Seraph.

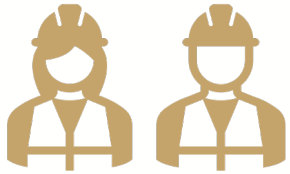
Q1 2023 INDUSTRY REPORT:

BUCKLE UP

NAVIGATING THE EVOLVING LANDSCAPE OF THE AUTOMOTIVE INDUSTRY

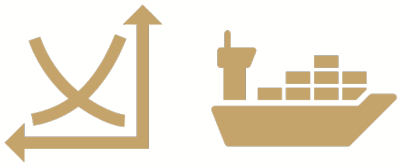
The North American auto industry is meeting significant challenges on the road to ambitious EV targets

Labor availability & capability



- The U.S. auto industry is at its **highest** employment level since 2008, qualified workers are not looking for opportunities
- Average hourly wages have increased 17% over the last 3 years
- **Efficiency has declined** more than 3% in the last year in terms of real output per hour across the industry

Demand uncertainty & supply chain disruptions



- Lower volumes have been favorable for OEM pricing, but difficult for suppliers
- Finished vehicle inventory is increasing**, but is still down 75%** from pre-COVID
- Chip shortages prevented millions of vehicles from being produced in 2022, it's not smooth sailing yet

Economic uncertainty & regulatory challenges

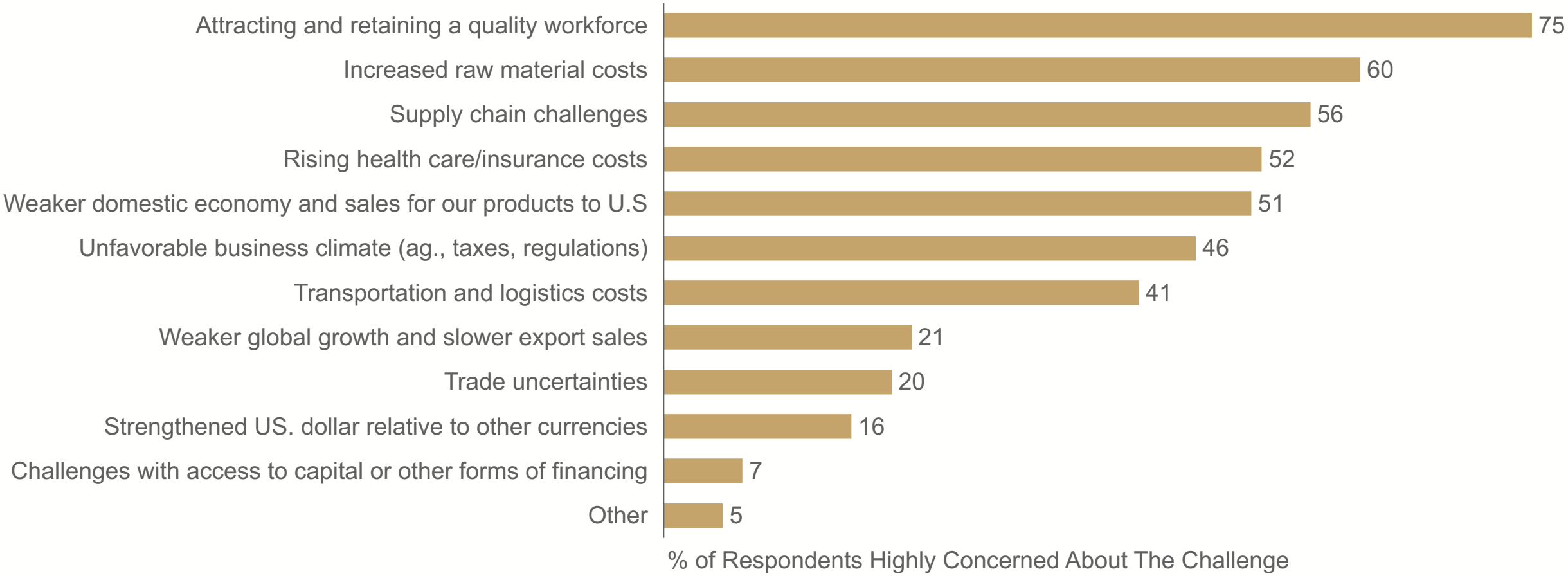
- **Interest rates are up** 4.2% in the last year, but elevated inflation hasn't been digested via supplier cost recoveries
- Consumer sentiment is improving, but remains low
- New regulations and incentives are reshaping the industry
- Geopolitical shifts and content requirements are **accelerating regionalization**

Shifting conditions exposed supply chain vulnerabilities; reshoring, risk management and a return to efficiency are needed

Challenges	Impact	Solutions
Monetary stimulus increased inflation and input costs	Inflation costs fall on suppliers, leading to cost-cutting into "muscle," creating crises	• Incorporate labor and material cost inflation recovery mechanisms into purchasing agreements • Invest in improving efficiency, there is still opportunity for many plants to achieve +25% increases by returning to previous levels
International supply chain instability persists	Lack of visibility leads to reactive excess inventory among suppliers	• Diversify and localize supply base (e.g., Mexico – "local for local") • Deploy digital tracking solutions for visibility through the tiered supply base • Utilize and execute tools such as PFEP / Kanban / Routing / Cycle Counting
Inadequate risk assessment for supply agreements, a "Buy Now Pay Later" approach	Self-reinforcing loop of supply chain disruptions	• Increase rigor of supplier capacity evaluations • Quantify revenue and profit losses due to supply shortages • Create vesting schedules for purchasing bonuses, incentivizing risk management
US lags in automation per vehicle produced and faces skilled trades shortages	Staffing challenges and increased inefficiencies	• Identify repetitive functions and automate, build internal automation capability • Implement workforce development programs training on manufacturing management, continuous improvement and automation

Manufacturers are broadly concerned about input costs and availability, with growing concern for future demand

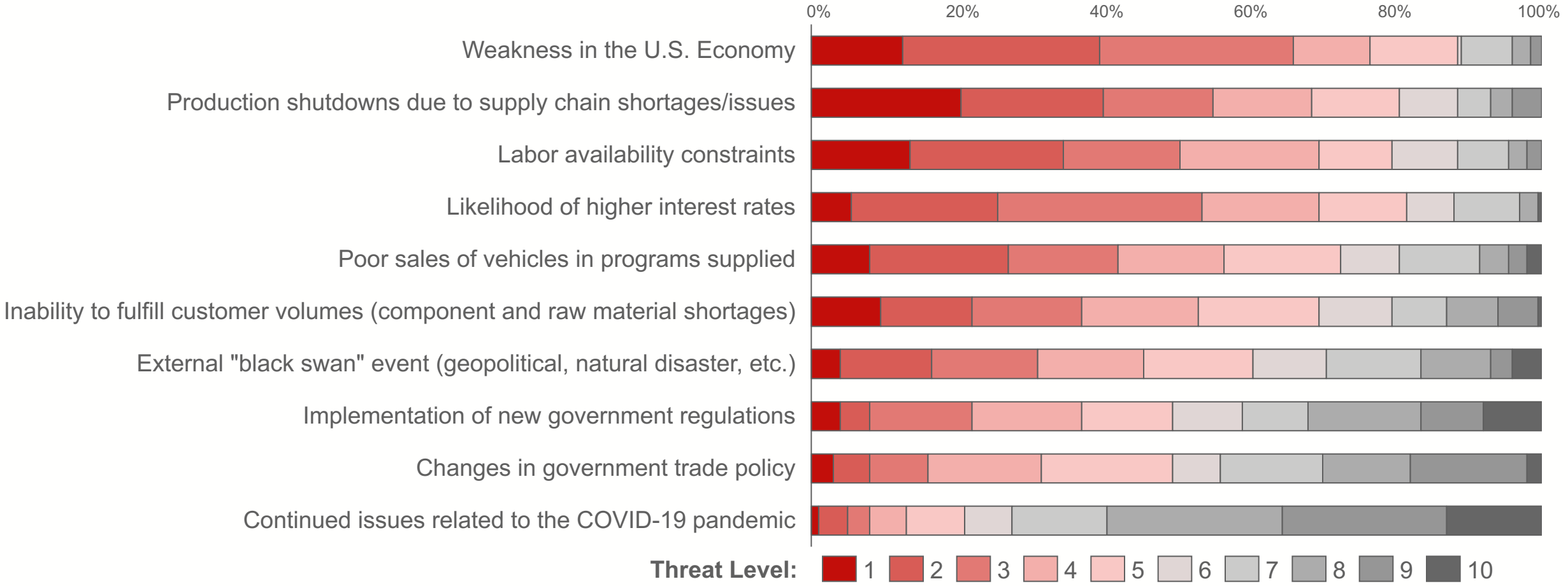
National Association of Manufacturers' Outlook Survey Q1 2023



Source: National Association of Manufacturers Q1 2023 Manufacturers' Outlook Survey

Automotive supplier leaders share similar concerns

Automotive industry threats, identified ranked by leaders in MEMA Member Survey Q1 2023



Source: MEMA OE Supplier Barometer Q1 2023

Maintaining high-quality manufacturing operations teams is harder than ever, human capital development needs to be a focus

Businessweek | The Big Take

America's $52 Billion Plan to Make Chips at Home Faces a Labor Shortage

In Ohio, a bipartisan push to build more fabs needs more workers—and quickly.

The New York Times

Alone and Exploited, Migrant Children Work Brutal Jobs Across the U.S.

Arriving in record numbers, they're ending up in dangerous jobs that violate child labor laws — including in factories that make products for well-known brands like Cheetos and Fruit of the Loom.

NATIONAL ASSOCIATION OF Manufacturers

2.1 Million Manufacturing Jobs Could Go Unfilled by 2030

THE WALL STREET JOURNAL.

Don't Blame Covid for the Worker Shortage

CRAIN'S CHICAGO BUSINESS

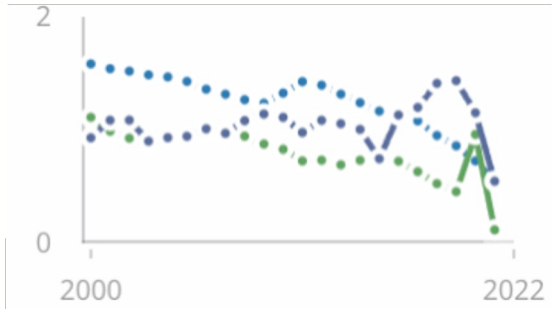
Another rough road ahead for auto suppliers this year

Current labor and leadership constraints will not abate, effective management and automation are needed to improve efficiency

Demographics

- Decades of declining population growth rates have shrunk labor force, with big drop offs in recent years

Population annual growth rate % '21	
Mexico	0.6
United States	0.1
Canada	0.5



Re-shoring

- Geopolitical concerns in China
- Inflation Reduction Act & CHIPS Act
- Risk-management lessons learned from COVID supply chain challenges

New technologies

- Energy transition, new EV battery factories $73B announced in 2022 alone
- Autonomous technology, automotive is adding new components
- Growing VC-backed space, drone, and flight companies attracting talent

Sources: World Bank, NPR, DOE, White House

Government incentives, combined with companies considering the total landed cost for products is driving increased reshoring

