DOT II: USA CAR DEALERS
PREPARE FOR CHANGE

PART 2: OUTSIDE THE STORE

A report to NADA
By Glenn Mercer

Presented at:
The 2020 NADA Show
THE FUTURE “OUTSIDE” THE STORE

In this section we now add back in the 4 topics set aside in the first section and reassess the outlook for franchised new-car dealers. In discussing these so-called ACES topics, we will focus only on the implications for dealers, leaving aside broader questions about the impact on society, OEMs, cities, etc. Taking these in turn from lowest to highest potential dealer impact, we cover:

- C: CC – Connected Car
- E: EV – Electric Vehicles
- A: AV – Autonomous Vehicles
- S: MS – (“Shared”) Mobility Services
Definition: A car equipped with Internet access, and usually also with a wireless local area network. This allows the car to share internet access, and hence data (e.g. media, maps), with other devices both inside as well as outside the vehicle.

Forecast: Rapid penetration, from ~50% of NC sales today to ~100% by 2025. Known technologies easy to add to the car at fairly low cost. No change to our prior forecast.

Business model: Unclear at present. Services may be highly redundant to the phone, their value is uncertain, customer WTP (willingness to pay) likely low. Fully unlocking CC value may require AV (autonomous vehicle) operation.

Impact on dealers: Modest but mixed. CC can tie the vehicle closer to the dealer, but CC-enabled OTA (over-the-air) updates may siphon off some service revenue.
“OUTSIDE” FACTORS

SUMMARY

Connected Car: Minimal dealer impact, probably positive from tighter linkage of car to service bays, but to the extent OTA work is done w/o the dealer, possibly of concern.

Electric vehicles

Autonomous vehicles

“Shared” mobility services
Definition: EV is coming to mean only battery-only EV (BEV, e.g. Bolt) rather than BEV or PHEV (plug-in hybrid, e.g. Volt)

Forecast: Steady growth, as battery cost declines, charge points and vehicle offerings multiply, and ranges increase. Original forecast: 5% of 2025 sales; raised now to 6%.

Business model: EVs shifting from niche buyers (focused on “green,” HOV lane access, and status) to the mainstream. Yet expected future growth is mostly supply push: demand pull is problematic. USA adoption will lag that of EU and China (weaker subsidies, cheaper gasoline, preference for trucks).

Impact on dealers. No real sales impact (dealers will sell what buyers want), but eventually negative to service profit, due to lower annual service cost (~40% below ICE). This will be slow to emerge and may be offset by higher service retention.
EV: SUPPLY IS COMING STRONG...
BEV sales are up fivefold since 2013, while total “green” demand is up only about 15%. Are BEV buyers being conquered from ICE, or are they just rotating out of hybrids?

**BEV: GROWING? CANNIBALIZING? CONQUESTING?**

Sales of “Alternative” Powertrains, USA, in 000 units

First four months of 2020:
- Alt m/s 4.1%
- PEV m/s 2.2%
- BEV 1.8%

... BUT EV DEMAND SIGNALS ARE MIXED
American consumers are broadly unaware of what their EV options are.

It gets worse...
“OUTSIDE" FACTORS SUMMARY

Connected Car: Minimal dealer impact, probably positive from tighter linkage of car to service bays, but to the extent OTA work is down without the dealer, possibly worrying.

Electric Vehicles: No real impact on sales. Slow penetration expected; will accelerate. Eventual downside for service, but this is the dealer’s business to lose.

Autonomous Vehicles

“Shared” Mobility Services
Definition: Terminology varies, but at its core an AV can sense its
environment and move with reduced human input. A low-level (LL) AV
has minimal abilities (e.g. ACC), a high-level (HL) AV maximal (e.g.
passengers sleep while the car drives).

Forecast: LL AV: very rapid growth (100% of new sales by 2025)*; HL
AV: very slow (<10%). Uncertainty is high re rate of HL growth, but all
recent forecasts have been scaled back. Our updated forecast for HL
AV in the USA in 2025 is accordingly cut to 5%.

Business model: as a privately-owned vehicle an AV is just another set
of options. As a fleet-owned MS vehicle, an HL AV becomes a
“robotaxi,” which may displace private ownership (see MS section).

Impact on dealers: eventually possibly negative, but mixed. Short-
term: ADAS proliferation and complexity boost service revenue; mid-
term: personal AVs add sales (e.g. to the disabled and elderly), and
more service revenue due to increased VMT; long-term: robotaxis may
replace ownership with “permanent rental” (see MS section).

* LL (aka ADAS: advanced driver assistance systems) applications include Lane
Departure Warning, Adaptive Cruise Control, Lane Keeping, Driver Monitoring, ESC, etc.
The safety argument for HL AV may now be moot, given LL AV capabilities...

“Overall [NHTSA] estimates that, together, [four Level 2 advanced driver assist systems]... could potentially address nearly 89 percent of [ ] crashes....

