Deloitte.

Future of Automotive Sales and Aftersales

Impact of current industry trends on OEM revenues and profits until 2035

Euro5, China, Japan, United States

Preface

The global automotive industry is on the cusp of a monumental transformation.

Readers only need to glance at the headlines to see the grim future some are predicting for the industry.

Besides technological trends in the area of connected car, e-mobility, and autonomous driving, we can observe significantly changing customer preferences in terms of mobility usage and buying preferences.

Hardly any expert questions these developments, but what was missing from our perspective was a holistic understanding of what these trends really mean to the sales and aftersales business of an established original equipment manufacturer (OEM)– very concretely in terms of revenues and profits:

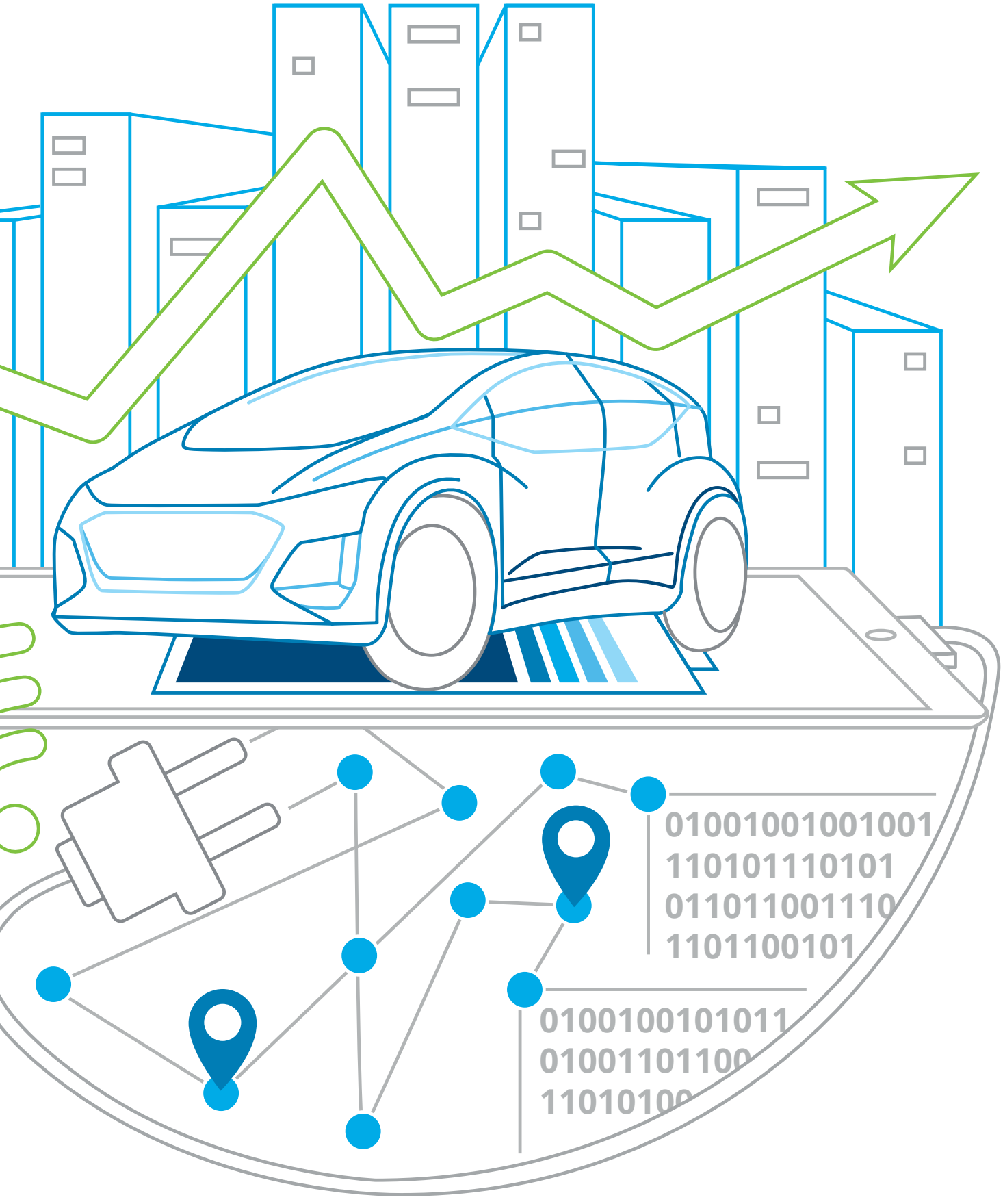
- How will trends affect traditional business segments, vehicle sales, and aftersales?
- What are opportunities and risks are involved with new business segments, such as mobility and connected services?
- When and how will these developments and trend effects differ across core markets?

The aim of this study is not only to create transparency and quantify the trend effects and opportunities, but also to provide strategies and approaches to navigate through these expectedly dynamic and challenging future years of transition.

Certainly important to mention is that this simulation was performed before the global COVID-19 pandemic; however, we do not expect the crisis to cost this study any validity. In fact, we expect some implications to arrive in the industry earlier and harder. Without wanting to anticipate any of the results at this point, we do expect, for example, that the pressure on the contribution margin we identified will affect OEMs even harder when revenues decline temporarily. We also have to assume that customer demand for omnichannel interaction will grow faster, as we observe a rapid digitalization of consumer behavior in many industries. Last but not least, we expect the momentum for transformation and consolidation that especially dealers and repair shops have already been facing before the COVID-19 pandemic to increase even more.

We hope that you will benefit from our insights and thoughts and derive value from our findings for your decision-making processes.

Dr. Thomas Schiller
Managing Partner | Clients & Industries
Deloitte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Introduction

Motivation for study

In these times of great uncertainty regarding future trends and their effect on current OEM business, this study was written to increase transparency for decision-makers.

In today's media landscape, there is much ambivalence about the industry trends expected to emerge. In addition, the opinions are too often narrowly cut–without considering all OEM business segments as a whole, and lacking a holistic treatment of industry trends and their impact on the OEM business.

What was also lacking was not only a qualitative, but also a quantitative analysis of trends' effects on OEM business that might help in making coherent decisions.

Aim of study

The aim of this study is to build a flexible quantitative model that allows us to simulate the impact of selected trends (within the technological, social, regulatory, macroeconomic, and competitive sphere) on OEM revenues and profits per business segment in different scenarios.

In that sense, we determined more than 500 revenue and profit levers that are analyzed both individually and interdependently. The whole study has been performed from an OEM perspective in order to make it more convenient for OEMs to evaluate trend effects, thus making it possible to adapt current models to individual OEM data and assumptions.

We believe that a truly nuanced approach to the future would never rely exclusively on a single possibility of trend emergence. For us, it is of utmost importance to create a framework that is valid for different future scenarios (which may be differently disrupted by industry trends) and for OEMs with different strategic directions. We therefore strive to provide a flexible approach that challenges one-sided assumptions and produces a multidimensional vision of the future.

Scope

In this edition of our study series, the geographic markets under consideration are China, the United States, Euro5, and Japan. The Euro5 market consists of Germany, France, the United Kingdom, Spain, and Italy. An extensive study version for Germany was already published in September 2019 and is available for download online.

With these markets, we estimate to cover around 70 percent of the global new car sales market volume in 2035. However, other markets can be flexibly integrated into the model.

In terms of products and services, our study will focus exclusively on passenger cars and services associated with passenger cars. We also factor in light commercial vehicles, but only in relation to autonomous mobility services like ride-pooling and robo-shuttles.

In terms of the time frame, we forecast industry trends and their effects up to 2035. In our analysis of emerging trends, it became evident that certain industry developments are expected to kick in between 2030 and 2035 in particular. We felt it was crucial to include this time span, especially in view of the massive transformation that OEMs urgently need to introduce in response to those trends.

Note: As mentioned in the preface, this simulation was performed before the global COVID-19 pandemic. We expect a shift in vehicle sales in the early 2020s, but no significant effect over the considered time span of 17 years until 2035. Besides, the OEM we are looking at serves as a proxy and represents a fictive average of a Chinese, US, Japanese, and European OEM (see the following chapter).

Study design

Figure 2. Overview of study design

1. Definition of a proxy OEM

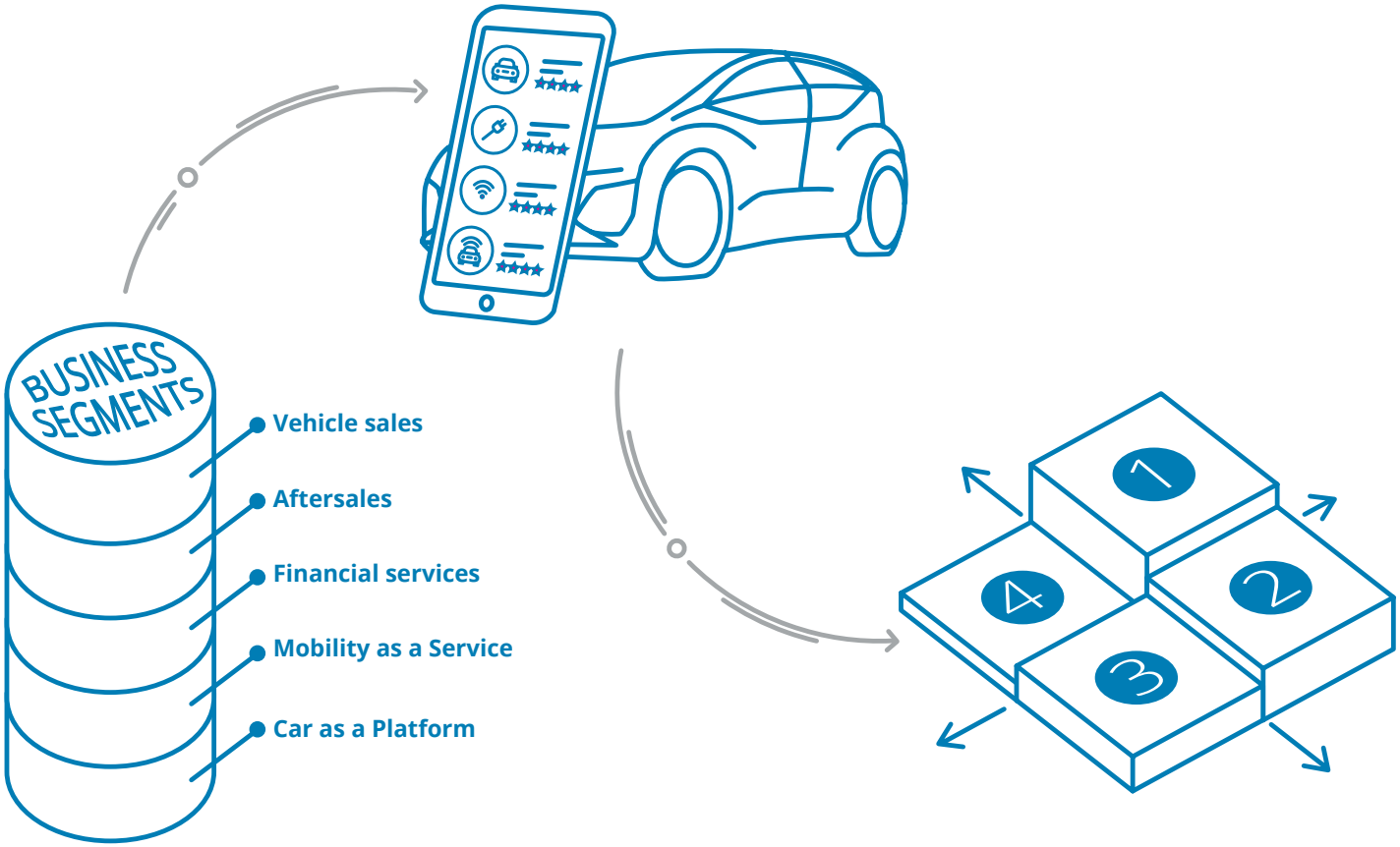
As a first step, we define an OEM to serve as a proxy in our models for the future of automotive sales and aftersales. We define an OEM by its business segments and classify its size and structure in terms of revenues, vehicle segment sales, geographic markets, and organizational setup.

2. Trend analysis and forecast of industry drivers

For each automotive industry trend, we forecast a base case and a disruptive case of trend emergence. This reflects different manifestations of consumer, business, technological, and regulatory forces and lays the foundation for a nuanced assessment of the trend effects.

3. Identification of "future states" as strategic option spaces

We present a differentiated perspective of future industry effects based on two scenarios of trend emergence. Beyond that, we distinguish between two degrees of future OEM dominance over the competitive landscape, resulting in four possible future states in 2035.

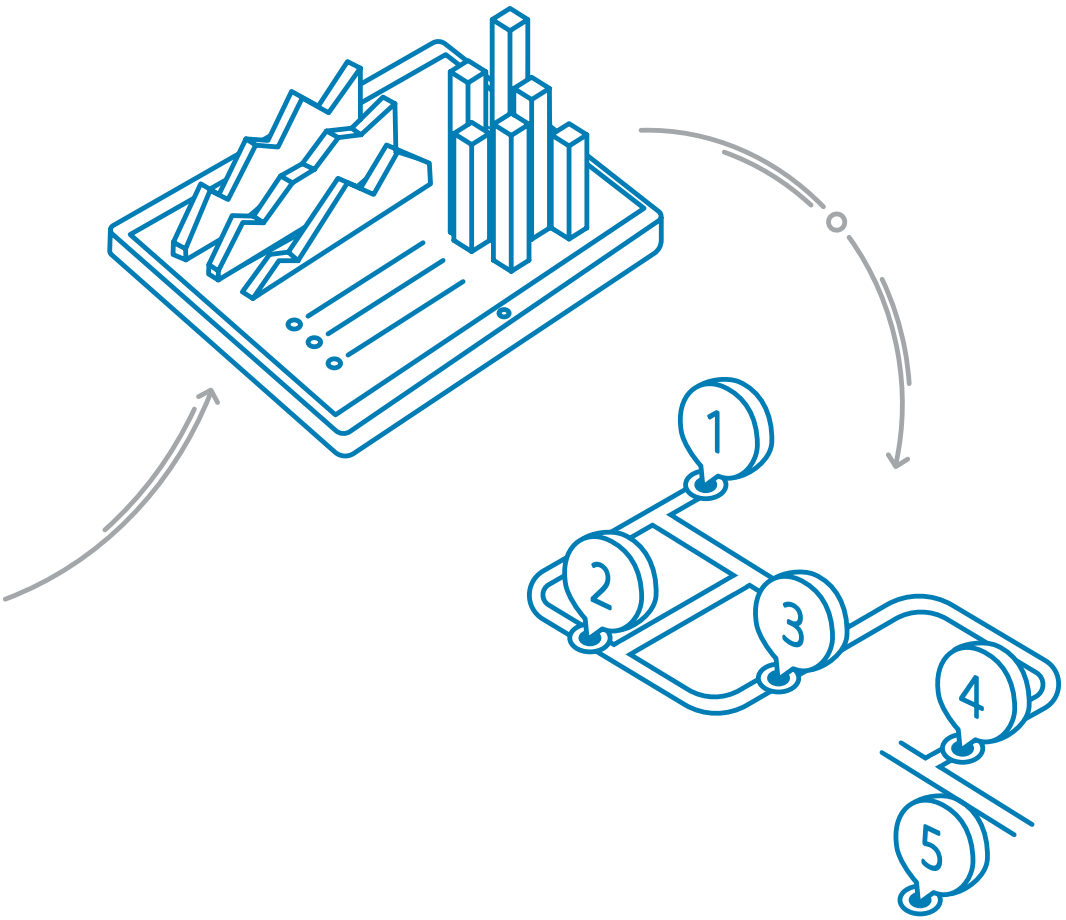


4. Qualitative and quantitative evaluation across business segments

In this chapter, we go through each business segment to show how the trends affect these businesses qualitatively and quantitatively on a granular revenue stream level within the future states. The results shown are the output of a flexible tool used to forecast the revenue and profit pool developments.

5. Identification of priority actions for OEMs

In our final step, we highlight actions OEMs need to prioritize in order to succeed in the lead-up to 2035.



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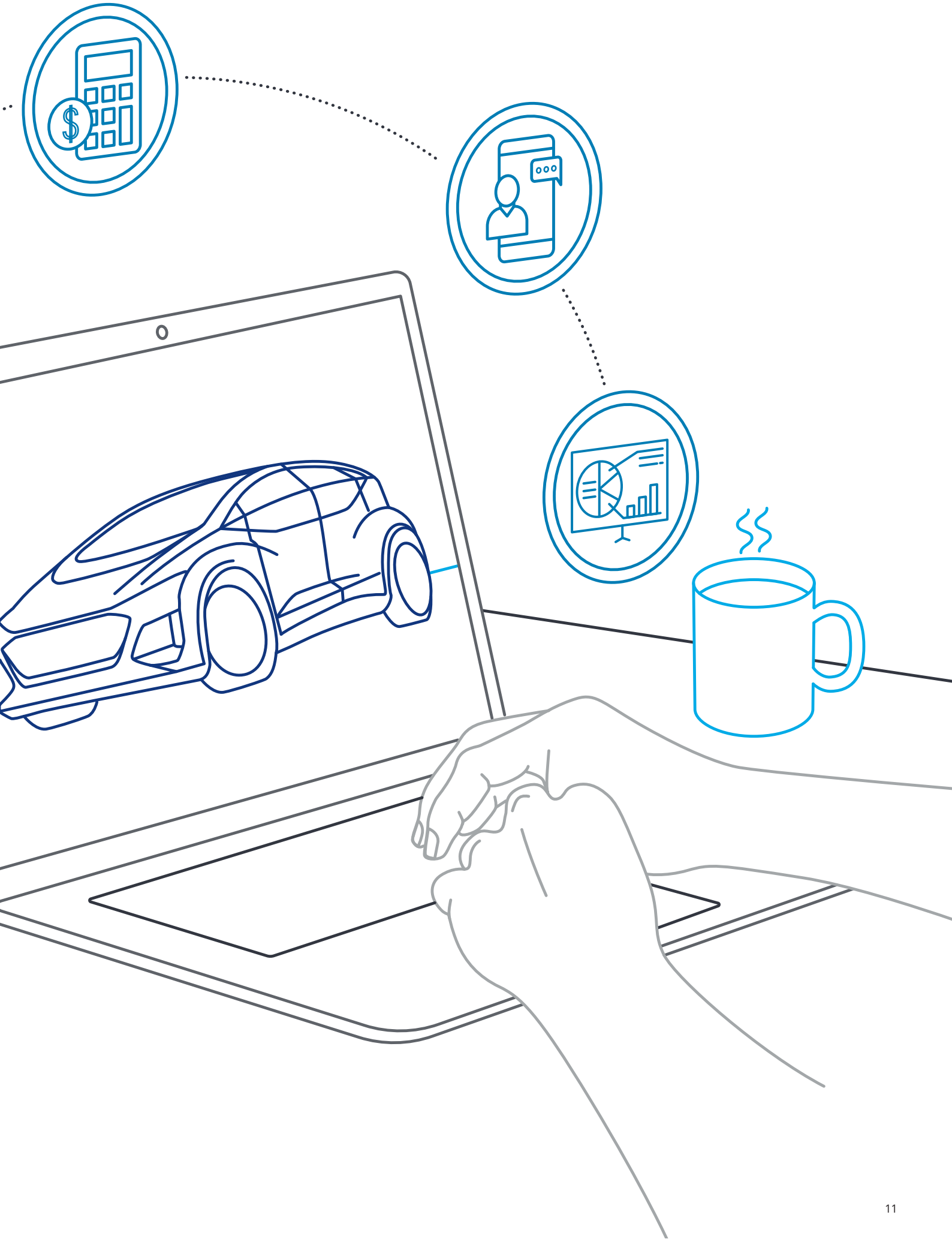

Characteristics of the proxy OEM

In our analysis, we will demonstrate the industry development based on a proxy OEM with the following characteristics:

- OEM operates globally. Markets under consideration are China, United States, Euro5 (Germany, France, United Kingdom, Spain, and Italy), and Japan. The proxy OEM does not have a specific country of origin and represents a fictive average of a Chinese, US, Japanese, and European OEM.
- OEM generates revenues in five different business segments, which will provide a consistent structure throughout the study. All revenue streams are illustrated on the next page in a comprehensive revenue tree, valid from a current and future business perspective. As illustrated in figure 3, most revenues are currently being made in Euro5. However, China ranks highest regarding new car sales volumes with other business segments currently being underrepresented (figure 4).
- Captive finance organization is considered as a part of the OEM. For a detailed analysis of future development of captives, we recommend reading our Deloitte study, *Future of captives – what will be the core businesses for automotive captives in 2030*, which was published in 2018.
- OEM owns a fleet services entity that provides services to multibrand vehicles.
- OEM is generally perceived by the market as a high-quality and premium manufacturer. The new car sales distribution across vehicle segments is shown in figure 5.
- Cars with alternative drivetrains currently account for 3 percent of total new car sales of the OEM across respective markets.
- OEM owns part of its retail network.

Figure 3. Total OEM revenues (in $B) in 2018

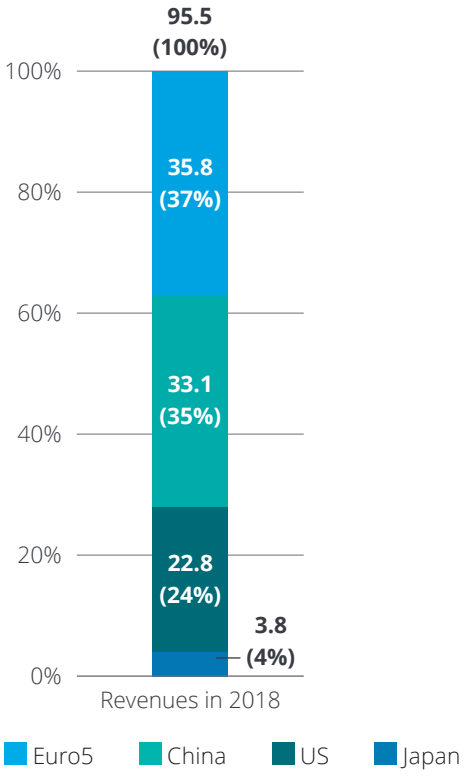

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Figure 4. Proxy OEM's new vehicle sales (in millions of vehicles) in 2018

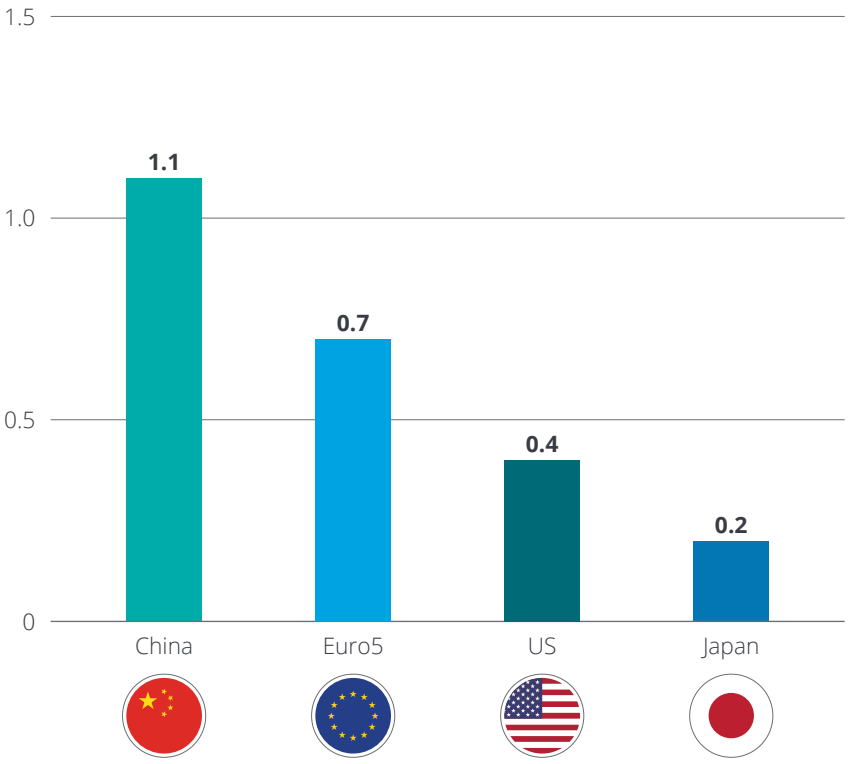

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Figure 5. Vehicle segments as share of the proxy OEM's new vehicle sales in 2018

		China	US	Euro5	Japan
A	Micro	5.1%	0.2%	6.1%	39.9%
B	Subcompact	10.0%	5.3%	21.5%	23.1%
C	Compact	50.3%	37.8%	40.5%	15.3%
D	Midsize	28.1%	48.1%	20.4%	17.8%
E	Premium	6.6%	8.5%	11.4%	3.9%
F	Luxury	0.0%	0.0%	0.1%	0.0%

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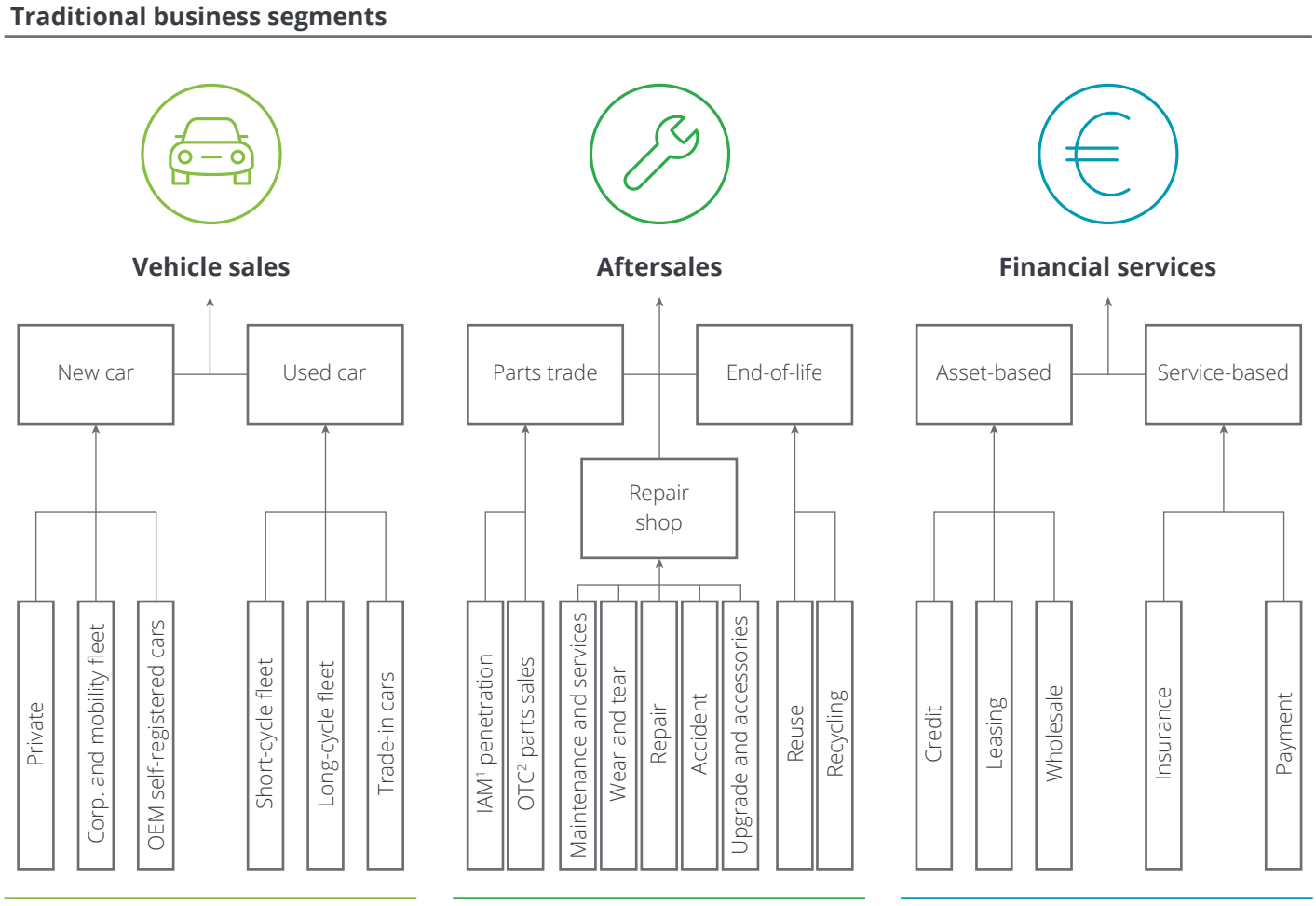
Revenue tree

The OEM generates revenues in five different business segments, which serve as a consistent structure throughout the study. All revenue streams should be valid today and in the future for all OEMs and in every market.

Figure 6. Proxy OEM revenue tree



☐ Revenue (sub)streams – Definition overview of revenue substreams on the next page

[1] Independent aftermarket
[2] Over-the-counter

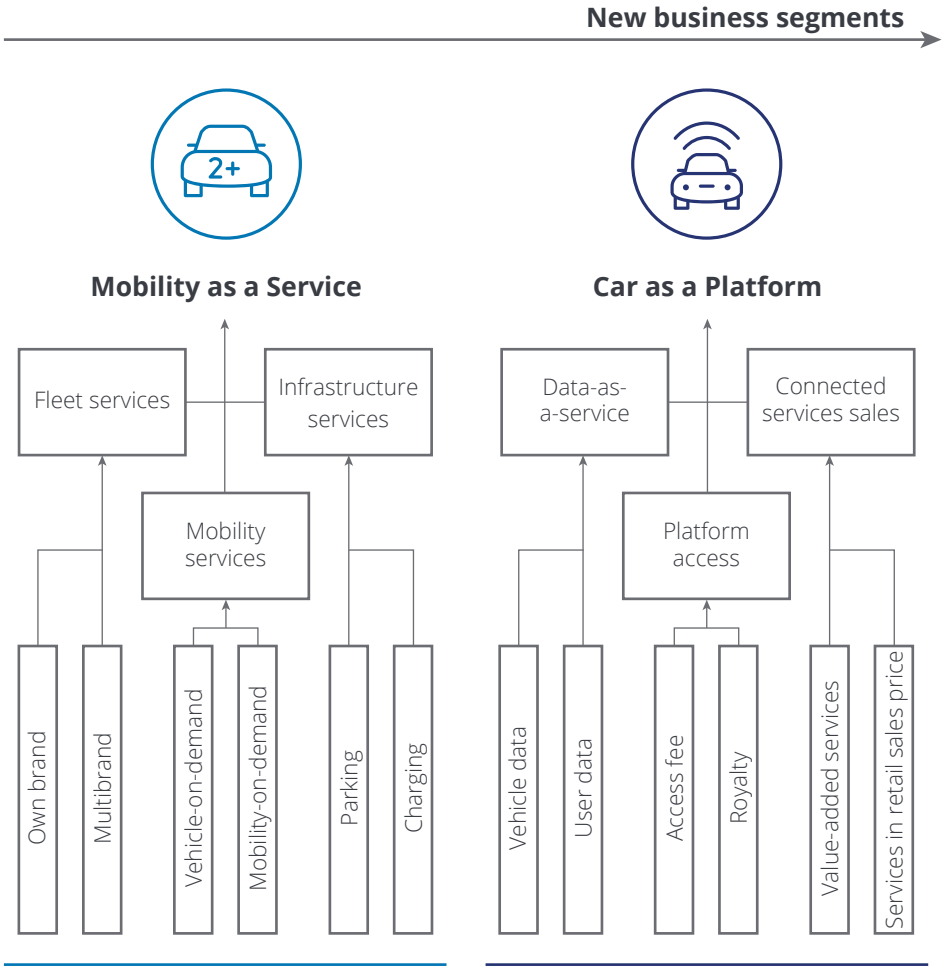

New business segments
2+
Mobility as a Service
Car as a Platform
Fleet services
Infrastructure services
Mobility services
Own brand
Multibrand
Vehicle-on-demand
Mobility-on-demand
Parking
Charging
Data-as-a-service
Connected services sales
Platform access
Vehicle data
User data
Access fee
Royalty
Value-added services
Services in retail sales price

