The Road Ahead for Automotive Retail

20 March 2024

A View from America

Glenn Mercer
glennmercer.substack.com and mercer.glenn@gmail.com

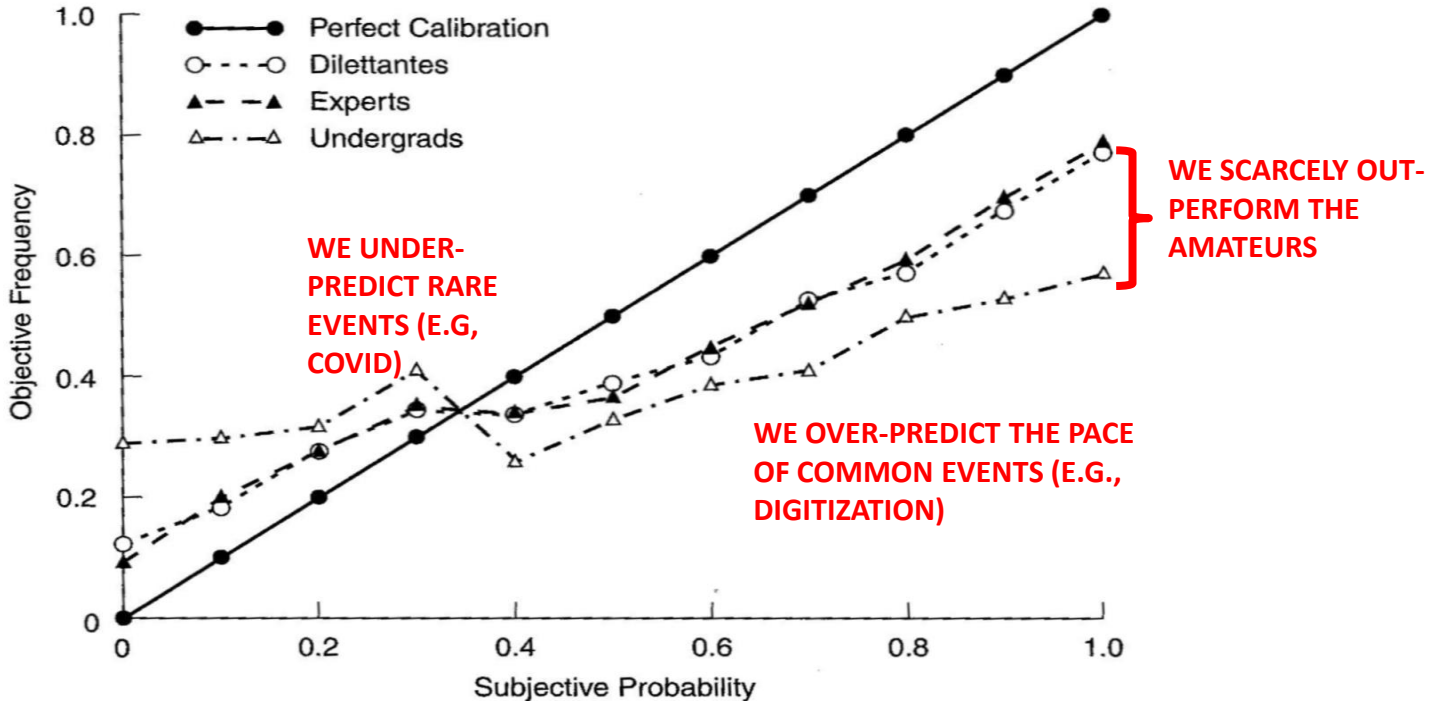
Introduction

- Contents are my own, not NADA positions
- Looking back 10 years (to the start), and ahead 10
- Relevant to the USA only
- “The big trends are a rotating cast” (this is a snapshot)
- My perspective: *only* impact on automotive retail (not social, political, economic, environmental).

Acknowledgements

- As always, I want to thank all the analysts I have learned from.
- I do no primary research of my own, and so I depend on the good work and the good will of all the industry analysts out there who are generous enough to make their work available.
- They deserve credit for their work, just as I must accept responsibility for any garbling of it: errors are entirely mine.
- I encourage you to employ their services when you can, as they earn their livings doing this.

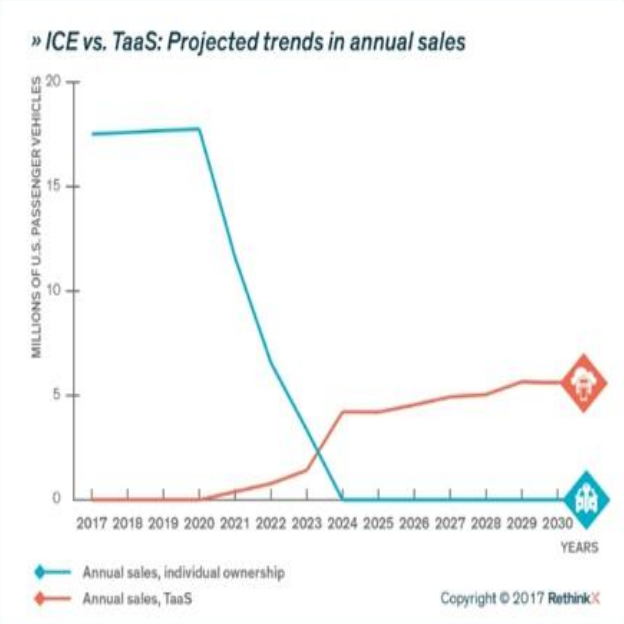
My biases, #1: If I'm an "expert," I'm likely wrong



My biases, #2: Equilibrium beats extrapolation

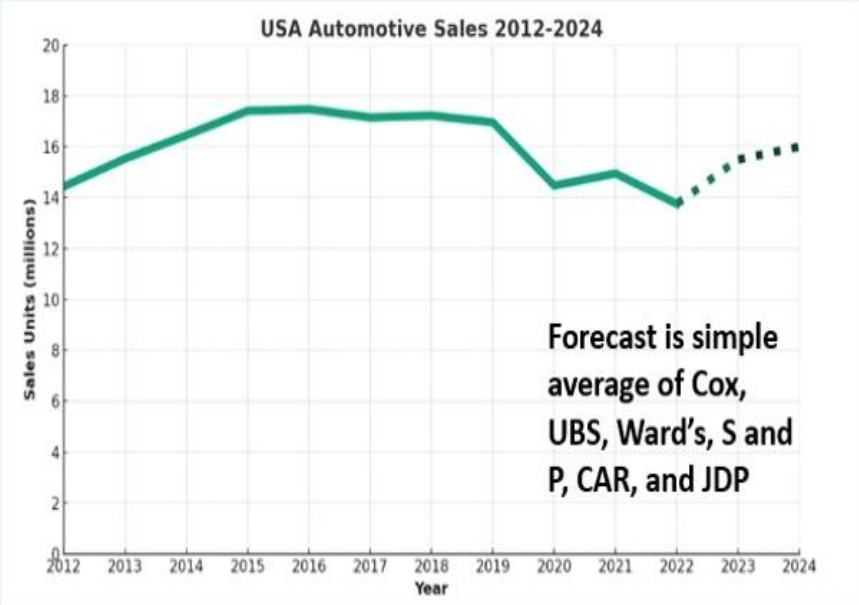
Extrapolation by ReThinkX 2017:

AV growth leads to ZERO retail car sales by 2024

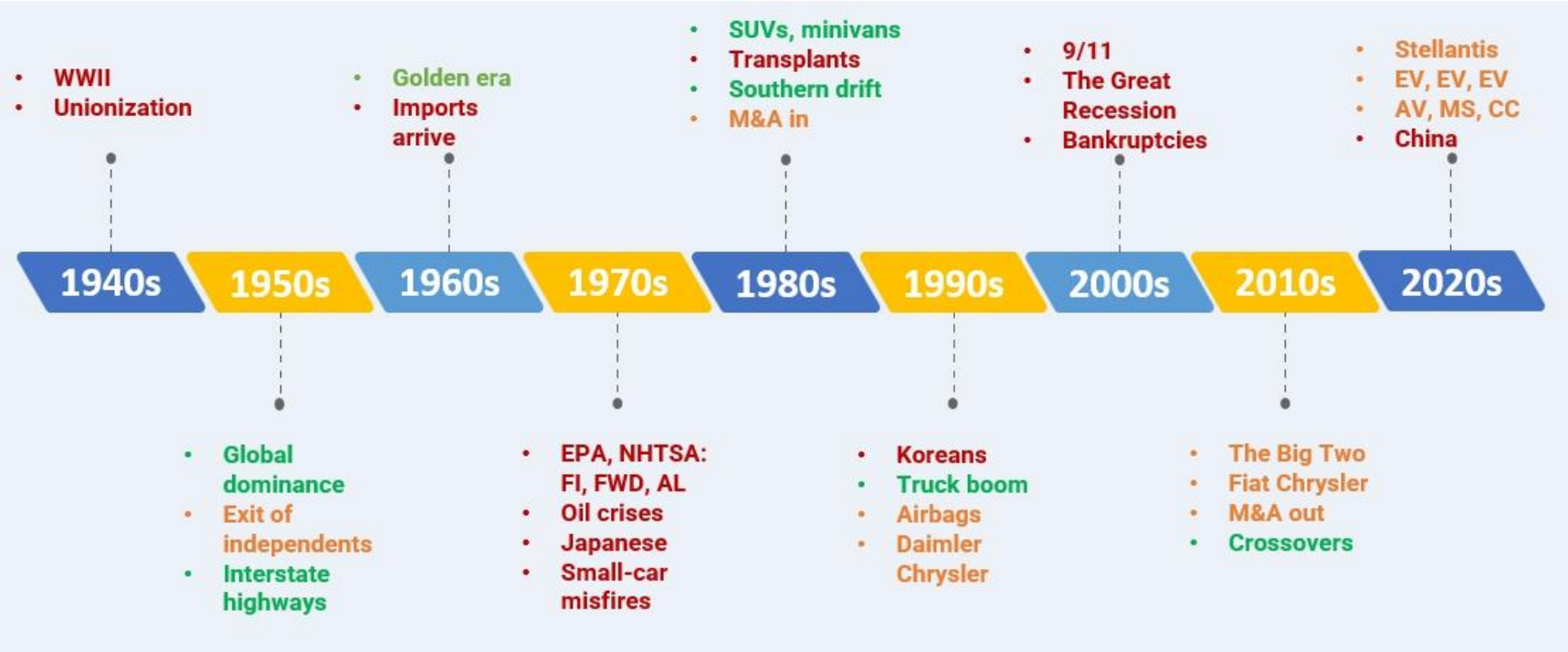


Mean Regression: Sales will recover post pandemic:

Retail sales in 2024 likely 15 million or more



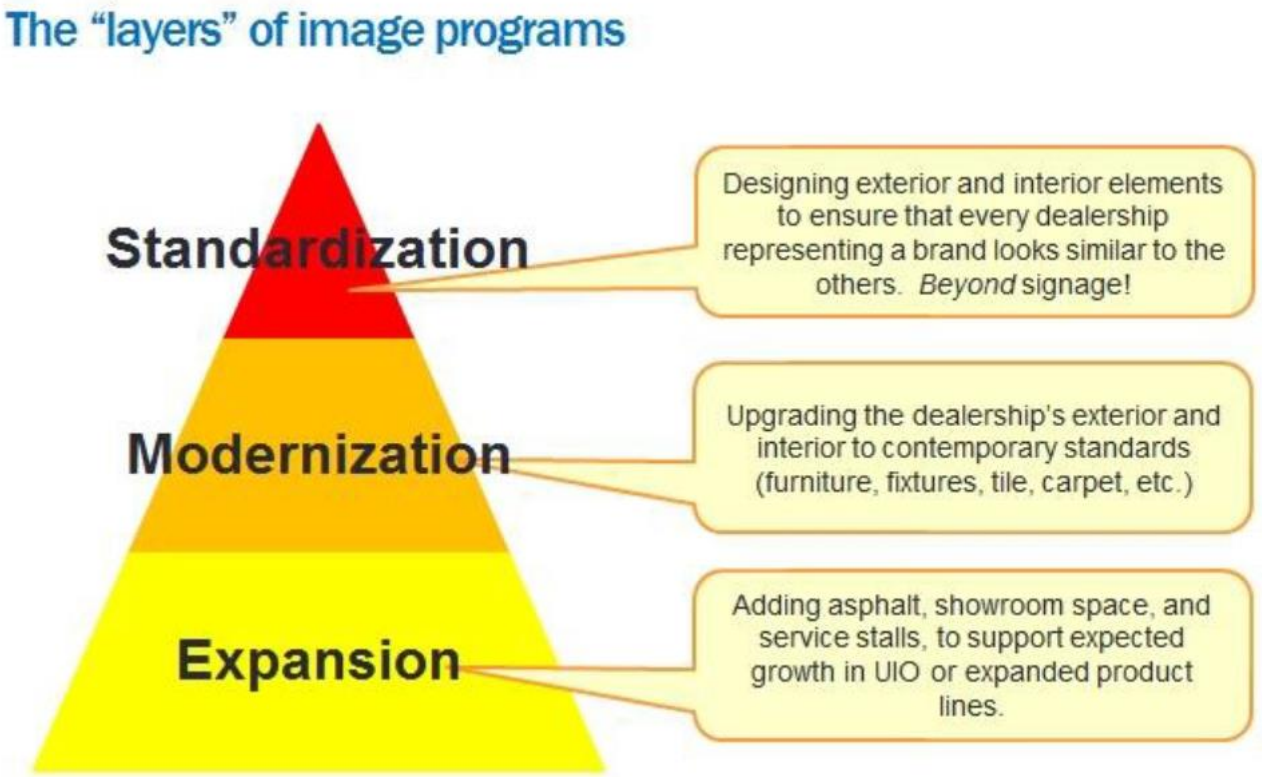
My biases #3: We've *always* been living with change



