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US Autos & Industrial Tech

2025 outlook - resiliency of profits, AI progress, recovery potential for industrial market in focus; MGA downgrade

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2024 was a mixed year for our coverage with respect to both fundamentals and stock performance. Companies with more meaningful exposure to the datacenter/AI market saw some of the strongest positive Street consensus estimate revisions (FactSet) and stock returns (e.g. VRT, APH, and FLEX), while companies with more auto and industrial exposure generally had estimates that were more flattish or revised lower (and 2025 Street consensus estimates were revised down for all the auto tier 1 suppliers in our coverage). At the median, stocks in our coverage have declined by 15% YTD (vs. the S&P 500 up 27%), and 2024 Street consensus estimates have been revised down by about 10% at the median.

We believe three key themes for 2025 for our Autos & Industrial Tech coverage will be: **1) The resiliency of profit margins**, especially given a dynamic price-cost backdrop, a mixed auto and industrial end demand environment, and the risk of higher tariffs. We believe companies that can leverage platforms to grow software and services profit streams, and those with product leadership, will generally be better positioned to navigate these profit cross-currents. **2) The rate of AI progress**, and what this means for both AV tech development and the sustainability of datacenter capex. We expect datacenter capex growth to remain strong in 2025, and for autonomous vehicle (AV) deployments/progress to continue at a measured rate. Importantly, datacenter capex has historically been lumpy due to technology cycles, investment timing, and/or customer business conditions, and we similarly believe that there could be some periods of volatility in the future (although this may be beyond 2025). If we expected a more extended deceleration in profit growth though for our companies selling into this market, which is not our base case for 2025, then we could be less positive on datacenter exposed stocks. **3) The recovery potential in end markets that have been cyclically depressed.** We expect some recovery in the industrial end market in 2025 off of a low base for our coverage, although the magnitude of the recovery will depend on end demand, and higher tariffs could mitigate this. The November 2024 ISM index reading of 48.4 was up 4% yoy, which we see a positive signal for the industrial exposed companies in our coverage. Separately, we believe there could be stability or modest growth for companies selling into the telecom market after an extended period of weaker sales, but we do not expect a substantial recovery as the capex estimates from our colleagues covering the leading carriers imply that capex will be flattish yoy.

We are lowering our EV forecast for the US market to reflect likely lower purchase tax credits, as well as reduced emissions requirements. We now expect EV mix as a percent of new vehicle sales to be 8.5% in 2025, 25% in 2030, 40% in 2035 and 60% in 2040, down from 9%/40%/60%/75% previously. Importantly, we do still expect growth in EV unit volumes in 2025 driven more by Europe and China, although the rate will depend in part on how much OEMs are able to meet more stringent Co2 requirements in Europe for 2025 with EV mix shift.

We lower estimates for some of the auto tier 1s in our coverage to reflect the reduced EV content opportunity, and more generally we believe powertrain mix volatility, limited production volume growth, and cost challenges/tariff risk will weigh on valuations for suppliers.

We see mixed implications from tariffs. There are scenarios where tariffs on imports from Mexico and/or Canada are broadly negative for our autos coverage and traditional North American auto OEMs. However, it is unclear how broadly tariffs may be applied, and we believe tariffs on imports of foreign vehicles would limit competition/supply (note the base case view of our macroeconomics team is for tariffs to be applied to vehicles coming from China and/or Europe, and from Chinese OEMs out of Mexico). In addition, tariffs on vehicles imported from Mexico/Canada could potentially reduce industry supply (and thus improved pricing may mitigate the effect of lower volumes). We would expect suppliers to seek to pass on higher costs, if any, but broad-based tariffs would be an incremental negative in our view (with suppliers likely to be affected by lower production volumes even if they were able to fully pass on tariff costs).

We remain Buy-rated on GM and F as we expect a relatively consistent cyclical environment for the US auto market in 2025 (and now with higher ICE/hybrid mix where both companies have significantly better profits than in EVs), reasonable valuations, and a longer-term opportunity from software and services. However, if finished vehicle inventory continues to increase in the US market in 2025, then we may turn less positive as this could suggest pricing will be more difficult than we currently expect. Separately, we'd note that if inventory levels don't decline in the US, then there could be downside to our base case NA production forecast (which is for low single digit growth next year).

For Neutral-rated TSLA, while we believe that the company is in a leading position in the domains of platforms & power, and in the broader clean mobility space (including EVs, storage, software, and charging), we expect it will face headwinds in the core auto business over the near to medium term (including slower global EV demand, and pricing pressure). We also expect that it will take time for Tesla to grow its FSD/AV business to a more meaningful level. While we see some fundamental headwinds to the core auto business over the near to medium term and see valuation as full, we also believe the stock could remain at a higher multiple to reflect the long-term opportunity tied to FSD/robotics given broader market interest in potential AI beneficiaries. We believe the prospects for Tesla's auto business (including the growth impact from new/refreshed models planned for 2025) and progress with FSD (including the performance of v13) will help determine the valuation level the stock will trade at, and if the higher valuation multiple is sustained.

We're downgrading the stock of auto tier 1 supplier Magna (MGA) to Sell from Neutral given its above average exposure to the European market where we expect weaker production in 2025 (and, related to this, its lower exposure to Chinese domestic auto OEMs), and given Magna's below average content per vehicle growth. We expect slower revenue growth to also affect its margin targets.

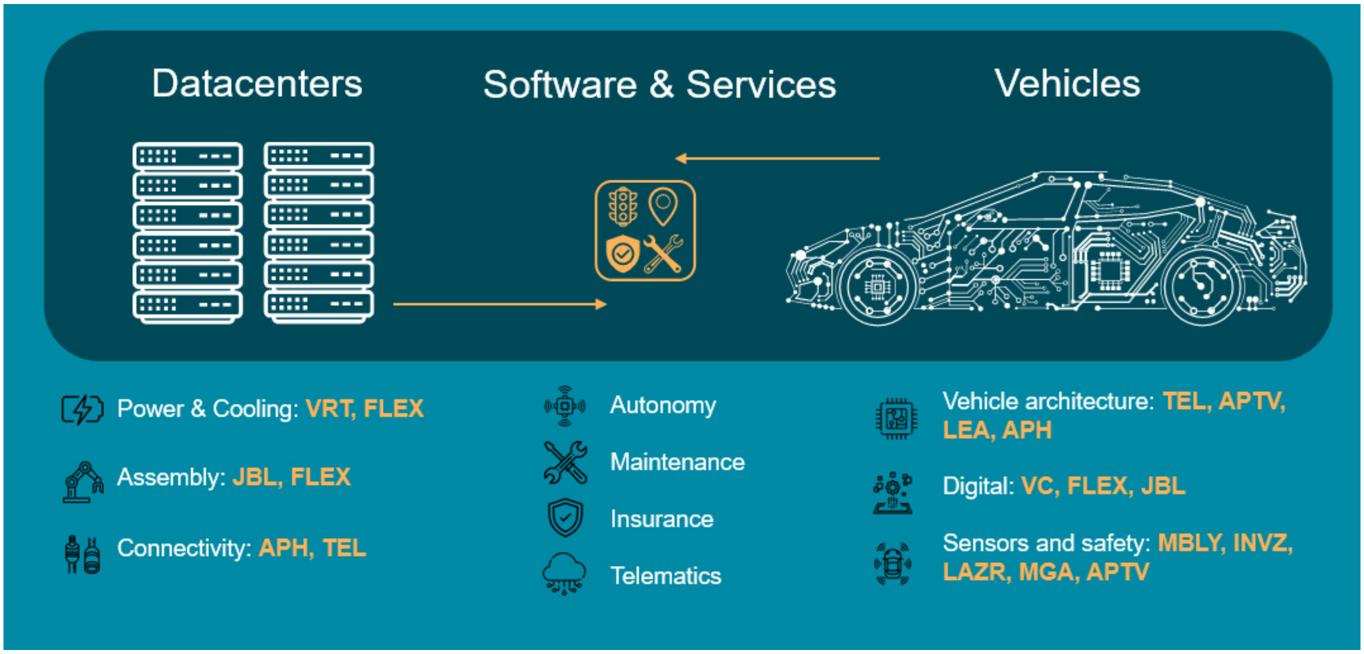
Within this industry backdrop, we continue to believe that companies that can master both the platform and power aspects of the auto & industrial tech industries will generally be best positioned for longer-term profits. As we wrote in our Platforms & Power: driving more sustainable profitability report:

- **Platforms:** By platforms, we are referring to the underlying hardware (e.g. the electrical and electronic architecture and powertrain) that underpins the vehicles (and can be common building blocks across multiple car models), and also the vehicles being a platform to sell higher margin software and services. As the auto OEMs expand their fleet of connected vehicles with shared software, we believe there is the potential for this ecosystem to be a platform for new digital products which could include those from third parties.
- **Power:** By power, we are referring to the power efficiency that is key for electric (and even hybrid) vehicle cost and range, and also to the products used to power the hardware (e.g. datacenters, grid, and EV chargers).

We see some of the most attractive investing opportunities over the next 12-24 months within our electronics components and EMS coverage (e.g. FLEX, TEL, and APH) given the growth and profit potential in applications across the auto, industrial, and datacenter markets tied to platforms and power (including powering and connecting the AI datacenters that are used to develop ADAS and AV software, and enabling the high speed vehicle compute and electrical & electronic architectures in vehicles). **We'd also highlight Buy-rated BDC, as the company is making the transition to a solutions provider, and should benefit if there is a pick-up in the industrial market.**

The Buy-rated auto tier 1s in our coverage (APTV, VC, LEA) all have solid content per vehicle growth (which we think is key in a muted production backdrop), category leadership in select areas (e.g. in high voltage and seating), and limited obsolescence risk (e.g. no material ICE specific products).

Exhibit 1: Illustrative Ecosystem of Platforms & Power



Source: Goldman Sachs Global Investment Research

2024 year in review

The stocks in our coverage are down 15% YTD at the median compared to the S&P 500 up 27% YTD. Established companies in our coverage are down 4%, while early-stage companies are down 41% YTD at the median. Underperformance has been most acute for the auto supply chain companies we cover (including auto tier 1s and auto tech suppliers). Some auto suppliers cut 2024 guidance multiple times amidst a volatile fundamental environment driven by factors including weaker overall production levels, shifting powertrain mix, and customer exposure (with Chinese domestic OEMs taking share from Western OEMs). However, companies with more meaningful exposure to the datacenter/AI market saw some of the strongest positive Street consensus estimate revisions (FactSet) and stock returns (e.g. VRT, APH, and FLEX).

Stock performance for our covered companies since 3Q earnings reports has been somewhat better generally speaking. Specifically, examining how each stock has traded since the company reported its most recent quarterly results, the stocks in our coverage are up 7% at the median vs. the S&P 500 up 4%. Established companies in our coverage are up 7% and early-stage companies are up 6% at the median in this timeframe.

Exhibit 2: Stock performance of covered companies since 3Q24 EPS reports and YTD

	Stock Performance			
	Since 3Q24 reports		2024 YTD	
	Absolute	Relative to S&P 500	Absolute	Relative to S&P 500
Auto OEMs				
GM	7.8%	4.7%	46.3%	19.1%
F	-7.1%	-10.8%	-13.2%	-40.4%
TSLA	87.7%	83.6%	61.4%	34.2%
RIVN	39.9%	38.9%	-33.4%	-60.6%
Tier 1 Suppliers				
BWA	3.2%	-0.6%	-3.7%	-30.9%
LEA	-2.2%	-6.3%	-27.6%	-54.9%
GNTX	5.0%	1.2%	-3.6%	-30.9%
MGA	15.8%	10.0%	-22.8%	-50.0%
APTV	-15.4%	-19.2%	-35.2%	-62.5%
VC	7.0%	2.9%	-25.8%	-53.1%
Electronic Components				
APH	8.6%	5.5%	50.0%	22.7%
* TEL	-1.6%	-5.0%	8.2%	-19.1%
ST	-7.9%	-13.6%	-16.6%	-43.8%
BDC	1.9%	-1.9%	55.5%	28.3%
Lidar & Autonomy				
AUR	11.3%	7.5%	98.1%	70.9%
LAZR	-50.0%	-50.6%	-83.7%	-110.9%
INVZ	18.2%	17.3%	-73.6%	-100.9%
MBLY	36.7%	32.9%	-58.9%	-86.2%
EMS				
* FLEX	9.4%	5.9%	70.7%	43.5%
JBL	--	--	3.6%	-23.6%
Test & Measurement				
* KEYS	11.0%	9.0%	8.6%	-18.6%
Power & Thermal Management				
VRT	8.2%	5.1%	166.7%	139.4%
Voice Technology				
* CRNC	40.1%	38.7%	-57.2%	-84.4%
Charging Infrastructure				
* CHPT	5.7%	6.6%	-40.6%	-67.8%
Warehouse Automation				
* SYM	-12.4%	-14.8%	-46.1%	-73.4%
EV Battery				
QS	-3.3%	-7.4%	-25.2%	-52.5%

**Since most recent FY quarterly reports*

Source: FactSet

CY24/CY25 consensus EPS estimates for established companies in our coverage have been revised -10%/-15% YTD at the median and are about unchanged since the day before companies' respective 3Q24 reports.

Since the start of 2023 and through 2024 YTD, CY24/CY25 consensus estimates have been revised down by -15%/-21% at the median for the companies where estimates were available.