Figure 7. Revenue stream – Definitions

Traditional business segments

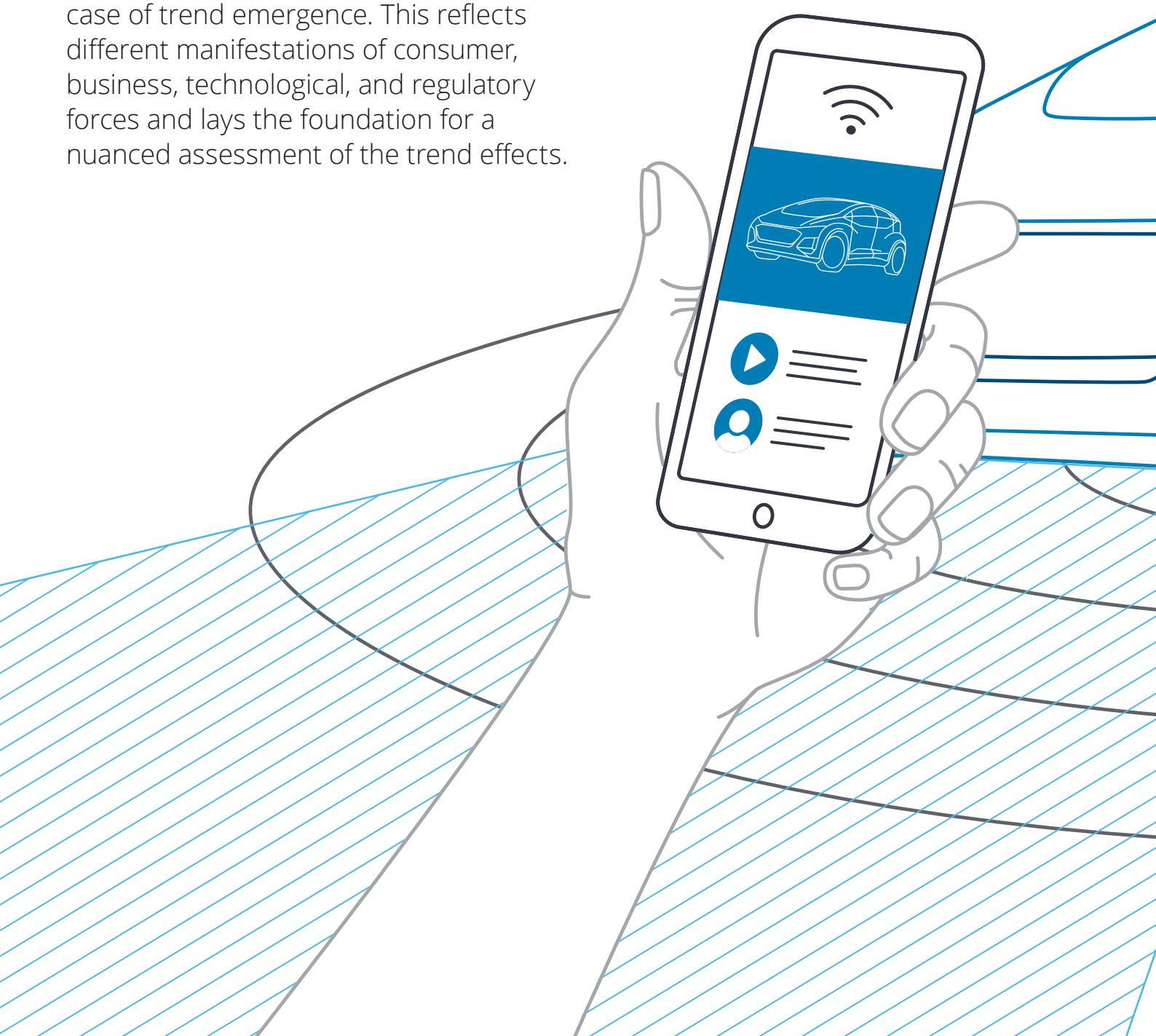
New business segments

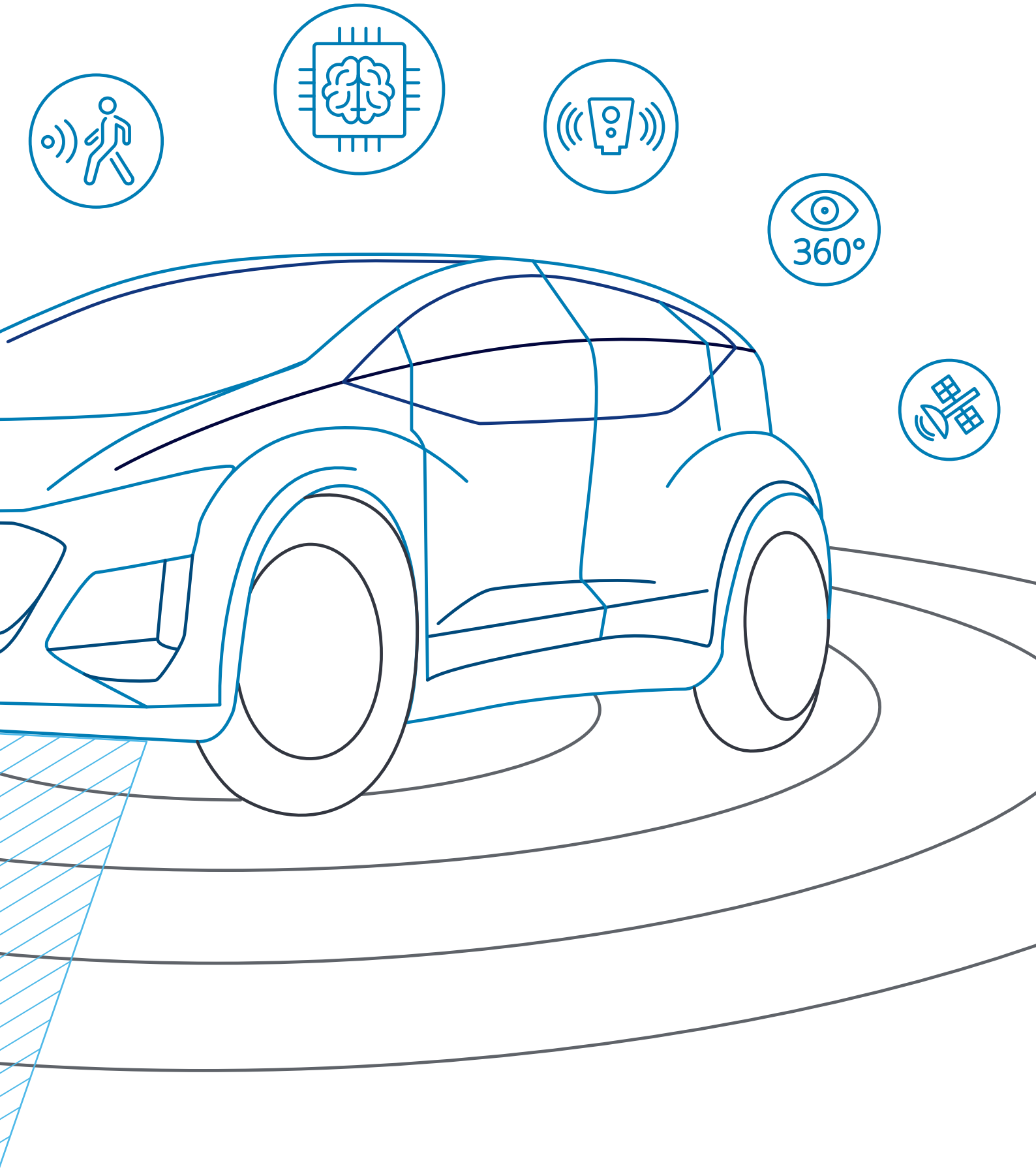
Business segment	Revenue stream	Revenue substream
Vehicle sales	**New car**	Private
		Corporate and mobility fleet
		OEM self-registered cars
	Used car	Short-cycle fleet
		Long-cycle fleet
		Trade-in cars
Aftersales	**Repair shop**	Maintenance and services
		Wear and tear
		Repair
		Accident
		Upgrade and accessories
	Parts trade	IAM penetration
		OTC parts sales
	End-of-life	Reuse
		Recycling
Financial services	**Asset-based**	Credit
		Leasing
		Wholesale
	Service-based	Insurance
		Payment
Mobility as a Service	**Fleet services**	Own brand
		Multibrand
	Mobility services	Vehicle-on-demand
		Mobility-on-demand
	Infrastructure services	Parking
		Charging
Car as a Platform	**Platform access**	Access fee
		Royalty
	Data-as-a-service	Vehicle data
		User data
	Connected services sales	Value-added services
		Services in RSP

Definition
Passenger cars sold to private customers
Passenger cars sold to corporate fleets with or without full-service leasing and mobility fleets
OEM self registrations (to employees)
Used cars (less than three years old) from fleet customers
Used cars (more than three years old) from fleet customers
Used cars from private customers
Regularly recurring revenues, including, for example, inspections
Recovery of abrasion arising from vehicle usage
Services to fix unanticipated vehicle breakdowns
All services attributable to accident recovery
Additional features and equipment added to vehicle after purchase
Direct parts sales to wholesalers, distributors, and repair shop chains
Over-the-counter parts sales to repair shop and the end user
Sale of end-of-life components for new use cases in other industries (such as used batteries)
Revenues from recycled resources sold
Credit finance to enable vehicles to private, corporate, and governmental customers
Financial and operating leasing to enable vehicle sales to private, corporate, and public-sector customers, including (full-service leasing) fleet management contracts
Support of dealer network by financing floorplan of dealer and real estate for required facilities
Bundling of existing offerings (such as full-service leasing contracts) with additional insurance contracts
In-house transaction platforms allowing for revenues from transaction fees (micropayments arising from Mobility as a Service)
Revenues that come from fleet services contracts for own car brand
Revenues that come from fleet services contracts for multibrands
Shared mobility services without driver provision
Shared mobility services where passenger is driven (by driver or by level 5 autonomous driving technology)
Entails provision of parking services and infrastructure (on-street and off-street) as an agent or operator
Entails provision of charging services and infrastructure as an agent or operator
Access fee to receive platform access or placement
Commission fee generated from sales through platform
Revenues from selling vehicle data as a broker
Revenues from selling user data as a broker
Ongoing service sales during car usage (for example, through subscription)
Services which are calculated in retail sales price and sold at the time of car purchase

Trend analysis and forecast of industry drivers

For each automotive industry trend, we forecast a base case and a disruptive case of trend emergence. This reflects different manifestations of consumer, business, technological, and regulatory forces and lays the foundation for a nuanced assessment of the trend effects.

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Introduction

What the OEM's business model will look like in the future depends on various influencing factors that are hard to measure and predict.

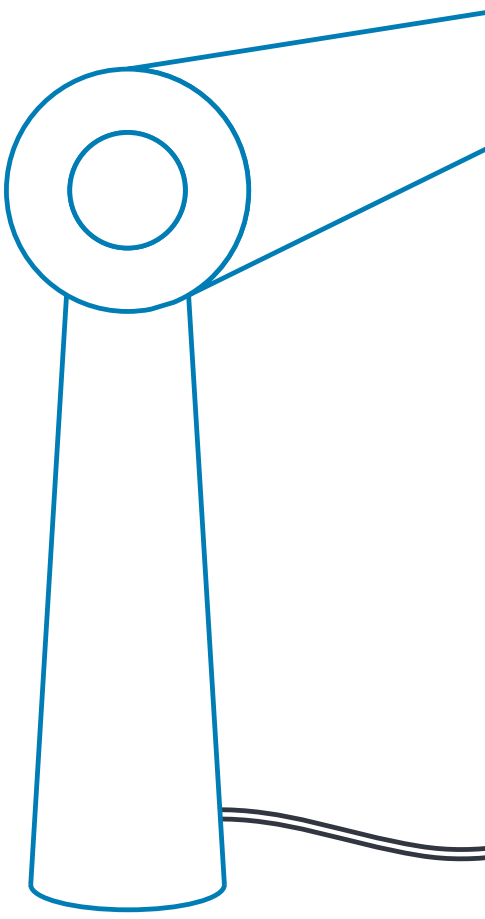
We screened and analyzed drivers across countries and industries. Factors taken into consideration include regulatory decisions, societal changes, technological advancements, and the strategic decisions of market players–to name just a few.

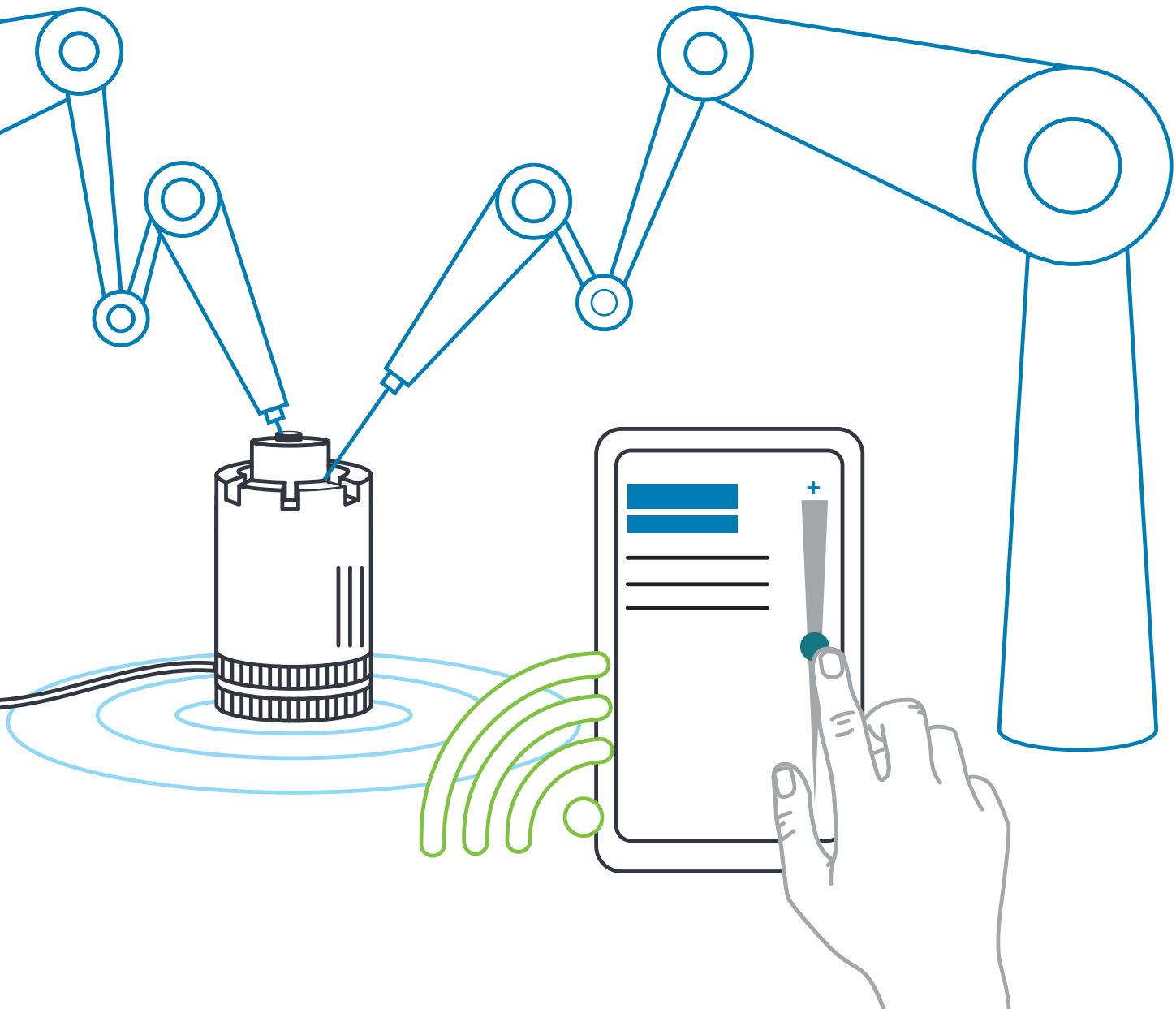
The findings were challenged in expert interviews with industry experts, OEM executives, and academic thought leaders, as well as research of sources in the public domain.

This study focuses on industry drivers with the highest potential for disruption, ultimately resulting in four main trends that will shape the automotive industry until 2035. Besides those industry trends, we also considered macroeconomic developments that affect the automotive industry.

We found that the smallest adjustments relating to selected drivers yield large discrepancies in trend emergence–this applies particularly to regulatory decisions that have the ability to significantly shift the trend emergence upward or downward.

To prepare for all contingencies, we built different forecasts based on variations in technological, social, political, and economic drivers. The following figures within respective trend analysis represent a base case and a disruptive scenario, but we advise readers to prepare for a more disruptive scenario, as past experience shows that organizations are more likely to suffer from underestimating than overestimating future trends. From a technological point of view, we are certain that at least the base-case scenario will emerge.





Connectivity

We assume that connectivity of both cars ("connected car") and customers ("connected customer") will differ significantly across markets driven by technical infrastructure and consumer preferences.

By 2035, we assume that almost all cars sold in our focus markets will be connected; however, only a share of these will operate at a full connectivity level. Consumers across markets are expected to attach a higher value to connected services and shift strongly to online purchasing–however, to a different degree depending on the geography. What should be also mentioned is that connectivity is very closely related to the autonomous driving trend as one of its main enablers.

Connected car

The penetration of car connectivity depends highly on the smart infrastructure development, the functioning of back-end infrastructure for data processing and the available interface for consumers, or third parties. We define the "connected car" based on six levels of vehicle connectivity and functionality, all the way to vehicle-to-everything (V2X) connectivity. V2X includes vehicle-to-infrastructure, vehicle-to-network, vehicle-to-vehicle, vehicle-to-pedestrian, vehicle-to-device, and vehicle-to-grid communications. In all fields, we are already seeing innovative products transitioning from the R&D phase into serial production.

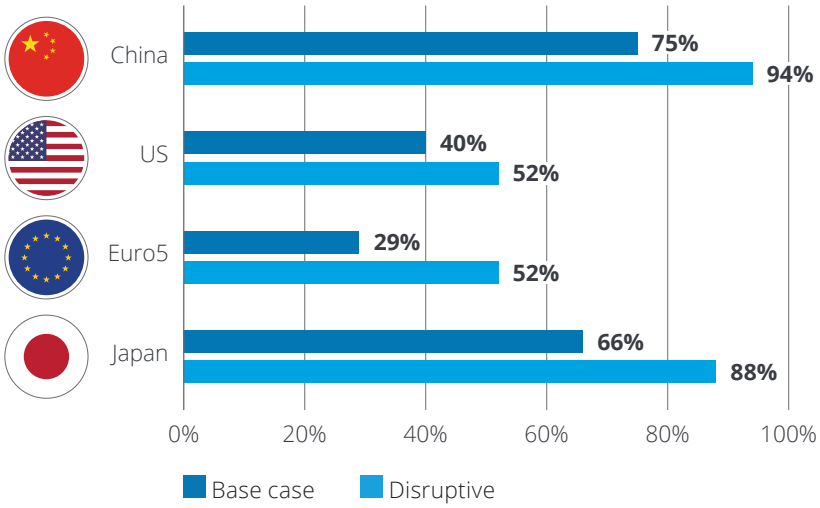
The arrival of 5G connectivity will contribute to the next boom in trend emergence, although we expect discrepancies between urban and rural areas to persist–but especially differences across markets.

Connected customer

Connectivity among consumers in particular is expected to grow, including their preference for online purchasing. They are accustomed to seamless online purchases of consumer goods and will transfer their expectations of service to the automotive industry. In addition, the majority of consumers value–and are willing to pay for–connected technologies.

Even though 100 percent of vehicles will have basic connectivity by 2035, only a fraction are expected to have full connectivity in terms of V2X. This is mainly due to the elevated hardware costs that will make V2X a premium option in the passenger car segment.

Figure 8. Share of cars with V2X functionality for new vehicle sales in 2035



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China

By 2035, it is expected that 75 percent of all new vehicles sold will have V2X functionality.

Currently, already 76 percent of consumers in China feel that increased vehicle connectivity is beneficial, being most interested in receiving updates regarding traffic congestion and access to nearby parking.

In a global comparison, Chinese consumers show a particularly high preference for in-car connected services, with a willingness to pay for elevated connectivity levels. This drives a market for connected services sales and data-as-a-service and promotes investments in connected infrastructure.

Beyond that, China is expected to be the leading market for autonomous mobility services driving the demand for car and infrastructure connectivity.

United States

By 2035, it is expected that 40 percent of all newly sold vehicles will have V2X functionality. The United States is currently the most developed country for connected vehicle services and a pioneer in autonomous driving technology application. A major challenge for the nationwide adoption of connected cars is the costly 5G infrastructure implementation requiring a high density of 5G masts, including remote areas, for nationwide connectivity.

Despite a strong expected preference for the use of connected value-added services, increased car connectivity is currently still difficult to sell at a premium price: Less than half of consumers in the United States feel that increased vehicle connectivity is beneficial (46 percent).

Euro5

It is expected that by 2035, 29 percent of newly sold vehicles will have V2X functionality in Euro5.

In general, Euro5 customers are more skeptical toward increasing connectivity with their vehicles: Only 36 percent of German consumers think increased connectivity would be beneficial. Nevertheless, variation between the markets is high. In the United Kingdom, for instance, consumers are gaining trust in fully self-driving vehicles; in 2018, already 49 percent of the study respondents said fully self-driving cars would not be safe, compared with 73 percent in 2017.

The European Commission states in its action plan that by 2025, all urban areas, as well as major roads and railways, should have uninterrupted 5G coverage to support the development of connected vehicles. OEMs and technological companies also advance the development of V2X functionalities and autonomous driving by harmonizing standards.

Japan

Japanese consumers seem skeptical toward increased vehicle connectivity, with only 49 percent agreeing that increased car connectivity is beneficial.

The Japanese government is developing 5G technology in urban as well as rural areas. Because of the very high population density, necessary nationwide 5G coverage is expected to be achieved easily. We believe that 90 percent of the population will have access to 5G within the next five years as a strong driver for connected vehicle use in 2035. By then, we forecast that 66 percent of new car sales will be sold with V2X functionality.

Consumer survey data based on *Deloitte Global Automotive Consumer Study 2020.*

Alternative drivetrains

In the future, we assume that various drivetrains will coexist, with battery-electric vehicles leading the way. The emergence of alternative drivetrains is mainly driven by decreasing production costs, regulation, charging infrastructure, and increasing performance.

Alternative drivetrains are expected to continuously gain share in the overall drivetrain mix. In the alternative drivetrains trend, we consider a variety of drivetrains, since the race for a dominant technology has not yet been won and might vary based on geographical markets.

Emerging alternative drivetrains include primarily battery-electric vehicles (BEV), hybrid electric vehicles (hybrid) and fuel cell vehicles (FCV). We expect this trend to emerge with high certainty and to strongly affect all steps of the current OEM value chain.

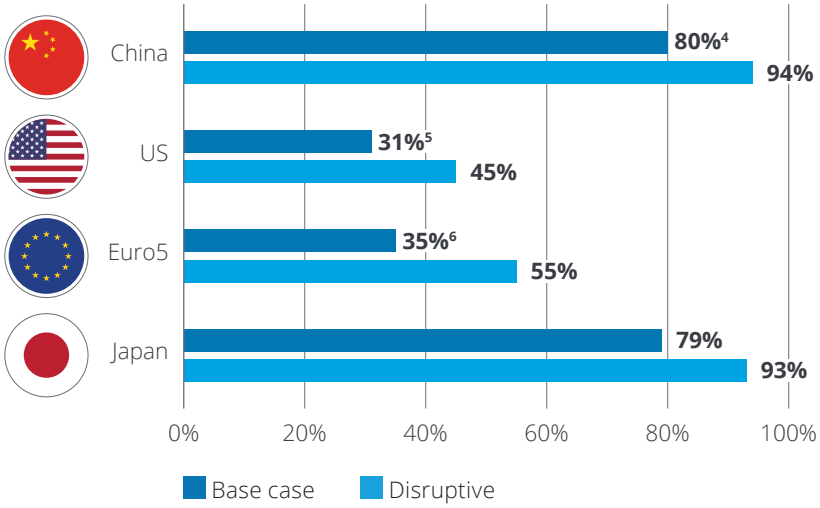
Almost all OEMs and many suppliers are putting immense effort into the research and development of alternative drivetrains. More stringent environmental regulations have affected the internal combustion engine (ICE) manufacturing industry. There is still room for the optimization of gasoline engines with downsizing and upsizing technologies, as well as incremental improvements to diesel engine components such as injectors and high-pressure pumps.

There are also ICEs using alternative fuels (ethanol, biodiesel, CNG, LPG). Drivetrains with alternative fuels remain one cluster within the ICE framework and are not further detailed. The ICE share within the overall drivetrain mix is not expected to grow. Legislation regarding emission levels and announcements from selected countries on the planned ICE sales bans add further validation.

That said, it is unlikely that we will see a complete end to all ICE sales. Selected providers may even find a business potential in a strongly consolidated market.

The material costs for alternative drivetrains are relatively high at present, but we expect this to change over time and bolster the emergence of this trend; Electric engines without rare-earth elements can reduce the production costs by 20–30 percent in the near-to-mid-term. Making engines smaller and lighter can also reduce costs, for example, by using silicon carbide transistors for the engine electronics to reduce capacitor size. We foresee a strong increase in the market volume and in the demand for all electronic-related parts like power electronics, converters and inverters, and electric motors. We also expect investments in the charging infrastructure to accelerate the emergence of electric drivetrains.

Figure 9. Share of cars with alternative drivetrains for new car sales in 2035



Numbers may not equal total shown due to rounding.

[4] 76% BEV; 3% hybrid; 1% FCV.
[5] 29% BEV; 2% hybrid.
[6] 25% BEV; 10% hybrid.
[7] 15% BEV; 62% hybrid; 2% FCV.

Please see the Deloitte study, *The future of the automotive value chain – supplier industry outlook 2025*, for more information.

China

China shows a large potential for alternative drivetrains, which is strongly driven by governmental initiatives such as resolute subsidies for new energy vehicles and fuel cell vehicles, as well as direct R&D investments. For example, research on hydrogen energy and fuel cell technology was listed as one of the 15 priorities under China's Energy Technology Innovation Action Plan 2016–2030. Keep in mind that battery-electric power is considered core and hydrogen power "only" supplementary in China.

Besides the governmental incentives, Chinese customers also are open-minded toward alternative drivetrain technologies. According to Deloitte's new energy vehicle (NEV) consumer survey, 60 percent of premium BEV owners and 89 percent of nonpremium BEV owners are convinced that BEVs with a range of more than 400 kilometers can totally meet their daily needs.

This outlook motivates ventures to come up with creative solutions, such as innovative charging concepts (for example, battery swapping, mobile charging services, and one-stop charging).

For more information, see *A NEV revolution in the making*, published by Deloitte in 2019.

United States

Even though the United States can be considered a pioneer in alternative drivetrain development, US consumers still mainly consider their likely next vehicles to be ICE-powered. The share of ICE vehicles is expected to stay high in the United States because of its unique geographic and economic situation: large stretches of rural land and relatively low oil prices.

Due to the above-mentioned geographical conditions, the infrastructure investments were not yet pursued strongly, except by individual OEMs investing in their own charging network to support the adoption of their product portfolio.

Euro5

In Euro5 markets, we expect alternative drivetrains to reach 35 percent of new car sales in 2035.

CO_2 emission standards by the European Commission specify one key driver for alternative drivetrains. With penalties and specific emission targets, OEMs have a financial incentive to move away from the internal combustion engine. Beyond that, the production of low- and zero-emission cars is rewarded.

Public charging infrastructure funding programs exist at the national and EU level. We also see a variety of players making investments, such as utility providers, public transportation companies, or OEMs.

Japan

Japan has the world's highest hybrid market penetration, with only a fraction constituting plug-in hybrid vehicles. Beyond that, Japan shows an exceptional focus on fuel cell technology development and adaption. The clearly stated aim of becoming a world-leading example for hydrogen-based mobility is supported by various ambitions that apply to both incentives for the purchasing of fuel cell vehicles and infrastructure development.

Consumer survey data based on *Deloitte Global Automotive Consumer Study*.

Shared mobility

Shared mobility will increase the utilization per vehicle and shift ownership from private customers to fleet operators. Accelerated growth in mobility services is expected with the emergence of autonomous driving.

The increase in shared mobility yields a significantly increased utilization rate per vehicle, as well as potential reduction of personal vehicle ownership in urban areas, a trend highly dependent on the respective country's consumer preferences.

To operationalize the shared mobility emergence, we took the average vehicle utilization per year, in terms of kilometers driven, as a proxy, because a lower degree of private ownership usually implies more kilometers driven per vehicle.

Shared mobility has emerged as a consequence of an increased technical ability to coordinate the flow of information and to enable connectivity between cars, consumers, and fleet service providers.

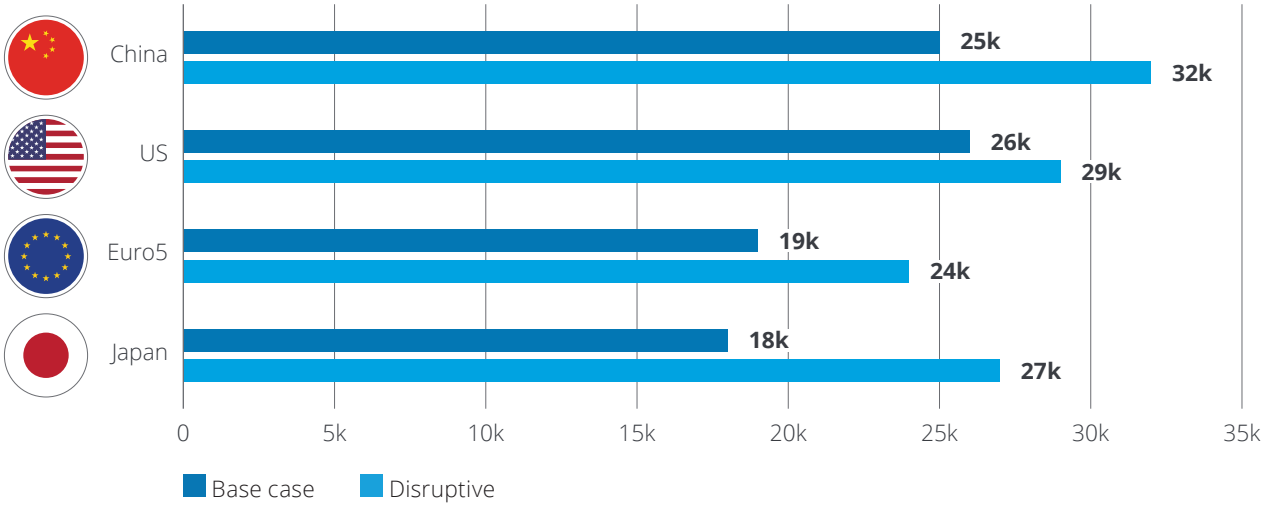
For example, the evolution of payment processing infrastructure has enabled efficient micropayments. Today, this trend is further accelerated by the consumer preference for flexibility, increased service availability, and an overall perceived higher economic benefit from asset-sharing.

The latter has particularly risen due to urbanization. Beyond that, the new tech-savvy generation is further leading the way toward pay-per-use mobility. Additionally, the quality of services has improved: Transparent and continuous feedback can be given in a usage-based business model enhancing the overall user experience.

The shared mobility trend leads to a shift to more usage-based mobility services and will shift the shares in ownership away from private customers to fleet operators, which will represent the largest customer share for most OEMs in the future.

The emergence of autonomous driving level 4/5 would lead to a strong shift to mobility services usage, as driver costs constitute a large portion of current passenger costs.

Figure 10. Utilization per vehicle measured in average kilometers driven per year in 2035



Numbers may not equal total shown due to rounding.

China

In China, the shared mobility trend has already emerged, making China the largest market globally in terms of user base and daily rides with shared mobility services. This trend will continue to grow, mainly driven by urban population growth and infrastructure development. In addition to these factors, government policies have been a key driver of shared mobility.

With a growing urban population from 760 million in 2015 to more than 1 billion in 2050 and actions by the government to decrease urban congestion and increase air quality in urban areas (purchase restrictions and taxes), the demand for shared mobility is expected to grow over the coming years and to have a 32 percent share of the daily urban mobility by 2050 (see Deloitte's *Car-hailing at crossroads* report, 2019).

United States

Large demand for shared mobility exists due to a high urbanization rate (82 percent) but is growing at a lower rate than in other markets. The US urbanization rate is expected to reach 89 percent by 2050.

The large geographical expanse of the country and a lower adoption rate of alternative drivetrains, which favors mobility services from a total-cost-of-ownership perspective, are contributing factors to slower acceleration of shared mobility services.

Euro5

The growing level of urbanization, from 74 percent today to 84 percent in 2050, and the rise of regulatory pressure on ICEs, will drive growth and consumer demand of shared mobility.

However, differences in local regulations in Europe remain a challenge for providers of shared mobility services. A harmonization of local conditions would lead to an increase of offers and a quicker adoption by customers in Europe.

Japan

The well-developed and accepted public transportation system in Japan presents a challenge to providers of shared mobility. Railroad transportation accounts for more than half of all passenger kilometers traveled. For better illustration, in the United States, almost half of citizens do not have direct access to public transportation infrastructure.

The level of urbanization is expected to grow slowly until 2050, as already more than 91 percent of Japan's population currently resides in urban areas.

Consumer survey data based on *Deloitte Global Automotive Consumer Study.*

Autonomous driving

The largest technological hurdle lies between level 3 and level 4 autonomous driving. We expect at least level 4 to be applied initially in specific use cases only.

Autonomous driving refers to the trend toward cars driving at a full automation level without human intervention. In terms of enabling technologies, automated driving has evolved from advanced driver-assistance systems (ADAS) for active safety, which have been developed over recent decades and are undergoing continuous improvement. A classification system based on six different levels, ranging from fully manual to fully automated systems, was published in 2014 by SAE International, an automotive standardization body (see figure 12). Level 0 to level 2 requires a human driver to monitor the driving environment at all times. Level 0 means no driver assistance at all, while level 1 provides simple support such as speed control. Level 2 combines lateral and longitudinal control by the vehicle in specific situations. However, the driver needs to monitor the car and traffic at all times and be ready to take over vehicle control immediately.

The focus of current developments among car manufacturers is in the range of levels 2 through 4. The most important transition is between partial automation (level 2) and conditional automation (level 3), as in the latter case the driver is allowed to be out of the loop completely. The main difference between level 4 (high automation) and level 5 (full automation) is the system's ability to handle specific restricted driving modes versus all driving modes (eventually, these types of vehicles will not have a steering wheel).

Automotive manufacturers are forging the path to high and full automation based on the previous experience with driver assistance systems, particularly the proven success of level 2 automation.

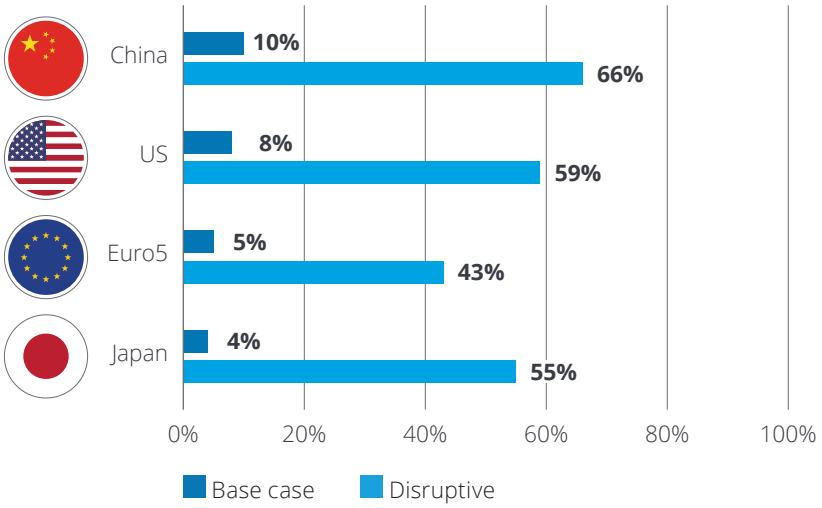
However, the quantum leap in system reliability is between levels 3 and 4. At both levels, the system is already responsible for monitoring the driving environment, but at level 3 (conditional automation), a human driver must still be prepared to take control of the vehicle within seconds. At level 4, the system must be able to manage specified traffic conditions without any driver intervention and revert to a safe state when unforeseen events occur.

Level 3 and level 4 technologies are already being launched on the market, with level 3 primarily focused on an automated highway pilot and level 4 on specified applications such as automated valet parking or the first robo-taxi fleets in selected cities.

In a base-case, disruptive scenario, we can observe that most autonomous vehicles (level 4/5) will be sold in China in 2035 (figure 11). The figures have strong upscale potential in a disruptive scenario, with favorable regulatory decisions, widespread social acceptance, and technological innovation. The high discrepancy is mainly due to the fact that large-scale adoption beyond selected use cases is especially dependent on the regulatory push.

