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Insurance

Motor Insurance 2.0

We see a significant part of the ~\$200bn market value of the global motor insurance industry at risk, under the cumulative effect of a broad range of disruptive trends: car technology, new mobility, availability of data, digitisation, regulation and world economics.



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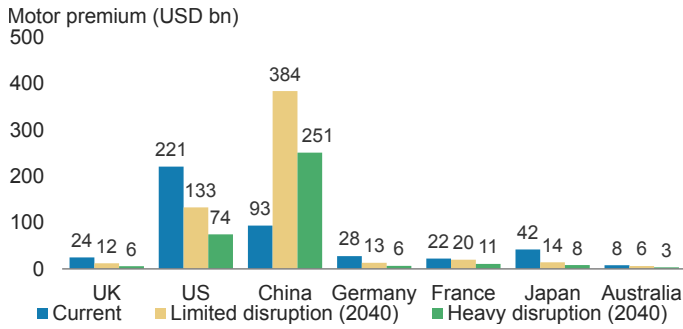
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Motor Insurance is on the Brink of Dramatic Change

Exhibit 1:

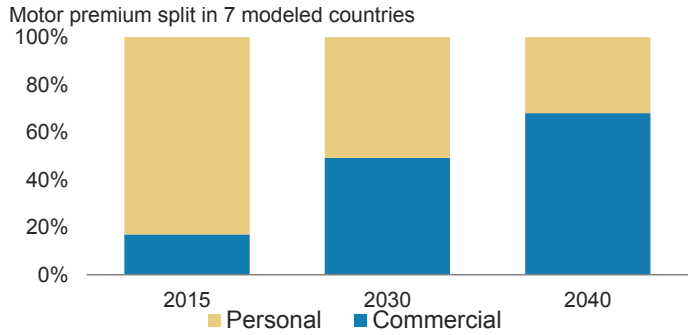
Motor premiums could decline as much as 80% in some mature markets by 2040



Source: Morgan Stanley Research, BCG analysis

Exhibit 2:

We forecast a gradual shift from personal to commercial lines, with commercial lines representing ~70% of the market by 2040

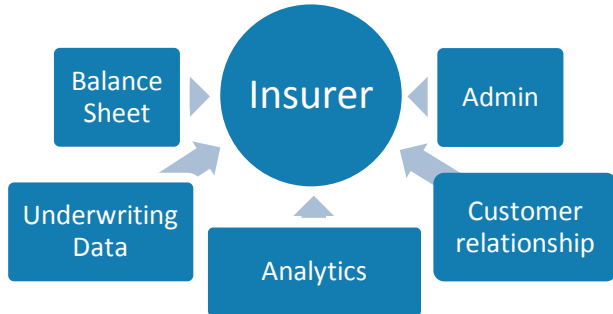


Source: Morgan Stanley Research, BCG analysis

Exhibit 3:

The traditional motor insurance model is likely to be heavily disrupted - insurers face an outcome where disruptors have competitive advantage in data, analytics and distribution; potentially leaving the insurers as low margin capital and admin providers

Old World



Source: Morgan Stanley Research, BCG analysis

New World

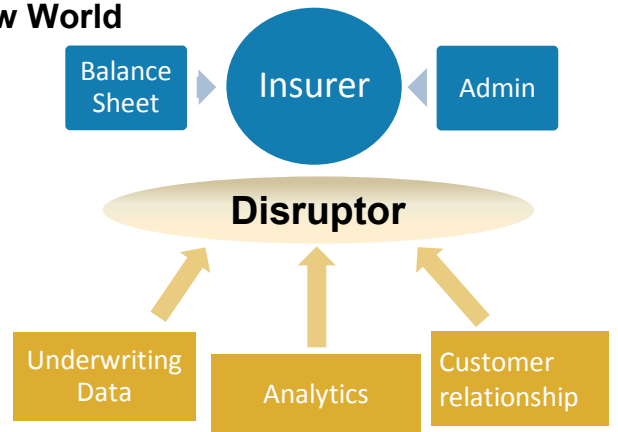
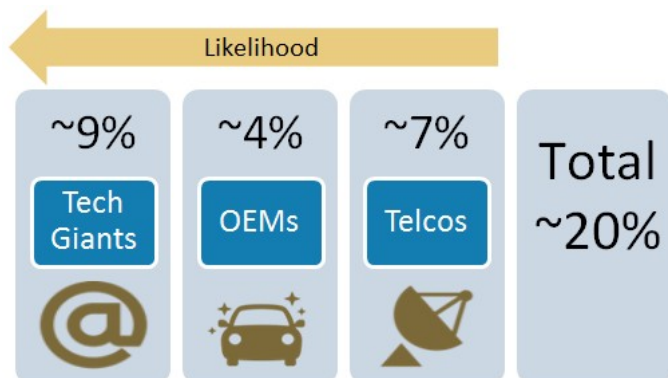


Exhibit 4:

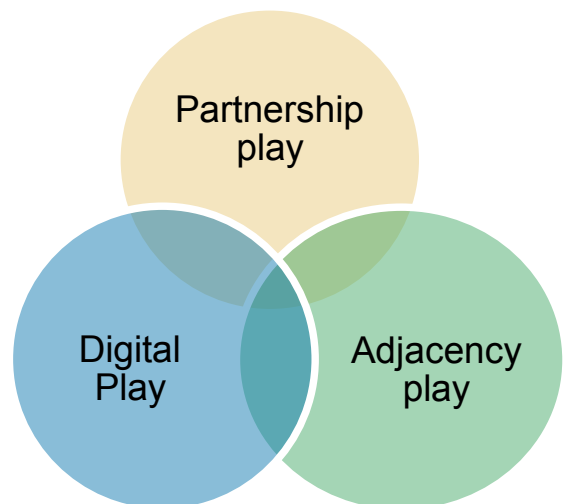
We estimate that disruptors may account for ~20% of the market by 2020 (with country variances) - share which is not addressable by traditional insurers unless they form partnerships



Source: Morgan Stanley Research, BCG analysis

Exhibit 5:

Each motor insurer should be fundamentally reconsidering all aspects of its operating model. Broadly, we see three strategic plays



Source: Morgan Stanley Research, BCG analysis

Elevator Pitch: Mapping Disruption in Motor

We see a significant part of the ~\$200bn market value of the global motor insurance industry at risk, under the cumulative effect of a broad range of disruptive trends: car technology, new mobility, availability of data, digitisation, regulation and world economics. When combined these disruptive forces may lead to steep revenue declines in mature markets (e.g. our modelling suggests Japan 2040 premiums could be 84% lower than 2015 in a Heavy disruption scenario), a fundamental move away from personal lines to commercial lines (e.g. a personal motor market in mature economies that is up to 35-67% smaller in 2030 than today), a radical shift of future growth to emerging markets and the likely entry of disruptive players.

In light of the combined threat of these dynamics, incremental change is not an option - insurers must adapt rapidly or become increasingly marginalised.

Our work seeks to map out in high definition how the market evolves over time as it transitions to a future state in which much safer, and eventually autonomous vehicles dominate the car parc and shared mobility solutions are widely adopted in urban areas.

In order to better understand how the next 5-10 years and beyond look we have conducted an extensive global consumer survey, in-depth industry interviews and detailed proprietary market modelling by country.

Our key findings:

1) Decreasing motor insurance risk pool in mature economies. In the short-to-medium term, despite some resilience, market growth will progressively slow down (e.g. we estimate UK growth 17% lower than the 10-year trend by 2025). In the long term, the risk pool is reduced dramatically, leading to a reduction of overall market size in mature markets of 15-72% by 2040 in nominal terms in our 'Limited disruption' scenario. The two main drivers are (i) an accelerating reduction in accident frequency due to adoption of collision avoidance and speed management technology, and (ii) slower, but material downwards pressure on the size of the car parc due to adoption of shared mobility.

2) In our Heavy disruption scenario, a combination of technological, regulatory and social factors accelerate the reduction of market size in mature markets, reducing it by 18-60% by 2030 and 54-84% by 2040. We see solid social and economic arguments for governments seeking to speed adoption rates of safer technology through speed control measures, scrappage schemes and other legislation. Furthermore, new mobility companies are strongly incentivised to catalyse these changes by rolling out fleets of shared, autonomous vehicles.

3) Even greater reductions in personal lines insurance markets, as a high proportion of the risk pool shifts to commercial insurance. The shift from personal lines to commercial lines (from a ~80/20 personal vs. commercial in 2015 to ~50/50 by 2030, and ~30/70 by 2040), implies a personal motor market in mature economies that is 35-60% smaller in 2030 than today in nominal terms. Furthermore, collision avoidance technology will be covered by manufacturers, and OEMs by product liability insurance, while new mobility businesses will bulk buy fleet insurance.

4) Progressive shift of future growth towards emerging markets. Emerging markets motor insurance premiums are likely to continue to grow - albeit below the trend rate. We still forecast robust growth in markets such as China, which will grow from ~13% of the global motor market at present, to ~20% by 2025.

5) The traditional motor insurance model may be heavily disrupted by non-traditional players with access to proprietary driver data, superior analytics capabilities, and direct customer access. Sophisticated counterparties (such as shared mobility fleet owners) will not only own the data but are likely to perform their own analytics, making it challenging for insurers to address the growing commercial lines market. Furthermore, we see a credible threat that tech giants, OEMs (original equipment manufacturers) and, to a lesser extent, telcos could corner a significant (and profitable) share of the remaining personal lines market. This is further supported by our consumer survey, which shows that nearly 50% of today's young driver population would be prepared to purchase motor insurance from non-traditional players.

6) Ultimately, insurers face the risk of becoming pure capital providers. Without ownership of the customer and with the erosion of their traditional advantage in the data and analytics necessary to price risk, and manage claims and fraud, insurers face being marginalised. In aggregate we think that a significant part of ~\$200bn of market cap associated with motor insurance is at risk, with UK insurers most at risk, while Continental European and South Korean insurers are relatively less impacted.

7) We feel that on the whole there is a false sense of security in the market. Whilst significant pain may not be felt in the immediate future, the next few years will be crucial for motor insurers to lay the foundations for success in the future state. Each motor insurer should be fundamentally reconsidering all aspects of its operating model (including product and business mix, underwriting capabilities, distribution channels, cost structure, and acquisition strategy).

8) Broadly, we see three, non-exclusive strategic plays. A 'Digital play' involves leveraging technology throughout the value chain to exchange data and engage with consumers, optimise the cost of risk and achieve superior cost efficiency. This model requires insurers to collect and use data in a more integrated way across functions - underwriting, servicing and claims - that are currently siloed in most insurers. Under a 'Partnership play' insurers may turn to strategic partners (e.g. OEMs, data aggregators, digital service providers) to secure access to data and customers and/or complement their range of services. An 'Adjacency play' is also possible where insurers look to mobility-related adjacencies in order to replace lost revenues and fuel future growth. Choice of strategy will depend on size, global reach and business mix.

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Executive Summary

This Blue Paper was prepared jointly by Morgan Stanley Research and Boston Consulting Group (BCG). It follows on from September 2014's joint Blue Paper Insurance and Technology: Evolution and Revolution in a Digital World. We have collaborated globally, involving the insurance, technology and autos groups at each organisation.

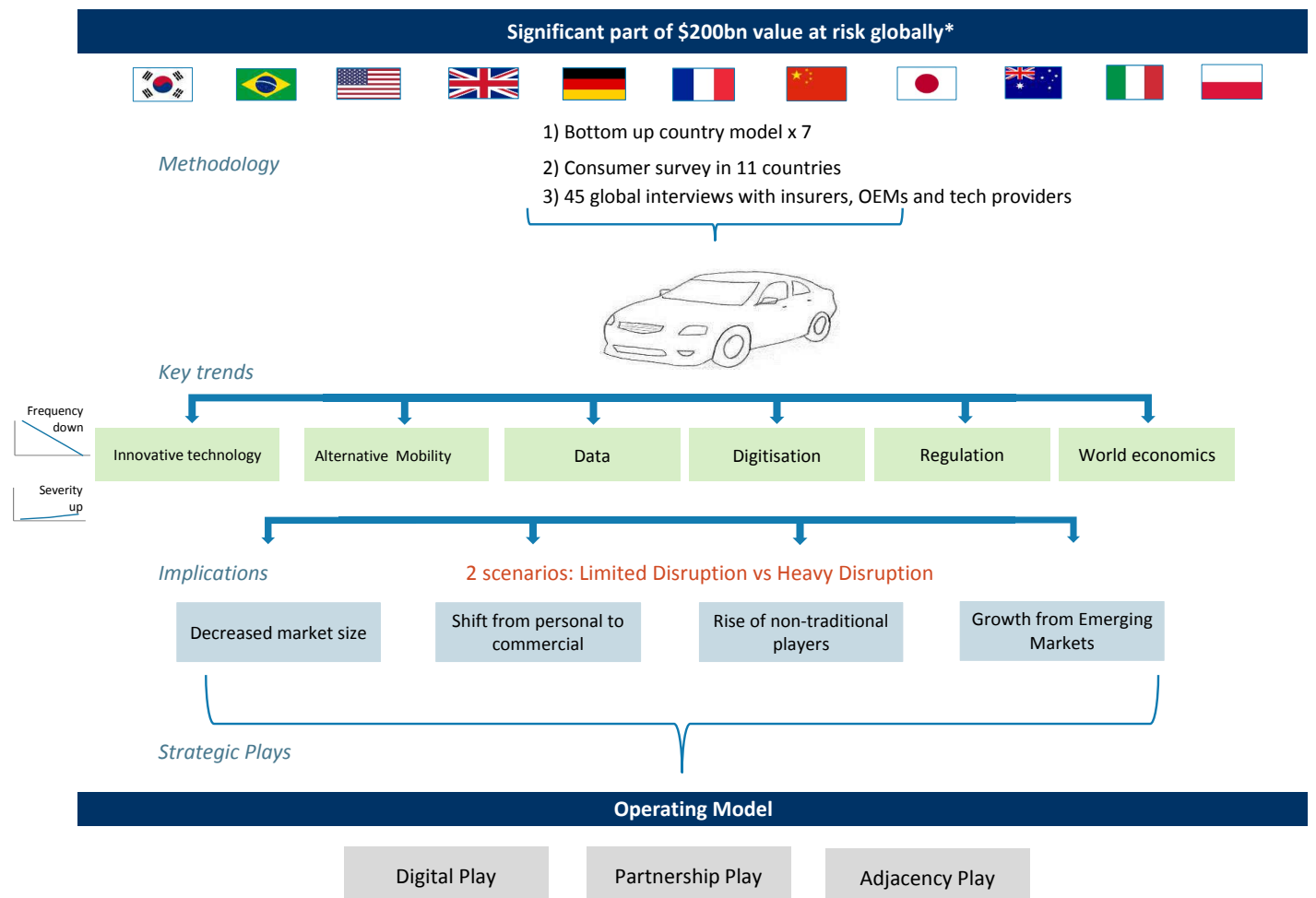
In researching this report, we conducted 45 interviews with senior executives of insurers, OEMs and technology providers globally. In addition, we commissioned a proprietary global survey of drivers and motor insurance customers in 11 countries.

We also constructed seven proprietary country market models to forecast the granular year-on-year impact of the introduction of technologically advanced vehicles and move to shared mobility, from 2015 to 2040.

See **Exhibit 6** for a summary of our methodology and approach.

Exhibit 6:

Motor 2.0: summary of our methodology and approach



* Please see Appendix 4 for a full list of companies included in the calculation.
Source: Morgan Stanley Research, BCG analysis

False sense of security

We believe there is a false sense of security in the motor insurance market - in our view the market is ripe for disruption by new entrants, the personal motor market could shrink by up to 35-67% by 2030 in mature countries, and a significant part of the ~\$200bn² of market capitalisation globally could be at risk.

Six underlying trends

There are several underlying trends converging on the industry: car technology, new mobility, availability of data, digitisation, regulation, and world economics:

1) Innovation in technology, not only within the car, from collision avoidance features through to fully driverless vehicles, but also external technologies, which could lead to better accident analysis and safer driving through tighter speed control.

2) Rise of alternative mobility models. For example, ride-hailing, ride-sharing and car-sharing, which are gaining traction in urban centers with consumers increasingly switching part of their private miles to alternatives, foregoing car ownership and building multimodal journeys.

3) Availability of data, including the ongoing penetration of connected cars and the development of new sources of data, both proprietary and publicly available.

4) Digitisation, fundamentally changing the way in which customers interact with car-related data and services, and forcing insurers to integrate themselves into an increasingly digital mobility ecosystem.

5) Regulation, both at regional and local levels, which may slow down or accelerate key developments in motor insurance. For example, mass adoption of car safety features and speed control meas-

ures, deployment of driverless cars and new insurance coverage requirements, ownership of data etc.

6) World economics, leading to the ongoing shift of car parc growth to emerging markets.

When combined, these various disruptive forces could have a material impact on the market and re-shape the competitive landscape in a shorter time frame than many insurers may expect. In this report we have sized this combined impact.

Highlights from our global consumer survey

Our proprietary global consumer survey - which we conducted in 11 countries around the world – supports these trends and provides some fascinating insights.