Exhibit 3: 2024 and 2025 estimate revisions since the start of 2023, before 3Q24 EPS reports, and YTD

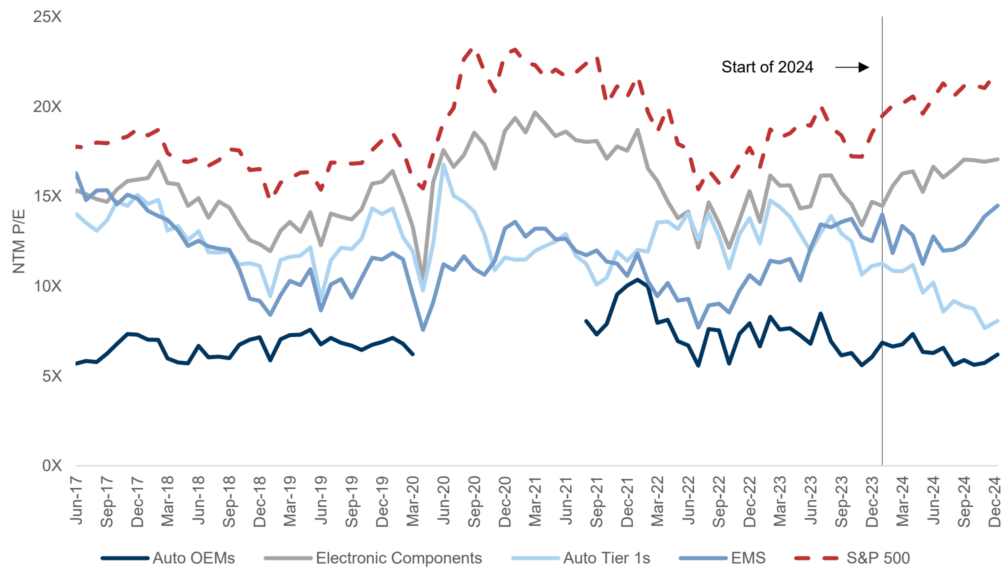
		Change in consensus EPS estimates					
		2024			2025		
		Since the start of 2023	Since T-1 3Q24 reports	2024 YTD	Since the start of 2023	Since T-1 3Q24 reports	2024 YTD
	Auto OEMs						
	GM	74.6%	3.9%	36.3%	76.2%	7.7%	38.6%
	F	0.9%	-3.1%	5.1%	-4.7%	-7.9%	1.5%
	TSLA	-65.8%	7.7%	-36.3%	-57.7%	6.2%	-36.4%
	Tier 1 Suppliers						
	BWA	-14.3%	3.1%	-1.8%	-17.2%	-0.7%	-5.1%
	LEA	-31.3%	-1.9%	-23.8%	-32.3%	-7.2%	-30.0%
	GNTX	-16.6%	1.0%	-14.0%	--	-4.0%	-17.9%
	MGA	-31.3%	-1.0%	-22.0%	-27.8%	1.4%	-24.8%
	APTV	-2.8%	-1.0%	4.4%	-8.2%	-7.8%	-4.4%
	VC	-15.0%	5.4%	-8.4%	-20.7%	-0.1%	-20.5%
	Electronic Components						
	APH	7.6%	4.2%	13.5%	25.2%	4.7%	18.3%
*	TEL	-6.2%	-0.3%	0.8%	--	-1.5%	-3.0%
	ST	-21.0%	-2.5%	-14.4%	-28.2%	-10.3%	-26.1%
	BDC	-12.5%	2.0%	8.4%	--	0.7%	5.7%
	Lidar & Autonomy						
	MBLY	-74.2%	-0.1%	-72.8%	-67.1%	-11.2%	-65.6%
	EMS						
*	FLEX	26.7%	1.1%	14.6%	--	0.4%	12.8%
	JBL	-7.0%	--	-10.9%	--	--	-16.7%
	Test & Measurement						
*	KEYS	-26.7%	1.1%	-10.7%	--	-0.9%	-13.6%
	Power & Thermal Management						
	VRT	95.7%	5.6%	20.3%	126.0%	7.8%	31.3%
	Voice Technology						
*	CRNC	-36.3%	38.8%	-28.3%	-93.3%	193.4%	-87.4%
	Warehouse Automation						
*	SYM	-48.8%	-21.3%	-43.6%	--	-31.4%	-51.9%

**Since most recent FY quarterly reports*

Source: FactSet

We show historical NTM P/E multiples by subsector in Exhibit 4. Multiples have expanded for our EMS and electronic components coverage while auto tier 1 suppliers in our coverage had the highest degree of multiple compression since the beginning of 2024.

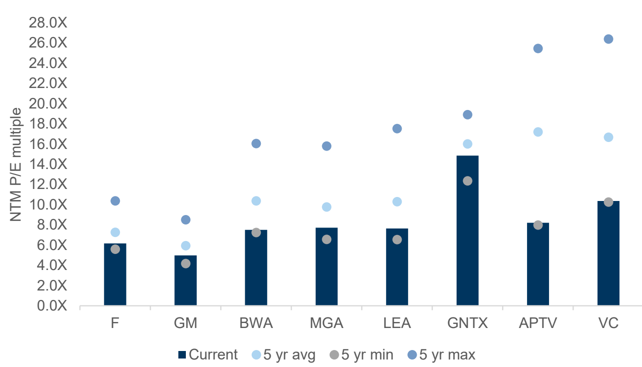
Exhibit 4: NTM P/E multiples by subsector



Source: FactSet

Ford, GM, and the auto tier 1 suppliers in our coverage are currently trading at the middle to lower end of historical valuations on consensus NTM EPS estimates.

Exhibit 5: Ford, GM, and our tier 1 supplier coverage are trading at the mid to lower end of historical valuations



Source: FactSet

End market outlook

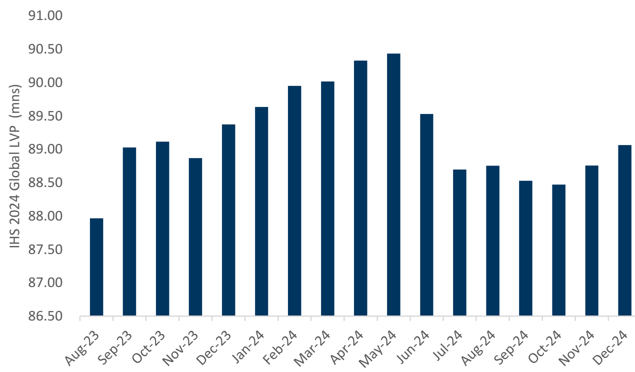
Autos

2024 recap - Production tracking lower yoy, with light vehicle sales slightly up

The auto end market has been choppy and mixed by region (and with share shifts by OEM). IHS/S&P Global Mobility now expects 2024 global light vehicle production of 89.1 mn (down 1.6% yoy), compared to 89.6 mn (down 0.9% yoy) at the start of 2024

(Exhibit 6). This has been driven in particular by a weaker outlook in Europe, with IHS now projecting European production declines by 5% in 2024.

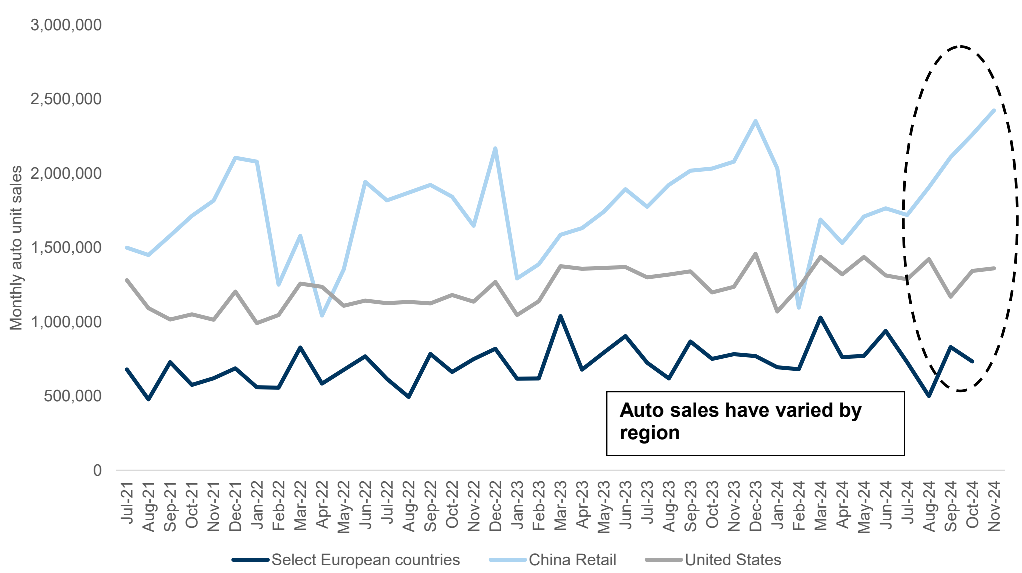
Exhibit 6: 2024 IHS production forecast has been revised down since the beginning of the year
2024 Global LV production



Source: IHS

Sales results have also varied by region. US SAAR has averaged ~15.7 mn YTD, with total units up ~2% yoy through November. In 4Q QTD, sales in the US are up 11% yoy (albeit off of a lower 4Q23 base due to the UAW strike) with SAAR averaging 16.4 mn. In Europe in select countries, through October vehicle sales are up 1%, with sales in October down 2%. In China, through November, sales are up 5% YTD, with 4Q QTD sales up 14%.

Exhibit 7: Monthly regional auto sales



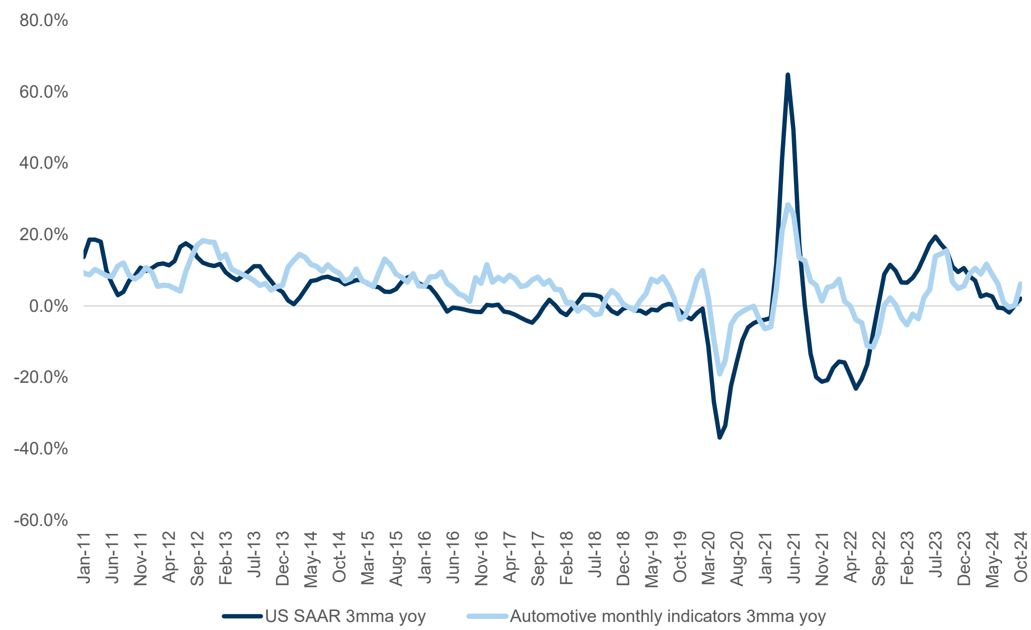
Source: Autodata, CPCA, ACEA

2025 outlook - Expect modest volume growth

We expect low single digit growth in 2025 for both auto production and sales, with production up mid single digits in China, up low single digits in North America, and down low single digits in Europe. We expect the US light vehicle SAAR in 2024/2025/2026 to be 15.85 mn/16.00 mn/16.25 mn.

Our view for low single digit growth in US auto sales in 2025 is consistent with our auto leading indicators analysis (recall this tracks key inputs including Google search traffic, housing starts, and consumer sentiment, and has an R-squared of 0.6 on a 2-month lead vs US SAAR yoy), and also the 2025 outlook from our Economics team for low to mid single digit growth in housing starts. We also expect some ongoing net price normalization (driven by higher incentives) and modestly lower interest rates to support volume growth.

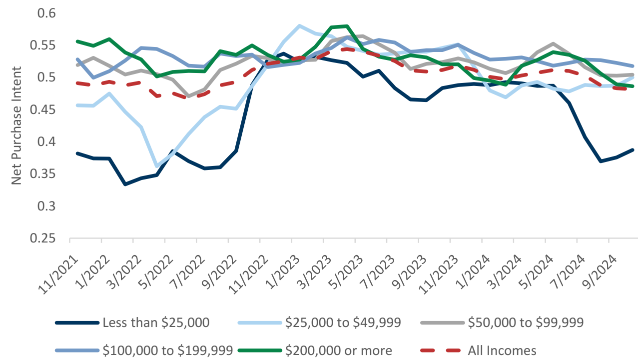
Exhibit 8: US SAAR vs. Auto Monthly Indicators



Source: Goldman Sachs Global Investment Research, University of Michigan, The Conference Board, St. Louis Federal Reserve

Interestingly, survey data of US consumers from HundredX shows a slight trend lower in net purchase intentions over the last year. However, in the last few months there has been an uptick in net purchase intent amongst lower income consumers, which we believe may be due to changes in interest rates and lower vehicle pricing/higher incentives (Exhibit 9). Coupled with the fact that US SAAR has been stronger the last few months, we believe this implies that improved affordability will help sales volumes in 2025.

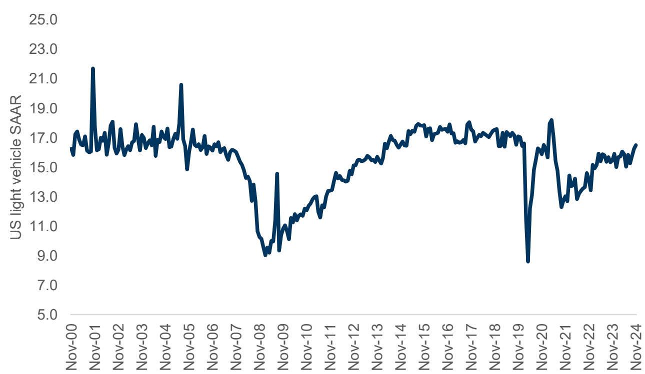
Exhibit 9: Net Purchase Intent (NPI) for lower income band US auto consumers has ticked up in recent months after declining for a majority of 2024



Source: HundredX

We also note that our 16 mn forecast is in line with the long-term average Exhibit 10.

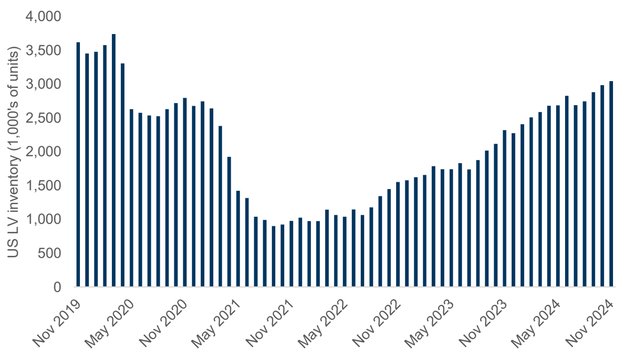
Exhibit 10: US light vehicle SAAR



Source: Wards

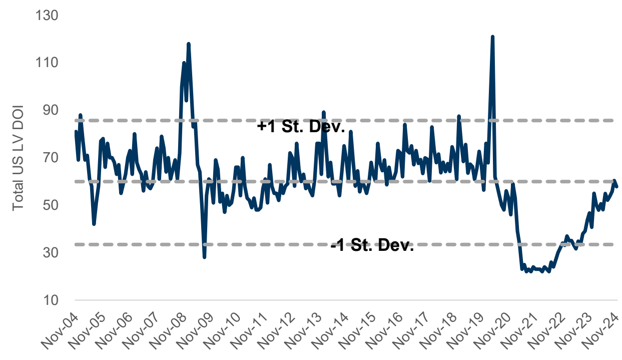
Finished vehicle inventory levels for the US are back at historical levels on a days and units basis, although somewhat higher than some companies are targeting.