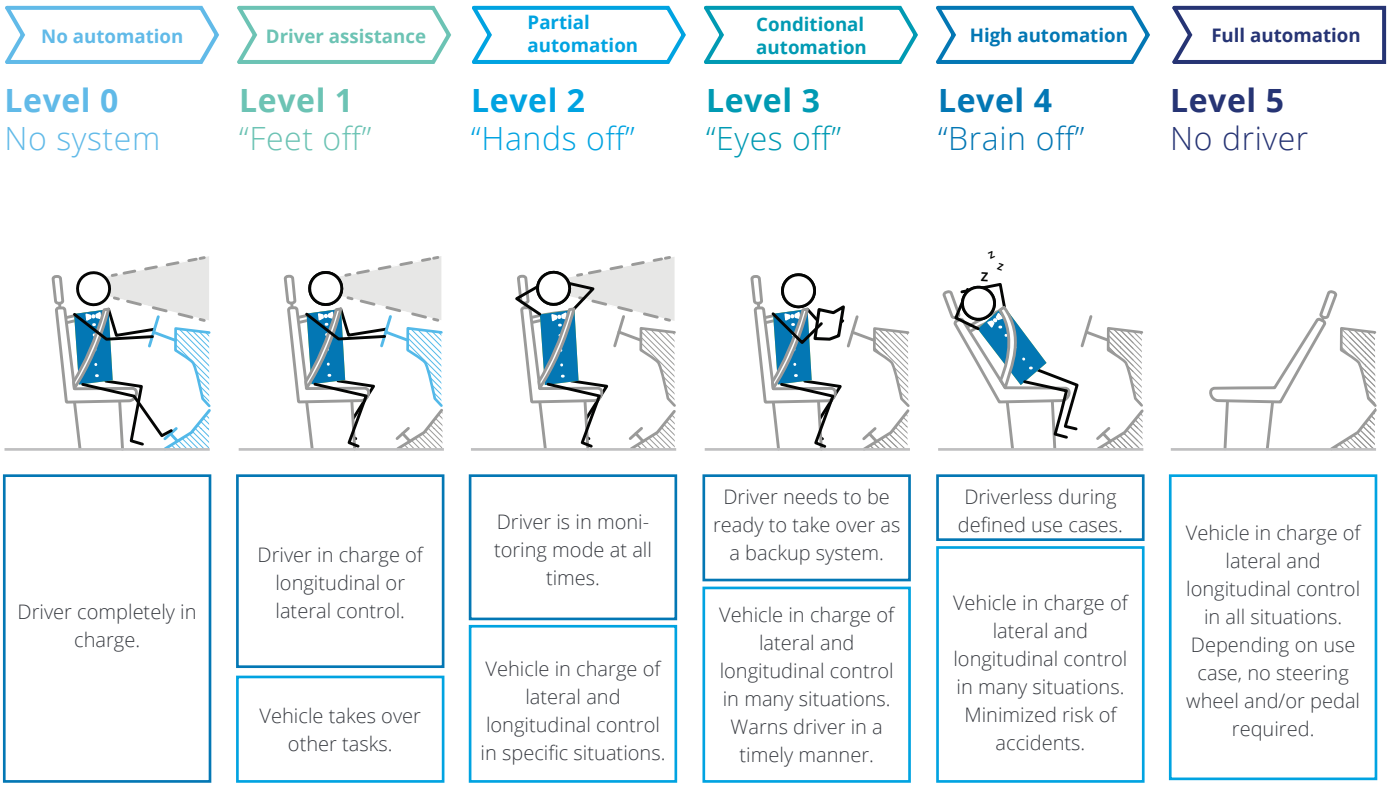
Please see our Deloitte study, *Autonomous driving: Moonshot project with quantum leap from hardware to software & AI focus*, for more information.

Figure 11. Share of autonomous vehicles (level 4/5) for new vehicle sales in 2035



Numbers may not equal total shown due to rounding.

Figure 12. ADAS levels – overview



Source: Deloitte research 2018, SAE International 2014.

China

China is expected to have the largest growth potential, with 10 percent of ADAS level 4/5 cars of new car sales in a base case.

The Chinese government shows high interest in making new technologies scalable and is willing to provide significant infrastructure investments for autonomous vehicles in urban areas.

This is fostered by a large urban population and a density of technologically affine consumers with the globally highest acceptance rate toward autonomous mobility.

United States

In a base case, we assume that 8 percent of all new vehicles in the United States will have ADAS level 4 or 5–limited to selected urban areas or dedicated routes.

The United States currently has the most progressive environment for the use of autonomous vehicles. Many states have already issued legislation and executive orders related to autonomous vehicles. First-use cases are also applied in the United States, as some regions show optimal conditions for autonomous driving pilots in terms of traffic, street, and weather conditions.

Acceptance among US consumers is not particularly high, in part because of recent news of accidents reported using autonomous vehicles.

Euro5

In Europe, we believe that 5 percent of new vehicle sales will offer level 4 or level 5 automation. However, in a disruptive scenario with favorable regulatory decisions, widespread social acceptance, and technological innovation, this could go as high as 43 percent.

The high discrepancy is mainly due to the fact that large-scale adoption beyond selected use cases is especially dependent on uncertain European regulatory decisions. Traffic security legislation tends to be rather conservative toward ADAS acceptance and data usage, but may shift strongly once accident rates are significantly lowered.

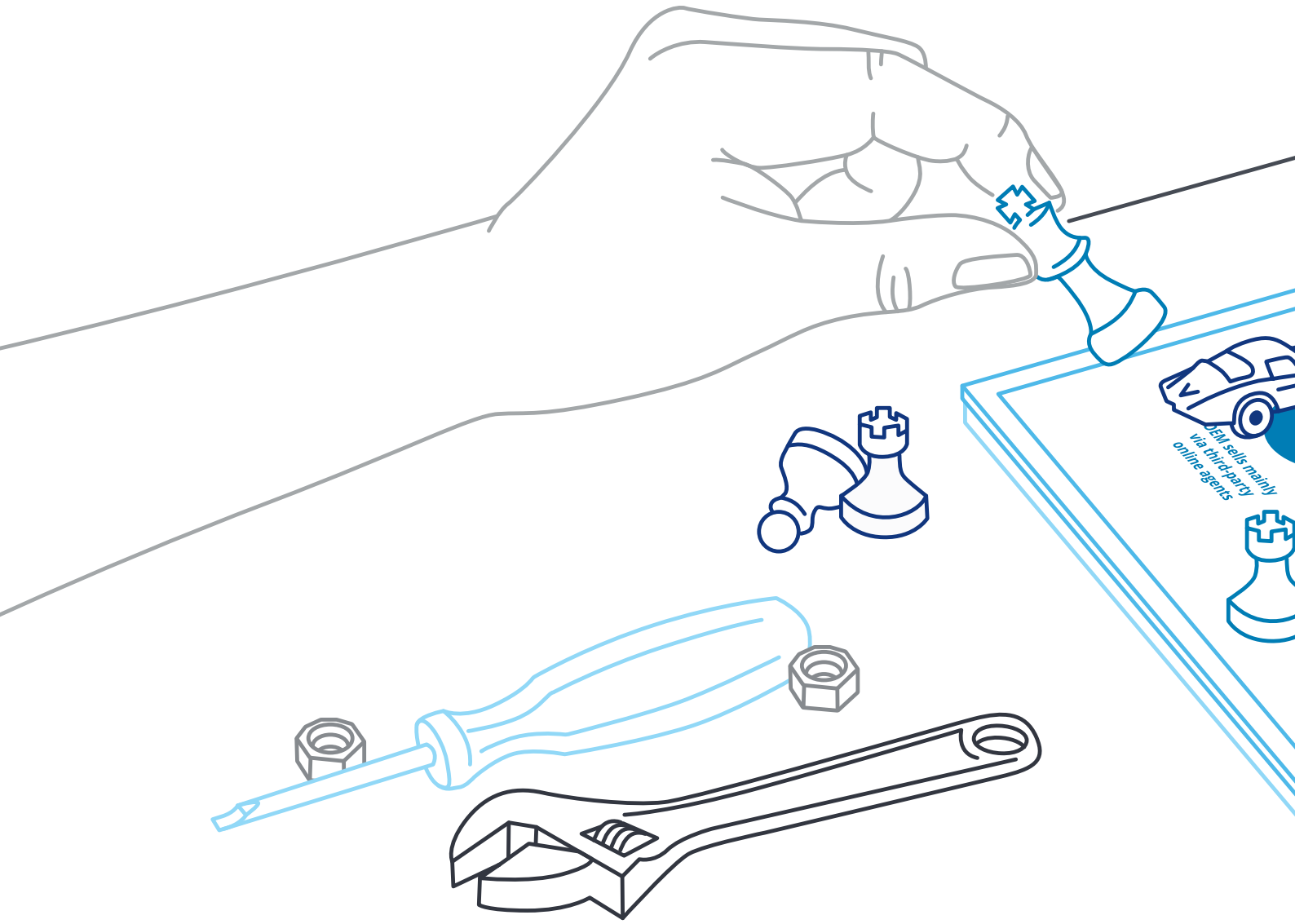
Japan

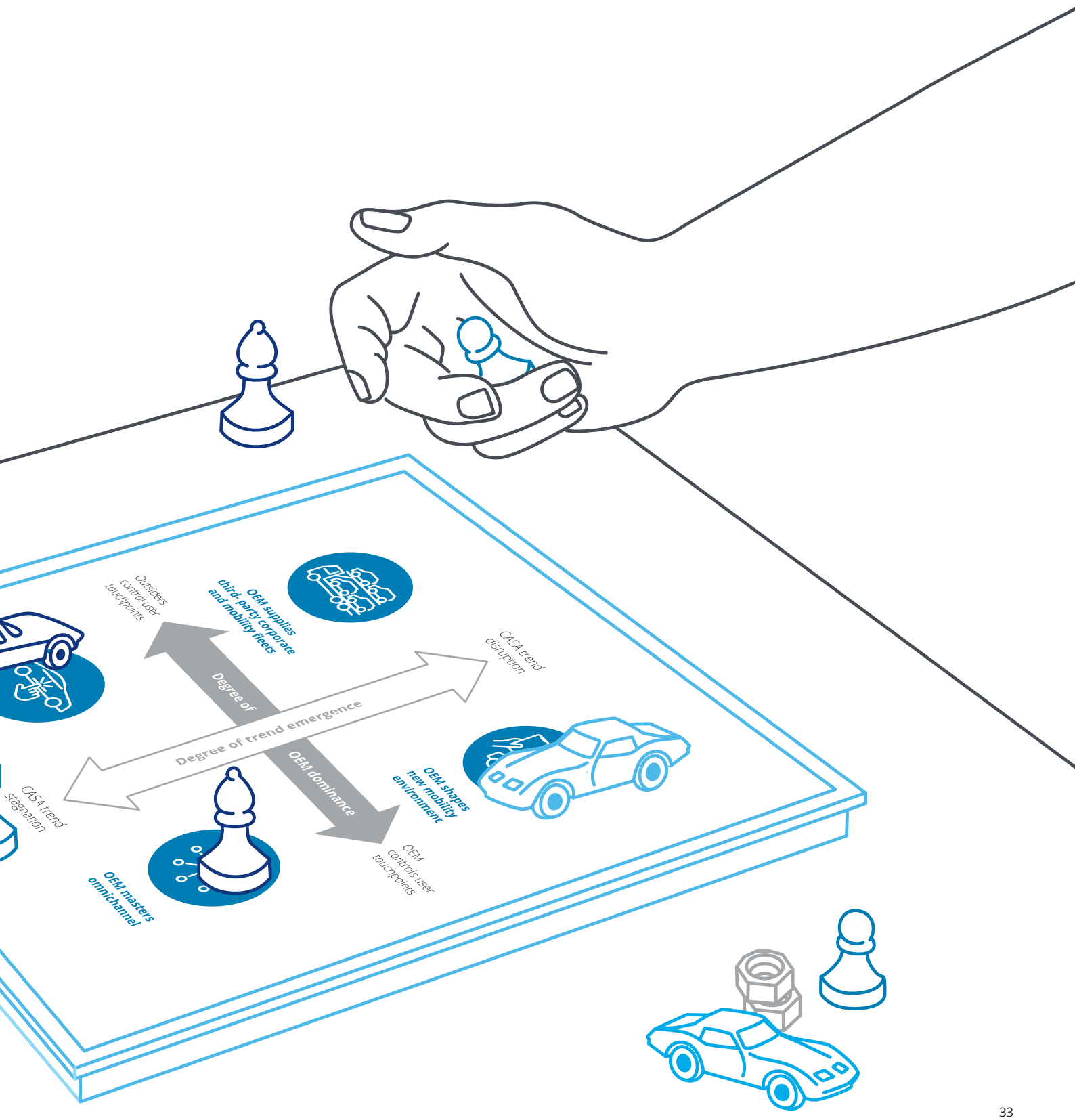
Japan's demographic structure, with a quarter of the population age 65 or older, makes autonomous driving a relevant use case to provide motorized mobility. With local OEMs, government, and startups pushing the technology development and deployment, we will see first fully autonomous application examples in the very near future. Nevertheless, broad adoption is expected to be limited in comparison to other global regions, with current legislation and consumer acceptance as hindering factors. Ride-hailing and ride-pooling mobility services do not show the highest popularity in Japan, where autonomous driving is expected to be applied most commonly. This is generally due to a well-established public transportation system.

Consumer survey data based on *Deloitte Global Automotive Consumer Study 2020*.

Identification of future states as strategic option spaces

We present a differentiated perspective of future industry effects based on two scenarios of trend emergence. Beyond that, we distinguish between two degrees of future OEM dominance over the competitive landscape, resulting in four possible future states in 2035.




Outsiders control user touchpoints
OEM supplies third party corporate and mobility fleets
CASA trend disruption
Degree of
Degree of trend emergence
OEM dominance
CASA trend stagnation
OEM shapes new mobility environment
OEM masters omnichannel
OEM controls user touchpoints

Introduction

In order to show how industry trends will affect the OEM business in a comprehensive and nuanced way, we have built a framework that considers different scenarios of industry trend emergence for OEMs with different strategic directions. The maturity of emerging trends will shape the environment that OEMs are facing in 2035. Trend emergence depends on political, business, social, and technological criteria that will have a significant effect on the OEM business.

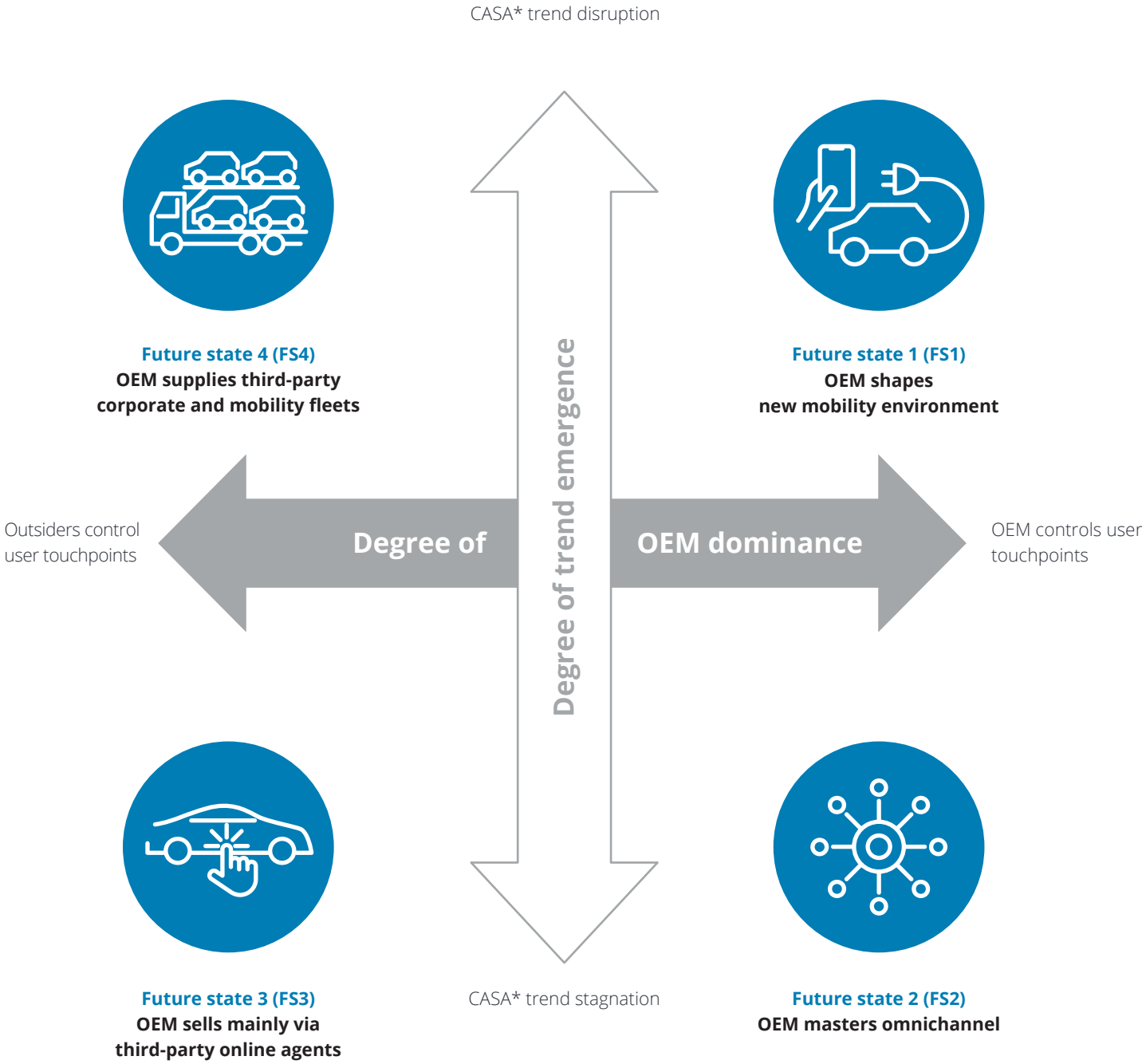
That said, the future of any OEM is also the result of its own strategic decisions, and different OEMs will face different future states as a result. The proxy OEM for our purposes is a dominant player in the industry, which for decades–in many markets–successfully sold vehicles, provided profitable aftersales products and services, and built a financial services infrastructure. Beyond that, the OEM has met its customers' needs through indirect stationary retail, while its portfolio of repair shops and dealerships has been effective in capturing revenues and profit pools across all business segments.

In light of current competitive dynamics, however, we must acknowledge that this assumption may not hold true in the future. Recent signposts indicate a change in the competitive dynamics, with new market entrants already claiming their share of the OEM-dominated automotive industry. Technological disruption and evolving mobility user behavior, in particular, have opened the opportunity for a new kind of competition. Market entrants from unrelated and adjacent industries have started launching offerings that bypass the OEM sales channels and sell directly through digital user touchpoints that are becoming increasingly relevant.

We also need to take into consideration that not all OEMs will still exist in their current form in 2035. Future states are a result of consolidation trends and reflect a proxy OEM that prevails.

Furthermore, strategic decisions do not necessarily apply to an entire OEM, but may instead vary depending on the brand and the organizational entity. Of course, OEMs might be in different future states in respective markets due to the inevitable varying pace of trend emergence.

Figure 13. Future states in 2035



* CASA = Trends of connectivity, alternative drivetrains, shared mobility and autonomous driving

Future states

At the intersection of connectivity, alternative drivetrains, shared mobility, and autonomous driving (referred to as "CASA") trend emergence and OEM dominance over its new competitive environment, we identified four future states.

Future states with trend stagnation

Where trend emergence is weak in CASA, new business segments such as Mobility as a Service and Car as a Platform will have less relevance and market potential. That said, we will still see vehicle sales shift further to fleet customers and private customers requesting omnichannel interaction during purchase and usage. OEMs will need to establish a direct sales network and implement an omnichannel strategy. Securing the aftersales revenue is another key goal. Repair shops will become increasingly dependent on external online agents, and OEMs will have to do more to retain customers in the proprietary aftersales ecosystems–it will no longer suffice to have a vehicle-centered aftersales business model. Failing that, OEMs will face margin pressure. Large digital players will increase their negotiating power, and the OEM will find itself relegated to the back of the value chain. Omnichannel transformation will therefore be a decisive factor for OEMs looking to coexist successfully with digital challengers.

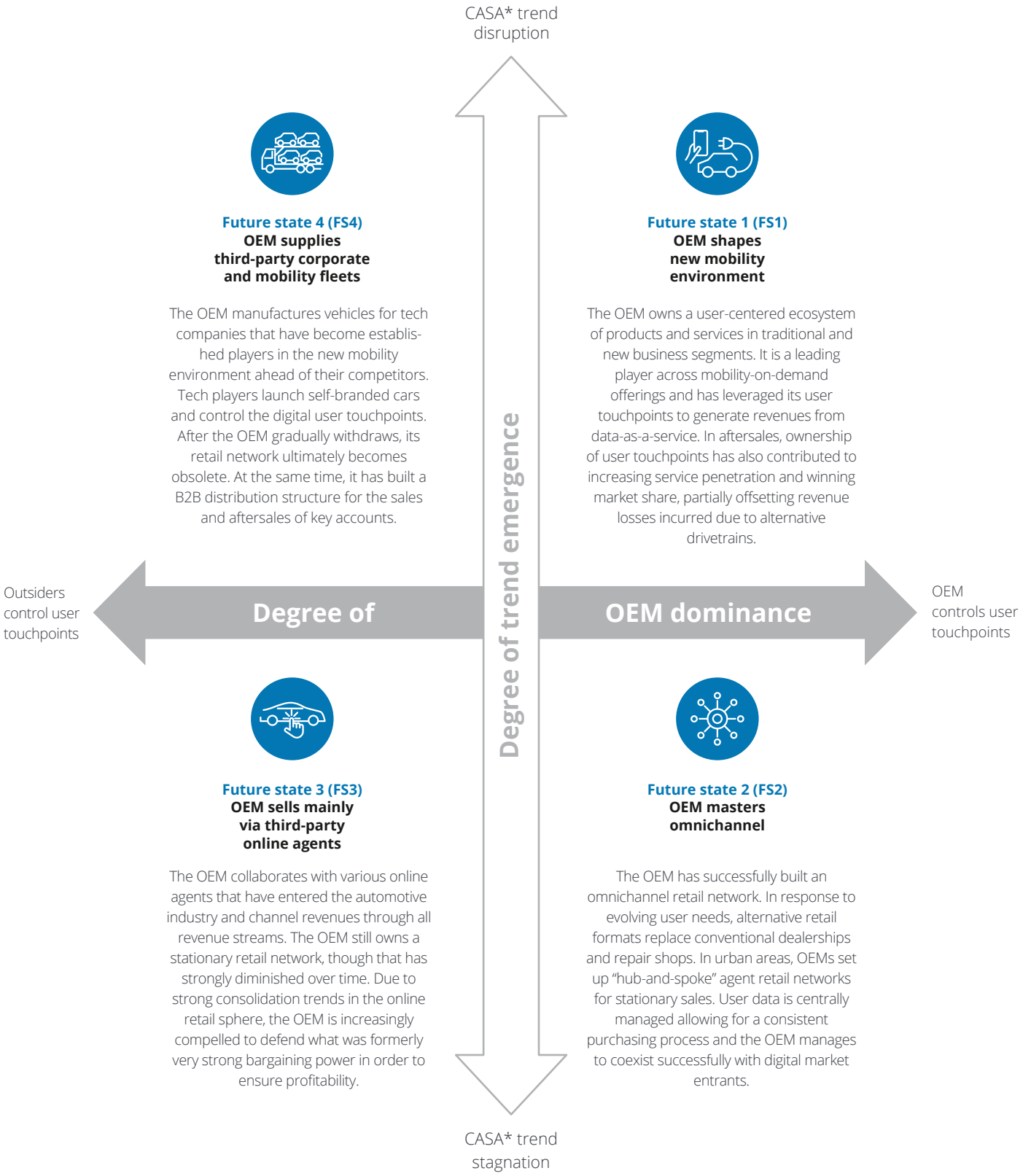
Future states with trend disruption

Where trend emergence is strong in CASA, OEMs are under even more pressure to transform if they want to prevail in a new mobility environment. There will be a strong consolidation and a "winner-take-all" market dynamic in new business segments at the user interface, along with strong challengers among the new "digital native" competitors. The OEM will need to invest heavily in distant capabilities and preserve them if they want to reach future mobility users through digital touchpoints. The OEM might also decide to avoid making significant changes to the business model and maintain a vehicle-centered ecosystem, establishing partnerships with mobility service providers and online retailers to respond to the new business segments.

If this is the case, the OEM will have to sacrifice its ties to end users of mobility services and work instead to build a direct key account sales structure. This transformation will not be easy, due to cost-driven competition and further consolidation. The OEM must exploit economies of scale by expanding volume through acquisitions and partnerships or by building production facilities. It will also have to invest heavily in new vehicle technology (connectivity, autonomous driving technology, alternative drivetrains) to avoid being displaced by current suppliers.

In any future state, the OEM has to transform significantly to gain market share and defend against competition.

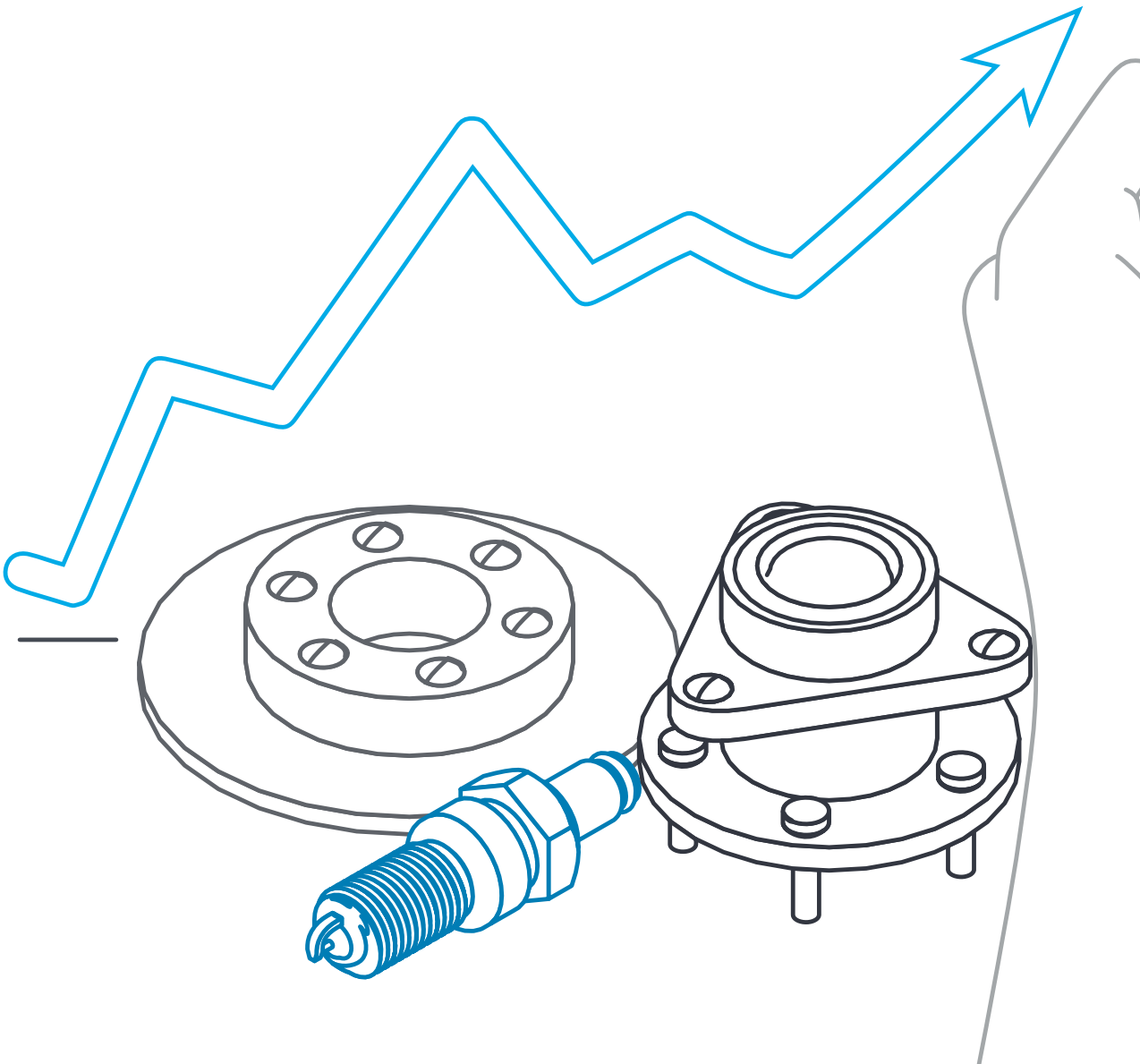
Figure 14. Future states in 2035 – Descriptions



* CASA = Trends of connectivity, alternative drivetrains, shared mobility and autonomous driving

Qualitative and quantitative evaluation across business segments

In this chapter, we go through each business segment to show how the trends affect these businesses qualitatively and quantitatively on a granular revenue stream level within the future states. The results shown are the output of a flexible tool to forecast the revenue and profit pool developments.

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Evaluation approach

As the goal of this study is to facilitate decision-making in the face of uncertainty, it is essential that we quantify projected shifts and their implications for the automotive industry. Therefore, as an integral part of this study, we designed a model to assess the quantitative implications of all four future states on OEM revenues and profit pools.

1. Definition of a proxy OEM

To lay the foundation for our quantitative model, we defined a proxy OEM. This proxy OEM represents a fictive average of a Chinese, US, Japanese, and European OEM. However, performing the analysis from an OEM perspective allows us to illustrate implications of the future industry trends better. Sources include public data as well as Deloitte industry data.

2. Calculation of baseline 2018 revenues and profits

The 2018 baseline revenues represent averages of different OEMs as stated in the definition above. We consider profits in terms of contribution margin (the selling price per unit minus the variable cost per unit). To research 2018 financials, we looked at price and quantity levers within revenue substreams and allocated values based on data in the public domain and our internal knowledge database.

3. Forecast of base case 2035

To forecast the 2035 base case revenues and profits, we created a base-case scenario of trend emergence and applied it to all price and quantity levers. Beyond that, we factored macroeconomic and demographic changes into our base case forecasts. The base case reflects the expected case of our model using the assumptions deemed most likely to occur. Furthermore, the proxy OEM does not engage in radical corporate transformation activities and continues operations as in the past. The forecasts do not account for inflation. The sources comprise existing Deloitte studies and tools, information in the public domain, and investor reports, as well as expert interviews with clients and thought leaders.

4. Forecast of future state variations 2035

As a next step, we developed both stagnant and disruptive scenarios of industry trend emergence and adjusted our base case in both directions. The resulting addressable markets were given an OEM share depending on the OEM's ability to channel revenues via its own sales network. Both our assumptions on the maturity of industry trends and the ability of an OEM to capture traditional and future revenues were used to determine the four future states.

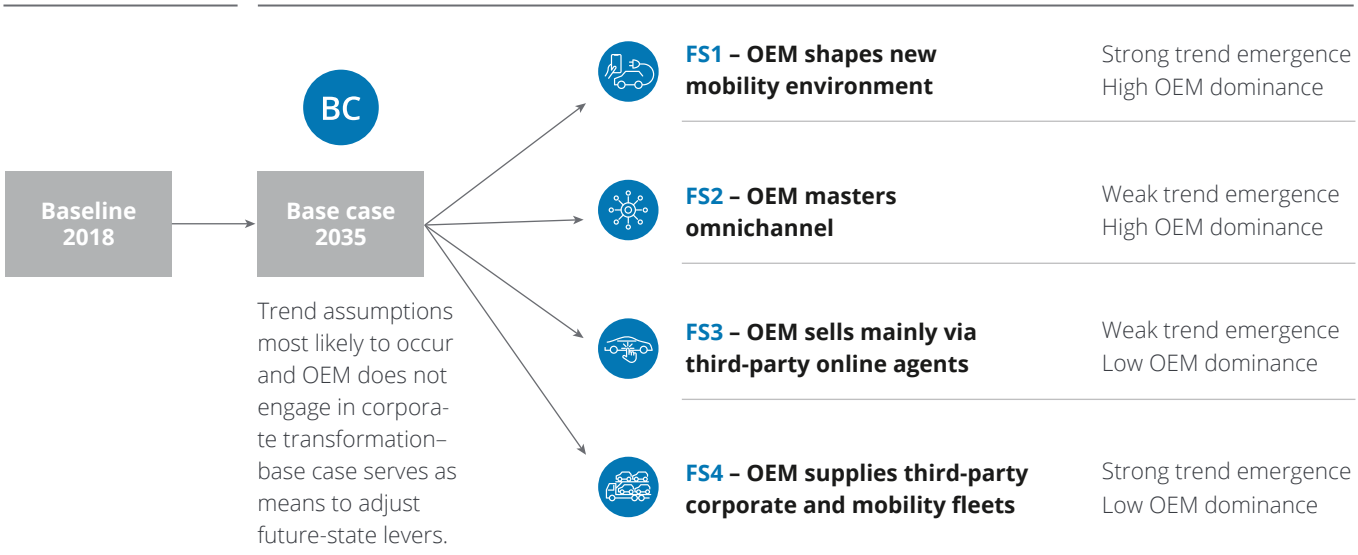
We determined the trend effects by deriving and quantifying the causal effect of trend drivers on all revenue stream levers using research methods, such as regression analysis and expert insights. We looked at each price and quantity lever within the revenue substreams and analyzed how each trend would affect them. See figure 16 for selected levers that have been analyzed.

5. Consolidation in simulation tool

To reflect strategic choices and different perspectives, we developed a simulation tool that uses concrete OEM figures to calculate the implications of various strategic decisions. The tool, which was developed by the Deloitte Analytics Institute, can be adapted to defined vehicle segments, geographic markets of interest, desired time horizons, and the degree to which users believe particular industry trends are likely to emerge.