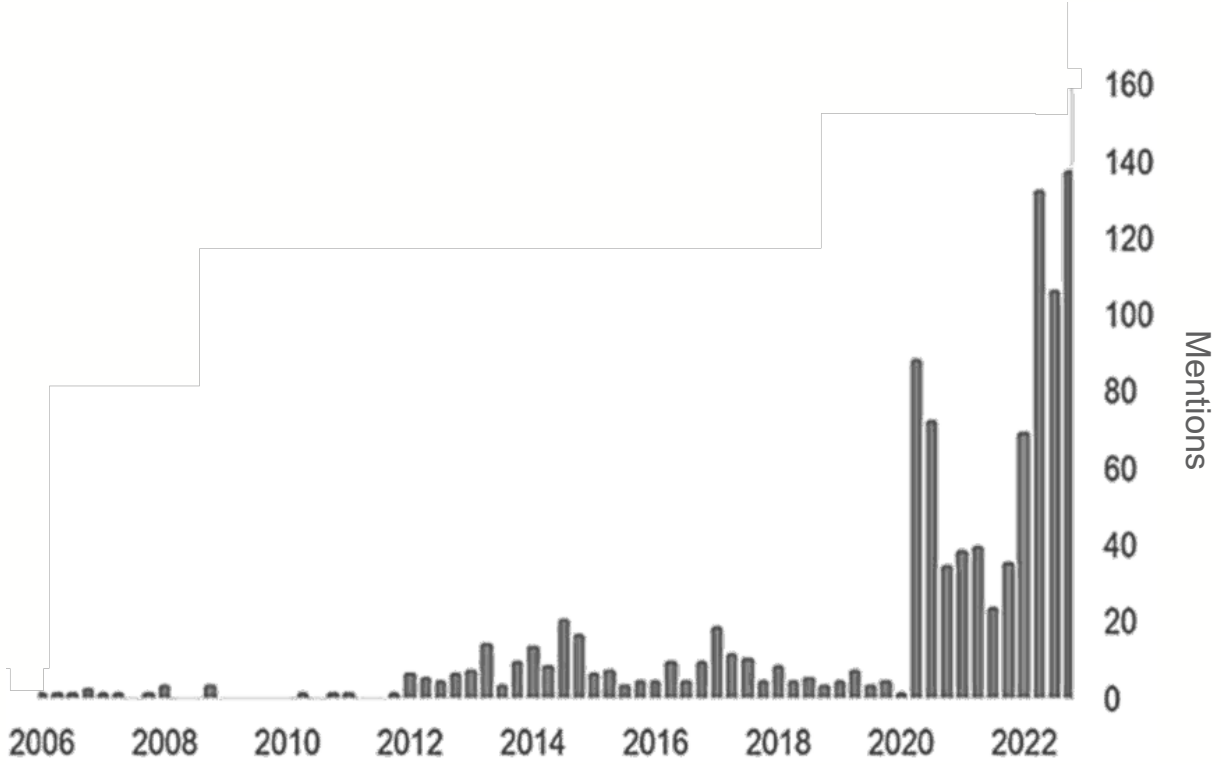
- The number of reshoring and foreign direct investment related manufacturing job announcements in 2022 totaled over 360,000**, up 53% from the 2021's record year**.
- The surge in EV batteries and chips was a significant contributor to this increase.
- When surveyed* the top 3 factors driving these were:

Government Incentives

Skilled Workforce Availability And Training

Supply Chain Interruption Risk

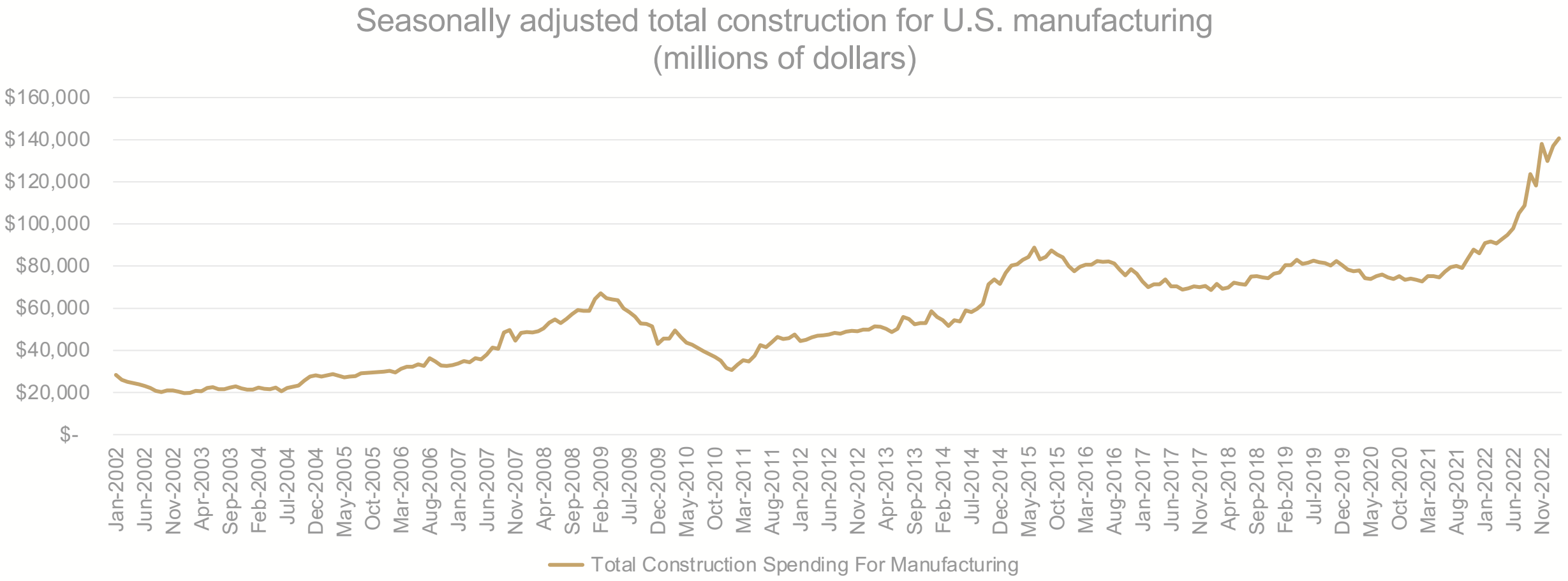
Reshoring mentions by U.S. companies on quarterly earnings calls



"Reshored" supply chains will span across U.S. & Mexico, regionalization is key for this decade

Source: Reshoring Initiative 2022 Report*, AlphaSense, Company Earnings Calls

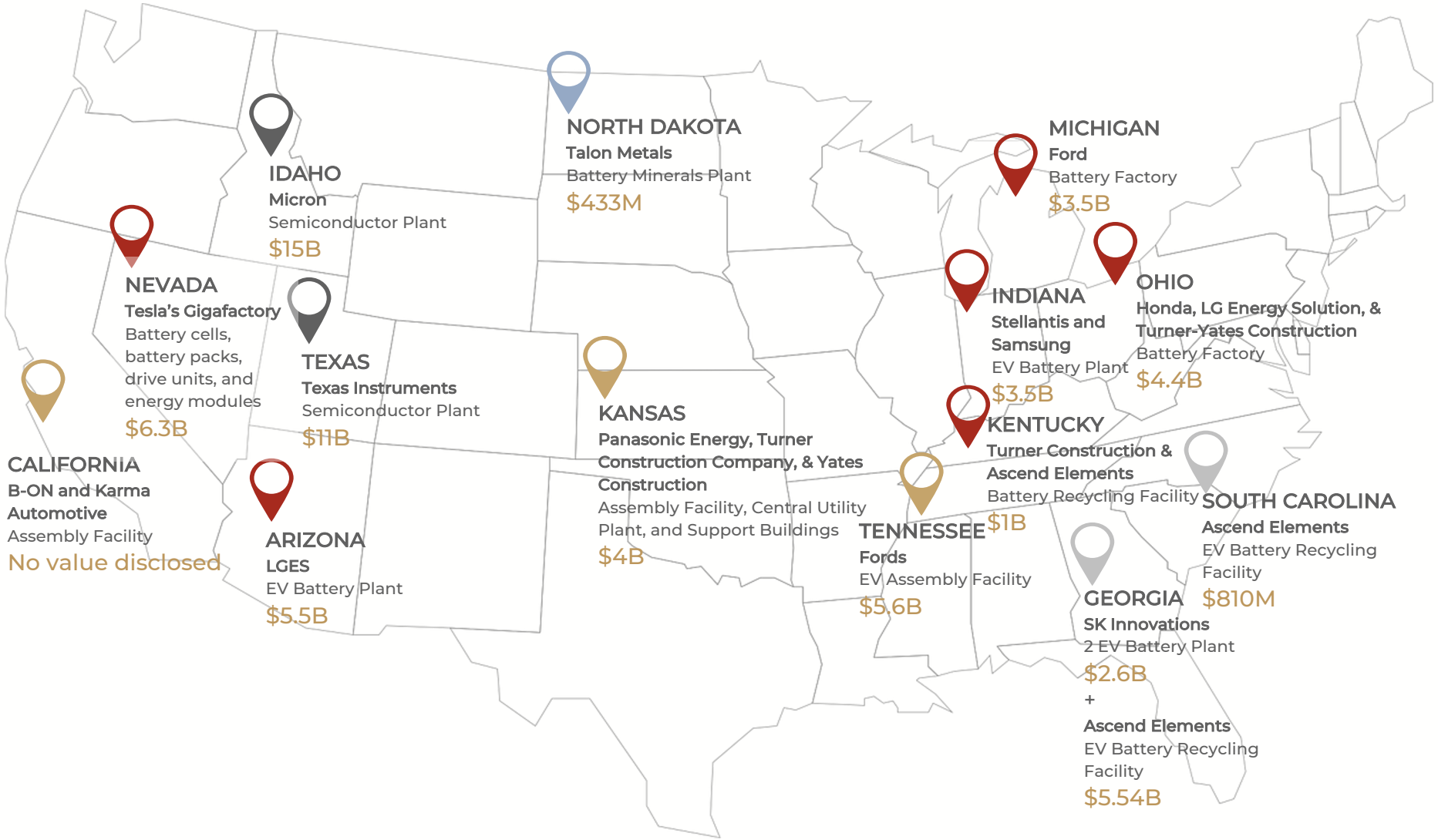
Capital spending for plant construction is at highest level yet



Have you invested in the human capital needed to operate these plants?

Source: U.S. Census Bureau,

The U.S. private sector is responsible for $455B of the $860B global EV investments through 2030



Legend

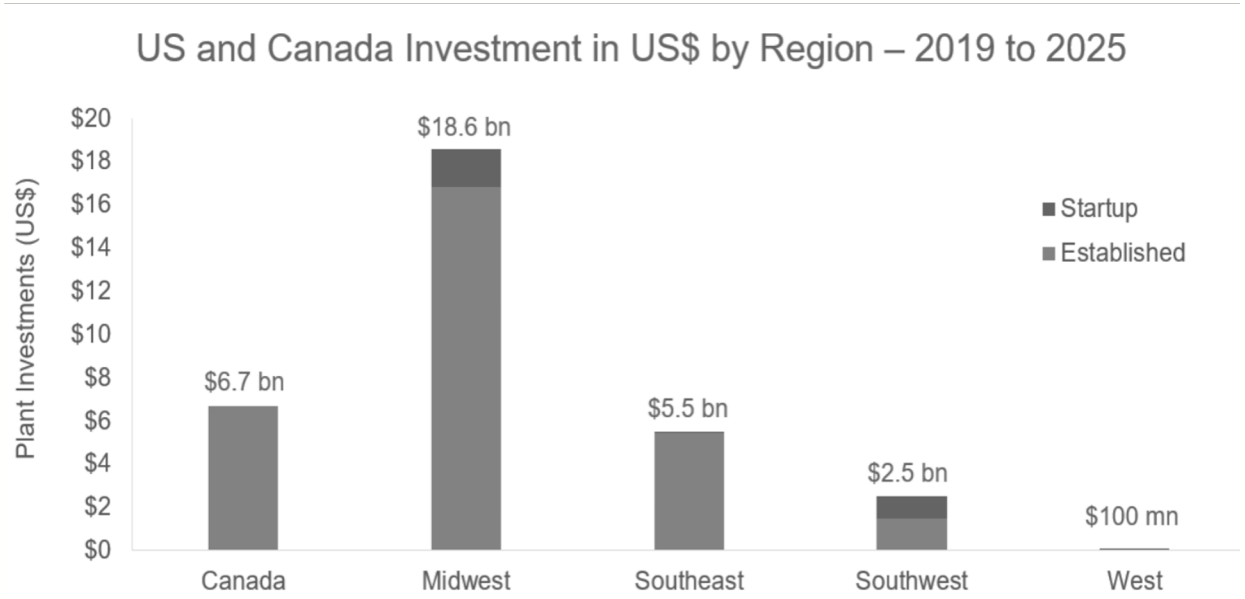
- Battery Manufacturing
- Battery Recycling
- Semiconductor
- Assembly Facility
- Battery Mineral Plants

Large joint ventures formed with Asian battery tech providers

- These joint ventures (JV) are largely between major automotive OEMs and battery manufacturers/construction companies such as Turner-Yates, Panasonic, Samsung, SK Innovation, etc.

