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# Bible 4Q24 – Autos: a trough is emerging. One of our favored semi sectors in 2025

6 March 2025

**We publish today the Automotive section of our 26<sup>th</sup> Tech Infrastructure Quarterly Bible.**

In this fast-paced world, it is important to regularly review extensively what happened across our coverage to update our convictions and strengthen our expertise. Getting fundamental and secular views is great, but often easy. Good research is also about thoroughly reviewing short-term industry dynamics and investor sentiment.

**We publish the Bible section by section.** For each segment, we wrap up the current context (recent developments and key controversies), what we have learned in the quarter with underlying data and

analyses, a summary of what we expect next, and our updated convictions. In the coming weeks we will publish sections on Telecom Infrastructure, Cloud, Memory, Semicap, Foundries, Enterprise IT, PC and Ride sharing & Delivery.

See the following links for the [Smartphones](#) and [Industrials](#) sections.

**There is monumental work behind this report.** For each segment, we track all company comments and key reported numbers, industry data, and the evolution of consensus expectations. All the work is accessible in excel spreadsheets on request.

## Automotive – The context

*After the Covid-19 crisis, which took SAAR down 20% in 2020, semi shortages slowed the pace of recovery in 2021 and 2022. While deliveries returned to pre-Covid levels in 2023, they declined again in 2Q24, suffering from weak end demand.*

*xEV penetration is below 20% today, yet OEMs are pushing out ramp plans and others in the value chain are warning that EV demand is slowing. This is mostly BEV, though, and Hybrids are picking up the slack.*

*The auto semi market entered a shallow down cycle in 2019, which depleted inventories into the first half of 2020. Revenues recovered strongly, growing sequentially every quarter between 2Q20 and 4Q23, supported by the rapid growth of EV and ADAS, OEMs shifting production to higher-end vehicles, and a steady build up of OEM and channel inventories.*

*Semi revenues per car delivered went several times above standard deviation, which we attribute partly to an acceleration of growth in the content per car, partly to pricing, and partly to inventory building up across the value chain. The industry entered a steep inventory correction indeed in 4Q23.*

*Investor focus, entering earnings season, was mostly on the shape of the cycle—specifically, the timing of the trough and the pace of a recovery.*

## Automotive – What have we learnt this quarter?

### Production grew in 4Q, but demand remains weak

4Q24 global auto production grew 1% YoY (vs. 5% decline in 3Q24). However, end demand remains weak, with OEMs citing an uncertain environment and a continued shift toward lower-end models. The industry forecasts production to decline another 0.5% this year.

### xEVs decelerate across the world

xEV sales grew 28% YoY in 4Q24 in China, decelerating 13pts from 3Q24, and fell 3% YoY in the rest of the world – the first decline since 2Q20, decelerating by 4pts from 3Q24.

Globally, PHEVs once again outpaced BEVs, growing 40% year-on-year compared to 6% for BEVs.

### Auto semis: Steep correction, but signs of a trough emerging.

Auto semi revenues declined 9% YoY and 4% QoQ – 9 points below seasonality – driven by the ongoing inventory correction.

The outlook is mixed: Infineon and Analog – among the first hit by the correction – along with others, are already signaling a recovery, while onsemi and STM, impacted later, have limited visibility. Consensus expects industry revenues to bottom out in 1Q25, in line with our analysis.

### Tesla: weakness in the core business, but FSD progress is accelerating

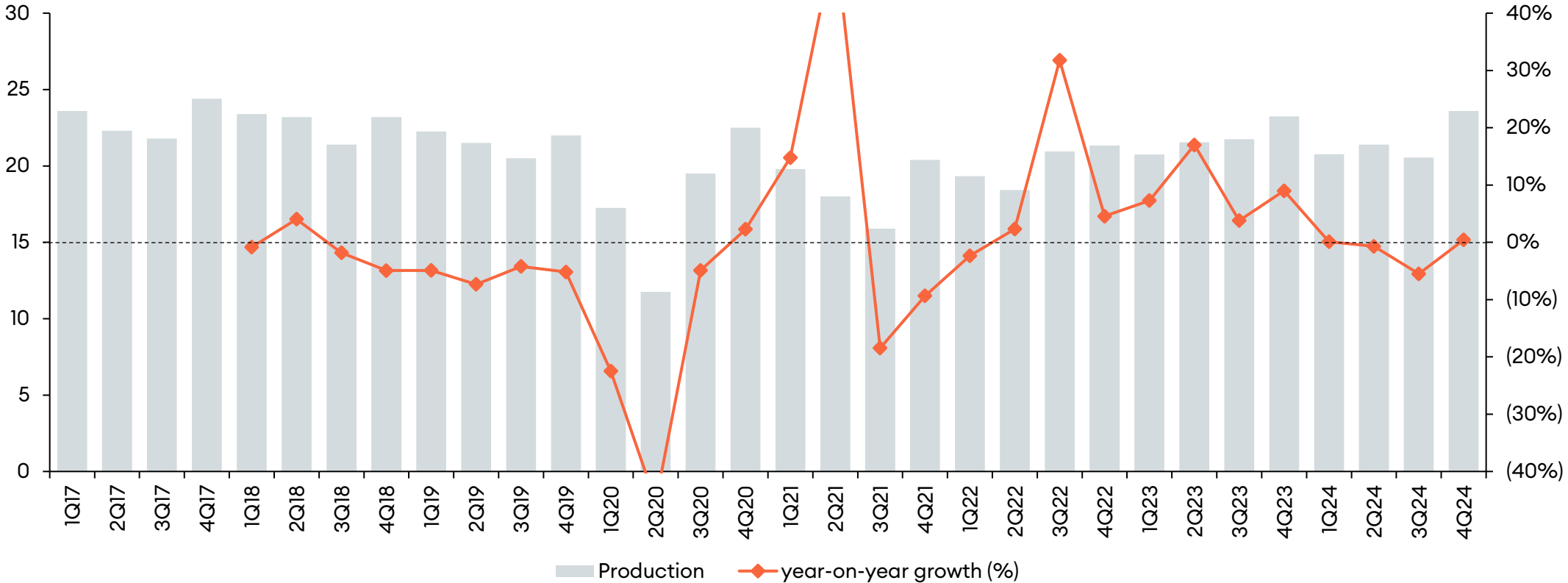
Deliveries grew 7% sequentially, but at a cost: ASPs and gross margins fell 5% and 3.6 pts, respectively.

FSD progress is accelerating. Mean time between failures has surpassed 1,000 miles, and Tesla has announced plans to release an unsupervised version of FSD and begin robotaxi trials in the US later this year.

# Automotive production returned to growth in 4Q24

**Auto production grew 1% YoY**

LHS: Global auto production (m units) RHS: YoY Growth (%)



Source: S&P Global, Autoliv, Corporate Reports, and NSR analysis.

## However, the industry expects another weak year, down 0.5% over 2024

Auto production is expected down 0.5% in 2025, with growth stalling in China and slowing in the rest of the world

Global Automotive Production by Region (units)

	FY2023	FY2024	YoY Growth	FY2025	YoY Growth
Global	87.8	86.7	(1.2%)	86.3	(0.5%)
China	28.1	29.2	4.2%	29.1	(0.4%)
Europe	17.8	17.0	(4.7%)	16.5	(2.8%)
N. America	14.4	14.0	(2.4%)	13.9	(1.6%)
Rest of Asia	13.9	13.6	(2.2%)	13.9	2.0%
Japan	8.5	7.7	(8.8%)	7.7	(0.5%)
S. America	2.9	2.9	1.8%	3.1	5.3%

*“production is expected to be negative in the low single digits. The environment will **remain uncertain** due to factors like tariffs, market developments in China, or an increased pull for production localization.”*

Continental – 29 January 2025

*“We expect 2025 to be a **challenging year** for the automotive industry with **LVP declining** and geopolitical risks remaining.”*

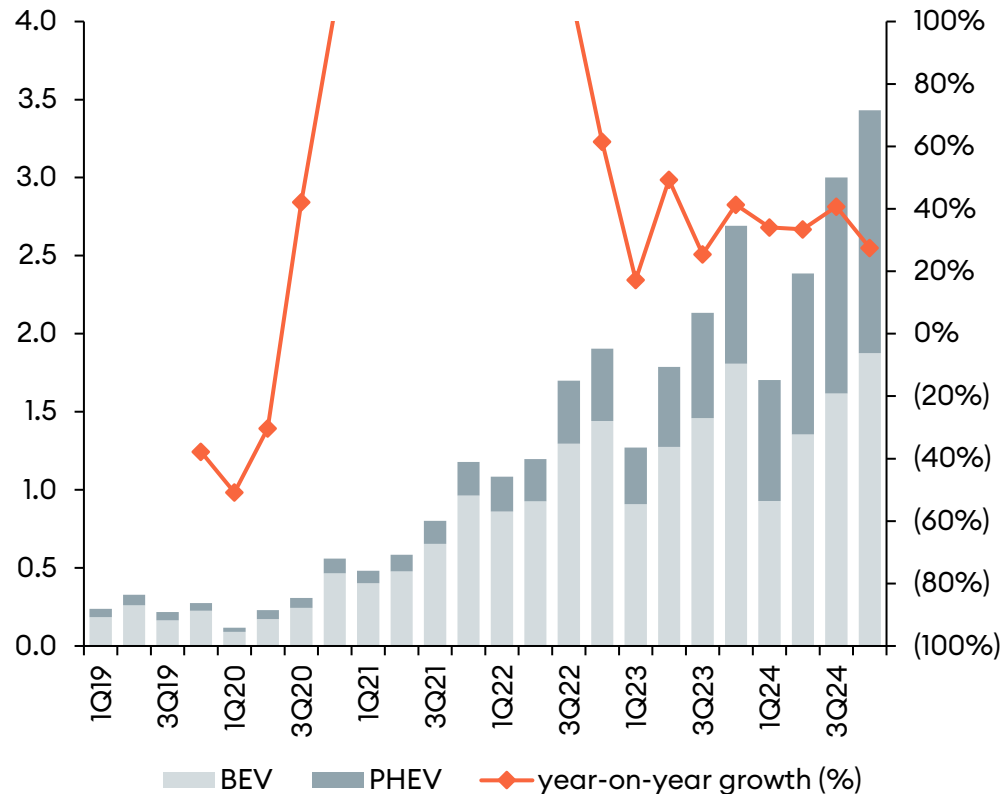
Autoliv– 31 January 2025

Source: Autoliv, S&P Global and NSR estimates and analysis.