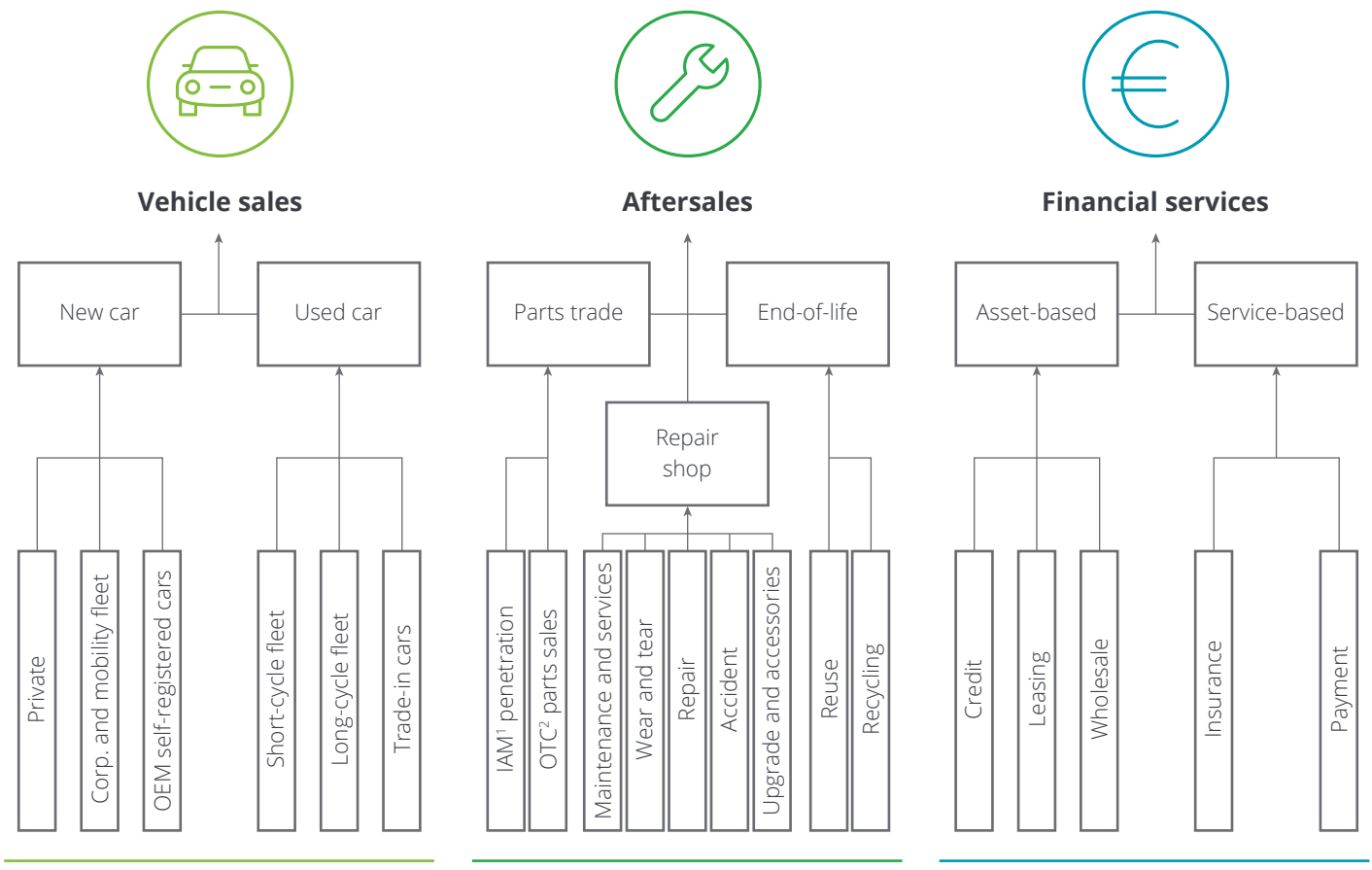
The tool is set up flexibly to be adjusted to OEM needs. Baseline and assumptions can be adjusted, granularity can be extended (such as vehicle segments), and business segments can be restructured or added according to an OEM's organizational structure.

Figure 15. Illustrative approach



Methodology
In order to calculate OEM revenues and profits, we analyzed for each revenue stream how levers react to the emergence of industry trends.

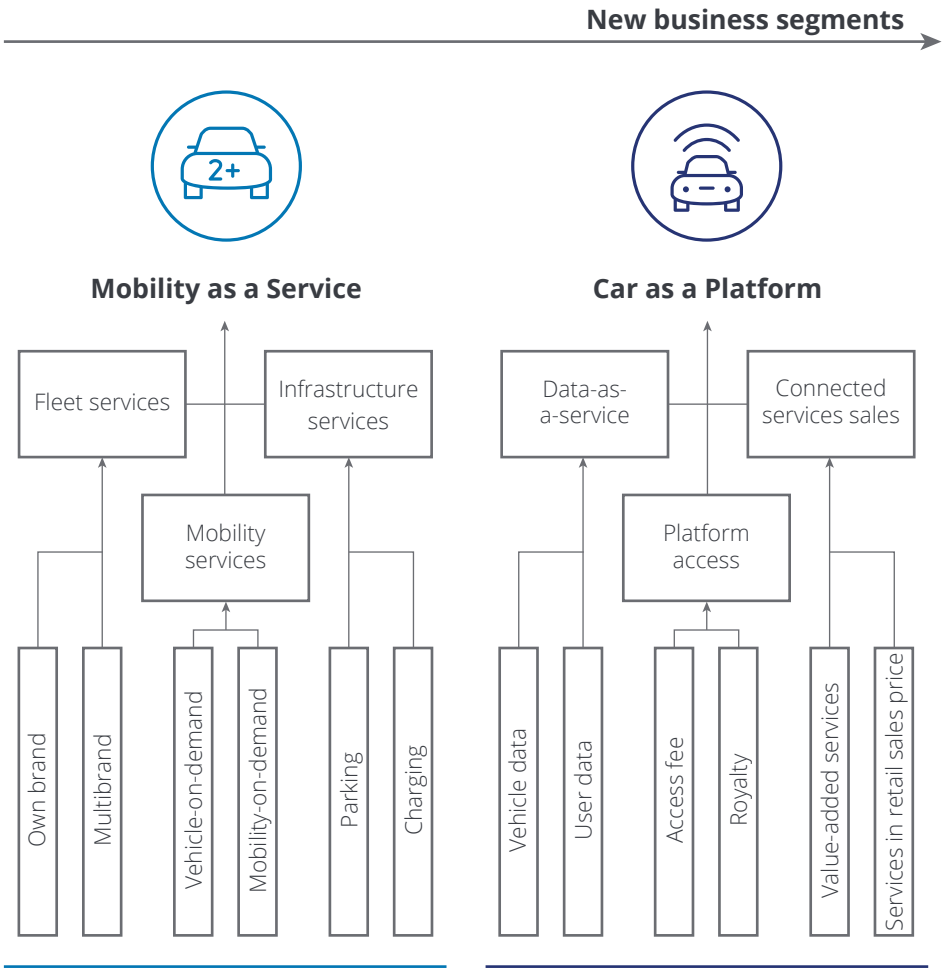
Figure 16. Proxy OEM revenue tree



☐ Revenue (sub)streams – Definition overview of revenue substreams on page 16

Exemplary levers

Vehicle sales volume	Average ticket size	Penetration rate
Average vehicle price	Number of repair shop visits	Asset value
Contribution margin	Parts and labor share of ticket size	Average duration of contracts
...	...	...



Passenger waiting time	Commission fee
Mobility fleet operating costs	Share of service subscriptions
Modal transport split	Data market value
...	...

[1] Independent aftermarket
[2] Over-the-counter

BC

Base case
In the base case, the proxy OEM will increase its revenues from $96 billion in 2018 to $146 billion in 2035, growing at a yearly rate of 3 percent.

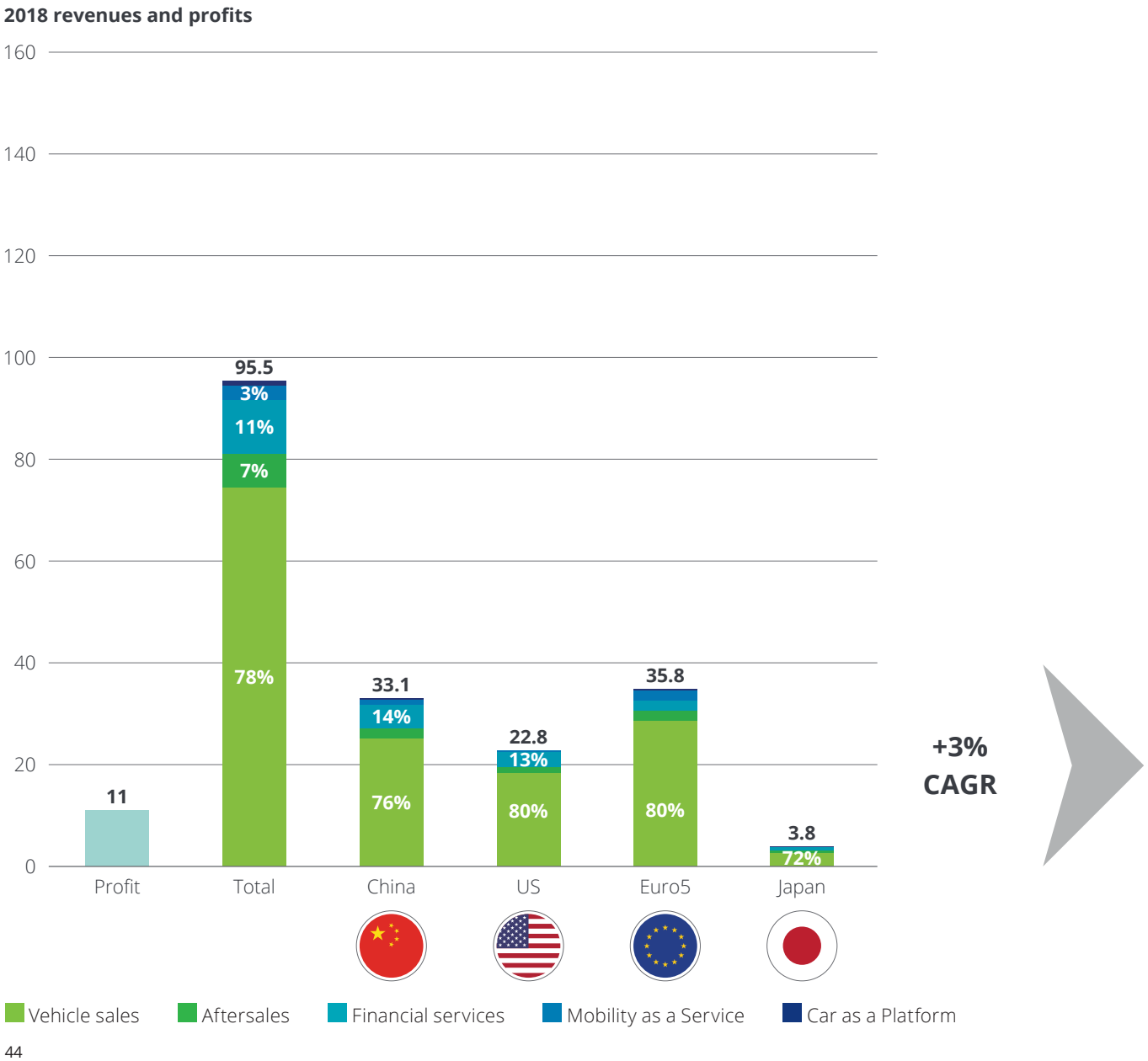
In 2018, traditional business segments still constitute 97 percent of overall revenues. In a base case, this figure decreases to 83 percent by 2035.

Mobility as a Service gains importance, in particular, generating $19 billion in total revenues in 2035.

From a regional market perspective, China is the main driver of future growth and is responsible for around 83 percent of future revenue growth.

The United States, Euro5, and Japan grow rather slowly. For instance, Japan and Euro5 lose absolute revenues in traditional business segments and will only grow due to the proxy OEM's participation in new business segments.

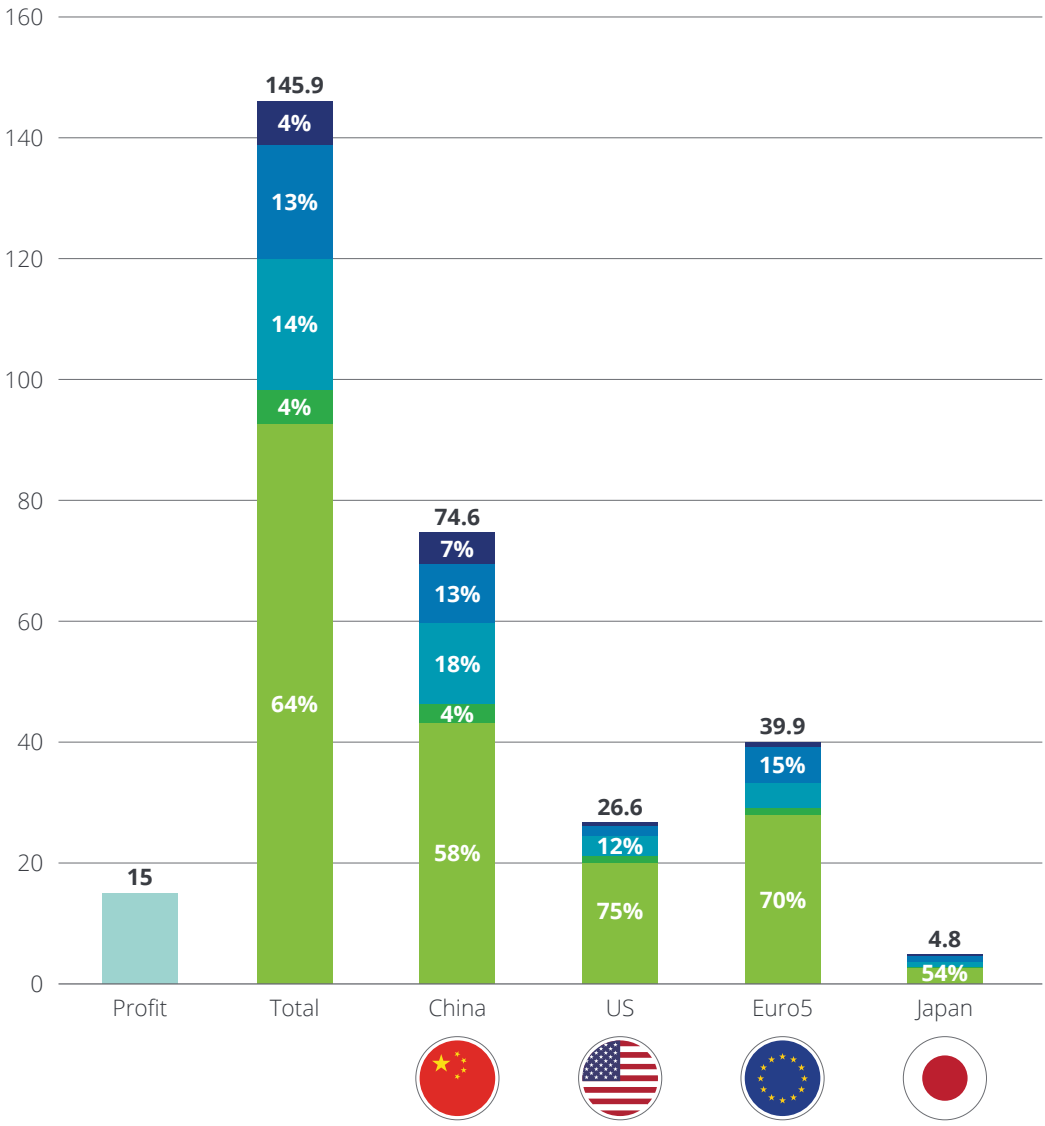
Figure 17. Global revenues and profits (in $B) of proxy OEM in 2018 and base case 2035



Contribution margin is expected to grow absolutely from $11 billion to $15 billion; however, relative contribution margin is expected to decline.

Without significant transformation, OEMs will struggle to remain as profitable as today.

2035 base case revenues and profits



Numbers may not equal total shown due to rounding.

Overview of business segments
The following section offers an in-depth analysis of the future developments along all five OEM business segments.

Although we conducted a financial simulation for all future states, our main focus is on the base case figures, with examples of different manifestations across other future states in selected cases. We will show how industry trends affect the OEM business segments on a granular revenue stream level in each business segment.

Figure 18. Base-case figures

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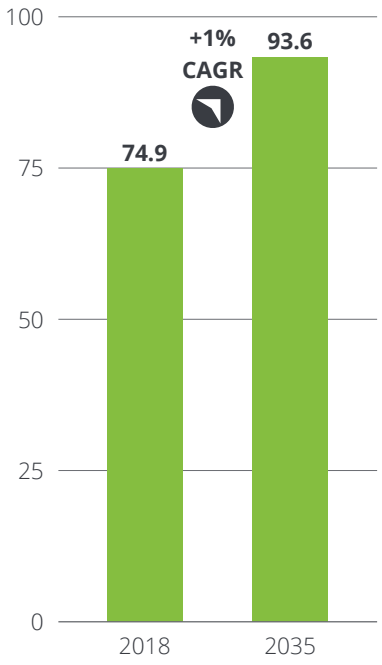
Vehicle sales

Revenues (in $B) in 2018 and 2035



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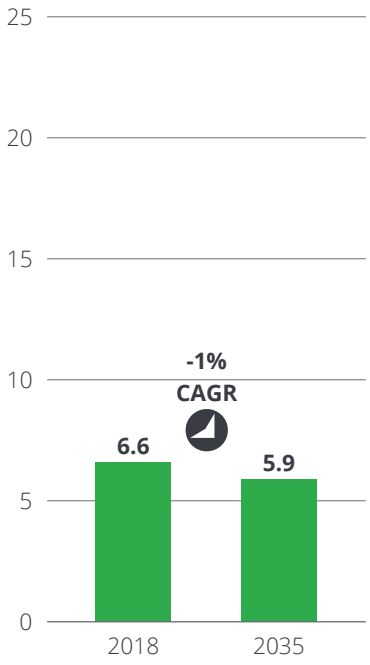
Aftersales

Revenues (in $B) in 2018 and 2035



Revenue streams

New car
Revenue growth 2018–2035 **+2% CAGR**

Used car
Revenue growth 2018–2035 **0% CAGR**

Parts trade
Revenue growth 2018–2035 **+3% CAGR**

Repair shop
Revenue growth 2018–2035 **-2% CAGR**

End-of-life
Revenue growth 2018–2035 **+31% CAGR**

Numbers may not equal total shown due to rounding.

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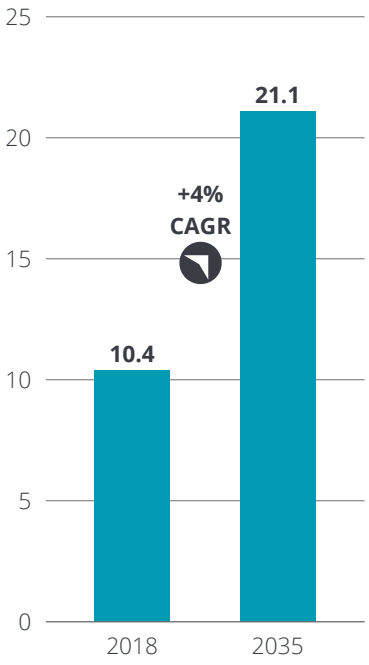
Financial services

Revenues (in $B) in 2018 and 2035



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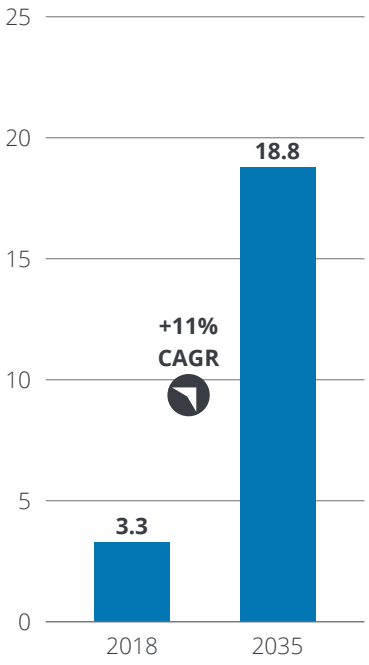
Mobility as a Service

Revenues (in $B) in 2018 and 2035



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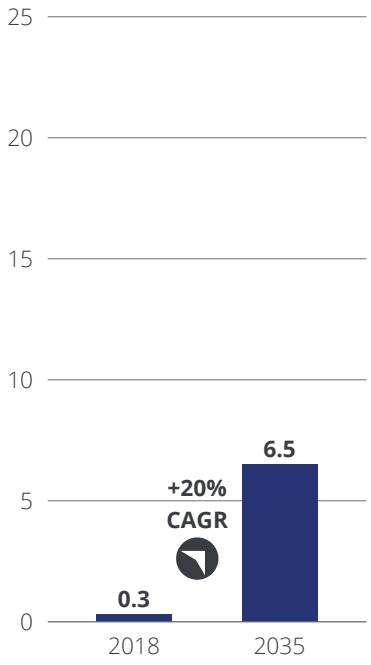
Car as a Platform

Revenues (in $B) in 2018 and 2035



Asset-based
Revenue growth 2018–2035 **+4% CAGR**

Service-based
Revenue growth 2018–2035 **+3% CAGR**

Fleet services
Revenue growth 2018–2035 **+1% CAGR**

Mobility services
Revenue growth 2018–2035 **+14% CAGR**

Infrastructure
Revenue growth 2018–2035 **+19% CAGR**

Data-as-a-service
Revenue growth 2018–2035 **+43% CAGR**

Platform access
Revenue growth 2018–2035 **+35% CAGR**

Connected services sales
Revenue growth 2018–2035 **+19% CAGR**

1. OEM shapes new mobility environment

Where the trend emergence is strong, the OEM can more than double its revenues as the OEM is able to actively shape the new mobility environment. First, the OEM gains market share in traditional business segments through the ownership of user touchpoints and a strong offering for fleet customers; and second, it has successfully transformed to become a Mobility as a Service and Car as a Platform provider.

2. OEM masters omnichannel

In a future state where the OEM masters omnichannel, revenues increase strongly. Overall profit margin (contribution margin) is around 13 percent, or $22 billion. The OEM can coexist successfully with digital market entrants and even saves on retail costs through its direct sales channel structure. New business segments will make up only a small fraction and constitute 13 percent of total revenues.

3. OEM sells mainly via third-party online agents

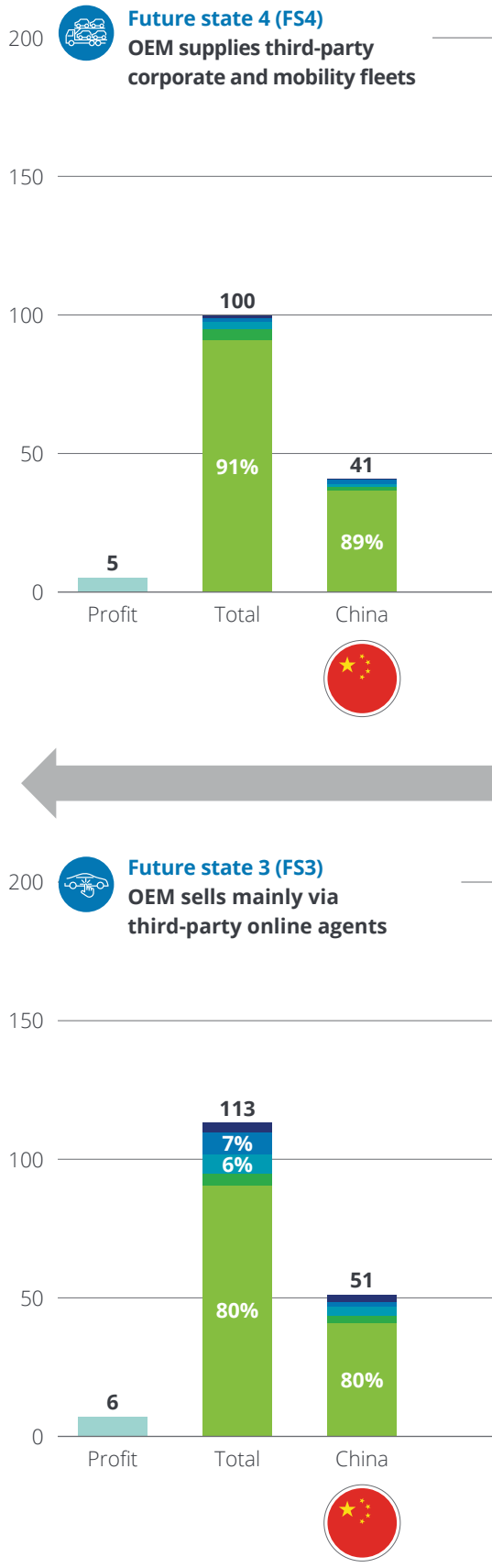
In this future state, profitability suffers from strong consolidation trends in the online retail sphere and the increased OEM dependence on nonproprietary sales channels. The contribution margin in this future state amounts to around 5 percent. The OEM also loses overall market share in traditional business segments.

4. OEM supplies third-party corporate and mobility fleets

In this future state, new business segments remain mainly untapped, and the OEM primarily generates revenues from vehicle sales. Economies of scale and high-quality components have allowed the OEM to sustain that future state. Still, profitability is difficult to manage, since large fleet customers have strong negotiation power.

Figure 19 shows the revenue and profit development in four scenario narratives. In the following business segment deep dives, we will use the base case as orientation. (See page 40 for a detailed definition of the base case.) In the two new business segments, Mobility as a Service and Car as a Platform, we will also analyze future state 1 (FS1), as these segments are expected to reach a significant contribution only in a disruptive scenario and where the OEM managed to transform itself into a leader within the new mobility environment.

Figure 19. Revenues and profits of proxy



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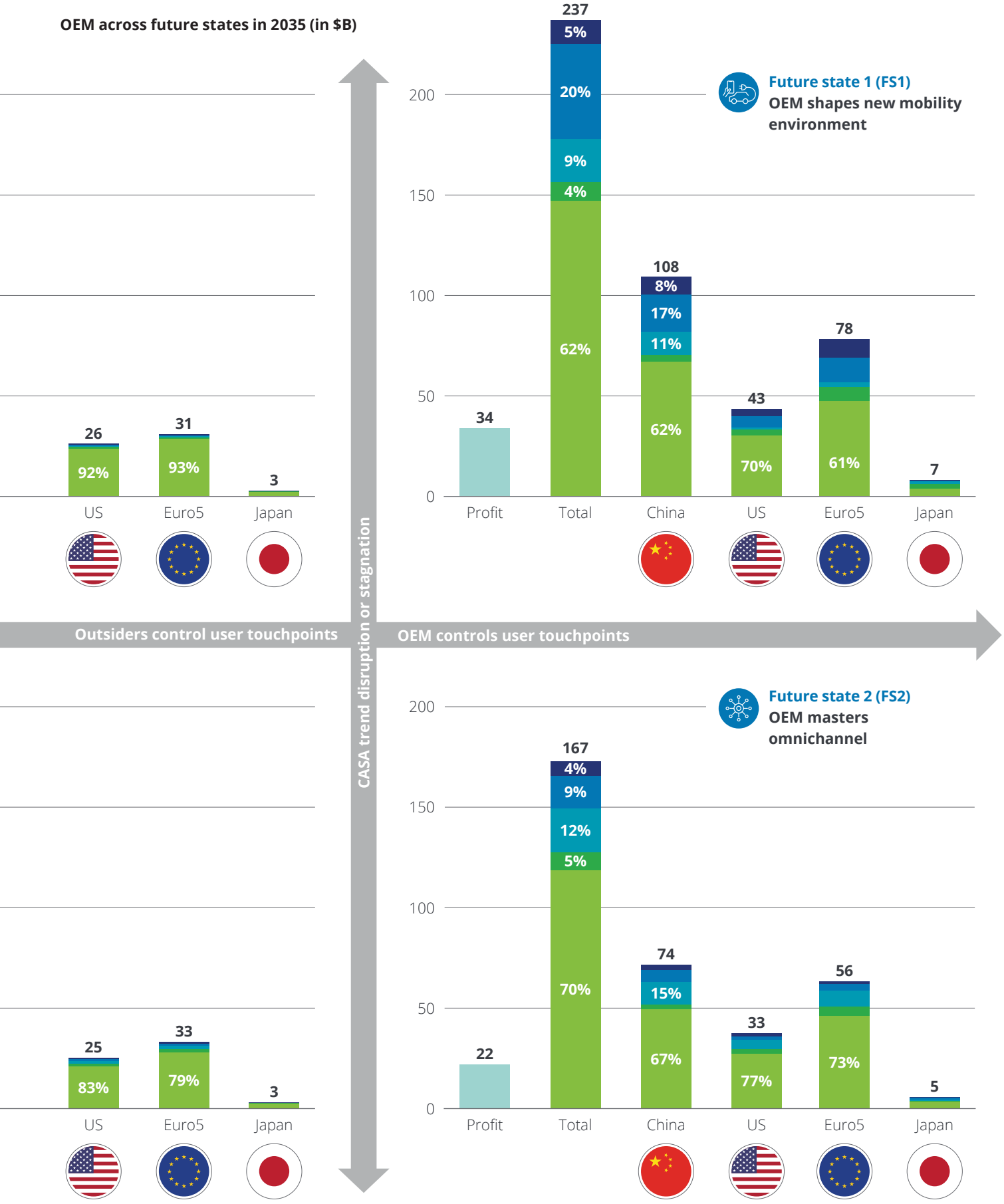
OEM across future states in 2035 (in $B)



Vehicle sales

Summary

- The overall vehicle sales of the proxy OEM would grow by 25 percent in a base case. Major growth comes from China, but the United States is also growing slightly. Euro5 and Japan show declining revenues in both new car sales and used car sales.
- Main drivers are macroeconomic trends such as wealth, demography, and urbanization, but a shift from private ownership to shared usage likewise is expected to affect vehicle sales. The degree of this effect strongly depends on the CASA disruption and also the market in question.

Technological development further affects prices (such as increasing standardization of features) and eventually the contribution margin.

Figure 20. Revenues (in $B) from 2018 to 2035 of proxy OEM by revenue streams

	2018	Base case 2035	OEM shapes new mobility environment	OEM masters omnichannel	OEM sells mainly via third-party online agents	OEM supplies third-party corporate and mobility fleets
New car	61.0	80.0	127.5	98.2	77.7	82.7
Used car	13.9	13.5	20.2	19.4	12.6	8.7
Total	**74.9**	**93.6**	**147.7**	**117.6**	**90.3**	**91.5**

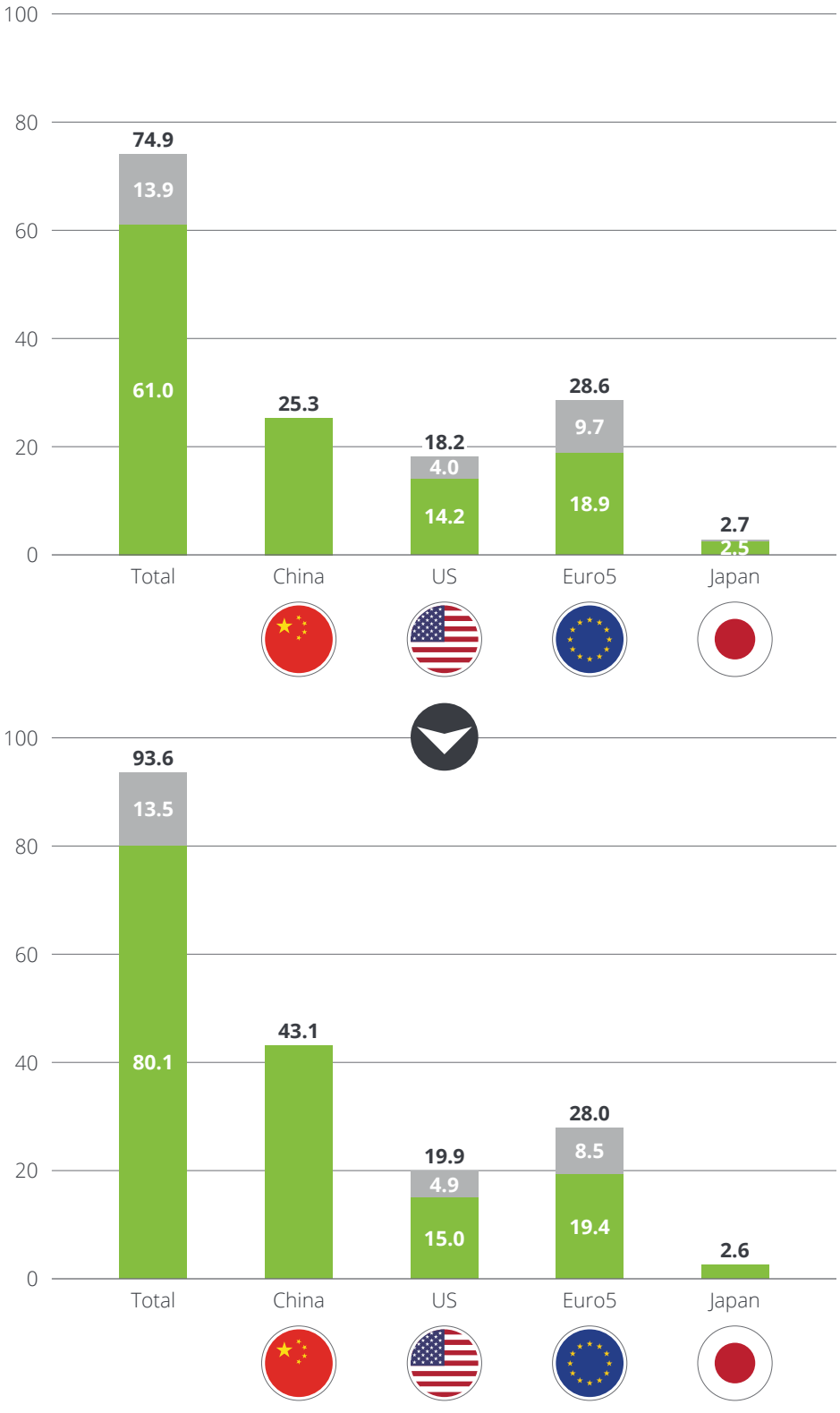
Numbers may not equal total shown due to rounding.

The overall vehicle sales of the proxy OEM would grow by 25 percent in a base case.
The major growth in vehicle sales comes from China, while US prospects in vehicle sales are moderate but positive as well. Only Euro5 and Japan show declining sales.

In the following chapter, we will dive deeper into the effects that we have identified and quantified to provide a better understanding of developments.

The trend effects can be broken down into volume and price effects.
Future trends affect vehicle sales business by raising or lowering unit sales or increasing or decreasing prices. On the following pages, these effects will be examined in more detail.

Figure 21. Revenues (in $B) in 2018 and 2035 of proxy OEM by revenue streams (base case)



Numbers may not equal total shown due to rounding.

Related content

Overall global vehicle sales development across markets

Macroeconomic drivers
The data sets used for the general vehicle sales forecast were based on a previous analysis done by Deloitte. Since the vehicle sales forecast is a major and very sensitive factor in the model, this report will provide deeper insights into the relevant methodology and results.

The initiative analyzed, based on the multivariate time series regression, vehicle sales of the past 20 years to forecast vehicles sales of the next 20 years. Therefore, a three-pronged approach was conducted:

Data collection
of the 49 countries regarding vehicle sales and trend effects

Regression analysis
including three models for total sales, premium sales, and volume sales

Forecast
with the help of preceding data and upcoming trends

The following factors were considered:

- Wealth
  Household income and GDP per capita
- Urbanization
  Population density
- Demography
  Percentage of the working population to the total population
- Infrastructure
  Road and real network
- Automotive affinity
  Individual acquisition rate of new cars ("country fixed effects")

The research explicitly highlights the results of 12 countries, including the selected focus markets of this study: China, the United States, Euro5, and Japan.

