXN	35%	\$1,571	3Q23	\$1,278	1Q25E	-19%
Infineon	57%	\$2,364	3Q24	\$1,955	1Q25E	-17%
ADI	30%	\$785	1Q23	\$653	3Q24	-17%
NXPI	58%	\$1,899	4Q23	\$1,683	1Q25E	-11%
Avg						-22%

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Source: Citi Research, Company Reports

## Analog sales usually increase 60% and last for 10 quarters in an upturn

Based on historical analog cycles, analog sales usually increase roughly 60% from trough to peak and increase roughly 30% from its prior peak. We note that a typical upturn lasts for about 10 quarters.

In prior upturns, units typically increased roughly 40-60% from the trough and pricing typically declines by 5-15%.

Figure 24. Analog Sales Rose Roughly 60% on Average in Prior Upturns

Analog Sales Trough to Peak Cycle	Trough Sales	Peak Sales	Sales Change	Units change	ASP change	Length of Cycle (Quarters)	Current vs prior Sales Peak
March 2009 to Sep 2010	6.02	11.04	83%	94%	-5%	7	
Dec 2011 to Sep 2014	9.69	11.64	20%	43%	-16%	12	6%
March 2016 to Sep 2018	10.95	14.94	36%	56%	-13%	11	28%
June 2020 to Sep 2022	12.19	23.21	90%	56%	22%	10	55%
			58%	62%	-3%	10	30%

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Source: Citi Research, WSTS

## We are modelling sales to be up 30% by 2H26, in line with a very modest upturn

We are modelling sales to be up roughly 30% from the trough by 2H26 for the analog companies, in line with the more modest upturns observed in the 2011-2014 and 2016-2018 upturns given the macro uncertainty.

Figure 25. Modelling Sales to Grow 30% from Trough

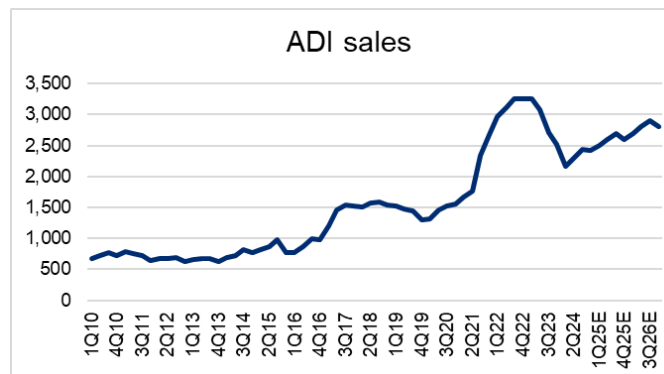
	Trough	Qtr	Peak	Qtr	Growth
MCHP	960	1Q25E	1,300	3Q26E	35%
ADI	2,159	1Q24	2,900	3Q26E	34%
TXN	3,661	1Q24	4,800	3Q26E	31%
ON	1,350	2Q25E	1,750	4Q26E	30%
NXPI	2,800	1Q25E	3,300	4Q26E	18%
	10,930		14,050		29%

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Source: Citi Research, Company Reports

As shown in the table below, we are modelling ADI sales to increase 34% from the trough and MCHP sales to increase 35% from the trough.

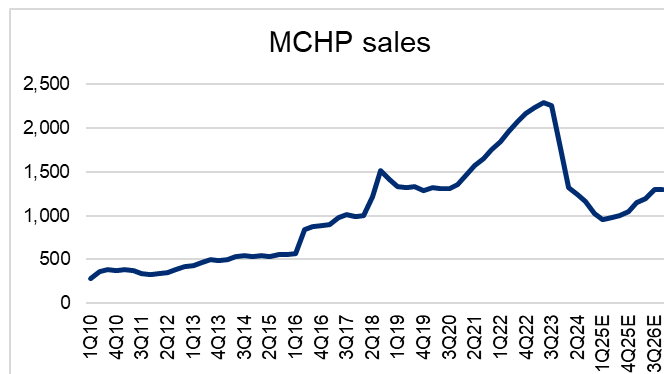
Figure 26. ADI Sales, 2010-2026E



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Source: Company Reports and Citi Research Estimates