# xEV sales grew strong double-digits in China, but declined in the rest of the world

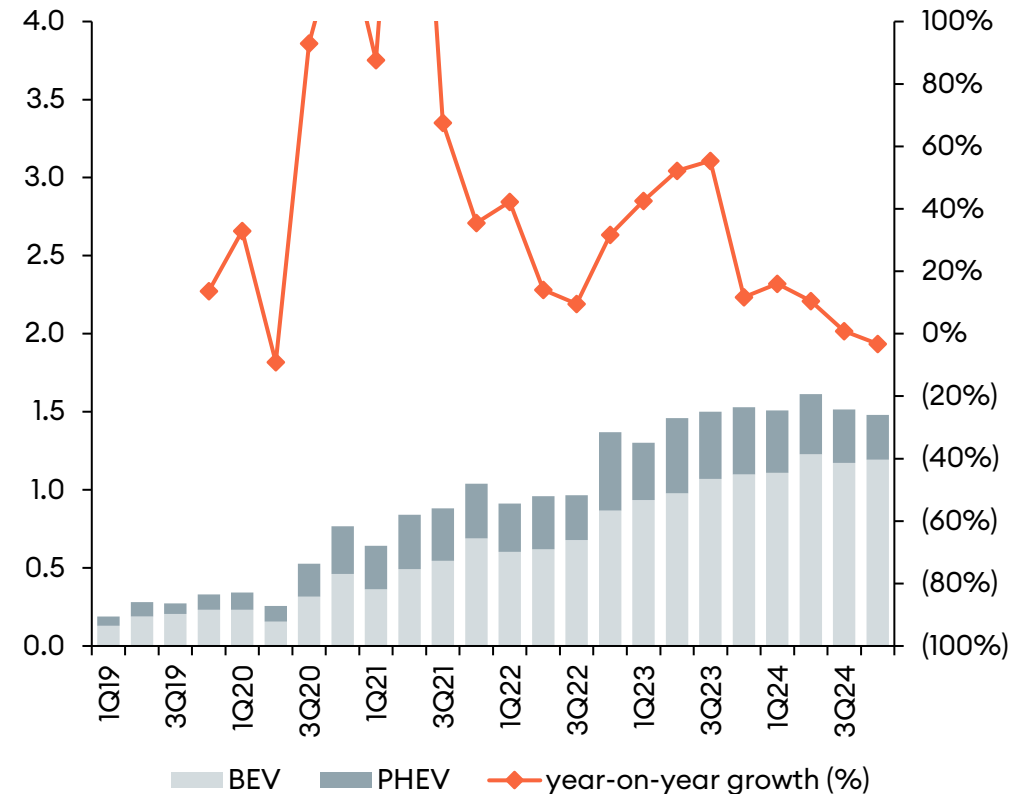
## xEV sales in China grew 28% YoY

LHS: EV sales China (k units) RHS: YoY Growth (%)



## ex-China xEV declined 3% YoY

LHS: Global EV sales, ex. China (k units) RHS: YoY Growth (%)

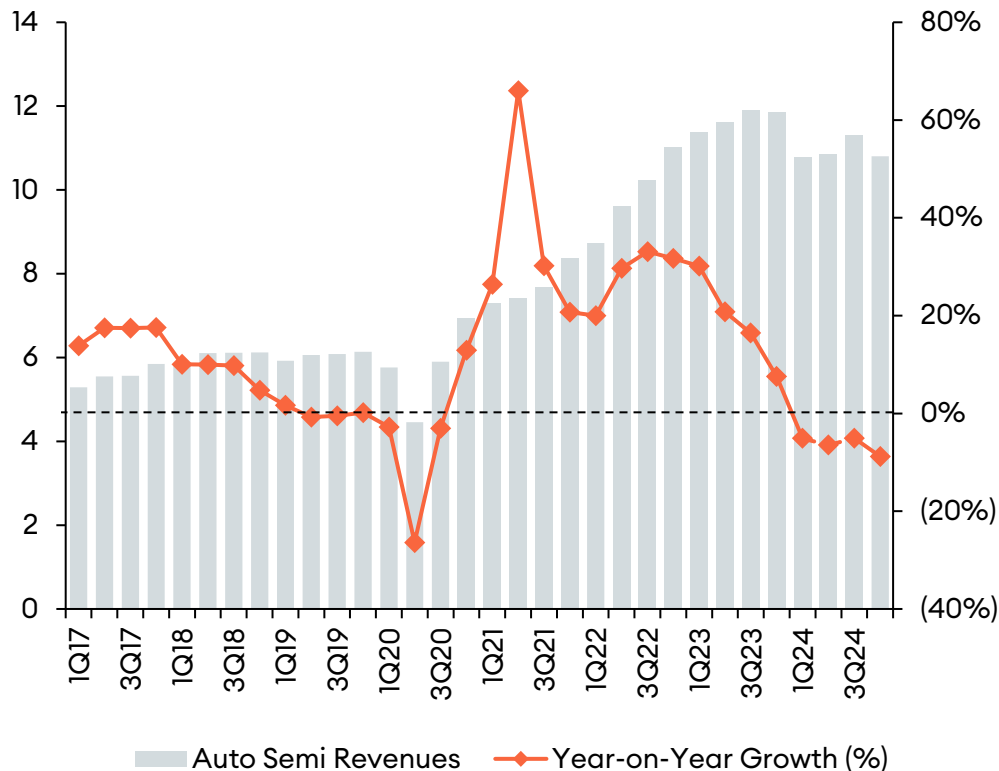


Source: EVSalesBlogSpot, CleanTechnica, CAAM, CPCA, and NSR estimates and analysis.

# Auto semis: Further inventory correction, with revenues down 9% YoY

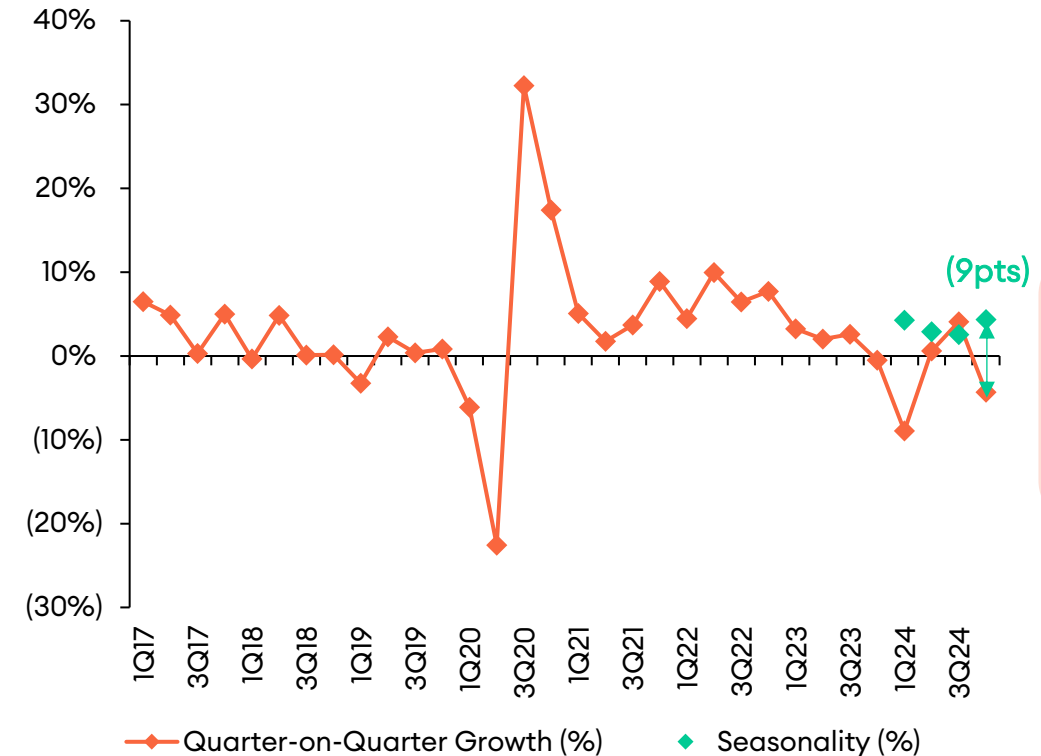
## Revenues declined 9% year-on-year

LHS: Automotive Semi revenues<sup>1</sup> (US\$bn) RHS: YoY Growth (%)