Exhibit 11: Finished vehicle inventory is back in the historic 3+ mn range
US light vehicle inventory



Source: Autodata

Exhibit 12: Finished vehicle inventory is now within historical levels on a days basis
Total US light vehicle DOI



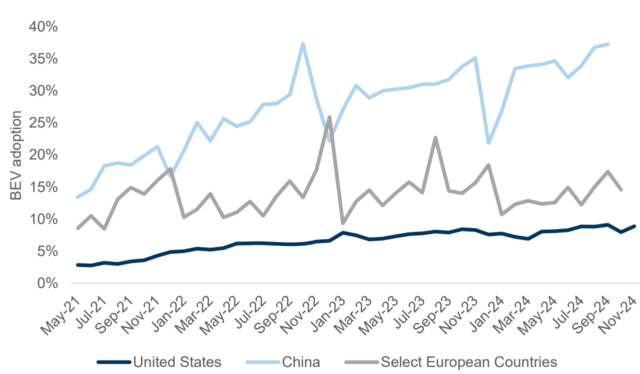
Source: Autodata

EV sales update for 2024

EV sales are up 8% YTD in the US per data from Motor Intelligence, and up 12% in 4Q QTD. EV sales were down 5% YTD in Europe through October, and EVs (BEVs) were up 14% YTD through October in China.

EV sales as a percent of new vehicles are running at about 8-9% in the US currently per Motor Intelligence, compared to China at over 30% and Europe in the low to mid teens (Exhibit 13).

Exhibit 13: BEV adoption as a percent of new vehicle sales volumes by region



Source: Autodata, Wards, CPCA, ACEA

Lowering our US EV forecast

We are lowering our EV forecast for the US market to reflect likely lower EV purchase tax credits, as well as reduced emissions requirements. We now expect EV mix as a percent of new vehicle sales to be 8.5% in 2025, 25% in 2030, 40% in 2035 and 60% in 2040, down from 9%/40%/60%/75% previously.

Our revised expectation is based on:

i) An assumption that the up to $7.5K EV purchase tax credit under the IRA is

removed in 1H25 (based on a recent call we did with a group of legislative affairs experts on potential US public policy, as well as media reports) and an elasticity of demand analysis.

As of December 2024, the US Department of Energy's website lists over 40 EV models and a handful of PHEV models that qualify for IRA credits. We estimate that the EV vehicle models that currently qualify for IRA credits make up roughly ~40-60% of US EV 2024 YTD deliveries (although some buyers of those vehicles are ineligible for credits due to the income limits). However, business EV purchases (including leasing vehicles to consumers) are not limited by battery content or income restrictions (and thus vehicles not on the DOE list could get credits).

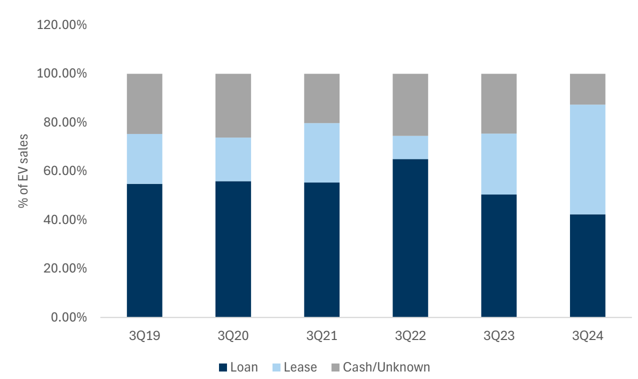
For PHEVs, we estimate that the PHEV platforms that qualify for IRA credits made up roughly 25-45% of PHEV 2024 YTD volumes (recall PHEVs have comprised a little less than 2% of total US vehicle sales in 2024).

The Treasury Department noted that more than 300k point of sale (POS) deductability requests totaling >$2 bn in credits were made between Jan 1 and Oct 1 of this year. Of this, >250k requests were for new vehicle purchases.

Moreover, many of the top selling EV models were leased and currently qualify for IRA credits regardless of domestic battery content or consumer income levels, as we show per Experian data in Exhibit 14 and Exhibit 15.

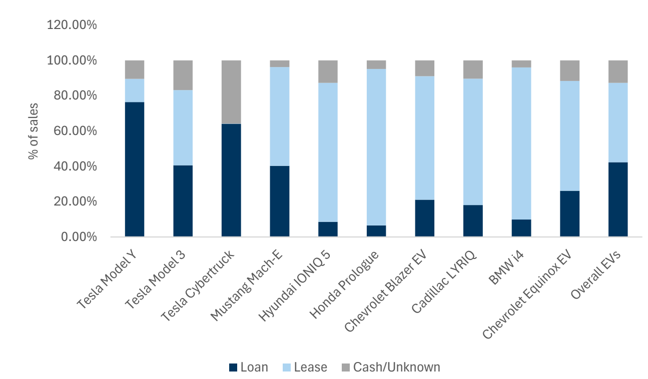
Our prior elasticity of demand analysis showed that each low single digit change in price for the mainstream part of the market typically correlates to a low single digit change in demand, all else equal.

Exhibit 14: EV purchase method in 3Q 2019-2024



Source: Experian

Exhibit 15: Purchase method for top 10 selling EV models vs overall EV market in 3Q24



Source: Experian

ii) The potential for reduced emissions requirements. Historically, EPA rules have changed from one administration to the next. When President-elect Trump was in office during his first term, the administration completed a rollback of US vehicle emission standards that resulted in 1.5% annual increases through 2026, compared to the 5% increases in the prior rules. The majority of automakers were not meeting the 2012 standard without resorting to the use of credits, and auto OEMs typically use credits to comply with the standards, per the most recent EPA report.

On a state level, the California Air Resources Board (CARB) has set its own set of requirements for zero-emissions vehicles (ZEV) through model year 2035. However, per our recent expert call, pending but not-yet-granted EPA waiver requests could be pulled proactively by California, although the state may still try to require stronger standards (which could lead to litigation).

iii) We still see longer-term drivers of higher EV adoption, albeit at a lower level. OEMs still need to comply with likely increasing emissions standards globally and in the US. Moreover, in the long-term EVs can offer safety, performance and potentially cost benefits. Both Ford and GM have recently stated at investor events that they still plan to invest for higher long-term EV mix.

We still expect the EV market overall to grow, although at a slower pace.

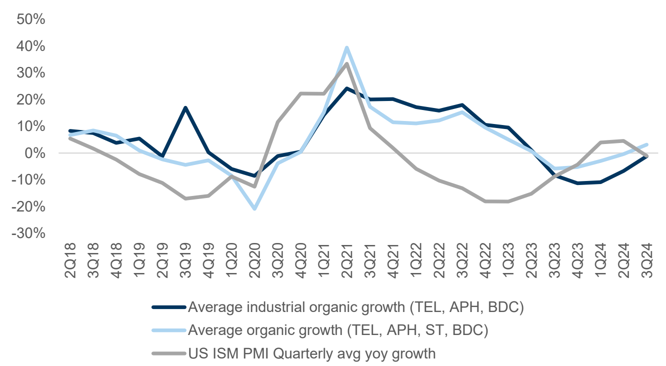
With the changes to our US EV outlook, we now expect global EV mix to be approximately a mid teens percent of new vehicle sales in 2025, roughly 30% in 2030, and about 60% in 2040. This would imply EV volume growth of approximately 20% in 2025. Importantly, we do still expect growth in EV unit volumes in 2025 driven more by Europe and China, although the rate will depend in part on how much OEMs are able to meet more stringent Co2 requirements in Europe for 2025 with EV mix shift.

Industrial - recent datapoints suggest the industrial end market remains somewhat weak, but the yoy improvement in the November ISM index is a positive signal in our view, and we think there is the potential for a cyclical recovery in 2025

While the industrial end market remains generally soft (especially in Europe), we think that there is the potential for improvement in 2025. We note that some suppliers have already been under-shipping sell-through for the last several quarters and will be lapping easier yoy compares in 2025. The current weakness in the industrial market for several companies is now approaching 4-6 quarters, and matching the length of historical downturns.

As of 3QCY24 EPS reports: 1) TE Connectivity had seen organic revenue decline in its industrial equipment business for 6 consecutive quarters. Importantly, the rate of organic revenue decline decelerated in 3QCY24. 2) For Amphenol, its industrial business stabilized in 3Q24 and was about flat yoy after 5 quarters of organic revenue declines; 3) Belden’s automation solutions segment (formerly industrial automation) has experienced 5 consecutive quarters of organic revenue declines, but the rate of the decline decelerated to a low to mid single digit rate in 3Q24 (from a low to high teens decline in each quarter from 4Q23-2Q24).

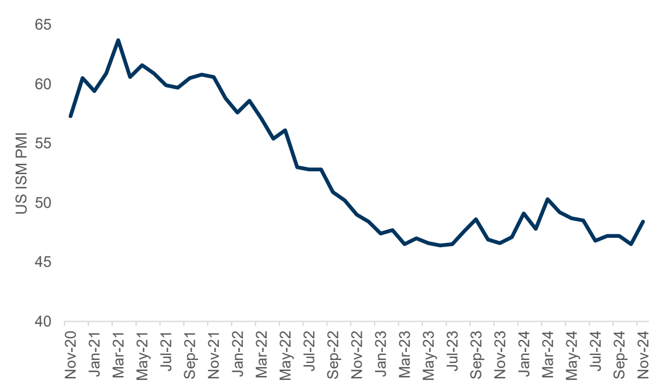
Exhibit 16: Organic growth for industrial exposed names in our coverage vs. the US ISM PMI quarterly average yoy growth



Source: Company data, FactSet

The US ISM PMI was up about 4% both mom and yoy in November to 48.4 from 46.5 in October. The index was -1%/-3%/-1%/+4% yoy in August/September/October/November after being flat to up yoy each month from January to July 2024.

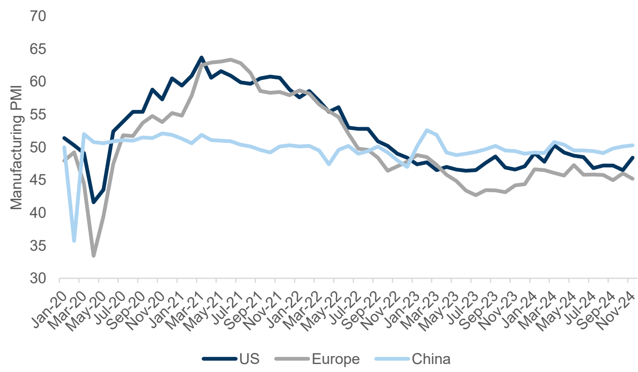
Exhibit 17: The US ISM PMI increased both mom and yoy in November



Source: FactSet

For Europe, the PMI index has been relatively stable in recent months but remains at a weak overall level (we note that the German PMI in October/November was 43.0/43.2). The PMI in China was back above 50 in October and November and was up mom and yoy in both months as well.

Exhibit 18: Manufacturing PMI by region since 2020

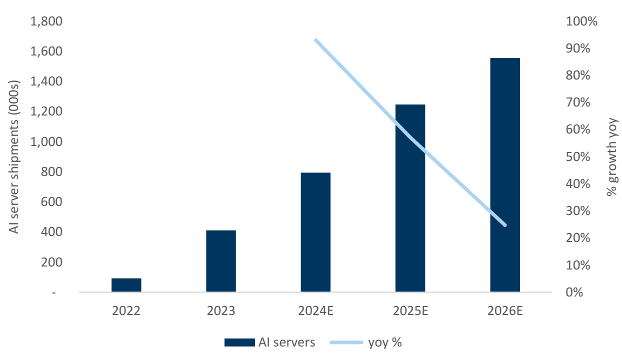


Source: FactSet

Datacenter - market remains strong with continued growth expected in 2025

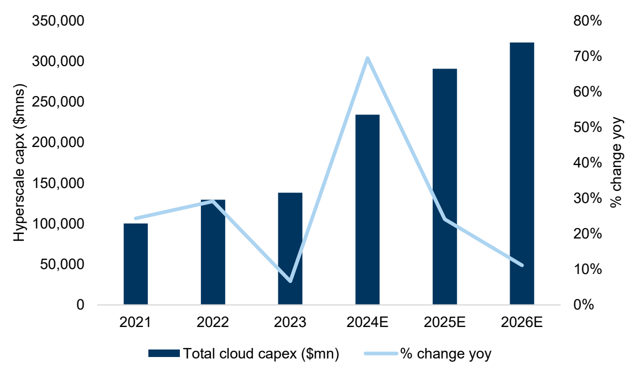
We continue to believe that demand trends in the datacenter market remain strong. We note that our GS TMT colleagues expect AI server yoy shipment growth of 93%/57%/25% in 2024/25/26 respectively. The current GS cloud capex forecast is for a 69% yoy increase this year and 24% in 2025 (Exhibit 19 and Exhibit 20).

Exhibit 19: GS AI server shipments forecast is for 93% yoy growth in 2024 and 57% in 2025



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 20: Our GS colleagues expect 69% and 24% yoy growth in hyperscale capex in 2024 and 2025 respectively

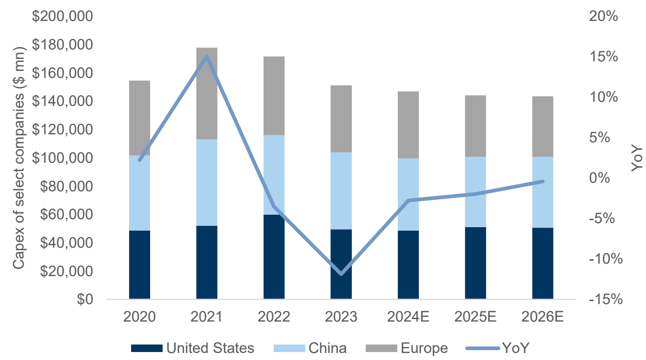


Source: Company data, Goldman Sachs Global Investment Research

Telecom - market remains muted, yoy declines in capex expected, albeit smaller than 2024

Our GS TMT colleagues expect telecom capex to decline 2% yoy in 2025 and to be about flat in 2026, after declining an expected 3% in 2024 (Exhibit 21).

Exhibit 21: GS telecom capex forecast is for yoy declines in 2024/25 and to be about flat in 2026



Source: Company data, Goldman Sachs Global Investment Research

Tariffs and geographic exposure

Framing supply chain and sales exposure for our autos and EMS coverage

Our macroeconomics team believes there is a 40% chance of across the board tariffs of 10-20% that have been proposed under a new Trump administration. We show supply chain and sales exposure for our EMS and auto coverage in this section of our report.

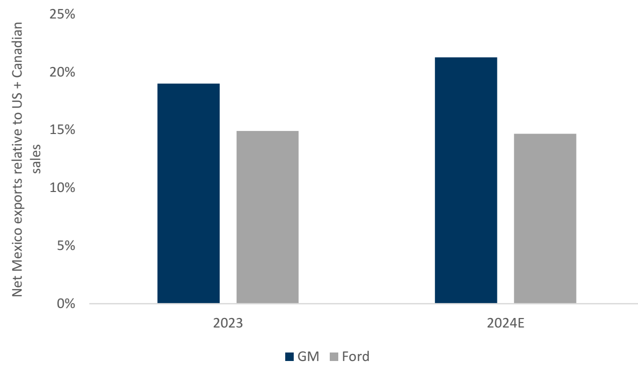
For the US auto market, there are 10-10.5 mn vehicles produced and 15.5-16 mn vehicles sold in the US annually per IHS, implying net imports of ~5 mn per year. Mexico and Europe are a few key regions for auto imports.