Figure 27. MCHP Sales, 2010-2026E

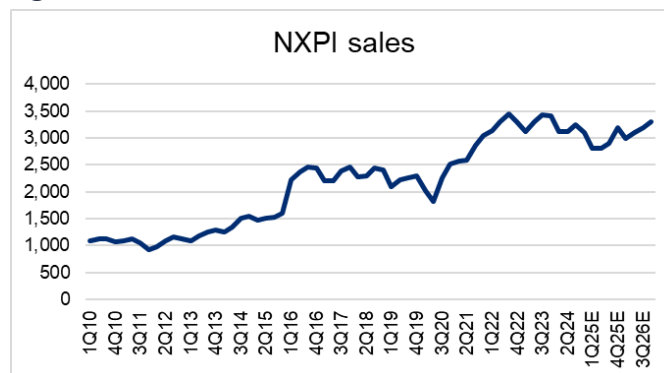


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Source: Company Reports and Citi Research Estimates

We are modelling NXPI sales to increase 18% from the trough and TXN sales to increase 31% from the trough. We expect NXPI sales to grow the slowest among the analog names as the company experienced the smallest sales correction.

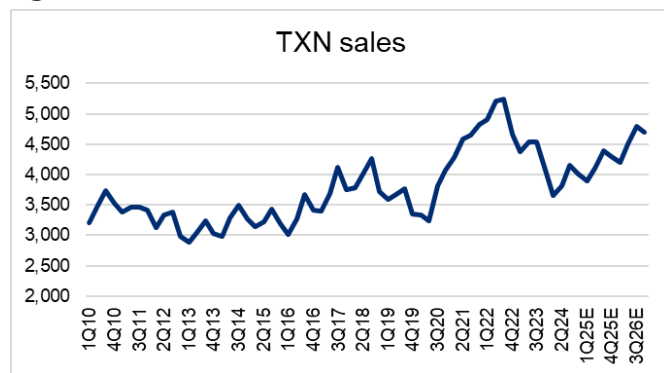
Figure 28. NXPI Sales, 2010-2026E



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Source: Company Reports and Citi Research Estimates

Figure 29. TXN Sales, 2010-2026E



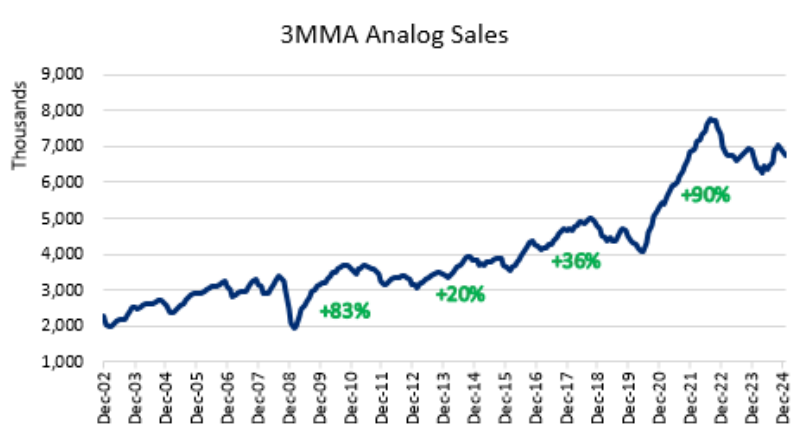
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Source: Company Reports and Citi Research Estimates

## ... but we see upside to our sales estimates

As shown in the table below, during each upturn, analog sales have historically exceeded its prior peak. Analog sales have been growing at a 6-8% CAGR in the last 5, 7, 10, 20 years. Given that our 2026 sales estimates for the companies are currently below prior peak levels, we see upside to our estimates.

Figure 30. 3MMAAnalog Sales since 2002



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Source: Citi Research, WSTS

## Expect quarterly EPS to grow roughly 70% from the trough by 2H26

Consequently, we are modelling quarterly EPS to grow roughly 70% from the trough. We expect MCHP to see the largest quarterly EPS growth given how depressed sales, gross margins were. We expect TXN to see the second largest EPS growth driven by lower underutilization rates and lower depreciation.

Figure 31. Quarterly EPS to grow roughly 70% from the Trough

	EPS				
	Trough	Qtr	Peak	Qtr	Growth
MCHP	\$0.04	1Q25E	\$0.48	3Q26E	1062%
TXN	\$1.05	1Q25E	\$1.90	3Q26E	81%
ADI	\$1.40	1Q24	\$2.26	3Q26E	62%
NXPI	\$2.52	1Q25E	\$3.37	4Q26E	34%
Median					72%
Average					310%

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Source: Citi Research, Company Reports

## Plenty of growth/upside after 2026

Based on historical cycle trends, we anticipate most of the analog companies to be closer to peak EPS sometime in 2027. We expect peak/target EPS for the analog companies to be roughly 80% above 2024 trough levels.