Notable Joint Ventures:

- **General Motors + LG Energy Solution:**
  - JV dubbed ‘Ultium Cells’
  - Secured $2.5B loan from US Energy Department for 3 EV battery plants
  - This JV will boost US-based production capacity to **382 GWh by 2025** and will support **6,000 construction jobs**
  - Two of three plant locations announced: Lansing, MI and Spring Hill, TN
  - The third plant will be approximately **a $275 million project**, but specifics have not yet been released
- **Turner-Yates + Panasonic Energy:**
  - Awarded **$4B** to construct EV battery plant in De Soto, KS
  - Plans include the assembly facility, a central utility plant, and supporting buildings.
  - Production to begin by the end of March 2025

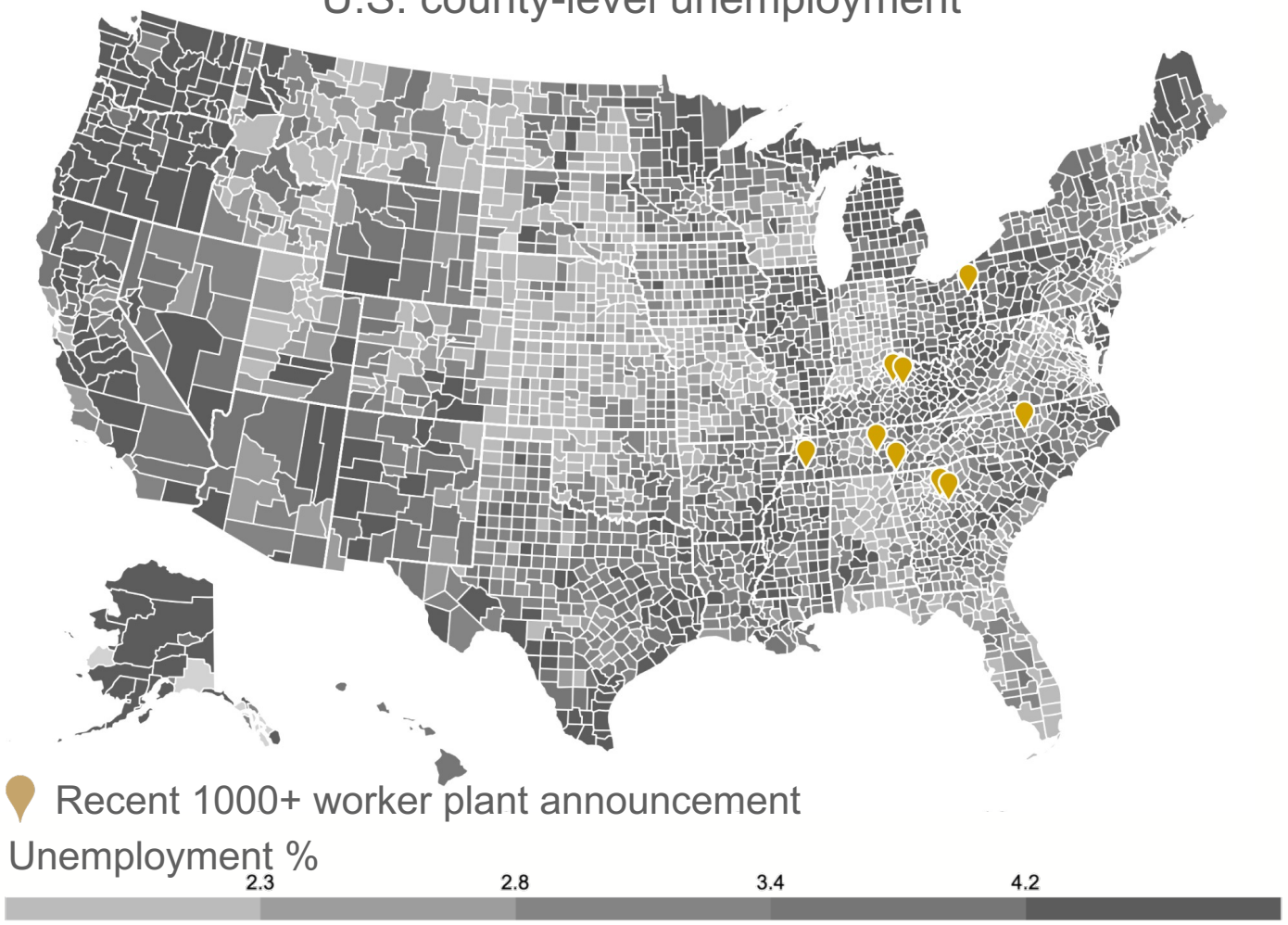


These deals show the dedicated push towards onshore manufacturing to make the US a real competitor in the global EV economy.

Source: IEA

EV and regionalization bring increase investment, but new factories in tight labor markets bring challenges

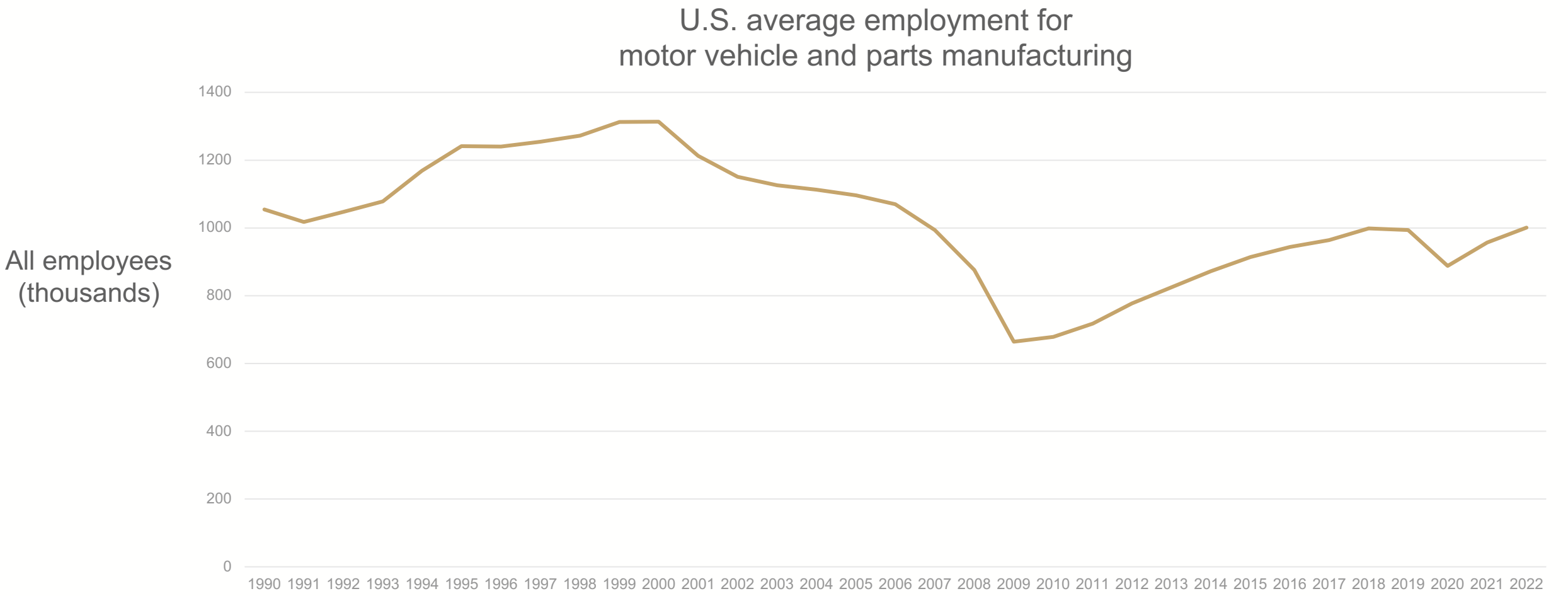
U.S. county-level unemployment



An increase in labor demand without an increase in supply leads to higher price

Source: BLS, Company Filings

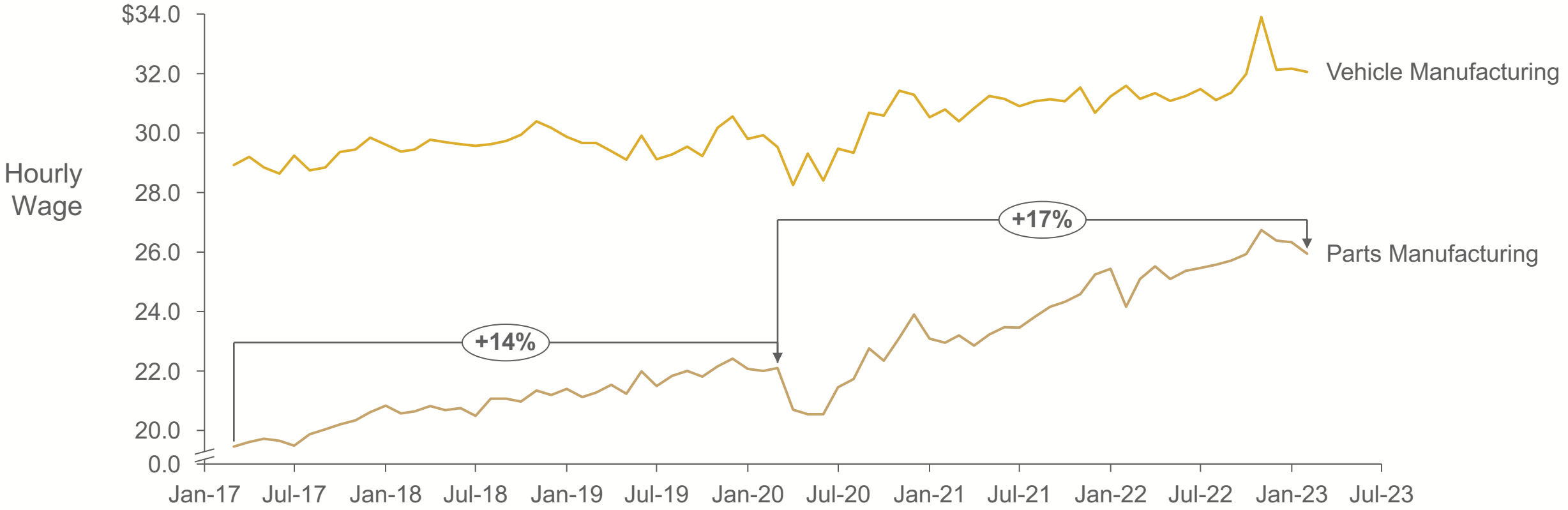
Highest level of U.S. motor vehicle manufacturing employment since 2007 necessitates bringing new workers into the industry



Source: U.S. Bureau of Labor Statistics. BLS.gov

Nationwide wages in the supply base have risen by 17% over the last three years, in-line with inflation

Average Hourly Earnings Of Production And Nonsupervisory Employees
Motor Vehicle & Parts Manufacturing (Not Seasonally Adjusted)