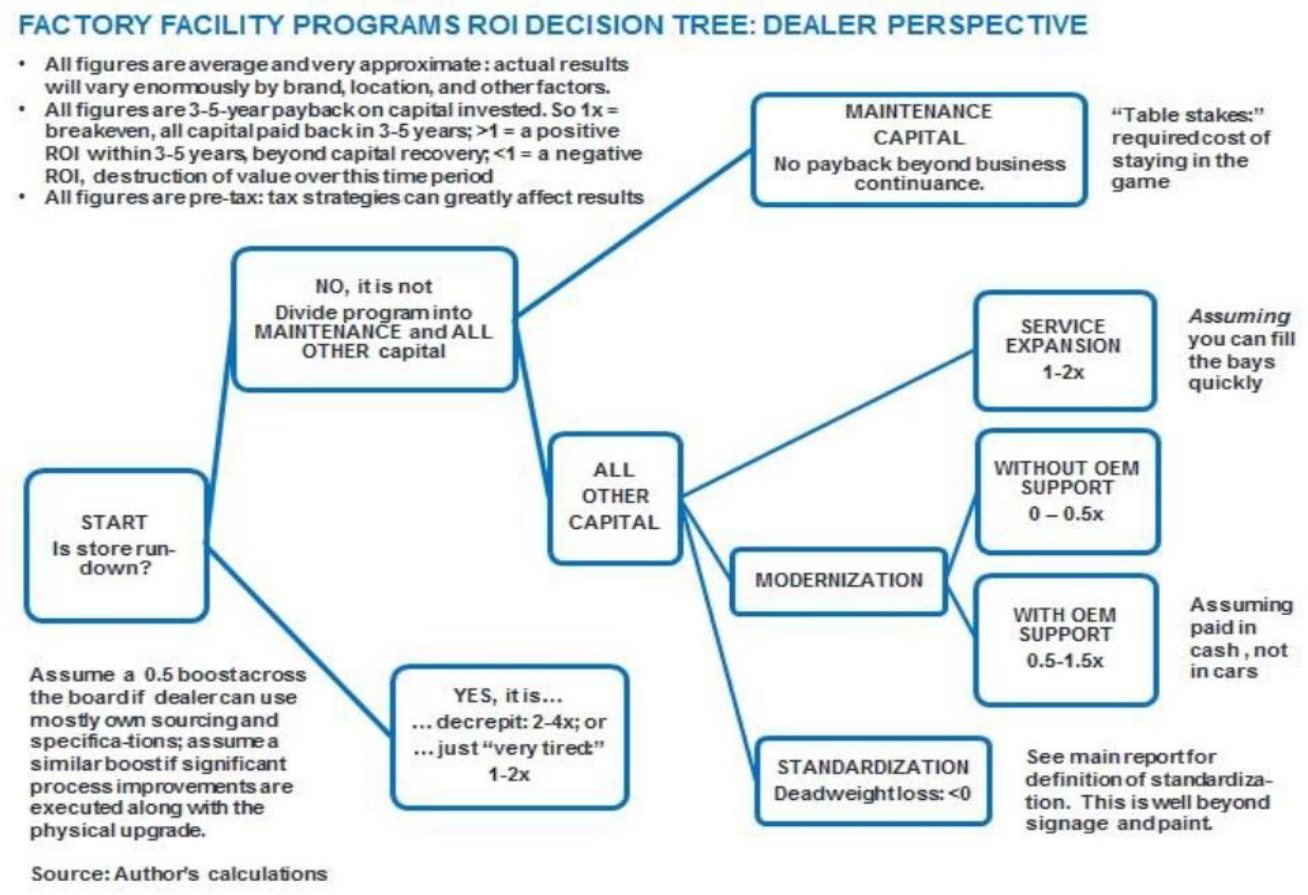
Comments on: Status Quo

- Brand standards (facilities)
- ROI (“new normal”)

Brand standards: facilities. Research findings (2013)

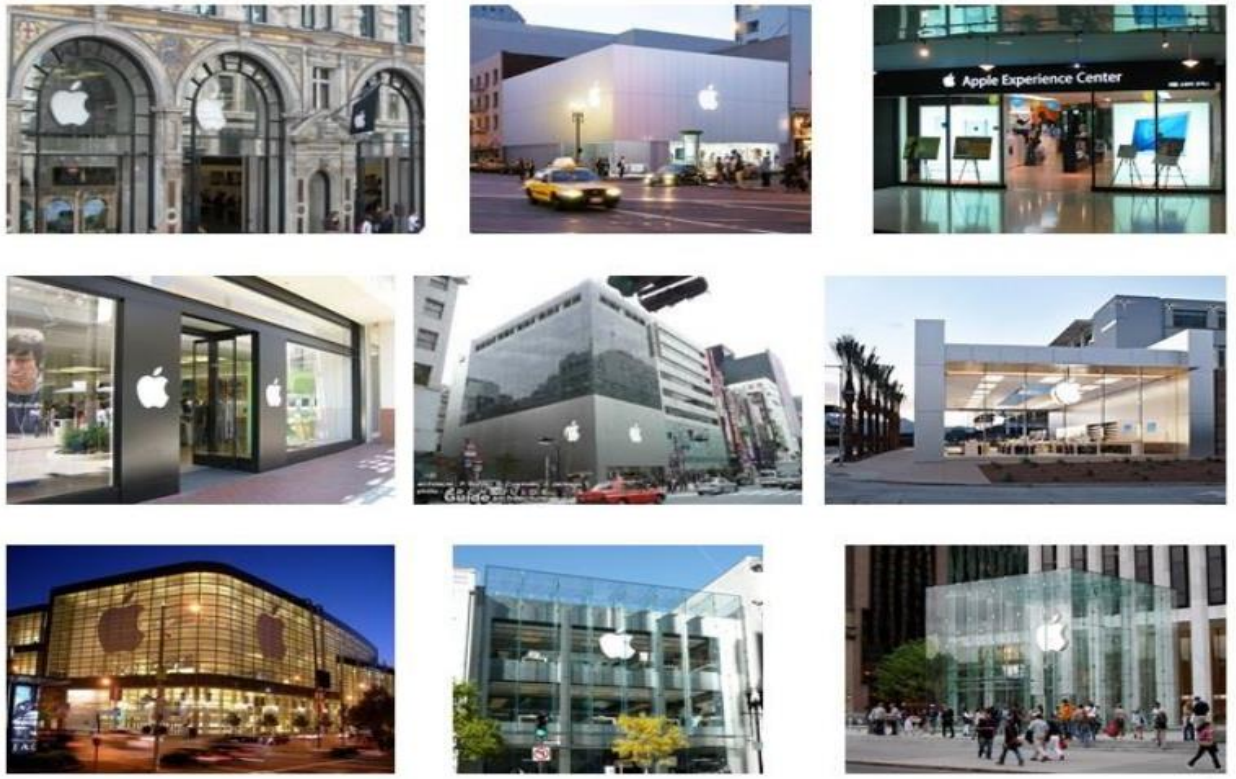


Brand standards: facilities. Research findings (2013)

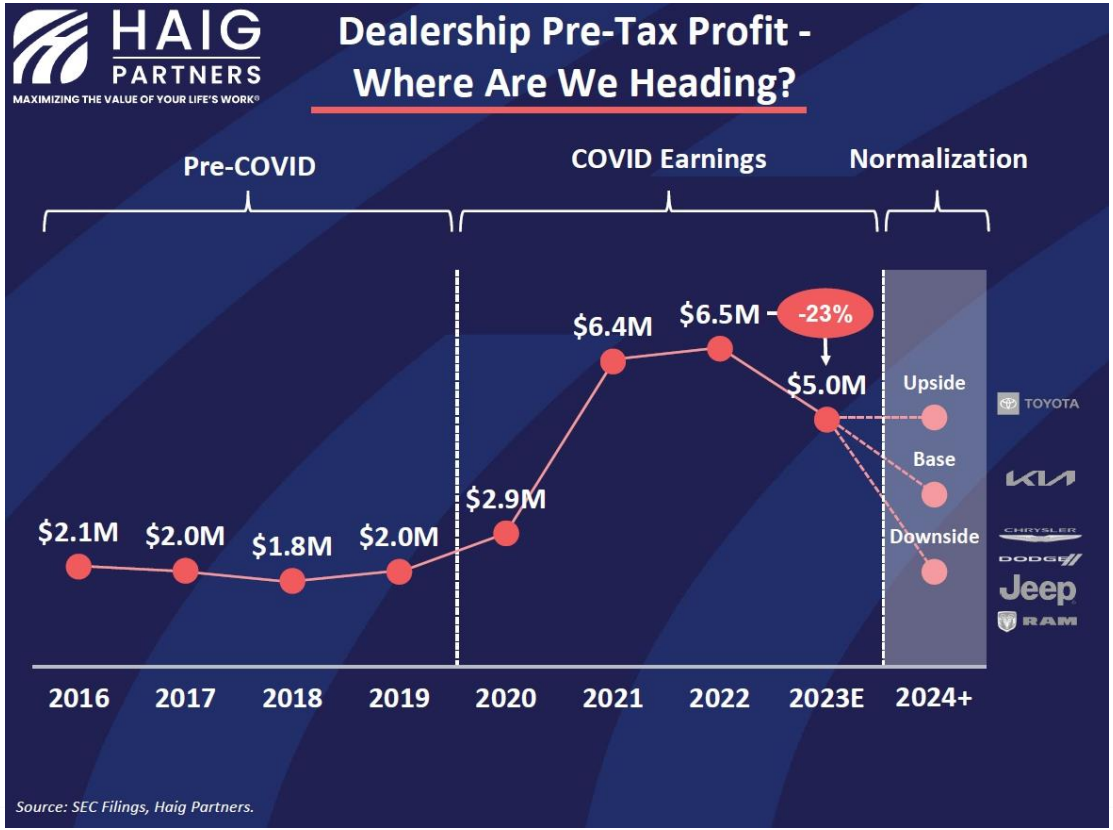


Brand standards: facilities. Research findings (2013)

NINE APPLE STORES AROUND THE WORLD



ROI: Tomorrow: what is the “new normal?”



Mean Regression is THE issue at present (not EV, nor anything else): where will profits stabilize?