The GS macroeconomics team expects President-elect Trump to impose additional tariffs on auto imports, as detailed in its Macro Outlook 2025: Tailwinds (Probably) Trump Tariffs and 2025 US Economic Outlook: New Policies, Similar Path reports. Specifically, the GS macro team believes that there could be an incremental tariff of 97.5% on auto imports (EVs from Chinese producers) from Mexico and an incremental tariff of 22.5% on auto imports from the EU (see exhibit 4 of the 11/17 note for additional details). Our colleague George Galliers also detailed imports and exports between the US and Europe for his coverage in an 11/4 note.

OEMs - we believe there are mixed implications from potential auto tariffs for domestic OEMs, as vehicle import tariffs could reduce competition from China and/or Europe, but Ford and GM each have some degree of manufacturing in Mexico (and a meaningful part of the broader auto supply chain is in Mexico).

We show the ratio of net Mexico exports relative to US and Canadian sales in Exhibit 22 per IHS data, implying a mid teens percent of Ford's and ~20% of GM's volumes for the US and Canadian markets is made in Mexico. Tesla does not currently produce vehicles in Mexico.

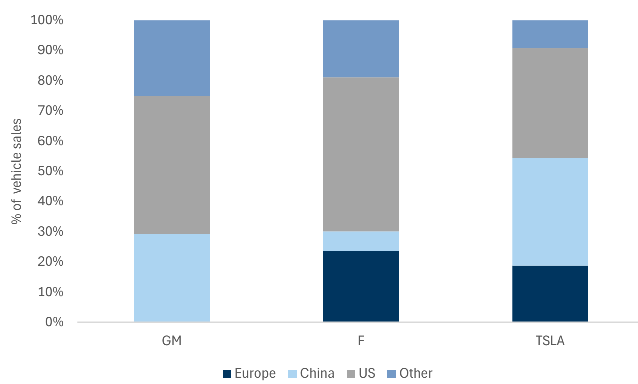
Exhibit 22: Ford and GM Mexico production relative to US and Canada sales



Source: IHS, Goldman Sachs Global Investment Research

We also show percentage of vehicle sales by region, inclusive of JVs, for Tesla, GM, and Ford based on 2024 sales YTD.

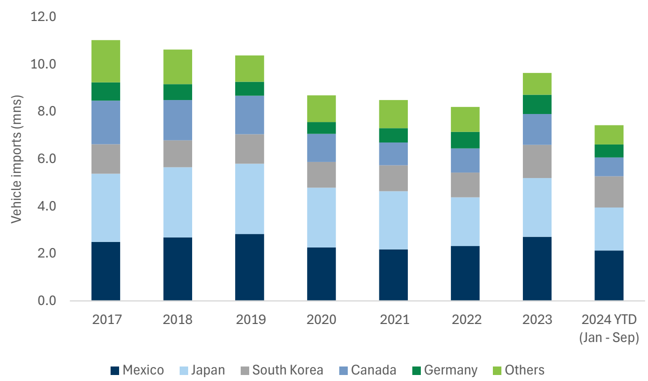
Exhibit 23: % of vehicles sold in key regions for GM, Ford, and Tesla



Source: Company data, Goldman Sachs Global Investment Research, CPCA, IHS

More generally, per the US International Trade Commission (USITC), the US imports ~1-1.5 mn vehicles annually from Canada and 2-3 mn from Mexico. We show annual imports from key import countries including Mexico and Canada for 2017-3Q2024 in Exhibit 24. We note that these are gross imports (i.e. they do not net out US exports to these regions).

Exhibit 24: US vehicle imports 2017-3Q2024



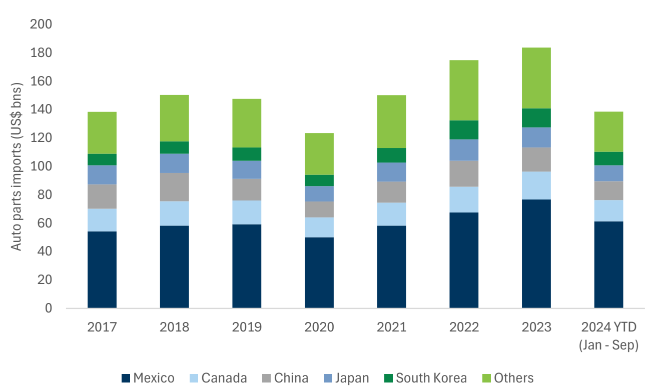
Source: USITC

Tier 1 suppliers - we think that potential auto tariffs on auto parts from Mexico would be an incremental negative (all else equal) for the tier 1 suppliers in our coverage but note that these companies have experience navigating complex supply chains and could partly mitigate the impact by reallocating resources and relocating operations.

At recent investor conferences, companies in our coverage have spoken to about $75 bn-$100 bn of auto parts imports from Mexico into the US and have said that meaningful tariffs would have a substantial impact on the industry.

Based on US International Trade Commission data for select auto part codes, we estimate that >$55 bn in auto parts are imported annually from Mexico to the US, and ~$15-$20 bn in auto parts were imported annually from Canada to the US (Exhibit 25).

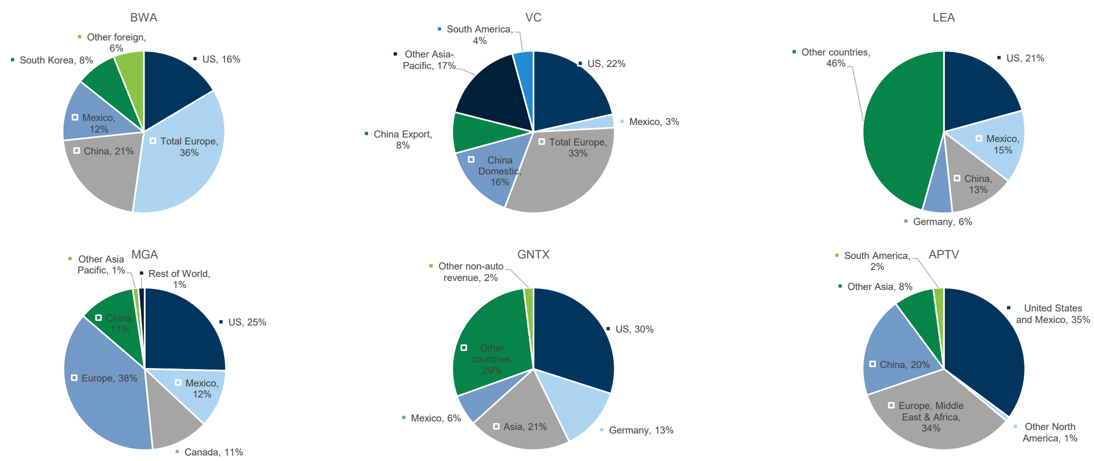
Exhibit 25: US auto part imports 2017-3Q2024



Source: USITC

For the auto tier 1 suppliers in our coverage, 2023 net sales attributed to Mexico was a low to mid-single digit percentage of total sales for Visteon and Gentex and a low to mid teens percentage of total sales for Magna, BorgWarner, and Lear. While Aptiv did not specifically break out Mexico sales in its 10-K, the company noted on its 3Q24 EPS call that it manufactures 90% of what it sells in region for region. For its supply chain, roughly 80% of what Aptiv sources is in region for region (the areas that the company tends to be short in are around certain electronics semiconductor products). Lear commented on its 3Q24 EPS call that it continues to shift its wiring operations to new lower cost manufacturing locations and that it leverages its footprint in North Africa to supply the European markets. In North America, Lear expects to shift its headcount in wire operations from 60%/40% Mexico/Honduras to 40%/60% over the next couple of years.

Exhibit 26: 2023 net sales by region for tier 1 suppliers

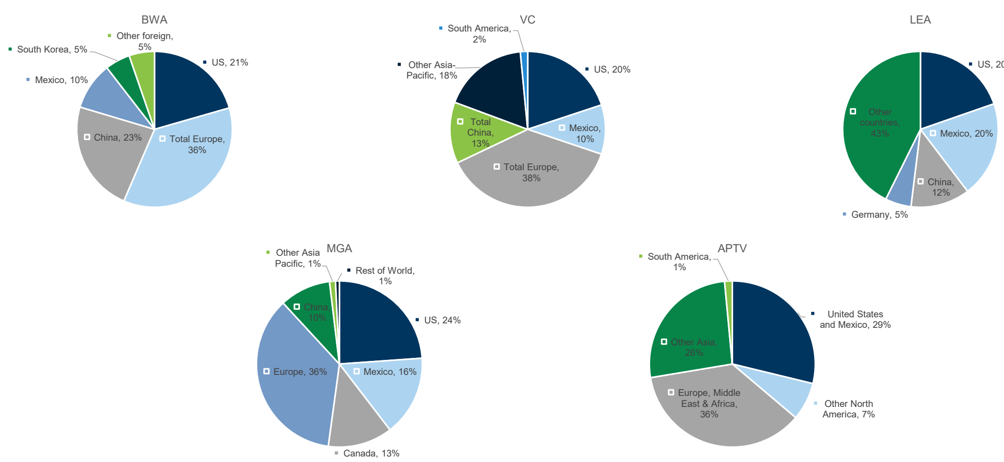


Visteon notes that sales are based on geographic region where sale originates and not where customer is located

Source: Company 10-K filings

In terms of long-lived assets, ~10% of long-lived assets were attributable to Mexico for BorgWarner and Visteon in 2023, ~16% for Magna, and ~20% for Lear. Aptiv does not break out US vs Mexico long-lived assets, and Gentex does not disclose long-lived assets by region (but Gentex does not have any facilities in Mexico as of its most recent 10-K).

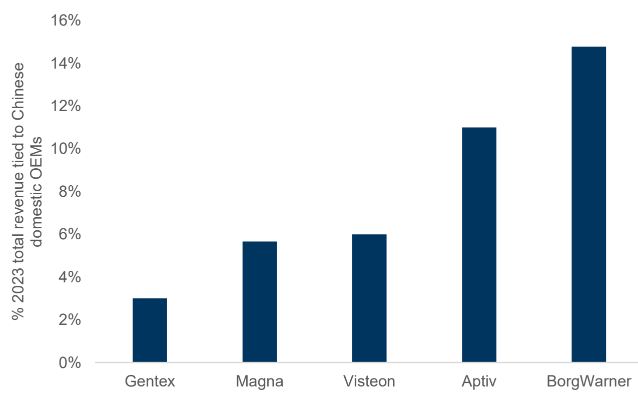
Exhibit 27: Long-lived assets by region for tier 1 suppliers



Source: Company 10-K filings

Given the pace at which the Chinese domestic OEMs are taking share and outgrowing the overall market, we also analyze the exposure to Chinese domestic OEMs for select tier 1 suppliers in our coverage in Exhibit 28. Our analysis shows that Aptiv and BorgWarner each had >10% of total revenue tied to Chinese domestic OEMs in 2023 respectively while Magna and Visteon have a mid single digit percent of total revenue tied to domestic Chinese OEMs. We believe Gentex has a low to mid single digit percent of revenue tied to the Chinese domestic OEMs.

Exhibit 28: % of total company revenue tied to Chinese domestic OEMs

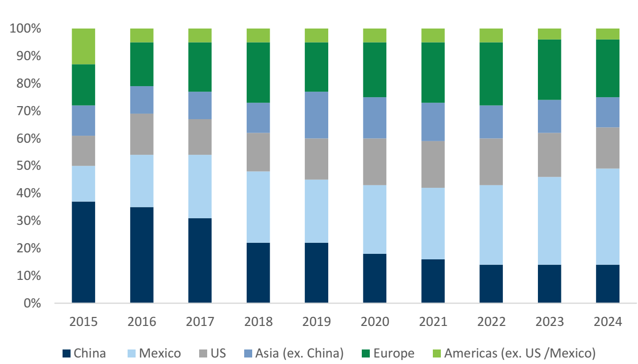


Source: Company data, Goldman Sachs Global Investment Research

EMS - our covered companies (Flex and Jabil) each have over a third of their capacity in North America, although we note that EMS companies in recent years have been effective at passing on incremental supply chain costs (and the North American OEMs have a larger footprint in the US and North America than Asia based competitors in general).

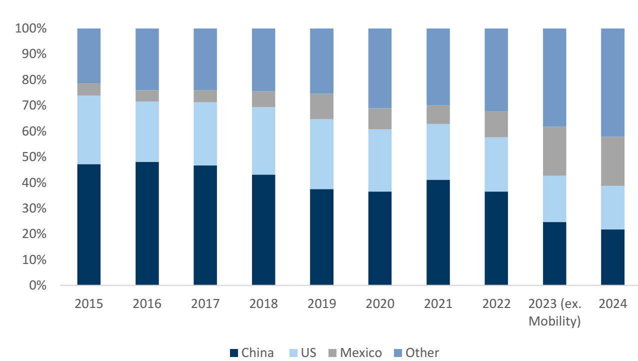
As shown in Exhibit 29 and Exhibit 30 both Flex and Jabil have global supply chains and an increasing amount of business coming from North America (Mexico and the US). While this is partly reflecting changing end market mix, it also is being driven by customers seeking more regional and resilient supply chains.

Exhibit 29: % of Flex Long Lived Assets by Region
% of Flex Long Lived Assets by Region for FY2015-2024



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 30: % of JBL Long Lived Assets by Region
% of JBL Long Lived Assets by Region for FY2015-2024



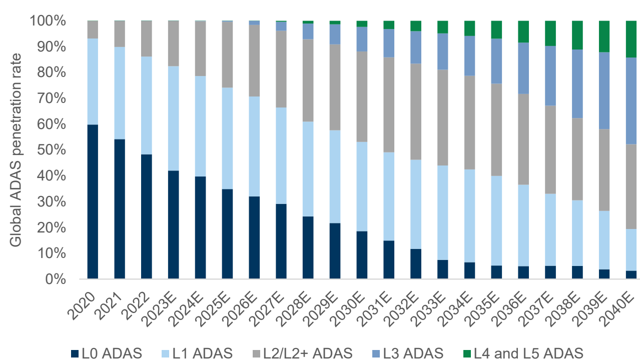
Source: Company data, Goldman Sachs Global Investment Research

Rate of AV progress

We continue to believe that autonomous vehicle (AVs) deployments will make measured progress in both the robotaxi and AV trucking markets in 2025.

We still expect that vehicles with situationally eyes-off (L3) capability will reach ~10% of the market for new vehicle sales in 2030, up from a very low level currently. For fully autonomous vehicles (L4/L5), we expect the market to be relatively small in the near to medium term and driven by commercial applications/robotaxis, but to reach >1 mn vehicles in 2028 and >2 mn in 2030, with L4/L5 reaching a mid teens percent share of global vehicle sales in 2040 (which would include personal L4 vehicle ownership).