NHTSA V2V Rulemaking Notice, at 3863
...thus triggering a pivot to an argument for convenience and cost ("robotaxis")

## ANNOUNCED MAJOR ROBOTAXI DEVELOPMENT PROGRAMS

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<td>Unknown</td>
<td>OEM customers</td>
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Source: Citi Research
But forecasts as to the arrival of HL AVs / robotaxis are divergent and uncertain...

- Rowe sees 100% penetration of AVs in America by 2050;
- Hars sees 90% of “all trips” by 2030;
- Litman sees 50% by 2040;
- Lux Research expects level 3 vehicles at 10% of sales by 2030;
- BCG sees level 4 at 10% by 2035;
- Navigant sees 75% before 2035;
- McKinsey (hedging nicely) has level 4 “up to 15%” of sales by 2035;
- IHS expects 600,000 AVs (level not clearly defined) on US roads by 2025;
- while Toyota doesn’t expect many level 4 cars at all before 2035;
- and UBS also thinks they will take more than a decade to hit the road in force.
... and have in recent months been dramatically scaled back.

“It’s time to lower expectations about autonomous vehicles.” Danny Shapiro, Nvidia. The Information, 1/11/2019

“Level 4/5 will have no more than 1% of global sales penetration by 2025.” Veoneer CEO Jan Carlson, February 2019

“Revenues from autonomous driving will not ramp up until 2030 and beyond. Until 2030, the market will be driven mainly by assistance systems.” Chief Executive of supplier Conti Elmar Degenhart (May 2019)

Uber CEO Dara Khosrowshahi: “The future of mobility is electric and autonomous, but the arrival of driverless robotaxis will be quite a few years beyond 2020.” (May 10, 2019)

“I’ve got some bad news for everybody: While we have the technology to build a self-driving car, you are still not going to be able to call a car. Driverless cars are still very, very immature technology.” Missy Cummings, Director, Human-Machine Systems Lab, MIT.

MIT’s Bryan Reimer: “The timeline we’ve been hearing is 2026. We’ll have driverless cars at a few hundred millions of $ of losses is not realistic.”

“The hype around driverless cars came crashing down.”

Anne Widera (ex-Waymo): “We are becoming more realistic re large volumes of L4/5... mid-2020s at the earliest. We need software that is capable, cars that are scalable, hardware that is cheap, and we are quite a few years away from all these.”
Connected Car: Minimal dealer impact, probably positive from tighter linkage of car to service bays, but to the extent OTA work is down without the dealer, possibly worrying.

Electric Vehicles: No real impact on sales. Slow penetration expected but may accelerate. Eventual downside for service, but this is dealers’ business to lose.

Autonomous Vehicles: ADAS grows rapidly, stimulating service and maybe sales. High-level AVs may be a more serious threat, but their arrival is likely to be delayed.

“Shared” Mobility Services
MOBILITY SERVICES

Definition: No good definition, but encompasses at least ridehail (Lyft), bikeshare (Ofo), e-scooters, carshare, rideshare, integration of cars with other transport modes (e.g. subways). In this report we focus on ridehail, as this is the MS most likely to have impact on dealers.

Forecast: Eventual penetration completely unknown: opinions rule, fact base still immature, growth is rapid, but from a very small base, and may already be maturing; behavior change (MS) harder to forecast than technology change (EV AV CC), business models multiply, but almost all are losing vast sums.

Business model: The core belief is that there is more money to be made in selling mobility as a service than in selling the car as a product.

Impact on dealers: As configured today (ridehail as taxi), no detectable impact on sales, and possibly a modest tail-wind to service. But if AVs and MS are linked up (as low-cost robotaxis), we enter a world of “eternal rental.” Implications are unclear but negative for dealers, as while VMT rises, sales shift from retail to wholesale/fleet, and service may also. Sales clearly fall only if rides are shared, not just hailed.
IS RIDEHAIL ALREADY MATURING?

FREQUENCY OF RIDE-HAILING USAGE – DELOITTE SURVEY

Source: Deloitte data are from 1/2017 and 1/2020
NO TO-DATE DETECTABLE IMPACT OF MS ON CAR OWNERSHIP OR DRIVER’S LICENSES

Source: Chapter 8, Transportation Energy Data Book, ORNL; Hedges & Company for 2019 LD est.; Experian for V/HH est.
FURTHER, NO VISIBLE IMPACT OF MS ON CAR OWNERSHIP IN CITIES, WHERE MS MAKE THE MOST SENSE (EXCEPT SF)

Note: Registrations are thought to exclude ridehail cars in most cities and are known to be excluded in NYCD data.
THERE ARE FACTORS TO CONSIDER BEYOND PURE CENTS/MILE COSTS

ADVANTAGES TO OWNERSHIP BEYOND PER-MILE COST

1. Convenience. More convenient to jump in your own conveyance and go where you want when you want. We value our time and our capriciousness.
2. Comfort. You can set up your car to cater to your tastes, interests, special needs and comfort settings. There are a lot of them in a modern vehicle and people like them.
3. Stuff. Many of us treat our car as a large purse. We have stuff available to meet occasional needs – like golf clubs or change or tools or shaving gear or make-up.
4. Individualization. Having your car as a statement of what kind of person you are can be a significant share of its value. Why does anyone ever buy a Jaguar?
5. Control. You can fix your costs of transportation with your own vehicle. If I have no other way to go, once I give up my car, it seems likely that whoever is controlling the other options can start overcharging or controlling for their interest rather than mine.
6. Privacy. I may wish to ride alone. I can keep my car clean – or not, as I want. I know my driver (me). Do I want every trip I take to be with other people’s germs?
7. Rural vs. Urban. Most MS only work well in relatively dense cities. Most of these plans seem to ignore most of the real estate in the country.
SHARING IS THE THREAT TO SALES, NOT JUST HAILING

The arithmetic shows that ridehail does not reduce car sales... rideshare does.