My ~~forecast~~ hope: 150% of 2019

Comments on: Electric Vehicles

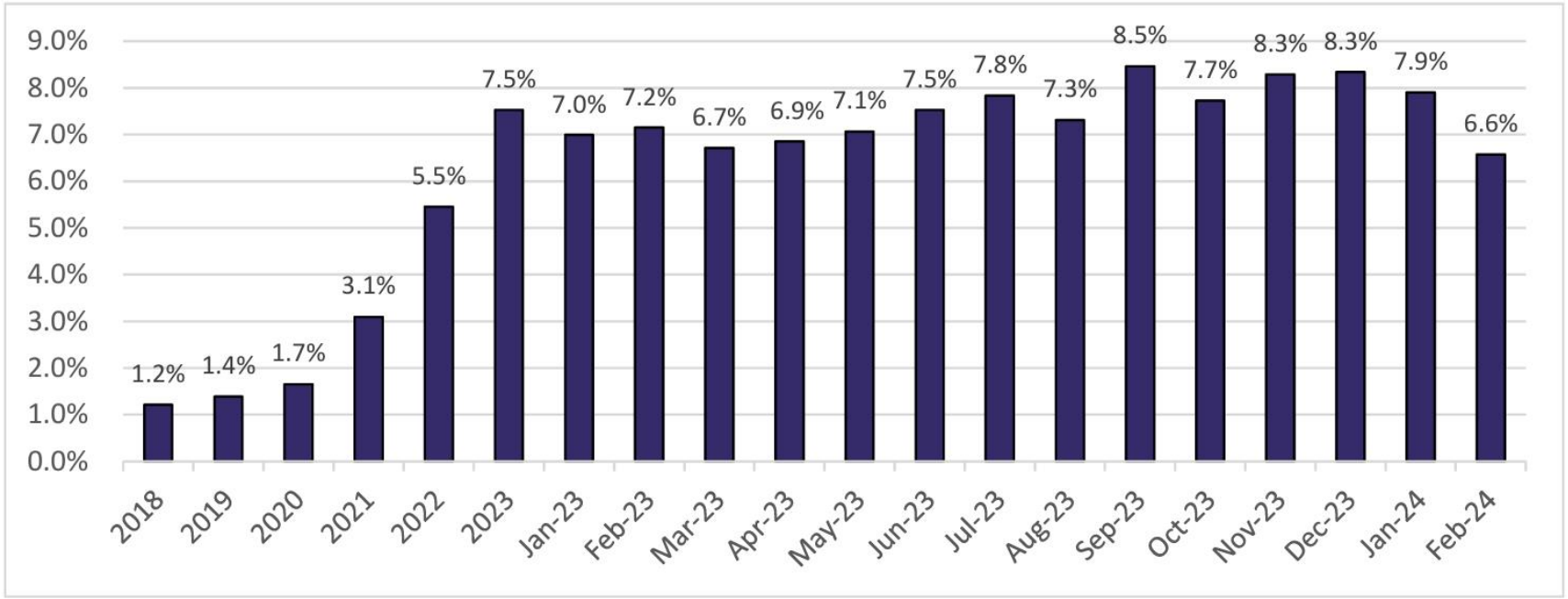
- American view
- Impact on aftersales

EV: Electric Vehicles

- Yesterday: two small niches
  - Incumbent OEMs: low-cost short-range urban cars (e.g., Leaf)
  - New entrant Tesla: *no!* - high-cost long-range premium vehicles
- Today: a struggle between supply push and demand pull
- Tomorrow: trajectory is up, but the path will be rocky
  - Government push is long-term pro-EV, short-term dependent on politics
  - Customer base evolving from premium/male/"techies" **buyers** to mass-market/family/"drivers and passengers" **shoppers**
  - OEMs face a gap between profitable ICE and unprofitable (for now) EV

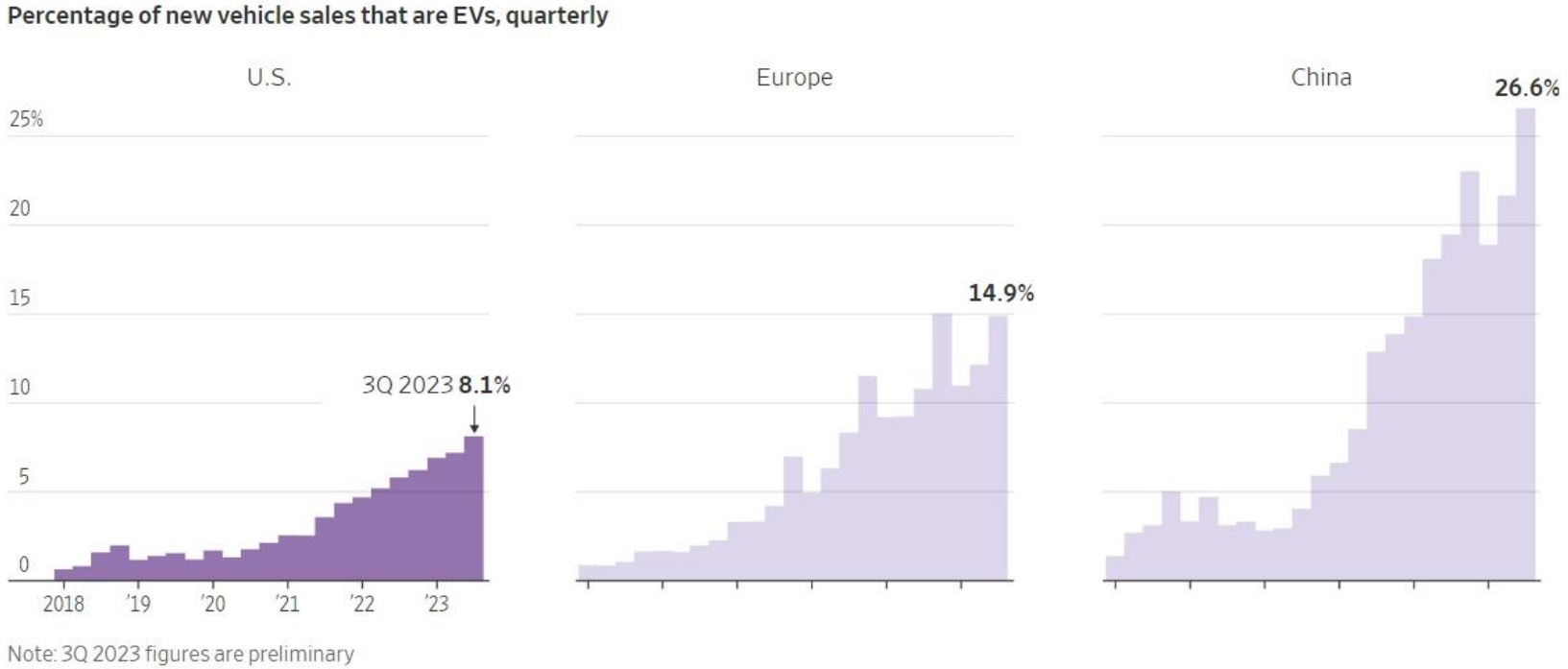
EV: Short term. Growing share? Yes. No.

FROM 2018 TO 2023 BEV (sic) SHARE ROSE 8 BASIS POINTS/MONTH. SINCE JANUARY 2023: -4



Source: Wards; Wells Fargo Securities, LLC

EV: Long term. ROW leads, US must (slowly) follow



Source: GlobalData via WSJ 12/27/2023

Anyway…what will be the impact on dealers?

THE ANSWER WILL VARY BY DEPARTMENT

A. Sales: Mildly Negative and Getting Worse

- Growing lower-margin EV sales cannibalize falling higher-margin ICE sales
- Some volume loss to new EV entrants, to the extent they do not use dealers
- Investment required in sales force training

B. Aftersales / Service: Negative, Eventually Lower revenues eventually

- High investment in facilities, equipment, tools, chargers..

C. Overall Store: Eroding Balance of Power

Increasing OEM attempts to redefine channels: e.g., from *dealer* to *delivery point*, or *agent*

The impact of EVs on fixed operations

A. ***Why*** **is this a potential problem?**

B. ***What*** **is the nature and size of the problem?**

C. ***When*** **will we have to deal with it?**

D. ***How*** **can we best deal with it?**

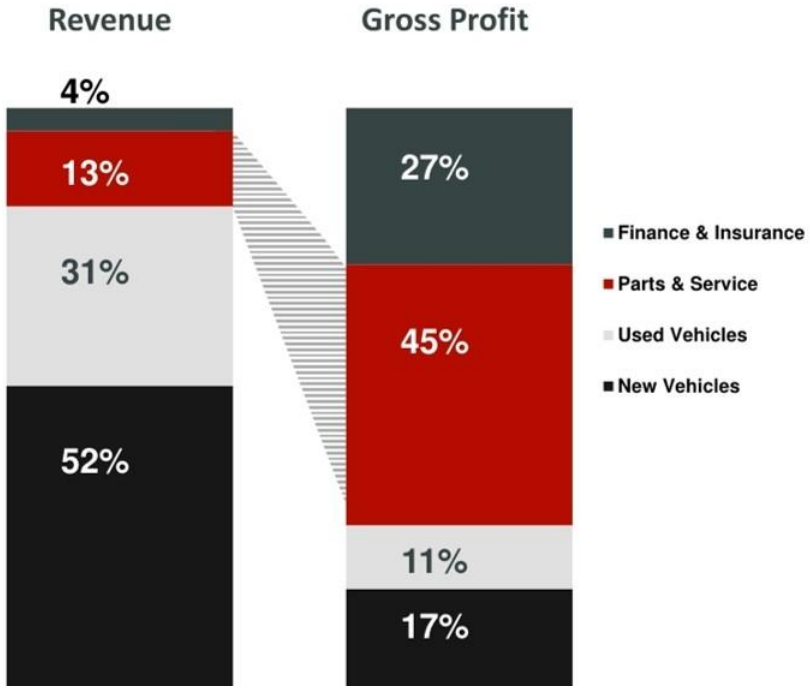
E. ***What happens*** **if we do not address it?**

Why is this a potential problem?

BECAUSE SERVICE DRIVES PROFITS TODAY ($) *AND* TOMORROW (LOYALTY)

PROFITS TODAY

Using Group 1's Q1 2023 financial results, Service was 13% of revenue and 45% of gross profit, with an absorption rate of 110%.

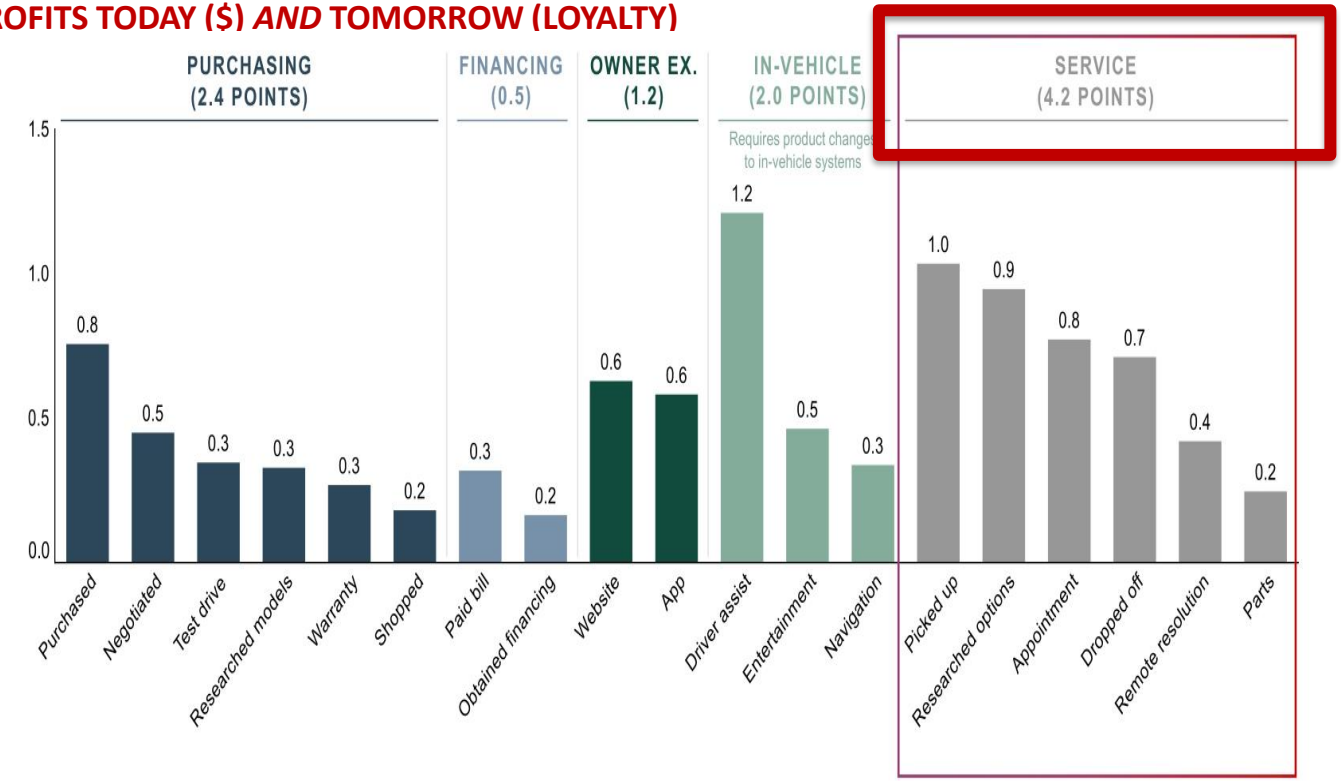


Why is this a potential problem?