Figure 32. Summary of Citi's Peak/Target EPS Estimates

	Prior Peak (2022 or 2023)	2024	Peak/Target	Growth from 2024
TXN	\$9.69	\$5.06	\$10.03	98%
MCHP	\$5.42	\$1.43	\$3.00	110%
ADI	\$10.38	\$6.28	\$11.40	82%
NXPI	\$12.45	\$11.29	\$14.50	28%
				80%

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Source: Citi Research Estimates

### TXN to achieve peak EPS of \$10, or 100% EPS growth

We believe TXN can eventually achieve peak sales of \$20 billion, peak gross margins of 70% and peak operating margin of 52%, which they had achieved back in 2022, for long-term peak EPS of \$10.03, or 100% EPS growth from 2024 EPS of \$5.06. Please see note.

Figure 33. TXN Peak EPS Model

	2022	2024	Peak
<b>Revenue</b>	<b>\$20,028</b>	<b>\$15,641</b>	<b>\$20,000</b>
Sales Growth from 2024			30%
<b>Gross Margin</b>	<b>68.8%</b>	<b>58.1%</b>	<b>70.0%</b>
SG&A	\$1,704	\$1,794	\$1,800
SG&A % of revs	8.5%	11.5%	9.0%
R&D	\$1,670	\$1,959	\$1,700
R&D % of revs	8.3%	12.5%	8.5%
<b>Operating Income</b>	<b>\$10,397</b>	<b>\$5,341</b>	<b>\$10,500</b>
<b>Operating Margin</b>	<b>51.9%</b>	<b>34.1%</b>	<b>52.5%</b>
Interest Income/Other	(\$108)	(\$12)	\$50
Tax	12.5%	12.3%	13.0%
<b>Net Income</b>	<b>\$9,006</b>	<b>\$4,675</b>	<b>\$9,179</b>
Shares	926	919	915
<b>EPS</b>	<b>\$9.69</b>	<b>\$5.06</b>	<b>\$10.03</b>

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Source: Citi Research Estimates

### MCHP target EPS of \$3.00, or 110% EPS growth

We are Buy-rated on MCHP as we believe the company is shipping well below demand given sales are 58% below the peak. We are confident in MCHP's sales bouncing back faster than peers given Steve Sanghi's extensive experience in managing MCHP through downturns.

We are modelling sales to grow 20% from 2024 levels and expect the company to achieve their gross margin target of 65% and operating margin target of 40%. We estimate MCHP could achieve an EPS of roughly \$3.00 in the medium term with additional upside after that, or close to 110% increase in EPS from 2024 EPS.

Figure 34. MCHP Medium Term Target EPS Model

	2022	2024	Target
<b>Revenue</b>	\$8,050	\$4,757	\$5,722
Sales Growth from 2024			20%
<b>Gross Margin</b>	<b>67.1%</b>	<b>58.5%</b>	<b>64.6%</b>
SG&A	\$773	\$617	\$500
SG&A % of revs	9.6%	13.0%	8.7%
R&D	\$1,078	\$969	\$960
R&D % of revs	13.4%	20.4%	16.8%
<b>Operating Margin</b>	<b>44.1%</b>	<b>25.1%</b>	<b>39.1%</b>
Interest Income/Other	-\$202	-\$241	-\$330
Pretax Income	\$3,346	\$954	\$1,906
Tax Rate	9%	19%	15%
Net Income	\$3,036	\$775	\$1,620
Shares	560	542	540
<b>EPS</b>	<b>\$5.42</b>	<b>\$1.43</b>	<b>\$3.00</b>

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Source: Citi Research Estimates

### ADI peak EPS of \$11.40, or 82% EPS growth

We are modelling ADI peak sales to be up 50% from 2024 levels, or just 2% CAGR from peak 2022 levels. Assuming gross margins go back to 70%, we can expect EPS to be roughly \$11.40, or 82% from 2024 EPS estimate of \$6.28.