Exhibit 31: GS AV/ADAS forecast 2020-2040E



Source: IHS, Goldman Sachs Global Investment Research

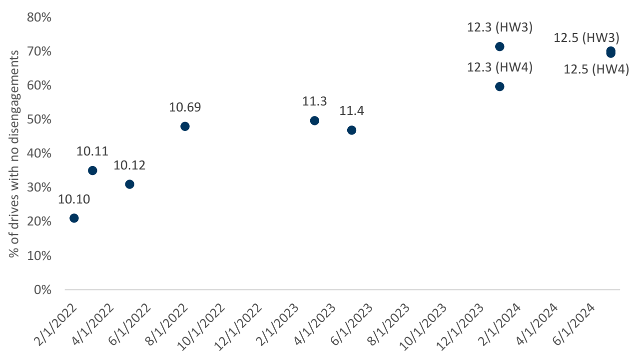
We highlight several companies that continue to make progress in the autonomy space, including Tesla, Cruise, and Aurora from our coverage.

Robotaxis

Tesla: Tesla continues to roll out incremental updates to its FSD software for AI4 (HW4) vehicles, with v13 released at the end of November/beginning of December to some customers, which includes the ability for FSD to park, unpark, and reverse. The company released v12.5.6.3 to AI4 (HW4) vehicles in early/mid-November, which combined the end-to-end neural net for both highway and city driving and posted on X that it had seen a 4x increase in miles between necessary interventions on 12.5.6.3 compared to v12.5.4.

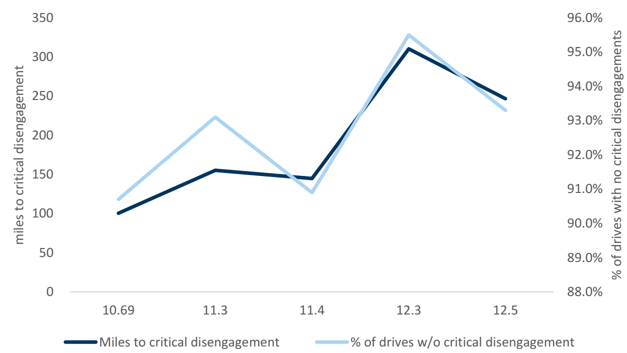
Crowdsourced data on TeslaFSDtracker shows ~70% of drives with v12.5.x having no disengagements and ~93% of drives with no critical disengagement (with ~250-325 miles between critical disengagements for v12.3.x and v12.5.x), although we acknowledge that the crowdsourced data has some limitations related to control and sample size. We believe comments from Tesla on X and on its earnings calls imply FSD performance is at ~1-10K miles between critical intervention with its test fleet. While there continues to be improvement with each iteration, we believe a significant degree of improvement would be needed for the company to reach its target of being safer than a human. For example, data provided by the California DMV on Waymo shows 14 disengagements in ~119k miles or 1 disengagement every ~85k miles for the 12-month period from Dec 2022 to Nov 2023 (when excluding test vehicles), and we'd note that accidents would generally occur over fewer miles in a city than a rural/highway environment (with Waymo suggesting its vehicles have fewer accidents than human drivers). Moreover, Tesla's safety report shows a vehicle in the US gets into an accident every 600-700K miles. Therefore, for Tesla to meet or exceed human level performance, we believe FSD would require exponential improvement. We believe investors will be monitoring FSD v13 performance as additional data is generated in the coming weeks.

Exhibit 32: % of drives with no disengagements by FSD version



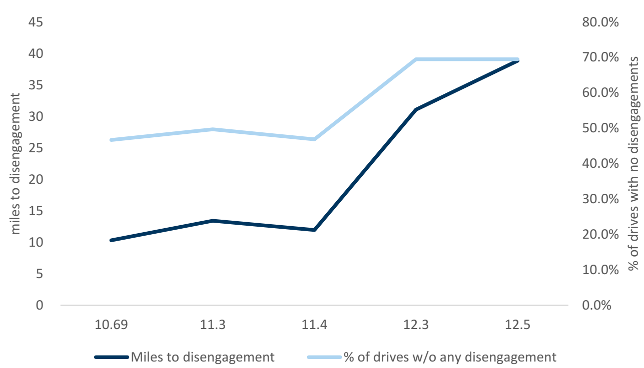
Source: TeslaFSDtracker

Exhibit 33: % of drives and miles between critical disengagements by version



Source: TeslaFSDtracker

Exhibit 34: % of drives and miles between any disengagement by version



Source: TeslaFSDtracker

On robotaxis specifically, Tesla is targeting to deploy a robotaxi service in Texas and/or California in 2025 using Model 3/Y vehicles, and expects to start production of its Cybercab robotaxi in 2026 (although we note that the company has historically been optimistic with its timelines). Robotaxis have permitting requirements determined at the state/local level and these requirements are more detailed in some states (e.g. California) compared to others (e.g. Texas and Arizona). For Cybercab, we note that larger scale deployments would require FMVSS changes (e.g. allowing a vehicle to not have a steering wheel or rear-view mirror), and a NHTSA exemption would be required to deploy up to 2.5k vehicles. We therefore believe that over the medium to longer-term federal clarity especially for consumer vehicles would be helpful for L4 scaling, but we don't believe permitting is the key gating factor for Tesla presently.

Waymo: Waymo currently operates in several areas, including San Francisco, Los Angeles, and Phoenix. The company announced in November that it was accepting all riders in LA (similar to SF and Phoenix) after initially onboarding users off a waiting list. Waymo also announced in December that it will be expanding to Miami through its fleet partnership with Moove and expects to begin offering rides in 2026. The company has also expanded its ride-hail territory in all three cities (SF, LA, and Phoenix) during 2024. Per a post on the company's X page, Waymo is now providing more than 150k paid rides per week as of 10/29/24. Waymo also has a partnership with Uber, and has started providing driverless delivery for select Uber Eats restaurants in the Phoenix area and plans to offer autonomous ride-hailing in Austin and Atlanta starting in early 2025 per the company. Per Waymo's safety hub, Waymo had completed ~25 mn rider-only miles as of the end of July 2024 in Phoenix and San Francisco, over which it had 67 fewer injury causing crashes and 81 fewer police-reported crashes, which the company stated is >50% lower in both cases compared to the human driver benchmark.

Cruise: GM announced on 12/10/24 that it plans to refocus its AV efforts on personal autonomy, and will no longer pursue a robotaxi business. The company believes it can leverage the technology that Cruise had developed, in conjunction with its existing Super Cruise ADAS capabilities, toward this. GM said it expects restructuring to drive at least $1 bn of annual savings. For sensitivity, $1bn of savings at the current tax rate and 2025 sharecount equates to about $0.80 per share of EPS.

Trucking

Aurora: Aurora continues to haul commercial loads for customers in its autonomous trucks with safety drivers, with the company noting it is scheduling nearly 160 loads per week on its 3Q24 earnings call. Cumulative to-date through 10/27/24, Aurora has autonomously delivered (under the supervision of vehicle operators) 8,200+ loads, driving 2.2 mn+ commercial miles, with nearly 100% on-time performance for its pilot customers, including FedEx, Werner, Schneider, and Uber Freight. Aurora expects to launch commercially (with no safety driver) in April 2025, starting with 1 truck and scaling to up to 10, with capacity increasing to tens of trucks by the end of 2025.

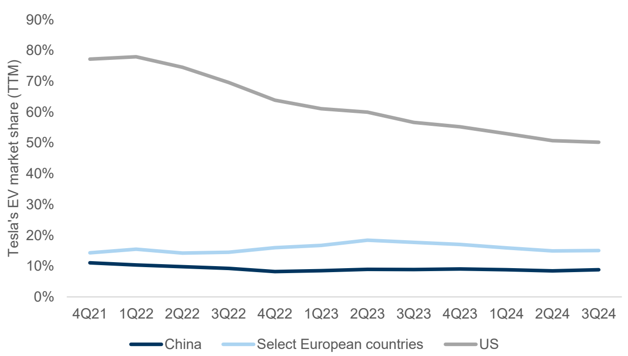
Per a September press release, Aurora is launching its Partner Success Program, slated to begin in 4Q24. Additionally, Aurora said that it plans to extend its Fort Worth to El Paso lane by opening operations to Phoenix. The company expects to begin commercial pilots for customers between Fort Worth and Phoenix in the first half of 2025 with the intent to go driverless on that route later in the year.

Kodiak: Kodiak Robotics is expecting to deliver commercial AV trucks to Atlas in late 2024 for use off-road in the Permian Basin. The company is also expecting to deploy AVs for the Class 8 on-road market over time. An important feature of its hardware kit (SensorPods) is that the company can quickly change them out for replacement. Kodiak's network incorporates more than 18,000 miles of freight-dense lanes. Kodiak highlights partners including Werner, Pilot Flying J, and Maersk.

Tesla updated estimates and valuation

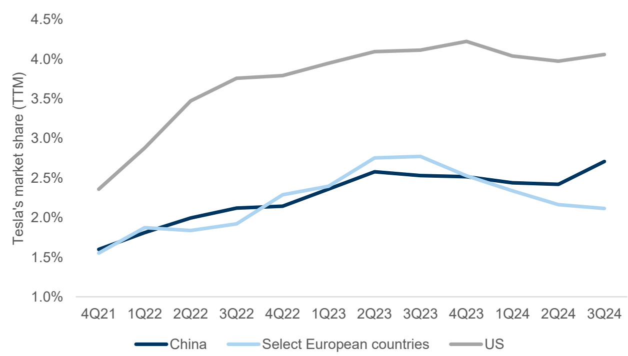
While we believe that the company is in a leading position in the domains of platforms & power, and in the broader clean mobility space (including EVs, storage, software, and charging), we expect Tesla will face headwinds in the core auto business over the near to medium term (including slower global EV demand, and pricing pressure). Tesla's EV market share has been trending lower across the US, Europe, and China which we believe is contributing to pricing headwinds, although share could be more stable for Tesla going forward, with several of the larger auto OEMs taking a more selective approach to the EV market given likely reduced emissions requirements.

Exhibit 35: Tesla's EV market share (TTM)



Source: Autodata, CPCA, ACEA, Goldman Sachs Global Investment Research

Exhibit 36: Tesla's market share (TTM)

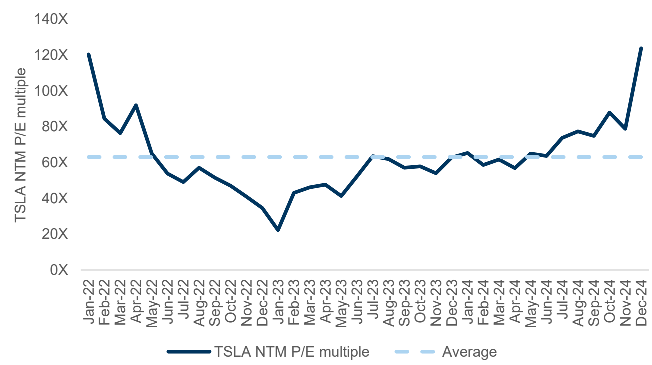


Source: Autodata, CPCA, ACEA, Goldman Sachs Global Investment Research

While we see some fundamental headwinds to the core auto business over the near to medium term and see valuation as full, we also believe the stock could remain at a higher multiple to reflect the long-term opportunity tied to FSD/robotics given broader market interest in potential AI beneficiaries. Tesla's stock is trading at the higher-end of the historical range on NTM non-GAAP EPS (Exhibit 37).

We believe the prospects for Tesla's auto business (including the growth impact from new/refreshed models planned for 2025) and progress with FSD (including the performance of v13) will help determine the valuation level the stock will trade at, and if the higher valuation multiple is sustained.

Exhibit 37: Tesla is currently trading at the higher end of its historical range on Street NTM EPS estimates



Source: FactSet

With Tesla trading at a $1.4 trn enterprise value, fundamentally we believe this implies using a reverse DCF analysis that in steady state (we assume 2040) that Tesla's revenue would need to reach $1-$1.5 trillion with a high teens to low 20% range EBIT margin (assuming a terminal multiple in the high teens, which implies a high single digit percent WACC). This would require a high degree of growth and success in several business areas, including in software/AI enabled businesses. One scenario for this could be: 1) Tesla's auto business by 2040 reaches 10-15 mn units at a $40-$45K ASP with a low to mid teens EBIT margin; 2) Energy revenue grows at a low double digit to mid teens CAGR from 2026E through 2040 (reaching $100-$150 bn of revenue) with a mid teens EBIT margin; 3) Services & Other exceeds $200 bn of revenue at a low to mid teens margin (driven by a larger installed base, and growth in charging and insurance); 4) The balance (we estimate >$200 bn) would need to come from AI related efforts such as FSD, AVs, and robotics at a high EBIT margin. We believe the risk is to the downside that Tesla can achieve such a high degree of success across so many businesses, although there could be upside scenarios too (e.g. licensing FSD to multiple other auto OEMs, or providing Dojo as a service).

We frame the potential longer-term TAM opportunities for FSD and robotaxis in Exhibit 38 & Exhibit 39.

We believe Tesla's FSD revenue is currently about $1-$3 bn (more likely at the lower end of this), mostly from upfront license sales that is generally a license attached to that vehicle for the life of the car. We frame the opportunity as the technology improves and the installed base grows.

Exhibit 38: Potential FSD TAM sizing

Annual revenue in mns from monthly FSD subscriptions										
		Installed Base (mn)								
Monthly ASP	Attach Rate	25	30	35	40	45	50	75	100	125
$25.0	10%	750	900	1,050	1,200	1,350	1,500	2,250	3,000	3,750
	25%	1,875	2,250	2,625	3,000	3,375	3,750	5,625	7,500	9,375
	40%	3,000	3,600	4,200	4,800	5,400	6,000	9,000	12,000	15,000
	50%	3,750	4,500	5,250	6,000	6,750	7,500	11,250	15,000	18,750
	75%	5,625	6,750	7,875	9,000	10,125	11,250	16,875	22,500	28,125
$50.0	10%	1,500	1,800	2,100	2,400	2,700	3,000	4,500	6,000	7,500
	25%	3,750	4,500	5,250	6,000	6,750	7,500	11,250	15,000	18,750
	40%	6,000	7,200	8,400	9,600	10,800	12,000	18,000	24,000	30,000
	50%	7,500	9,000	10,500	12,000	13,500	15,000	22,500	30,000	37,500
	75%	11,250	13,500	15,750	18,000	20,250	22,500	33,750	45,000	56,250
$100.0	10%	3,000	3,600	4,200	4,800	5,400	6,000	9,000	12,000	15,000
	25%	7,500	9,000	10,500	12,000	13,500	15,000	22,500	30,000	37,500
	40%	12,000	14,400	16,800	19,200	21,600	24,000	36,000	48,000	60,000
	50%	15,000	18,000	21,000	24,000	27,000	30,000	45,000	60,000	75,000
	75%	22,500	27,000	31,500	36,000	40,500	45,000	67,500	90,000	112,500
$150.0	10%	4,500	5,400	6,300	7,200	8,100	9,000	13,500	18,000	22,500
	25%	11,250	13,500	15,750	18,000	20,250	22,500	33,750	45,000	56,250
	40%	18,000	21,600	25,200	28,800	32,400	36,000	54,000	72,000	90,000
	50%	22,500	27,000	31,500	36,000	40,500	45,000	67,500	90,000	112,500
	75%	33,750	40,500	47,250	54,000	60,750	67,500	101,250	135,000	168,750
$200.0	10%	6,000	7,200	8,400	9,600	10,800	12,000	18,000	24,000	30,000
	25%	15,000	18,000	21,000	24,000	27,000	30,000	45,000	60,000	75,000
	40%	24,000	28,800	33,600	38,400	43,200	48,000	72,000	96,000	120,000
	50%	30,000	36,000	42,000	48,000	54,000	60,000	90,000	120,000	150,000
	75%	45,000	54,000	63,000	72,000	81,000	90,000	135,000	180,000	225,000
$300.0	10%	9,000	10,800	12,600	14,400	16,200	18,000	27,000	36,000	45,000
	25%	22,500	27,000	31,500	36,000	40,500	45,000	67,500	90,000	112,500
	40%	36,000	43,200	50,400	57,600	64,800	72,000	108,000	144,000	180,000
	50%	45,000	54,000	63,000	72,000	81,000	90,000	135,000	180,000	225,000
	75%	67,500	81,000	94,500	108,000	121,500	135,000	202,500	270,000	337,500

Source: Company data, Goldman Sachs Global Investment Research

Our AV forecast implies that a global fleet of a few million commercial AVs used for rideshare could be on the road in 2030. Although this would comprise less than 1% of the global car parc of over 1 bn vehicles, it could result in a >$25 bn market for personal mobility from robotaxis (depending on factors such as ASPs, trips per day, and average miles traveled per trip).