BECAUSE SERVICE DRIVES PROFITS TODAY ($) *AND* TOMORROW (LOYALTY)

PROFITS TOMORROW

Bain research (using Uplift and LMC data) show Net Promoter Scores (~ loyalty) more influenced by service than by sales, F&I, etc. NPS can translate into future revenue and profits.

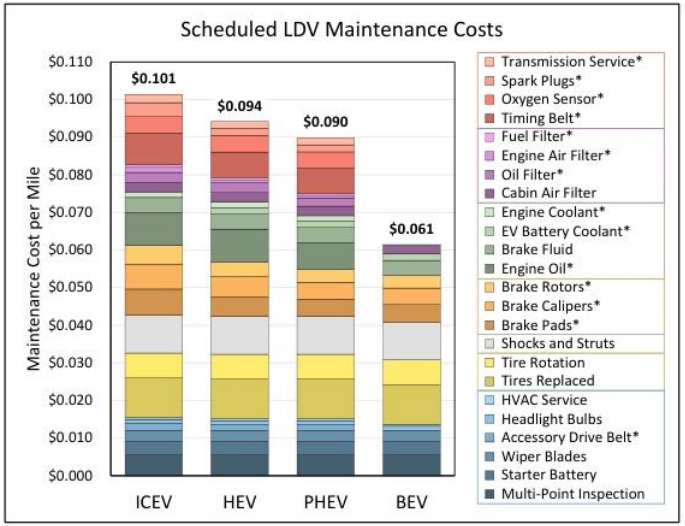


What is the nature and size of the problem?

ESTIMATES VARY, BUT IN THE LONG RUN AN ALL-EV FLEET COULD REQUIRE UP TO 40% LESS SERVICE

EVs require less maintenance and repair than equivalent ICEs, due to fewer moving parts in the powertrain, and the absence of extensive powertrain-cooling and -lubrication systems.

MAINTENANCE (-40%)



REPAIR (-40% OR MORE)

LDV	ICEV	HEV	PHEV	BEV / FCEV
Car	100%	89%	86%	67%
SUV	91%	81%	78%	61%
Pickup	70%	62%	60%	47%

Source: NREL (National Renewable Energy Laboratory): contact me for the full study

When will we have to deal with it? (long term)

URGENCY WILL VARY BY YOUR LOCATION, BUT ON AVERAGE YOU HAVE SOME TIME

USA light-duty fleet mid-year 2022:

Total: 285 million
EV (BEV+ PHEV): 1.5 million = **0.5%** of the current fleet
(HEV: 6.5 million = 2.2% of the current fleet)

USA light-duty fleet 2030:

Total: 300 million
EV share by S&P EV 2030 sales forecast scenarios:

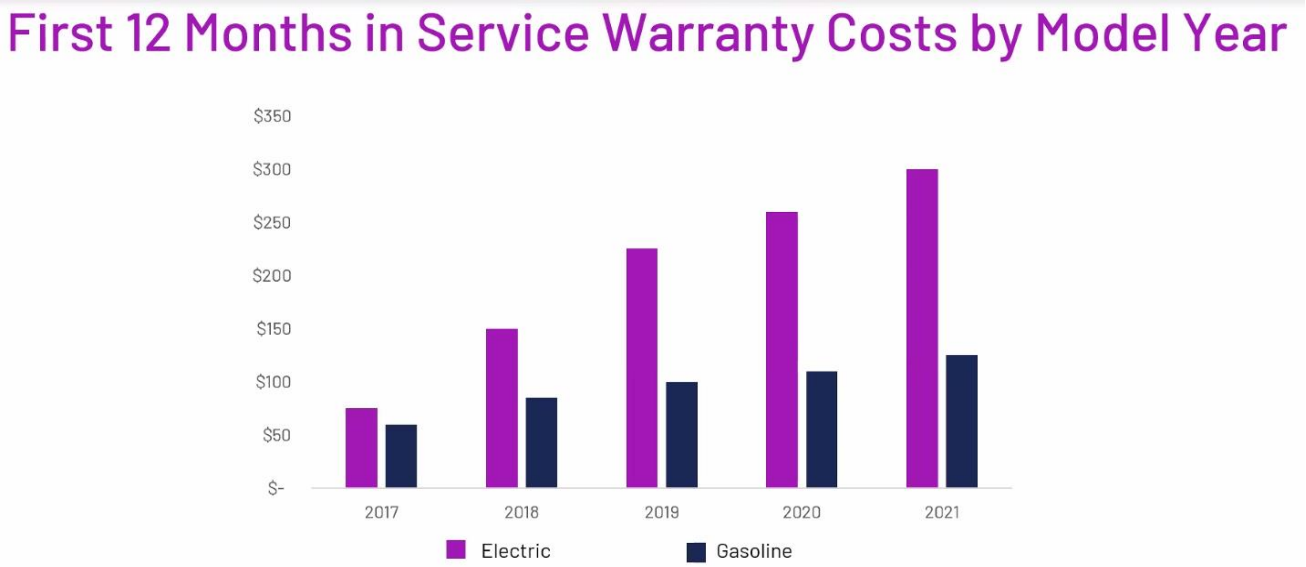
Conservative @ 20%	17 mm UIO, or	**5.7%**
Mid-range @ 34%	25 mm UIO, or	**8.3%**
Aggressive @ 50%	37 mm UIO, or	**12.3%**

SOME REASONS FOR HASTE

1. **This is your business to lose: high retention rates could erode**
2. **The independent after-market is already moving**
3. **Action helps defuse the "only direct sellers care about the planet" slander**
4. **EVs will be a higher percentage of newer cars, on which dealers thrive**

When will we have to deal with it? (short term)

INTRIGUINGLY, SOME DATA SHOW *NO* DECLINE SO FAR IN SERVICE FOR EV vs. ICE – AND IT IS NOT JUST WARRANTY



Source: WarrCloud, dealer group X, Cox Automotive, Mitchell, Group 1

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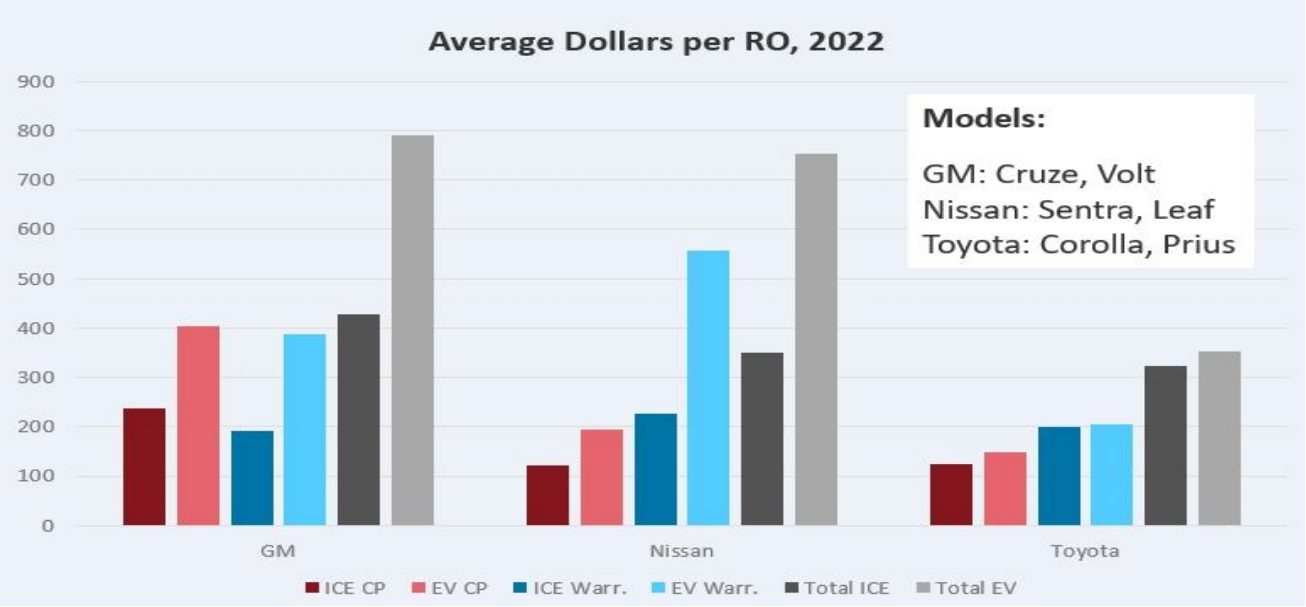

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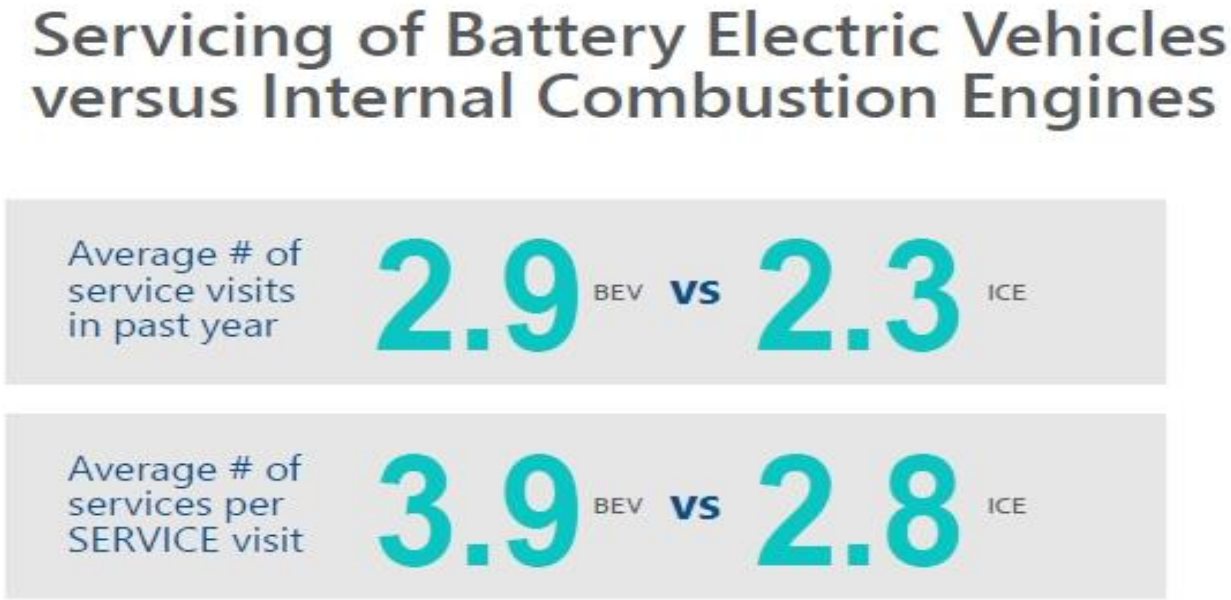

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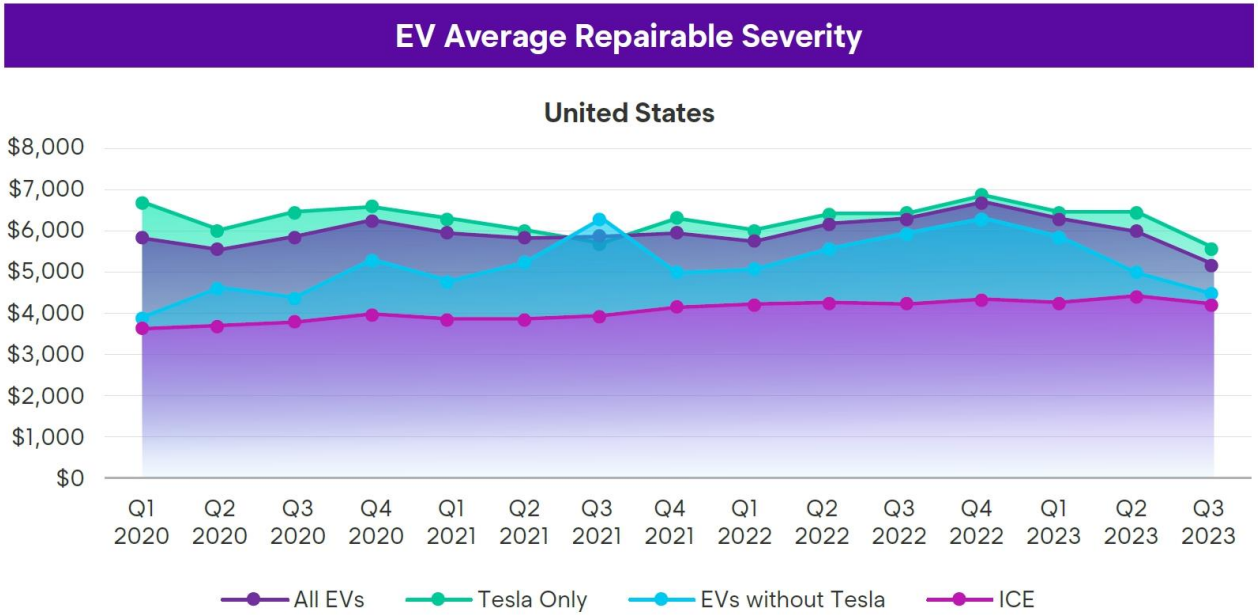

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When will we have to deal with it? (short term)

INTRIGUINGLY, SOME DATA SHOW *NO* DECLINE SO FAR IN SERVICE FOR EV vs. ICE – AND IT IS NOT JUST WARRANTY

Battery Electric Vehicle Parts and Service Outlook

Our dealerships are equipped to service all powertrain types

According to Edmunds.com
5-year repair and maintenance cost of ownership

2023 Audi
e-tron (EV)
$8,554

vs.