Figure 35. ADI Peak EPS Model

	2022	2024	Peak
<b>Revenue</b>	\$12,580	\$9,338	\$14,020
Sales Growth from 2024			50%
<b>Gross Margin</b>	<b>74.0%</b>	<b>67.9%</b>	<b>71.0%</b>
SG&A	\$1,295	\$1,063	\$1,472
SG&A % of revs	10.3%	11.4%	10.5%
R&D	\$1,688	\$1,499	\$1,893
R&D % of revs	13.4%	16.1%	13.5%
<b>Operating Margin</b>	<b>50.6%</b>	<b>40.5%</b>	<b>47.0%</b>
Interest Income/Other	-\$205	-\$247	-\$247
Pre-tax Income	\$6,165	\$3,532	\$6,347
Tax Rate	13%	11%	12%
Net Income	\$5,384	\$3,131	\$5,585
Shares	518	499	490
<b>EPS</b>	<b>\$10.38</b>	<b>\$6.28</b>	<b>\$11.40</b>

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Source: Citi Research Estimates

### NXPI peak EPS of \$14.50, or 28% EPS growth

We are modelling NXPI peak sales to be up 10% from 2024 levels. Assuming gross margins and increase to 60%, we can expect EPS to be roughly \$14.50, or 28% from 2024 EPS estimate of \$11.29.



Figure 36. NXPI Peak EPS Model

	2023	2024	Peak
<b>Revenue</b>	\$13,276	\$12,614	\$13,812
Sales Growth from 2024			10%
<b>Gross Margin</b>	<b>58.1%</b>	<b>57.7%</b>	<b>60.6%</b>
SG&A	\$1,096	\$1,077	\$1,160
SG&A % of revs	8.3%	8.5%	8.4%
R&D	\$2,354	\$2,284	\$2,486
R&D % of revs	17.7%	18.1%	18.0%
<b>Operating Income</b>	<b>\$4,251</b>	<b>\$3,907</b>	<b>\$4,721</b>
<b>Operating Margin</b>	<b>32.0%</b>	<b>31.0%</b>	<b>34.2%</b>
Interest Income/Other	-\$283	-\$275	-\$300
Pretax Income	\$3,968	\$3,632	\$4,421
Tax Rate	17%	19%	18%
Net Income	\$3,250	\$2,914	\$3,625
Shares	261	258	250
<b>EPS</b>	<b>\$12.45</b>	<b>\$11.29</b>	<b>\$14.50</b>

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Source: Citi Research Estimates

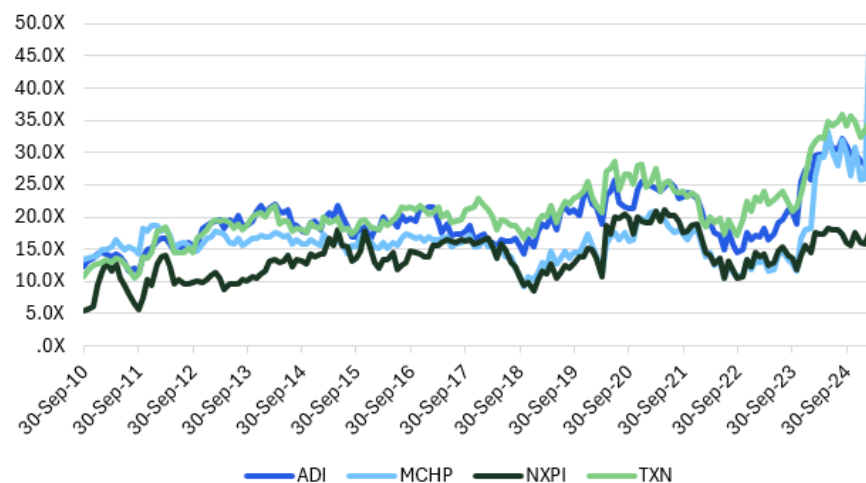
## TXN commentary will likely be the next catalyst

We expect TXN to comment they are seeing a broad-based recovery during 1Q24 earnings - similar to ADI. MCHP also mentioned that January/February bookings are meaningfully higher.

## Biggest risk - Multiples are elevated

The biggest risk is the elevated multiples for the analog names, but we would argue that the S&P 500 and SOX index are all trading well above their historical averages. We would cite [rule #1](#) - Never buy or sell purely based on valuation.