From car ownership to car usage

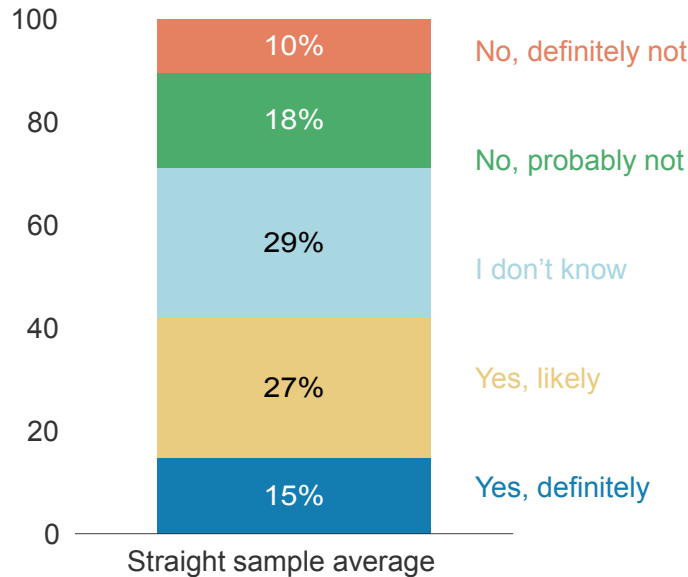
Although car ownership remains strongly valued by >90% of respondents across all markets, ages, income levels and residential areas, consumers are increasingly considering foregoing car ownership should convenient, price effective alternatives become available. Only 60% of consumers would keep owning a car they rarely use, and 25% would be ready to stop owning a car given their likely shift to alternative mobility (see [Exhibit 7](#) - [Exhibit 8](#)). We believe that the shift is likely to show initially as a reduction in the number of cars per household, as multiple-car owners are already less keen on replacing second and third cars compared to their primary car (see [Exhibit 9](#)).

We also expect to see a gradual shift of private miles to public transportation and shared miles, and a gradual reduction in miles traveled per private vehicle per year.

Exhibit 7:

Amongst consumers willing to switch away more miles in the future, 42% could stop owning a car, which is 25% of all consumers

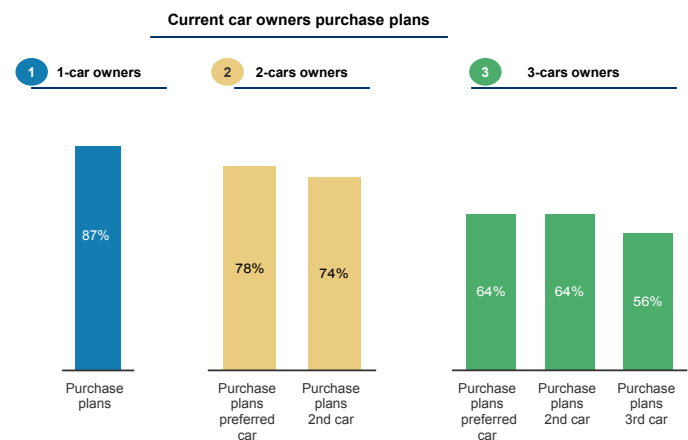
% of respondents¹



1. Question: You have stated that you see yourself switching some of the miles you currently travel in your private car to 'alternative mobility'. When you do this will you stop owning a car?
Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Exhibit 9:

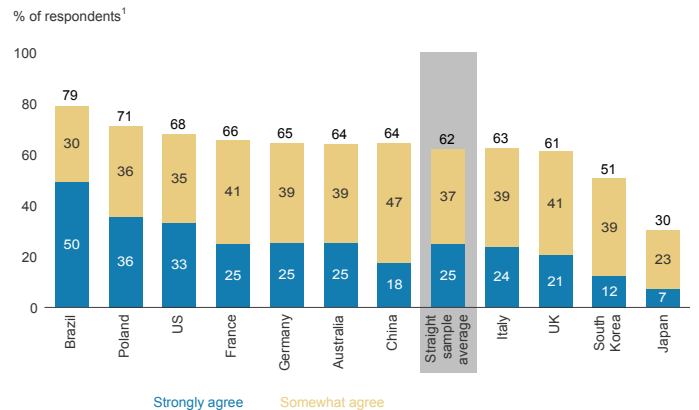
Multiple-car owners are already less keen on replacing the second / third cars compared to their primary car



Question: Approximately when do you next plan to replace your car? Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Exhibit 8:

Willingness to continue owning a car that is only rarely used is about 60% on average



1. Question: I would continue owning a car even if I rarely used it - Please let us know whether you agree or disagree with the following statements. Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Consumers seek advanced car safety features

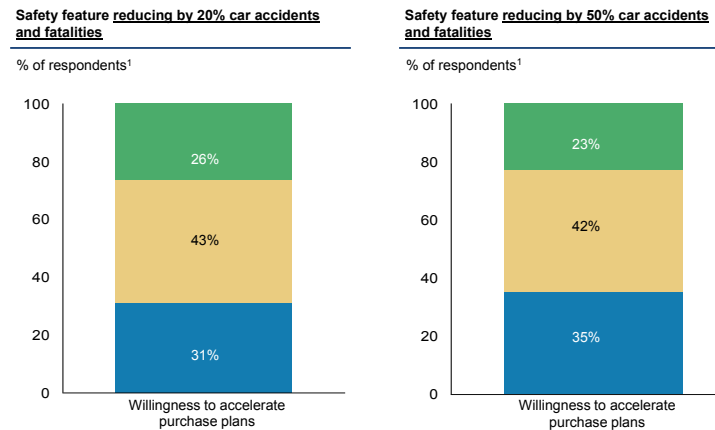
Consumers across all markets are willing to pay more and bring car purchases forward for accident proofing technology. ~80% would pay to have these features in their future car; at least 65% would even pay to retrofit into their current vehicle; 75% would accelerate purchase plans in order to have the features as early as possible. Consumers from emerging markets and Germany are willing to spend more on such technologies (see [Exhibit 10](#)).

We also see broad support for regulatory stimulus. ~70% consumers would support their governments making accident reduction technology mandatory in all new cars, and ~20% would actively lobby for it (see [Exhibit 11](#)).

Financial incentives, whether when purchasing the car or in the form of lower insurance premiums, would further accelerate the penetration of accident proofing technology.

Exhibit 10:

Consumers are likely to accelerate purchase plans to get a car with safety features

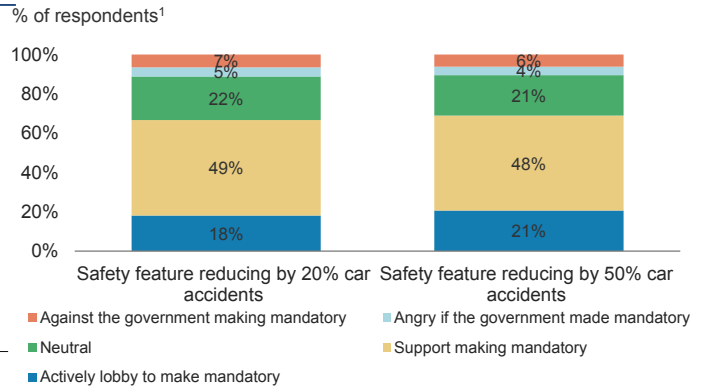


No, the availability of this safety feature would not affect when I would plan to buy my next new car
 Yes, I would look to buy a new car with this safety feature immediately
 Yes, I would look to buy a new car with this safety feature earlier than I would otherwise have bought a new car

1. Question: If this safety feature were available in new cars, would you accelerate your plans to buy your next car? Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Exhibit 11:

Consumers are supportive of mandatory regulation of safety features on new cars



1. Question: What would be your view on potential government regulation in relation to this safety feature in new cars? Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Consumers are generally open to autonomous vehicles

54% of consumers are very open to taking a ride in an autonomous vehicle, while 52% would consider purchasing one. For 40% of these consumers the key reason is safety (although it should be noted that safety concerns are also the main reason behind resistance to driverless cars).

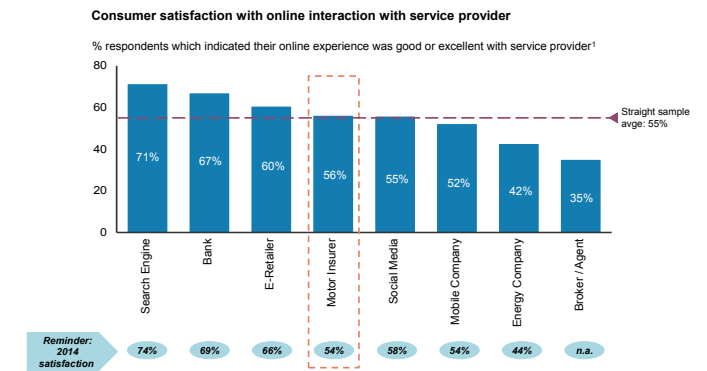
These findings are consistent with a separate study conducted by BCG and the World Economic Forum which found that 58% of consumers would take a ride in a fully driverless car, and ~30% of consumers would be willing to pay more than \$5k extra for an autonomous car.

We note, however, that consumer sentiment towards autonomous vehicles is volatile and overly sensitive to isolated events (e.g. media coverage of accidents involving the testing of a driverless car). Therefore, although inevitable, the transition towards driverless cars may not be a smooth ride.

The insurance digital experience remains a key area for improvement

Exhibit 12:

Overall, online interaction with insurers generates an average level of consumer satisfaction compared to other industries. Search engines and banks rank higher



Question: How would you describe your online experience with each of the following companies? Morgan Stanley and BCG Insurance Customer Survey 2016; Source: BCG analysis, Morgan Stanley Research

When compared to our 2014 consumer survey, insurers appear to have improved their digital experience, but consumers are still dissatisfied past the acquisition phase. 56% of consumers rate their online experience with insurers as good or excellent (a 2 point increase vs our 2014 survey), although insurers are still ranked in the middle of other online service providers (see [Exhibit 12](#)).

We find that consumers prefer online and remote (mail/phone) channels over face-to-face across all of the motor insurance value chain. Consumer adoption is higher for mobile and tablet apps than web portals, but the overall digital customer experience remains one of the most frequently mentioned pain points.

60% consumers using only indirect (intermediated) channels would consider purchasing directly from insurers with a better online offering. Improving the digital experience would not only improve customer acquisition and engagement but also unlock efficiency gains, especially in policy changes and claims processing, where the share of human interactions and online dissatisfaction remain the highest.

Consumers (especially younger drivers) ready to turn to non-traditional players

55% of consumers are willing to purchase insurance from a non-traditional player. When asked to select across a variety of non-traditional players, 40% of customers would consider purchasing motor insurance from OEMs, more than 10 points ahead of tech giants or telcos. This may be because OEMs are already a part of the insurance customer journey for 9% of customers, especially in research (12% of consumers) and purchase (14%). Developed markets, especially Japan, Italy and the US, lead the pack.

As expected, young drivers are even more willing to purchase from non-traditional players; however, this segment would prefer to purchase from a start-up than from an OEM or a tech giant.

Four key implications for the future of motor insurance

We expect that the above trends will have four main implications for the future of motor insurance:

1) Decreasing motor insurance market size in mature economies, we estimate by 15-72% by 2040 in nominal terms (in a Limited disruption scenario), driven by downward pressures on the size of the car parc and reduced accident frequency.

2) Shift from personal lines to commercial lines (from a ~80/20 personal vs. commercial in 2015 to ~50/50 by 2030 and ~30/70 by 2040), implying a personal motor market in mature markets that is up to 35-67% smaller than today in nominal terms in 2030.

3) Rise of non-traditional players, building an underwriting advantage in data, analytics, digital capabilities and direct customer access to take significant (and profitable) share of the remaining personal motor market from incumbent insurers.

4) Progressive shift of future growth towards emerging markets, starting with China.

1. Downwards pressure on insurance market size (both short and long term)

In a Limited disruption scenario we expect the total insurance market size in mature economies to shrink by ~15-72% by 2040.

In the short term, despite some resilience, market growth will progressively slow down relative to trend. For example, in the UK by 2025 we forecast premiums could be 17% lower than if premiums had continued to grow at same average rate as for the past 10 years (1.9%). There are two main drivers of this slowdown: (i) a downward pressure on car volumes driven by the stabilisation then slight decrease of the car parc due to consumer adoption of shared mobility solutions, and (ii) a reduction in accident frequency due to the adoption of collision reduction and speed management technology, which will push claims down and lower prices.

Accident severity evolution is less clear. Although there may be an overall increase in severity as more expensive car parts lead to higher repair costs per collision, this is counterbalanced by lower bodily injury claims as the average speed per collision is likely to fall.

When forecasting market size, we believe that there is too much focus on the end state of fully autonomous (Level 5) vehicles. Level 1 and 2 cars (which are already on sale) are significantly safer than predecessors, which is likely to have an immediate impact on claims patterns. On a 5-10 year view, it is these features, and the potential for connected cars and other external technologies to enable stricter speed controls, that will materially impact the risk pool.

Heavy disruption scenario

We see the following factors as plausible drivers of an accelerated impact on the market:

- 1) **Voluntary retro-fitting of safety features into older vehicles** driving even faster penetration of collision-reduction technology and reduction in accident frequency.
- 2) **Regulatory stimulus** (e.g. government scrappage schemes) further increasing the rate at which collision reduction technology permeates the market.
- 3) **The early introduction of shared, driverless, electric vehicles** (especially in urban areas) further propelling a feedback loop of safer cars and lower pollution, which leads to faster introduction of newer cars. New mobility players have a strong economic incentive to roll out shared, driverless fleets as removing drivers could materially improve their profitability.

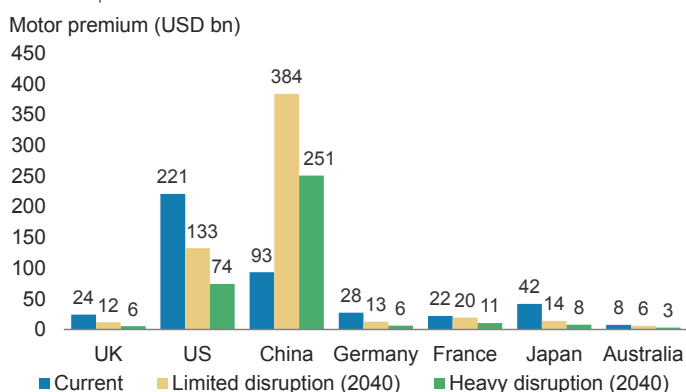
In the short term, the decrease in total claims could lead to a boost to profitability in markets where premiums do not fall as quickly as claims. For example, regulatory constraints, price opacity and low levels of competition can lead to stickier pricing in selected markets. In the medium term, we expect the overall profit pool to decline in line with reduced risks.

We have also considered a Heavy disruption scenario, in which a combination of technological, regulatory and social factors accelerate the transformation of the motor insurance market of mature economies, reducing it by 18-60% by 2030 and 54-84% by 2040.

In [Exhibit 13](#) we show the relative size of the various country markets we have modeled in the base case or 'Limited disruption' scenario and the 'Heavy disruption' scenario. We think premiums will decrease substantially across all of the mature markets that we have modeled.

Exhibit 13:

Motor insurance premium forecasts for selected countries: we show our 2040 estimates in both a 'Limited' and 'Heavy' disruption scenario and compare with current volumes



Current premiums are FY15 premiums converted to USD using FX rates at 31/12/2015, forecast premiums are converted to USD using FX rates at 26/09/2016 Source: Morgan Stanley Research estimates, BCG analysis

2. Shift from personal lines to commercial lines

We expect commercial lines to progressively replace personal lines, as a result of two factors.

First, increasing usage of shared mobility solutions leads to a rise in the number of fleets and commercial vehicles (which is magnified in terms of premium impact given higher utilisation, or miles per vehicle, for shared vehicles versus private vehicles). In our base case (Limited disruption) scenario, we model for commercial lines to represent 49% of market premiums by 2030, and 67% by 2040 compared with 17% at present across the seven markets that we model. We see immediate challenges for personal lines motor where volumes are likely to decline, a trend masked at the aggregate level by commercial lines growth.

Second, the risk pool will shift towards product liability, as vehicles rather than drivers progressively become the main source of accidents.

3. Disruptive threat from non-traditional players

As the value of insurers' proprietary data and traditional expertise diminishes, the traditional motor insurance model is likely to be heavily disrupted. We see a number of non-traditional entrants whose capabilities allow them to extract value from the market. Indeed, a number of the innovations we are already seeing have been driven by other players: for example, OEMs developing tailored products for their drivers, parts manufacturers mapping the roads, and telematics providers delivering value-add propositions to the digital customer.

We expect data to become a major point of contention in the years to come. Traditional insurers may very well find themselves forced to pay to access driving data unless they can secure it directly through much stronger customer relationships. Moreover, sophisticated counterparties such as shared mobility fleet owners will not only own the data but are likely to perform their own analytics – dramatically reducing the value proposition of an insurer.

Furthermore, we think that a number of innovative models could emerge to dislodge incumbents from the most attractive risks.

Three components are essential to building an underwriting and pricing advantage to 'cherry-pick' attractive customers:

- Access to driver data, e.g. from connected cars and smartphones, which can be used to price motor risk as, or potentially more, accurately as using historical claims data
- Superior analytics capabilities combining private data with public data sources
- Direct customer access

In this report we have outlined a credible scenario where each of three types of organisations could take 4-9% of selected markets by 2020: Tech giants, OEMs and, to a lesser extent, Telcos.

Three plausible types of insurance disruptor

Tech giants: a player such as Google, Facebook, Apple or Amazon for instance could push targeted, highly customised insurance offers to customers via their smartphones. Selection, underwriting and pricing would leverage customer data from the use of navigation services and apps, such as Google Maps and Waze.

OEMs: car manufacturers could push tailored insurance offers to connected car drivers via the car dashboard. Pricing would be informed by driving data collected from the car, with analytics possibly sourced from partners.

Telcos: telecom companies could leverage their direct access to smartphone customers, along with the customer data they collect – partnering with third parties for pricing and underwriting.

Ultimately, insurers face the risk of becoming pure capital providers. Without ownership of the customer and with the erosion of their traditional advantage in the data and analytics necessary to price risk and manage claims and fraud, insurers face being marginalised to less profitable risk pools, and reduced importance in the value chain.