## 4% sequential decline, 9pts below seasonality

Auto semi QoQ revenue growth & seasonality (%)



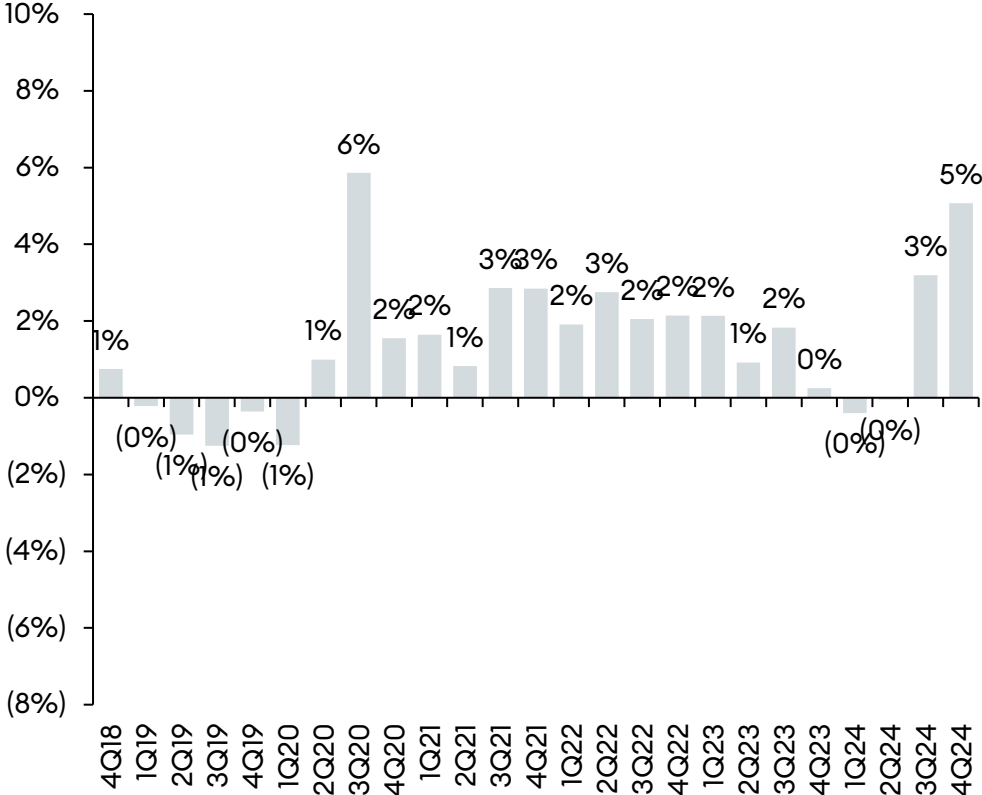
<sup>1</sup> = Companies: Infineon (ATV), Cypress (Auto), NXP (Auto), ON Semi (Auto), STMicro (Auto/ADG), Renesas (Auto), Melexis (Group), Analog Devices (Auto), Maxim (Auto), Linear Technologies (Auto), Diodes (Auto), Monolithic Power (Auto), Mobileye (Group), Nvidia (Auto), Elmos Semi (Group), Vishay (Auto), Texas Instrument (Auto - VA consensus)

Source: Corporate Reports, FactSet, Visible Alpha, and NSR analysis.

# Auto semis: Revenue beat, but guide below

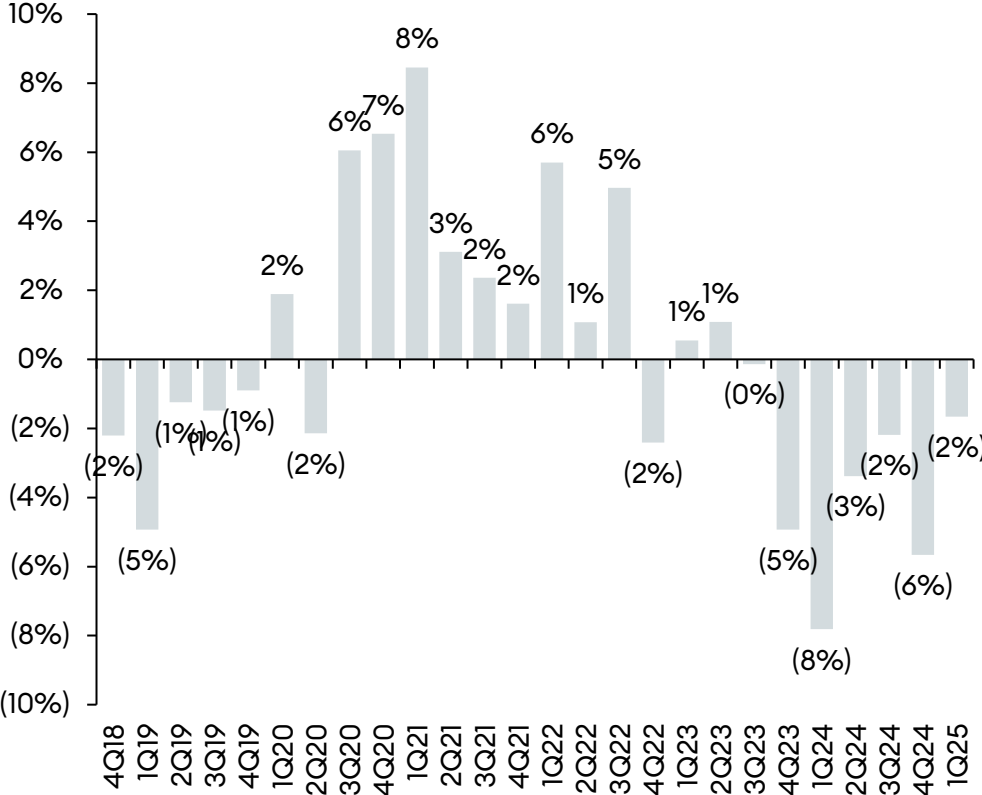
## 4Q24 auto revenues 5% above expectations

Automotive Semi revenues vs expectations<sup>1</sup> (%)



## Auto semi companies guided 2% below

Automotive semi company guidance vs expectations<sup>1</sup> (%)



1 = Companies: Infineon (ATV), Cypress (Auto), NXP (Auto), ON Semi (Auto), STMicro (Auto, prior to 1Q24 estimated based on ADG), Renesas (Auto), Melexis (Group), Analog Devices (Auto), Maxim (Auto), Diodes (Auto), Monolithic Power (Auto), Mobileye (Group), Nvidia (Auto)

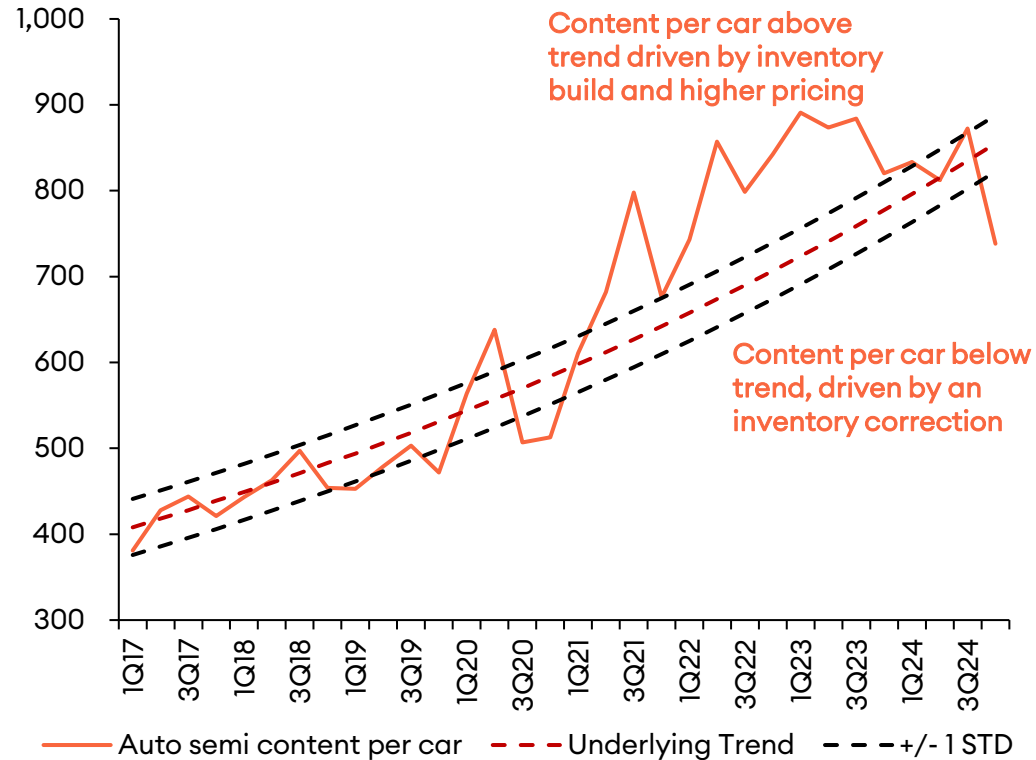
Source: Corporate Reports, FactSet, and NSR analysis.