Figure 37. SOX and S&P500 Multiples are Elevated as well



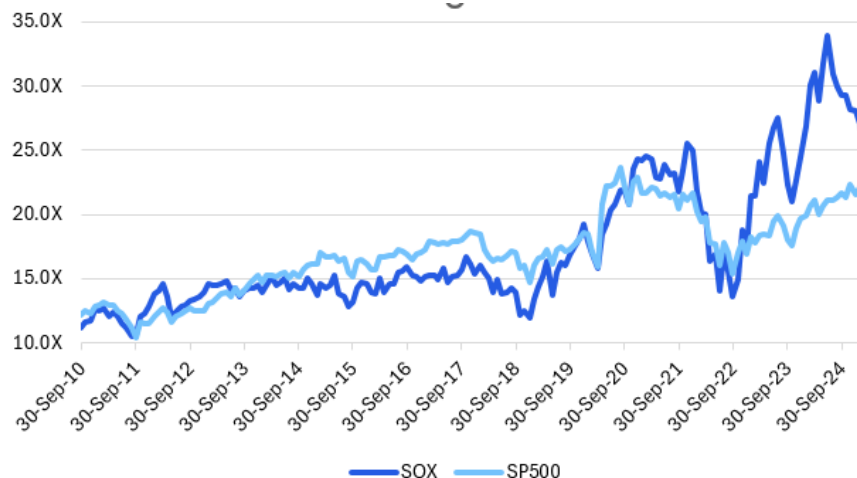
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Source: Citi Research, Factset

## SOX and S&P are also expensive

NTM P/E of the SOX index is currently trading at 24X, roughly 40% higher than its 15-year historical average of 17X. NTM P/E of the S&P 500 index is currently trading at 20X, roughly 20% higher than its 15-year historical average of 17X.

**Figure 38. SOX and S&P500 Multiples are Elevated as well**



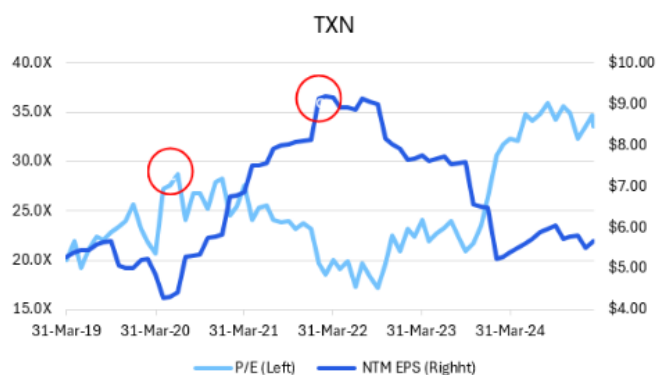
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Source: Citi Research, Factset

## Stock prices typically move higher despite elevated multiples

We believe the elevated multiples are justified in anticipation of the positive estimate revisions. Analog stocks typically trade at peak multiples due to depressed earnings, and the stocks peak a few quarters after EPS estimates are revised higher.

As shown in the chart below, TXN was trading at peak multiple of 28X NTM P/E in March 2021, six months before the stock peaked in September 2021 and close to a year before NTM EPS estimate peaked in February 2022.

**Figure 39. TXN NTM P/E vs NTM EPS**



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Source: Citi Research, Factset

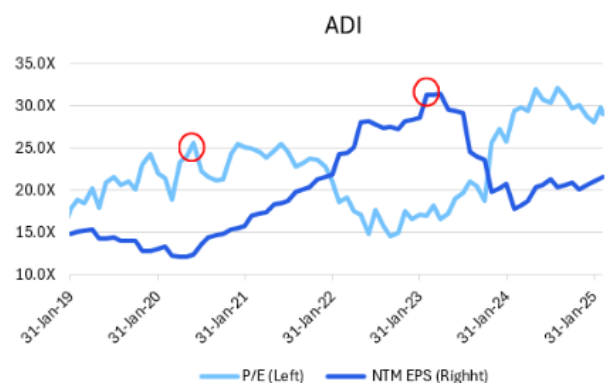
**Figure 40. TXN NTM P/E vs Stock Price**



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Source: Citi Research, Factset

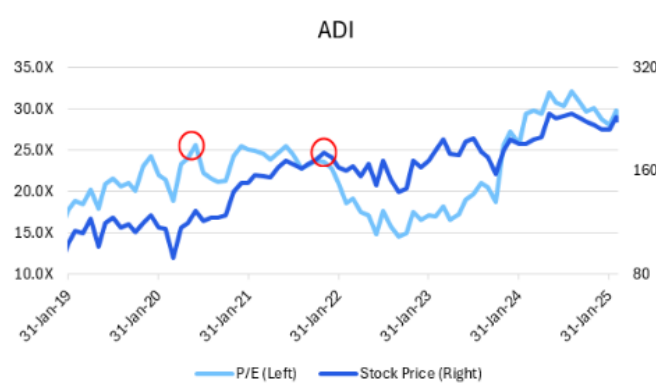
Similarly, ADI was trading at 26X NTM P/E in June 2020, roughly fifteen months before the stock peaked in November 2021, and close to three years before the NTM EPS estimate peaked in March 2023.