Source: U.S. Bureau of Labor Statistics. BLS.gov

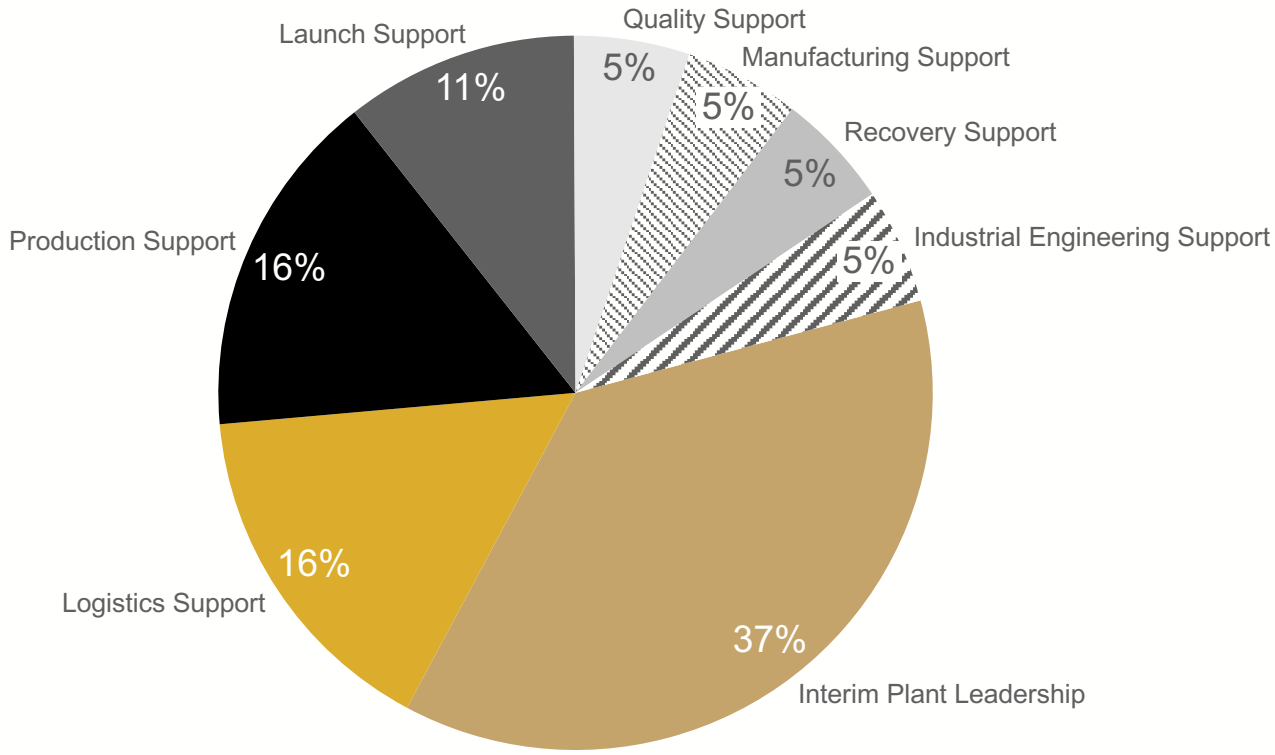
Suppliers have had difficulty stabilizing plant leadership teams

We've seen an increase in suppliers seeking interim leadership due to permanent leadership positions remaining open for extended duration.

Other than the absence of a critical position, Logistics and Production support are the most common shortfalls that plants are experiencing.

Launch support is becoming increasingly necessary with the number of plants being built in the US on the rise – especially new EV and battery plants.

Areas where suppliers are seeking support

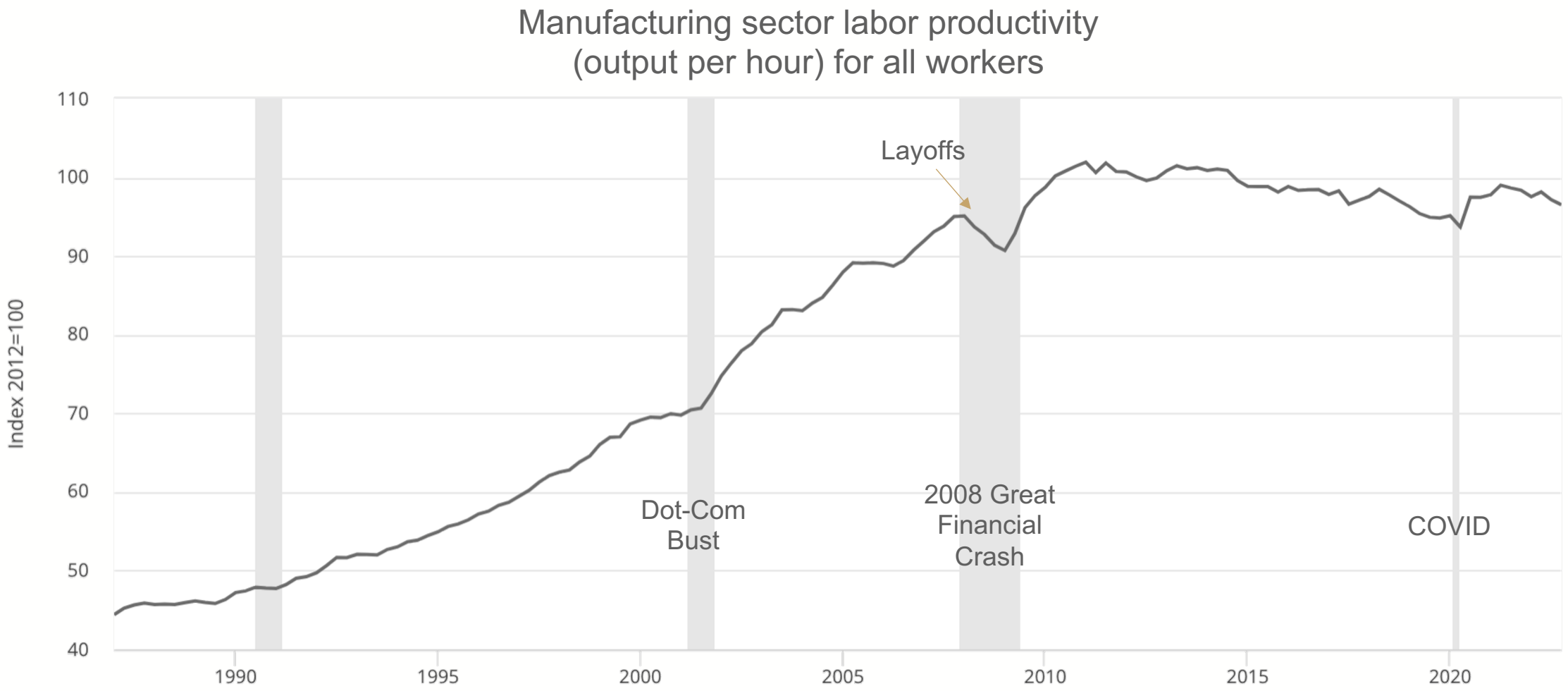


Source: Seraph RFP Analysis

US manufacturing productivity struggled over the last 15 years, operations require improved training, management quality, and automation

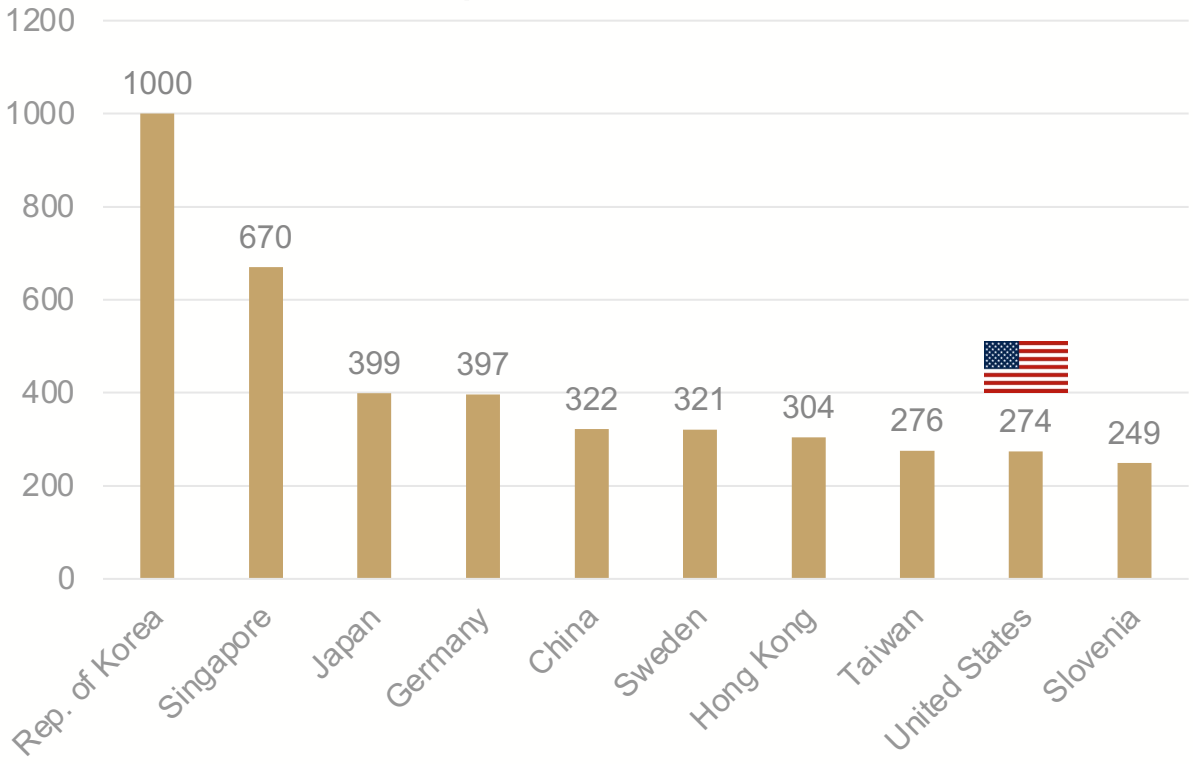
Source: U.S. Bureau of Labor Statistics. BLS.gov

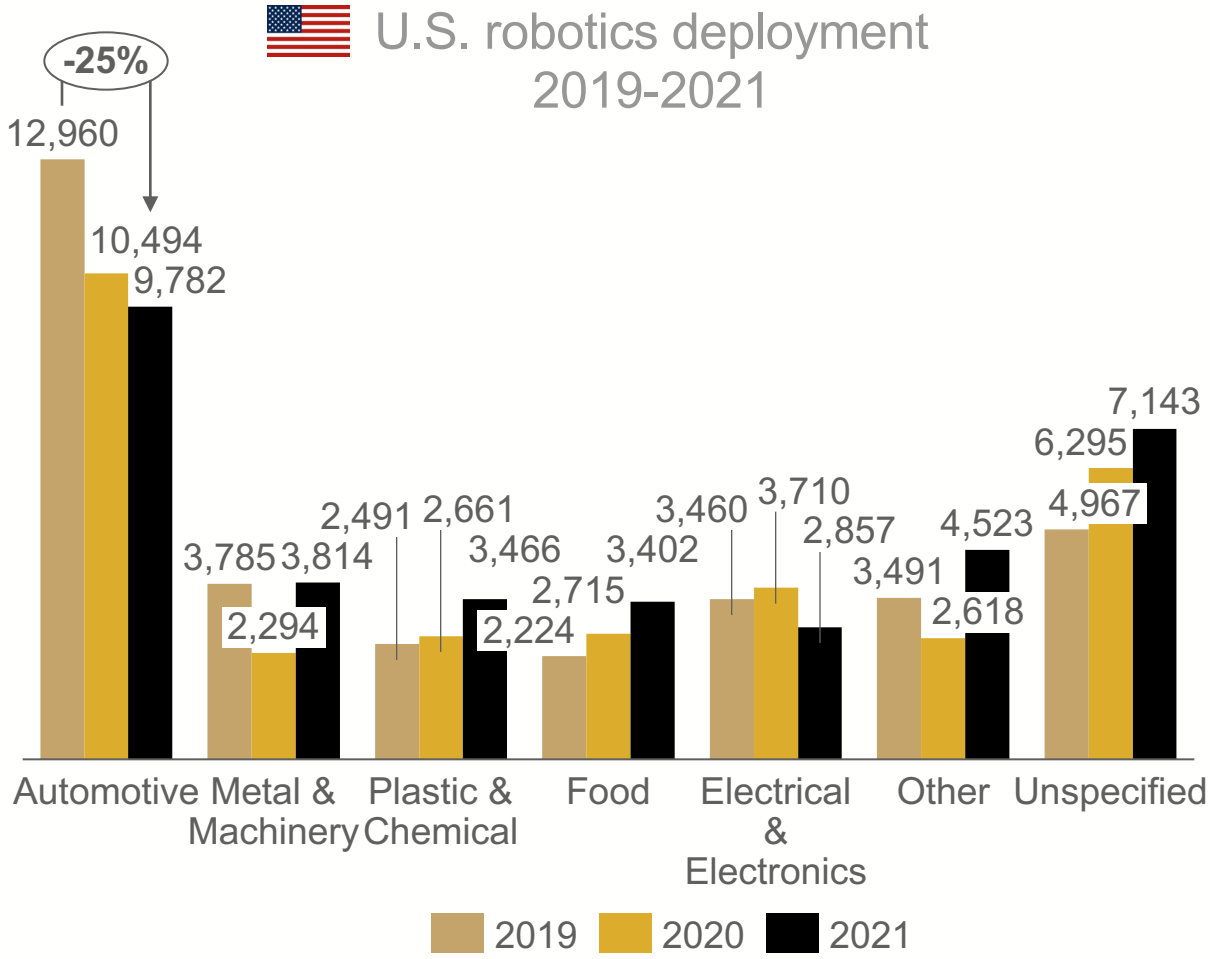
After a short gain from headcount reductions in 2008, productivity flatlined