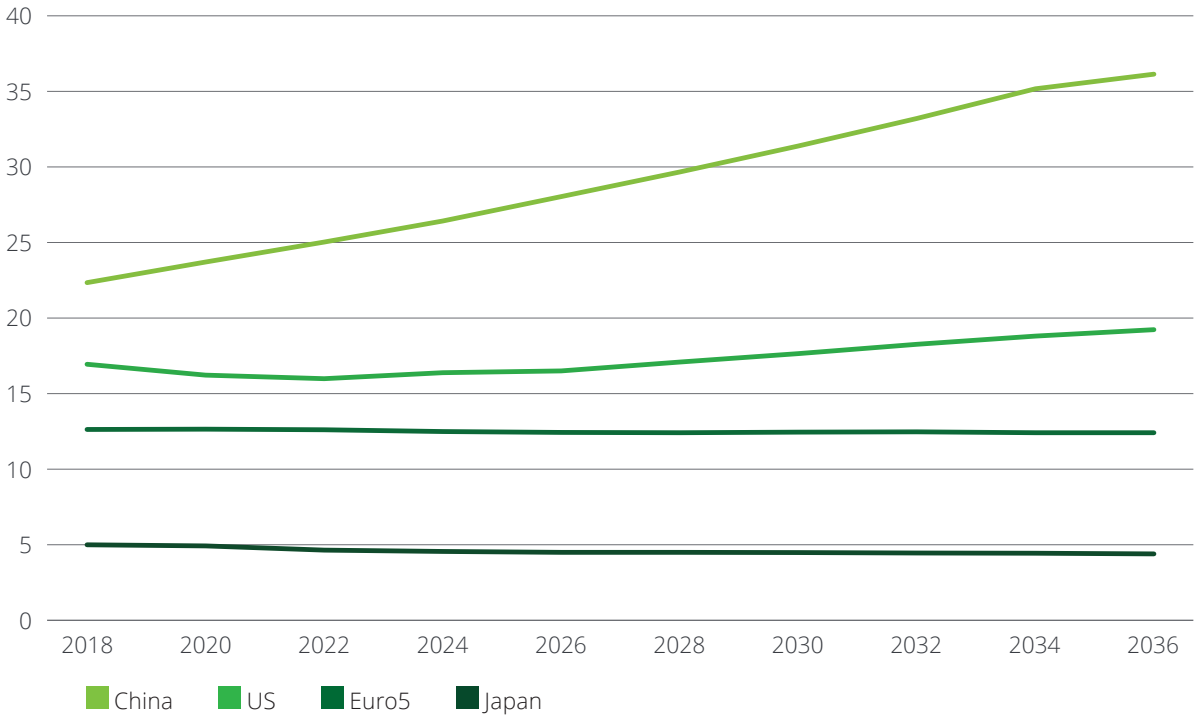
The United States shows a moderate growth of 14 percent, with a particular high growth in premium cars of 40 percent.

In all of Europe, new car sales will grow, as this development is mainly a result of the strong increase of sales in Eastern Europe (Russia and Poland).

China and India are the main growth drivers for total vehicle sales in the Asia-Pacific region. China shows an increase of 62 percent in total new vehicle sales until 2035 due to an unsaturated market (only 20 percent of the Chinese population currently has a vehicle), on par with a strong increase in wealth and income. In comparison, Japan shows a decline in total vehicle sales by 13 percent. While the premium sales are not affected by the decline in total sales, they remain mainly the same. The reason for this development is mainly the aging population.

Figure 22. Total vehicle sales in China, United States, Euro5, and Japan (in millions of vehicles)

Figures represent total forecasted market volume.
(Individual segments such as premium segment behave differently.)



Numbers may not equal total shown due to rounding.

Shared mobility effect

The effect of shared mobility on the forecast of vehicle sales has already been discussed, and it is expected that the effect to be lower than previously assumed. In Euro5, for example, new car sales would decline only about 1 percent until 2035 due to the emergence of robo-taxis and robo-shuttles.

Three main effects of shared mobility on vehicle sales numbers have been observed:

- **Private vehicle ownership decrease**
  Shared mobility means less private vehicle ownership, which leads to a decline in vehicle sales in the private segment. Vehicle sales to fleet customers will not fully replace the decline in the private vehicle segment, because asset allocation will become more efficient. However, shared mobility services will often complement private vehicle ownership and are restricted mainly to urban areas.

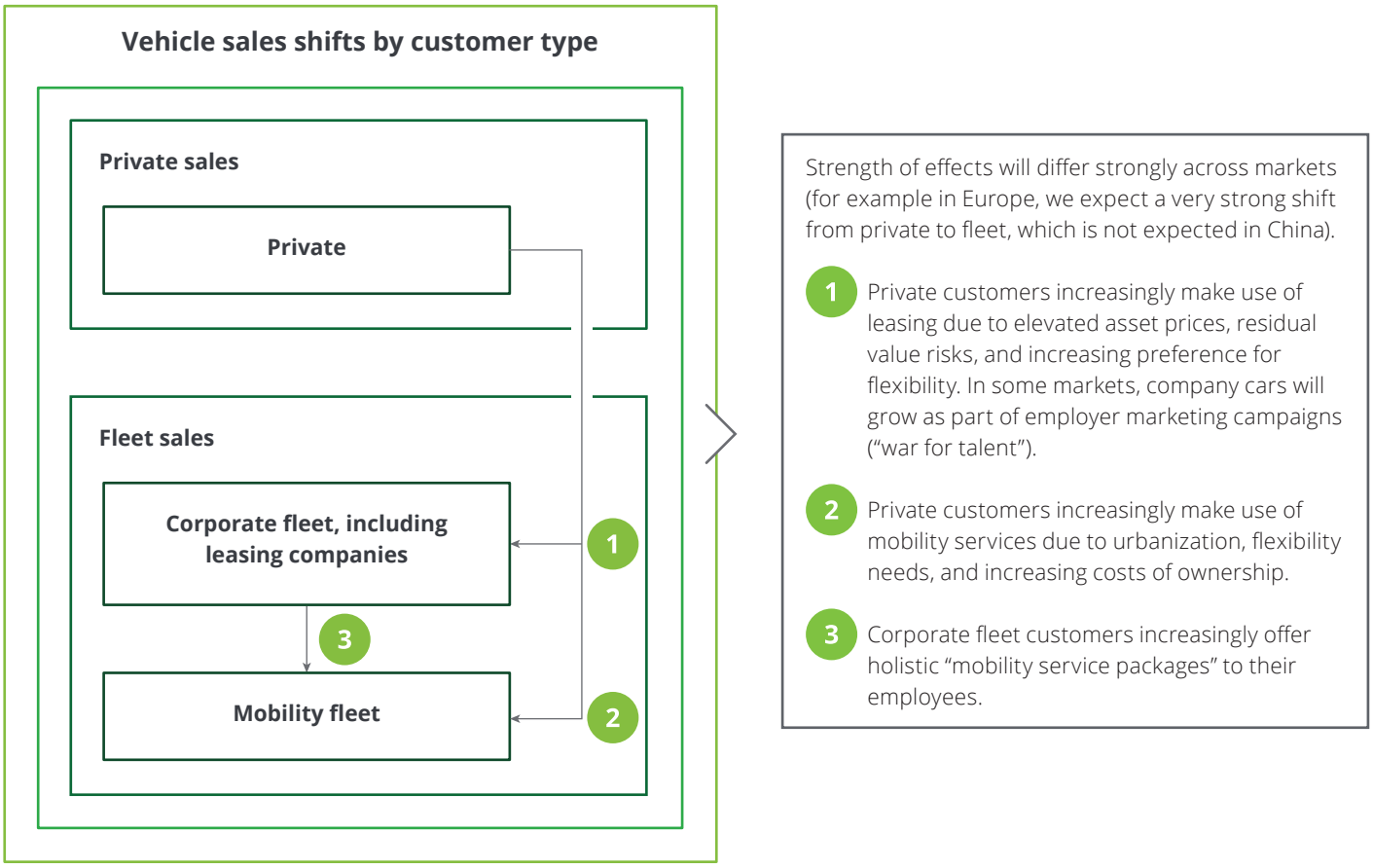
- **Utilization increase**
  Shared mobility increases utilization per vehicle and average kilometers traveled annually per vehicle. This leads to higher abrasion and increasing depreciation, and the replacement rate should have a positive effect on vehicle sales.

- **Shift from private to fleet**
  As figure 23 shows, there is a significant trend toward corporate and mobility fleets, and away from private customers. The corporate and mobility fleet business increases with growing shared mobility offerings, a shift away from private customers toward leasing, and growth in corporate leasing and corporate mobility offerings (such as mobility vouchers and employee shuttles).

Industry consolidation

Strong competition from either traditional competitors or new market entrants will put pressure on the margins, and not all OEMs will be able to cope with that. It is assumed that the proxy OEM benefits moderately from the excess market share as other OEMs perish.

Figure 23. Global OEM new car sales by customer type



Price effects

A major expected price effect comes from rising vehicle list prices due to higher integration of autonomous and connected hardware components, such as light detection and ranging (LiDAR), sensors, radar, and cameras. The question is whether customers are willing to pay for that premium. In addition, there is an assumption that ICE and plug-in hybrid electric vehicles (PHEVs) will experience declining prices because consumers increasingly prefer BEVs. This effect could be driven by regulatory decisions, as well as consumers' increasing environmental awareness coupled with the negative reputation of ICE vehicles. Another factor that puts pressure on prices and thus contribution margins is the shift toward fleet customers, who have much stronger bargaining power than private customers. General price effects and inflation were not considered in our revenue and profit simulation.

Used car business

In terms of volume, the used car business is directly correlated with new car sales. For our proxy OEM, we assume the OEM does not gain revenues or profits from trade-in business (purely dealer business)–only from remarketing cars, either from long-cycle fleets or short-cycle fleets. On the one hand, it is assumed that with an increasing fleet share, the used car volume will increase. On the other hand, new concepts such as lifetime leasing are on the rise, where the car remains in the possession of the vehicle or mobility provider until the vehicle's life cycle ends. These are general trends that we anticipate; however, the used car market differs significantly across markets, and future developments depend on the OEM's used car strategy in that market.

The Chinese market is not only one of the central markets globally, but also one of two major drivers for the Asia-Pacific region (besides India). Our proxy OEM will achieve revenue growth of 70 percent in the Chinese market, indicating a CAGR of 3 percent. Premium vehicle sales will increase, too, leading to 8 percent of total vehicle sales. Development for new car sales is mainly driven by the following factors:

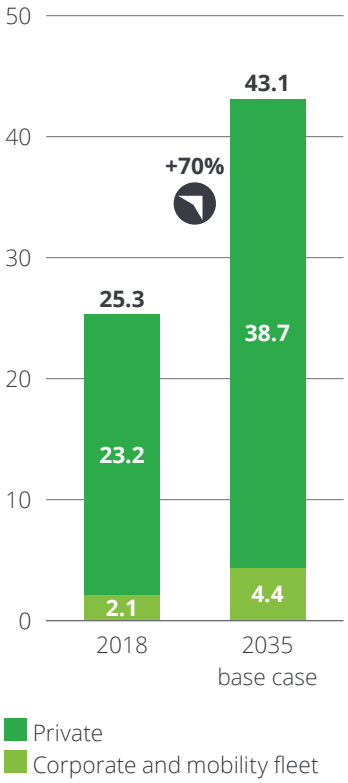
First, low vehicle density provides a huge opportunity because roughly 80 percent of the Chinese population do not own a vehicle–compared to mature markets such as Europe and the United States. The average number of vehicles per household also is very low in China.

Second, Chinese wealth is increasing, leading to a near-50 percent reduction in low-income households.

Third, Chinese government supports the purchase of new cars, which opens up license plate regulations, lifts purchase restrictions for no-car households, and supports sales in lower-tier cities–especially for alternative drivetrains. Chinese customers are very open to new technologies, such as electric vehicles and connected cars, and are willing to pay extra.

However, we must add that the strong growth of the Chinese market in the next 15 years will still slowly decline in comparison to the past 15 years. Tier 1 and tier 2 Chinese cities are faced with increased populations and a growing total cost of ownership (TCO) per vehicle due to the high cost of parking spaces and other restrictions. Moreover, mobility services are growing as an appropriate alternative to private car ownership.

Figure 24. Revenues (in $B) in 2018 and 2035

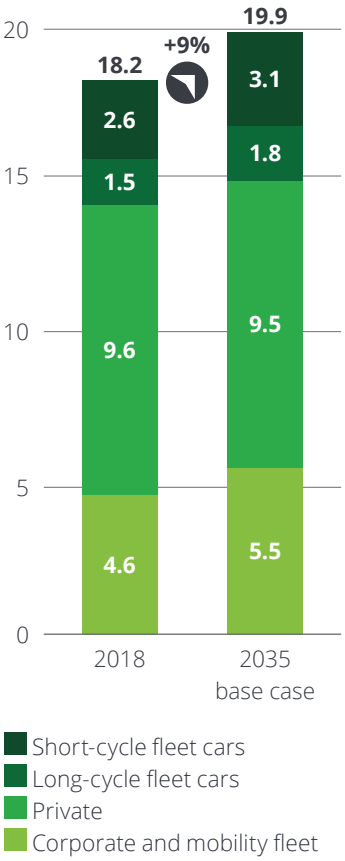


Numbers may not equal total shown due to rounding.

US vehicle sales show a moderate growth of 9 percent due to an increase in corporate and mobility fleet, as well as remarketing cars (short- and long-cycle).

The US population is forecasted to grow by roughly 15 percent until 2035. The growth is mainly driven by rural and suburban areas, which favor vehicle sales. The proportion of premium sales to total vehicle sales only slightly increases from 11 percent in 2019 to 13 percent in 2035. Rising consumer preferences for leasing, with diminishing contract lengths, pushes more used cars into the market. In addition, the rejuvenation of the used car offering increases residual values. Moreover, the geographic conditions in the United States favor individual mobility, which explains the high proportion of sales to the private customer segment.

Figure 25. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

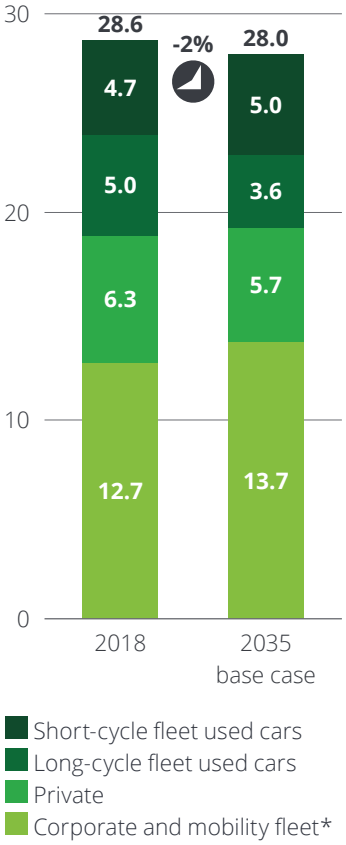
The European market (Euro5) as a whole shows declining vehicle sales figures for several reasons.
First, the aging and simultaneously shrinking population leads to a lower base of potential customers purchasing a vehicle.

Second, increasing urbanization with shared mobility is expected to lead to a decrease of private vehicle sales and a shift toward corporate fleets, especially short-cycle fleet used cars. We will also see customer shifts within the fleet segment (for example, corporate customers who add mobility services to their employee benefits program).

However, the outlook is not all negative. Increased household income favors premium car sales and often causes car prices to rise. The share of households with annual incomes above $75,000 is expected to increase from 13 percent in 2019 to 33 percent in 2035. In 2035, every third new vehicle sale is a premium vehicle in Western Europe.

Beyond these first two reasons, increasing the amount of standard technology built into new cars also has a positive effect on prices. List prices may rise due to higher standards and drive revenues upward.

Figure 26. Revenues (in $B) in 2018 and 2035



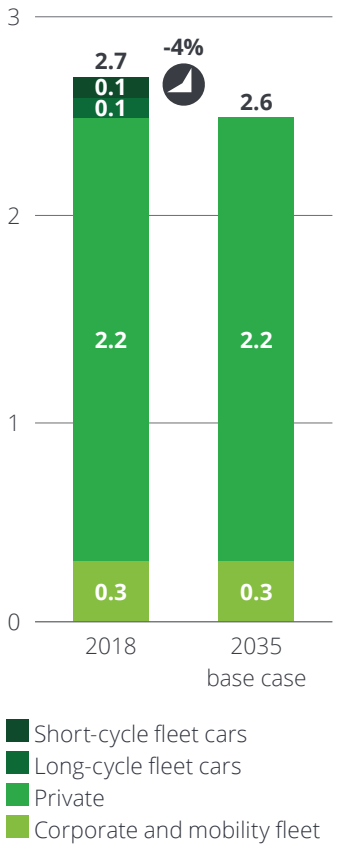
Numbers may not equal total shown due to rounding.

* Includes OEM cars in this illustration

Of our selected countries in this report, Japan shows the highest decline in vehicle sales by 4 percent until 2035.
Decline is mainly due to an aging population. Additionally, Japan expects to face an urbanization rate that increases up to 94 percent, shaving off new vehicle sales. A changing fleet mix is also expected to affect prices negatively.

The used car demand likewise is affected by these factors analogously–on average, a 5 percent shorter vehicle lifetime and an 8 percent increase in average holding periods. The revenue decline is slightly offset by 5 percent higher average retail sales prices, which are pushed down by new vehicle sales.

Figure 27. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

In order to realize significant future growth and profitability, OEMs need to succeed in China and require a comprehensive transformation of the current retail networks in all markets.

Regardless of the strategic future state that OEMs target, they need to build a direct sales model globally.
Across all future states, OEMs will need to implement a direct sales model to serve changing customer demands. Fleet customers will constitute a large revenue share of the customer segments, as we have shown, and an indirect sales model will not sufficiently serve this target group. Instead, fleet customers require a competitive direct sales offering that is flexible enough to adapt to their respective industries, key account distribution structures, and logistics optimization.

Beyond that, the OEM retail network in its current indirect model represents a crucial cost and risk factor, mainly due to the high capital commitment of real estate and cars, in an even more competitive environment.

In order to capture future revenues in the private customer segment, omnichannel transformation is essential.
Current retail structures do not reflect customer expectations in terms of convenience, flexibility, and transparency. As these expectations vary considerably, OEMs need to establish diverse point-of-sale formats. High-tech vehicles require in-depth explanations, and a broad customer base will demand individual customer support and advice throughout the buying process. Alternative retail formats that focus on advising customers as opposed to making vehicle sales will reflect these demands.

In urban areas, designing "hub-and-spoke" networks to centralize customer accounts and secondary activities is recommended. The central hub can serve as the primary point of contact for customer service and manage order allocation, matching points of sale and agents to customers' needs. A centralized cloud infrastructure can also provide transparency along the entire sales funnel.

Aftersales

Summary

- CASA trends will cause a decline in the current aftersales business–alternative drivetrains, in particular, are expected to put the current total profits of the OEM at risk.
- China represents the only growing market in aftersales driven by a strongly growing number of car units in operation.
- In the meantime, the effect of CASA industry trends is expected to be lower on higher-aged vehicles, which are currently dominated by the independent aftermarket.
- Reduced development cycles can lead to increased warranty rates, with retail network capacity increasingly being occupied by warranty cases.

Figure 28. Revenues (in $B) from 2018 to 2035 of proxy OEM by revenue streams

	2018	Base case 2035	OEM shapes new mobility environment	OEM masters omnichannel	OEM sells mainly via third-party online agents	OEM supplies third-party corporate and mobility fleets
Workshop	5.9	4.5	7.2	6.4	2.7	1.9
Parts trade	0.7	1.2	1.4	1.3	1.0	1.1
End-of-life	0.0	**0.1**	0.3	0.2	0.1	0.0
Total	**6.6**	**5.9**	**8.8**	**7.8**	**3.8**	**3.1**

Numbers may not equal total shown due to rounding.

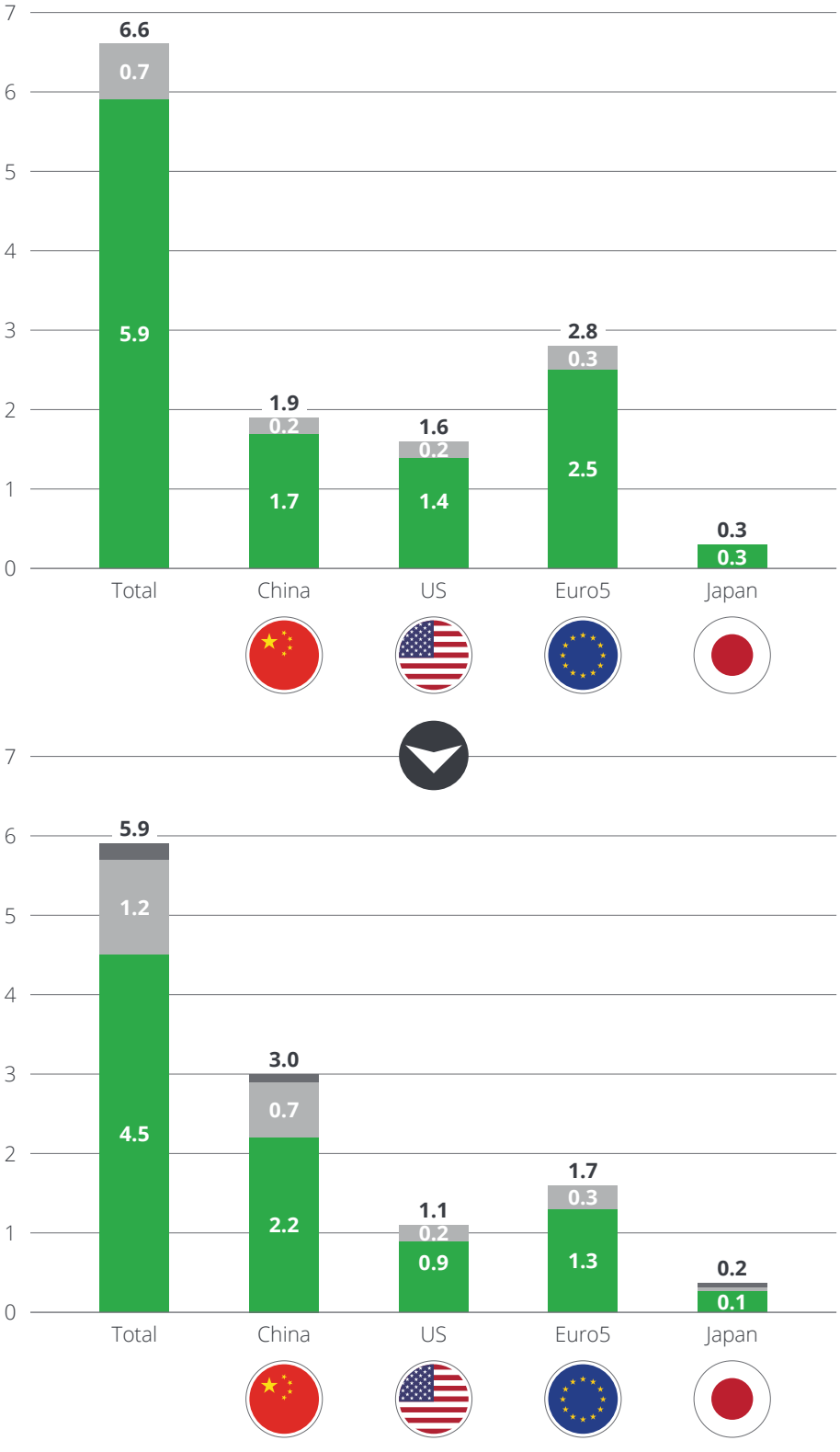
Accounting for approximately 7 percent of the total OEM revenues and a quarter of the total OEM profit today, the aftersales business and its future development are of significant importance.

The outlook for today and the future is not favorable–alternative drivetrains, as well as a changing customer landscape and new sales channels, call for immediate action.

Vehicles at the age of six years and below make up the largest share of the current OEM aftersales business, while the independent aftermarket (IAM) has achieved a significant market share in age seg. II+. CASA trends will lead to a substantial change in the vehicle base currently addressed by OEMs, mainly due to alternative drivetrains in general and electrification in particular.

We also see new customer groups emerging between OEMs and the end customer: online agencies and platforms challenge the OEM's price competitiveness and put downward pressure on OEM profit pools. Increasing customer expectations, increasing relevance of fleet customers, and greater price transparency through online channels will increase the pressure and demand new solutions.

Figure 29. Revenues (in $B) in 2018 and 2035 of proxy OEM by revenue streams (base case)



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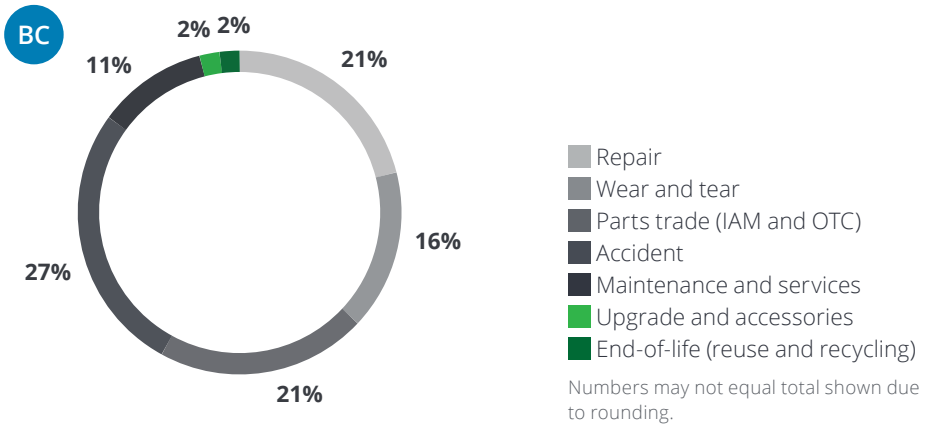
On the following pages, we outline the impact of CASA trends on the OEM aftersales business, first drilling down into the service portfolio mix and then presenting actions OEMs can take to ensure these urgently required measures are implemented.

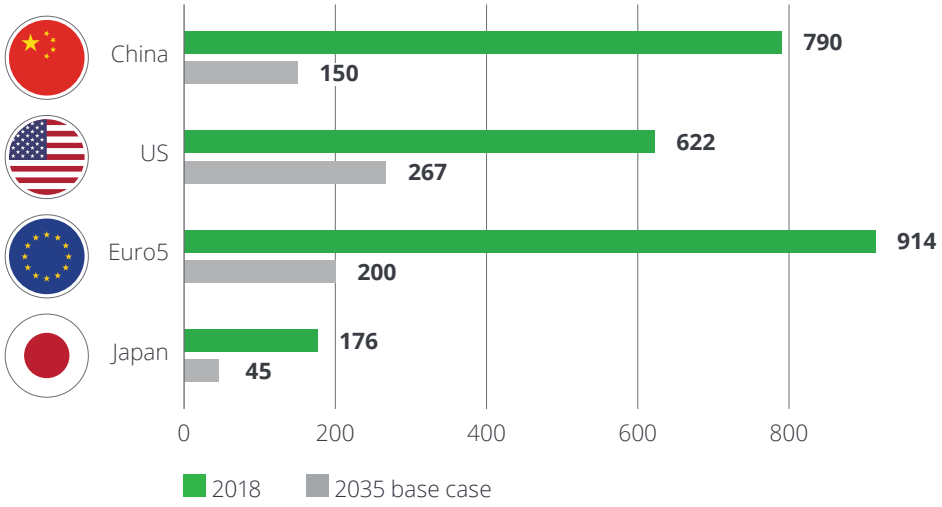
Figure 30. OEM aftersales portfolio mix in revenue share, 2035



Numbers may not equal total shown due to rounding.

Maintenance and services revenues dramatically decrease due to a growing share of electric drivetrains.
The future dominance of alternative drivetrains for OEM customers with vehicles in seg. I and II will cause a significant decline in traditional revenues primarily coming from ICE-related services (such as oil and service). The increased connectivity level in cars with "over-the-air" functionality and software updates will contribute a minor increase in additional revenues, but will not offset the decline.

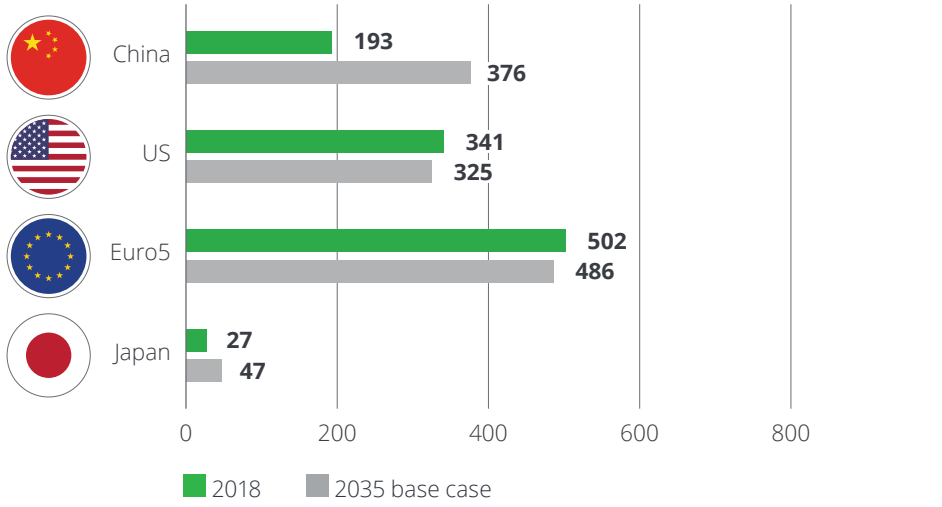
Figure 31. Maintenance and services Base-case revenue development (in $M)



Numbers may not equal total shown due to rounding.

Repair revenues decline due to lower vulnerability of alternative drivetrains and the increased connectivity of cars.
The individual repair costs are expected to increase due to the higher complexity of vehicle platforms. That said, the overall repair revenues will still decline, as alternative drivetrains are less repair-intensive and breakdowns will be less likely to occur because of effective predictive maintenance systems.

Figure 32. Repair Base-case revenue development (in $M)



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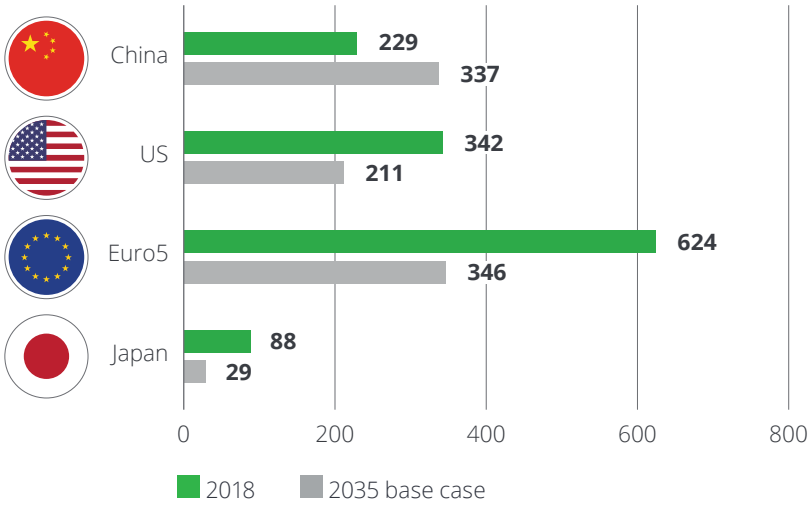
Tires, as the only growing product segment in the wear and tear category, cannot compensate for the decline in other wear parts services.
As one of the few parts with slight growth potential, tires are expected to generate more revenue due to the increase in drivetrain torque and car weight. Other revenues within this category are expected to fall significantly because of fewer moving parts with alternative drivetrains and increased parts quality.

Figure 33. Wear and tear Base-case revenue development (in $M)



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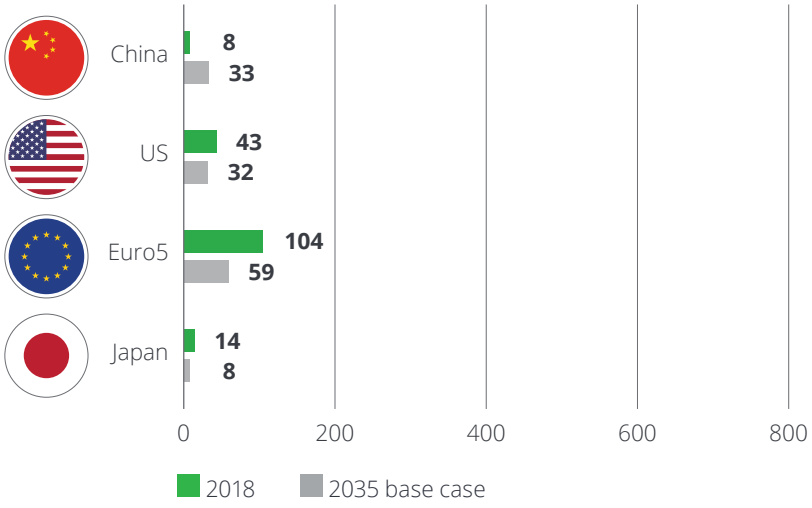
A decline in revenues stems mainly from representation of fleet operators as the largest customer share.
With fleet operators representing the largest customer share of future OEMs, revenues in upgrades and accessories will decline. OEMs pre-fit relevant life cycle technology into fleet vehicles and integrate connectivity functions into vehicle platforms. Regulatory changes will inhibit OEMs' ability to modify and upgrade individual vehicles. Slight growth is expected in upgrading services for connectivity functions and e-mobility accessories.

Figure 34. Upgrades and accessories Base-case revenue development (in $M)



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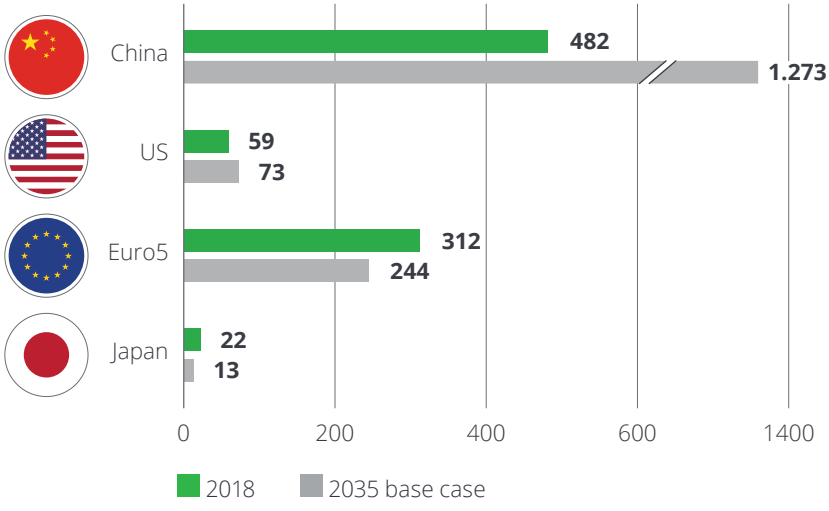
Accident revenues decline mainly as a result of autonomous driving advancements.
Accident rates are expected to drop significantly as the increased levels of ADAS improve human error prevention. Even lower ADAS levels (below level 3), which show an accelerating penetration of car units in operation due to regulatory requirements, are already creating a significant decline in accident rates.