4. Rise of emerging markets

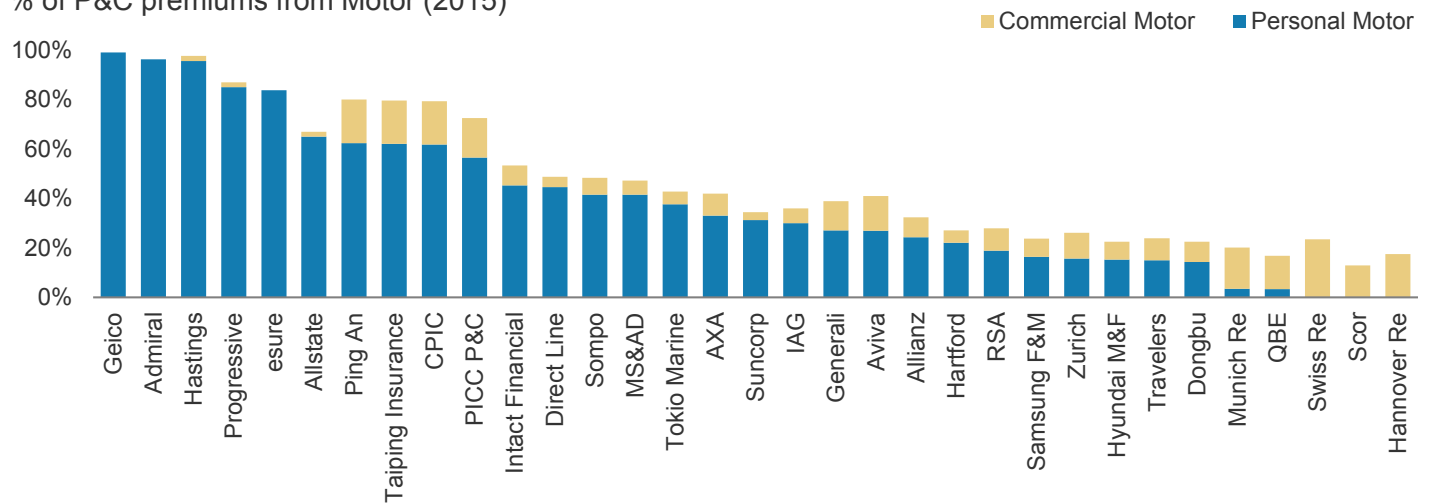
Growth in the motor insurance industry will increasingly shift to emerging markets, predominantly driven by increasing vehicle volumes and miles driven. We expect this growth to more than compensate for reduction in premiums per mile driven by lower accident frequency.

In 2015, China motor premiums represented ~13% of the global motor market, but we expect this share to increase to ~20% by 2025³. In a Limited disruption scenario, we think premiums could grow to ~3.5x its current size by 2030 and ~4x by 2040. In a Heavy disruption scenario, we model for faster adoption of technology and think that premiums will still grow, albeit at a lower rate, and potentially triple by 2040. Eventually, we think that premium growth still slow and reach a peak around 2035-2040, although it could be closer to 2030 in a Heavy disruption scenario.

Exhibit 14:

Percentage of P&C premiums from motor FY15. We believe the pure play personal motor insurers are most exposed to changes in shared mobility and autonomous driving trends

% of P&C premiums from Motor (2015)



Source: Company Data, Morgan Stanley Research, BCG analysis

Value at Risk

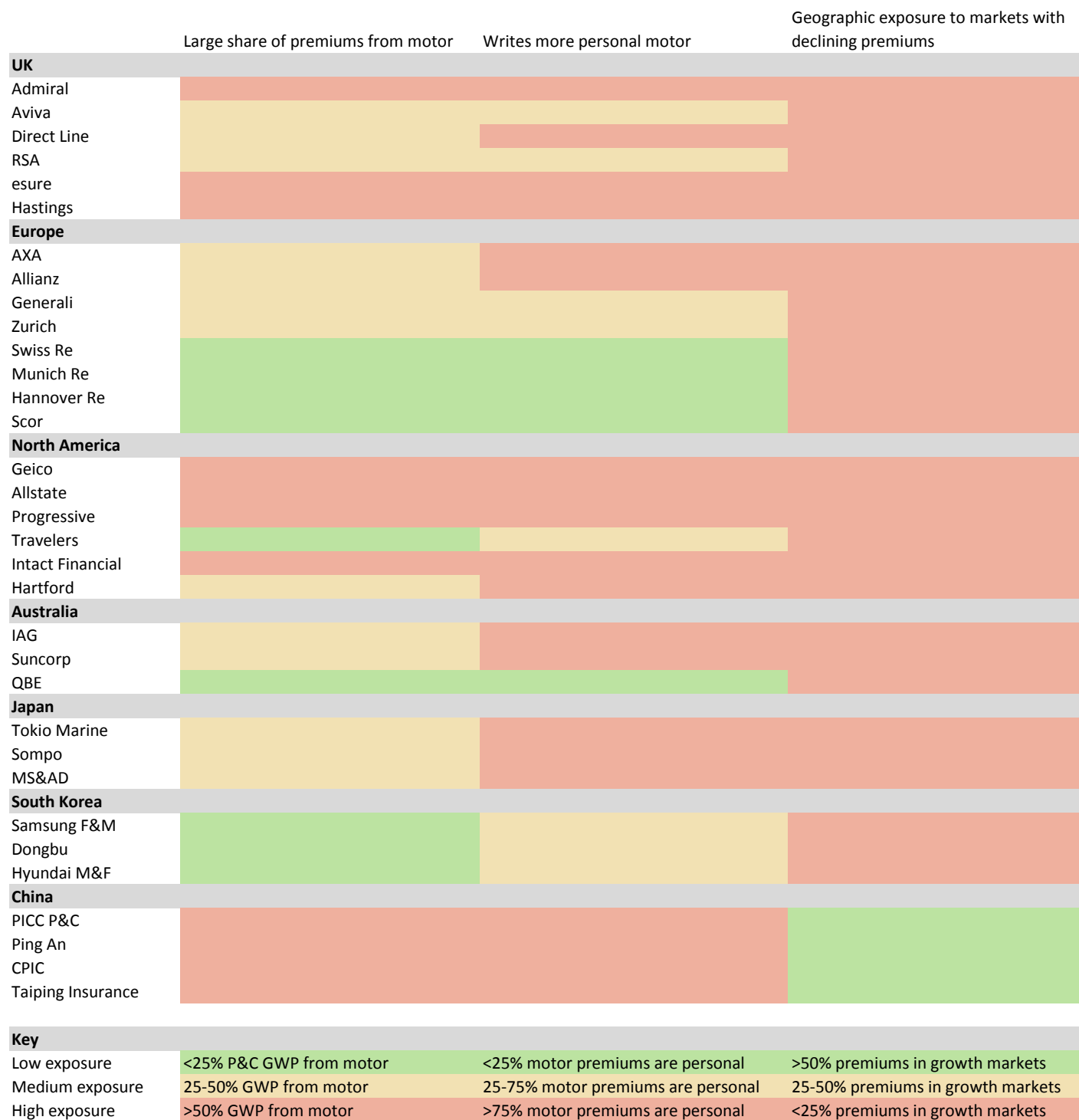
When combined, we believe that these developments represent an imminent threat to incumbents and could put a significant part of ~\$200bn of market value at risk (see Appendix 4 for companies included in the sample).

Exhibit 14 shows the percentage of P&C premiums from motor for major global insurers. We estimate that this represents ~\$260bn of motor premiums in 2015, yielding ~\$17bn post-tax profit and representing ~\$200bn market cap (a significant part of which is at risk). We see the UK insurers at most risk, while Continental Europe and South Korea are relatively less impacted.

Exhibit 15 shows a 'heat map' of global exposures for major insurers in each region. We have identified three 'risk factors' and for each insurer indicated whether we think there is low, medium or high exposure to each risk factor. The risk factors that we have identified are: 1) high percentage of P&C premiums from motor, 2) high share of personal motor premiums in total motor premiums, and 3) group P&C geographic exposure to mature markets, where we think premiums will decline dramatically.

Exhibit 15:

We have quantitatively mapped out exposures of global insurers to three of the five risk factors we have identified - we see those with highest exposure to personal motor, limited commercial lines capability and greatest exposure to markets with declining premiums as potentially exposed



1) Large share of premiums from motor: <25% low exposure, 25-50% medium exposure, >50% high exposure. 2) Writes more personal motor: if more than 75% of motor premiums are from personal motor then high exposure, 25-75% medium exposure, <25% low exposure. 3) Geographic exposure to markets where we think premiums will decline - we look at total P&C exposure, as we do not have enough public disclosure of the geographic split of motor premiums. Source: Morgan Stanley Research, BCG analysis

Insurers must adapt - we consider three strategic plays

Although certain insurers are anticipating change, we think that the industry as a whole is underestimating the extent and timing of disruption. Whilst significant pain may not be felt in the short term, the next few years will be crucial for motor insurers to lay the foundations for success in the future state. Indeed there are many opportunities for insurers to prepare for this disruption – in the form of new offers, access to new data, improved customer experience, and digital distribution.

In the face of such disruption, we believe that incremental change is not an option: insurers must adapt. Each motor insurer should fundamentally reconsider all aspects of its operating model (including product and business mix, underwriting capabilities, distribution channels, cost structure, and acquisition strategy) as well as the potential response of competitors.

Broadly, we see three, non-exclusive strategic plays:

1) Digital play: By leveraging technology throughout the value chain, insurers will be able to fulfill modern consumers' expectations regarding an end-to-end digital value proposition, improve data capture, analytics and risk management capabilities and achieve superior cost efficiency. We believe this is a necessary step in order to remain competitive. It is not, however, an easy change, requiring significant investment in capabilities, e.g. to transform the level of customer engagement, collect new data from multiple sources and use it in an integrated way across the organisation. We see the current organisational structure of insurance companies – with separate underwriting, servicing and claims functions – as a major impediment to this model.

2) Partnership play: To keep growing revenues within the motor insurance value chain and defend against potential disruptors, insurers may turn to strategic partners to secure access to data and customers or complement their range of coverage-related services (e.g. to cover journeys across multiple mobility solutions). OEMs, new mobility players, telematics manufacturers and telcos are the most likely partners, although others will emerge. As most potential partners compete on a regional or global scale, local insurers may be increasingly challenged to develop an attractive value proposition for them, which may lead to a progressive globalisation of the motor insurance market.

3) Adjacency play: Insurers may also look to expand into mobility related adjacencies in order to increase consumer engagement, collect more data, replace lost revenues and fuel future growth. Such moves could include expanding into adjacencies such as car safety features, car repairs, services related to roadside assistance, new mobility solutions, and products covering new risks such as cyber.

Choice of strategy will depend on size, global reach and business mix

We believe that the choice of strategy and timing of execution will depend on an insurer's size, global reach and business mix.

Large insurers will be better positioned to make the investments required to keep pace with technology. Global insurers are more likely to be able to form partnerships with disruptors than local players. Insurers focused on personal lines or reliant on an agent network may feel the pressure to adapt their model earlier or more drastically. Players with a predominantly young and / or urban customer base may be affected sooner - this is particularly so in markets such as the UK and US where there is a record of rapid digital adoption. There is no standardised approach, and the path to the future state is unlikely to be linear.

Key Trends Impacting the Motor Insurance Market

We see six main trends shaping the future of the motor insurance industry. A series of technological, demographic and regulatory changes have huge potential to disrupt all aspects of the motor insurance value chain. These trends are also extending the motor insurance value chain into adjacencies as the role of the 'traditional motor insurer' evolves.

1) Accident proof technology and the autonomous car: more in-car safety features and emergence of autonomous cars, as well as external technology which could lead to better accident analysis and safer driving through speed control, reduces and shifts the shape of the risk pool.

2) Shared mobility behaviours and models: driven by the growth of the sharing economy and consumers switching to shared means of transport.

3) Increase in data: insurers using data is not new, but new sources of data come from connected cars, smartphones and apps, and big data is changing the way insurers need to collect and analyse data.

4) Digitisation: consumers are shifting towards digital consumption, and insurers are digitising processes enabled by technology.

5) Regulation: regulatory changes can have a profound impact on the (insurable) car parc and timing of change. We have estimated that in a very simplistic scenario, savings from autonomous vehicle technology could fund a scrappage scheme for ~14% of the US car parc. We think rights to data ownership will be an important factor shaping the market.

6) World economics: emerging markets are still seeing an increase in car penetration and miles driven, which may offset some of the pressures from technology on traditional motor insurers.

1) Accident proof technology and the autonomous car

Car technology can be defined in 6 levels, from traditional vehicles (level 0) to fully autonomous vehicles (level 5). We use the Society of Automotive Engineers' (SAE) definition. As we move up the levels, safety increases, which ultimately results in shrinkage of the risk pool for insurers. Considering each level in turn:

Level 0 (traditional vehicle): Vehicles today where a human is in full control of the vehicle at all times (it may include early warnings or an intervention system).

Level 1 (ADAS vehicles): Vehicles where steering **or** braking/acceleration are augmented by a driver assistance system, but a human performs all remaining aspects of the dynamic driving task (e.g. adaptive cruise control, emergency braking, lane control).

Level 2 (ADAS vehicles): Vehicles where steering **and** braking/acceleration are done by a driver assistance system but a human performs all remaining aspects of the dynamic driving task.

Level 3 (partially autonomous vehicle): Autopilot performs driving task under defined circumstances, such as low speed traffic jams, but a human driver is required (i.e., to respond to a request to intervene).

Level 4 (partially autonomous vehicle): Autopilot performs the driving task under defined circumstances, such as low speed traffic jams and urban driving, even if a human driver does not respond when requested.

Level 5 (fully autonomous vehicle): Driving task is solely performed by autopilot in all roadway and environmental conditions. Humans act only as passengers; no humans are required for vehicle operation.

As we show in **Exhibit 16**, ADAS vehicles could have up to 30% collision reduction, whilst partially autonomous vehicles have a maximum collision reduction of 75%, increasing to 95% for fully autonomous vehicles. The highest collision reduction is not achieved until all driving modes are automated.

Exhibit 16:

A level 5 vehicle could have 95% collision reduction, achieved when all driving modes are automated and activated

SAE level	BCG segments	Steering and acceleration/ deceleration	Monitoring of driving environment	Fallback performance of dynamic driving task	System capability (driving modes ¹)	Max collision reduction
<i>Human driver monitors the driving environment</i>						
0	No automation				N/A	0%
1	Advanced Driver Assistance				Some driving modes	15%
2					Some driving modes	30%
<i>Automated driving system ("system") monitors the driving environment</i>						
3	Partially autonomous vehicles				Some driving modes	55%
4					Some driving modes	75%
5	Fully autonomous				All driving modes	95%



1. A type of driving scenario with characteristic dynamic driving task requirements (e.g., expressway merging, high speed cruising, low speed traffic jam, closed-campus operations, etc.)
Source: SAE (Society of Automotive Engineers); BCG analysis, Morgan Stanley Research

Car safety features become increasingly important and often mandatory in new cars. In Europe, new cars now need accident reducing features to obtain a 5 star Euro NCAP (European Car Assessment Programme). For example, a 5 star rating on a car would need to include safety features that protect an adult occupant, child occupant, pedestrian (cars with autonomous braking systems will be awarded extra points), and have safety assist capability (e.g. seatbelt reminders).

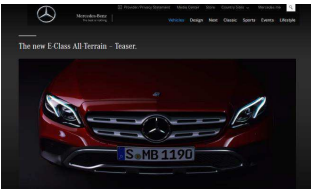
Major OEMs are already leading the way in accident proofing technology. For example, Mercedes-Benz's Intelligent Drive system, and Tesla Model S Autopilot System provide ADAS features including driver assist systems, and safety systems such as blind spot assist and lane departure warnings, as show in **Exhibit 17** - **Exhibit 18** . General Motors acquired Cruise Automation, a California based software firm that develops aftermarket solutions for autonomous cars in March 2016, for \$600m.

But new innovators are also joining the market, with technology companies and ride-hailing services all running autonomous car projects. For example, Google is testing autonomous cars on public roads, and plans to make them widely available by 2020.⁴ In September 2016 Uber announced that it will roll out a shared and autonomous car fleet in Pittsburg USA,⁵ and General Motors has invested \$500m in Lyft, with the two companies working to demonstrate 'autonomous capability in a sharing environment'.⁶ We also think that Apple could launch autonomous cars as management has emphasised the change coming to the auto industry,⁷ and is hiring automotive experts. In a Morgan Stanley report⁷ we noted that Apple met with California DMV officials in August 2015 to discuss self-driving cars. Companies that want a permit to test autonomous cars must reveal details about the vehicles and test drivers. On September 21, 2015 the Wall Street Journal reported that Apple is targeting 2019 for shipments of an autonomous vehicle.⁸ Apple has not commented on any of these developments.

The full table below illustrates in more detail the innovative players in the market testing autonomous cars.

Exhibit 17:


Leading OEMs already provide cars equipped with safety features and parking assistance systems, such as the Mercedes-Benz Intelligent Drive system

Mercedes-Benz Intelligent Drive system	ADAS features provided
 <p>Sensors on board</p> <ul style="list-style-type: none"> • Long-range radars • Short-range radars • Front monovision cameras • Side monovision cameras • Stereo camera • Navigation system • Ultrasonic sensors • Infrared camera 	<p>Driver-assist systems</p> <ul style="list-style-type: none"> • Adaptive cruise control • Lane keeping assist • Traffic sign assist <p>Safety systems</p> <ul style="list-style-type: none"> • Collision prevent assist¹ • Emergency braking • Blind spot assist • Cross traffic assist • Pedestrian detection • Drowsiness monitor¹ • Night view assist • Surround view system <p>Parking systems</p> <ul style="list-style-type: none"> • Parallel park assist

1. Collision prevent assist and drowsiness monitor provided standard on Mercedes S-550.
Source: Screenshot from Mercedes website, BCG analysis, Automotive News, Morgan Stanley Research

Exhibit 18:












Tesla Model S Autopilot system features are progressively enabled over time with software updates

Tesla Autopilot System	ADAS features provided
 <p>Sensors on board</p> <ul style="list-style-type: none"> • Long-range radars • Near/far infrared camera • Navigation system • 12 Ultrasonic sensors • Parking sensors 	<p>Driver-assist systems</p> <ul style="list-style-type: none"> • Traffic aware cruise control • Automatic lane centering and changing with Autosteer <p>Safety systems</p> <ul style="list-style-type: none"> • Daytime running lights • Automatic emergency steering , braking and side collision warning • Blind spot warning • Lane departure warning • Electronic stability and traction control with dual-motor functionality • Adaptive Lighting System • Built-in 3G/4G system continuously records location, speed and car condition <p>Parking systems</p> <ul style="list-style-type: none"> • Self parallel parking • Parking space detection

Source: Tesla, BCG analysis, Morgan Stanley Research. Image reproduced with kind permission from Tesla.