# Semi sales per car is below trend: OEMs are digesting inventory

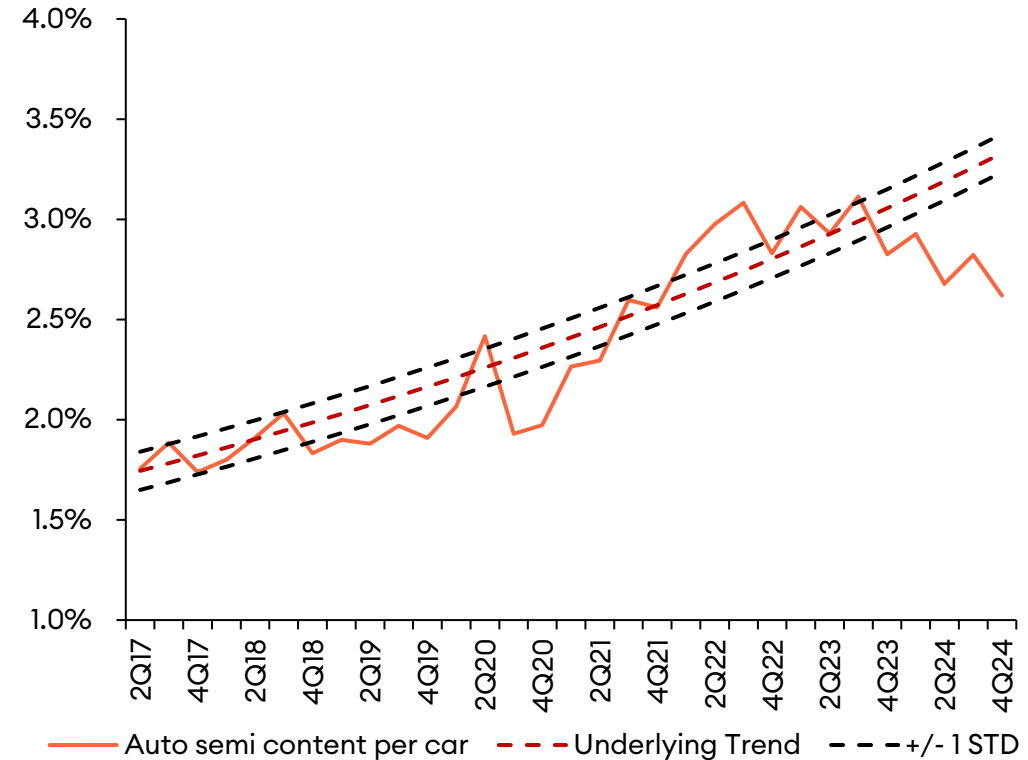
## Semi revenue per car produced is below trend

Automotive semi revenues<sup>1</sup> per car produced (US\$)



## On a dollar basis, semi content is below trend

Automotive semi revenues<sup>1</sup> / OEM revenues<sup>2</sup> (%)



1 = Companies: Infineon (ATV), Cypress (Auto), NXP (Auto), ON Semi (Auto), STMicro (Auto, prior to 1Q24 estimated based on ADG), Renesas (Auto), Melexis (Group), Analog Devices (Auto), Maxim (Auto), Linear Technologies (Auto), Diodes (Auto), Monolithic Power (Auto), Mobileye (Group), Nvidia (Auto), Texas Instrument (Auto)

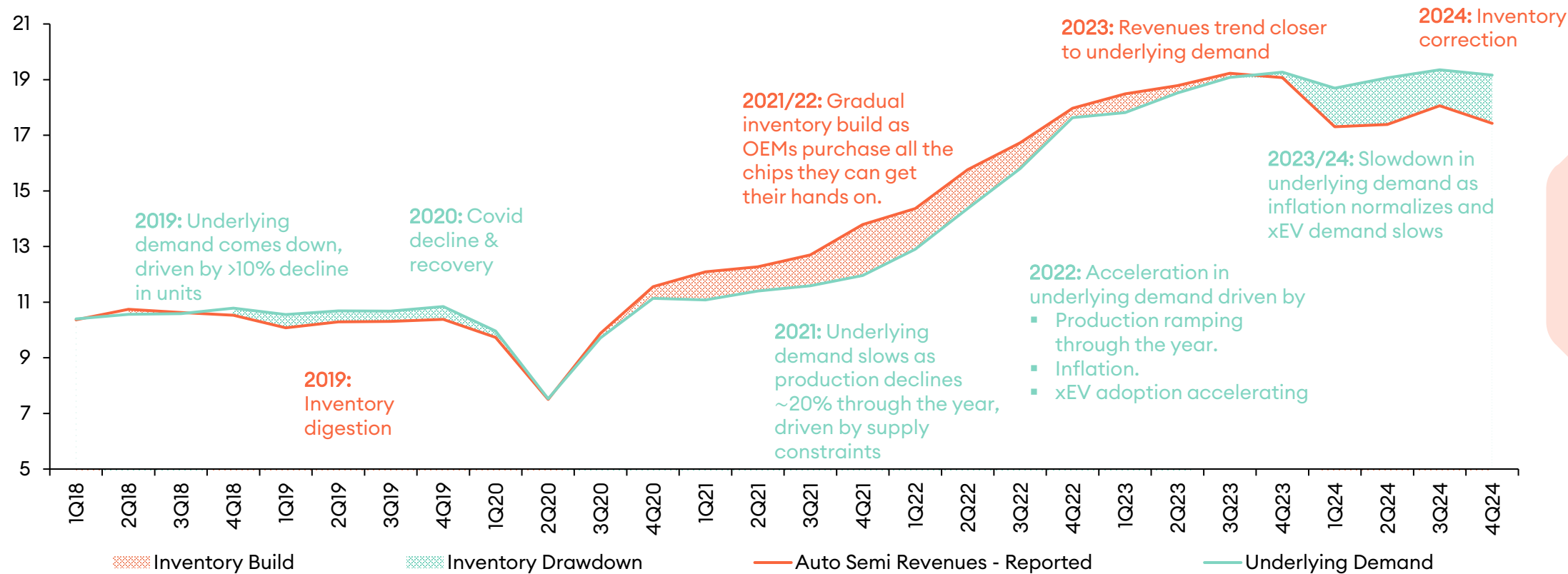
2 = Companies included: VW, BMW, Honda, Nissan, Toyota, General Motors, Ford, Hyundai, Tesla, Mitsubishi Motors, Kia, Renault, Nio, Li Auto, Xpeng, Ferrari

Source: Corporate Reports, FactSet Consensus, Visible Alpha Consensus, IHS, Autoliv and NSR analysis.

# Auto semis: Rapid inventory digestion... but there is a lot to digest!

We estimate another \$1.7bn of inventory was digested in 4Q24, \$4bn left to go

Automotive semi revenues (US\$bn)

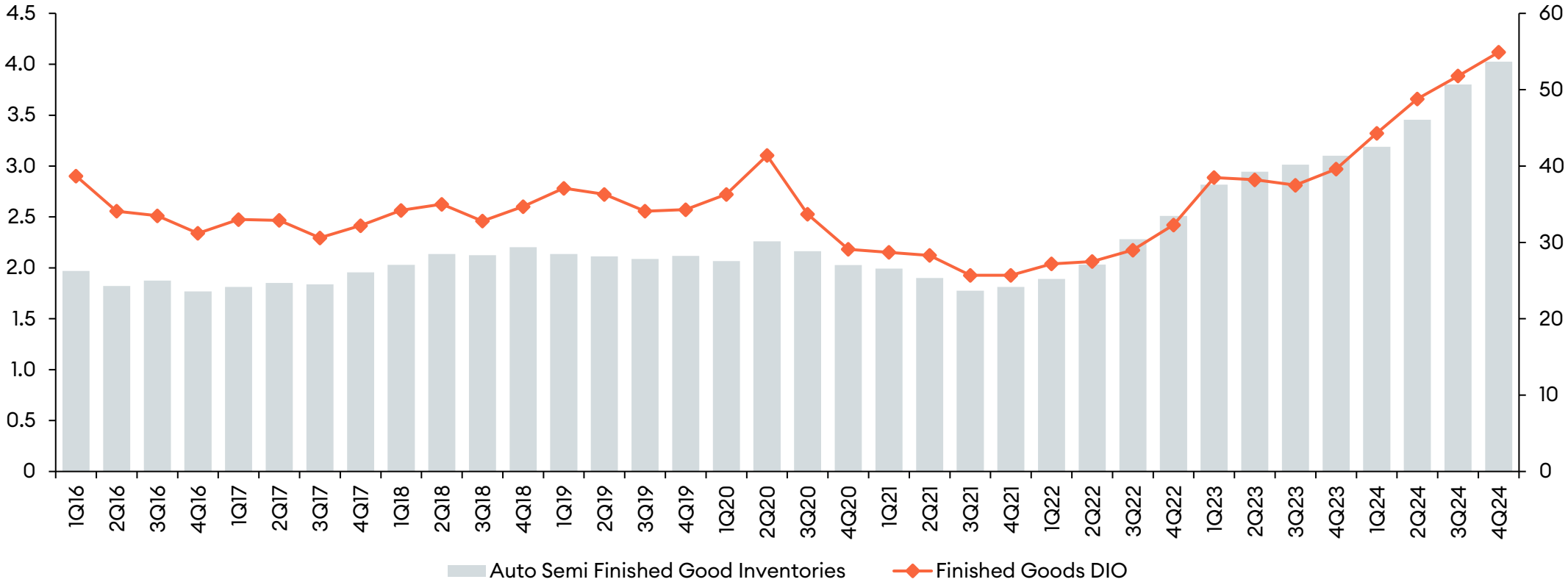


Source: Corporate Reports, FactSet Consensus, Visible Alpha Consensus, IHS, Autoliv and NSR analysis.