Exhibit 39: Potential robotaxi TAM

2030 market scenarios for robotaxis ($ mn)								
		Global AVs in operation (000s)						
Revenue per trip	Trips per robotaxi per day	150	750	1,350	2,000	2,650	3,300	4,000
$5	2	$548	$2,738	$4,928	$7,300	$9,673	$12,045	$14,600
	4	$1,095	$5,475	$9,855	$14,600	$19,345	$24,090	$29,200
	6	$1,643	$8,213	$14,783	$21,900	$29,018	$36,135	$43,800
	8	$2,190	$10,950	$19,710	$29,200	$38,690	$48,180	$58,400
	10	$2,738	$13,688	$24,638	$36,500	$48,363	$60,225	$73,000
	12	$3,285	$16,425	$29,565	$43,800	$58,035	$72,270	$87,600
	14	$3,833	$19,163	$34,493	$51,100	$67,708	$84,315	$102,200
$7	2	$767	$3,833	$6,899	$10,220	$13,542	$16,863	$20,440
	4	$1,533	$7,665	$13,797	$20,440	$27,083	$33,726	$40,880
	6	$2,300	$11,498	$20,696	$30,660	$40,625	$50,589	$61,320
	8	$3,066	$15,330	$27,594	$40,880	$54,166	$67,452	$81,760
	10	$3,833	$19,163	$34,493	$51,100	$67,708	$84,315	$102,200
	12	$4,599	$22,995	$41,391	$61,320	$81,249	$101,178	$122,640
	14	$5,366	$26,828	$48,290	$71,540	$94,791	$118,041	$143,080
$9	2	$986	$4,928	$8,870	$13,140	$17,411	$21,681	$26,280
	4	$1,971	$9,855	$17,739	$26,280	$34,821	$43,362	$52,560
	6	$2,957	$14,783	$26,609	$39,420	$52,232	$65,043	$78,840
	8	$3,942	$19,710	$35,478	$52,560	$69,642	$86,724	$105,120
	10	$4,928	$24,638	$44,348	$65,700	$87,053	$108,405	$131,400
	12	$5,913	$29,565	$53,217	$78,840	$104,463	$130,086	$157,680
	14	$6,899	$34,493	$62,087	$91,980	$121,874	$151,767	$183,960

Source: Company data, Goldman Sachs Global Investment Research

Given our reduced EV market forecast, we are lowering our EPS estimates for Tesla, driven by lower deliveries and lower auto gross margins. Our 2024/2025/2026 EPS estimates including SBC are now $2.01/$2.85/$3.95 from $2.01/$3.00/$4.25. Our CY24/25/26 non-GAAP EPS estimates (ex. SBC) are now $2.42/$3.25/$4.35.

While we see fundamental headwinds to the core auto business over the near to medium term, we also believe the market is taking a more forward-looking approach to Tesla, including with respect to its AI opportunity. We are Neutral-rated on TSLA shares. We increase our 12-month price target to $345 from $250 prior, which is now based on 95X (from 65X prior to better reflect long-term opportunities implied in a DCF analysis) applied to Q5-Q8E EPS including SBC. Key downside risks to our view relate to potentially larger vehicle price reductions than we expect, increased competition in EVs, slower EV demand, delays with products/capabilities like FSD/4680, key person risk, the internal control environment, margins, and operational risks associated with Tesla's high degree of vertical integration. Upside risks include faster EV adoption and/or share gain by Tesla, a stronger macroeconomic environment for new vehicle sales more generally, earlier new product launches than we expect, and an earlier/larger impact from AI enabled products (e.g., FSD, Optimus and robotaxis) than we currently anticipate.

Margin resiliency in focus

We examine some of the key issues for margin resiliency for our coverage in this section of the report, including software and services mix, product leadership, and company-specific revenue growth potential. We also detail margins vs. history by segment.

Software and services a strategic focus for auto OEMs

We believe auto OEMs can increasingly grow software and services revenue as platform providers, especially as their installed base of connected vehicles grows.

We believe that ADAS/autonomy, telematics and connectivity, predictive maintenance, and insurance are key opportunities. For telematics, Ford recently commented at our Communacopia + Technology conference that industry ARPU in commercial is ~$20 per month for telematics dashboards and starts at $5 per month for data services. For insurance, auto OEMs benefit from a deeper look at how drivers engage with the safety functions embedded into the car, and insurance (either as a broker or underwriting) has been a rising focus for Tesla, Rivian and GM.

OEMs in our coverage (Ford, GM, Tesla, and Rivian) have various software offerings:

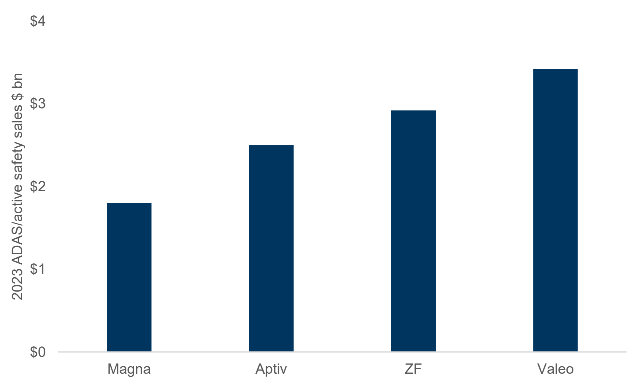
- Ford offers services and software, including telematics and fleet management software for Pro and BlueCruise for consumer ADAS. The company expects to have $1 bn in software revenue (including from sales of Pro and BlueCruise software and revenue assigned to software functions offered standard on vehicles) in 2025 and expects ~20% of its Pro segment EBIT to come from software and services in 2026, up from low double digits currently. As of its 3Q24 report, Ford noted it had more than 805k paid software subscriptions, including nearly 630k in Pro. On BlueCruise, Ford stated it had over 537k BlueCruise enabled vehicles on the road.
- GM offers software and services through both its OnStar business and its Super Cruise offering. On Super Cruise, GM noted that over 280 mn miles have been driven with Super Cruise engaged and expects to have ~380k Super Cruise enabled vehicles on the road at the end of 2024 and to double that in 2025. On attach rates, GM stated at its investor day that it was seeing 20-25% attach rates for customers as they came off of the trial period. GM expects to grow its revenue from software (inclusive of OnStar) at a 15% CAGR through 2030 from over $2 bn today.
- Rivian does not currently have a large revenue contribution from software but recently announced/deployed several offerings including its Autonomy+ and Connect+ platforms, with both starting on free trials and the company noting it will charge ~$15/mo or $150/year for the Connect+ platform, and we expect Rivian to monetize the autonomy platform in the future. The Autonomy+ platform is currently an L2 ADAS offering and Connect+ allows for increased connectivity such as hotspot and data to access music streaming apps.
- Tesla derives its software revenues from several products including premium connectivity but primarily its Autopilot and FSD (Supervised) offerings. We estimate that Tesla's FSD business generates $1-$3 bn of revenue per year (and we believe it's more likely at the lower end of this currently), and we believe Tesla's software business can reach $20 bn+ by 2030 largely driven by improved FSD functionality for its own fleet (at least L3 and eventually L4). We provide more detail on progress with AI and FSD in the "Rate of AV progress" section of this report.

Consistent with our platform & powers thesis, we think that product leadership and content growth will be key considerations in a more muted auto production environment for auto tier 1 suppliers

We believe that category leadership will be increasingly important for the durability of earnings, especially for auto tier 1s in a muted auto production environment. We examine company positioning in key product lines like active safety and seating in Exhibit 40 & Exhibit 41.

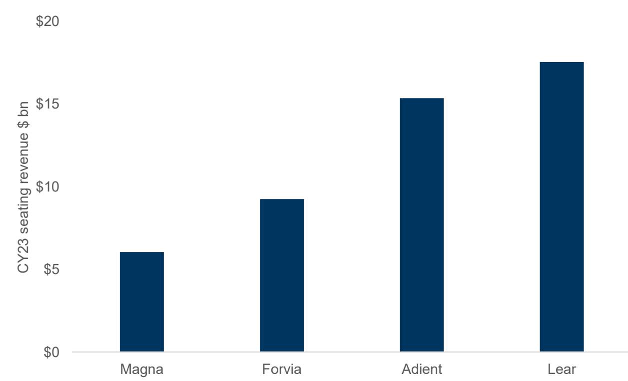
As auto OEMs increasingly use common underlying vehicle platforms, we believe it will be important for suppliers to adapt to how their products will work at a system level, making product leadership for suppliers even more important, in our view.

Exhibit 40: Active safety sales by supplier for 2023



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 41: Seating sales by supplier for 2023

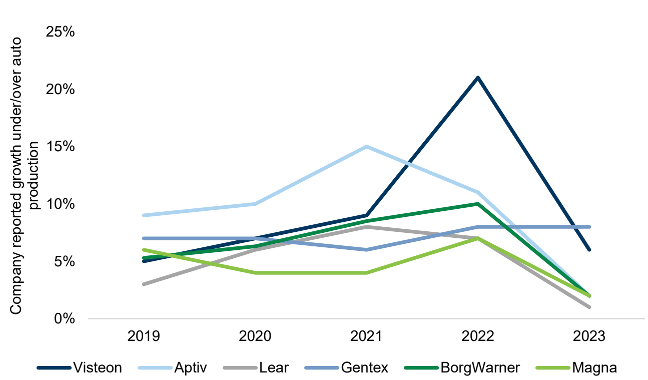


Source: Company data, Goldman Sachs Global Investment Research

We believe that product leadership will help tier 1 suppliers to execute on price cost, especially in parts of the supply chain where OEMs may look to vertically integrate as volumes increase with a platform approach.

Another key consideration for resiliency of profits will be around content growth and the ability for tier 1 suppliers to outgrow underlying production. We show growth over market (GoM) for tier 1s in Exhibit 42.

Exhibit 42: GoM for tier 1s in our coverage



Source: Company data, Goldman Sachs Global Investment Research

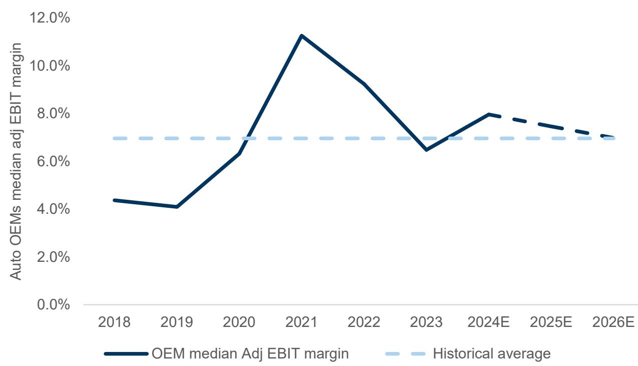
Margins by sub-sector relative to historical averages for auto OEMs, tier 1s, and EMS

companies

For traditional auto OEMs in our coverage, we believe that adjusted EBIT margins will remain around the 5-year historic levels as OEMs look to offset industry headwinds (e.g. pricing declines, rising labor costs) with cost reduction efforts, mix, and volume growth.

Exhibit 43: Auto OEM median adj EBIT margin relative to the historical average

GSe of auto OEMs median adj EBIT margin 2024E-2026E

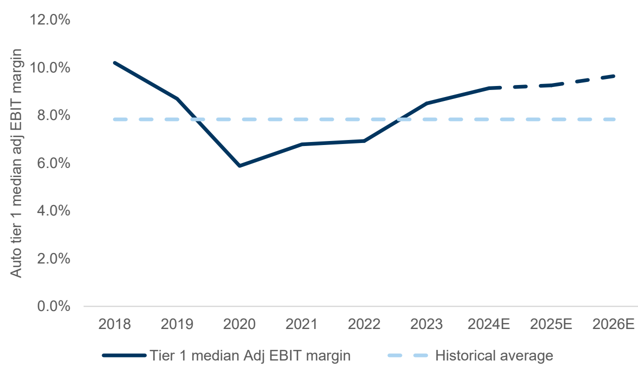


Source: FactSet, Goldman Sachs Global Investment Research

While the auto tier 1 suppliers in our coverage were under-earning relative to the historical average EBIT margin for the sub-sector during the COVID and supply chain crisis in 2019-2022, auto tier 1s have returned to historical average margins, and we expect margins to be relatively flat in 2025 yoy.

Exhibit 44: Auto tier 1 median adj EBIT margin relative to the historical average

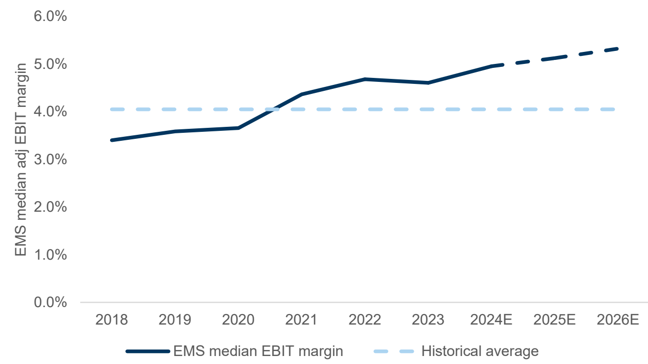
GSe of auto tier 1 median adj EBIT margin 2024E-2026E



Source: FactSet, Goldman Sachs Global Investment Research

The EMS companies in our coverage (Flex and Jabil) have executed on margin expansion over the past several years. The current median EBIT margin is now in the ~5%+ range, up from ~3-4% few years ago. A key debate has been around the sustainability of margins at this higher level relative to history. We think that margins can even expand from here in part given the ongoing mix shift to faster growing end markets with longer product cycles and higher margins, as well as operational execution.