Exhibit 19:

Key players targeting to make autonomous cars available by 2018 – 2021

Player	Projection
	Autonomous cars being tested on public roads; to be widely available by 2020 ¹
	Autonomous taxis to begin testing on public roads in 2017 ²
	Autonomous cars launching in Pittsburgh USA in September 2016 ³
	Autonomous car developed by 2018 ; regulatory approval by 2019+ ⁴
	Autonomous car deployed by 2020 , if not sooner ⁵
	Fully autonomous cars for sale by 2020 ⁶
	Autonomous car fleet available in 2021 ⁷ for ride sharing
	Autonomous car available by 2021 , commonplace by 2025 ⁸
	Autonomous car to launch in 2021 ⁹
	Autonomous car to launch in 2020 ¹⁰
	Car to launch in 2019 , may be autonomous ¹¹

Source: 1. Interview with director of Google's self-driving car project, reported by Reuters, 14 January 2015, 2. Wall Street Journal, 5 May 2016, 3. Uber, September 2016, 4. Forbes, 2 Jun 2016, 5. Autocar, 6. Tech Insider, 6 April 2016, 7. Ford press release 16 August 2016, 8. Top Gear, 1 March 2016, 9. BMW press release, 1 July 2016, 10. BBC News, 7 October 2015 11. Wall Street Journal, 21 September 2015. The companies have not commented on the press reports.

Uber: launching autonomous ride-hailing cars in September 2016

Uber's business model centres on an app which enables consumers and taxi drivers to connect directly, removing the need for either a centralised booking system or for a cab to be hailed in the street. Its growth has been rapid, with Uber now operating in 68 countries and over 450 cities. We believe that the high value of the asset (car) combined with the low car utilisation rate are two key characteristics that are driving Uber's success in the shared economy.

Uber introduced a self-driving fleet of Volvo XC90s in Pittsburgh USA in September.

There is a strong economic case to automate the ride, since ~1/2 of the cost of a ride sharing trip is the cost of the human driver. Therefore automating the ride is key to expanding affordability and access.

It also gives the mass consumer first hand experience of autonomous driving - which we think is an important hurdle to winning over the public, local government and regulatory bodies. We believe firms like Uber are trying to use early accumulation and analysis of the data produced by their self-driving fleet to change consumer and regulator perceptions of fully unassisted human driving as a potential public health and safety hazard. In our consumer survey, the main reason that drivers did not want to use autonomous cars was due to perceived safety concerns.

Uber started to map out its street data in 2015, starting with the US and now in the UK. Its terms⁹ state that it may share mapping data with third-party vendors, consultants, marketing partners and other service providers. Therefore, we think that Uber could use the data to build up proprietary data analytics capabilities and, for example, could sell the data on. Uber's current technology uses Google Maps or Waze, but this way Uber will have its own database and own its own data.

We note that Ford has also recently announced¹⁰ that it plans to mass produce a fleet of fully autonomous cars for ride-sharing by 2021. Whilst Uber's cars will initially require a human operator (which will be phased out over time), the technology is being deployed 5 years ahead of Ford. Furthermore, Uber appears to be OEM agnostic - the Volvo arrangement is not exclusive.

We think that other technology and auto partnerships on autonomous cars may follow, and they may provide the catalyst for more widespread penetration and acceptance of the technology.

What about the insurance?

Under the current Uber model (with manual driving), from an insurance perspective the boundaries are arguably undefined. Uber provides insurance while 'live'; there is a low level of liability insurance active when the app is turned on but before the trip starts, with higher coverage once the trip has started. However, there is debate as to the adequacy of 'personal' insurance for off-duty drivers (we discuss insurance of this 'coverage gap' in [Call to Action and Strategic Plays](#) . We also discuss the potential for Uber to write its own insurance in [Deep Dive: Potential Disruptive Competitors](#).

Software companies are also retro-fitting the technology onto existing cars. nuTonomy, a US based startup software developer for self-driving cars has got permission from the Singaporean government to test self driving taxis (currently in a small area away from the centre).¹¹ The company retrofits small Renault and Mitsubishi electric vehicles with their software and cameras. It aims to expand to a fully self-driving taxi fleet in Singapore in 2018.

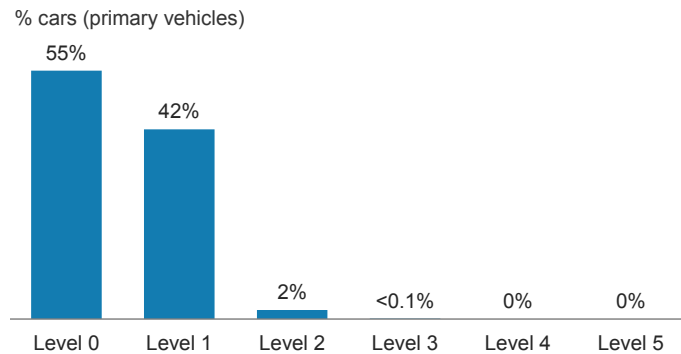
We forecast an initially slow adoption of autonomous cars, but rapid growth. Globally, our consumer survey shows that a large portion of respondents already have some kind of level 1 safety feature in their new cars, but penetration of anything in level 3 or above is almost negligible (**Exhibit 20**). However, we estimate that autonomous car penetration can grow, with partial (level 3 and 4) or fully

autonomous cars (level 5) potentially making up 51% of the car parc by 2035 in the UK, 73% in the US, and 43% in China. In **Exhibit 21**, we show our forecast for the make-up of the car parc over time in the US.

Consumers are generally open to autonomous vehicles. 54% of consumers are very open to taking a ride in a self-driving car, and 52% would consider buying an autonomous vehicle. The main reason why a consumer would accept owning a self-driving car is mainly due to safety (viewed as safer than non self-driving cars). However, one of the main reasons why consumers would resist an autonomous car is also due to safety. For urban drivers, on average they expected to own a self driving car within ~11 years.

Exhibit 20:

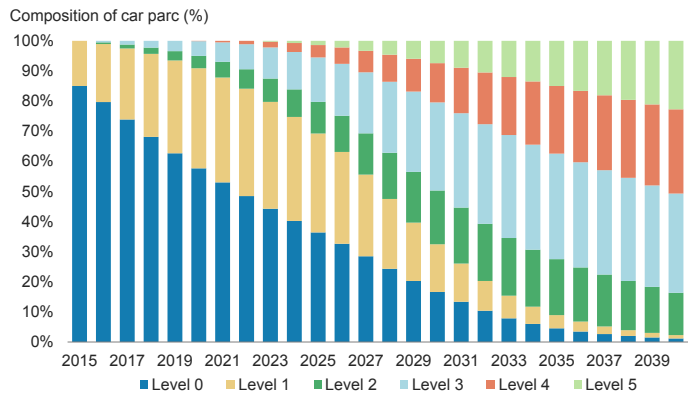
42% of consumers already have some kind of level 1 safety feature in their car, but few have anything more advanced



Question: Which of the following safety features does your primary car have? Morgan Stanley and BCG Insurance Customer Survey 2016
Source: Society of Automotive Engineers; BCG analysis, Morgan Stanley Research

Exhibit 21:

Base case scenario: we forecast a slow penetration of safety features into the car parc (US example)



Source: BCG analysis, Morgan Stanley Research. Note: US car parc projected using new vehicle sales estimates from IHS, BCG and Morgan Stanley estimates

2) Shared mobility behaviours and models

The concept of sharing is not new; however, technology has facilitated the sharing economy. Today's platforms facilitate sharing among people who do not know each other and may not necessarily have connections in common. Some of the highest valued start-ups are based on the concept of sharing (Uber, Didi Chuxing, Airbnb, WeWork) so we think that it is well received by investors.

In our view, the rise of the shared economy has been driven by:

1) Increasing urbanisation. According to the UN, 30% of the world's population resided in urban areas in 1950, 54% in 2014, and it projects 66% by 2050.¹² Cities are growing and can only have room for so many more cars. In our consumer survey we found that 50% of urban drivers use shared mobility models, compared to 19-26% for rural and suburban areas ([Exhibit 22](#)).

2) Traffic planning. Governments are increasingly concerned about the negative externalities connected with driving, and cities are specifically promoting measures aimed at reducing individual motor traffic. For example, the Urban Transport Development Concept in Stuttgart, Germany, has specifically outlined shared cars as a potential solution (amongst others) to reduce emissions and protect residents in urban areas.

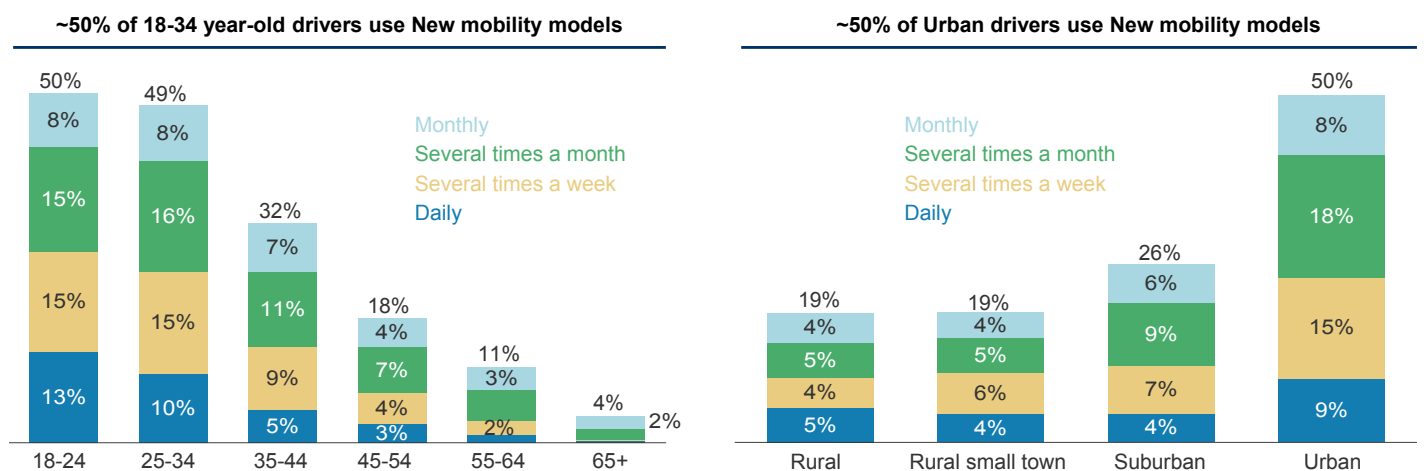
3) Shifting attitudes towards car ownership with a younger population. Millennials (often defined as those born in the 1980s and 1990s) are moving away from owning vehicles, particularly in urban areas. A technology driven, asset light and low cost model fits better with budgets, whilst faster access to goods and services fits better with an 'always connected, on-the-go' life-style. Our consumer survey suggests that 50% of 18-34 year old drivers use shared mobility models, compared to 11-18% for 45-64 year olds ([Exhibit 22](#)).

4) Smartphone technology. Smartphones have become a 'hub of life', given increasing internet penetration and constantly improving features. They allow for an instant exchange of information, which is particularly important for 'on-the-go' sharing such as Uber. They are no longer just used by the younger generation, but older generations are also going online with ease of access facilitated by tablet technology.¹³

For a more detailed discussion on the concept of the sharing economy, see the Morgan Stanley Foundation report: [Sustainable Economics: Worth Sharing?](#).

Exhibit 22:

Our global consumer survey shows that young, urban drivers use new mobility models the most



Question: Which modes of transport do you use as a passenger? Morgan Stanley and BCG Insurance Customer Survey 2016. Source: Morgan Stanley Research, BCG analysis

Exhibit 23:

Various new mobility models are emerging in the motor space, using cars owned by individuals or cars owned by companies

Cars owned by individuals	Ride-hailing	On-demand bookings for rides <ul style="list-style-type: none"> • Customer requests ride through app • Request routed to available driver nearby 	  
	Peer-to-peer ride-sharing	Private individual makes planned rides available for sharing <ul style="list-style-type: none"> • Driver adds planned ride to platform • Customer pays to share ride 	 
	Peer-to-peer car-sharing	Private individual makes their car available to rent <ul style="list-style-type: none"> • Available through platforms • Rental usually by the day with flat mileage rate 	 
Cars owned by companies	Station-based car-sharing	Car is assigned to a specific parking space <ul style="list-style-type: none"> • Customer pays for time and distance traveled • Return to same parking spot 	 
	Free-float car-sharing	Car can be parked anywhere <ul style="list-style-type: none"> • Vehicles can be parked anywhere in a specific area • Customer pays for distance traveled 	 

Source: BCG analysis, Morgan Stanley Research

Case study: BlaBlaCar

BlaBlaCar is a ridesharing platform that allows a passenger to search for trips that other drivers are making, and pay a charge to join the trip, reducing the cost of traveling or commuting. It has 30 million members across 22 countries, and over 3 billion miles shared. Each driver has a profile with reviews by other members, social network verification, and a 'blabla' rating (willingness to chat during a trip). It is predominantly used for long distance travel.

BlaBlaCar provides additional insurance cover, free of charge, through a partnership with AXA. The insurance cover provides breakdown cover, onward travel, accident cover and legal protection for the driver and the passenger.

BlaBlaCar raised \$200m in September 2015 to expand operations across emerging markets, including India and Brazil.

Various new shared mobility models are emerging in the motor space. As we show in [Exhibit 23](#), many different models have emerged, from ride hailing to free-float car sharing. It has resulted in an increasing switch from private to shared miles, and exponential growth in alternative mobility users. Our global consumer survey shows that new mobility has traction in every market we surveyed (see [Exhibit 26](#)).

OEMs are introducing their own shared mobility schemes. There has been a raft of investments by OEMs into shared mobility start ups ([Exhibit 25](#)), which are active in all key markets ([Exhibit 24](#)). We believe that these investments could accelerate adoption of shared miles, and potentially a fleet of autonomous (electric) vehicles, owned by corporations and rented by the mile.

Exhibit 24:

















New mobility models have penetrated all key markets.

	Ride-hailing	Peer-to-peer ride-sharing	Peer-to-peer car-sharing	Station-based car-sharing	Free-float car-sharing
	UBER, Gett, Lyft	zimride	GETAROUND, TURO, CARHOPPER	zipcar	CAR 2GO
	UBER, Gett, HAIL O	Bla Car, liftshare	easyCar club, ridelink	Enterprise CarClub, zipcar	DriveNow
	UBER, eCab	Bla Car, karzoo	drivy, Koolicar, deways	autolib'	
	UBER, taxi.eu, mytaxi	Bla Car	drivy, tamyca	Flinkster, stadtmobil, greenwheels	DriveNow, CAR 2GO
	UBER	Bla Car			CAR 2GO
	UBER, iTaxi	Bla Car			
	UBER, DiDi		PP租车 (PPZuche), 凹凸共享租车 (atzuche.com)	一嗨租车 (eHi Car Services)	
	UBER, OLA, MERU	Bla Car, PoolCircle		Zoomcar	
	UBER, スマホde タックン			Ha:mo RIDE, Times Car	
	UBER, KakaoTaxi, HAIL O, EASY TAXI			Green Car, citycar	
	UBER, GOATCH	coseats.com, hitch-a-ride	carhood, DriveMyCar, CAR NEXT DOCK	flexicar.com.au, goget	
	UBER, EASY TAXI	Bla Car		zozcar	

Source: BCG analysis, Morgan Stanley Research. Examples are illustrative not exhaustive.

Exhibit 25:

OEMs are introducing their own shared mobility schemes and there have been a raft of investments into the space.

OEM	New Mobility Offering	Details
	Drive Now 	<ul style="list-style-type: none"> Joint venture between BMW and Sixt App that helps find, unlock and start cars without requiring central collect and return point
	Relay Rides, Let's Drive NYC, Maven 	<ul style="list-style-type: none"> Partnership with Relay Rides that facilitates access to temporary and affordable transport Let's Drive NYC is GM-led initiative and provides easy access to car for select residents in NYC
	Zipcar partnership 	<ul style="list-style-type: none"> Partnership with Zipcar to offer one-way trips, flexible destinations and indefinite reservations
	Car2Go 	<ul style="list-style-type: none"> Car sharing app that is on-demand, by-the-minute and free of parking fees, annual charges and fuel costs
	Enterprise CarShare 	<ul style="list-style-type: none"> Partnership with Enterprise to supply affordable and temporary car rentals across the US states and college campuses
	Yuko 	<ul style="list-style-type: none"> Toyota's own car sharing initiative rolled out in Ireland All cars equipped with Toyota Safety Sense
	Quicar 	<ul style="list-style-type: none"> Cars available at central locations for both short and long-term rentals
	Uber 	<ul style="list-style-type: none"> Uber has partnered with Volvo to allow users to hail self-driving cars. It will be available in Pittsburgh. Uber will add its own self-developed autonomous driving systems to the Volvo base vehicle.