Nevertheless, overall revenues will grow due to an increase in car units in operation in China, and individual customer repair costs will increase due to the higher complexity of vehicle platforms and sensor density. Beyond that, PHEVs and BEVs might face higher total write-offs if the battery is damaged.

Figure 35. Accident Base-case revenue development (in $M)

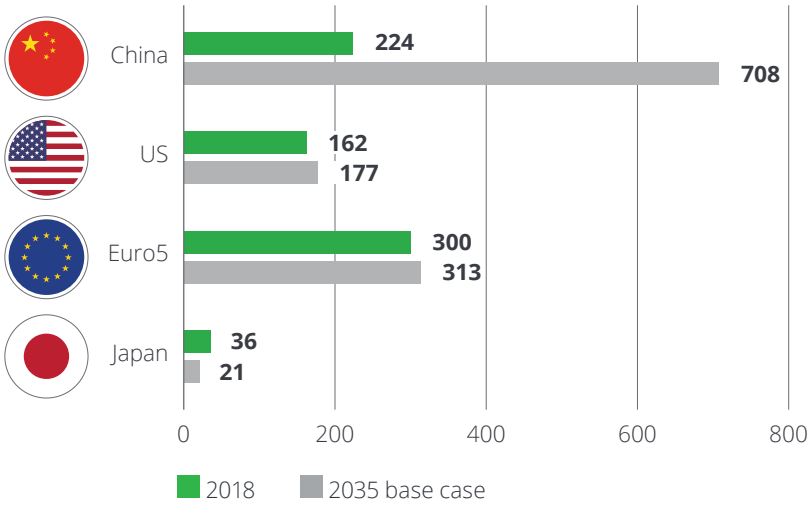


Numbers may not equal total shown due to rounding.

In particular, accident spare parts sales to third parties remain an area where the CASA impact is moderate until 2035.
The parts trade looks set to remain more stable, as every car in the OEM lot is a potential target. Vehicles on the market now will be in Seg. III+ until 2035, enabling OEMs to expand IAM parts sales slightly in certain parts categories thanks to the current speed of innovation and change frequency.

Figure 36. Parts trade

Base-case revenue development (in $M)



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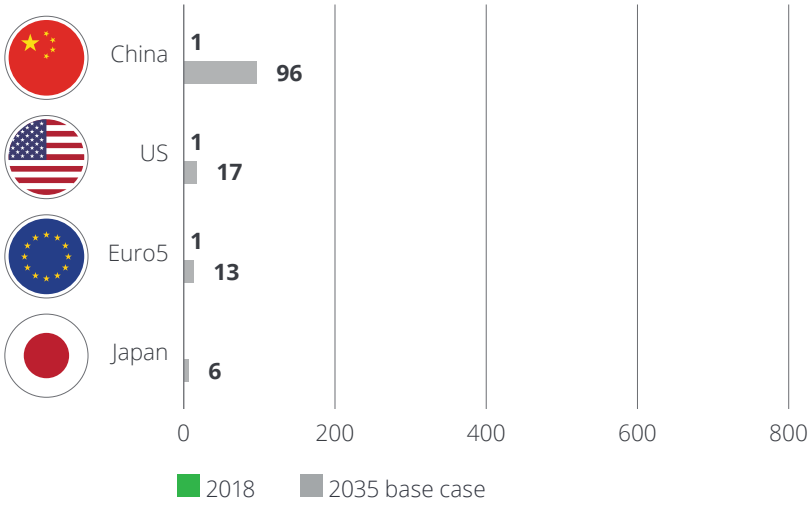
Battery reuse becomes an increasingly relevant business model–other resources and returns remain at current levels.
Reusing parts opens up a completely new revenue stream for parts sold to third-party OEMs and industry outsiders (excluding the remanufacturing business). Batteries are the most valuable assets for third parties, as they can be used to store energy. Recycling generally is not pursued for commercial purposes.

Figure 37. End-of-life

Base-case revenue development (in $M)



Numbers may not equal total shown due to rounding.

Industry trends will cause a decline in the current aftersales business–alternative drivetrains in particular are expected to put current total profits of the OEM at risk.

Financial services

Summary

- Revenues in financial services will more than double due to strong growth in China–the country will contribute more than half of the proxy OEM's* financial services revenues in 2035.
- Service-based business is expected to grow in each market, driven by the growth of new business segments.
- Mastering omnichannel with a focus on direct sales will be a key success factor in all markets for asset- and service-based businesses.

In financial services, it is important to mention that we structured the OEM revenue tree from a solely functional perspective. That means we did not include services that constitute mobility services but are in use with many OEMs included in the captive organization (such as fleet services).

For each revenue stream, we analyzed how its levers are affected by industry trends. For financial services, those levers primarily constitute penetration rate, duration of contracts, nominal interest rate, default risk, and refinancing risk. We will outline some of the major assumptions around the effect of industry trends (CASA) on the following revenue streams: credit and leasing, wholesale, insurance, and payment.

Credit and leasing

Overall, we expect a strong shift from owning to usage, which favors leasing over financing. That might be enforced by a rising maturity of mobility fleets and other subscription-based concepts. In addition, leasing might benefit from technological drivers such as alternative drivetrains, autonomous driving, and connectivity, which come with higher technological and regulatory uncertainty around asset ownership. An increased asset value due to costly autonomous and connected features might even intensify that effect. The same effect, however, with an open direction would account for alternative drivetrains–depending on their price development in comparison to ICE vehicles.

Wholesale financing

In wholesale financing, future trends bear opportunities and risks at the same time. Generally, technological development within vehicles, especially alternative drivetrains, requires huge investments on the dealer side that will broadly have to be financed. On the one hand, we expect strong pressure on dealers and repair shops, caused by several factors, as described in previous chapters, that might lead to a reduction of dealers and repair shops or at least might increase their credit default risk. On the other hand, consolidation initiatives in recent years can be observed that might counteract the credit default risk of dealers and repair shops significantly. Other than that, omnichannel sales, new retail formats, over-the-air maintenance, virtual reality shopping, and build-to-order would let floor plans shrink and exert a negative effect on wholesale financing volume.

* Please note: Since we consider the captive organization as part of the proxy OEM, we will adhere to the term proxy OEM in this chapter for consistency reasons.

Insurance

Insurance will face significant changes in several areas, affected by all industry trends. Autonomous vehicles–depending on the level of autonomy–will be among the most affected.

Autonomous vehicles have significantly fewer accidents, but accident repair bills are expected to be higher than for cars without autonomous features. With regards to ADAS level 4/5, the overall question of who will carry insurance services is still unclear.

Sharing will have a significant impact on the insurance industry with both changing customer types (from private to fleet and from owner to user) and reduced contract duration. Insurance needs to ensure the same operational efficiency for micro-insurance products, with competitive offers and all enablers in place, such as flexible payment solutions. Also, user behavior is different during mobility services usage, as customers treat vehicles with less caution and thus cause more accidents.

Connectivity enables completely new opportunities opening up for insurance providers in terms of "usage-based offers," with the captives' competitive advantage having vehicle and customer data in-house. (Note: Data ownership and protection laws will differ depending on the country.)

In terms of alternative drivetrains, the question remains regarding development of future vehicle prices, which would directly affect total insurance volume. In any case, new components that come with alternative drivetrains open up new business opportunities such as battery lifetime insurance.

For a detailed analysis of the future development of financial services and captives in general, we recommend reading our Deloitte studies, *Future of captives – what will be the core businesses for automotive captives in 2030?* published in 2018 *and Fleet management in Europe – growing importance in a world of changing mobility*, published in 2017.

The proprietary payment functionality is a key enabler for OEMs' future mobility offering.
Moving toward 2035, the OEM will focus more on service-based business and dominate the financial products and services market in the future mobility landscape by owning the payment infrastructure, offering full-service leases, and funding multibrand vehicles.

The cost savings and recurring income generated in traditional businesses will be invested in building digital business models adapted to new mobility needs. Payment services provided for mobility and connected services are separate to the existing business and yield revenues from micropayment transactions throughout the entire user journey.

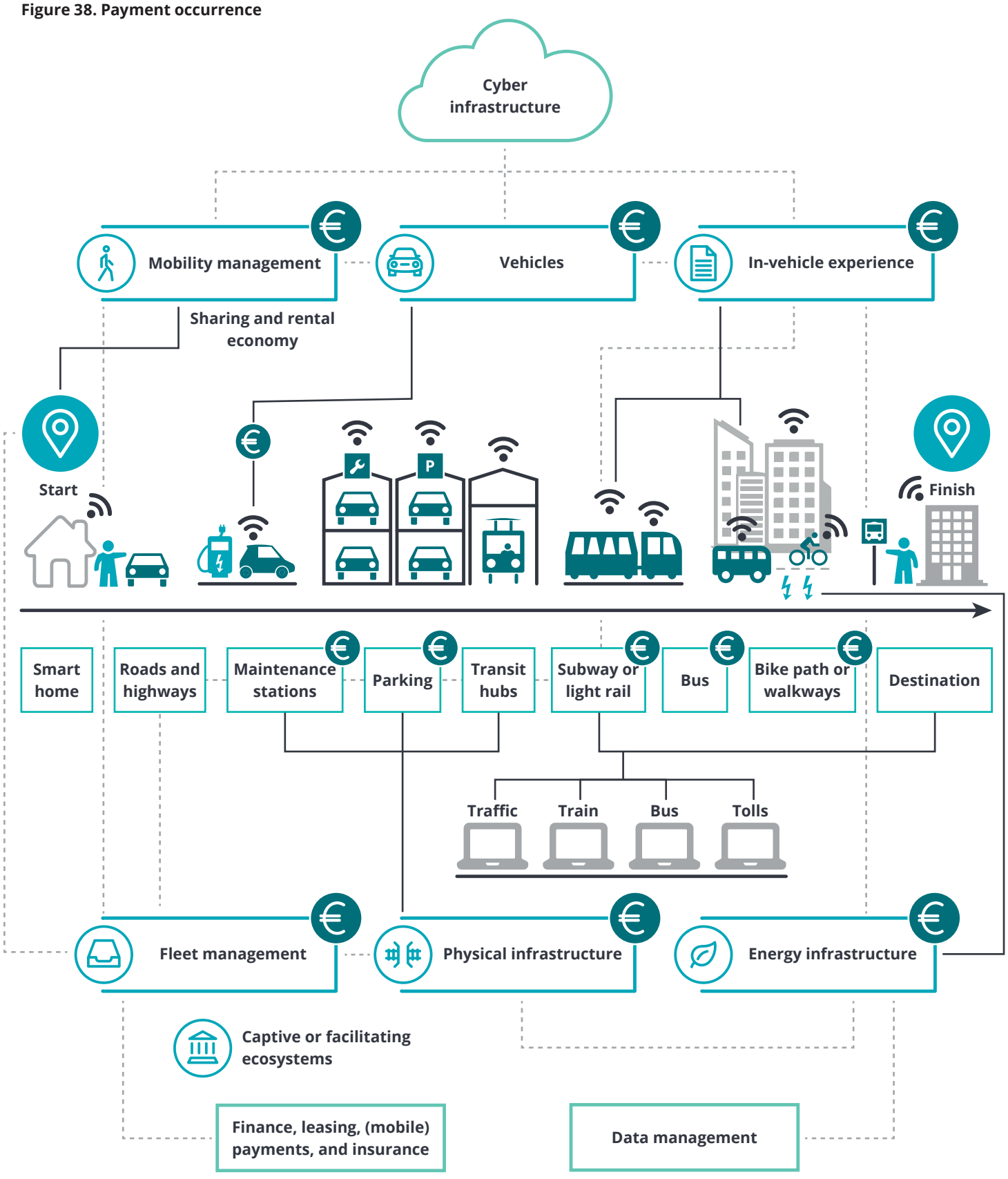
In particular, today's Gen Y and Gen Z consumers are very familiar with using a mobile app for transportation and micro-services. On-demand features will make these apps even more important. With a greater volume of transactions across the entire mobility journey (see figure 38), payment services will become a key enabler if the OEM succeeds in shaping the new mobility environment. An integrated mobile payment solution is crucial for seamless multimodal mobility, gives the OEM access to customer data, and saves costs by avoiding transaction fees to external payment providers.

The payment functionalities provided also enable OEMs to leverage user data that will contribute to revenues in the Car as a Platform segment and to the overall market-driven innovation of OEMs' existing products and services portfolio.

The insurance revenue substream will also benefit from an increase in the volume of data being collected. OEMs are able to offer attractive and flexible on-demand and pay-per-use offerings with adjustable insurance rates.

Deloitte, *Future of captives*, 2018.

Figure 38. Payment occurrence

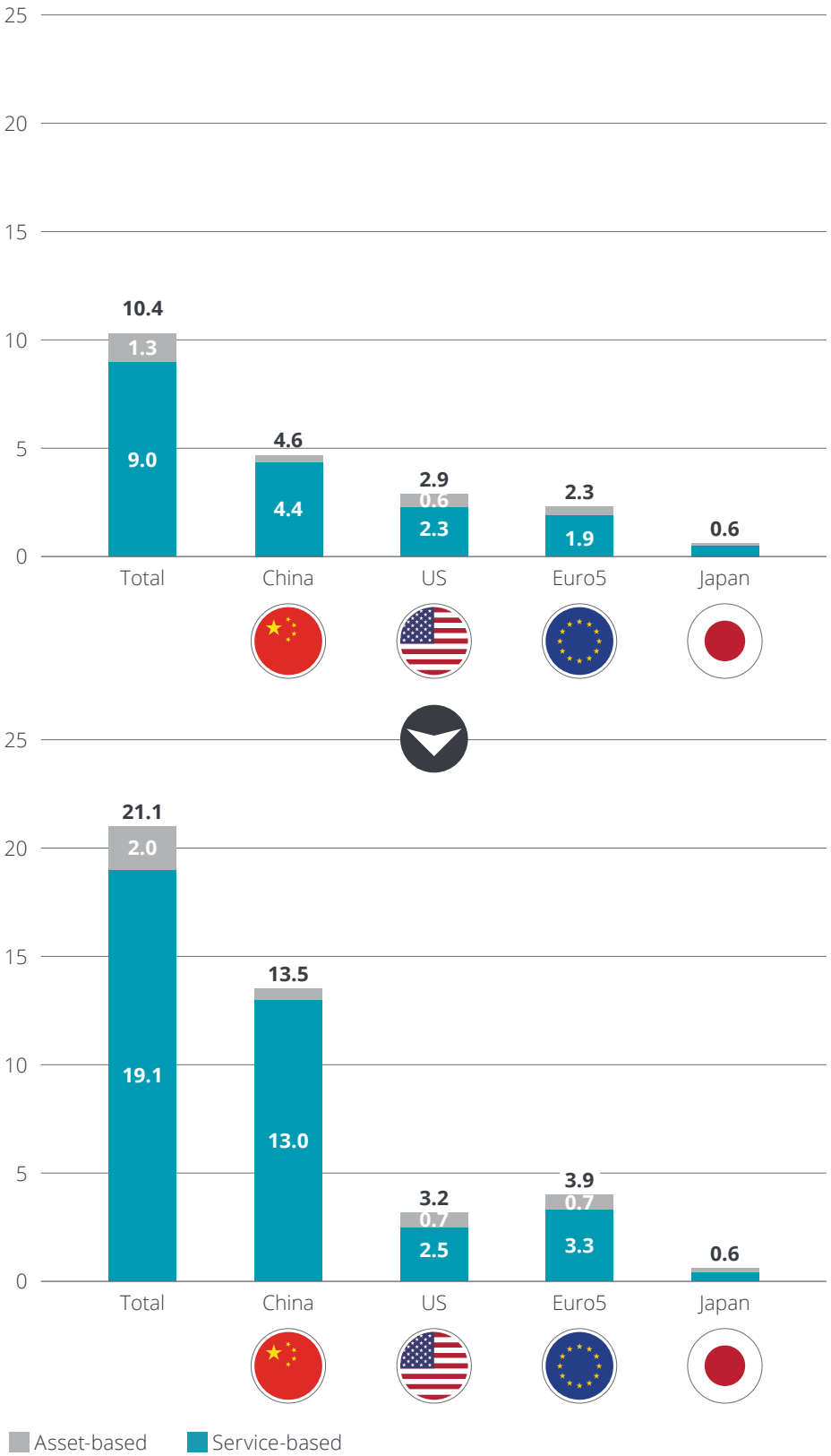


The OEM currently generates most revenues with asset-based businesses: credit, leasing, and wholesale. In 2018, initial offerings in service-based businesses, such as insurance or payments, have already been established, but are not yet scaled globally. These offerings do not currently generate noticeable profits, while insurance is the main revenue source of service-based businesses.

In 2035, multibrand leasing and residual value management will ensure that traditional asset-based businesses maintain a strong foothold. The growth in asset-based revenues is mainly driven by China, which will contribute over half of revenues in 2035. Asset-based business in China is driven by growth in car sales and higher credit and leasing penetration rates.

Unlike in past years, OEMs will expand their offering to include multibrand solutions for future customers. The emergence of Mobility as a Service, in particular, will give multibrand offerings paramount importance in attracting a large customer base and addressing a wide range of customer preferences and use cases. In 2035, the multibrand segment is expected to account for a significant amount of total captive assets.

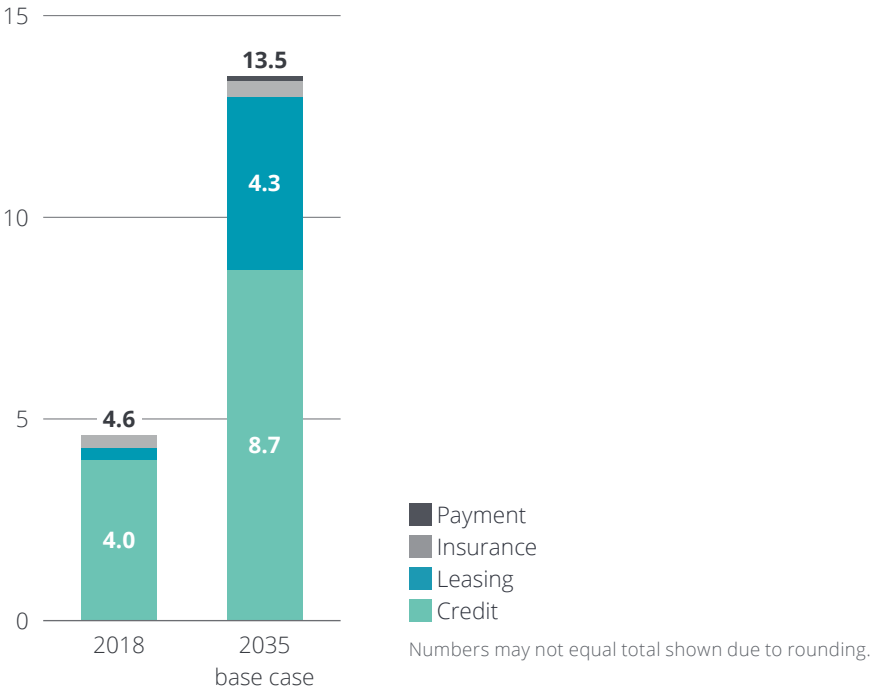
Figure 39. Revenues (in $B) in 2018 and 2035 of proxy OEM by revenue streams (base case)



Numbers may not equal total shown due to rounding.

Revenues will experience strong growth in China from $4.6 billion to $13.5 billion, driven by growing new car sales and financing rate.
Chinese customers will change between now and 2035. Many will move away from owning vehicles and consider leasing as a financing option. The revenue generated in China by the proxy OEM through leasing will be nearly 10x higher than in 2018, contributing 32 percent to overall revenues in China in 2035. Revenues generated by the credit business will also continue to rise with a higher penetration rate. The insurance business is expected to only see modest growth, as customers tend to purchase insurance in a package together with other insurance products unrelated to their vehicle.*

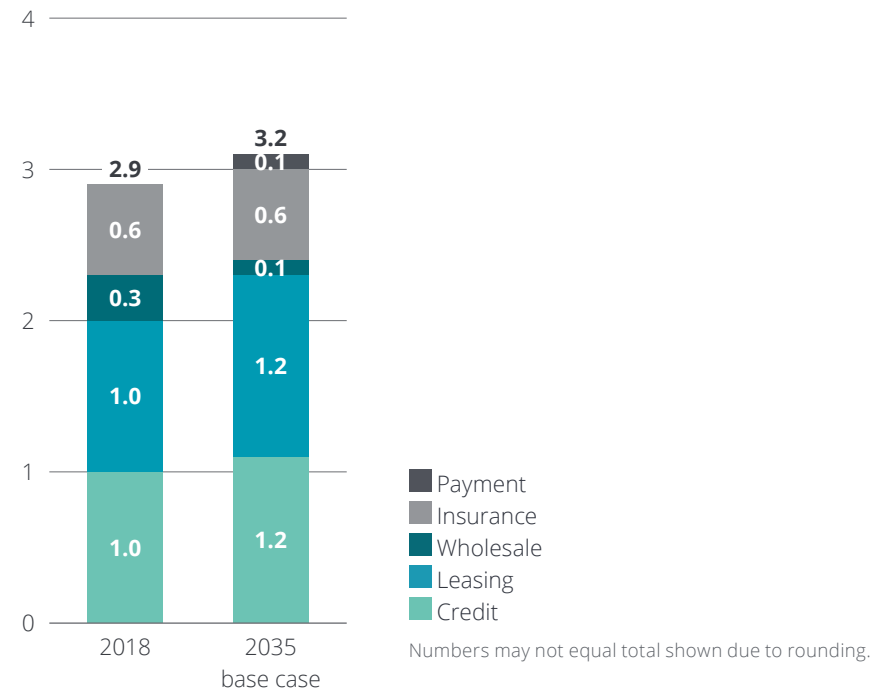
Figure 40. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

Financial services revenues in the United States grow moderately from $2.9 billion to $3.2 billion, with leasing revenues showing slightly stronger growth than credit revenues.
The United States remains an important revenue source for the proxy OEM, contributing 15 percent of overall revenues in financial services in 2035. The leasing business will experience the strongest growth, which is in line with a shift in customer behavior and additional business models around used car remarketing. An expected ramp-up of new passenger car sales after a steady decline expectedly until 2028 further drives asset-based revenues. Beyond that, OEMs will optimize their leasing and credit businesses by more strongly engaging in the residual value management.

Figure 41. Revenues (in $B) in 2018 and 2035

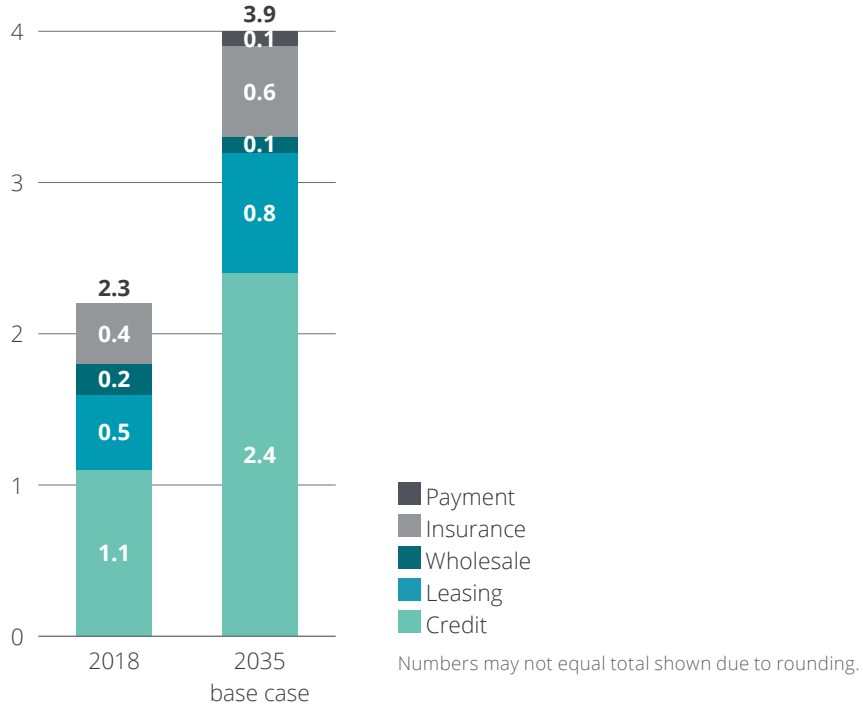


Numbers may not equal total shown due to rounding.

* It is assumed that the proxy OEM does not engage in wholesale financing; however, other OEMs might offer it to their network.

Revenues in the Euro5 markets grow by 71 percent from $2.3 billion to $3.9 billion, fueled by an increase in the credit and leasing business.
The credit business will see strong growth until 2035 as more customers switch from cash payment to credit payment. OEMs will offset declining used car sales by engaging in residual value management and building additional business models around used car remarketing.

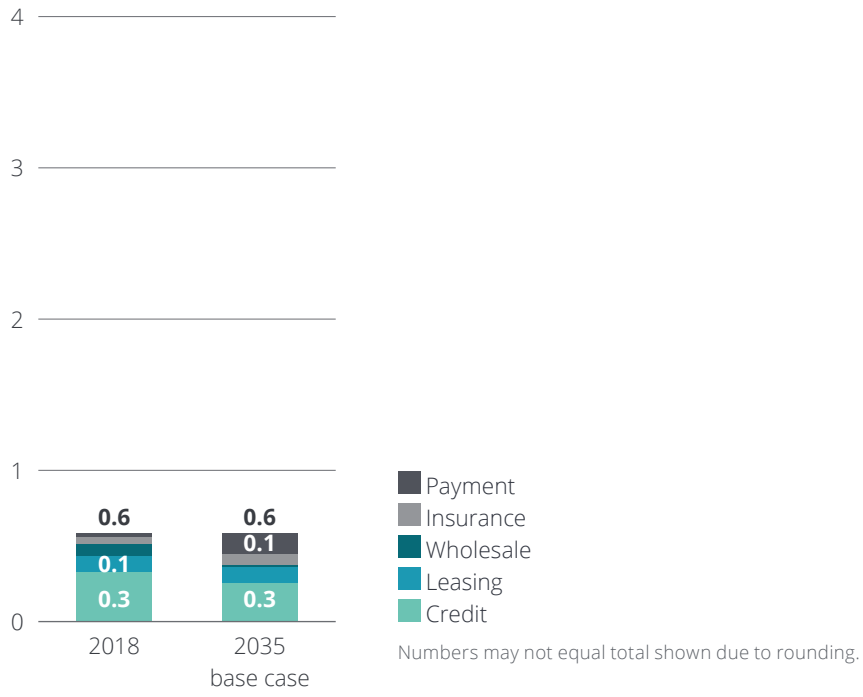
Figure 42. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

The Japanese market experiences an increased penetration rate; however, declining new car sales volume offsets that growth.
The Japanese market is expected to decline slowly due to strong local competition and an anticipated shrinking population. The new and used car demand is hit by the shrinking population, and urbanization is putting further pressure on vehicle sales as the demand for individual transportation slows down. However, these changes present an opportunity for the proxy OEM to shift away from an asset-based to service-based business to generate new offerings for the customer and meet their changing demands.

Figure 43. Revenues (in $B) in 2018 and 2035

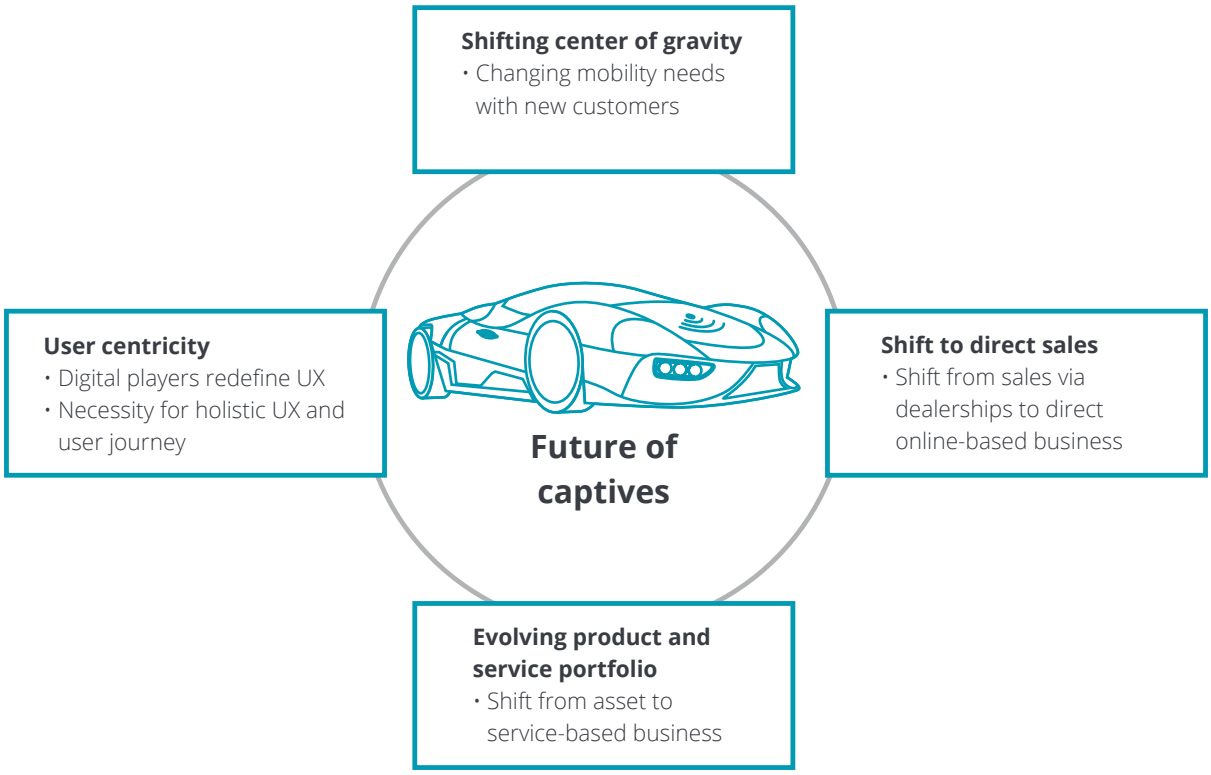


Numbers may not equal total shown due to rounding.

The *Future of captives* study sheds light on the possible developments in the captive industry as it progresses toward 2030.

The captive industry is on the verge of the most intense change in its history. To support our audience in making solid decisions and the shape of future business, we have also developed a financial model for the captive industry. This allows us to quantify the effects on a proxy captive organization to give our readers even more tangible insights.

Figure 44. Key findings of the *Future of captives* study



Source: Deloitte, *Future of captives*, 2018.

Mobility as a Service

Summary

- The OEM can yield significant revenue growth in Mobility as a Service and grow at a total CAGR of 11 percent until 2035 in a base case scenario.
- The largest market potential can be found in China; however, the market is highly competitive.
- In Europe, the potential is relatively moderate, but chances are good for traditional OEMs to conquer the market.
- Shaping the new mobility environment would strongly leverage profit potential. This implies becoming a holistic "full-service mobility provider," which would yield substantial synergies, as OEMs can then control end-to-end user touchpoints and optimize costs throughout all revenue substreams. This would require OEMs to undergo a massive transformation, which not every OEM will want to do if it wants to avoid sunk-cost investments.

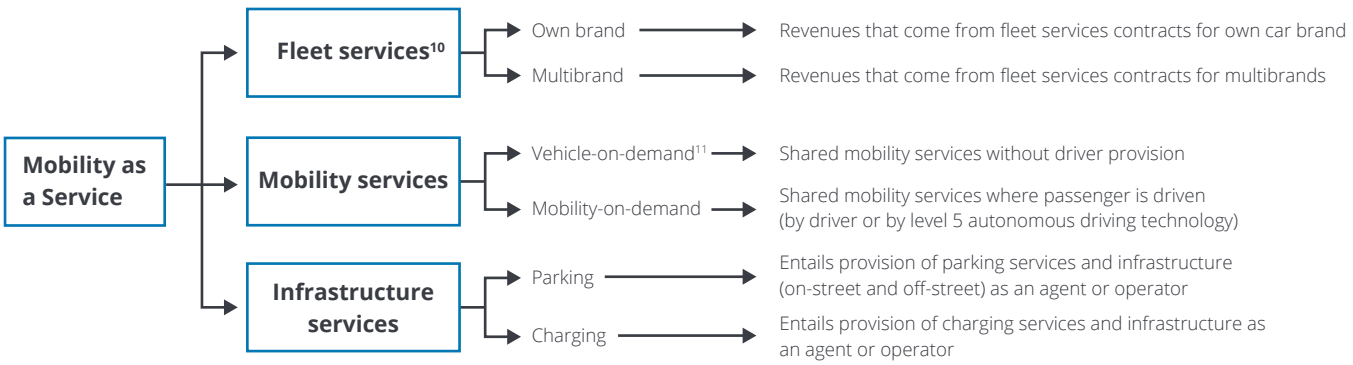
Mobility as a Service will become relevant, in particular, if the emergence of CASA trends is strong and only a few players capture the market potential.
We expect a large consolidation in this business segment, as mobility services and infrastructure services require economies of scale and face a fiercely competitive environment.

From a user perspective, we also expect a full-service integration to move increasingly to a single user platform, which will boost the "winner-take-all" market dynamic despite hyperlocal conditions. In this context, we will also look at the future state where OEMs shape the new mobility environment, because mobility services benefit from a strong emergence of industry trends, and strong OEM participation is a prerequisite for revenues in Mobility as a Service.

Mobility as a Service revenues of the exemplary OEM today consist largely of fleet services and vehicle-on-demand offerings.
Currently, the vast majority of revenues in Mobility as a Service come from the operation of fleet services for corporate customers. The mobility services business is growing but without generating significant profits.

However, we believe that investments being made today can pay off in 2035, if OEMs are committed to pursuing a holistic portfolio approach.

Figure 45. Mobility as a Service revenue streams
The Mobility as a Service business segment includes fleet services, mobility services, and infrastructure services.



[10] Exemplary OEMs own a fleet services entity.
[11] Vehicles include only passenger cars and robo-shuttles in this study.

The emergence of CASA trends will facilitate Mobility as a Service in all revenue streams.
Below, we outline the main effects of CASA trend disruption on Mobility as a Service revenues independent of market considerations.

Shared mobility
Firstly, shared mobility promotes mobility services, as the trend is toward usage-based mobility rather than vehicle ownership. Increased asset efficiency and higher utilization reduce mobility prices for users, which again increases utilization. For the effects on vehicle sales volume, please see the "Vehicle sales" chapter.

In addition, fleet services benefit from the shared mobility trend as fleet customers gain market size.

Shared mobility also has an indirect positive impact on charging revenues, as BEVs outperform traditional ICE vehicles in terms of total cost of ownership when vehicles are in frequent use.