Source: St. Louis Federal Reserve Bank

The US still trails automation leaders by a substantial margin, and U.S. automotive deployments contracted over the last three years

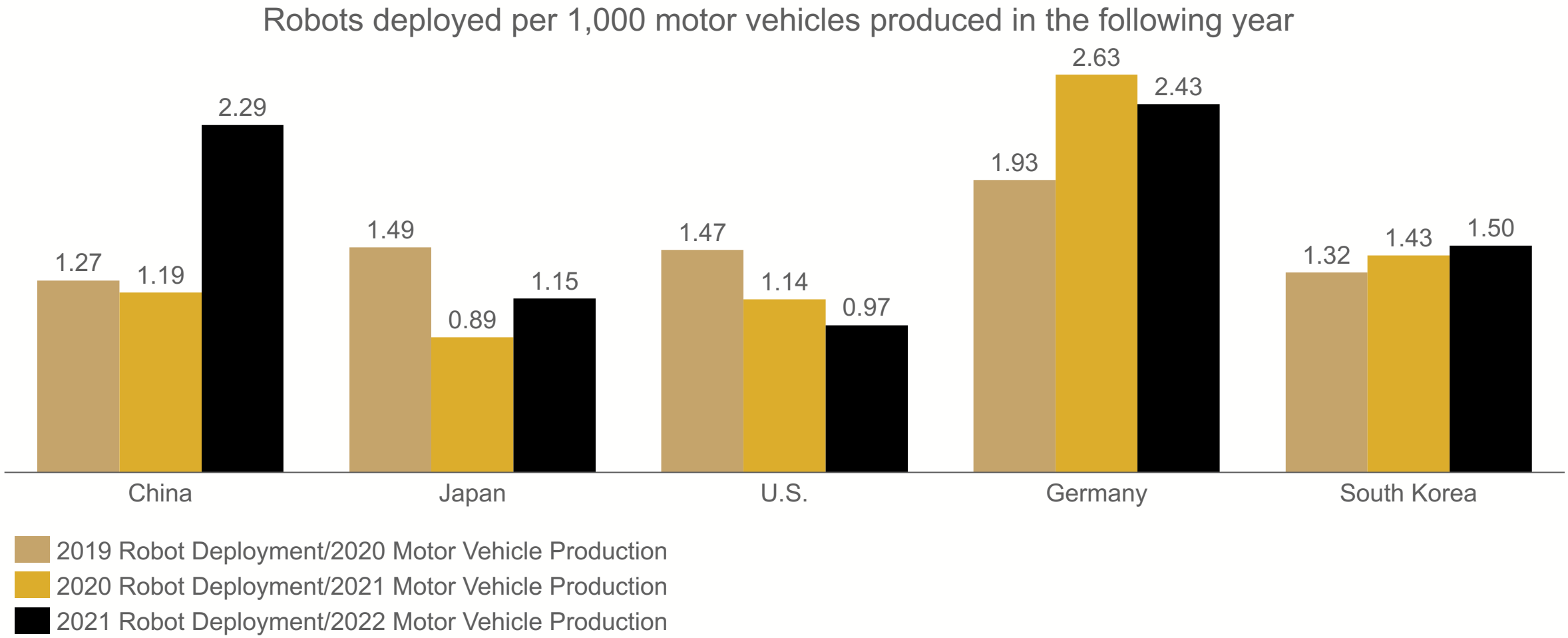




Note: 2021 data was released Dec 2022, The IFR uses the term "industrial robot" based on the definition of the International Organization for Standardization (ISO). According to ISO standard 8373:2012 (§ 2.9), an industrial robot is an automatically controlled, reprogrammable multipurpose manipulator programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications. Thus, industrial robots are fully autonomous machines that do not require a human operator and can be re-programmed to perform several tasks such as welding and soldering, dispensing (e.g. painting/enameling), (dis-) assembling, handling operations, or processing (e.g. cutting or grinding).

Source: International Federation of Robotics, World Robotics Report 2022, 2021 and 2019

The U.S. lags other automotive leaders in terms of recent robots and cobots deployed per vehicle produced



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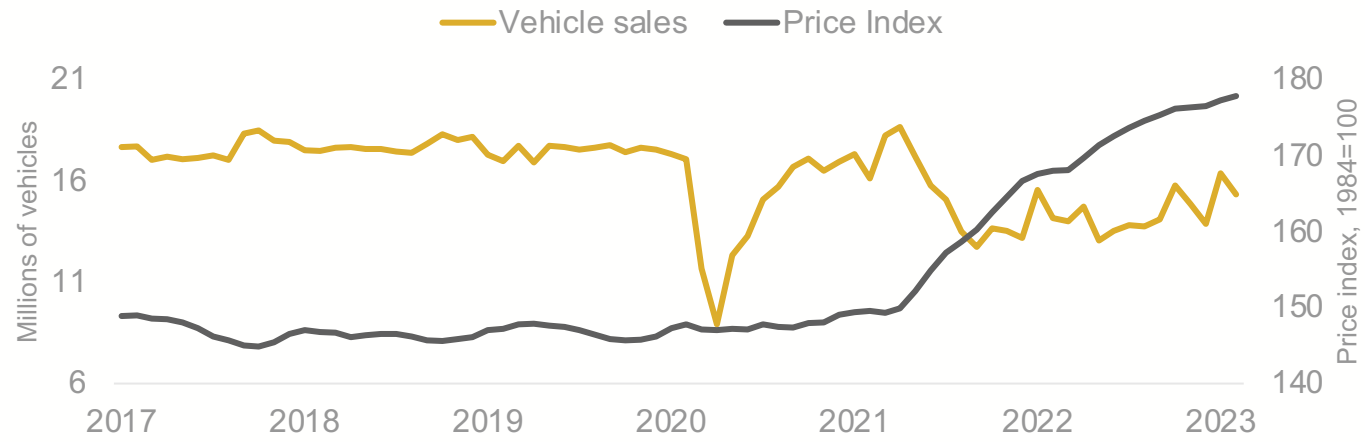
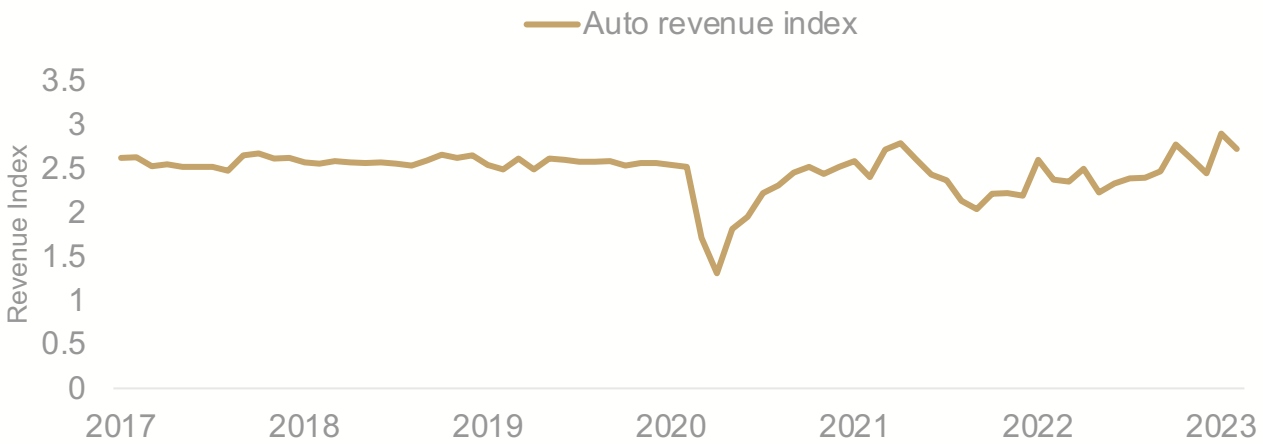
Source: International Federation of Robotics, World Robotics Report 2022, 2021 and 2019, International Organization of Motor Vehicle Manufacturers

Despite low production numbers, auto revenue remained relatively stable due to record-high new vehicle prices





Supply constraints

- Chip shortages have led to a shortfall of:
  - ~10.5 million vehicles in 2021
  - ~4.6 million vehicles in 2022
- To a lesser extent, labor and supply chain constraints have also played a role in drop-off in vehicle production

Pent-up demand

- The Federal Reserve estimates that US households accumulated ~$2.3 trillion in excess savings during the pandemic
- Demand has spiked to an unsustainable level as Americans spend these accumulated savings
  - US personal savings rate dropped to 2.7% in June 2022, the lowest level since August 2005