2023 Audi
Q5 (ICE)
$8,478

BEVs still require repairs and maintenance, despite not needing some common low-margin maintenance services such as oil changes.

Group 1's analysis shows that we generate **more revenue per repair order** for vehicles with alternative powertrains.

As vehicle complexity continues to increase, it becomes more difficult for do-it-yourself and independent service shops to compete against franchised dealers who have the **capital, special tools, training, and software access** to make more complicated repairs.

Source: WarrCloud, dealer group X, Cox Automotive, Mitchell, Group 1

How can we best deal with it?

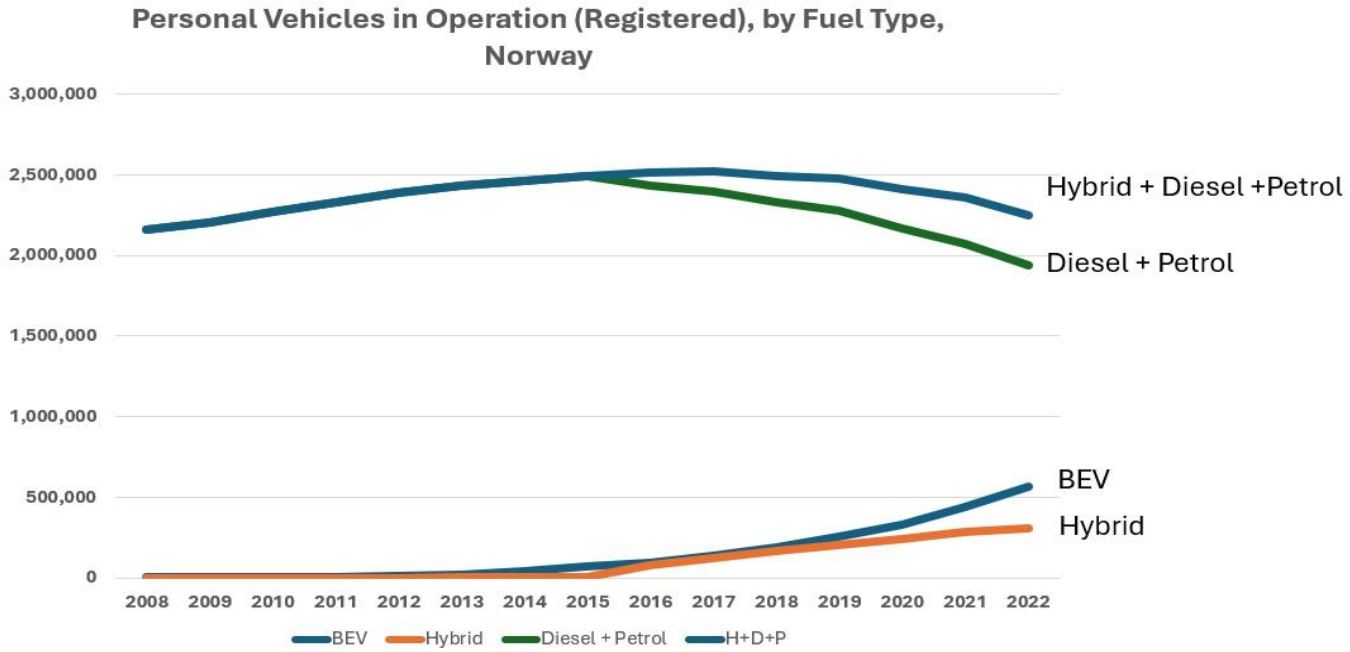
ADVICE FROM SCANDINAVIAN DEALER MöLLER BIL, WHOSE NORWEGIAN SALES ARE >85% BEV.

“We are living today your future.”

- Sell tire contracts: EV **tires** last 20% less than ICE tires and cost 200-400 € more per set.
- Consider **collision repair**: EVs cost 25% more on average than ICE to fix. [source: CCC]
- Aggressively **sell the expertise** gap between dealer and independents (e.g., voltages).
- Expand **F&I** (especially I) offers: EV buyers are concerned to protect their investment.
- It is time to move into service for **older cars** than you are usually comfortable with.
- Get started on equipment acquisition and technician **training**, of course.

About Norway….

IT TAKES A LONG TIME FOR THE FLEET TO CONVERT, EVEN HERE



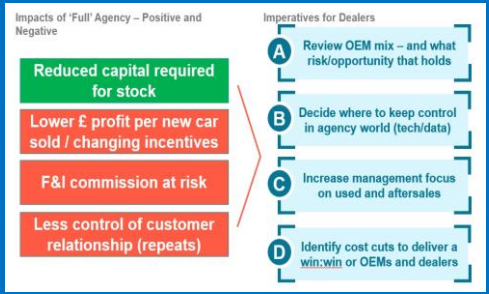
Source: Statistics Norway

What happens if we do not address it?

THE INDEPENDENT AFTERMARKET (WHICH ALREADY HAS A 70% SHARE OF SERVICE) IS NOW TARGETING EVs.

Included in the NxtGen Bumper to Bumper Option

- DC-1000 High Voltage Battery Discharger and Accessories
- NG Test Adapters
- Two Laptop Computers
    - Pre-loaded with required testing software for this Option



Comments on: Agency

CC1: Channel Change

- Yesterday: mostly a non-issue
  - Incumbent OEMs: almost entirely dealer-enabled
  - New entrant Tesla: NO! direct-to-customer (DTC)
- Today:
  - USA stable, globally OEMs try a third way, usually described as agency
  - Cited motives: to lower cost, to set prices, to connect to customers
- Tomorrow: implementation of hybrid/agency and DTC varies greatly
  - Varies by brand, market segment, country, etc.
  - Volume cars are sold, ∴ dealers; premium cars bought, ∴ h/a or DTC
  - Great and greatly varying regulatory and legal complexity by country

Two US views, from DeBoer and Penske

From the LAD Q4 2021 Earnings Call (edited for clarity, from audio transcript):

“Remember that franchise laws are state-by-state, so we believe any change is very slow. In Europe there is acceleration of agency, and we’ll see more about what those margins are as we move into 2023, 2024. But right now it seems front-end margins are between 6% and 10%. And some F&I is reduced under agency. But we know that one German OEM moving to agency elsewhere said that it isn't really on the

“To put it in perspective, we won’t see an agency model here in the US.”

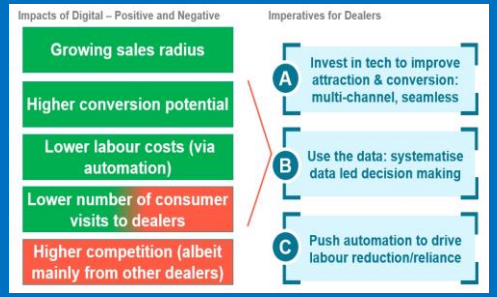
Roger Penske, Chairman & CEO, Penske Automotive Group

Second Quarter 2022 Earnings Call

I think we all hear this idea that the dealers are going to be disintermediated. I don't think most manufacturers think that way. If you think this is the start of DTC or this is the start of a total new channel, I don't believe that that's where it's at. … I think manufacturers have large challenges to be able to compete with new entrants like Tesla, that they have plenty to do rather than worry about [dealers] And it takes the [OEM/ dealer] partnership to be able to create competitive advantages over those DTC OEMs that do have some advantage today. And so, we definitely look at them as friends.”

Some thoughts on distribution channels

- **Across channel types (dealer/hybrid/DTC), average inherent cost/car is similar**
- **Cost/car varies more *within* a channel than the average varies *across* channels**
- **Cost variations are due mostly to conflating channels and OEM strategies:**
  - Choices made **upstream** of the channel: e.g., limited product lines, build-to-order production, high or low advertising spend -- all are choices that can be made for any channel
  - Choices made in channel **design**: e.g., size of store, service level (thus staffing), physical store specifications – all are choices not inherent in the selection of channel
- **The full picture must include not just costs incurred, but value generated, e.g.:**
  - A mass-market ***push*** OEM will likely prefer the dealer channel, as dealers have more tools and motivations to "get the car sold" than do centralized systems
  - A premium ***pull*** OEM may prefer DTC for direct contact with customers
  - A *new entrant* to a market may prefer to use dealers, for superior local knowledge, and speed.
- **Past OEM efforts in agency and DTC haven't worked out well. What's different now?**
  - Expectations are that advanced IT will compensate for human skill gaps
  - "All I have to do to become an agent is *forget* everything I know. All the OEM has to do is *learn* everything I once knew."
- **Agency is by no means "all bad" for dealers: the devil is in the details.**
- **OEM control slowly but steadily increases for the average small dealer, regardless of channel**



Comments on: Digitization (excuse me, digitisation!)

Thoughts on digitization in the USA

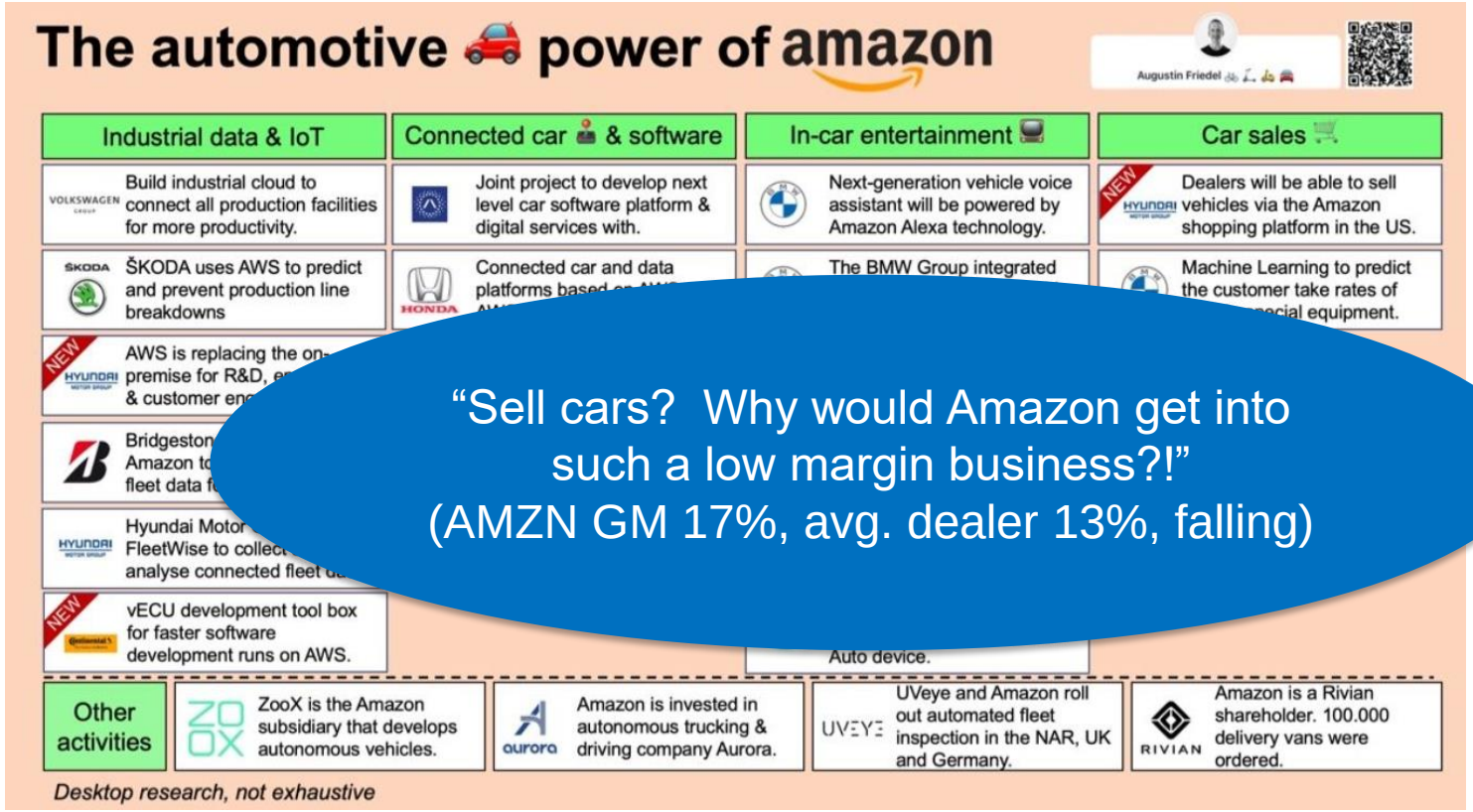
NB: VENDORS (E.G. AUTOTRADER) AND CONSULTANTS (E.G. OCC) HAVE GREATER DEPTH HERE THAN I DO!