# Finished goods inventories at auto semiconductor manufacturers increased

Finished goods inventories at auto semi companies increased 6%% QoQ. Days outstanding increased by 3 days

LHS: Automotive semi companies' <sup>1</sup> finished goods inventories (US\$bn) RHS: Days of Finished Goods Outstanding (Days)



1: Company-wide finished good inventories of Texas Instruments, Analog Devices, Maxim, ON Semi, NXP, STM, Vishay.

Source: Company Reports, and NSR analysis.

## Auto demand is shifting toward the lower end

### OEMs are facing increased pricing pressure, and continued favoring of lower end models

*“Affordability remains top of mind for customers, and we continue to review every aspect of our cost of goods sold (COGS) per vehicle to help alleviate this concern.*

Tesla

Tesla Q4 Quarterly Investor, Note 29 January 2025

*“we’re selling more Trax and Trailblazers and vehicles at **the low end** [...] We’re actually seeing much more traction in that space, which is taking **overall ATP down**. But our margins are continuing to perform because we’re still selling.”*

General Motors

Paul Jacobson GM , 19 February 2025

Ford

*“The commodity part of the market someone who’s on a budget, yeah, I think there’s going to be a lot of price pressure [...] So yes, we’re **seeing some pressure** in key areas, but we’re really moderating that in terms of our incentive spending”*

Sherry House, CFO, Ford , 11 February 2025

Mercedes

*“You could sell more cars if you do a car that is smaller than this car. **Yes, we could**. But would it really be profitable growth? We don’t think so”.*

Ola Kielynyos, CEO, Mercedes-Benz , 20 February 2025

Source: Corporate Reports and NSR analysis.

# Western OEMs are facing weak demand for EVs

## Auto manufacturers are seeing a slowdown in EV adoption

### Volkswagen

*“The EV market is going **half of the speed** of what it should go or it was forecasted to go, this is the reality of the story “*

Luca de Meo, CEO, 20 February 2025

### Mercedes

*“in **subdued** EV environment [...] Transformation is not a linear thing and probably in many markets, it's **going to take longer**”*

Harald Emil Wilhelm, CFO, Mercedes Benz – 20 February 2025

### Magna

*“And given the **significant pullback in EVs relative to previous OEM expectations**, particularly in North America, we negotiated an unusually high level of commercial settlements in 2024, which helped mitigate the impact of **EV volume shortfalls**.”*

Patrick W.D. McCann, CFO, Magna - 14 February 2025

Source: Corporate Reports and NSR analysis.

## Auto semi manufacturers still face steep inventory corrections

### onsemi

*“Amid a backdrop of endmarket softness and geopolitical uncertainty, **inventory digestion persists** across our key end markets. Our stance has not changed.”*

Hassane El-Khoury, CEO, onsemi – 10 February 2025

### Lattice

*“On an end market basis, Industrial/Automotive was down 9%, primarily due **continued inventory normalization.**”*

Rick Muscha VP-IR, Lattice Semiconductor Corp - 10 February 2025

### Infineon

*“**Inventory corrections are continuing**, especially in automotive and industrial, slowly getting less intense.”*

Jochen Hanebeck, CEO, Infineon – 4 February 2025

### STMicro

*“We continue to face a delayed recovery and inventory correction in Industrial and a **slowdown in Automotive**, particularly in Europe.”*

Jean-Marc Chery, CEO, STM - 30 January 2025

### Melexis

*“Starting in August and in September, we have seen a lot of pushout requests. It means that our order book got content, but those orders were not needed by the customers anymore, then we **have accepted all the pushouts during Q4**”*

Marc Biron, CEO, Melexis – 5 February 2025

Source: Corporate Reports, and NSR analysis.

# Auto semi manufacturers experienced strong demand from China

## All companies reported strength in China

### Infineon

*“In China, by far the world's largest and by now also the most innovative global xEV market. Conversely, the new US administration will likely curb EV growth [...] We saw a quarter-on-quarter **increase by 10% of our Automotive revenue** in China to an all-time high last quarter.”*

Jochen Hanebeck, CEO, Infineon – 4 February 2025

### Analog

*“Starting with Q1, revenue came in better than expected, **driven by Asia**, which we've talked about continued strength in China [...] We've seen growth in the other parts of the China business, but the Auto is continuing to lead.”*

Richard C. Puccio CFO, Analog Devices - 19 February 2025

### onsemi

*“Our fourth quarter automotive revenue increased 8% sequentially, **driven by China**, followed by North America [...] China grew 18% quarter-over-quarter. “*

Hassane El-Khoury, CEO, onsemi - 10 February 2025

### NXP

*“Full year revenue for 2024 was down 5% year-on-year due to a weak macro in the Western markets, while **China continued to be resilient.**”*

Bill Betz, CFO, NXP Semiconductors – 4 February 2025

Source: Corporate Reports, and NSR analysis.

# Most auto semi manufacturers see the trough; onsemi & STM anticipate more pain.

## Many forecast a recovery

*“We expect the inventory reduction by our automotive, industrial customers to continue throughout this quarter before **abating** sometime in spring. [...] On a divisional level, ATV is expected to trend **along the same lines as the group [5%].**”*

**Jochen Hanebeck, CEO, Infineon – 4 February 2025**

*“On a sequential basis, at the midpoint, we expect Industrial to lead our growth and **automotive to grow** [...] Importantly, booking strength was driven by Industrial and Automotive, our two largest end markets.”*

**Vincent T. Roche, CEO, Analog – 19 February 2025**

*“Sales in the second half of 2025 are expected to grow significantly compared to the first half of 2025”*

**Karen van Griensven, CFO, Melexis – 5 February 2025**

*“Within Industrial and Automotive, we have seen a **nice recovery in Automotive this past quarter**. So, that's a positive and we do expect all segments to grow into Q1.”*

**Ford D. Tamer, CEO, Lattice - 10 February 2025**

Source: Corporate Reports, and NSR analysis.

## STM, onsemi forecast further weakness

*“Our business environment **remains challenging** as we continue to face a delayed recovery and inventory correction in Industrial and a slowdown in Automotive, both particularly in Europe [...] Our Q1 2025 net revenues will decrease by 27.6% year-over-year and 24.4% sequentially.”*

**Jean-Marc Chery, CEO, STM – 30 January 2025**

*“So, by end **market automotive's going to be down the most**. We think that's going to be probably 25% or more down sequentially.”*

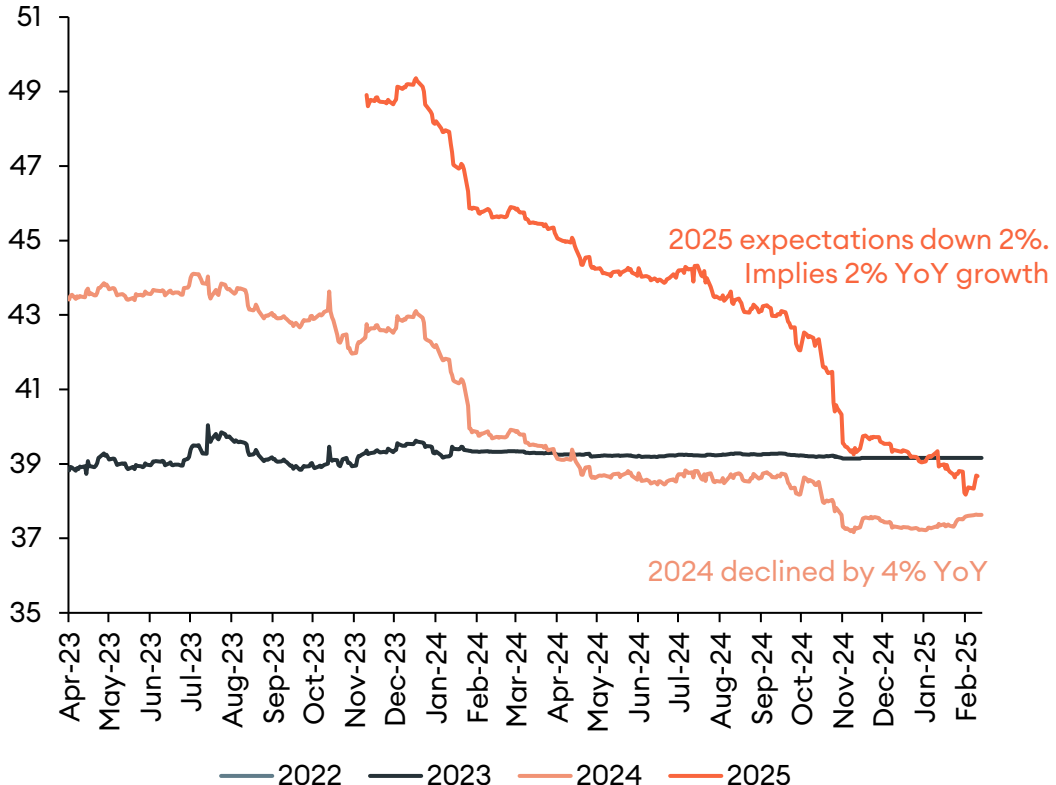
**Sam Thad Trent, CFO, onsemi – 10 February 2025**