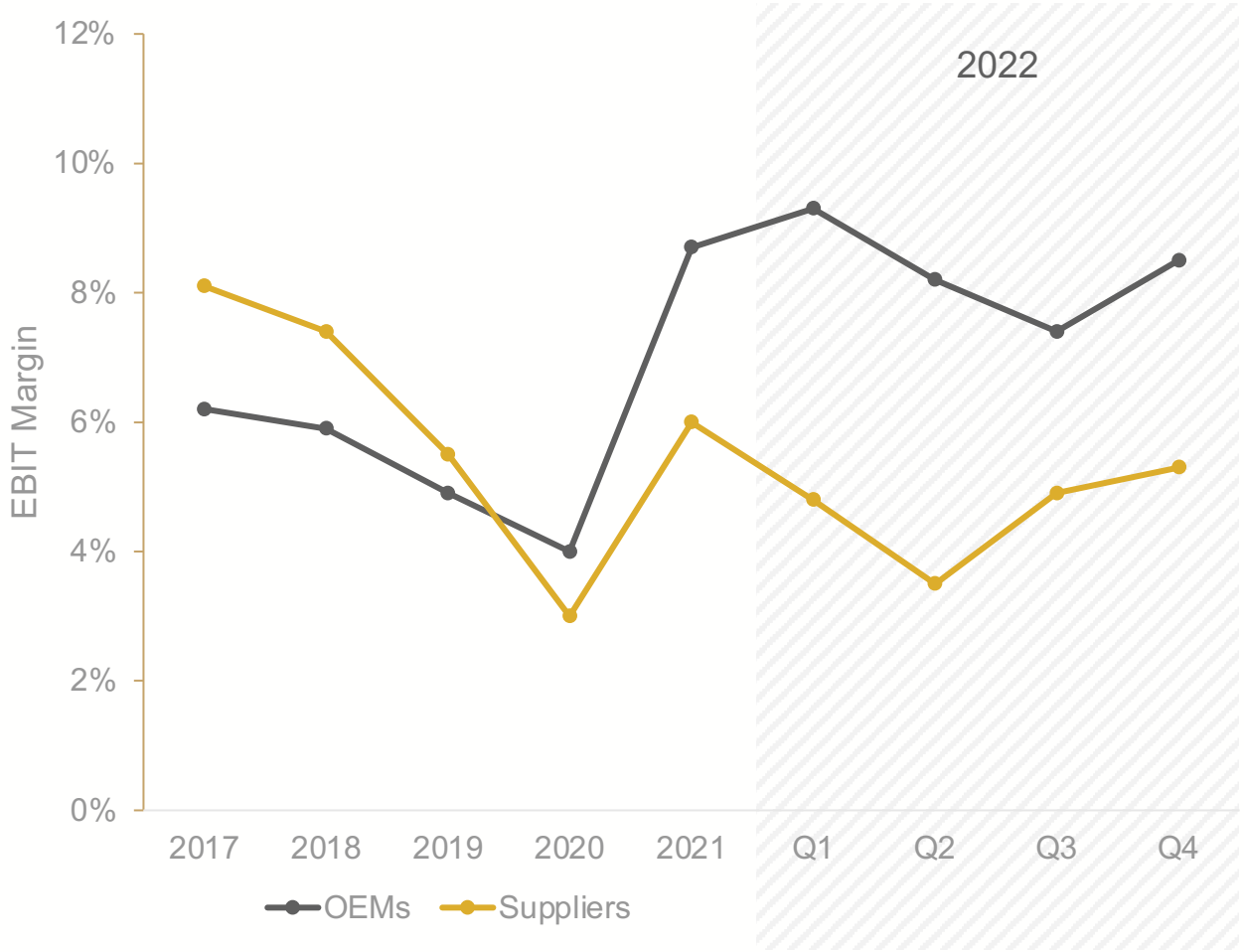
New vehicle offerings

- OEMs have responded to this imbalance between supply and demand by cutting production of budget vehicles in favor of high-margin, luxury vehicles
  - 2021 – luxury vehicles comprised 14.1% of total sales
  - 2022 – luxury vehicles comprised 17.3% of total sales

Will the auto industry be able to maintain profits as EV production costs ramp up, and more vehicles compete in the EV category?

Note: Auto revenue index = vehicle sales x price index
Source: U.S. Bureau of Economic Analysis, Federal Reserve Bank of St. Louis, AutoForecast Solutions, JD Power

OEMs have benefited from high prices and low volumes, with supplier EBIT margins continuing to trail OEMs throughout 2022



"Even if a supplier has the same revenue or is getting close to 2019 levels of revenue, their cost structure has changed significantly."

- Michael Robinet, S&P Global Mobility

Suppliers have struggled to pass rising costs on to OEMS, absorbing the majority of **raw material cost** increases - from 2020 to 2022, raw material costs increased:

- 144% for EVs and
- 106% for ICEs

Wage growth peaked at 6.3% (annualized) in 2023, with sectors relevant to auto suppliers being hit harder than most:

- Manufacturing - 6.6%
- Low skill - 6.7%
- Hourly - 6.5%

While **shipping costs** fell significantly in 2022, they remain above pre-pandemic levels:

- Baseline - ~$1,500 FBX global container freight index
- 01/01/2022 - $9,293
- 12/31/2022 - $2,246

The battle for EV market share has led to surging **R&D costs** for traditionally mechanical suppliers

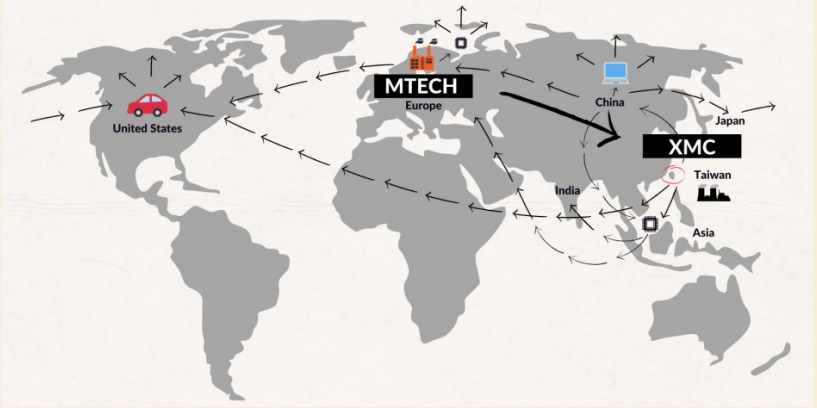
- 9.8% increase in US R&D spend across all US automotive in 2022

Note: OEMs (N=13), suppliers (N=22)
Source: SEC filings, company reports, S&P Global Mobility, AlixPartners Global Automotive Outlook, Federal Reserve Bank of Atlanta, FBX Global Container Freight Index

The supply headwinds responsible for these abnormal conditions are expected to mitigate slightly, but remain a factor throughout 2023

Chip shortages

- The global semiconductor shortage is expected to ease slightly in 2023, but it shows no signs of being completely resolved
  - 4.5 million vehicle shortfall in 2022
  - **2.8 million vehicle shortfall expected** in 2023 – projection unchanged after Q1
- It is important to note that the 2.8 million projection factors in a mild recession in 2023 – if the **US avoids a recession and demand is higher than expected, the chip constraint will have a greater impact,** still reason for concern in 2024

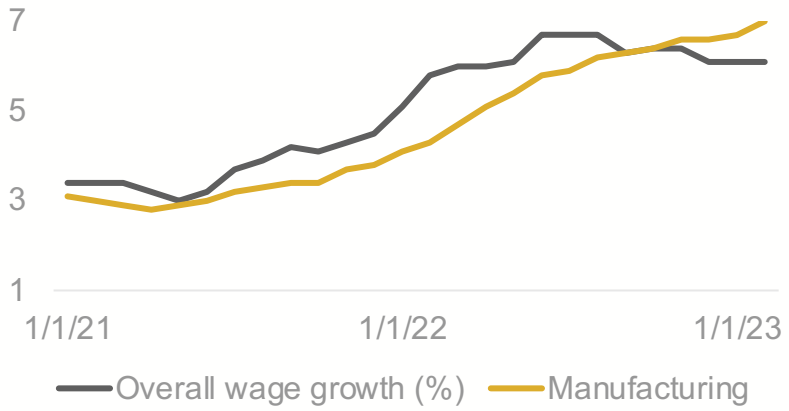


Raw materials

- Raw material prices in 2022:
  - ▲ Lithium up 87.2% to 519,500 CNY/T
  - ▼ Cobalt down 26.3% to 51,955 USD/T
  - ▲ Nickel up 43.1% to 29,886 USD/T
  - ▼ Steel down 13.2% to 3,966 CNY/T
  - ▼ Aluminum down 14.4% to 2,405 USD/T
- Raw material prices in Q1 of 2023:
  - ▼ Lithium down 55.8% to 229,500
  - ▼ Cobalt down 32.8% to 34,930
  - ▼ Nickel down 20.9% to 23,651
  - ▲ Steel up 5.3% to 4,175
  - ▼ Aluminum down 3.9% to 2,312
- Raw material price **expectations, next 12 months**:
  - ▲ **Lithium up 41.4%** to 324,473
  - ▼ **Cobalt down 11.1%** to 31,066
  - ▼ **Nickel down 21.9%** to 18,464
  - ▼ **Steel down 3.6%** to 4,023
  - ▼ **Aluminum down 9.3%** to 2,097
- Takeaways for rest of 2023:
  - EV – rebound in lithium prices will outweigh falling cobalt and nickel prices
  - ICE – slight decrease in raw materials cost

Labor market

- Despite aggressive rate hikes from the Fed, unemployment remained low in 2022, putting positive pressure on wages
  - 3.5% entering 2023
- Year-over-year manufacturing wage growth exceeded overall wage growth by the end of 2022
- CBO expects unemployment to rise to 5.1% by year end, leading to slower wage growth starting in 2024
  - Some surveys indicate impact on wages will happen before 2024, but data is mixed

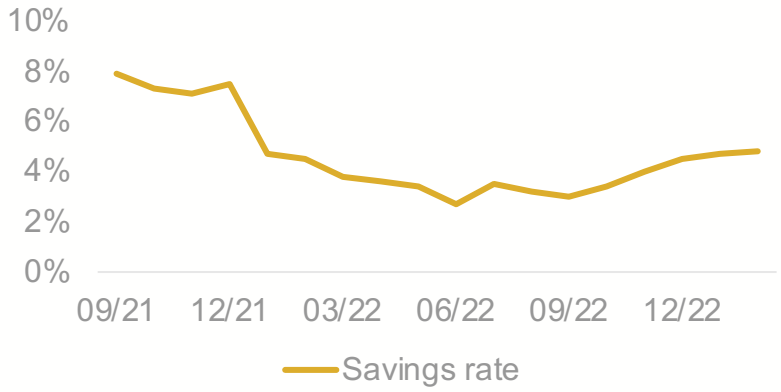


Note: Map is purely theoretical to demonstrate complexity of supply chain, company names are fictional
Source: AutoForecast Solutions, Chordata, Trading Economics, Federal Reserve Bank of St. Louis, Federal Reserve Bank of Atlanta, Congressional Budget Office (CBO)

Demand resiliency throughout 2023 will be heavily reliant on movement in savings rates, interest rates, and consumer sentiment

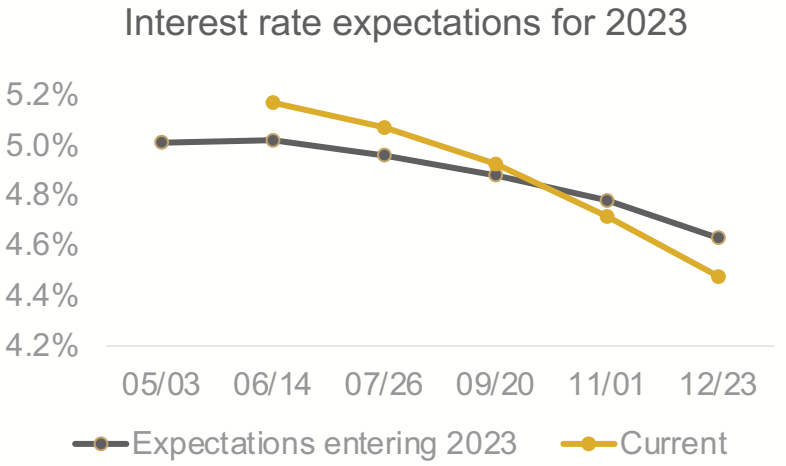
Savings rates

- JP Morgan estimates that consumers have spent ~57% of the excess savings that were built up during the pandemic
- Savings rates continued their gradual ascent in Q1, increasing from 4.5% to 4.8%
  - 7.9% average in 3 years preceding pandemic
- While savings rates and demand will have to stabilize eventually, this data suggests a more drawn-out reversion to pre-pandemic norms



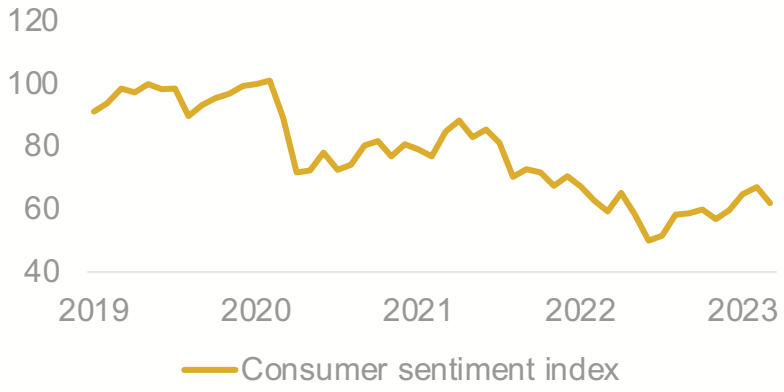
Interest rates

- Entering 2023:
  - Fed funds rate sat at 4.33%
  - Analysts expected rates to rise to 5.02% and end the year at 4.63%
- After Q1:
  - Rate increased to 5.08% after May meeting
  - Rates expected to drop to 4.48% by year end