Figure 41. ADI NTM P/E vs NTM EPS



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Source: Citi Research, Factset

Figure 42. ADI NTM P/E vs Stock Price



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## Trade war/ recession is another risk

Trade war and recession is another risk that could derail our thesis of an analog recovery. However, Citi's current global GDP growth forecast remains at 2.7% in 2025, and as such, we believe we should still see growth from the current level, albeit more modest. As highlighted earlier, we are currently modeling a more muted upturn of roughly 30% sales growth the trough by 2H26, in line with the more moderate upturns observed in the 2011-2014 and 2016-2018 upturns given the macro uncertainty. Please refer to Figure 24.

## Current implied multiples are back to 15-year average

A recession will also lead to multiple compression across the board. Given the recent sell-off in the last four weeks, the implied multiples of the stocks based on the target/peak EPS are now close to the 15-year average. In addition, we would note that the analog stocks typically outperform the SOX index in a [recession](#).

Figure 43. SOX and S&P500 Multiples are Elevated as well

	Current Price	Peak/Target EPS	Current Implied Multiple	15-year Average Multiple
TXN	\$179.45	\$10.03	17.9X	20.6X
MCHP	\$54.20	\$3.00	18.1X	16.6X
ADI	\$209.16	\$11.40	18.3X	19.4X
NXPI	\$207.10	\$14.50	14.3X	13.8X

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Source: Citi Research, Factset

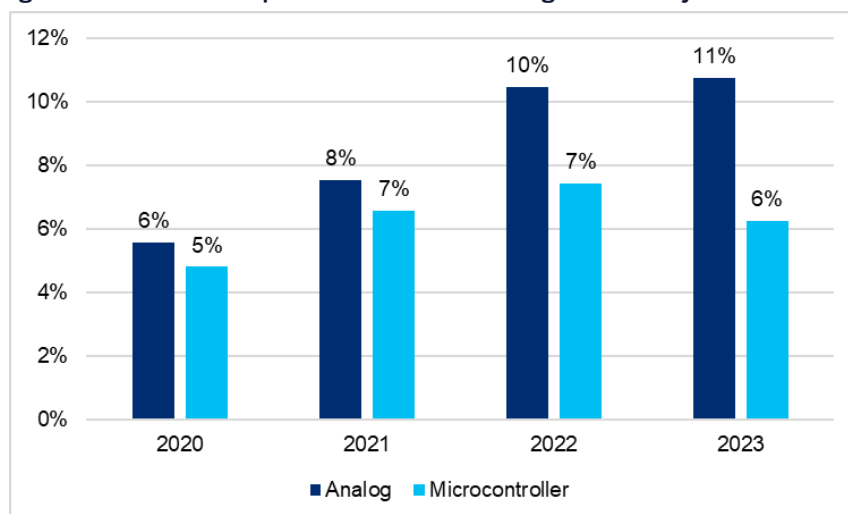
## Localization of China's semi supply chain is another risk

As stated in our previous [US-China Chip Rivalry](#) note, we believe the localization of China's semiconductor supply chain remains a medium-to-long-term risk for the Analog companies.

According to Gartner, sales from Chinese companies account for roughly 10% of total Analog sales and 6-7% of total Microcontroller sales as of 2023. In terms of end applications, 30-40% of the sales are for the Consumer end market, 30-35% for the Industrial end market, and roughly 2-5% for the Auto end market. We believe Chinese companies are not yet taking significant share in the Auto and core Industrial end markets due to the more stringent qualification standards for these applications. In addition, there is a preference for Chinese companies to use western suppliers if the end products are meant for the export market.

As such, we anticipate roughly a mid-single % impact to sales for the majority of the Analog companies over the next few years due to China's localization of supply chain. We believe the upturn will be able to mitigate the gradual erosion in market share by Chinese companies.

**Figure 44. Chinese Companies' Sales as Percentage of Industry Sales**



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Source: Citi Research, Gartner

## TXN is our top pick, followed by MCHP, ADI and NXPI

Texas Instruments is our top pick in analog based on the best risk/reward. While MCHP has more upside to EPS, we acknowledge more risk/time needed versus TXN.