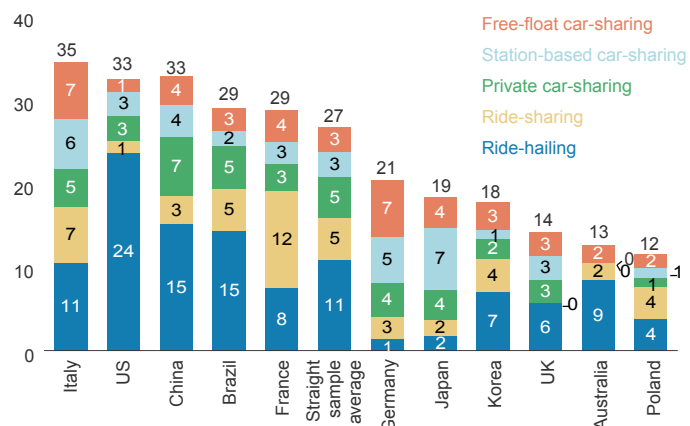
Source: BCG analysis, Morgan Stanley Research. Examples are illustrative not exhaustive.

Our consumer survey reveals that shared mobility trends differ by region.

In China, shared mobility addresses important demographic and environmental challenges, but ownership is still seen as important to status in Tier-2 and below cities. North America may have the home field advantage on tech innovation and early application but faces legal and regulatory challenges as well as a deeply rooted culture of car ownership. In Europe, changing preferences and habits of the younger generation in urban areas foster car sharing growth, but the older generation, which is the largest new car buyer group, will maintain car ownership. We found that sharing was very popular in emerging markets, and in developed markets Italy, the US, and France lead the group (see [Exhibit 26](#)).

Exhibit 26:

Share of urban drivers willing to switch part of their private miles, and ranked shared mobility models as their first choice for a substitute (27% on average). Sharing appears to be very popular in emerging markets; among developed markets Italy, US and France lead the way. % of respondents¹



QM6: Which modes of transport will you replace your private miles with? Morgan Stanley and BCG Insurance Customer Survey 2016 Source: BCG Analysis, Morgan Stanley Research

New mobility players are also at the forefront of the driverless revolution. In August 2016, Uber announced that it will be launching self-driving, ride-sharing, cars to begin in September in Pittsburgh, partnering with Volvo. We discuss this in more detail in Trend 1) *Accident proof technology and the autonomous car.*

3) Increase in data

The connected car

Connected cars enable a constant exchange of data and the ability to monitor in real time a range of risks, increasing the amount of data that an OEM or insurer will have. For example, traffic and road information, local events, personal vehicle setup and data from external service providers can be used as inputs to monitor and record driving behaviour, location of the vehicle, wear and tear of parts and repairs history, and even the shopping habits of a driver.

Future growth catalysts include e-call and the rise of car infotainment systems. For example, e-call is a European Commission, pan-European initiative that will enable faster location and rescue of car accident victims through the use of telematics. It will be installed in all new cars sold in Europe by 2018, and have full coverage in the EU. E-call's connectivity may also be used for value-added services, similar to General Motor's OnStar system, which provides services

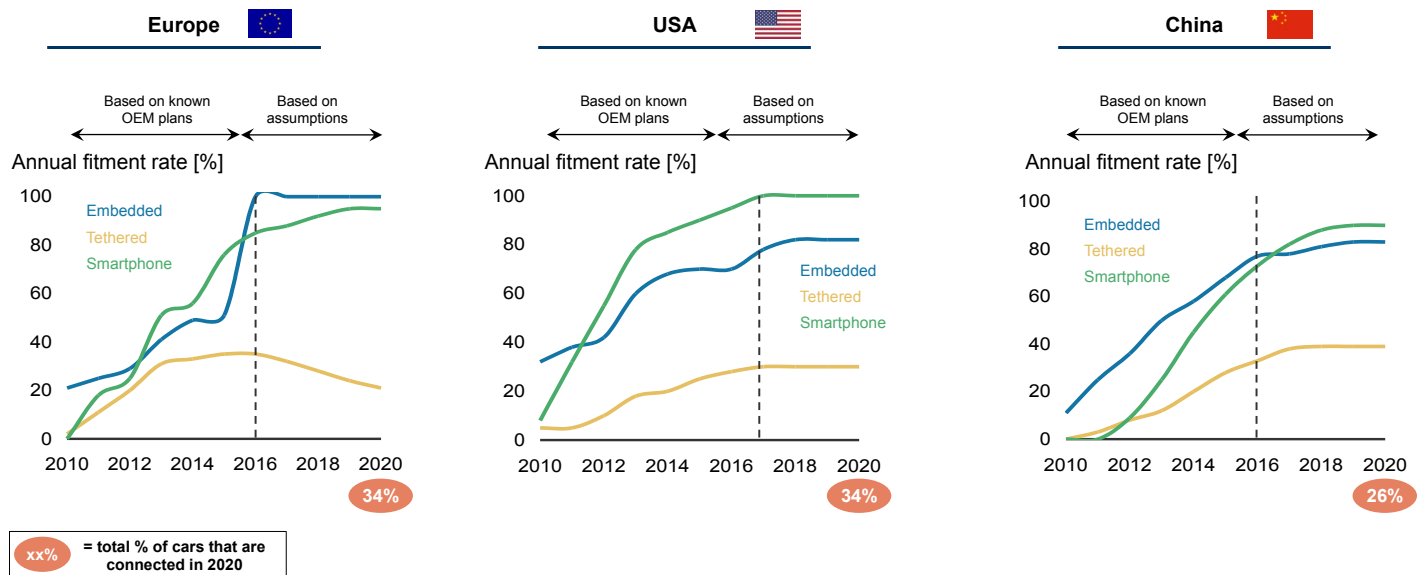
such as turn by turn navigation and stolen vehicle assistance. Apple and Google have launched in-car infotainment systems (Apple CarPlay, Android Auto systems), which add smartphone features to a car's dashboard. In **Exhibit 27**, we show the annual fitment rate of telematics devices to date, and the projections to 2020. We think that connectivity will be made even simpler with the introduction of e-sim (Embedded Sim) technology, which embeds a SIM card into the vehicle itself and establishes connectivity without the need for a smartphone.

We see a potential for OEMs and insurers to work together given increasing car connectivity. Data collected can be used to more accurately and individually price insurance policies, and the OEM has the distribution capabilities. However, data ownership is critical - if it lies with the manufacturer, insurers may not have access to pricing data and we could envisage a situation where manufacturers sell driving data to the insurers (see **Opportunities for insurers** for more detail).

In our consumer survey, we found that car connectivity has already become an essential purchase argument, especially for safety and navigation features. But consumers were also interested in buying cars that would have a convenience factor (e.g. automatic service reminder) and infotainment services (e.g. smartphone apps integration), see **Exhibit 28**.

Exhibit 27:

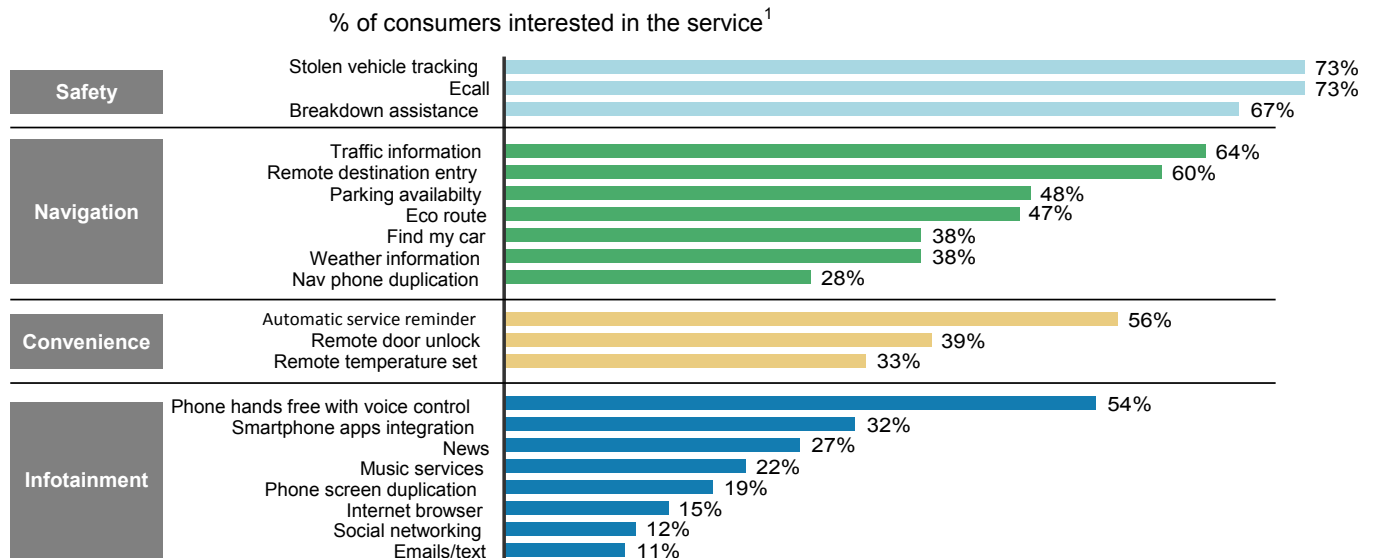
Almost all new cars to be connected by 2020 according to OEMs' plans



Source: SBD global end user survey

Exhibit 28:

Car connectivity has already become an essential purchase argument, especially safety and navigation features



1. Based on 8,000 people interested in a new car, across 8 countries Source: SBD global end user survey, BCG analysis

New sources and usages of data

Big data changes the way companies can collect and analyse data.

There is an exponential increase in data transaction volume, through the use of social media, the Internet of Things, growing e-commerce and digital services and media. Insurers stand to benefit as more data can be used to price and tailor policies; however, other industries are also gaining competitive advantages in data analytics. For example, Visa uses platform analytics to quickly identify fraud by analysing over 100bn transactions per year. It could mean that other industries may rely less on insurance but focus on preventative measures, owning more data than the insurers themselves.

4) Digitisation

Shift towards digital consumption

A key risk to traditional insurance agency distribution models is that more and more consumers choose to shop online.

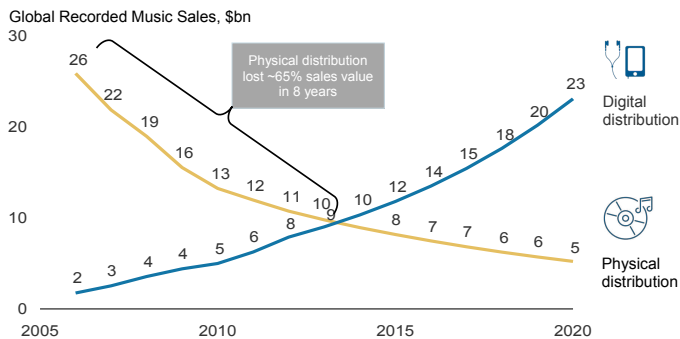
The change in other industries has happened very quickly with new entrants able to disrupt the legacy businesses. For example in the music industry, in less than 10 years, physical music distributors were completely disrupted by innovative new entrants, tech giants and home entertainment players (see [Exhibit 29](#)).

In our consumer survey, ~25-40% of the insurance customer journey is already being completed on online channels, especially during the 'research' and 'access' stages ([Exhibit 31](#)). We think it is important to invest in e-commerce and digital to reach millennial and multi-cultural segments (e.g. if language is a barrier in traditional transactions). Our consumer survey found that consumers rank policy price as the most important factor with their motor insurance, so we believe that consumers are seeking price transparency and the lowest pricing for a product, which is more achievable through online services.

Online channels are broadly used in insurance across all countries, as we show in [Exhibit 30](#) (from our 2014 consumer survey). The y-axis shows the proportion of respondents that use more than one online channel in each step of their insurance journey ('Research', 'Purchase', 'Modify', 'Claim' and 'Renew'). On the x-axis, we show the BCG "e-intensity index score", which measures the relative maturity of the internet in each economy. We can see that, on average, 88% of consumers surveyed globally use at least one online direct channel.

Exhibit 29:

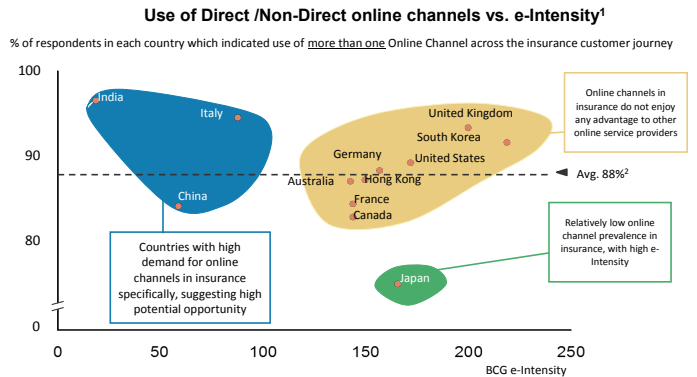
Whilst many insurers are sceptical about new entry, other industries (e.g. music) show how quickly things can change



Source: RIAA, BCG analysis, Morgan Stanley Research

Exhibit 30:

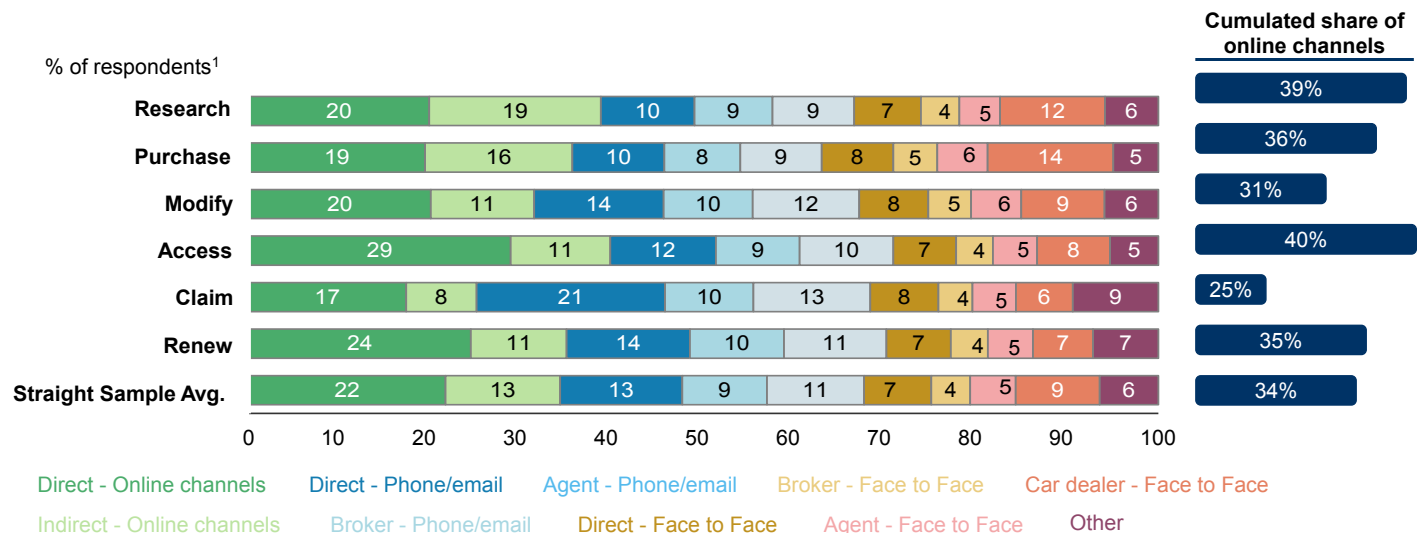
Online channels are broadly used in insurance across all countries



1. Question: Please indicate which of the 22 possible interaction modes you are using in each step of the insurance customer journey (Research, Purchase, Modify, Claim, Renew). 2. Straight line average. Morgan Stanley and BCG Insurance Customer Survey 2014; BCG e-Intensity; Source: BCG analysis, Morgan Stanley Research

Exhibit 31:

Breakdown of customers' use of channel of interaction with insurers. ~25% to 40% of the consumer journey is done via online channels, which is the highest at the access stage and lowest at the claims stage



Questions: Please indicate which channels you used last time in each step of the insurance client journey (Research, Purchase, Modify, Claim, Renew). Direct online channels: Insurers and bank sites and portals, insurers mobile and tablet apps. Non-direct online channels: car sale, price comparison websites, other third party sites and social media. Other channels: employer, friends & family. Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Digitisation of processes

We recognise that a lot of the back end functions of an insurer can be optimised through digital processes, not just the front end distribution. A lot of the challenges and opportunities with digital lie beneath the surface: automation of many internal processes, agile working modes for both operations and IT staff, developments of ecosystems with external parties, and data-driven customisation through Big Data. We think that more efficient processes could improve productivity and enable insurers to more efficiently handle servicing of the insurance value chain - for example, innovating new products during the purchasing stage, improving claims efficiency, and providing a more tailored service during the renew stage.

We also see a trend to automate core processes, resulting in a reduction of admin expenses. For example, Concur provides travel services through the cloud, where users can request, approve, book and expense trips all through a smartphone app. It allows a company to control spending before it occurs, reducing expenses but also allows for an easy tracking of expenses to maintain transparency.

Simply moving distribution online and automating it could also reduce expenses greatly, as there is no commission. For example, 30% of Samsung Fire & Marine's auto insurance premiums come from its online channel. When the on-online channel reached economies of scale, the expense ratio dropped from 15% in 2011 to 9% in 2015. The expense ratio for the offline channel increased from 22% to 25% over the same period.

5) Regulation to drive change?