Exhibit 45: Median adj EBIT margin for our covered EMS companies relative to the historical average
GSe of EMS margins for 2024E-2026E



Source: FactSet, Goldman Sachs Global Investment Research

Downgrade MGA to Sell from Neutral given regional/customer exposure and slower company-specific growth

We downgrade Magna (MGA) shares to Sell from Neutral as we believe that the company's above average exposure to European auto OEMs (and limited sales to faster-growing Chinese domestic OEMs like BYD), and relatively lower content per vehicle (CPV) growth compared to our broader tier 1 coverage, will lead to slower revenue growth. With more muted revenue growth, we also believe it will be more difficult for Magna to reach its margin expansion targets. We lower our EPS estimates for 2025/2026, and lower our 12-month price target to $41 from $42 (implying 10% downside vs. 5% upside on average for our coverage).

What would make us more positive: While Magna has been investing for growth in megatrend areas, we believe its business has been affected by slower BEV ramps from key customers including Ford and GM (e.g. its battery enclosure business). However, if Magna has more success at improving its growth profile in megatrend areas (e.g. active safety, lightweighting/electrification) than we expect, then we could be more positive on the stock. We could also be more constructive if we had a more positive cyclical view on the market, given Magna's broader-based product set and exposure to Western OEMs. Finally, Magna has several cost/margin improvement efforts underway, and if these lead to stronger EPS/FCF than we expect, then we could change our view on the stock.

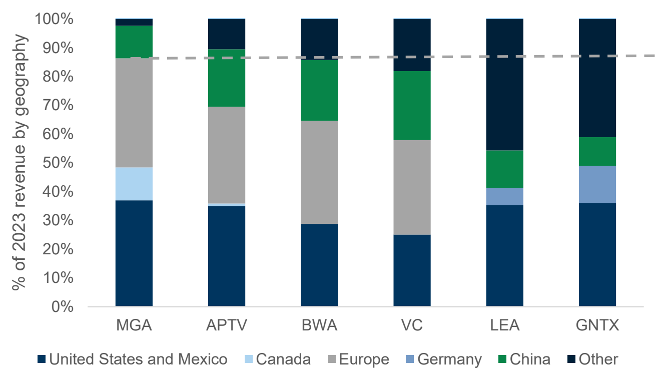
Regional exposure - we expect Magna's above average European exposure to be a headwind in the near to intermediate term given weakness in this region

While S&P Global Mobility/IHS increased its FY24 outlook for Europe with its December update by ~41K units as 4Q in Europe is coming in a bit stronger than expected, it reduced its outlook for 2025/2026 by ~261K units in each year respectively. IHS is now forecasting Europe LVP to be -2.6%/+2.5% yoy in 2025/2026. Recall that S&P Global Mobility/IHS previously cut their expectation for European production for 2024 by ~92K units on a FY basis in its update from November 12th (and China saw 412k units added to FY24 likely driven by stimulus).

We expect the challenging backdrop in Europe to be a particular headwind for Magna as nearly 40% of Magna's revenue was tied to Europe per its most recent annual filing, which is the highest amongst tier 1 suppliers in our coverage.

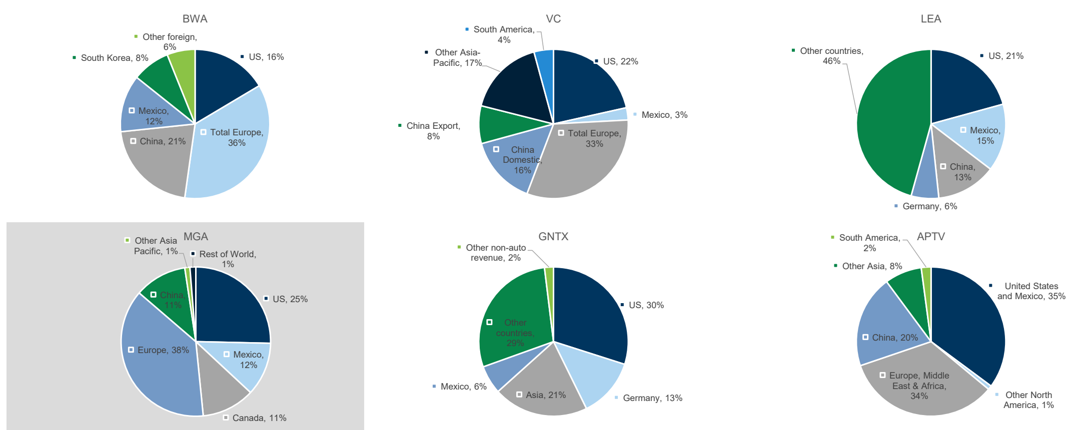
Magna's exposure to China is among the lowest in our coverage (Exhibit 46).

Exhibit 46: Magna has >85% of its revenue tied to North America and Europe (with nearly 40% from Europe)



Source: Company 10-K filings

Exhibit 47: Of our covered tier 1 suppliers, Magna has the largest European exposure

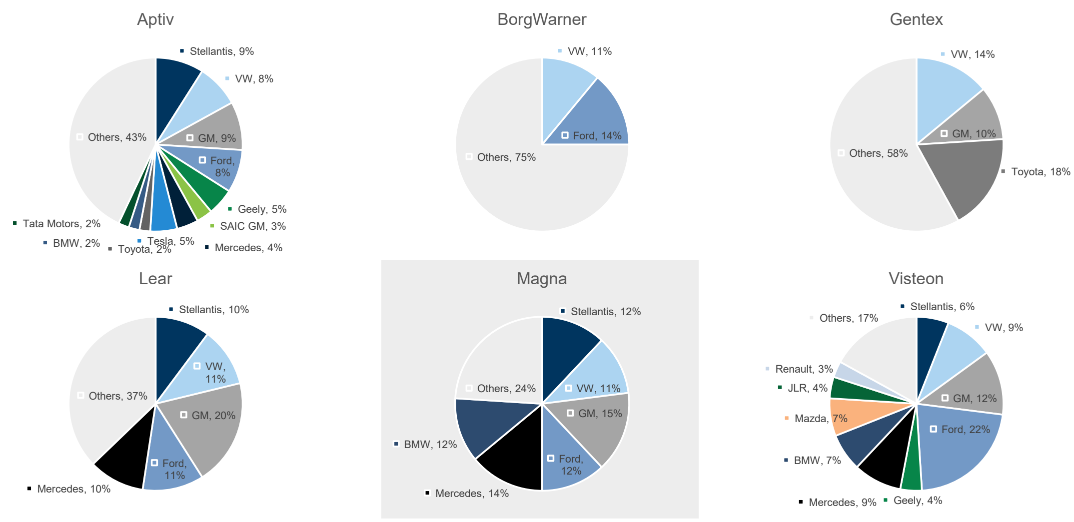


Source: Company 10-K filings

Customer exposure - we expect Magna's customer exposure to remain a headwind given the company's above average exposure to North American and European traditional OEMs and limited Chinese domestic OEM exposure

Per its most recent annual filing, key traditional Western OEMs (including Stellantis, VW, GM, Ford, Mercedes, and BMW) each made up 10-15% of Magna's total net sales in 2023 and collectively accounted for about three-quarters of Magna's revenue. We believe that Magna's outsized exposure to the traditional Western OEMs that are undergrowing the broader market and especially the Chinese domestic OEMs (and we estimate that Magna only has a mid single digit percentage of total revenue tied to domestic Chinese OEMs) will remain a headwind for growth. Some of Magna's top customers, including Stellantis, GM, and Ford, plan to reduce inventory in the coming weeks/months.

Exhibit 48: Customer exposure for tier 1 suppliers in our coverage



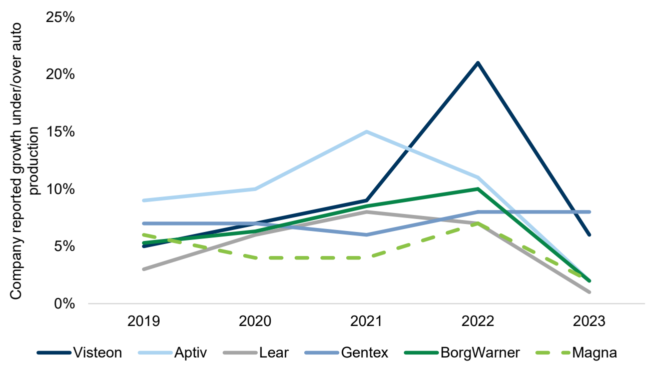
Aptiv as of FY2022; other companies as of FY2023

Source: Company 10-K filings

Expect slower growth over market than peers - Magna's historic growth over market has been below other tier 1 suppliers in our coverage

From 2019-2023, Magna's growth over market was in the mid single digit range and ~290 bp below the average of the other tier 1 suppliers in our coverage. While Magna has been investing to support new programs in megatrend areas, we believe some of its new programs will ramp more slowly including its battery enclosure business where it has content on BEV programs at Ford and GM. Moreover, given the uncertainty in megatrend areas in the current regulatory environment, Magna commented on its August earnings call that it may not reach megatrend profitability in 2026 like it had previously been targeting. We believe the company's relatively slower content per vehicle growth compared to our broader tier 1 coverage will limit growth over market and thus EPS/FCF improvement especially in a somewhat muted auto production environment.

Exhibit 49: Growth over market for tier 1 suppliers



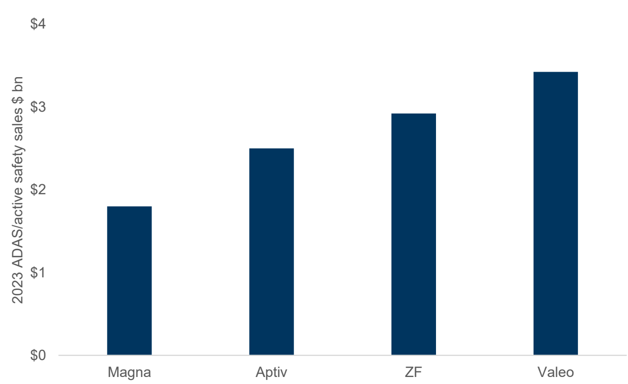
Source: Company data, Goldman Sachs Global Investment Research

While Magna has a broad set of capabilities, in some product lines it has more limited market share

Magna's broad set of capabilities spans across its Body Exteriors & Structures, Power & Vision, Seating Systems, and Complete Vehicle segments. However, as we wrote in our Platforms & Power report, we think that category leadership is increasingly important for auto tier 1 suppliers, especially in a muted production backdrop, and as OEMs are more likely to vertically integrate with platforms.

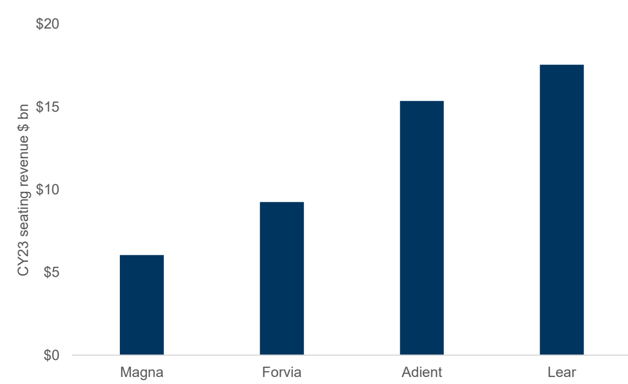
While we believe that Magna has product leadership in some areas like body structures, in other businesses like active safety and seating it is smaller than several of its competitors.

Exhibit 50: Magna's active safety business is smaller than those of its key competitors in the active safety/ADAS market



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 51: Magna's seating business is also smaller relative to Forvia, Adient, and Lear

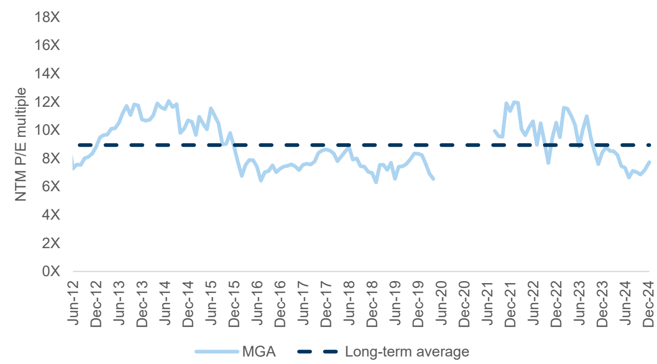


Source: Company data, Goldman Sachs Global Investment Research

Historical valuation and NTM P/E multiples

Magna is currently trading at ~8X NTM P/E on Street (FactSet) estimates compared to its long-term historical average of about 9X and its historical range of about 6X-16X.

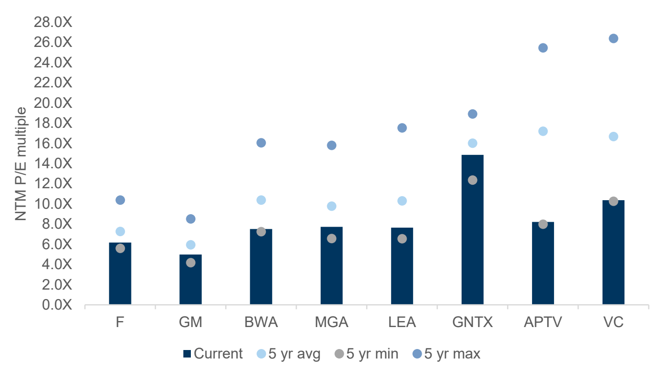
Exhibit 52: MGA NTM P/E multiple



Source: FactSet

While Magna's valuation multiple has compressed, this has occurred for the sector more broadly (Exhibit 53).

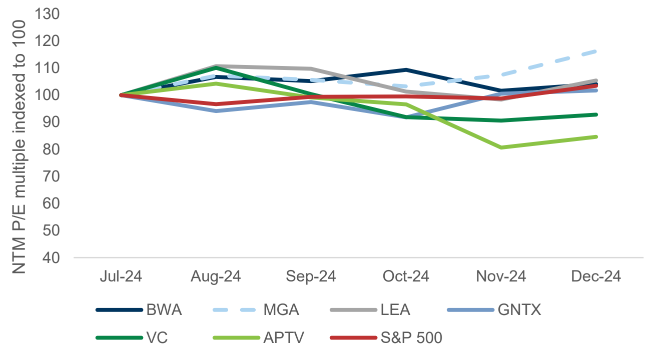
Exhibit 53: Several auto exposed companies in our coverage are trading at or near trough valuations on consensus NTM EPS estimates



Source: FactSet

Moreover, Magna's multiple has actually held in better than many of the other auto tier 1 suppliers in our coverage over the last several months. We examined NTM P/E multiples indexed to 100 since before companies reported 2Q earnings in late July/early August and found that Magna's multiple has expanded the most among tier 1 suppliers.