Figure 45. Analog Stock Ranking

Rank	Company	Rating	Current Price	Price Target	% Upside	Target Valuation Multiple	Investment Thesis
1	TXN	Buy	\$179.45	\$235.00	31%	35X C26 EPS	Favorable risk/reward and upside
2	MCHP	Buy	\$54.20	\$65.00	20%	36X C26 EPS	Highest EPS growth but high risk as well
3	ADI	Buy	\$209.16	\$265.00	27%	31X C26 EPS	Safest analog name but less reward
4	NXPI	Buy	\$207.10	\$290.00	40%	27X C26 EPS	Benefit from Analog Recovery, but the least EPS upside

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Source: Citi Research, FactSet, Market Pricing as of 3/18/2025

## Analog Companies' End Market Exposure

Most of the Analog companies have roughly 60-70% combined exposure to the Auto and Industrial end markets.

Figure 46. ADI F24 End Market Sales Exposure

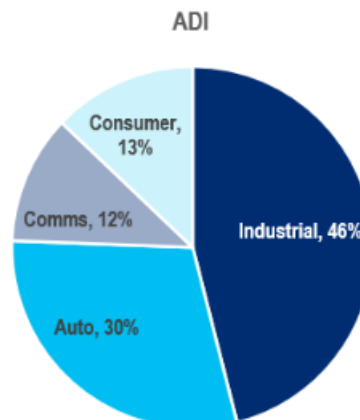
	Industrial	Auto	Comms	Personal Electronic / Mobile	Data Center/ Enterprise
ADI	46%	30%	12%	13%	-
MCHP	43%	18%	10%	11%	18%
NXPI	18%	57%	13%	12%	-
ON	25%	55%	10%	3%	7%
TXN	34%	35%	4%	20%	7%
Renesas	47%	52%			1%
STM	20%	46%	12%	22%	
IFX	33%	55%	10%		2%

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Source: Citi Research, Company Reports

ADI has 46% exposure to the Industrial end market, 30% exposure to the Auto end market, 12% exposure to the Comms end market and 13% exposure to the Consumer end market.

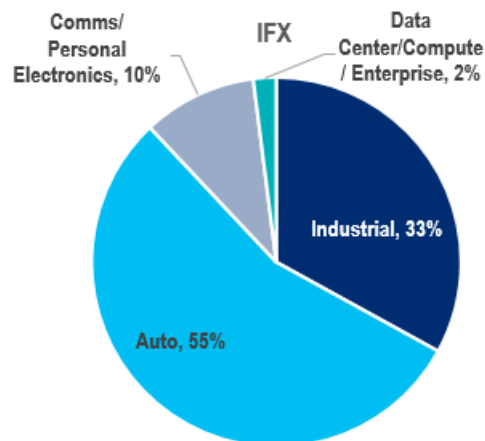
Figure 47. ADI F24 End Market Sales Exposure



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Infineon has 33% exposure to the Industrial end market, 55% exposure to the Auto end market, 10% exposure to the Comms / Personal Electronics end market, 2% exposure to the Data Center end market.

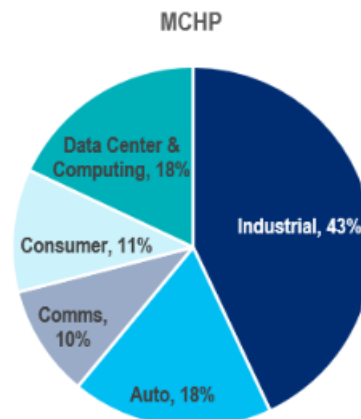
Figure 48. Infineon C24 End Market Sales Exposure



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MCHP has 43% exposure to the Industrial end market, 18% exposure to the Auto end market, 10% exposure to the Comms end market, 11% exposure to the Consumer end market and 18% exposure to the Data Center end market.

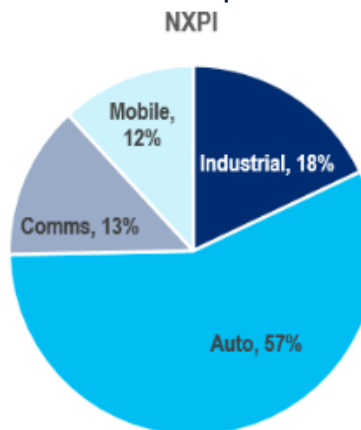
Figure 49. MCHP F24 End Market Sales Exposure



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NXPI has 18% exposure to the Industrial end market, 57% exposure to the Auto end market, 13% exposure to the Comms end market and 12% exposure to the Mobile end market.