The Regulatory Environment

We think that regulators have several reasons to encourage development of autonomous vehicles. Autonomous vehicle technology can improve safety of drivers and passengers (car accidents cost approximately 3% of global GDP, according to the WHO) and ease traffic congestion and limit pollution. The economics are strong, with many players expecting value creation from autonomous vehicles and who could lobby governments and regulators. We think that there are also social expectations as drivers in our global consumer survey have shown interest towards autonomous vehicles.

So far, there have been varying degrees of progress in establishing regulations around autonomous vehicles. In September 2016, the US published its first national guidelines for driverless cars in 'The U.S. Department of Transportation's Federal Automated Vehicles Policy'¹⁴, which includes outlines on how manufacturers can get approval for autonomous cars, handling of collected data, and details of each car's cyber security defences. It has also put in place a process for car makers to get approval for new software updates, in the same way as they need to for a new vehicle. In most countries in the EU, the Vienna Convention on Road Traffic prohibits the use of self driving vehicles, but there was a proposed amendment in March 2014 to include self-driving features. In the UK, the Department of Transport in a parliamentary debate announced that 'driverless cars will come under new legislation so they can be insured under ordinary policies'¹⁵.

But, just as many obstacles exist to block or delay adoption of autonomous vehicles. This includes regulation, liability, ethical dilemmas (how to programme the car to choose one of a 'no-win scenario'), compliance, cybersecurity concerns and traffic regulation.

We discuss regulation in further detail in the sub-section 'Regulation to drive change?'

Legal and regulatory obstacles to allow autonomous vehicles to get on the road still exist, but some change is already under way.

The Vienna Convention of Road Traffic 1968 includes articles to ensure that "Every driver shall at all times be able to control his vehicle"; however, this was amended in 2014 such that "[the vehicle]...can be overridden or switched off by the driver". The Geneva Convention on Road Traffic was amended in 2016 to allow automated driving technologies in traffic. However, the technology must align with the United Nations vehicle regulations and should be able to be overridden or switched off by the driver.

In the UK the government has launched a consultation so that automated vehicles can be insured for use on the road, and the Highway Code to be altered to facilitate the use of advanced driver assistance systems.

From 2019 all countries in the EU will have to start making legislative changes to allow autonomous cars in their country. CityMobil2 is a project (running from 2012-2016) co-funded by the EU that is testing

a platform for automated road transport systems. It will be implemented in several urban environments in Europe.

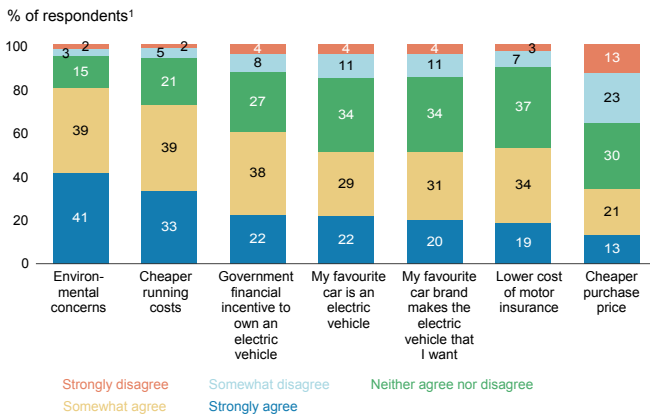
In South Korea, its first Internet of Things network launched in July 2016, which will allow smart devices to communicate with each other over the network. SK Telecom is providing the service, and is investing up to 100bn KRW (~90m USD) by the end of 2017 for develop the infrastructure.

In the US, the National Highway Traffic Safety Administration (NHTSA) in February released a range of definitions and interpretations related to autonomous vehicle testing. As part of these definitions, the NHTSA decided to treat Google's autonomous self-driving system as a 'driver.' Most recently, in September 2016, the US published its first national guidelines for driverless cars. It outlines how manufactures can get approval for such cars and how to measure the car safety. According to the guidelines, autonomous car manufacturers will have to share details on cyber security defences, data recording and privacy, consumer education and post-crash behaviour. Manufacturers are also required to get a safety approval for software updates in driverless cars as they would for a new vehicle.

With the emergence of connected cars and Big Data, it is unclear who exactly owns the data. Regulation governing ownership of connected car data is unclear and varies by market, but we think that OEMs have a clear advantage in collecting driving data. Only the EU appears to have explicit connected car data regulation (through its New General Data Protection Regulation, which requires clear consent from the driver for data-sharing services); however, there is a trend toward requiring consumer consent. In the US, there is currently no federal law set governing connected car data. OEMs have already started to take advantage of exclusive data access to offer their own insurance services (Toyota Insurance Management is part of the MS&AD group and underwrites its own insurance). We think that drivers may be able to control their data under law, but in practice OEMs will have an advantage over insurers in terms of accessing this data.

Exhibit 32:

Consumers own/plan to switch to electric or hybrid cars mainly for environment concerns and the cheaper running costs.

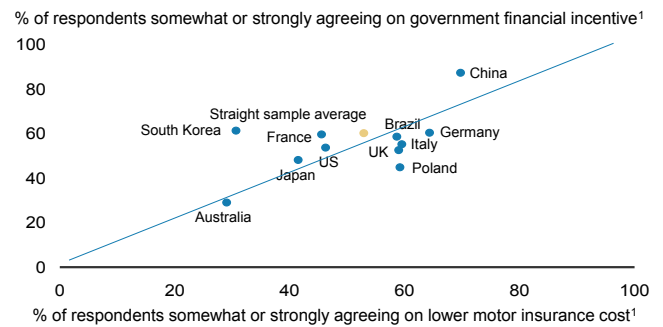


1. Question: We see you own or plan to own an electric car, to what extent do you agree or disagree with the following reasons for owning an Electric car? Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

In terms of electric and hybrid cars, we believe that consumers interests are also aligned with government. In our consumer survey the top reason why consumers would buy an electric or hybrid car is for environmental concerns (**Exhibit 32**), with cheaper running costs coming second. Across the countries, there seems to be a similar impact of financial incentives to switch to an electric or hybrid car, i.e. ~60% of consumers agreed that government incentives are important to switch to an electric/hybrid car, and ~50% of consumers agreed that insurance incentives are important (**Exhibit 33**). Therefore, we think that is possible that policy or regulatory change could spur faster adoption of electric vehicles, which may be higher level and have accident reducing technology. It also appears that consumers are somewhat expectant that buying an electric vehicle would mean lower insurance costs.

Exhibit 33:

In most countries, there was a similar impact of government financial incentives and lower motor insurance cost on consumer willingness to own an electric car



1. Question: We see you own or plan to own an electric car, to what extent do you agree or disagree with the following reasons for owning an Electric car? Morgan Stanley and BCG Insurance Customer Survey 2016. Source BCG analysis, Morgan Stanley Research

Case study: the social cost of driving

In the Exhibit below, we have outlined a very simplistic scenario where potential savings from autonomous vehicle technology could fund a scrappage scheme for 4-15% of the car parc in the US. According to the WHO, there were 34,000 road traffic deaths in 2013 in the US, and the cost of a death in the US is ~\$9.4m. 90% of car accidents are caused by human error, so in our base case we simplistically assume that fatal accidents are reduced by 90%, a saving of \$288bn for the year. Assuming that 50% of this saving is used for a \$4000 car scrappage scheme of older vehicles, it could be enough to potentially scrap 36m cars, or 14% of the 2015 US car parc.

We note that the OECD will launch a paper in October on 'Implementation of the Safe System' urging member governments to act because of huge GDP loss in road crashes. The working paper is based on the underlying principles that a human can make mistakes leading to road crashes, and that it is a shared responsibility between stakeholders (including manufacturers) to take action.

From our consumer survey, we found that consumers expect roughly 50% of the cost of the safety feature as a subsidy, in order for them to install it in their current car or purchase this feature as an add-on in their future car. By market, the subsidy expectation is lower in China (at around ~30-40% depending on the technology) and highest in the US (~54-56%). We also found that consumers are willing to pay more for accident proofing technologies if it is an add-on feature (around \$1.1k), rather than retro-fit.

Cost per fatality (USDm)	9.4			
Number of deaths in 2013	34,000			
Total cost of fatalities (USDm)	319,600			
US car parc (m) 2015	258			
		Bear	Base	Bull
Reduction in fatal accidents	50%	90%	99%	
Annual saved cost of fatalities vs today (USDm)	159,800	287,640	316,404	
Saved cost passed on in the form of scrappage schemes	25%	50%	50%	
Amount available for subsidies (USDm)	39,950	143,820	158,202	
Scrappage subsidy per car (USD)	4000	4000	4000	
Cars potentially scrapped (m)	10	36	40	
A % of total car parc	4%	14%	15%	

Source: US Department of National Transportation, WHO, UN, IHS, Morgan Stanley Research

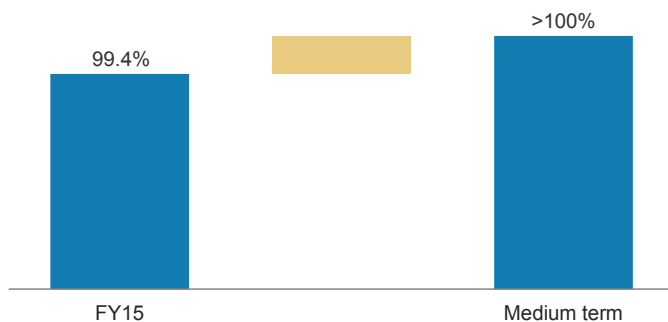
Another obstacle is due to the uncertainty of where liability risk falls. Liability could shift from driver liability to product liability (which may be an opportunity for insurers, as discussed in section **Call to Action and Strategic Plays**); however, whether the liability lies with the driver or the manufacturer in case of an accident is still a grey area. Please see case study on 'The Regulatory Environment' for quotes on autonomous car liability.

We have so far focused on the impact of shared mobility and vehicle safety on motor market dynamics, but note that there are other trends in the medium term, such as deregulation, which could also have an impact. In China, we highlight that the government has positioned the modern insurance industry as an "economic stimulus" and a "social stabiliser". The main impact is price deregulation, and we expect three outcomes leading to sustained competition in the near term.

- 1) More price competition in the motor market, leading to lower average premiums.
- 2) Decrease in claims numbers, as there are now heavier penalties for multiple claims. However, we think that the claims ratio could rise as a result of premium rate decline.

Exhibit 34:

China motor market: we expect COR to rise to close to close to 100% over the medium term; particularly challenging for small /medium sized players
Combined Ratio (%)



Source: BCG analysis, Morgan Stanley Research estimates

3) The direct channel's edge has eroded given that a 15% discount on premiums is no longer exclusive to the direct channel. Expenses may grow as players strive to capture market share.

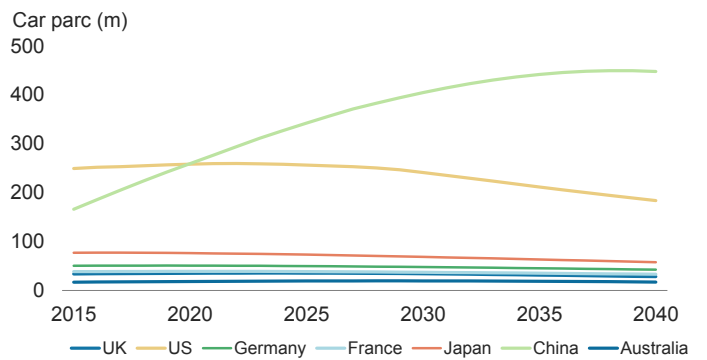
We believe that the regulator will ensure that the industry has a smooth transition to a free market, which could imply the CoR reaches a higher level. We expect that the combined ratio in China is likely to be stable over the near term but could rise from 99.4% in FY15 to above 100% over the medium term. This could be particularly challenging for small to medium sized players. We think that the insurers' attention has been focused on this aspect and less around the subject of technology disruption.

6) World economics

Globally, we still expect the car parc to grow for the next 10-15 years, but then reach a turning point where car ownership in developed countries declines as shared mobility becomes more dominant, but car ownership in developing countries continues to grow given the lower starting levels of penetration (Exhibit 35). There is a strong correlation between GDP and car penetration (Exhibit 36), and higher forecast GDP growth is likely to lead to stronger growth of the car parc in emerging economies (Exhibit 37).

Exhibit 35:

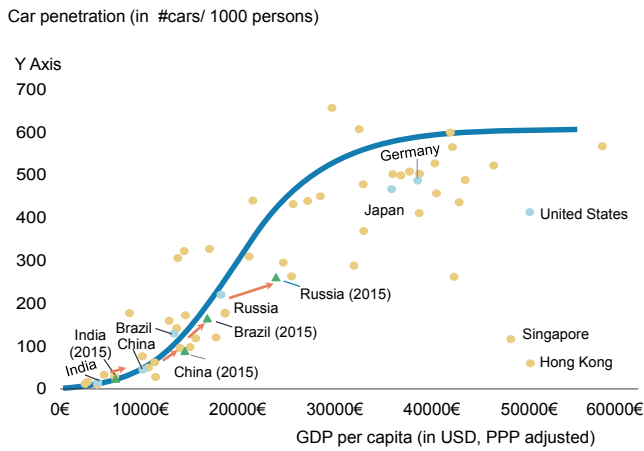
In our global model, we have forecast the car parc will shrink in most countries modeled with the exception of China



Source: Morgan Stanley Research estimates, BCG analysis. Please see the [Implications for Insurers - Assessing the Value at Risk](#) for further detail.

Exhibit 36:

Car penetration driven by GDP per capita

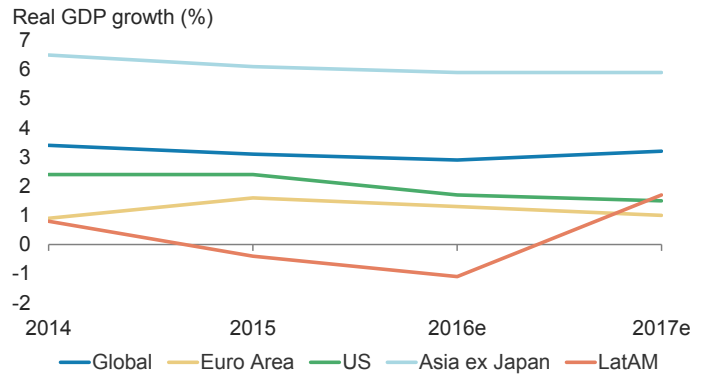


Source: EIU, BCG analysis, Morgan Stanley Research

We also think it is possible to see a 'technology leap' in China's motor insurance market vs. the historical market evolution in Europe and the US. In our consumer survey, we found that Chinese consumers already demonstrate a higher interest in connected cars, a higher interest for peer-to-peer insurance than other developing countries, and the highest willingness to own a self-driving car. A

Exhibit 37:

High GDP growth likely to lead to stronger growth of car parc in emerging vs. developed economies, given the correlation of GDP and car penetration



Source: Morgan Stanley Research estimates. [Global Macro Summer Outlook](#).

technology leap could put pressure on premiums due to the impact of collision reduction in safer vehicles, meaning that the market grows much slower than the historical trend.

We discuss global car parc and miles trends in further detail in [Implications for Insurers - Assessing the Value at Risk](#).

Global Consumer Survey

We commissioned a proprietary global insurance consumer survey in 11 countries in order to gauge perceptions about auto technology. Our key findings are split into 8 sections, which relate to the key trends we believe are impacting the motor insurance market.

1) Car ownership and relationship: Car ownership remains strongly valued, although we observe some downward pressure on the size of the car parc.

2) Alternative and shared mobility: Over time we will see a gradual shift of private miles to public transportation and shared miles.

3) Accident proofing technologies: Adoption of advanced car safety features by consumers is widespread and have strong consumer support.

4) Autonomous cars: Consumers are generally open to riding in and owning a driverless car. For respondents who would embrace the technology, safety was the main benefit; for those who resisted, safety was the key concern.

5) Consumers insurance journey: Improving insurers' digital experience, notably claims processing, would drive more efficient customer acquisition and engagement.

6) Threat of new entrants: From a consumer perspective, insurers still have a slight advantage but there is significant openness to purchasing insurance from a non-traditional player.

7) Usage-based insurance: Adoption has been low so far, but could be accelerated by connected cars.

8) New products and models: Consumers are generally interested in new insurance solutions (e.g. coverage for multimodal journeys), and models (such as independent driving score or peer-to-peer insurance).

Perceptions differ greatly by region, age, urbanisation and household income. Generally, consumers in emerging markets that we surveyed including Brazil and China, younger consumers, consumers in urban areas, and consumers with higher incomes are more willing to adopt new technologies and forms of mobility.

Car ownership and relationship

Today, car ownership still remains strongly valued by all consumers in our survey. Over 90% of consumers in our survey at least consider owning a car to be important in all markets, with the exception of South Korea and Japan, which put less emphasis on car ownership ([Exhibit 40](#)). However, we found that 1) the importance placed

on car ownership is slightly lower in urban areas, but surprisingly 2) younger generations valued car ownership slightly more than older generations, and 3) higher income earners value car ownership more.

The main reasons that consumers value car ownership are 1) the cost of alternative options, and 2) convenience "it would feel strange not to own a car". Preference to travel in a personalised environment was the least important ([Exhibit 41](#)).

The large majority of consumers plan to purchase a car or replace their current one, mainly within the next 2 years, but are willing to switch to leasing, electric cars, or trading up for a larger car.

Globally, the majority of our survey respondents said that they intend to replace their car, mainly within the next 2 years, despite a large variation in the average car age between countries. If the consumer did not currently own a car, ~50% plan on buying a first car (43% within the next 2 years) - although this varies greatly by market, with Brazil and China showing the highest propensity to buy (>80%) and Japan the lowest (23%). On average, consumers are more likely to buy new cars vs. used cars.

The share of leased cars in the car parc is likely to grow (from a very low base), potentially boosting car turnover.