Exhibit 54: NTM P/E multiples indexed to 100 for auto tier 1 suppliers and the S&P 500 before 2Q EPS reports through December



Source: FactSet

Price target & key risks

We maintain our CY24 EPS estimate of $5.25 and lower our CY25/CY26 EPS estimates to $5.80/$6.45 from $6.00/$7.00 prior driven primarily by lower revenue and margins. Our revenue and EPS estimates for CY25/CY26 are below the Street (FactSet), with the Street modeling EPS of $5.98/$6.70 in 2025/2026.

We lower our 12-month price target to $41 from $42, which is based on 7X (unchanged) applied to our normalized EPS estimate (including SBC) of $5.80 (from $6.00 prior reflecting our updated estimates). Our 12-month price target for MG.TO listed in Canada moves to C$58 from C$59 using the current exchange rate.

Key upside risks relate to 1) Magna gaining share (including growing with key customers and growing its presence in Asia); 2) Magna growing its content per vehicle and outgrowing industry unit production (and profitably pivoting toward secular growth themes in megatrend areas sooner than we expect); 3) if Magna can improve its EBIT margins and FCF faster than we estimate; and 4) if the auto cycle is better than expected (e.g. a better demand environment).

Estimate and price target changes

We are lowering estimates for F, APTV, BWA, LEA, VC, and RIVN to better reflect softer market trends, including for EVs.

Exhibit 55: GS revenue and EPS new vs old estimates

	Revenues (mns)					
	2024 Old	2024 New	2025 Old	2025 New	2026 Old	2026 New
Auto OEMs						
F	$180,419	$180,670	$179,740	$179,580	$184,505	$183,564
TSLA	$99,687	$99,687	$117,957	$113,871	$140,218	$133,595
RIVN	$4,663	$4,663	$4,881	$4,695	$6,176	$5,084
Tier 1 Suppliers						
BWA	$14,096	$14,096	$14,553	$14,380	$15,126	$14,889
MGA	$42,697	$42,697	$43,056	$42,610	$44,098	$43,638
LEA	$23,047	$23,047	$23,691	$23,439	$24,690	$24,411
VC	$3,860	$3,860	$4,050	$4,050	$4,338	$4,338
APTV	$19,719	$19,719	$20,176	$20,132	$21,276	$21,230

	EPS					
	2024 Old	2024 New	2025 Old	2025 New	2026 Old	2026 New
Auto OEMs						
F	$1.80	$1.80	$1.80	$1.75	$2.00	$2.00
TSLA	$2.01	$2.01	$3.00	$2.85	$4.25	$3.95
RIVN	($4.49)	($4.49)	($3.10)	($3.20)	($3.00)	($3.10)
Tier 1 Suppliers						
BWA	$4.25	$4.25	$4.50	$4.40	$5.05	$4.95
MGA	$5.25	$5.25	$6.00	$5.80	$7.00	$6.45
LEA	$12.05	$12.05	$14.15	$13.55	$17.25	$16.25
VC	$8.30	$8.30	$9.10	$9.00	$10.50	$10.50
APTV	$6.15	$6.15	$7.15	$7.05	$8.25	$8.15

Source: Goldman Sachs Global Investment Research

We increase our price target and target multiple for BDC reflecting recent datapoints which suggest the industrial end market remains somewhat weak, but the yoy improvement in the November ISM index is a positive signal in our view, and we think there is the potential for a cyclical recovery in 2025. We also increase our JBL price target reflecting improved peer multiples. We lower our price target for QS to align with the weaker EV market. We also lower target multiples for APTV and VC reflecting challenging industry trends, including for EVs. We lower our Q5-Q8 revenue estimate for Rivian reflecting the challenging industry backdrop for EVs, but we raise our target multiple to 3X from 2.5X prior reflecting higher market multiples and our price target moves to $13.

Exhibit 56: Updated 12-Month Price Targets

	Autos & Industrial Technology Price Target Changes					
	NEW			OLD		
Auto OEMs						
	Target Multiple	**Q5-Q8 EPS**	**Price Target**	**Target Multiple**	**Q5-Q8 EPS**	**Price Target**
TSLA	95X	$3.63	$345	65X	$3.85	$250
	Target Multiple	**Q5-Q8 Revenue**	**Price Target**	**Target Multiple**	**Q5-Q8 Revenue**	**Price Target**
RIVN	3X	$4,705	$13	2.5X	$5,505	$12
Auto Tier 1 Suppliers						
	Target Multiple	**Norm. EPS**	**Price Target**	**Target Multiple**	**Norm. EPS**	**Price Target**
APTV	10X	$7.05	$71	11X	$7.15	$86
BWA	8X	$4.40	$35	8X	$4.55	$36
LEA	9X	$13.55	$122	9X	$14.15	$127
MGA	7X	$5.80	$41	7X	$6.00	$42
VC	12X	$9.00	$108	13X	$9.10	$118
Components & Connectors						
	Target Multiple	**Norm. EPS**	**Price Target**	**Target Multiple**	**Norm. EPS**	**Price Target**
BDC	17X	$8.15	$139	16X	$8.15	$130
EMS						
	Target Multiple	**Q5-Q8 EPS**	**Price Target**	**Target Multiple**	**Q5-Q8 EPS**	**Price Target**
JBL	16X	$9.05	$145	15X	$9.05	$136

Our 12 month price target for MG.TO moves to C$58 from C$59 based on the current FX rate; JBL & TSLA EPS includes SBC

Source: Goldman Sachs Global Investment Research

Exhibit 57: Updated 12-month price target for QuantumScape

	New					Old				
	Price Target	Target Multiples			Discounted Period	Price Target	Target Multiples			Discounted Period
	Blended	Bear	Base	Bull		Blended	Bear	Base	Bull	
QuantumScape	$4.00	5X	12X	25X	2028	$4.50	7X	15X	30X	2028

Source: Goldman Sachs Global Investment Research

Coverage snapshot and upside/downside analysis

Exhibit 58: US Autos & Industrial Tech coverage snapshot

					CY2025E					
	Rating	12-month Price Target	Price	Upside/ Downside	Mkt Cap ($US mn)	ROE	P/E	EV/EBITDA	EV/Sales	EV/FCFF
Auto OEMs										
F	Buy	$12	$10.56	14%	$42,430	11%	6.0x	3.7x	0.3x	8.9x
GM	Buy	$67	$52.74	27%	$59,649	11%	4.7x	2.7x	0.3x	4.7x
TSLA	Neutral	$345	$400.99	-14%	$1,402,262	20%	140.9x	63.8x	12.2x	209.5x
RIVN	Neutral	$13	$14.06	-8%	$14,257	--	--	--	2.8x	--
Median						15%	6.0x	3.7x	1.5x	8.9x
Tier 1 Suppliers										
BWA	Neutral	$35	$34.61	1%	$7,770	15%	7.9x	4.7x	0.7x	15.2x
MGA	Sell	$41	$45.71	-10%	$13,132	11%	7.9x	4.4x	0.4x	10.6x
LEA	Buy	$122	$102.62	19%	$5,788	14%	7.6x	4.5x	0.3x	8.4x
GNTX	Neutral	$30	$31.15	-4%	$7,203	18%	15.2x	10.8x	2.8x	20.8x
VC	Buy	$108	$93.77	15%	$2,616	25%	10.4x	4.8x	0.6x	13.7x
APTV	Buy	$71	$58.42	22%	$14,358	17%	8.3x	6.8x	1.1x	11.7x
Median						16%	8.1x	4.7x	0.7x	12.7x
Components and Systems										
APH	Buy	$79	$72.61	9%	$91,888	26%	33.9x	22.4x	5.7x	34.0x
TEL	Buy	$190	$150.25	26%	$45,826	19%	18.6x	12.1x	2.9x	19.3x
BDC	Buy	$139	$119.87	16%	$4,965	25%	15.5x	12.0x	2.1x	19.8x
ST	Neutral	$36	$30.97	16%	$4,668	19%	9.1x	8.5x	2.0x	15.1x
Median						22%	17.0x	12.0x	2.5x	19.6x
Lidar and Autonomy										
AUR	Sell	$2.50	$7.39	-66%	$12,245	--	--	--	27.7x	--
INVZ	Neutral	$0.75	$0.68	10%	$114	--	--	--	0.4x	--
LAZR	Sell	$7.50	$7.65	-2%	$245	--	--	--	2.8x	--
MBLY	Buy	$20	$16.98	18%	$13,762	--	--	82.6x	6.5x	29.1x
Median						--	--	--	4.7x	--
EMS										
FLEX	Buy	$46	$37.93	21%	$15,172	21%	17.6x	9.4x	0.6x	17.5x
JBL	Buy	$145	$132.75	9%	$15,492	36%	17.5x	7.9x	0.6x	12.1x
Median						29%	17.5x	8.7x	0.6x	14.8x
Test and Measurement										
KEYS	Buy	$190	$168.90	12%	$29,220	27%	27.9x	21.7x	5.6x	27.2x
Power and Thermal Management										
VRT	Buy	$140	$121.70	15%	$46,771	28%	34.3x	24.3x	5.3x	37.1x
Voice Technology										
CRNC	Neutral	$8.00	$8.17	-2%	$384	5%	--	-74.9x	2.3x	17.9x
EV Battery										
QS	Sell	$4.00	$5.01	-20%	$2,550	--	--	--	23.9x	--
Charging Infrastructure										
CHPT	Sell	$1.25	$1.29	-3%	$562	--	--	--	1.0x	--
Warehouse Automation										
SYM	Neutral	$28	$26.76	5%	$15,680	--	--	--	393.6x	93.3x
Coverage Median						19%	12.8x	8.5x	2.2x	17.5x

*All price targets are for a 12-month time frame.
Forward Revenue & EBITDA take 2027 GSe for INVZ and LAZR
2026 for CHPT; 2028 GSe for QS and AUR; all discounted back to 2025

Pricing data as of market close on 12/10

Source: FactSet, Goldman Sachs Global Investment Research

For illustrative purposes, we show an upside/downside scenario analysis for select companies in our coverage below (with downside/upside multiples using the low/higher-end of historical ranges and/or peer levels).

Exhibit 59: Upside/downside scenarios for select companies in our coverage

	Upside/Downside Scenario								
	Current Price (12/10/2024)	Downside Multiple (NTM P/E)	NTM EPS (GSe)	Downside Valuation (Downside Multiple on NTM EPS)	Downside %	Upside Multiple (NTM P/E)	FY2026 EPS (GSe)	Upside Valuation (Upside Multiple on FY26 EPS)	Upside %
Tier-1 Suppliers									
BWA	$35	6X	$4.15	$25	**(28%)**	12X	$4.95	$59	**71%**
GNTX	$31	12X	$2.00	$24	**(23%)**	18X	$2.25	$41	**30%**
LEA	$103	6X	$12.20	$73	**(29%)**	10X	$16.25	$163	**58%**
MGA	$46	6X	$5.75	$35	**(25%)**	10X	$6.45	$64	**41%**
VC	$94	8X	$8.10	$65	**(31%)**	15X	$10.50	$157	**68%**
APTV	$58	7X	$6.75	$47	**(19%)**	15X	$8.15	$122	**109%**
Component Suppliers									
APH	$73	19X	$2.10	$40	**(45%)**	40X	$2.35	$94	**29%**
BDC	$120	9X	$7.35	$66	**(45%)**	16X	$8.40	$134	**12%**
ST	$31	8X	$3.20	$26	**(17%)**	13X	$3.90	$51	**64%**
TEL	$150	14X	$8.10	$113	**(25%)**	25X	$9.05	$226	**51%**
EMS									
* FLEX	$38	9X	$2.65	$24	**(37%)**	20X	$2.85	$57	**50%**
* JBL	$133	9X	$8.65	$78	**(41%)**	20X	$10.15	$203	**53%**
Test & Measurement									
* KEYS	$169	15X	$6.90	$104	**(39%)**	25X	$8.15	$204	**21%**
Power & Thermal Management									
VRT	$122	17X	$3.25	$55	**(55%)**	35X	$4.45	$156	**28%**

* EPS estimates exclude SBC

	Upside/Downside Scenario								
	Current Price (12/10/2024)	Downside Multiple	NTM GSe	Downside Valuation	Downside %	Upside Multiple	2026 GSe	Upside Valuation	Upside %
Auto OEMs		Downside NTM P/E	NTM EPS	Downside Multiple on NTM EPS		Upside P/E View	2026 EPS	Upside Multiple on 2026 EPS	
F	$11	4X	$1.70	$7	**(36%)**	7X	$2.00	$14	**33%**
GM	$53	4X	$10.10	$40	**(23%)**	7X	$11.25	$79	**49%**
TSLA	$401	30X	~$2.55-$3.00	~$75-$90	**~(80%)-(70%)**	~100X-120X	~$3.95-$4.35	~$395-$525	**~0-30%**

TSLA range shows EPS including and excluding SBC

Source: FactSet, Goldman Sachs Global Investment Research

We show key risks for the companies that we updated price targets and/or estimates for below.

Exhibit 60: Price targets and key risks

Company	Ticker	GS Rating	Current Price	Price Target	PT Methodology	Key upside/downside risks
Auto OEMs						
Tesla	TSLA	Neutral	$400.99	$345	Q5-Q8 EPS	EV adoption, margins, market share, the auto cycle, operational execution, key person risk
Ford	F	Buy	$10.56	$12	Norm. EPS	The auto cycle, market share, margins, and the ability to pivot to growth areas such as EVs and AVs
Rivian	RIVN	Neutral	$14.06	$13	Q5-Q8 Sales	Pre-orders/sales volumes, production ramp, market share, margins, software/services mix, the auto cycle, and EV adoption
Tier 1 Suppliers						
BorgWarner	BWA	Neutral	$34.61	$35	Norm. EPS	Revenue growth including ability to outgrow market due to EV portfolio, diesel exposure, the auto cycle, margins, and market share
Lear	LEA	Buy	$102.62	$122	Norm. EPS	The auto cycle, ability to benefit from increasing EV industry mix, margins, market share
* Magna	MGA	Sell	$45.71	$41	Norm. EPS	The auto cycle, market share, ability to outgrow production and capitalize on secular growth themes, capital allocation, and FCF
Visteon	VC	Buy	$93.77	$108	Norm. EPS	Ability to capitalize on EVs and AVs, margins, revenue, market share, general macroeconomic risk, multiple expansion/contraction
Aptiv	APTV	Buy	$58.42	$71	Norm. EPS	Ability to grow CPV, the auto cycle, market share, margins, debt
Electronic Components						
Belden	BDC	Buy	$119.87	$139	Norm. EPS	Industrial/macro trends, margins, leverage, and M&A
EMS						
Jabil	JBL	Buy	$132.75	$145	Q5-Q8 EPS	Revenue growth, trends at Apple and in key end markets, macroeconomic trends, margins, M&A, capital allocation
EV Battery						
QuantumScape	QS	Sell	$5.01	$4	2028 Sales (Discounted)	Ability to hit its targeted battery specs and ramp production, technological breakthroughs in today's lithium-ion batteries

* Our 12-month PT for MG.TO listed in Canada is 58 CAD

Source: FactSet, Goldman Sachs Global Investment Research

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Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

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