1. Assume 10 people drive 20K miles/year/person, for 10 years, in 10 cars that cover 20K miles per year, and wear out in 100K miles.
   - Total miles are 2 mm, thus 20 cars sold in 10 years, 10 every 5 yrs, cars last 10 yrs
2. Now assume “robotaxis” make travel so cheap people use them instead of buying cars. With low costs people travel more: 25K miles/year. Because the cars are utilized by more people, we need only 5 at one time, not 10. Cars still last 100K miles, but each car wears out in 2 years, due to higher usage.
   - Total miles are 2.5 mm, thus 25 cars sold, 5 sold every 2 years, for 10 yrs, cars last 2 yrs
3. NOW assume every trip is SHARED by on average 2 people: demand halves.
   - Total miles are still 2.5 million, but only 12.5 cars sold, over 10 years
"Carpools increased ridership 600K since 2010, following decades of decline. This was not enough to keep the mode from falling to 9% of the market in 2018 from 10% in 2017. There were 19 mm carpools in 1980, only 13.9 mm now."

Source: The New Geography, 10 3 2019
AND THEN... MICRO-MOBILITY SHOWED UP
INITIAL THOUGHTS ON MICRO-MOBILITY

- A contrast: in the developed world, people are flocking to scooters at staggeringly high rate (from an almost invisible starting point)... while in the developing world, people have been trying to ditch scooters for cars for the last several decades.

- The market is too fluid to make reliable predictions:
  - It is hard to discern the trend from the fad (Segway anyone?)
  - Seasonality may be a real problem outside the West Coast bubble
  - Multiple modes and models are contesting (owned scooters, shared scooters, docked bikes, dockless bikes, e-bikes)
  - There are vast regional differences (e.g. bikes already dominate in Holland, US bike lanes are scarce, European cobblestones kill scooters)

- Our initial view is that micro-mobility is complementary to car ownership, given limited use cases
NET: OUR MS FORECAST

TENTATIVE MS IMPACT FORECAST

- MS will continue steady but slow growth over the next decade.
- Vehicles/household number drops by about 10%, 0.2 vehicles, to 2.0. Our projected decline is modest because other factors will work in the opposite direction (e.g. increased suburbanization, increased wealth per capita).
- At 355 million in total population in 2030 (Census projections), and 160 million households (assuming a decline in household size due to an aging population), at 2.0 cars per household, our 2030 fleet is 320 million. We believe this is sufficient to let us maintain our steady-state annual new sales forecast at 17 million.
- Another factor propping up new sales is MS growth itself: arrival of ridehail in a given city tends to increase sales of new cars, as ridehail stimulates demand for incremental new trips, rather than replacing owned-car trips with hailed-car trips one-for-one.
"OUTSIDE" FACTORS

SUMMARY

Connected Car: Minimal dealer impact, probably positive from tighter linkage of car to service bays, but to the extent OTA work is down without the dealer, possibly worrying.

Electric Vehicles: No particular impact on sales. Slow penetration expected but may accelerate. Eventual downside for service, but this is dealers’ business to lose.

Autonomous Vehicles: ADAS grows rapidly, stimulating service and maybe sales. High-level AVs may be more of a threat, but their arrival is likely to be delayed.

“Shared” Mobility Services: minimal impact in the near term, but a significant – if today seemingly unlikely – threat in the longer run, robotaxis convert owners to renters.

Note: the challenges presented by three out of four of these topics (excluding only CC) are deemed to have lessened since the first DOT report.
BRIEF COVID UPDATE: ANYTHING DIFFERENT?

- Connected car: growth steady, use economics still murky
- Autonomy: low-level/ADAS marches on; high-level/self-driving slows due to ERD cost, performance challenges
- “Shared” aka mobility: ridehail collapses (germs), TNCs pivot to delivery (germs); scooters weak, but bikes strong; OEMs continue to endorse, but not necessarily act
- Electrification: (in the USA) OEMs slow launches but stay committed; cheap oil doesn’t help; market continues for now as “Tesla only;“ expect eventual recovery
AUTONOMY: HIGH-LEVEL AV PROGRESS SLOWS (ADAS KEEPS ON)

April 2020 state of AV forecasts from 2017

Red arrow = date has passed. Orange arrow = revised, to a later date
From Rodney Brooks, at MIT

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 (Next 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)
MOBILITY SERVICES: DEMAND RESETING?

As to their use of various mobility options are lifted (excerpts)

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