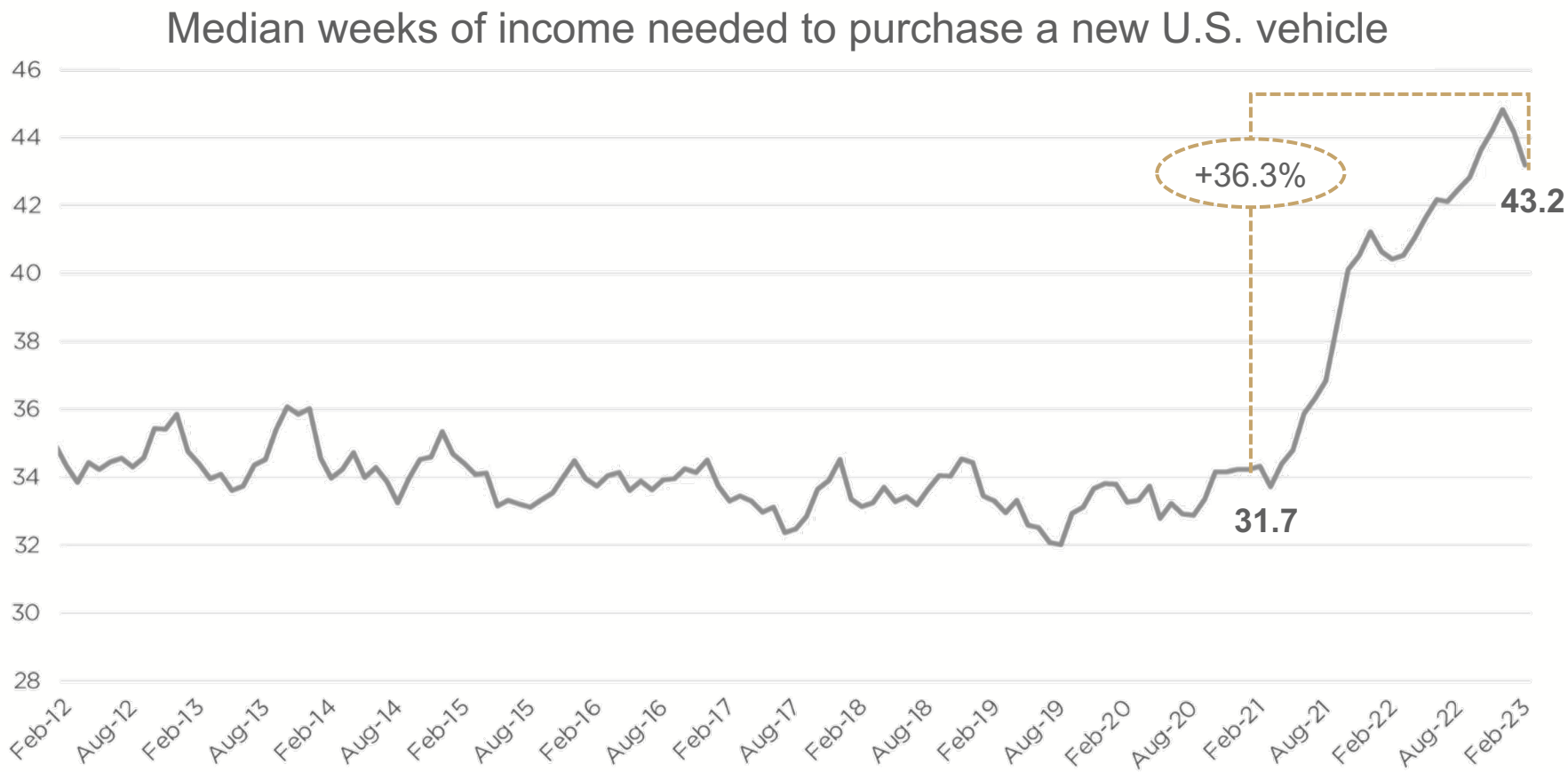
Consumer sentiment

- Entering 2023:
  - 63% chance of recession by year end
  - 25% felt it was a good time to buy a car
  - 59.7 consumer sentiment index
- After Q1:
  - 58% chance of recession by year end
  - 29% feel it is a good time to buy a car
  - 62.0 consumer sentiment index
- While an economic downturn is still expected in 2023, the prospect of a soft landing has increased



Note: Consumer sentiment index incorporates both the current status of and expectations regarding household finances and economic conditions, 100 is baseline; Implied fed funds rate expectations are derived from 30-Day Fed Funds futures pricing data
Source: U.S. Bureau of Economic Analysis, Federal Reserve Bank of St. Louis, JP Morgan Asset Management, NABE Outlook Survey, UM Consumer Survey, CME FedWatch Tool

A trend of new-vehicle affordability is emerging, but it's still expensive



Factors impacting recent affordability improvement

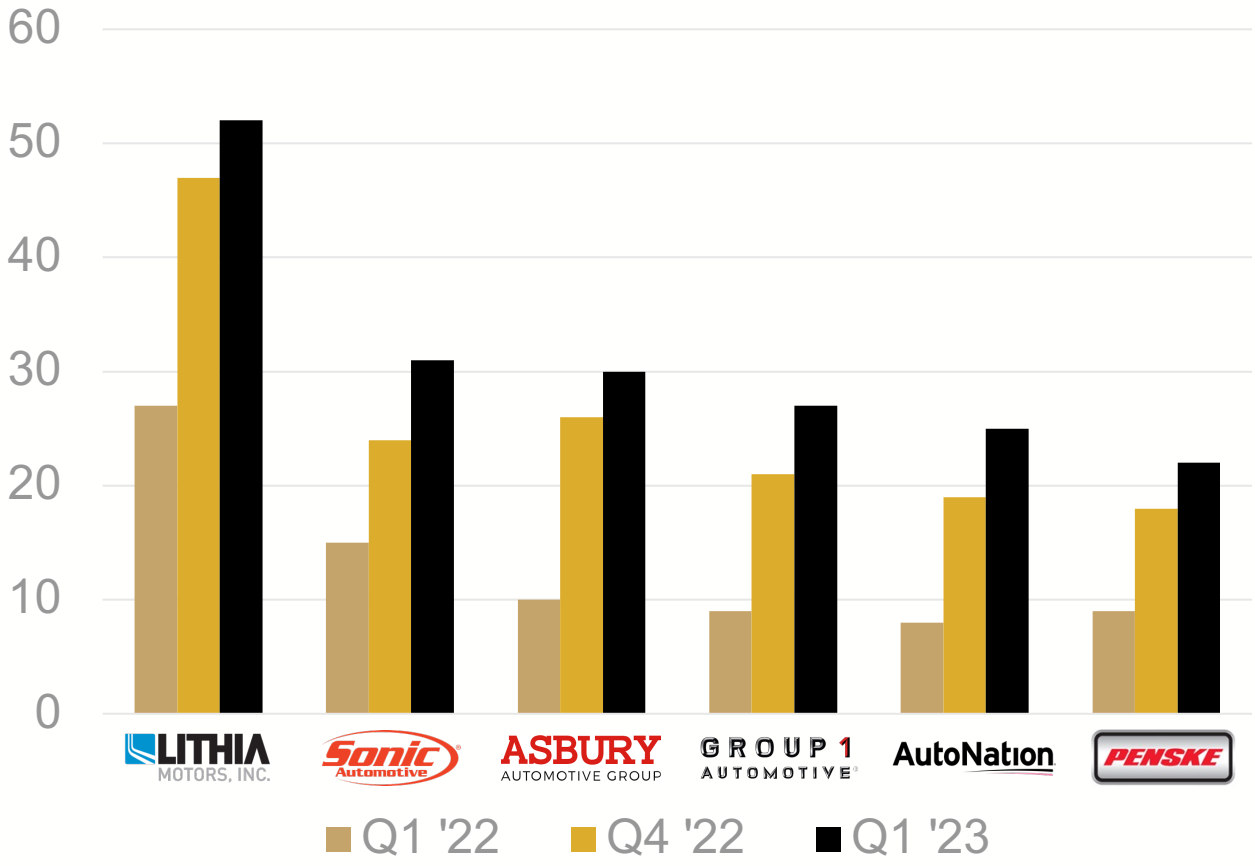
- Declining new-vehicle prices
- Increasing incentives
- Growing incomes
- A slightly lower average new auto loan rate

This higher vehicle cost has priced some buyers out of the market, the recent trend suggests OEMs may be interested re-engaging these consumers, which could increase volumes

Source: COX Automotive/Moody's Analytics Vehicle Affordability Index

Over the last year, combined lot inventories across the top six dealership have increased, but are still a small fraction of pre-COVID levels

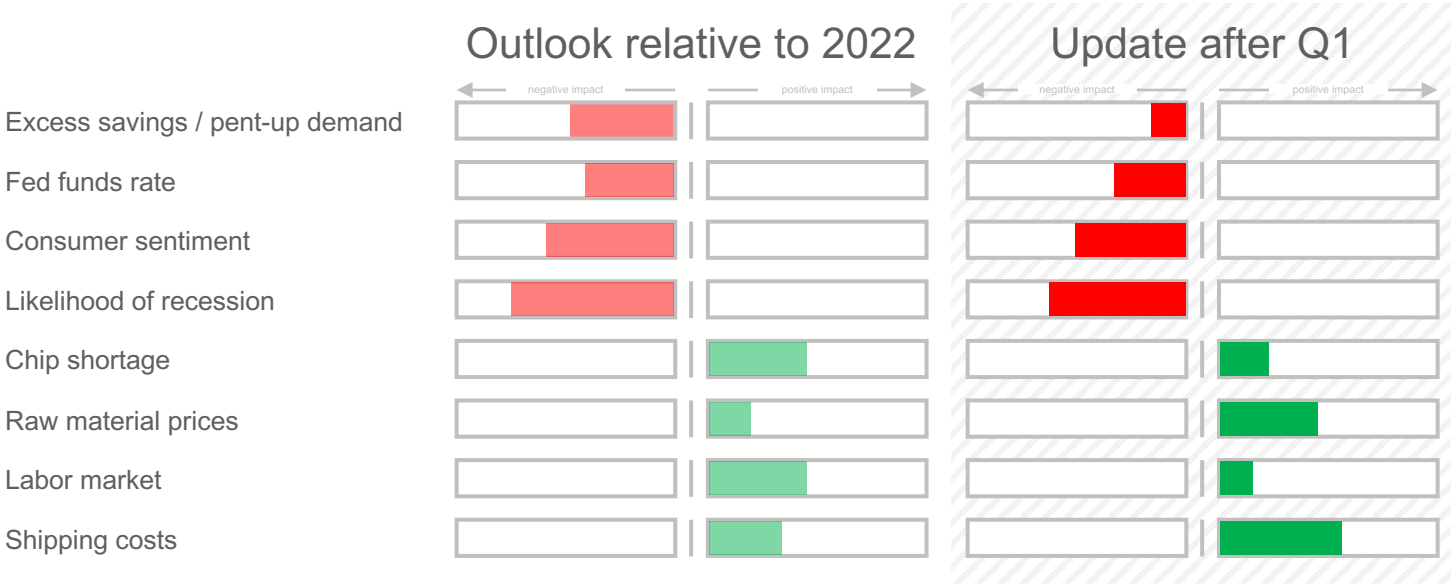
Days of inventory at the largest U.S. publicly traded dealerships



Total supply of U.S. auto inventories (thousands)