# Auto semi: Expectations declined further; sequential growth still expected in 2Q25

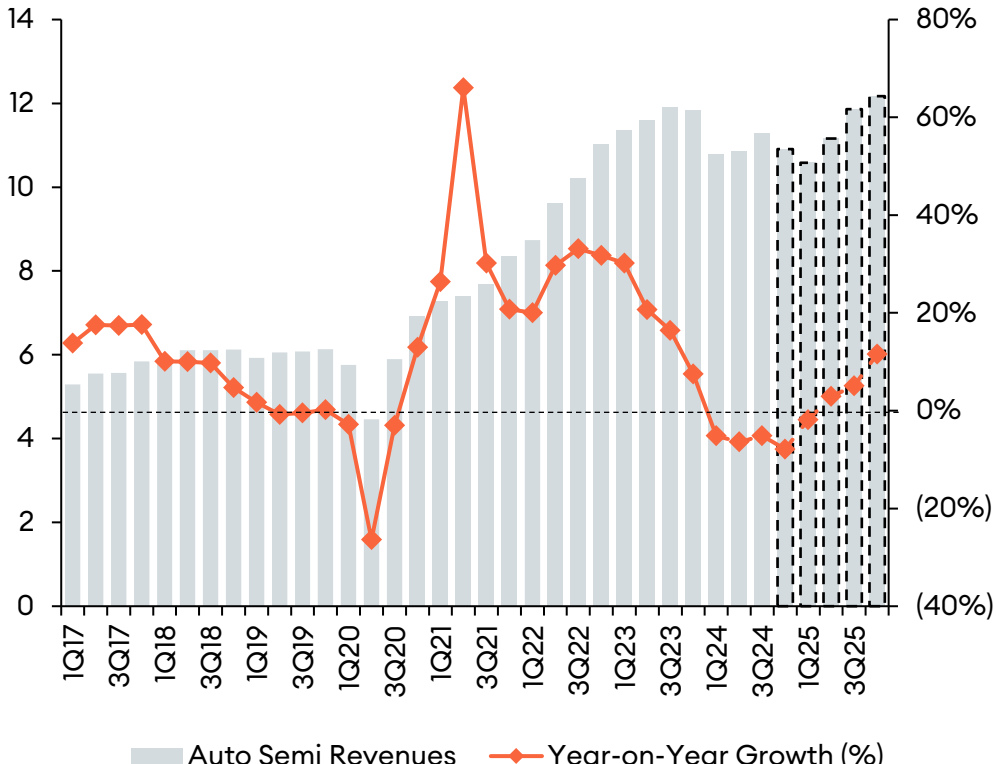
## Expectations came down by 2%

Auto semi revenue revision (US\$bn)



## Revenues bottoming in 1Q25

LHS: Auto semi revenues<sup>1</sup> (US\$bn) RHS: YoY Growth (%)



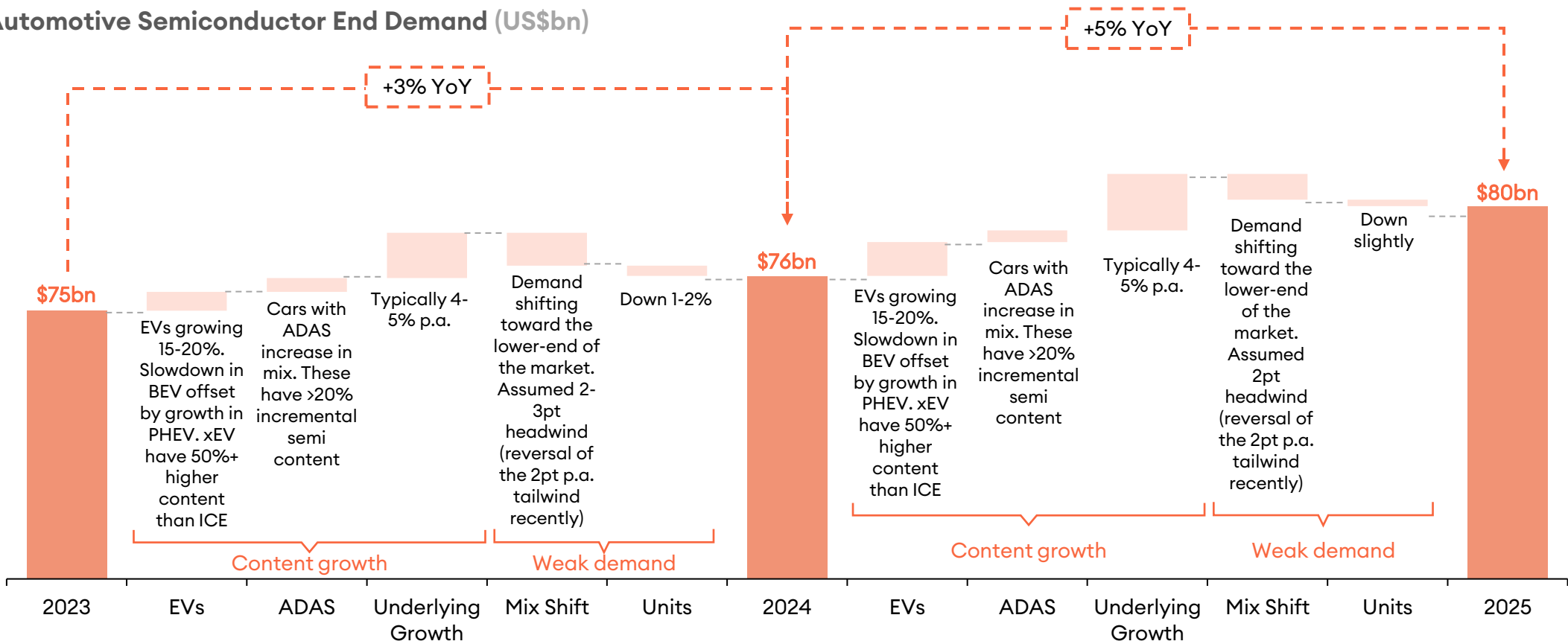
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Source: Corporate Reports, FactSet Consensus, Visible Alpha Consensus, and NSR analysis.

# Underlying auto semi demand will grow next year, despite weak end demand

## Underlying auto semiconductor demand should grow 5% in 2025

Automotive Semiconductor End Demand (US\$bn)



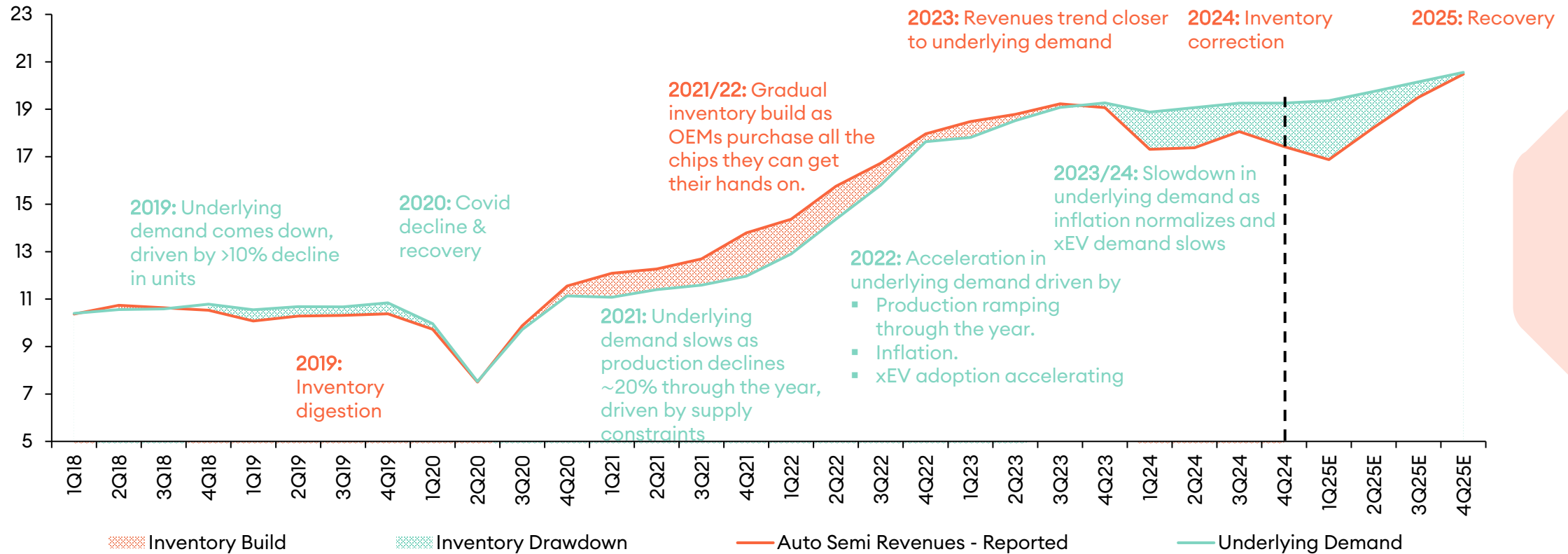
**Content growth will more than offset weak end demand**

Source: NSR estimates and analysis.