When asked about car purchasing plans, the vast majority of consumers chose outright owned cars but the intention to purchase leased cars was on average 2ppt greater than the current stock. This was especially true among younger drivers. We found that the replacement rate of leased vehicles is considerably shorter than outright-owned cars (4 years vs 7 years), so would expect higher leasing to drive an increase in turnover of the overall car parc.

Consumers showed a high willingness to purchase electric/hybrid cars, particularly within urban areas.

As we show in [Exhibit 42](#), the proportion of electric/hybrid cars in new car purchases is significantly higher than the portion in current cars, which implies a

big increase in the stock of electric/hybrid vehicles over time. The most frequently cited reasons to buy an electric/hybrid car are environmental reasons and cheaper running costs ([Exhibit 43](#)).

Despite valuing car ownership, >50% of consumers are concerned about the cost of owning a car, and are open to shared mobility solutions.

Concerns about cost of car ownership were particularly prevalent among younger respondents (62% of 18-24 year olds were concerned), and those living in urban areas (60%).

Our survey also showed that consumers are ready to abandon car ownership, should the alternatives prove cost-efficient and available.

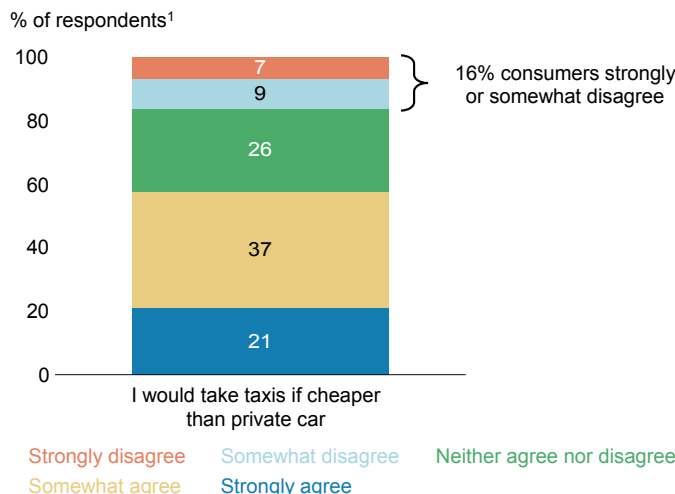
As we show in [Exhibit 38](#), most consumers would switch to using taxis if they were cheaper, and only 16% would not. Only ~60% of consumers would continue to own a car that they rarely use (the results varied by country, ranging from 30% in Japan to 80% in Brazil). 25% of all consumers are willing to stop owning a car if they switched their private miles to alternative modes of transport. Therefore we see the trend of falling car ownership playing out in the medium term, further supported by multiple-car owners not replacing their second or third cars, instead keeping only one car to be used when necessary.

We expect that the increasing availability and cost-efficiency of alternative shared mobility solutions will put downwards pressure on the car parc.

Exhibit 38:

Most consumers will switch to taxis if they were cheaper, only 16% would not

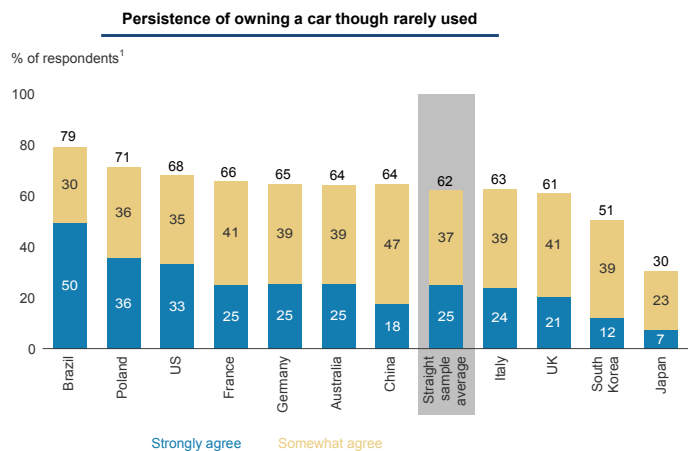
Consumer views on New Mobility models



1. Question: Please let us know whether you agree or disagree with the following statements. Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 39:

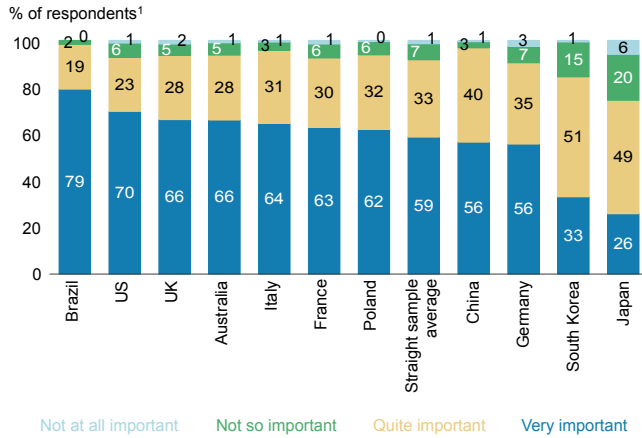
Only 60% of consumers would like to continue owning a car even if they rarely used it



1. Question: Please let us know whether you agree or disagree with the following statements, which includes: 'I would continue owning a car even if I rarely used it'. Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 40:

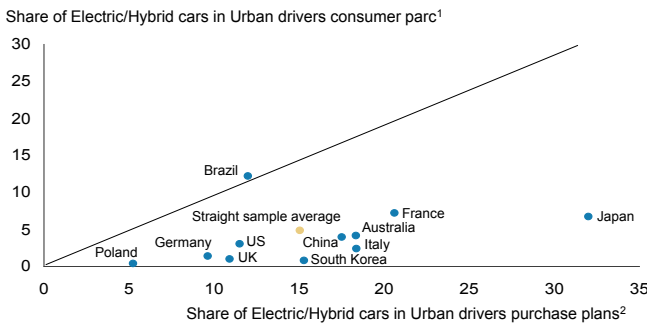
When asked whether owning a car was important, consumers value ownership strongly across all markets though slightly less in Japan



Question: Overall, how important is owning a car to you? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 42:

In urban areas, Electric cars/Hybrids remain marginal, but represent a significant share of consumers' purchase plans



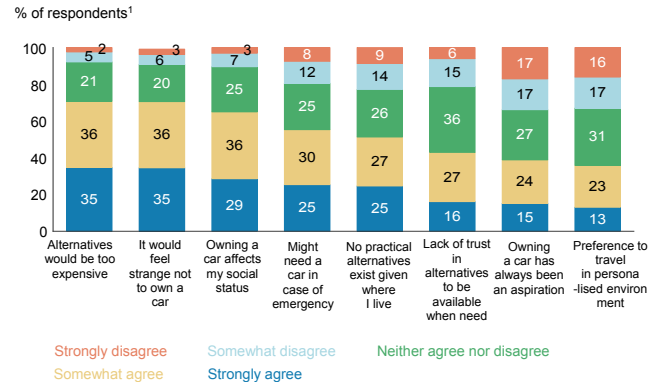
1. Question: What type of car do you have? (answer Electric (including plug-in hybrid)). 2. Question: When you replace your current car, what type of car will you replace it with? (answer Electric (including plug-in hybrid)). Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Alternative & shared mobility

Public transportation remains the primary alternative mode to private car miles, but new shared mobility models are no longer a marginal preference. 30% of consumers already share miles at least monthly, which is catching up with public transport (54% of respondents used it monthly), and traditional taxis (34% usage). Consumers who use shared mobility at least monthly are primarily amongst the younger generation (18-34 years old) and those who live in urban areas (see [Exhibit 44](#)). Ride-hailing (e.g. Lyft, Uber) and ride-sharing (e.g. BlaBlaCar) are the most popular forms of shared mobility. In urban areas, there is a significant variation across our surveyed countries on the use of shared mobility, with 80% of consumers in

Exhibit 41:

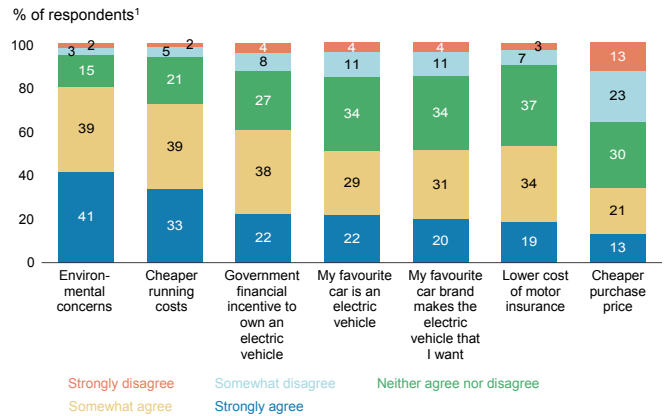
Reasons why consumers own a car: Cost of alternatives and convenience are the main drivers. There is limited importance of personalised environment



1. Question: What are the reasons why owning a car is so important to you? Please indicate whether you agree or disagree with the following statements. Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 43:

Reasons why consumers own / plan to purchase an Electric/Hybrid car: mainly for environmental concerns and the cheaper running costs



1. Question: We see you own or plan to own an electric car, to what extent do you agree or disagree with the following reasons for owning an Electric car? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

China using new mobility models at least monthly, compared to 10% in Japan ([Exhibit 45](#)). For those consumers who do not use shared mobility, around half have heard of the service (there is little variation amongst generations on awareness).

Our survey showed that, over time, consumers are willing to gradually shift their private miles to public transport and shared miles. For example, over the next 5 years, 49% of consumers are willing to switch on average 15% of their private miles to alternative mobility. After 15 years, the numbers rose to 61% who are willing to switch an average of 29% of their private miles. Emerging economies in our survey (Poland, China, Brazil) demonstrate more willingness to switch vs. developed economies.

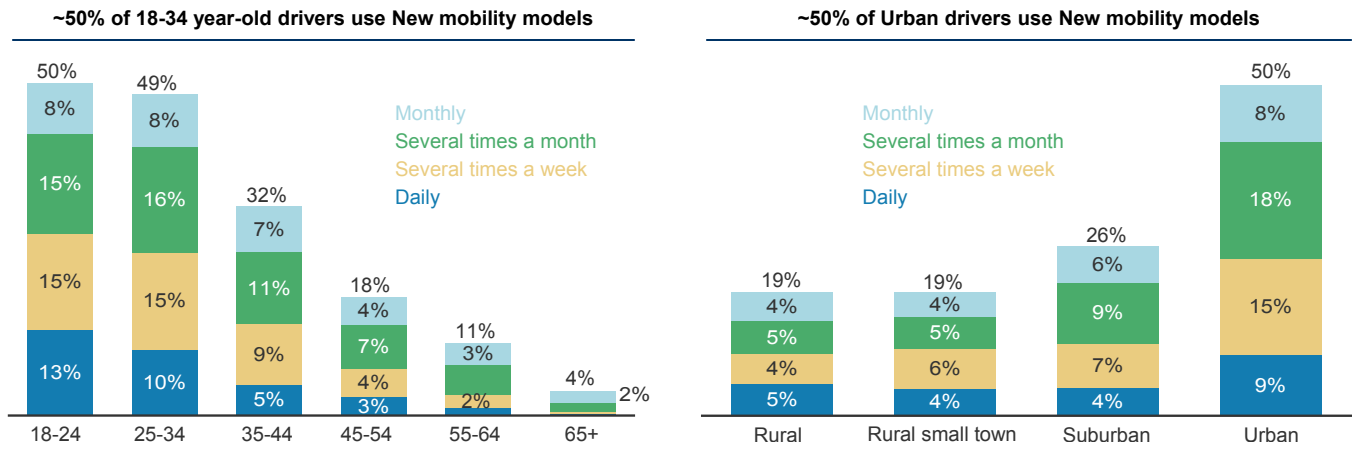
Which form of alternative mobility will consumers switch to?

Our survey shows that public transport is the most popular, with 58% of respondents ranking public transport as their first choice alternative; however, 24% of respondents still rank shared mobility models first (For a detailed split of the preference of each type of alternative mobility, please see [Exhibit 46](#).) Consumers who

already use shared mobility options are twice as likely to switch their private miles compared those who are not current users. This may be explained by the fact that consumers who did not currently use shared mobility expressed more concerns (over comfort, safety, convenience) compared to those who do already.

Exhibit 44:

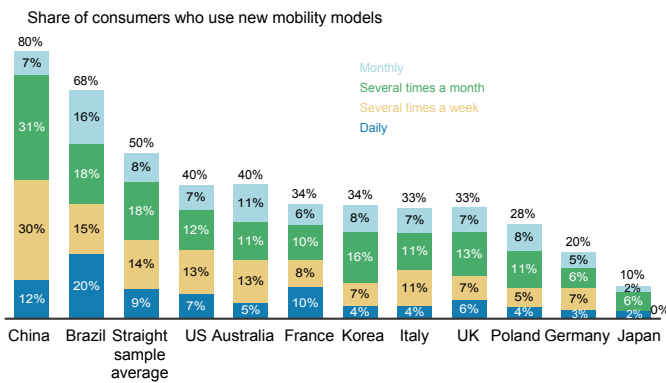
Young, urban drivers use new mobility models more to travel, with ~50% of 18-34 year olds using it at least monthly, and 50% of urban drivers using it at least monthly



Question: Which modes of transport do you use as a passenger? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 45:

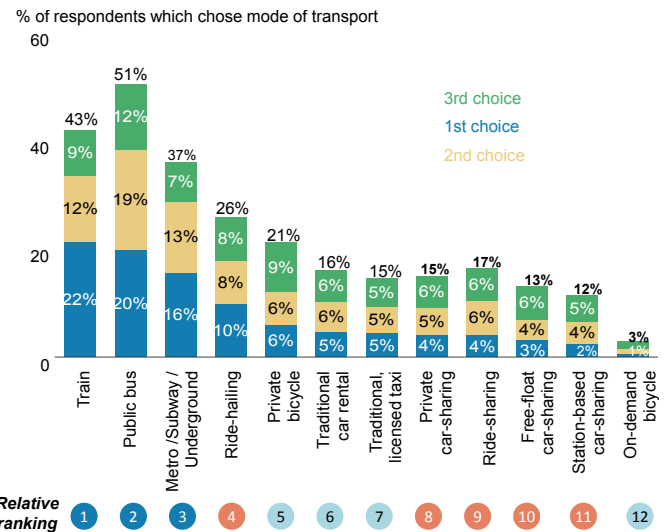
There is significant variation across all markets regarding consumers' use of new mobility models - emerging markets use it more often



Question: Which modes of transport do you use as a passenger? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 46:

Public transportation remains 1st choice to switch private miles to, but ~24% would switch to new mobility models



Question: Which modes of transport will you replace your private miles with? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Accident-proofing technologies

For a detailed explanation of the levels of car technology available, please see [Key trends impacting the Motor Insurance Market](#).

Over 40% of the current car parc in our survey is already equipped with level 1 technology, which may include features such as autonomous emergency braking, and cruise control. However, adoption of any technology above level 1 is marginal, with just 2% of cars equipped with level 2 features, and <0.1% equipped with level 3 ([Exhibit 47](#)). The results vary by market, with new cars (purchased within the last 3 years) in France, China and Brazil most often having safety features, and Japan and the US at the other end of the spectrum (see [Exhibit 48](#)).

We surveyed willingness to pay for accident proofing technology if it were 1) an add-on feature to a future car, or 2) if it could be retrofitted to an existing car. 1) As an add-on feature, ~80% of consumers are willing to pay for accident-proofing technology, which did not vary if the technology reduced accidents by 20% or 50%. 75% of consumers would even consider the feature as a trigger to accelerate their purchasing plans. 2) However, as a retrofit feature, there is a much larger dependency of willingness to pay on efficiency. ~65% of

car owners are willing to pay if the feature reduces accidents by 20%, which rises to 87% if the technology reduces accidents by 50%.

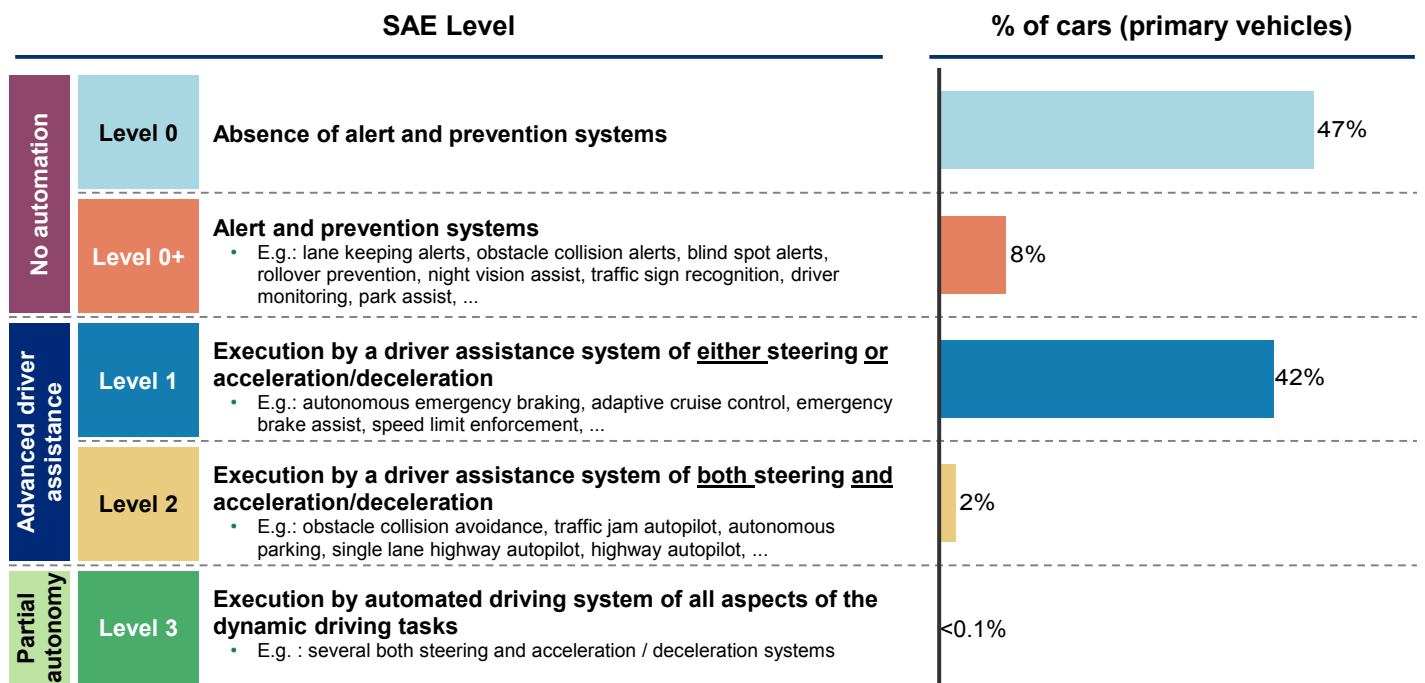
Consumers will pay more for accident proofing technologies if it is an add-on feature to a new car (~\$1.1k), rather than retrofit to an existing car (~\$0.8k). For any given income level, younger consumers have a higher interest in paying for accident proofing features. There is also a high positive correlation between the number of fatalities in the country and willingness to pay ([Exhibit 49](#)).