- **The DMS duopoly persists.** Market shares shift, but the two remain jointly dominant. There are consequences for the rate of innovation, and cost. The long-awaited arrival of a “white knight” has been repeatedly put off (until recently?). Could be a result of market structure, or of relatively high complexity of automotive retail (no Shopify here…)
- Vendor market is very active but dominated by many, **many me-too products** (often looking as much to get bought as to grow sales).
- Dealers have an average of **20-40 IT vendors per store group**. Their pursuit of the “next shiny thing” must end.
- **The promise of a full online transaction** (with driveway delivery) has been often promised, but never really delivered. Is the issue demand (consumers want offline transactions? If so, why?) or supply (no one has truly cracked the incredibly complex code yet)? Amazon/Hyundai may provide a way forward

Personal take on Hyundai/Amazon

- Amazon's getting into car sales has been speculated on for years (e.g., Banks Report 8/28/2016), but to date, no *real* movement has been seen. Too much work and risk for too little *return*?
- My take on Hyundai/Amazon:
  - Early days, wait and see. And talk to a dealer for the real story.
  - Many open issues (e.g., trade-in, F&I, dealer/dealer trades, test drives…)
  - Likely effectively "one price" (Amazon caps upside, Hyundai downside?), but internet has been narrowing price bands for years anyway
  - Net, just another way for dealers to reach customers? (See Costco, Ford AXZ, Credit Unions, AutoTrader, eBayMotors….)
  - Potential bonus: erodes the argument of "DTC superior to dealers" by giving dealers what seems to customers to be a Amazon-enabled DTC experience.

Worried about Amazon itself selling cars?



"Sell cars? Why would Amazon get into such a low margin business?!"
(AMZN GM 17%, avg. dealer 13%, falling)

Further out:

Connected Car

Autonomous Vehicles

Subscriptions

Further out:

- *Connected car*
- AV
- Subscriptions
- Mobility Services

CC2: Connected Car

- Yesterday: aka “telematics”
  - Immature technology (connectivity limited, software unreliable)
  - Tech firms seized all 3 major CC revenue streams: phone (calls/texts), music (streaming), navigation (maps)
  - OEMs adamant this must not happen again
- Today: connectivity ubiquitous, apps mature (e.g., Android Auto)
- Tomorrow: OEMs push CC features aggressively:
  - Seeking enormous recurring revenues
  - Hoping customers will pay - and OEMs will not compete all profits away
  - Will OEMs fairly share CC revenue with dealers “on the front line”?

OEMs hope for billions, but will customers pay?

Connected Car Values: Cost Savings & Revenue Potential		
What has value?	**Data to/from car: Value/Car/Year**	**Driver/Owner: Value/Car/Year**
Remote diagnostics	• OEM: $100-$200 (lifetime)	• Maintenance: $50+; Resale value: +10%
ACN or eCall	• First responder value	• Lower medical cost → life saving
Stolen vehicle tracking	• TSP subscription: $20-$50	• Up to value of car; insurance discount
Remote control functions	• TSP subscription: $10-$20	• Convenience & time savings
Telematics data plans & Wi-Fi	• TSP subscription: $50-$150	• Content, convenience & time savings
OTA software update	• OEM: $50-$100 vs. dealer update	• Convenience & time savings
Functional software update	• OEM: $50 -$3,000+	• Better car; longer useful life, resale value
Cybersecurity protection	• Supplier fees: $10-$20	• Safer car; Personal data protection
Cybersecurity: Attack prevention	• OEM: 100s of $M per event	• No loss of car use
Entertainment content	• Service usage: $20-$60	• Convenience & variety
Cloud-information	• Service usage: $10-$50	• Convenience & variety; $20-$50
Driver's driving data (UBI)	• OEM: $10-15; Insurance: $25-$40	• 10%-15% of insurance fee; Better driver
Navigation & LBS functions	• Service usage: $20-$50	• Time savings; Cost savings: $50-$100
Car speed & location	• Traffic Info supplier: $1-$2	• Free traffic information; Time savings
Location tracking: E-commerce	• Service usage: $10-$30	• Convenience; Cost savings: $10-$50
Marketplace service	• OEM-TSP commission: $20-$40	• Convenience; Cost savings: $20-$100
ACN=Automatic Collision Notification; LBS=Location Based Services; OTA=Over-the-Air; TSP=Telematics Service Provider		

Source: Egil Juliussen

OEMs hope for billions, but will customers pay?

"...if we fast-forward 10 years, the software, services, subscriptions, and other adjacent businesses... will be equal or greater than what we'll have from selling the vehicle."
Mary Barra (Chair and Chief Executive Officer, General Motors)

"By 2030, 20% of our [VW Group] revenue will be related to subscriptions and mobility services"
Michael Wintergerst (Executive Vice President, Vehicle & Cloud Platform CARIAD, a Volkswagen Group Company)

"This new business unit [Mobilize] aims at developing new profit pools from data, mobility, and energy-related services... to generate more than 20% of group revenues by 2030."
Luca de Meo (Chief Executive Officer, Groupe Renault)

"Our new high-margin software business will reach 4 billion Euros of revenues by 2026 and 20 billion Euros by 2030."
Carlos Tavares (Chief Executive Officer, Stellantis)

OEMs hope for billions, but will customers pay?

Yes: customers are familiar with paying for subscriptions of all kinds (e.g., Netflix)

No: customers will only pay for "above and beyond" car-related services (e.g., UBI)… and OEMs will likely "compete away" much of the revenue anyway

Further out:

Connected Car

Autonomous Vehicles

Subscriptions

Further out:

- Connected car
- *AV*
- Subscriptions
- Mobility Services

AV: Autonomous Vehicles

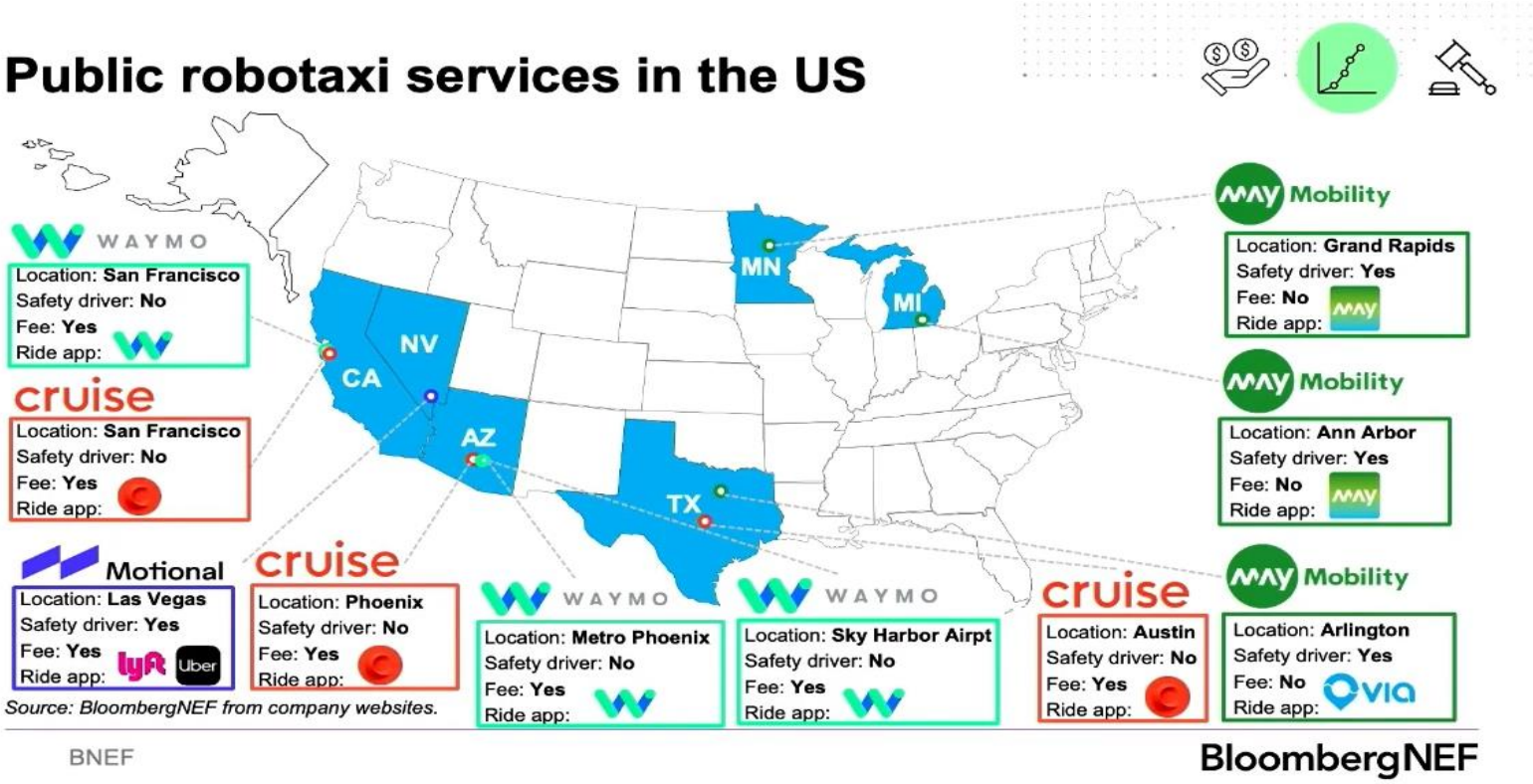
- Yesterday: Why own a car?
  - In 2012, Sergey Brin, co-founder of Google, says: “You'll ride in robot cars within 5 years.” (CNET)
- Today: Waymo works, but loses $; Tesla doesn’t work, but makes $
- Tomorrow: Slow but steady growth:
  - High-functionality AV robotaxis gain ground vs. taxis, ridehail – at what cost?
  - Medium-functionality AVs become options for (premium) personal ownership
  - Low-functionality ADAS becomes ubiquitous for all