Source: Automotive News, Company Filings, BLS

Softening demand headwinds coupled with relevant supply side updates have led to a slight recalibration of 2023 projections



Updated 2023 projections

Annual North American light vehicle production levels are expected to rise 15.09M units

New vehicle prices are expected to dip 3.8%, with new vehicle sales increasing 2.16%

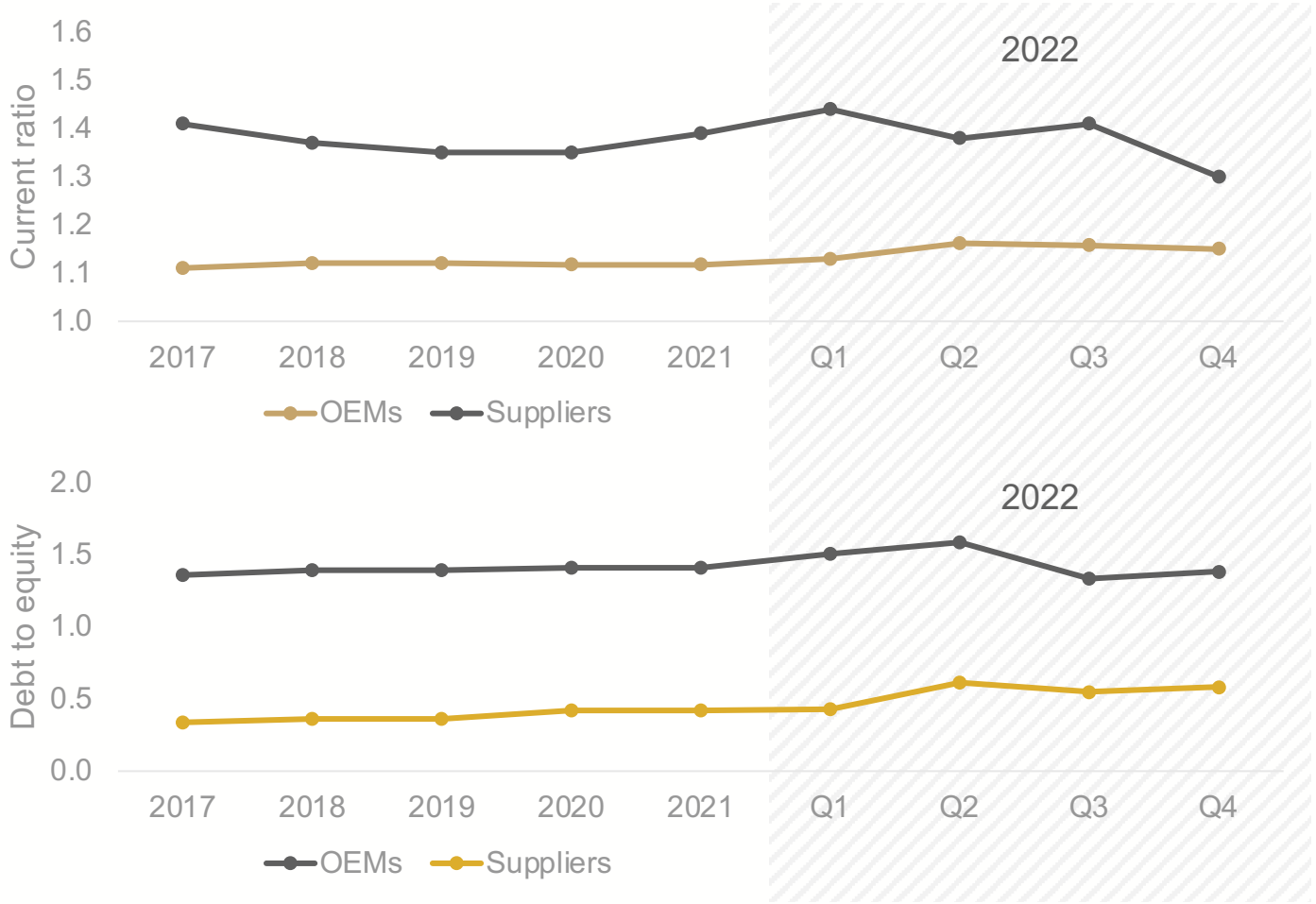
OEM EBIT Margins are expected to dip slightly, with supplier margins increasing slightly

Key metrics to monitor

1. **US personal savings rate** – currently 4.6%, expected to trend back to ~7.9% benchmark throughout the year, the rate at which it increases will be important in gauging pent-up demand
2. Fed funds rate – **CME FedWatch Tool** provides insight the market's expectation for future Fed meetings, which is often more accurate than any one source
3. Consumer sentiment – monthly **UM survey of consumers** indicates how confident consumers are in the economy and their own finances, which is a useful proxy for demand
4. Likelihood of recession – **NABE surveys** provide useful data from a panel of economists, current consensus is a mild recession in the back half of 2023
5. **Chip production** – 2.8 million vehicle shortfall expected in 2023, down from 4.5 million in 2022
6. Raw material prices
    1. EVs – **lithium, cobalt, and nickel**
    2. ICEs – **steel and aluminum**
7. Labor market – **monthly jobs reports**, current expectation is a moderate rise in unemployment throughout 2023
8. Shipping costs – **Freightos Baltic Index**, costs remain ~50% higher than pre-pandemic benchmark
9. Vehicle prices - **Manheim used vehicle value index** – useful indicator for how new vehicle prices will trend (started ticking back up in Q1 after a period of decreases)

Source: Cox Automotive, Manheim, JP Morgan Research, SP Global Mobility

OEMs remaining significantly more leveraged and less liquid than suppliers, with neither straying far from historical norms



Current ratio

- *Current assets/current liabilities is a metric to assess a company's ability to pay off short-term debts, over 1 is considered healthy.*
- One OEM stands out as being less liquid than most
  - Hyundai – 0.80
- All other OEMs sampled have current ratios between 1 and 2
- A few suppliers stand out as being less liquid than most
  - Valeo – 0.84
  - Forvia – 0.99
  - Plastic Omnium – 0.99
- All other suppliers sampled have current ratios between 1 and 2.5

Debt to equity

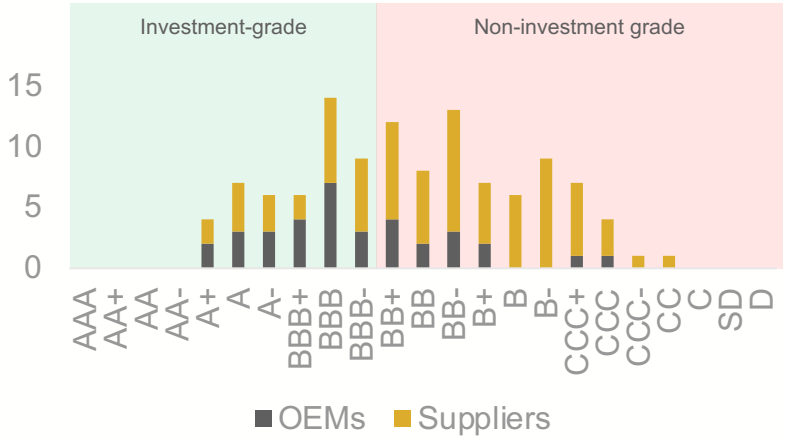
- *Measures financial leverage and risk. A higher ratio means more debt and sensitivity to interest rates.*
- A couple OEMs stand out as being less debt financed than most
  - Tesla – 0.13
  - Kia – 0.20
- One OEM stands out as being more debt financed than most
  - GM – 3.25
- A few suppliers stand out as being more debt financed than most
  - Forvia – 1.94
  - Goodyear – 1.63
  - Gestamp – 1.43

Note: OEMs (N=13), suppliers (N=22)
Source: SEC filings, company reports

While OEMs are stable, suppliers face credit risk in the event of an economic downturn, with legacy firms at even greater risk

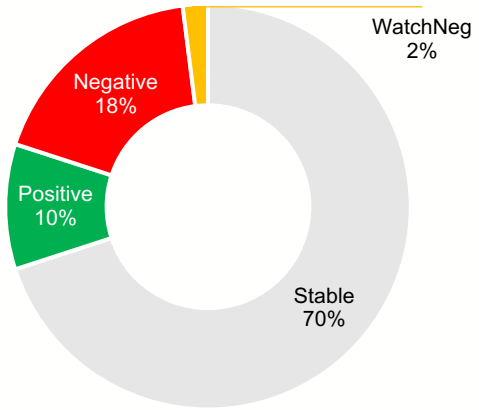
Current

- Despite being more leveraged than suppliers, OEMs have substantially higher credit ratings
- S&P credit ratings (shown in graph):
  - OEMs – 62.9% investment grade (22/35)
  - Suppliers – 30.4% investment grade (24/79)
- Moody's long-term ratings for US OEMs:
  - GM – Baa2 (investment-grade)
  - Tesla – Baa3 (investment-grade)
  - Ford – Ba2 (non-investment grade)



Outlook

- Automotive net outlook bias began 2022 at net neutral (0%)
- By Q4, it had dipped slightly(-8%), reflecting growing uncertainty regarding the health of the economy as a whole
- US OEMs are viewed neutrally, with GM, Tesla, and Ford retaining "Stable" ratings from Moody's
- S&P net outlook bias for all rated autos shown below:



Risk

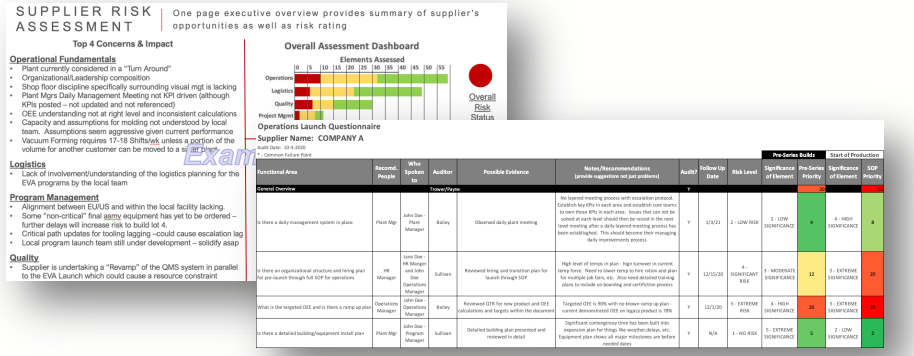
- In the event of a recession:
  - OEMs are seen to have sufficient headroom due to increased margins and sound financial status – limited credit risk
  - Suppliers have less headroom as they have been absorbing excess costs – credit risk for non-investment grade firms forced to refinance debt at high interest rates
- The lower margins and high R&D costs associated with entering the EV space put legacy suppliers at increased credit risk

Note: FFO / Debt chart includes S&P Global Mobility projections for 2023 and 2024
Source: Moody's, Standard and Poor's

How Seraph serves the automotive industry

Operational Consulting Services

- Whether crisis management, restructuring & turnaround, relocation & consolidation, greenfield, logistics, mergers & acquisitions, strategy development, among others; Seraph has the tools to support any operational situation.
- We support industries where operations is the backbone of the organization including automotive, private equity, aerospace, defense and medical device.



Operational Assessments

- Seraph offers different 1-day to 5-day assessments to provide in-depth visibility to your situation.
- Our questionnaire has been developed to understand each area of your operation, revealing key risks and opportunities.
- Upon completion of each assessment, Seraph will provide a detailed report outlining a clear path forward, recommending KPIs and deliverables.

ProductionNet

- Accurate, timely and useful information is required to efficiently guide your team through critical situations.
- ProductionNet offers visibility to your process, with minimal operator effort.
- Team members can quickly identify bottlenecks, troubleshoot quality issues, and plan a path to increasing OEE.

Leaders in “Operational Excellence,” Seraph works with most automotive OEMs and their supply base.

Seraph.

THANK YOU

CONTACT US!

Please reach out to one of our team for more information on our services and capabilities

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