# Auto semi: Destocking peaks in 1Q25, with a recovery beyond

1Q25 is the peak of inventory destocking. Revenues should trend toward underlying demand beyond

Automotive semi revenues (US\$bn)

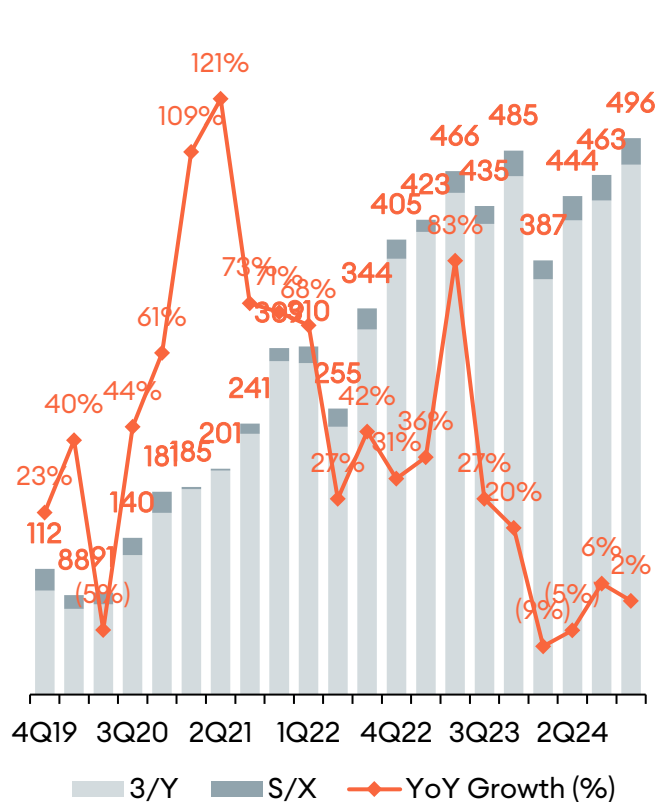


Source: Corporate Reports, FactSet Consensus, Visible Alpha Consensus, IHS, Autoliv and NSR analysis.

# Tesla's deliveries grew 2% YoY. Production decreased 7%

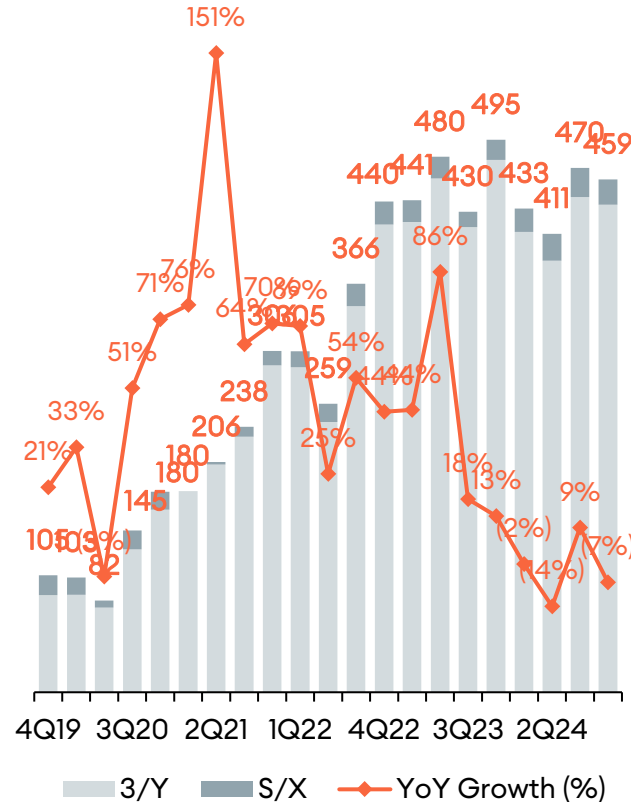
## Deliveries increased 2% YoY

Deliveries by model (k units), growth (%)



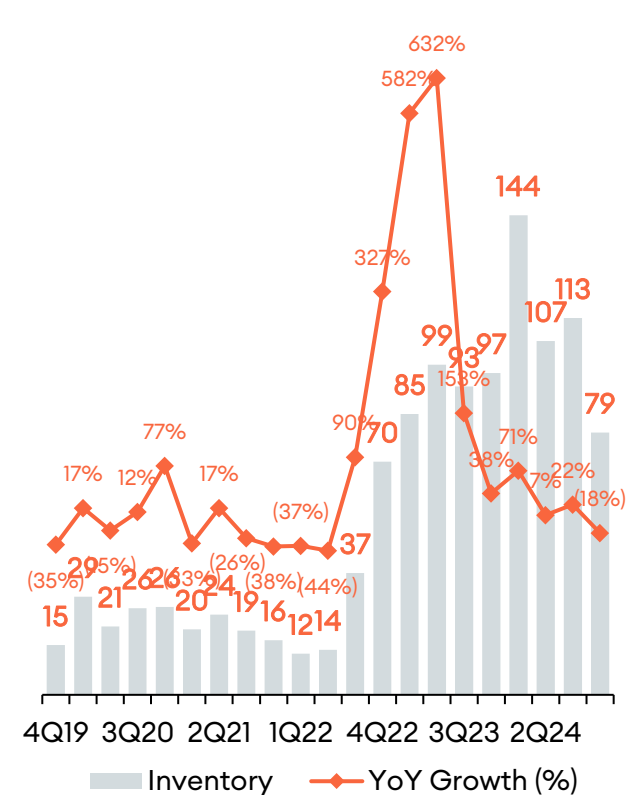
## Production decreased 7% YoY

Production by model (k units), growth (%)



## Inventory decreased to 79k units

Inventory (k units), growth (%)

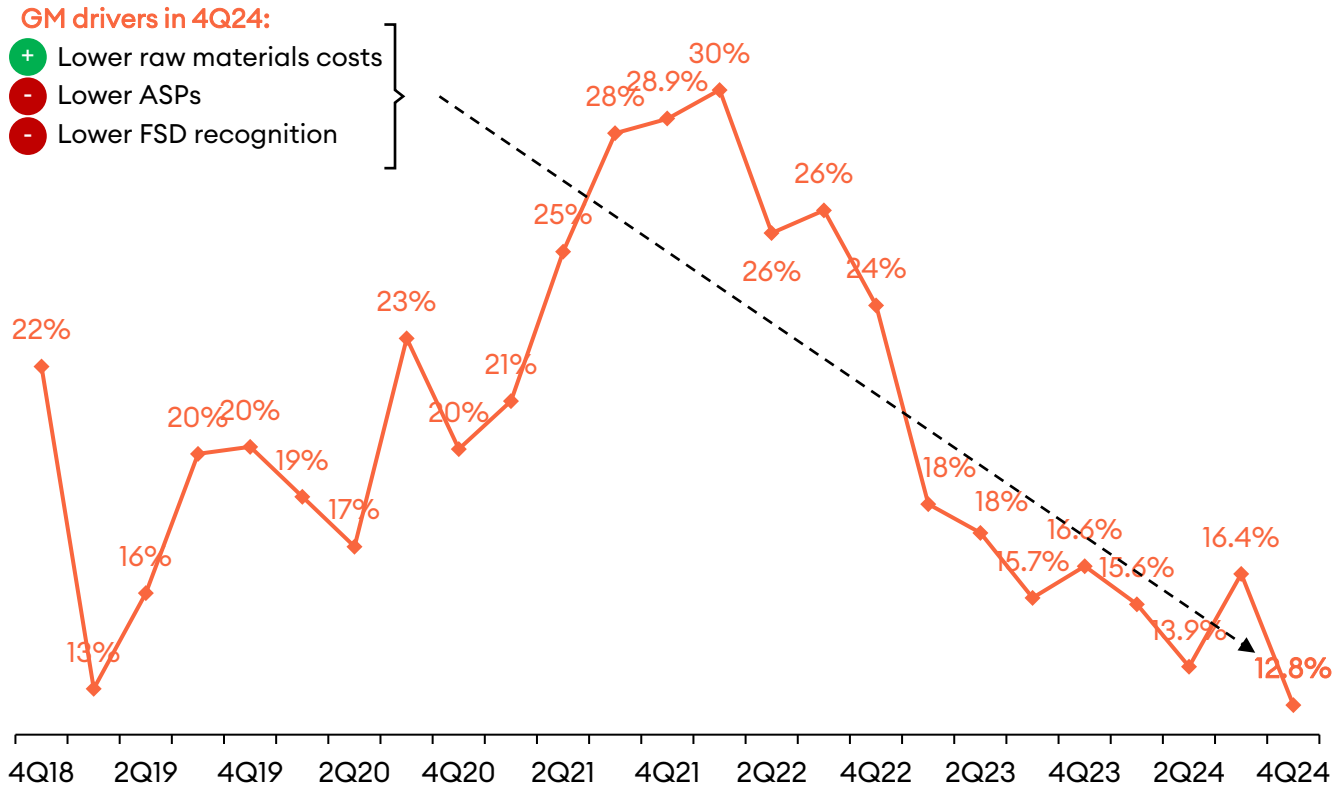


Source: Corporate reports, and NSR estimates and analysis.