AV: Autonomous Vehicles

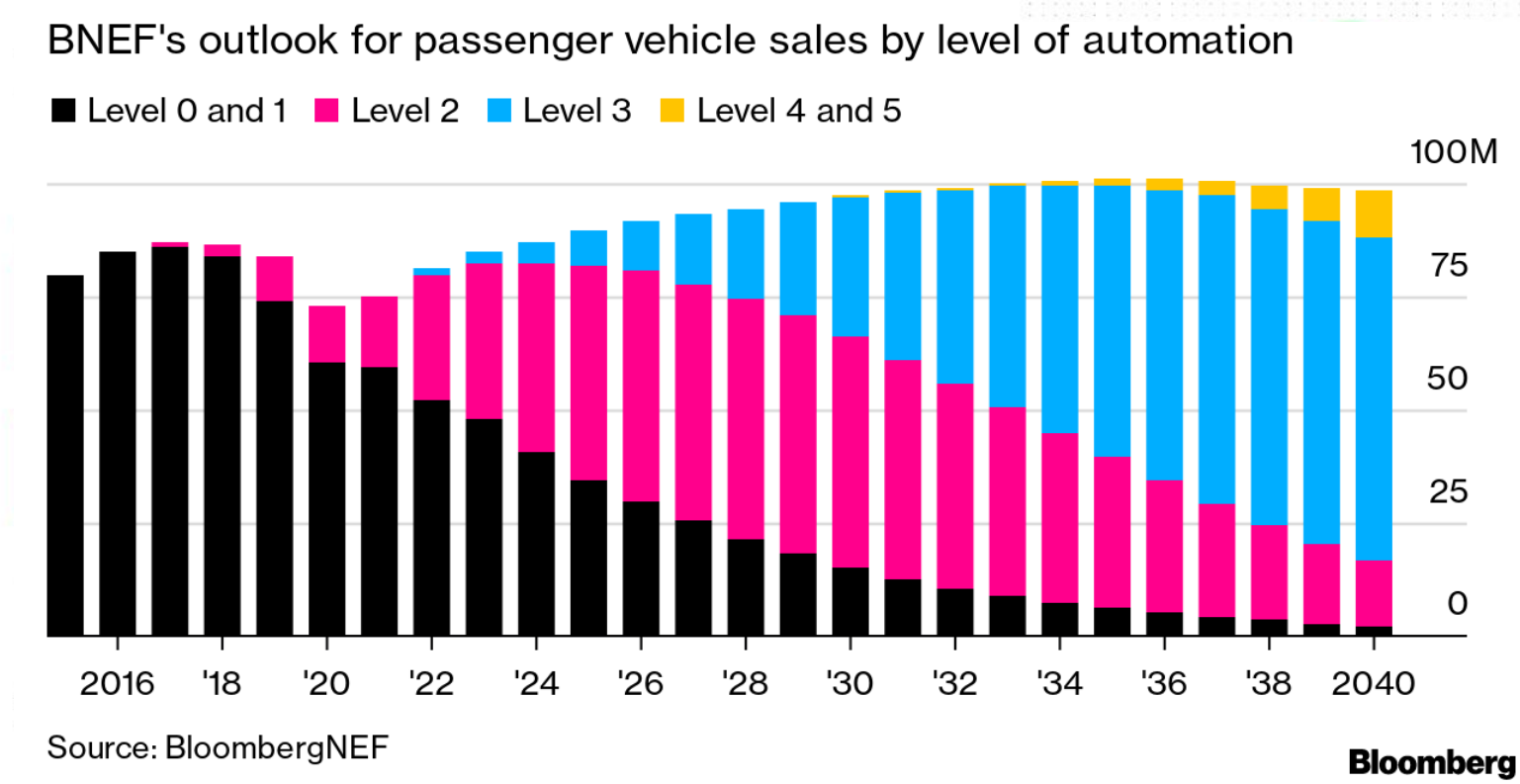
FORECASTS: http://www.driverless-future.com/?page_id=384 March 27, 2017

NVIDIA to introduce level-4 enabling system by **2018** *(2017)*
NuTonomy to provide self-driving taxi services in Singapore by **2018**, expand to 10 cities around world by **2020** *(2016)*
Delphi and MobilEye to provide off-the-shelf self-driving system by **2019** *(2016)*
Ford CEO announces fully autonomous vehicles for mobility services by **2021** *(2016)*
Volkswagen expects first self driving cars on the market by **2019** *(2016)*
GM: Autonomous cars could be deployed by **2020** or sooner *(2016)*
BMW to launch autonomous iNext in **2021** *(2016)*
Ford's head of product development: autonomous vehicle on the market by **2020** *(2016)*
Baidu's Chief Scientist expects large number of self-driving cars on the road by **2019** *(2016)*
First autonomous Toyota to be available in **2020** *(2015)*
Elon Musk now expects first fully autonomous Tesla by **2018**, approved by **2021** *(2015)*
US Sec Trans: Driverless cars will be in use all over the world by **2025** *(2015)*
Uber fleet to be driverless by **2030** *(2015)*
Ford CEO expects fully autonomous cars by **2020** *(2015)*
Next generation Audi A8 capable of fully autonomous driving in **2017** *(2014)*
Jaguar and Land-Rover to provide fully autonomous cars by **2024** says Director of Research and Technology *(2014)*
Fully autonomous vehicles could be ready by **2025**, predicts Daimler chairman *(2014)*
Nissan to provide fully autonomous vehicles by **2020** *(2013)*
Truly autonomous cars to populate roads by **2028-2032** estimates insurance think tank executive *(2013)*
Continental to make fully autonomous driving a reality by **2025** *(2012)*

AV: Autonomous Vehicles



AV: Autonomous Vehicles



Further out:

Connected Car

Autonomous Vehicles

Subscriptions

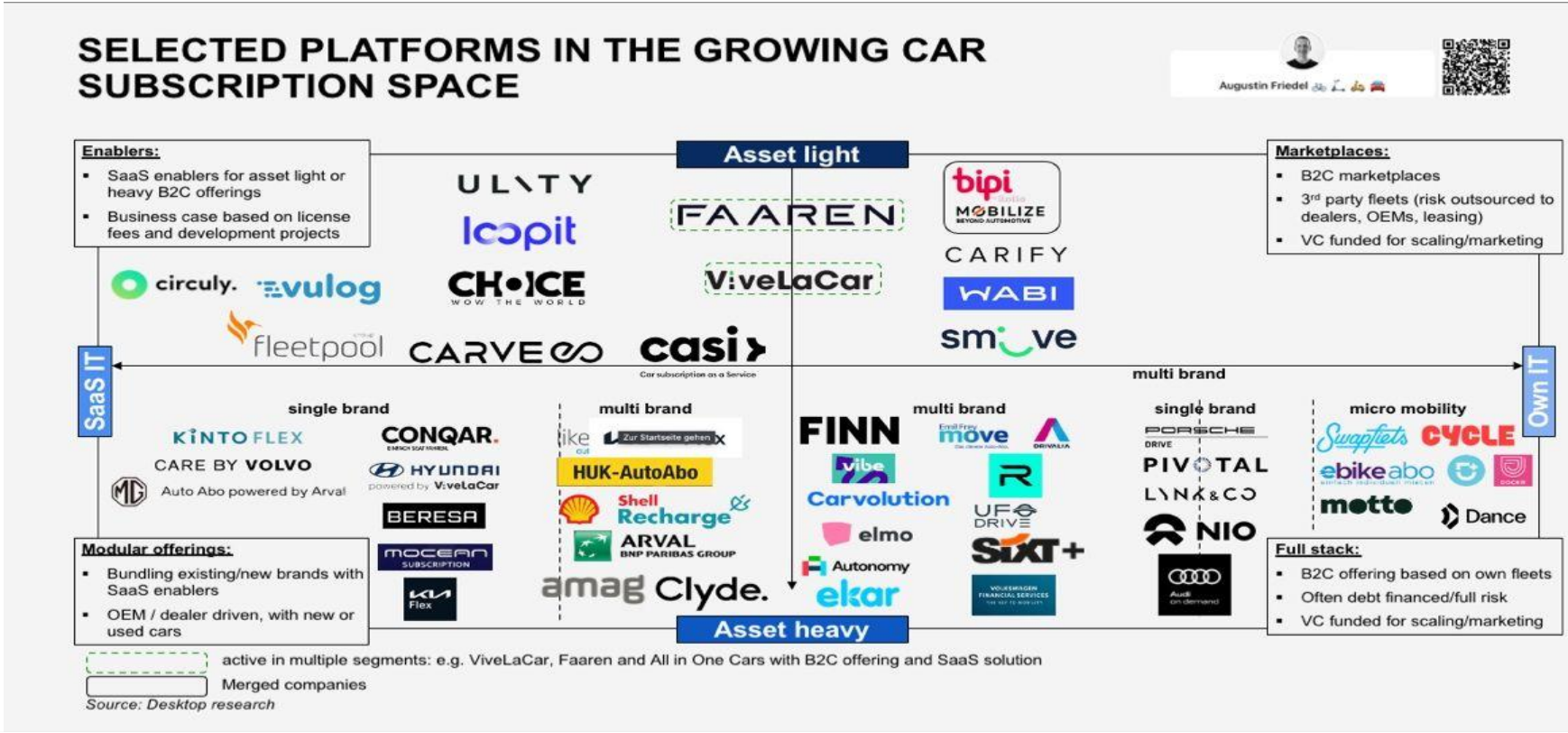
Further out:

- Connected car
- AV
- *Subscriptions*
- Mobility Services

Next up: micromobility, subscriptions again?

- Micromobility (vehicles < 1,000 pounds?) emerges as an alternative to car use (bikes, ebikes, scooters, NEVs, etc.), waxes and wanes
- Subscriptions (ownership < 1 year?) emerges as an alternative to car ownership (via dealers, OEMs, 3rd parties, etc.), mostly in Europe. In the USA mostly stalled:
  - Sticker shock (due in part to insurance practices) is a real problem.
  - With average American household owning ~2.5 cars, ability to swap is not highly valued
  - May make sense as a marketing tool (e.g., Porsche)

Next up: micromobility, subscriptions again?



Further out:

Connected Car

Autonomous Vehicles

Subscriptions

Further out?

- Connected car
- AV
- Subscriptions
- *Mobility Services*

MS: Mobility Services (ridehail mostly)

- Yesterday: Why own a car?
  - “Uber CEO Kalanick says car ownership is becoming passé: ‘Millennials aren't buying cars anymore. They don't want to drive. They don't want to own cars. They don't want that inconvenience.’“ – 2017 (Newsweek)
- Today: Uber weekly trips < 0.5% of personal car trips (Uber, 2022)
- Tomorrow: Just one more ~~transportation~~ mobility service, like:
  - Rental cars (Hertz was founded in 1918)
  - Plane travel
  - Mass transit

Zhang & Li meta-study

MS: Mobility Services (ridehail mostly)

"Vehicles available" per household

Metro Area	2005	2015	2022	2022-2005
Boston Cambridge Quincy	1.58	1.60	1.61	+0.03
Chicago Naperville Elgin	1.64	1.63	1.63	-0.01
San Francisco Oakland Fremont	1.69	1.73	1.75	+0.06
Los Angeles Long Beach Anaheim	1.81	1.84	1.87	+0.06
New York City Newark Jersey City	1.23	1.25	1.22	-0.01
Dallas Fort Worth Arlington	1.81	1.88	1.91	+0.10

Source: Table B08201, American Community Survey (1-year estimates), Census Bureau

MS: Mobility Services (ridehail mostly)

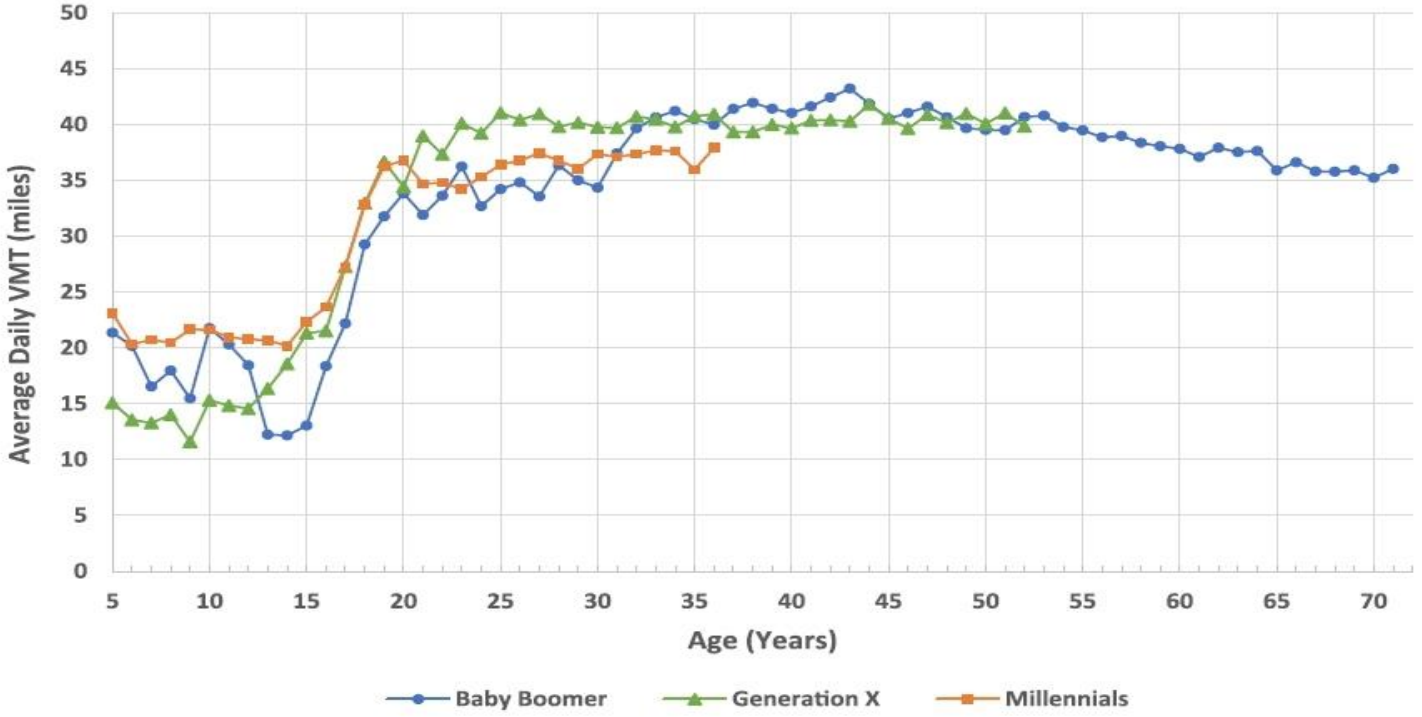


Fig. 1. Average Daily VMT by Baby Boomers (ages 5–71), Generation X (ages 5–52), and Millennials (ages 5–36).