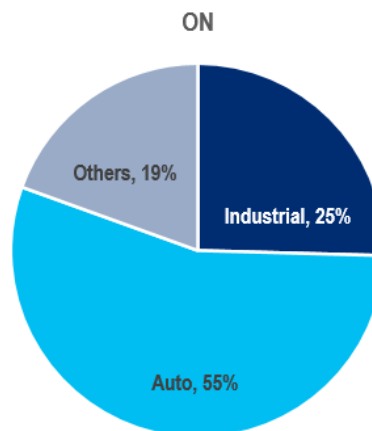
Figure 50. NXPI C24 End Market Sales Exposure



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ON has 25% exposure to the Industrial end market, 55% exposure to the Auto end market and 19% exposure to the Comms and Consumer end market.

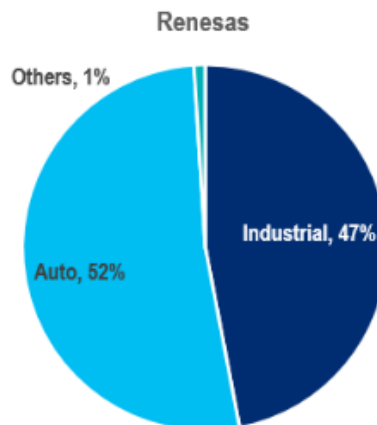
Figure 51. ON C24 End Market Sales Exposure



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Renesas 47% exposure to the Industrial end market, 52% exposure to the Auto end market and 1% exposure to the Compute end market.

Figure 52. Renesas C24 End Market Sales Exposure

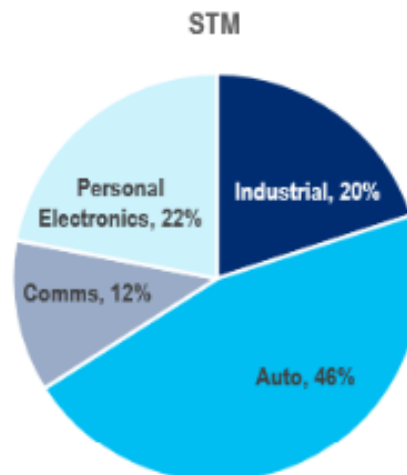


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STM has 20% exposure to the Industrial end market, 46% exposure to the Auto end market and 12% exposure to the Comms and Consumer, 22% exposure to the Personal Electronics end market.



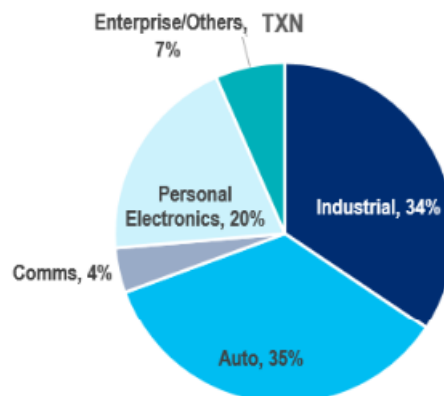
Figure 53. STM C24 End Market Sales Exposure



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TXN has 34% exposure to the Industrial end market, 35% exposure to the Auto end market, 4% exposure to the Comms end market, 20% exposure to the Personal Electronics end market and 7% exposure to the Enterprise end market.

Figure 54. TXN C24 End Market Sales Exposure



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#### Companies Mentioned:

Analog Devices (ADI.O; US\$209.16; 1; 18 Mar 25; 16:00)  
Arrow Electronics Inc (ARW.N; US\$107.43; Not Rated; 18 Mar 25; 16:00)  
Infineon Technologies (IFXGn.DE; €35.36; 1; 18 Mar 25; 17:30)  
Maxim Integrated Products LLC (MXIM.O^H21; Delisted)  
Microchip Technology (MCHP.O; US\$54.2; 1; 18 Mar 25; 16:00)  
Monolithic Power Systems (MPWR.O; US\$622.29; 1; 18 Mar 25; 16:00)

NXP Semiconductors NV (NXPI.O; US\$207.1; 1; 18 Mar 25; 16:00)

ON Semiconductor (ON.O; US\$43.42; 2; 18 Mar 25; 16:00)

Renesas Electronics (6723.T; ¥2380.0; 2; 18 Mar 25; 15:30)

STMicroelectronics (STMPA.PA; €23.48; 1; 18 Mar 25; 17:30)

Texas Instruments Inc (TXN.O; US\$179.45; 1; 18 Mar 25; 16:00)

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## Appendix A-1

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Data current as of 01 Jan 2025	12 Month Rating			Catalyst Watch		
	Buy	Hold	Sell	Buy	Hold	Sell
Citi Research Global Fundamental Coverage (Neutral=Hold)	57%	34%	9%	35%	48%	17%
% of companies in each rating category that are investment banking clients	43%	44%	35%	47%	40%	42%

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