# Automotive gross margin down 3.6pts QoQ

Auto gross margin declined 3.6pts QoQ, driven by lower ASPs

Automotive Gross Margin, ex. Leasing and Credits (%)



*“On the Automotive margin front, we saw a quarter-over-quarter decline, primarily due to lower ASPs than due to the recognition of FSD-related revenue in Q3 from feature releases.*”

*Our journey on cost reduction continues, and we were able to get our overall cost per car down below \$35,000, driven primarily from costs. This was despite increased depreciation and other costs as we prepare for the transition to the new Model Y, for which we recently started taking orders in all markets.*

*All our factories will start producing the new Model Y next month. [...] This changeover will result in several weeks of lost production in the quarter. As a result, margins will be impacted due to idle capacity and other ramp-related costs, as is common in any launch but will be overcome as production is ramped.”*

Source: Corporate reports and NSR estimates and analysis.

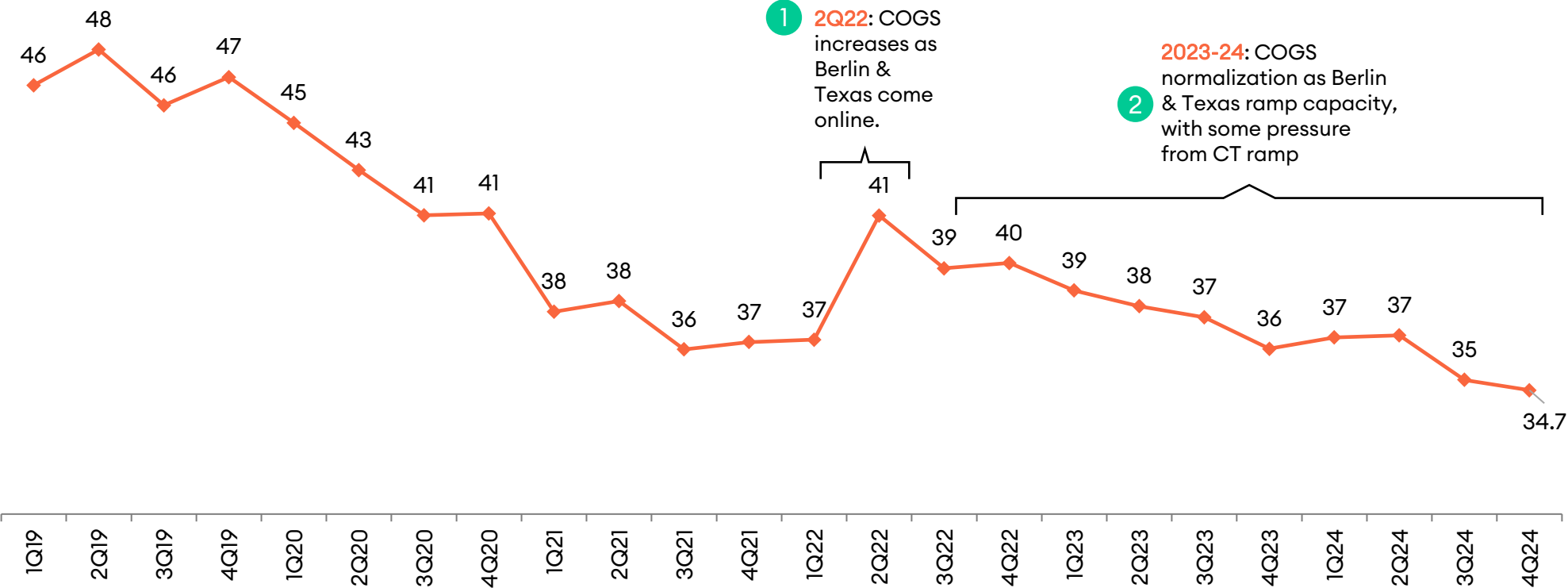
\* Excludes Regulatory Credits

Vaibhav Taneja, CFO, Tesla, 29 Jan '25

# COGS per car declined sequentially.

## COGS per car decreased 1% in 4Q24

COGS ex credits per delivered car\* (US\$k)

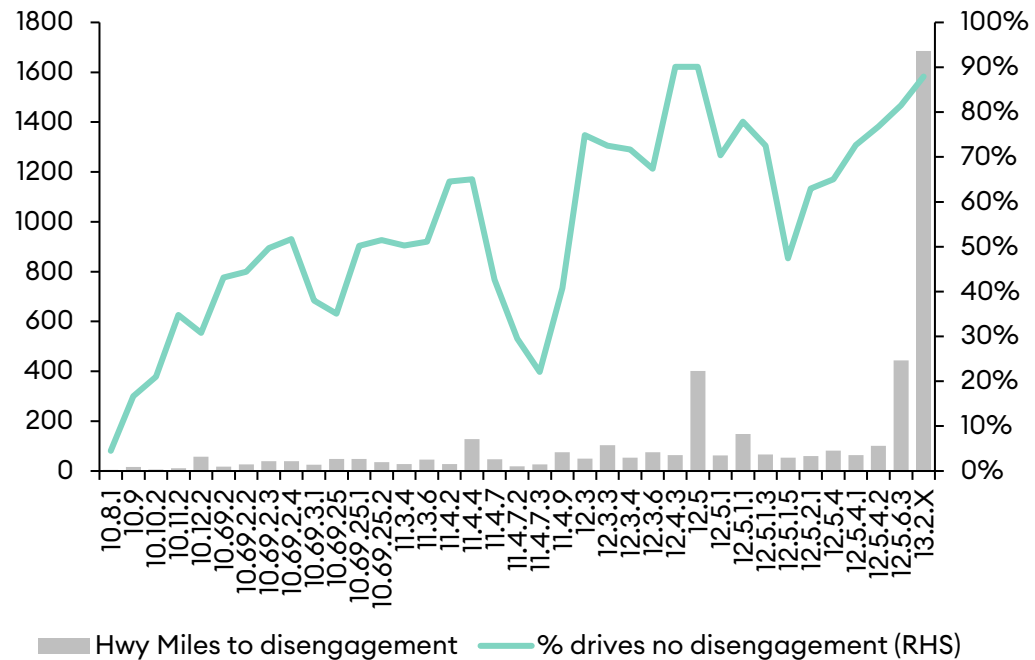


Source: Corporate reports, and NSR estimates and analysis.

# Tesla is making rapid progress on FSD

## Mean time between failure is increasing rapidly

Highway miles to disengagement (miles) & % drives with no disengagement (%) (crowdsourced)



## Launching unsupervised FSD & robotaxis this year

*“2025 will be a seminal year in Tesla’s history as FSD (Supervised) continues to rapidly improve with the aim of ultimately exceeding human levels of safety. This will eventually unlock an unsupervised FSD option for our customers and the Robotaxi business, which we expect to begin launching later this year in parts of the U.S. “*

*Tesla 4Q24 Shareholder Letter – 29 January 2025*

*“I’m confident that we’ll release unsupervised FSD in California this year as well. Yeah. In fact, I think we will most likely release unsupervised FSD in many regions of the country of the US by the end of this year”*

*Elon Musk, CEO, Tesla – 29 January 2025*

Source: Corporate reports, and NSR estimates and analysis.

## Automotive – Implications for our coverage and beyond

### Updated segment thesis

**Weak end demand:** Auto production and sales continue to decline.. This is likely to be a headwind on auto semis, but a limited one as most of the growth comes from content increase, not unit growth.

**Share losses exacerbate macro challenges for Western OEMs,** which have collectively lost ~20pts of market share in China over the last three years.

**Auto semi recovery is on.** Companies that were among the first to be hit by the correction are now guiding for sequential growth. Others will follow. 1Q25 will be the trough for the industry.

**Buy auto semis:** Auto semi stocks performed well in previous upcycles when they delivered sequential growth. Auto semis remain one of our favored sectors within semis.

### Investment opportunities

**Infineon** is a top pick. It will outperform the broader auto semi market this year, supported by favorable exposure to xEVs and MCU share gains. It is attractively valued considering its multi-year growth outlook. **Buy, €50 TP**

**Mobileye** is well positioned to help traditional OEMs keep up with Tesla's FSD. The transition to surround ADAS and SuperVision will drive long-lasting growth. Commercial traction has been very disappointing, though, and additional design wins, which still appear imminent, will matter a lot to restore our confidence. **Buy, \$26 TP.**

**Wolfspeed's** capacity ramp is materially slower than planned. It has missed the opportunity to be part of the top 3 SiC players and is now at risk of 1) facing margin pressure on wafer sales and 2) struggling to reach a sustainable absolute scale. **Neutral, \$7**

**Tesla:** Investors are looking past near-term pricing pressure and are focusing on FSD and robotaxi progress. 2025 will be a pivotal year on both fronts. **Buy, \$465 TP**



# Disclosures

12 month historical recommendation changes are available on request

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