Not to mention…

- Software-defined vehicle
- AI AI AI
- China

The software-defined vehicle

The concept of an SDV involves using software (S/W) to control and manage various vehicle functions.

Three main features of an SDV are:

1. **Modular** architecture: The vehicle's systems in effect can be “snapped” in and out, like Legos.
2. **Over-the-air** (OTA) updates: Software updates are delivered wirelessly.
3. Features enabled by **software**: the SDV adds feature via S/W (e.g. ADAS), less by hardware & retooling.

Three main benefits of using a SDV are:

1. **Customization**: SDVs are easily customized to specific customer needs, optimizing price, and at low cost
2. Improved customer **value**: SDVs can continuously optimize vehicle functions (e.g. improved ADAS algorithms)
3. Lower car **cost**: changes to the car are mostly by software changes, not hardware retooling

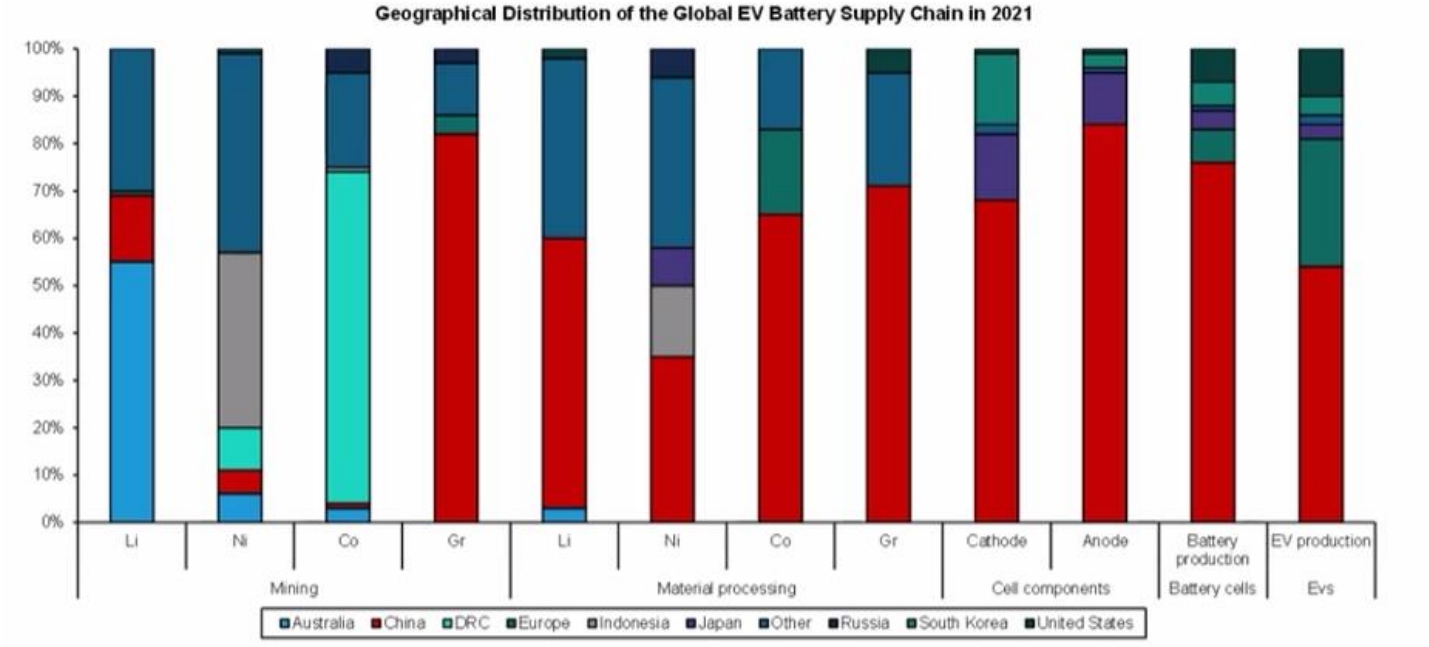
Source: generated by ChatGPT. Heavily edited by a human. Thanks, robot overlord!

AI AI AI

1. **Customer Service: AI-powered chatbots and virtual assistants can handle customer inquiries, provide information about vehicle features and pricing, schedule test drives, and even assist with the financing process. These AI tools can improve response times, provide 24/7 support, and enhance the overall customer experience.**
2. **Sales and Marketing: AI can analyze customer data to identify patterns and preferences, enabling dealerships to target potential buyers more effectively. AI can also assist in lead scoring and predictive analytics, helping sales teams prioritize leads with the highest likelihood of conversion.**
3. **Inventory Management: AI can optimize inventory by analyzing historical sales data, market trends, and customer preferences to forecast demand and recommend inventory levels for specific vehicle models. This can help dealerships reduce overstocking and understocking.**
4. **Predictive Maintenance: AI can be used to analyze vehicle data and predict when maintenance or repairs will be needed. This proactive approach can help dealerships offer maintenance services to customers at the right time, improving customer satisfaction and retention.**
5. **Autonomous Vehicles: As autonomous vehicles become more prevalent, AI will play a crucial role in managing and servicing these vehicles. Dealerships will need AI-powered diagnostic and maintenance tools to support the advanced technology in autonomous vehicles.**

China. Not just as battery supplier…

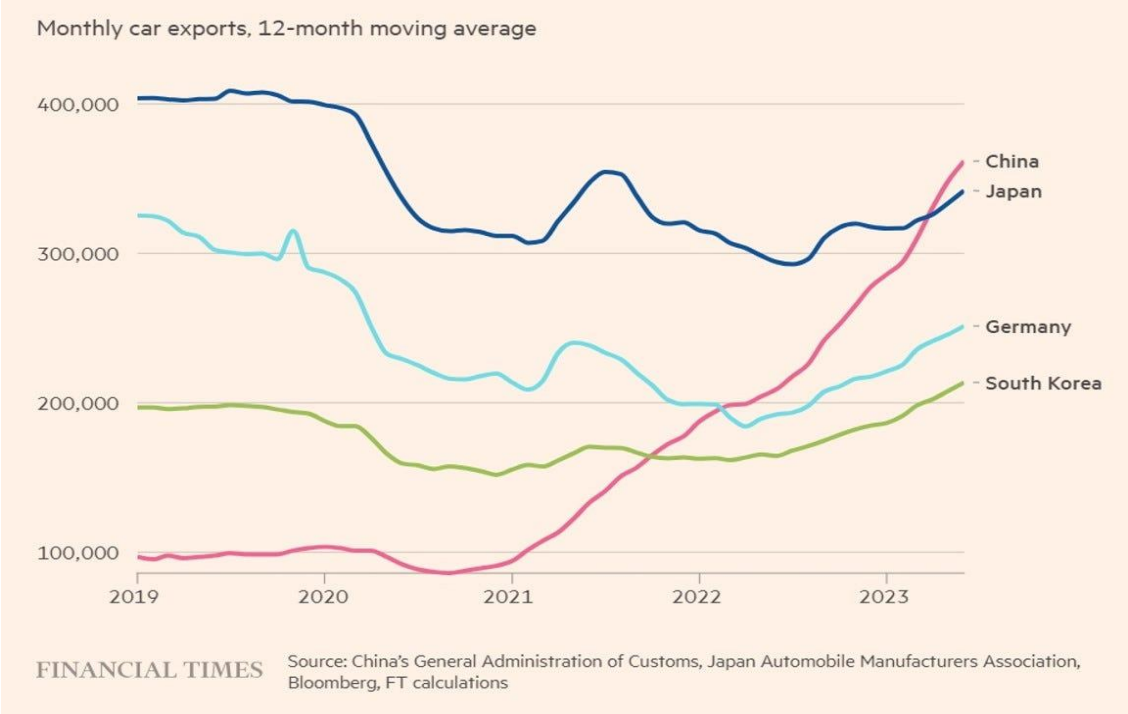
The PRC as battery materials choke point is well-known



Source: Alliance Bernstein

… but as car exporter

Domestic EV & ICE overcapacity is driving it to export



It’s not like we weren’t warned!

In **May 2015, China released the 10-year 'Made in China 2025' action plan** to upgrade production in prioritized sectors by fostering Chinese brands ... The NEV (New Energy Vehicle, which includes BEV, PHEV, and FCEV) sector was one of 10 sectors identified by the central government where China aims to become a dominant global player.

- **Specifically, the government set targets for sales of 1 mm NEVs by 2020** (70% from domestic firms) and 3 mm by 2025 (80% from domestic firms).
- Domestic models were to be in the top 10 by 2020 and domestic OEMs in the top 10 NEV producers by 2025.
- These were very ambitious targets for a new car type with an alternative source of propulsion, as sales of NEVs were only 50,000 in 2014. **[NEV sales in China in 2020: 1.4 mm]**
- The plan identified low emissions (high fuel efficiency and electrification), digitization, connectivity, and autonomous driving as the most feasible ways to meet these goals.

Source: ‘Made in China 2025': the development of a new energy vehicle industry in China," by G. Yeung, 2018

What is the Chinese EV advantage? Cost.

Example: BYD Seal vs. VW ID.3

The Seal is comparable to the VW, but costs $11,000 less to make.

The $11K breakdown: $3K powertrain, $4K components, $2K DDA, and $2K labor

Drivers of the lower Chinese costs:

- Global designs built UP from simple Chinese specs, not DOWN from global specs
- Leveraging the low-cost China supply base
- High level of component integration
- Low part complexity (via simple designs) save, directly, part costs and, indirectly, material costs (due to typically lighter weight)
- Non-key parts are bought "off the shelf," key parts made in vertically integrated manufacturing plants

Source: A2MAC1, via UBS

And they may change the basis of competition: BYD

- AI voice assistant: The voice assistant is more intelligent and user-friendly as it now gets empowered by Xuanji AI model. Apart from following the voice commands of navigating sunscreens, windows, audios, air conditioners etc., it is able to handle multiple orders at the same time and recognize orders given by different passengers. It also supports multi-car communication and allows for direct voice messaging among BYD cars. (Exhibit 7)

- Vehicle-mounted drone: The world's first vehicle-integrated unmanned aircraft system (UAS) is developed in collaboration with DJI. The drone can take off, land, and get batteries swapped automatically. It also supports HD image transmission with low latency and high frame rate. Drivers can get aerial views when driving and even create their AI-edited travel video with one click. (Exhibit 8)

- Palm key: This vehicle unlocking technology can unlock with a simple hand gesture in 8-20cm distance from the B pillar of car body. With this function, a driver doesn't need to carry a car key or a smartphone with them to unlock the car. (Exhibit 9)

- Center console screen with a lift-up camera: The in-car camera can hide itself into the large touch screen on the center console so that users don't have to worry about any privacy issues (i.e. the camera gets automatically on). The camera will support live video call when lifted.

- Steering decoupling technology: Playing racing games in the car will no longer wear out the tires. The damping motor can simulate a realistic feel, turning the intelligent cabin into an e-sports gaming space. (Exhibit 10)

- Full-scene vehicle satellite communication: When driving off-road or in areas with no signal, satellite communication can be used to make calls and send/receive messages. It also supports map tracking and guides for the return journey.

Source: Bernstein, 1/22/2024

Summary

- *The* issue: how fast do we regress to the (pre-pandemic) mean?
- EV: - evolving from *buying* to *selling*; + aftersales less worrisome than we feared
- Agency: + only “stealth” agency likely in the US; - OEM control grows anyway
- Digitisation: - spending remains high, results remain underwhelming?
- Connected car: + tech works; - but does the business?; - and will dealers be cut out?
- AVs: + no robotaxi Carmageddon; + personal AV upside?
- Micromobility, subscriptions: minimal impact in the USA… for now
- Mobility services: + “Uber everywhere” Carmageddon
- SDV and AI: Vast Potential, but we’ve seen Vast Potentials evaporate before
- China: in the US, a political rather than economic issue