Connectivity
Mobility as a Service will benefit strongly from connectivity being a key enabler for various revenue streams. Fleet management systems become more advanced, and fleet service customers benefit from the increased convenience (for example, vehicle maintenance managed predictively, flexible individual financing, and increased vehicle selection). Connectivity lays the foundation for effective mobility services. Routes and passenger pooling can be highly optimized, which ultimately benefits the end user's mobility experience. A seamless payment functionality and communicating fleet vehicles contribute further to user satisfaction (such as decreased passenger wait times). Infrastructure services also benefit from connectivity. For example, smart parking solutions allow for revenues in on-street and off-street parking by connecting users with parking spaces.

Alternative drivetrains
Alternative drivetrains help drive the emergence of mobility services due to the benefits in total cost of ownership for alternative drivetrains when this type of vehicle is used frequently. Besides obvious advantages of the alternative drivetrain emergence on infrastructure, new sources such as sales of home charging boxes to private customers, operation of public charging infrastructure, and fee commissions from app recommendations of charging stations to users represent attractive revenue sources. However, the market will be very competitive (including utility providers, tech players, startups, other OEMs), and major initial investments are high demands in order for OEMs to become dominant players.

Autonomous driving
Autonomous driving will be the key driver for mobility services–not only in terms of enabling, but also transforming them. When the emergence of this trend is strong, the number of shared mobility users is expected to rise exponentially with the advancement of autonomous driving technology, falling passenger costs per kilometer (as the driver currently accounts for half of all ride-hailing costs), and more widespread access to motorized mobility services for new consumer groups (such as seniors and young people). Once ADAS level 5 has been achieved, free-floating car-sharing and ride-hailing will converge into a single service provided by autonomous taxis, which are designed for individual trips for one person. The ride-pooling segment would be served by robo-shuttles, which cost less than robo-taxis but also offer less flexibility and comfort. They are designed for multiple passengers and compete strongly with urban public transit.

Beyond that, once we have achieved ADAS level 5, we still expect subscription-based ownership, car rental, P2P, station-based car-sharing, and ride-sharing to exist as mobility service concepts, though they will be considered niche markets relative to robo-taxis and robo-shuttles.

Main effects of ADAS level 5 on mobility services

- With extensive ADAS level 5 adoption, vehicle-on-demand becomes obsolete, making way for mobility-on-demand
- The elimination of driver costs reduces passenger costs per kilometer and strongly increases demand for mobility services
- Larger user group of motorized mobility (young people and seniors)
- Ride-hailing and free-floating car-sharing converge (robo-taxis)

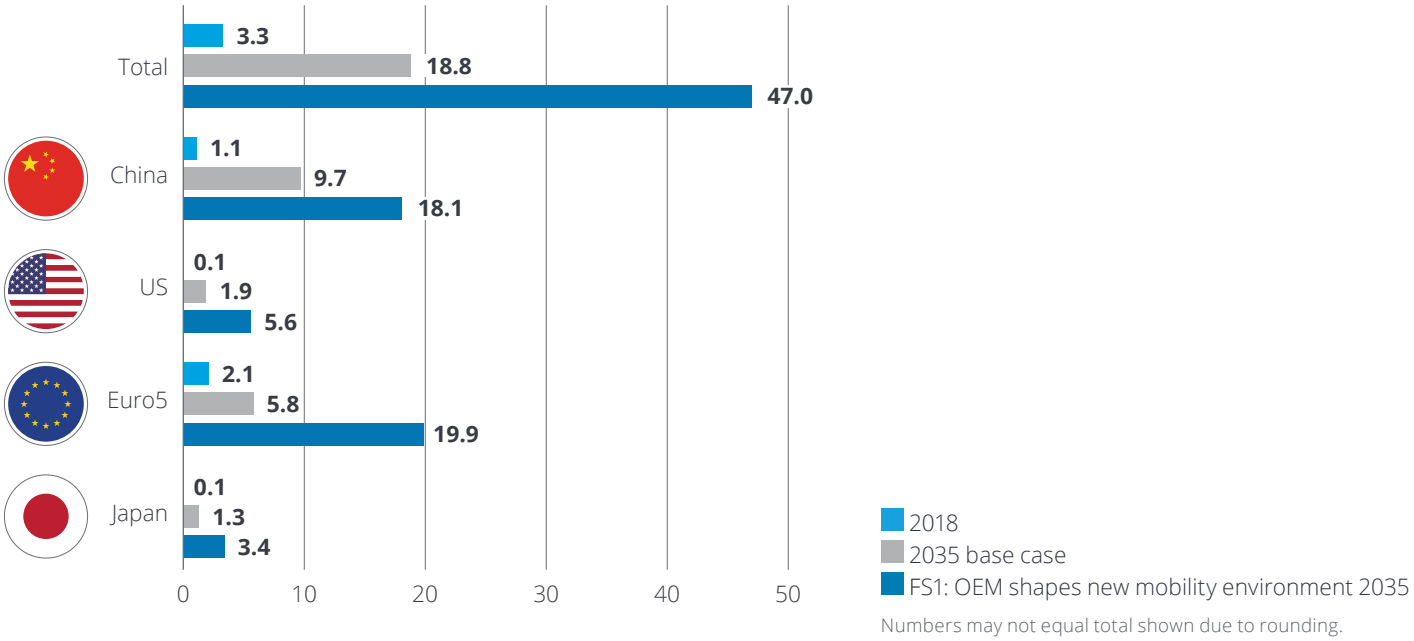
Figure 46. Mobility services concepts today and in the future with CASA trends disruption

Mobility service		Concept today	Future evolution with trends disruption
Ownership	Subscription-based owning	Membership with recurring fee provides flexible access to a variety of cars every few months	Increasingly taking share away from leasing due to the trend toward flexibility and rapidly changing preferences
Vehicle-on-demand* Passenger drives	Rental	Vehicle renting for flexible periods of time, ranging from a few hours to a few weeks	Use case still valid with ADAS level 5; enables users to access the same car for long periods (such as long-distance travel)
	P2P sharing	Peer-to-peer car-sharing involves private individuals lending cars to one another with platform providers acting as service agent	Market in decline as private car ownership falls–though ADAS level 4/5 car owners will be more willing to share cars
	Station-based car-sharing	Car lending service by fleet operator where vehicle must be picked up and returned at a specific location	With ADAS level 5, the market is in decline because it becomes less competitive compared with free-floating–still valid for specific use cases (such as long-distance travel)
	Free-floating car-sharing	Car lending service (short trips) in cities where cars are picked up and brought back at any location within service area	Market growing–cars become robo-taxis with ADAS level 5 operating in urban areas with door-to-door service
Mobility-on-demand Passenger is driven	Ride-sharing	Form of P2P sharing where drivers provide unused car space to passengers for specific rides and drive passengers	Market in decline as private car ownership falls–though ADAS level 4/5 car owners more willing to share cars
	Ride-hailing	Chauffeur service by professional drivers, usually in urban areas and booked by private individuals	**Robo-taxis**
	Ride-pooling	Chauffeur service by professional drivers, usually in urban areas for multiple passengers going in the same direction	**Robo-shuttles**
Usage			

With ADAS level 5, vehicle-on-demand becomes mobility-on-demand as the passenger is driven

* Vehicle refers to passenger cars including robo-shuttles (excluding bikes, scooters, etc.)

Figure 47. OEM Mobility as a Service revenues (in $B) 2018 and 2035



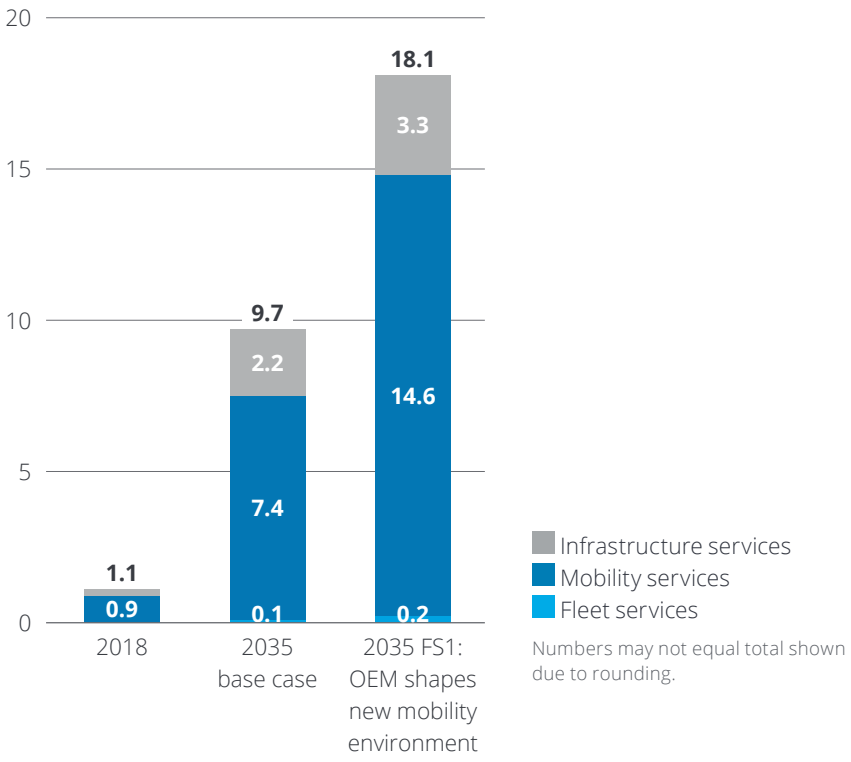
Numbers may not equal total shown due to rounding.

Overall market potential of Mobility as a Service is strongly dependent on industry trends emergence.

In a base case, China demonstrates strong growth in the Mobility as a Service segment with CAGR of 14 percent until 2035. The $1.1 billion revenues in 2018 increase to $9.7 billion in 2035.

Taking a closer look, fleet services show the strongest increase. This is mainly due to the fact that this revenue stream has been quite untapped until now. It will become much more relevant due to the growth of financial services and mobility services. OEMs' mobility services demonstrate a CAGR of 13 percent, as the OEM offers its own mobility services and thus takes a smaller share of the market with a strong predominance of mobility-on-demand over vehicle-on-demand. Infrastructure shows strong growth, mainly based on charging station revenues with increased electric drivetrains. Shaping the new mobility environment in China is particularly implementable in growing tier 2 and tier 3 cities (in terms of population and infrastructure) and would almost double the OEM's revenues to $18.1 billion in Mobility as a Service.

Figure 48. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

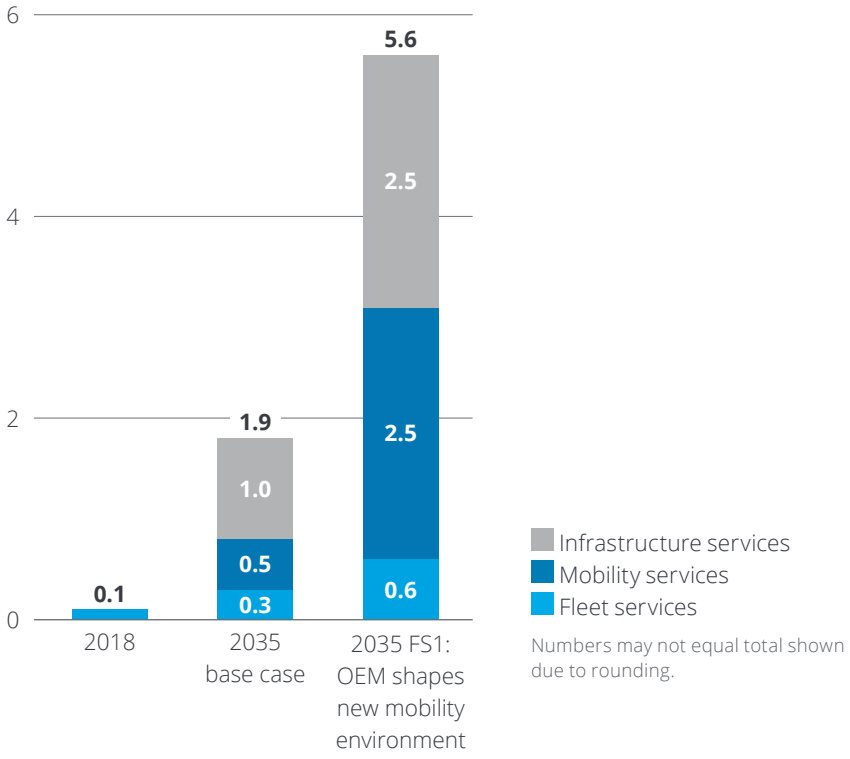
Looking at the Mobility as a Service segment in the United States in a base case, we see a strong increase in revenues from $0.1 billion in 2018 to $1.9 billion in 2035, making it the fastest-growing region for the proxy OEM in that business segment.
The strongest CAGR of 28 percent exhibits the revenue stream infrastructure. This is mainly driven by charging station revenues where we expect OEMs to take a large share against utility providers, government bodies, or new entrants.

Mobility services display a CAGR of 20 percent due to increased usage of pay-per-use shared mobility, especially in urban areas.

In large parts of the country, US consumers are expected to stick to individual motorized mobility. OEM share in the mobility services market is mainly a result of industry outsiders, such as tech players, that already dominate competitors in the base case scenario.

In a future state where the OEM shapes the new mobility environment, however, the United States represents an attractive market. The rising demand for shared mobility through an increasing population density level, especially in suburban areas, can be provided by an OEM offering that has prevailed against outside competition.

Figure 49. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

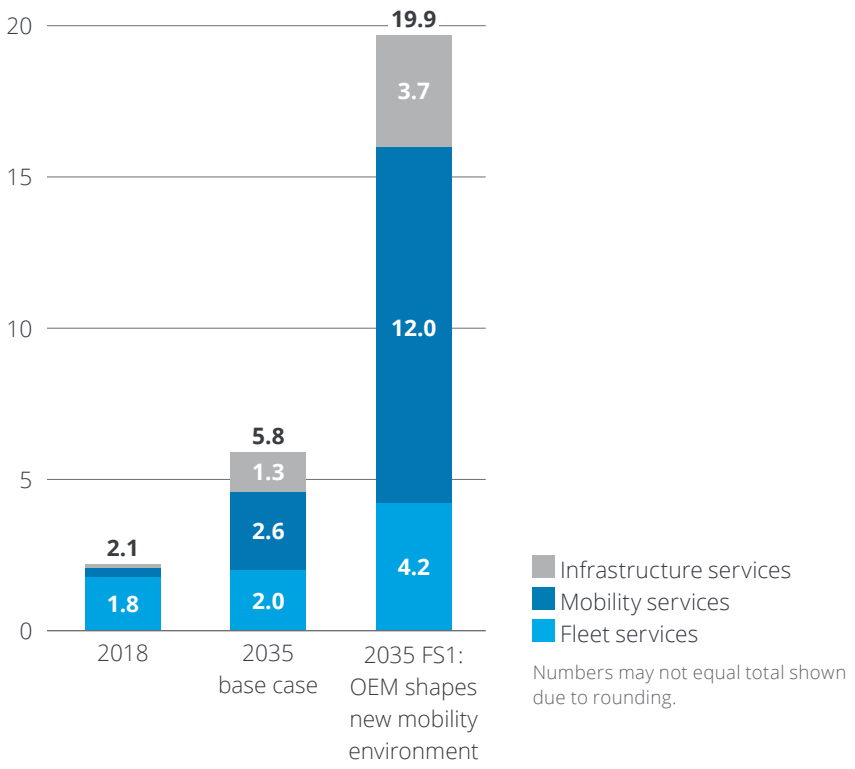
In a base case, the Euro5 countries exhibit a CAGR of 6 percent with an increase in revenues from $2.1 billion in 2018 to $5.8 billion in 2035.
A large fraction of revenues in 2035 come from fleet services, which is mainly driven by the shift from private ownership to fleet ownership and involves the operation of fleet services for corporate customers, including invoicing, vehicle logistics, and leasing-related services, among others.

Mobility services grow at a CAGR of 14 percent and shift strongly to mobility-on-demand, similar to other markets. Nevertheless, in a base case scenario, OEMs will experience difficulty in gaining high market share.

In Europe, the total addressable mobility services market will strongly depend on regulatory decisions by the EU and by country.

If legislation is in favor of mobility services (see future state 1) infrastructure in urban areas and the OEM is able to hold user touchpoints, a total revenue of $19.9 billion is expected for 2035.

Figure 50. Revenues (in $B) in 2018 and 2035



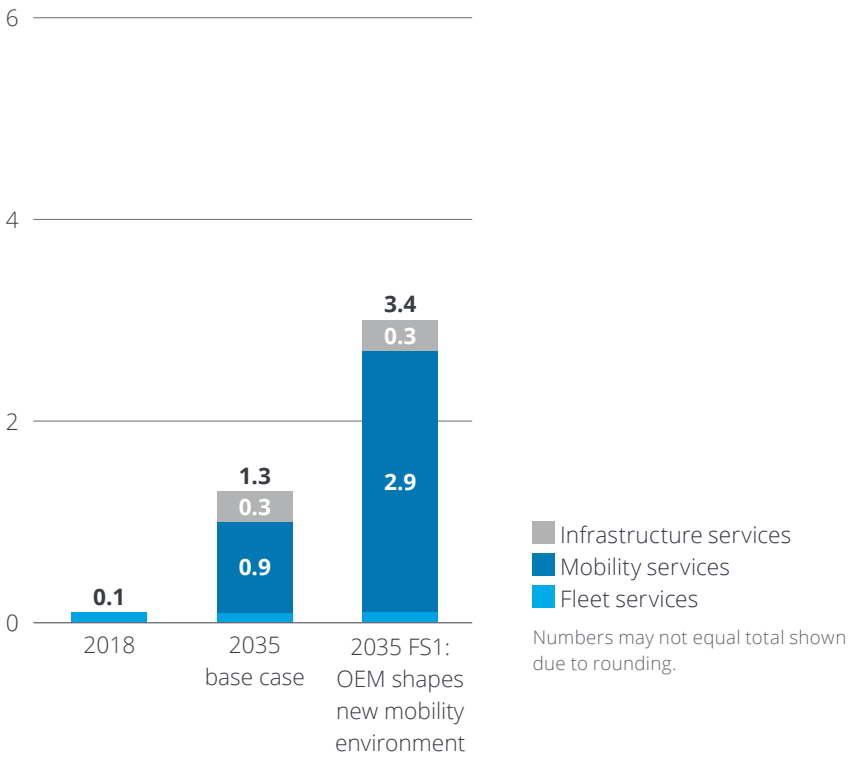
Numbers may not equal total shown due to rounding.

In a base case, Japan shows a CAGR of 18 percent with increasing revenues, from $0.1 billion in 2018 to $1.3 billion in 2035, mainly driven by OEM participation in the shared mobility services market.

The strongest growth comes from infrastructure with a 63 percent CAGR. This mainly stems from a 79 percent share of alternative drivetrains by 2035. Mobility services grow with a CAGR of 42 percent with the market currently not being exploited. Fleet services exhibit a CAGR of 3 percent with a strong shift from private customers to fleet customers and an increase in fleet contract penetration.

In Japan, Mobility as a Service revenues rise to $3.4 billion if the OEM is able to shape the new mobility environment. Despite strong growth, the overall market potential is limited due to public transportation remaining a large share of individual daily mobility.

Figure 51. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

Related content

Ride-hailing in China

The government plays an important role in the development of car-hailing services in the future.
It is important to understand changing regulations and the implications on OEMs' traditional business model of selling cars directly to consumers, as well as identifying challenges for future growth opportunities in China.

Shared mobility will be more favored by consumers, while the percentage of private cars continues to decrease in a growing number of cities caused by government policies (including purchase restrictions and higher vehicle usage costs for consumers) and increased maturity of shared mobility and public transportation.

Besides regulating private cars, the Chinese government also regulates car-hailing services by imposing stricter control measures on providers, which results in pressures on C2C-only business models and favors development of combined C2C/B2C offers. Full-time drivers tend to be more willing to comply with regulations, and operations are relatively more stable and thus easier to supervise. Meanwhile, part-time drivers lack compliance motivation due to the complexity of the policies and their requirements (such as the need for alternative drivetrains and license plate restrictions). These regulations require significant investments from new entrants to have a stable supply of full-time drivers, a well-developed platform, and vehicles that comply with government policies.

The Chinese government's management of car-hailing providers is now performed in most of the larger cities, and in the future, supervision of providers in tier 1 and 2 cities will become stricter and will adopt a "taxi-wise" management. Smaller tier 2 and 3 cities won't be affected by government regulations to the same extent because the car-hailing market relies on part-time drivers during nonpeak hours due to limited market size, less mobility demand, and fewer full-time drivers available in those cities, which may set up an environment for pilot studies for new entrants.

The market is dominated by one large and several weak players.
The largest player does not face significant competition in tier 1 cities–it generated 87 percent of the revenue in 46 tier 1 and 2 cities. However, in smaller tier 2 and 3 cities, smaller competitors are fighting for market share. The car-hailing market continues to grow mainly due to the following factors: license restriction policies, congested road conditions, population growth, and expansion of the urban travel area. Population growth leads to an increase in volume of service orders, and expansion of the urban travel area leads to an increase in average price per order. Population growth is driven by tier 2 city growth, which accounts for 80 percent.

Cooperation between car-hailing companies and OEMs and a direct market entry presents a growth opportunity for OEMs.
Strategic cooperations aim to customize the production of intelligent electric vehicles for shared mobility scenarios. Other potential co-ops with OEMs include the development of vehicles specifically designed for the car-hailing business.

Besides OEMs, leasing companies also entered the field to supply vehicles that exempt drivers from the purchase cost of operating car-hailing vehicles. OEMs can also provide support for car-hailing platforms, which has synergy effects and reduces new energy vehicle costs. The extended car-hailing business of OEMs can also improve resource utilization efficiency, enrich the business model, and further enhance customers' brand loyalties. It is foreseeable that in the future, there will be more car-hailing platforms relying on regional advantages, capital advantages, and traditional business advantages from OEMs.

Deloitte China, *Car-hailing at crossroads*, 2019.

Related content

Autonomous urban mobility in Germany

In 2035, the total German market for autonomous taxi and shuttle services is estimated to be roughly €16.7 billion, if the emergence of CASA trends is strong.
Our calculation of the market size is based on several assumptions. An average trip would cost €1.50 in a robo-shuttle and €3.40 in a robo-taxi. Prices were derived from a cost analysis including depreciation and maintenance at 60 percent of total fleet costs. The passenger waiting time would be no more than 10 minutes at peak times.

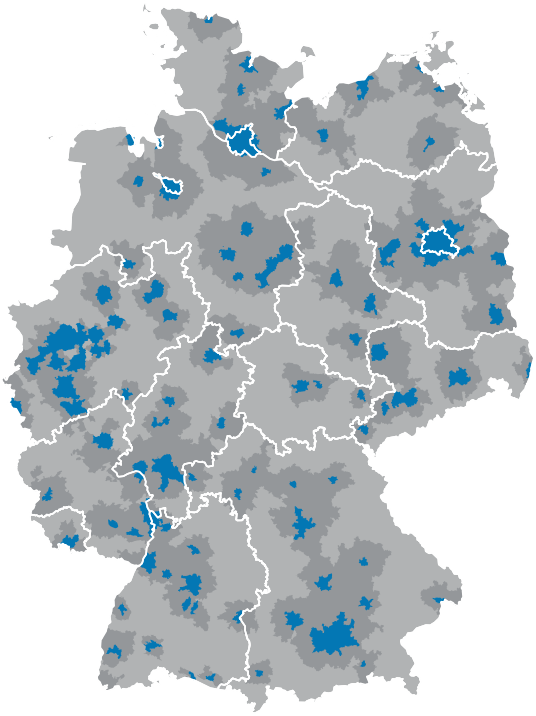
By means of a conjoint analysis, expert interviews, and our interpretation of the socioeconomic data, our key findings are as follows:

- It would be feasible to provide autonomous taxis and shuttles in 110 urban regions–7 percent of Germany's surface area (populations ranging from Speyer with 50,000 inhabitants to Berlin with 4.1 million inhabitants).
- 33.1 million Germans (roughly 40 percent) would have access to autonomous taxis and shuttles–youth and senior citizens in particular would drive growth in the demand for motorized mobility.
- The population served would use autonomous taxis and shuttles for approximately one-third (32 percent) of their daily trips, representing a total market potential of roughly €16.7 billion.

A more detailed elaboration on the future demand of autonomous taxis and shuttles is provided in the Deloitte Germany study, *Urban Mobility and Autonomous Driving in 2035*. With autonomous driving at the center of a vibrant discussion in recent years, that study answers today's key questions on the subject of autonomous mobility.

Deloitte Germany, *Urban Mobility and Autonomous Driving in 2035*, 2019.

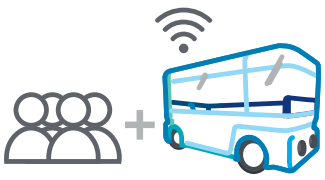
Figure 52. Autonomous mobility services: areas of operation



Areas where autonomous robo-taxis and robo-shuttles are feasible

Figure 53. Definition of autonomous services under consideration

Autonomous taxi
(robo-taxi – individual trip for one passenger)



Autonomous shuttles
(robo-shuttle – shared trip with max. four passengers)

Service available via mobile app

Door-to-door service possible

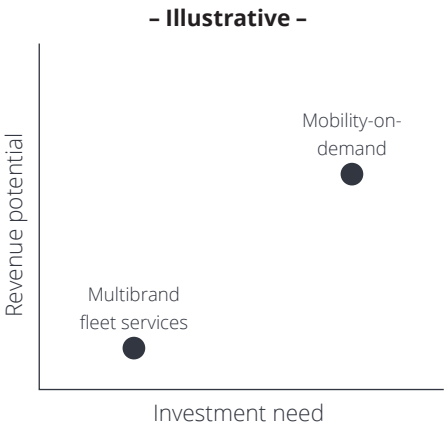
Profitability
The overview shows that Mobility as a Service is relatively fragmented and heterogeneous. A major question now is how to design the service portfolio. Strategic assumptions regarding customer behavior and the simulation of profits result in a clear recommendation toward a holistic Mobility as a Service approach.

Figure 54. Mobility as a Service portfolio strategies and evaluation

Selective
Focus on select services based on such criteria as early return on investment, ease of implementation, or urgent customer demand. This narrow portfolio strategy might be appropriate for initial trials, as it offers a low risk of false investments and ideally generates quick wins.

We do not, however, recommend this path, as it lacks long-term business cases and synergy effects in sales and costs, while it also cedes control of user touchpoints to competitors because it fails to cover the entire mobility user journey.

Bottom-line evaluation ★☆☆☆☆

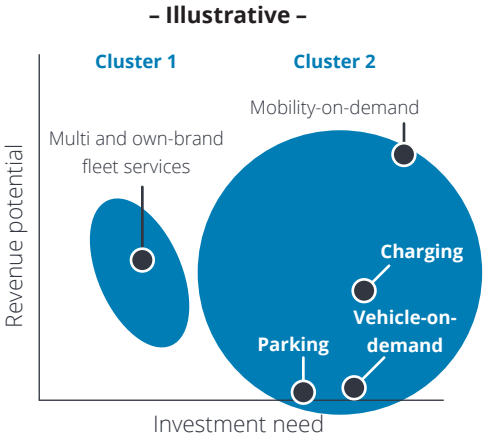


Clustered
Selection of services that are immediately interdependent and therefore:

- Facilitate synergies
- Ensure exclusive user access and mutual market penetration (such as charging and mobility-on-demand)

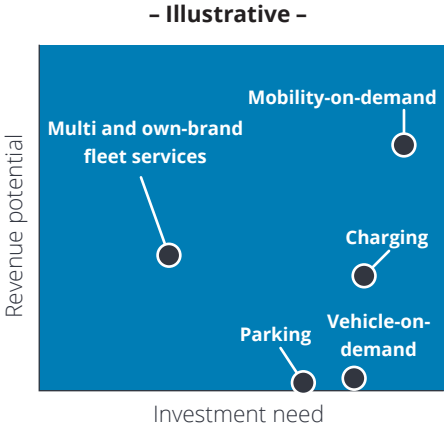
The clustered portfolio reduces complexity in the service offering and enables both organizational capabilities and infrastructure to be shared. However, it still has the same disadvantages as the selective portfolio strategy and lacks long-term business cases.

Bottom-line evaluation ★★☆☆☆



Holistic
Becoming a full-service mobility provider enables substantial synergies through control of end-to-end user touchpoints and reduces costs in all revenue substreams. More importantly, it allows OEMs to cross-sell services on a joint user platform. This is therefore the most favorable portfolio strategy. It is not necessarily the case that an OEM will develop and provide each service by itself; establishing partnerships or outsourcing services may be a valid and efficient way to reduce complexity or costs.

Bottom-line evaluation ★★★★★



In a future state where the OEM shapes the new mobility environment, we assume that the OEM pursues a holistic portfolio strategy. When it comes to Mobility as a Service, the OEM itself has not necessarily built up all services, but might have also engaged in partnerships to occupy all user touchpoints during the mobility journey with proprietary products and services.

In contrast to a selective or clustered portfolio strategy, the holistic approach offers advantages mainly from a profitability perspective. Reasons for this are outlined as follows:

1. **Cost synergies: Economies of scale**
   Several revenue streams depend highly on economies of scale due to a high price sensitivity from customers. For instance, from a conjoint analysis, we have found that mobility services will mainly compete on the price. Beyond that, the costs for marketing and secondary activities can be shared.

2. **Sales synergies: Cross-sales and lock-in effect**
   Mobility users desire a fully integrated experience that allows them to access all kinds of mobility services from one provider. Therefore, occupying all user touchpoints becomes especially crucial in Mobility as a Service. From a profitability perspective, the OEM can reach higher margins through cross-selling and exclusive user access. For instance, the OEM can advertise its own charging stations on its user platform during the mobility journey and sell at a price premium due to elevated entry barriers. By offering a holistic portfolio, the OEM can capture users and create a lock-in effect to its mobility ecosystem. Giving discounts during the initial customer contact for specific services allows the OEM to lock in the customer and sell related products and services at a price premium.

Conclusion

Mobility as a Service exhibits a huge growth potential in every market. However, the competition is already partially strong. To participate in any market, it is of upmost importance that the relevant enablers, such as connectivity, alternative drivetrain technology, and ideally ADAS technology, are in place.

In addition, OEMs should be aware that Mobility as a Service has to be approached holistically to generate profitable growth. Over the long term, only a few companies will dominate the Mobility as a Service industry, and enormous financial investments are required to win.

Approaching Mobility as a Service holistically means that the OEM must make careful decisions related to building, purchasing, and partnering.

China presents the largest potential for OEMs within Mobility as a Service. However, it exhibits a strong degree of competition, too, with large players already setting up more and more holistic mobility ecosystems.

The United States shows the largest growth potential–coming from a relatively moderate level but also showing strong competitive forces, especially from very dynamic industry outsiders.

In Europe, there is a high chance for OEMs to gain market position, which is necessary to become one of very few providers to win the race. Shared mobility is still in its early stages. Regulatory specificities and partially hyperlocal conditions complicate the market entry for industry outsiders.

Similar to Euro5, there is a good chance for OEMs to become one of the few mobility providers in Japan that complement the public mobility infrastructure.

In markets where the competition is already strong, OEMs should differentiate by using their strengths:

1. Create a lock-in effect as the vehicle manufacturer.

2. Use capabilities in production, aftersales, financial services, and fleet services to optimize the total cost of ownership and compete on prices.

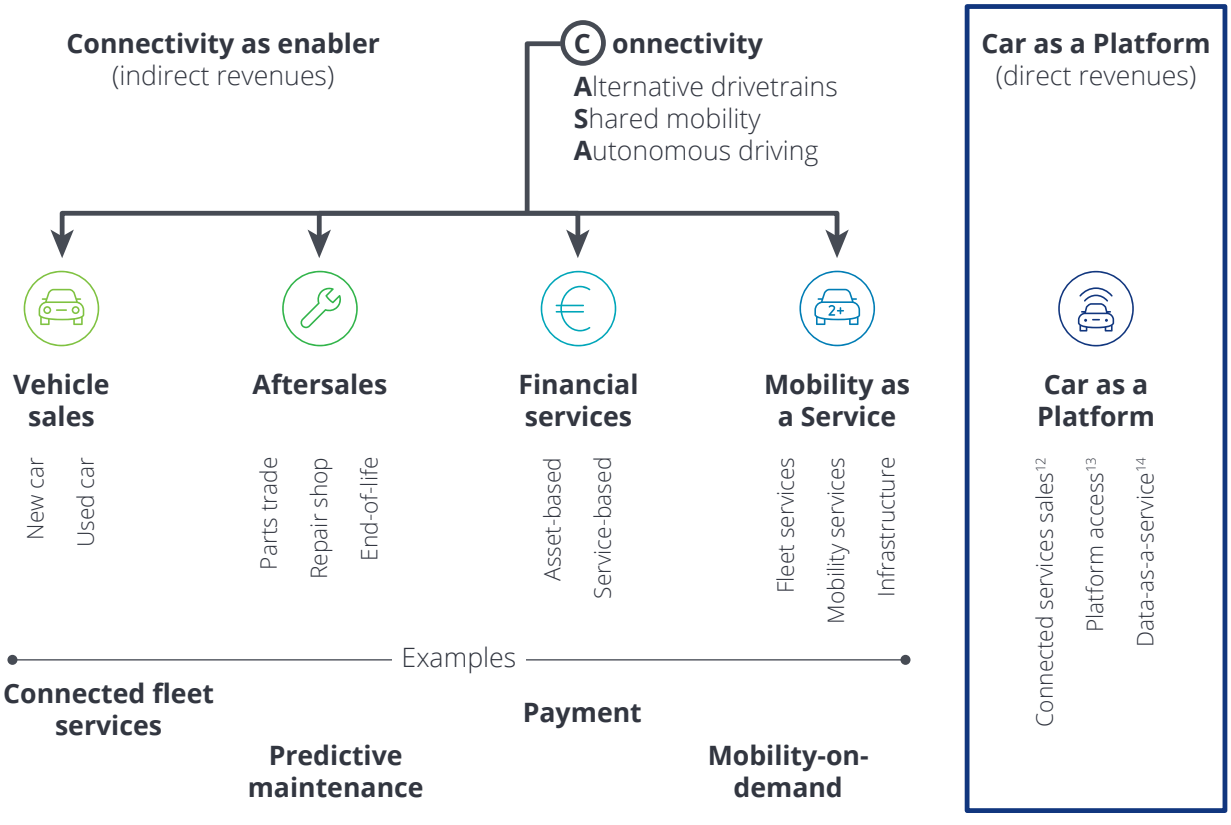
Even though the demand in Mobility as a service is very high, the ability to generate profitability from these services is challenging.

Car as a Platform

Summary

- Direct revenues are expected to increase from Car as a Platform sales, but the main role of connectivity is to act as an enabler for other revenue streams or as a cost optimizer.
- Overall, Car as a Platform looks set to remain relatively small, accounting for only 4 percent of total OEM business in a base case.
- Connected services sales revenues generated in China will drive most of the total revenue growth.
- As the OEM looks to define the new mobility environment, data-as-a-service becomes a new revenue contributor across markets.
- OEMs should carefully review their initiatives and partnerships to avoid sunk-cost investments and to deliver the best value to their customers.

Figure 55. Differentiation of revenues



[12] Selling vehicle data or user data to third parties.
[13] Selling user and in-car platform access to third parties.
[14] Selling valued-added services during car usage or in retail sales price.

Clarification of terminology

When discussing the potential of connectivity, "connectivity as an enabler" is often confused with "Car as a Platform."

"Connectivity as an enabler" has been discussed in depth in previous chapters (for example, in terms of facilitating predictive maintenance or as an enabler for fleet services, new mobility services, or infrastructure offerings). It is difficult to quantify these indirect effects, as they are often interdependent with other enablers such as autonomous driving or e-mobility.

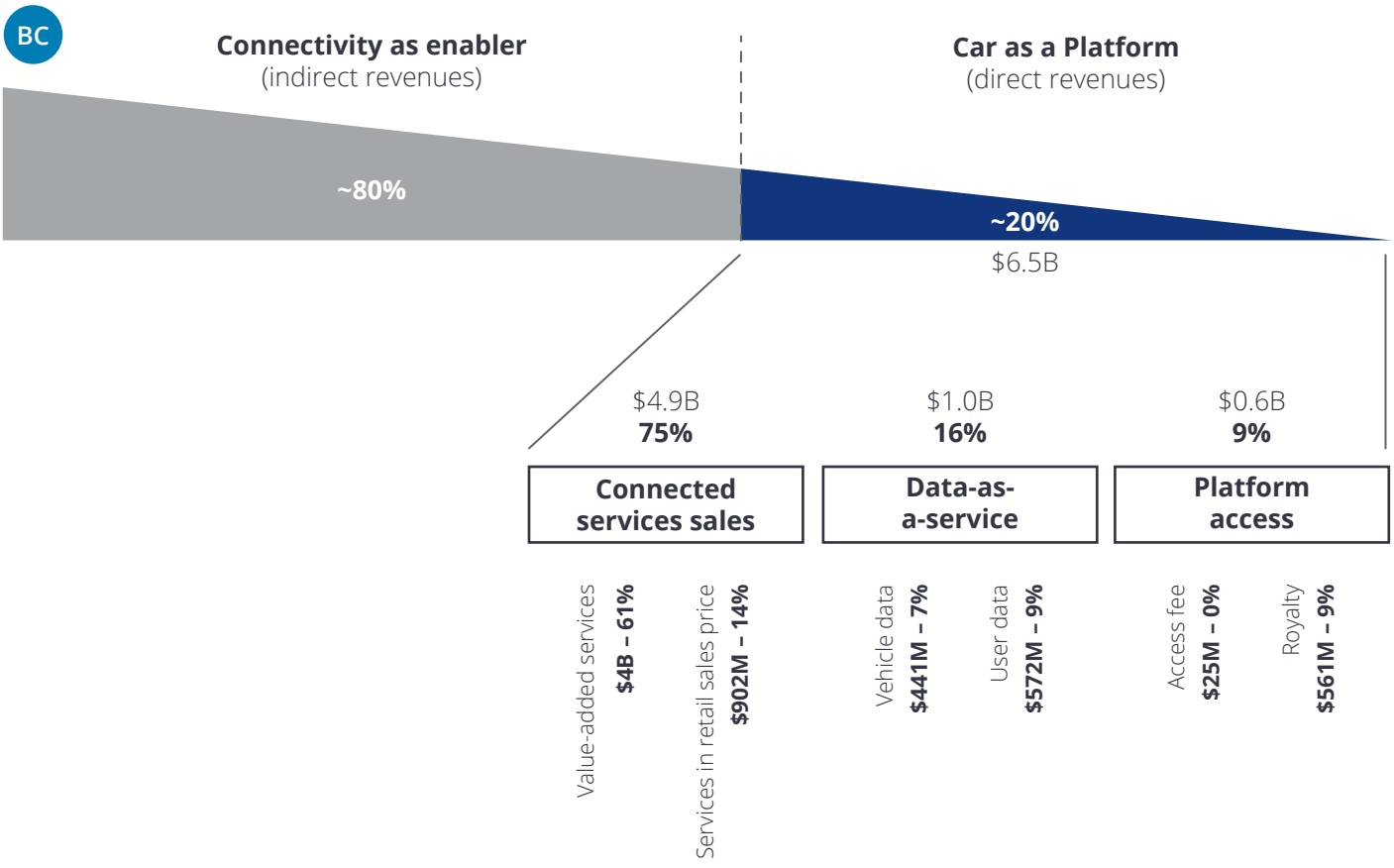
In this chapter, we focus on Car as a Platform in terms of direct revenues coming from data-as-a-service, platform access, or connected services sales.

Scope of chapter

Apart from the base case, we will also show figures for when the OEM shapes the mobility environment with its products and services:

- Where the emergence of CASA trends is weak, Car as a Platform will not be able to achieve a relevant market size.
- If the OEM does not control the user touchpoints, it will be unable to realize most of the revenues, because we can assume that third parties will provide Car as a Platform applications on their own.

Figure 56. Global total revenue potential of connectivity for the exemplary OEM in 2035



Numbers may not equal total shown due to rounding.

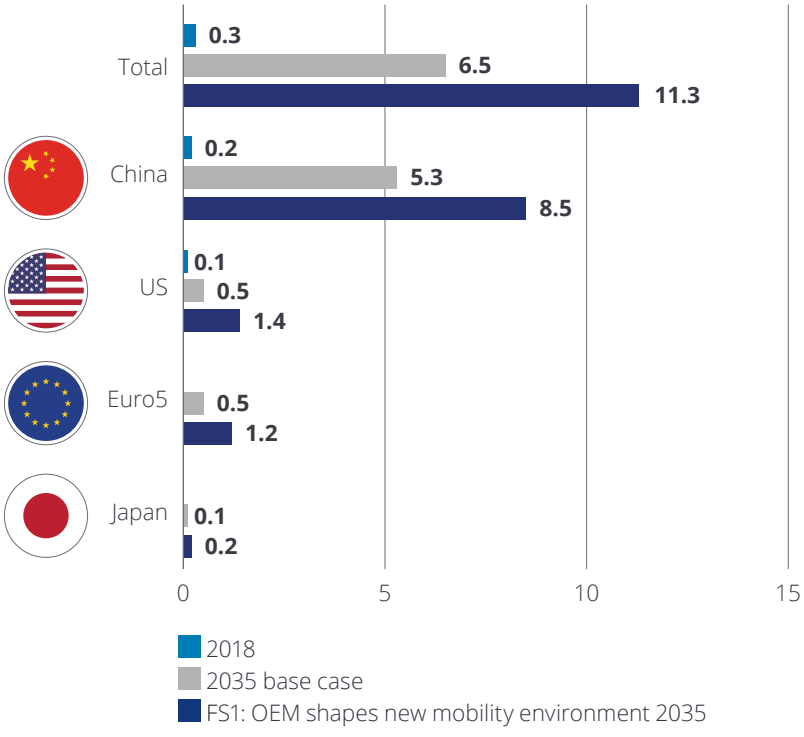
The Car as a Platform revenue streams are on an upward trend, gaining ground from a low level in 2018.
In 2018, Car as a Platform generated $0.3 billion in direct revenues, which is below 1 percent of total OEM revenues. At this point, sales mainly consist of connected services included in the retail sales price, such as navigation systems or voice assistance.

Overall, Car as a Platform will gain importance as customers shift away from a preference for minimal product variety and toward expressing very personal preferences. The trends toward product-as-a-service and digitalization contribute to the increased use of connected services. At the same time, a new monetization logic is emerging: Users are demanding pay-per-use offerings with multiple transactions.

China will be a main driver of future growth due to a strongly growing number of car units in operation and consumer preference for connected services. This creates revenue growth of 23 percent CAGR in China.

In a future where the OEM looks to define the new mobility environment, data-as-a-service is estimated to yield 25 percent of total Car as a Platform revenues. The OEM can generate data-as-a-service revenues especially from vehicle and user data, which can be sold for a variety of applications, including usage-based insurance, vehicle status information, and location tracking. Vehicles with V2X connectivity have significantly bolstered the OEM's ability to monetize data and implement use cases. In this future state, we assume that car makers have access to user data generated throughout the mobility journey.

Figure 57. OEM Car as a Platform revenues (in $B) 2018 and 2035



Numbers may not equal total shown due to rounding.

There are widespread and diverse potential use cases for vehicle and user data.

We identified various application areas classified across four customer groups: insurance, public, automotive, and other industries. For each field, we will introduce representative use cases.

This does not cover all existing use cases, and new use cases may emerge in the future.

Figure 58. Overview of selected data-as-a-service use cases

1 – Insurance sector	2 – Public sector	3 – Automotive sector	4 – Other sectors
PAYD/PHYD* insurance policies Speed, acceleration, braking, location, or weather data to adapt premiums to driving behavior	**Road infrastructure and design improvement** Road quality data to locate, predict, and avoid damage	**V2V communication** Access to vehicle data, proximity sensors, and traffic information to connect autonomous vehicles	**Smart grid** Charge status, speed, and direction traveled data to channel energy to targeted charging station locations where many EVs will most likely have to charge
Fraud recognition Vehicle camera, proximity, and impact data to analyze claim-relevant situations and identify fraudulent patterns	**Urban planning** Vehicle geolocation, timestamp, or data on the surroundings to intelligently plan roads and intersections	**Parts performance optimization** Access to usage data, error codes, and road-quality data to understand issues with parts and efficiently allocate R&D budget	**Charging network design** EV usage data to intelligently plan charging station infrastructure
Automatic collision claims Vehicle impact data for live assessment of damage to parts and its severity	**Parking** Data from vehicle cameras and proximity sensors to identify and guide drivers to available parking spots	**Warranty claim risk forecast** Forecast of warranty claims and damage-relevant parts and preemptive repair nudge	**Location- or time-based advertising** Provide access to location, speed, and time data so retailers can target customers in the vicinity
Health monitoring Data from vehicle sensors, interior cameras, and cabin air quality to assess driver health or state of inebriation	**Traffic flow management** Live traffic updates, hazard information, and vehicle data for optimization of traffic flow	**Automatic service appointment** Access to odometer, error code, and vehicle age data for automated scheduling of service appointments	**In-vehicle commerce and trunk delivery** Vehicle weight and load data to inform retailers that items have been delivered
	Usage-based taxation Odometer, speed, and location data to dynamically tax drivers	**Fleet management** Vehicle geolocation, speed, rental time, and distance traveled data to intelligently allocate fleet resources	

*Pay as you drive/pay how you drive

What OEMs should consider when entering the data-as-a-service business:

1. Define business strategy
OEMs need to carefully consider whether or not to enter a business area that is at once very promising and very uncertain, as well as in what form (individually, within partnerships, etc.) and to what extent. Data monetization works best at a large scale and is unrelated to the OEM's core business. It requires organizational anchoring and all of the effort associated with that.

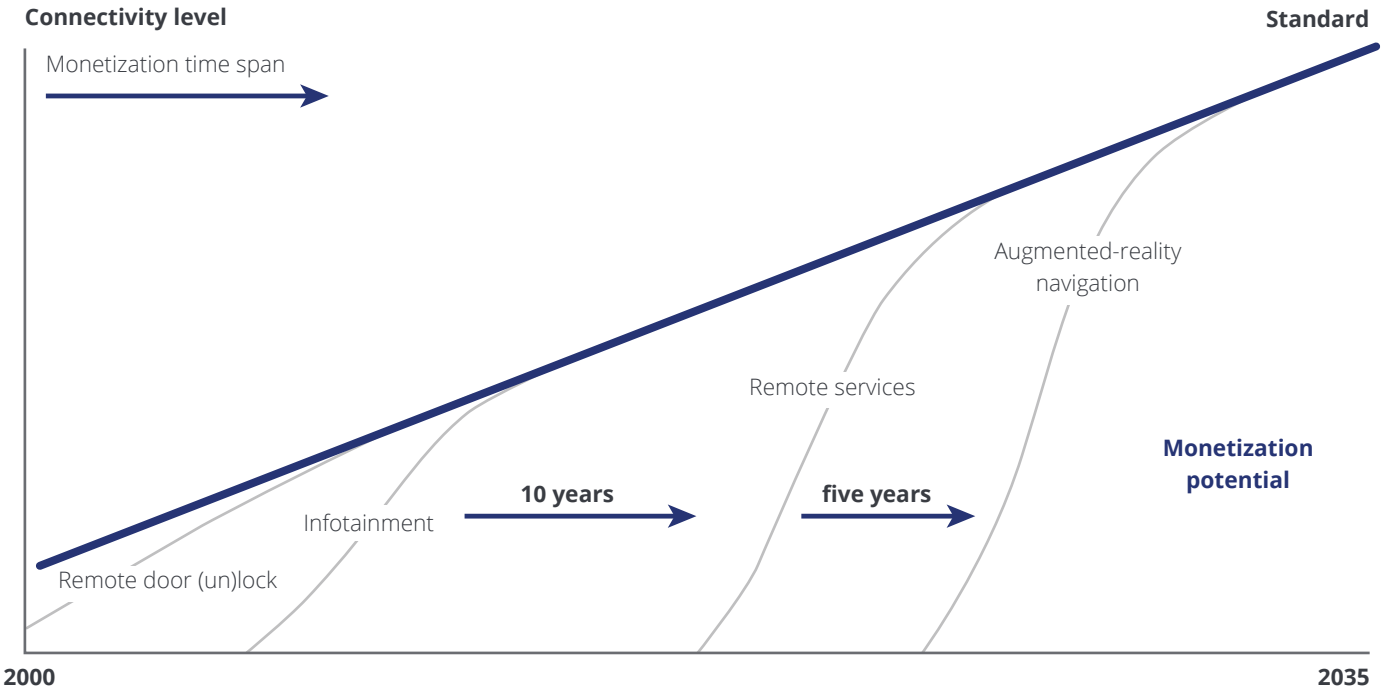
2. Build proprietary central data brokerage platform
The key to successful automotive data brokering is a central platform that ensures standardized end-to-end processes with centralized functions. In terms of functionality, the platform must be able to consolidate, anonymize, and distribute data.

3. Consider legal constraints
OEMs must ensure that its data processing systems comply with local legislation, which can vary significantly among markets and is not to be underestimated. Ideally, OEMs would create a consent management process for each data set, in which customers agree to share their data. Otherwise, the data must be anonymized, but in such a way that it does not diminish data.

In view of ever-shortening product life cycles and an incremental standardization of new technologies, the proxy OEM has only restricted short-term monetization potential with regard to connected services. Reaching long-term revenues from connected services requires repetitive, fast scaling of new technologies in-house or through acquisitions.

Technology adoption costs might increase rapidly during a delay. Strategic partnerships with technologically rooted companies is recommended in order to build joint forces in the research and development phase, set standards through innovation, and minimize financial downward risk of late technology adoption.

Figure 59. Illustrative overview of connected services monetization potential



Connected services sales are expected to contribute 75 percent to global OEM's Car as a Platform revenues as individual services gain importance and autonomous driving advancements gives customers more free time.
The OEM might be able to sell bundles with highly customized connected services to private customers as a premium offering. Revenues are generated either at the moment of the car purchase through option packages provided during the vehicle configuration or through an ongoing subscription model during car usage. Autonomous driving advancements drive sales of connected services because users have more free time available to spend productively and/or on infotainment.

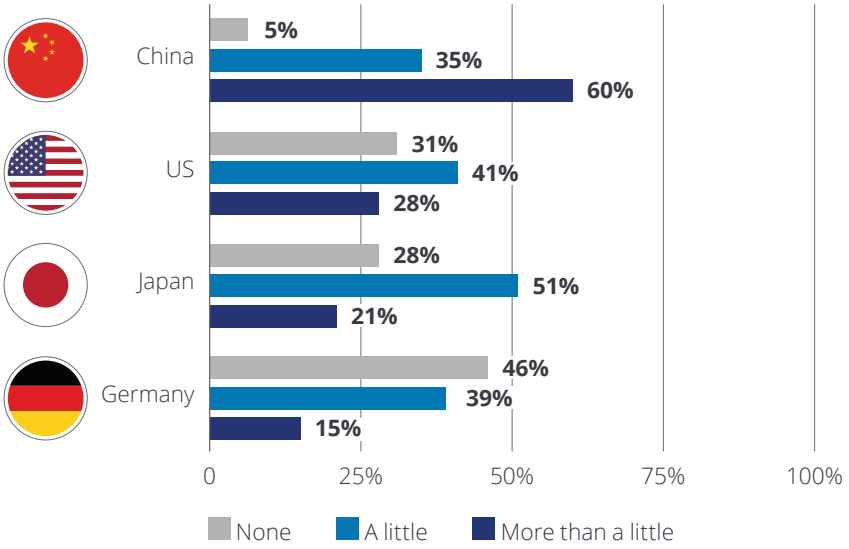
We expect that consumers in China will spend most of their time on infotainment and be most interested in value-added services. The service portfolio is expected to become broader, and we expect innovations entering the mobility journey from various other fields, such as biometrics, voice assistance, or the gaming industry.

Beyond that, we expect functional upgrades to be increasingly priced on demand (such as vehicle performance in terms of power).

Platform access revenues represent the third-largest revenue source.
The OEM will also allow outside service providers to reach car users through its mobile application and in-car content platform.

In addition to infotainment applications, the OEM sells advertising space and time, creating a highly scalable revenue substream that yields the highest contribution margin across all business segments.

Figure 60. Extra amount that consumers would pay for a vehicle that could communicate with other vehicles and road infrastructure to improve safety



Numbers may not equal total shown due to rounding.

In conclusion, we believe that connectivity will be a key enabler in the future, but direct revenues from Car as a Platform may in fact be lower than expected.
The measures to improve vehicle connectivity and associated operating models must be of the highest priority. However, as the competitive landscape and the nature of connected services R&D and operations is relatively new to all OEMs, finding a way to do so profitably will pose a significant challenge.

OEMs should design their Car as a Platform strategy wisely and select partners carefully.
When it comes to designing and implementing these services, OEMs have to select their strategy carefully. Collaborating with the right partners will be key. OEMs need to explore a cooperative model rather than traditional sourcing to address the challenges of this new, much faster business. Forming the right partnerships is also vital for the speed and the scale the business demands.

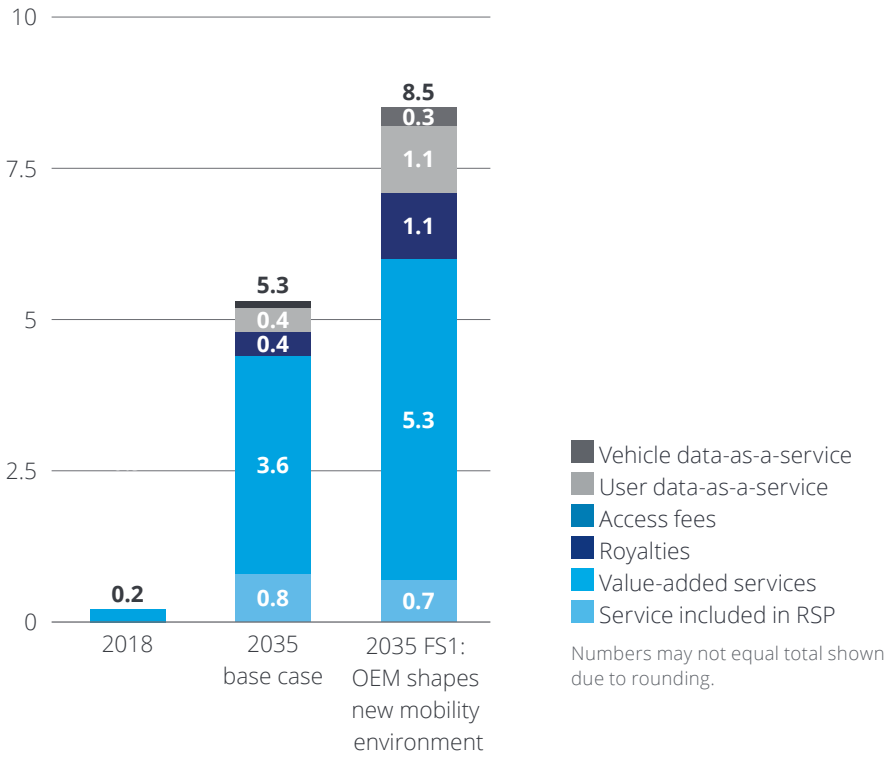
Late adopters will find it even harder to turn a profit. In terms of internal operations, OEMs will have to dismantle functional silos, and despite the need for a scalable cloud solution, connectivity services need to be adapted according to local conditions as user preferences (for example, interface control and service offering) across countries vary significantly.

Consumer survey data based on *Deloitte Global Automotive Consumer Study 2020.*

China experiences strong growth in Car as a Platform revenues from $0.2 billion in 2018 to $5.3 billion in 2035. Overall, Car as a Platform revenues in 2035 for China are expected to grow–driven by a strongly growing number of car units in operation and consumer preference for connected services. More specifically, most revenues generated in Car as a Platform stem from value-added services for customers: Consumers are expected to increase their service subscriptions and spend more, on average, for additional features such as infotainment packages. User data-as-a-service and vehicle data-as-a-service are expected to constitute a relatively small share because relevant data ownership remains difficult to obtain.

Shaping the new mobility environment (see future state 1) allows the OEM to reach more exclusive vehicle and user data access, among other things, and to sell more proprietary connected services. As a result, revenues are expected to increase to $8.5 billion.

Figure 61. Revenues (in $B) in 2018 and 2035

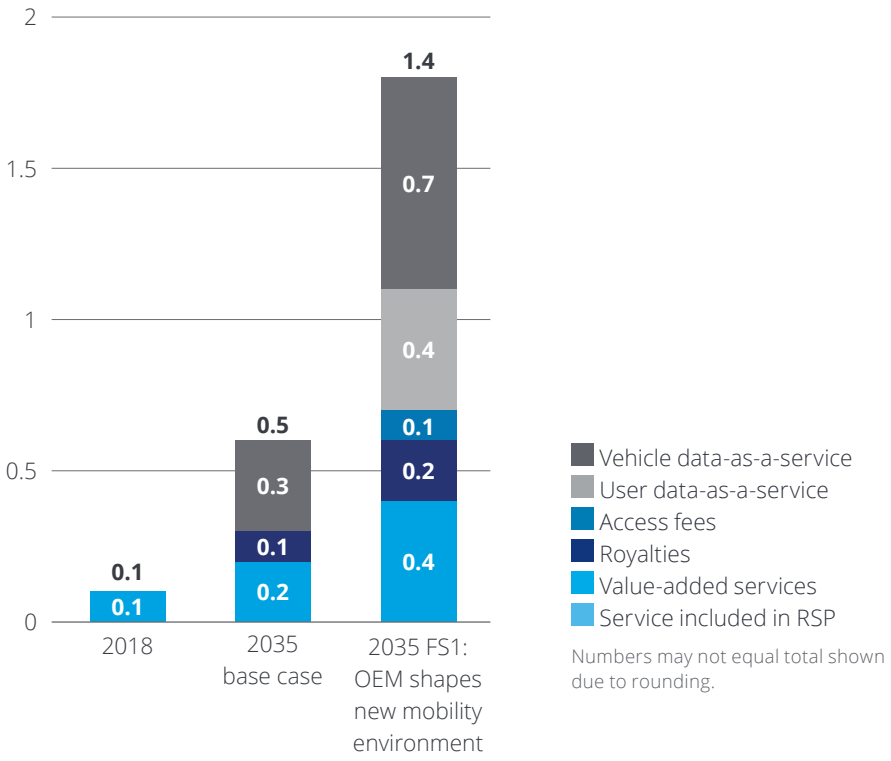


Numbers may not equal total shown due to rounding.

In the United States, Car as a Platform is expected to grow (due to vehicle data monetization, in particular) and may reach $0.5 billion in 2035.
Vehicle data-as-a-service contributes nearly half of revenues generated in the United States to Car as a Platform in 2035. Value-added services are expected to contribute around 37 percent. Consumers in the United States are especially in favor of a subscription-based business model for connected services, which results in the revenue discrepancy between value-added services and services included in the retail sales price.

In future state 1, the OEM is able to generate user data-as-a-service revenues as customers use its connected and mobility services user applications. Beyond that, vehicle data-as-a-service increases strongly driven by an elevated number of use cases (see figure 58).

Figure 62. Revenues (in $B) in 2018 and 2035



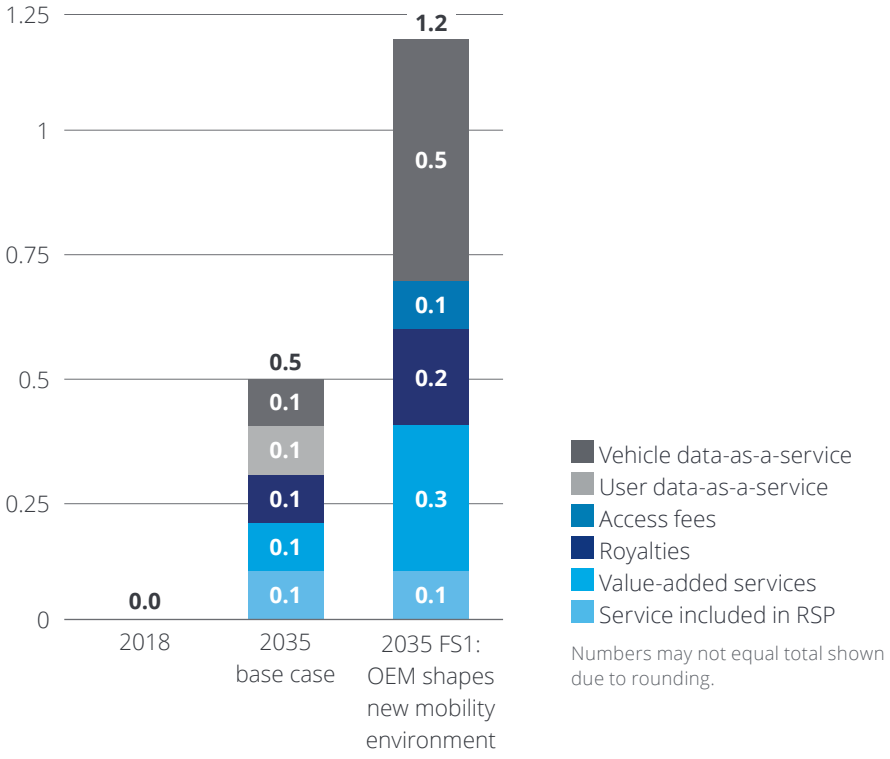
Numbers may not equal total shown due to rounding.

Car as a Platform revenues grow in Euro5 markets and reach $0.5 billion in 2035.

Revenues in Euro5 will be generated mostly by data-as-a-service and connected services sales. Overall revenue potential in Euro5 is limited due to a lack of exclusive data ownership by the OEM in a base case scenario. Beyond that, consumers seem hesitant to purchase value-added services because of stronger price sensitivity regarding connected services.

In a future state where the OEM shapes the new mobility environment, revenues increase across all services to $1.2 billion. Revenues from access services are added as complete new revenue streams because third parties are willing to pay the OEM for access to its user platform.

Figure 63. Revenues (in $B) in 2018 and 2035



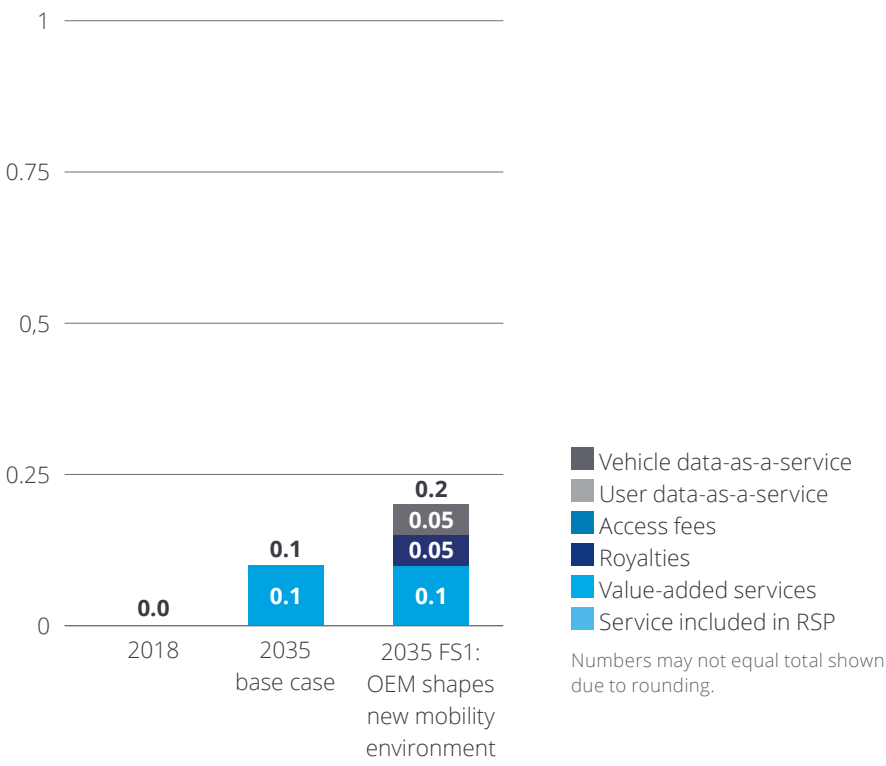
Numbers may not equal total shown due to rounding.

Japan will reach $0.1 billion in Car as a Platform revenues–moderate growth due to declining number of car units in operation.

In 2035, value-added services are the largest contributor of revenues. The moderate growth in comparison to other regions can, to some extent, be explained because the Japanese market faces an overall decline in number of car units in operation due to the aging population.

In future state 1, revenues increase to $0.2 billion because vehicle data can be monetized and royalties from third-party connected services sales will be captured.

Figure 64. Revenues (in $B) in 2018 and 2035



Numbers may not equal total shown due to rounding.

Summary of results

In a base-case scenario, the proxy OEM experiences compound annual revenues growth of 3 percent from 2018 to 2035. From all markets considered, the market development in China will contribute the most to overall growth. Other markets show only moderate or minor positive growth. In Euro5 and Japan, even traditional business segments decline and the loss can only be compensated through growth in new business segments.

Vehicle sales

The overall vehicle sales of the proxy OEM would grow by 25 percent in a base case. Major growth comes from China, but the United States is also growing slightly. Euro5 and Japan show declining. In each market, a significant shift from private to fleet segments and from stationary to online sales is expected–yet another reason why mastering omnichannel and direct sales will be key success factors across all markets.

Aftersales

The aftersales business of the proxy OEM will expectedly experience a decline of 11 percent in 2035, even in a base case. In disruptive trend emergence scenarios, the decline will be much stronger. Industry trends–and especially alternative drivetrains–are expected to put the current total profits of the OEM at risk. China represents the only growing market in aftersales driven by a strongly growing number of car units in operation. The effect of industry trends is expected to be lower on the vehicle age seg. II+, which is in most markets currently dominated by the independent aftermarket. Therefore, engaging in this segment is one of the key priorities OEMs should consider within their aftersales strategy.

Financial services

Revenues in financial services will almost double due to strong growth in China–the country will contribute more than half of the proxy OEM's financial services revenues in 2035. Japan is the only market under consideration where financial services revenues are expected to decrease due to declining new car sales. Service-based businesses are expected to grow in each market, driven also by growth of new business segments. Mastering omnichannel with a focus on direct sales will be a key success factor in all markets for asset-based and service-based businesses.

Mobility as a Service

The OEM can yield significant revenue growth in Mobility as a Service and grow at a total compound annual growth rate of 11 percent until 2035 in a base-case scenario.

Fleet services benefit from shared mobility and expand to include more multibrand offerings. The expected revenue growth in infrastructure services is driven mainly by the emergence of alternative drivetrains.

Shaping the new mobility environment would strongly leverage profit potential. This implies becoming a holistic "full-service mobility provider," which would yield substantial synergies, as OEMs can then control end-to-end user touchpoints and optimize costs throughout all revenue substreams. This would require OEMs to undergo a massive transformation, which not every OEM will want to do if they want to avoid sunk-cost investments.

Car as a Platform

Direct revenues are expected to increase from Car as a Platform sales, but the main role of connectivity is to act as an enabler for other revenue streams or as a cost optimizer. Overall, Car as a Platform looks set to remain relatively small, accounting for only 4 percent of total OEM business in a base case. Connected services sales revenues generated in China will drive most of total revenue growth. When the OEM looks to define the new mobility environment, data-as-a-service in particular becomes a new main revenue contributor across markets. OEMs should carefully review their initiatives and partnerships to avoid sunk-cost investments and deliver the best value to their customers.

Conclusion and priority actions

Create transparency to make profound decisions

As an initial step, we recommend that OEMs create full transparency about how industry trends affect their business, today and in the future. We encourage OEMs to take our analysis of the proxy OEM and carefully adapt it to the specificities of their own business.

- Get a better understanding of expected trend emergence also in correlation with internal product and sales planning (planned drivetrain mix, investments into new technologies, etc.)
- Perform risk assessment by analyzing and simulating effects of trends on current and future revenue and profit levers per business segment
- Review current investments and initiatives in how far they contribute to the chosen strategic path
- Dismantle functional silos and explore a cooperative model to get the holistic picture needed to make profound decisions

Ensure enablers are in place

Whether OEMs aim to participate in new business segments or not, in order to respond to technological advancements, the transformation of current products and processes is imperative. There are various levers that are needed and should be implemented, such as:

- Strategic partnerships and acquisitions (such as BEV platforms, cloud services, and software development expertise)
- Connected infrastructure and platforms (such as, car connectivity platforms and end-to-end customer engagement solutions)
- Standardization of autonomous driving functionalities, as well as alternative drivetrains adoption
- Mass data capabilities (including car and customer data) in a large-scale and flexible analytics network
- "Internal" digitalization of entire value chain to ensure flexibility and efficiency, including new capabilities and expertise

Ensure omnichannel capability

OEMs have to significantly transform their current stationary sales and aftersales network regardless of the future state scenario. This includes various fundamental sales transformation changes, such as:

- Reducing scale and assets in the traditional retail network and introducing new formats and digital experiences to the retail mix
- Developing a truly seamless (digital) customer experience (including full integration of OEM and national sales company (NSC) and retail channels)
- Integrating a digital service portfolio harmonized across all business units with "one-stop shopping" for the customer
- Creating fair and balanced "retail agency models" for OEM direct business models
- Optimizing total cost of ownership (TCO) as the basis for competing for fleet customers and as a key factor in making fleet operations more competitive

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