Consumers are looking to governments and insurers to support accident proofing technology, which may be a catalyst for its ongoing deployment technology. ~70% of respondents are supportive of governments making accident reduction technology mandatory in new cars (this reduced to ~60% if it were all existing cars), regardless of the accident reducing efficiency. On the insurance side, ~60% of consumers accept that insurers expect them to own a car with advanced safety features.

If there are financial incentives, consumers are more willing to adopt. Over 50% of consumers will reconsider paying if they could benefit from government subsidies or lower motor insurance, and expect that 35-50% of the accident proofing technology cost to be covered by such initiatives.

Exhibit 47:

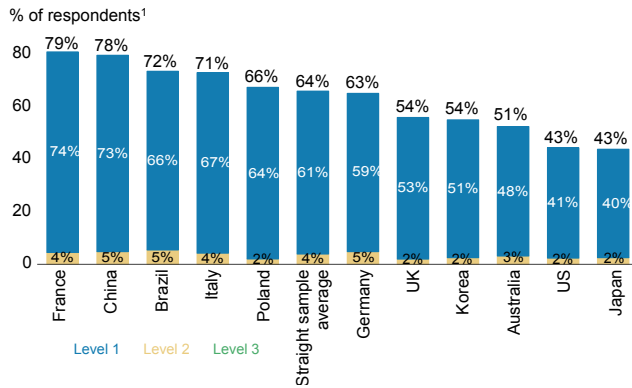
44% of the current car parc is equipped with advanced safety features (level 1 or above)



Question: Which of the following safety features does your primary car have? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; Society of Automotive Engineers; BCG analysis, Morgan Stanley Research

Exhibit 48:

There is a strong variations of advanced safety features penetration across all markets. Surprisingly, France and China have the strongest penetration



1. Question: Which of the following safety features does your primary car have? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; Society of Automotive Engineers; BCG analysis, Morgan Stanley Research

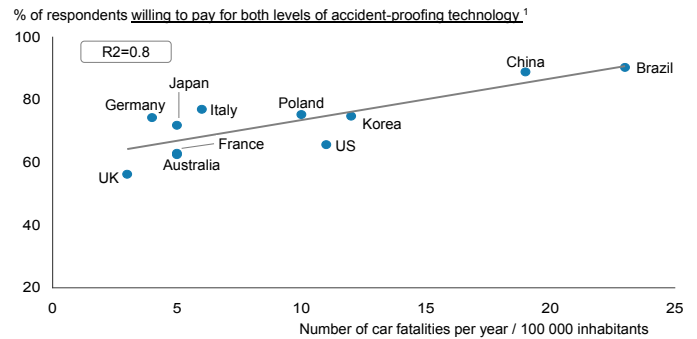
Autonomous cars

Consumers appear to be generally open to riding in and owning a self driving car, with only 22% of respondents in our survey being resistant to riding in an autonomous car, and 27% against owning one (in both cases, the rest were either actively willing to accept the technology, or neutral). Young, urban and early-adopter drivers are more enthusiastic about owning an autonomous car, with between 60-74% actively willing to accept driving one, as we show in [Exhibit 50](#).

Self-driving cars are viewed as both safe and unsafe, depending on the respondent. For those who were willing to drive an autonomous car, safety was the main reason for doing so. However, safety was also one of the main reasons why opponents of autonomous cars

Exhibit 49:

There is significant variation between consumers' willingness to pay across markets for accident proofing technology, but it is strongly correlated with car fatality rates



1. Question: Approximately how much would you be prepared to pay for this safety feature as an add-on when you buy your next car? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, World Health Organization, Morgan Stanley Research

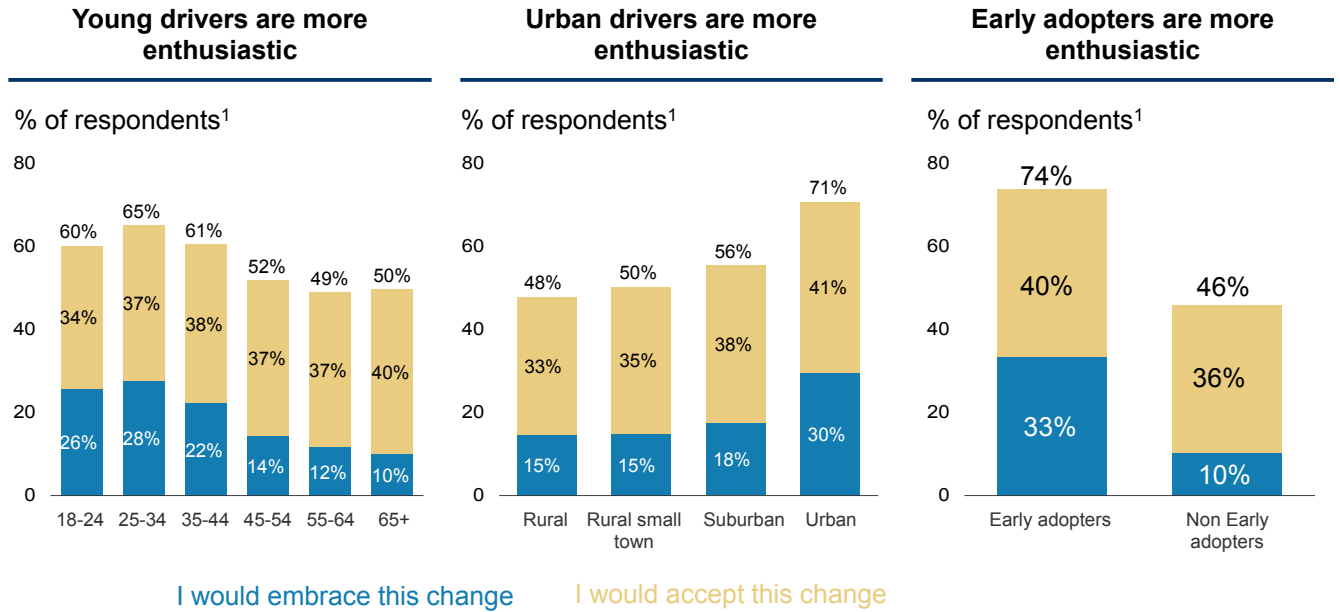
did not want to drive one. We show the variety responses for reasons to embrace, or resist, in [Exhibit 51](#) - [Exhibit 52](#). The main reason to resist driverless cars is that consumers would like to have control of the vehicle at all times.

Focusing on urban drivers, on average most think that they will be owning a self-driving car within 10 years. Within the countries that we surveyed, consumers in emerging countries expect to adopt autonomous car technology earlier than in developed economies (within 9 to 10 years vs in 12 to 16 years, see [Exhibit 53](#)).

Most consumers do not expect to keep paying for motor insurance while owning a self-driving car. Of those willing to embrace autonomous technology, only 15% declare themselves willing to continue paying insurance.

Exhibit 50:

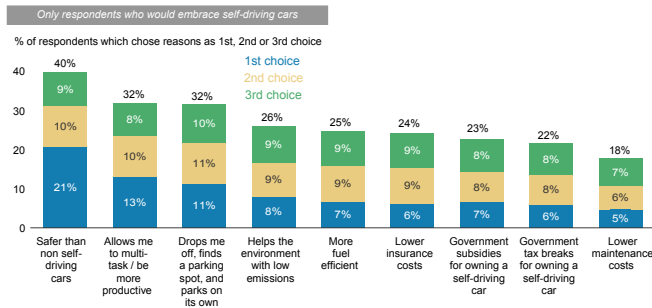
Young, urban and early-adopter drivers are more enthusiastic to owning a self driving car



1. Questions: Combination of "In relation to each of the following statements, please let us know how long you think it will be before the statement is true?" (options include owning a self driving car) and "In relation to each of the following statements, please let us know how you would feel about the scenario described - You own a self-driving car". Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 51:

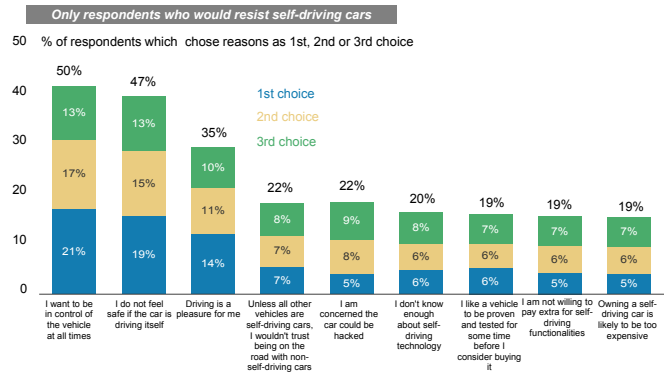
Consumers' willingness to own a self-driving car mainly comes from safety...



Question: What are the main reasons why you would embrace or accept owning a self-driving car? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 52:

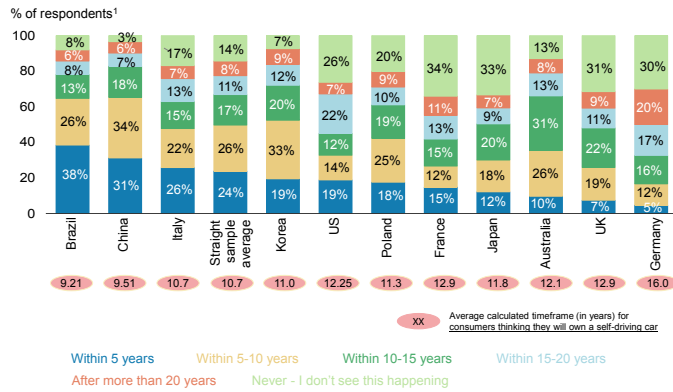
...but resistance to own a self-driving car also mainly comes from safety considerations



Question: What are the main reasons why you would resist owning a self-driving car? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 53:

The average calculated timeframe (in years) for consumers thinking when they will own a self driving car. Emerging market consumers anticipate change coming faster to the market while consumers in developed countries are more conservative



Question: "In relation to each of the following statements, please let us know how long you think it will be before the statement is true?" Respondents were asked to choose a time frame to see various statements coming true, of which one included "You own a self-driving car". Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Consumer's insurance journey

In this section we focus on the consumer journey across the insurance value chain.

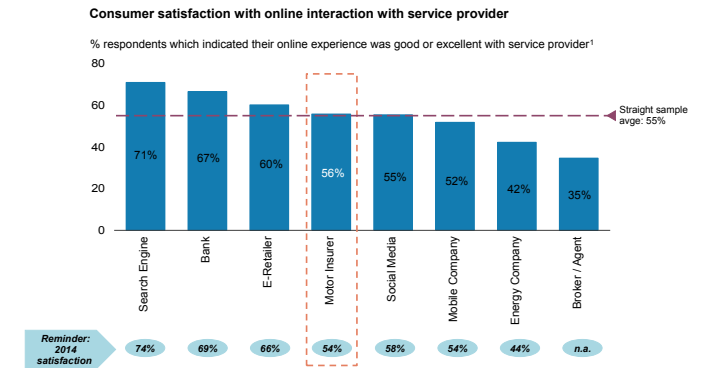
Our survey shows that most of the consumer journey is done via indirect channels (e.g. through intermediaries, which can be online or offline), although consumers are more keen to interact directly with insurers further along the value chain. For example, only 37-47% of the consumer journey is done via direct channels (i.e. directly from the insurer, either online or offline) across the value chain, but this increases to over 45% for the access, claims, and renewal stages.

Although online channels are broadly used across the consumer journey, most consumers remain multi-channel. 25-40% of the current customer journey is done online, with the lowest rate of online usage at the claim stage. By contrast, 12% of consumers did not use any kind of online channel - so-called 'offline consumers'.

When compared to our 2014 consumer survey, insurers appear to have improved their digital experience, but consumers are still dissatisfied past the acquisition phase. 56% of consumers rate their online experience with insurers as good or excellent (a 2ppt increase vs our 2014 survey), although insurers still ranked in the middle of other online service providers (see [Exhibit 54](#)). We also measured consumer satisfaction during each stage of the insurance process using a net promoter score, and as can be seen in [Exhibit 55](#),

Exhibit 54:

Overall, online interaction with insurers generates an average level of consumer satisfaction compared to other industries. Search engines and banks rank higher.



1. Question: How would you describe your online experience with each of the following companies? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

there is high dissatisfaction among the modify, access and claiming stages. Somewhat surprisingly, our survey shows higher consumer satisfaction when buying insurance via an insurers mobile or tablet app when compared to the website.

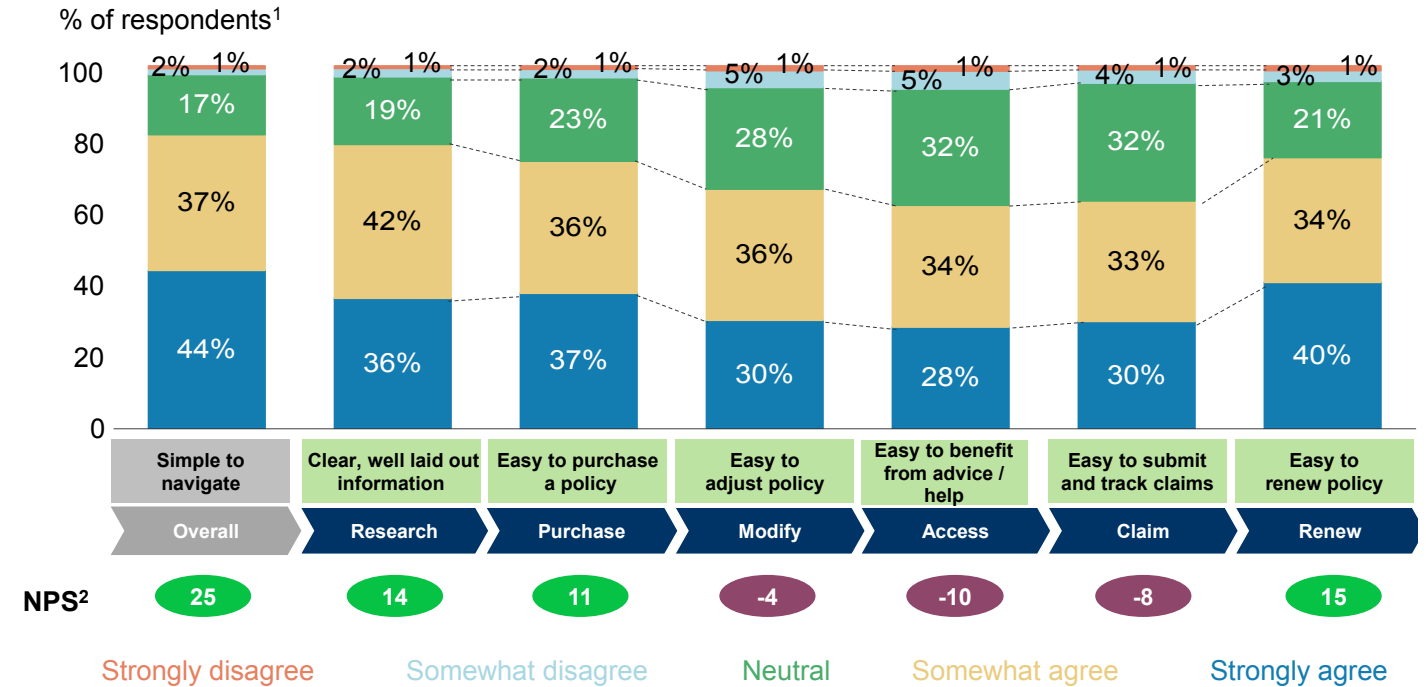
50% of consumers in our survey would be willing to switch to an insurer with a better online service. We think that a better digital experience can improve engagement, since over 50% of consumers almost never use (or only rarely use) their online portal. 60% of consumers using third-party channels to buy insurance would purchase online directly from an insurer, if the insurer were to improve its online service.

When surveyed on which online insurance improvements consumers would like to see, a simpler claims process and easier to use website came out first. As we show in [Exhibit 56](#), this is true for both consumers who already used online channels, and for consumers who do not.

However, there is still a degree of inertia amongst consumers. In all countries, human insurance interactions outnumbered online insurance interactions, but it was 2.5x more in France and Poland ([Exhibit 57](#)). It is the lowest in the UK where online aggregators are widely used. Offline consumers were not easily convinced to move to online interactions, since 54% of offline consumers said that they would not switch online even if an alternative motor insurance company would offer a better online experience. However, of the online consumers, 53% would switch provider if this were the case.

Exhibit 55:

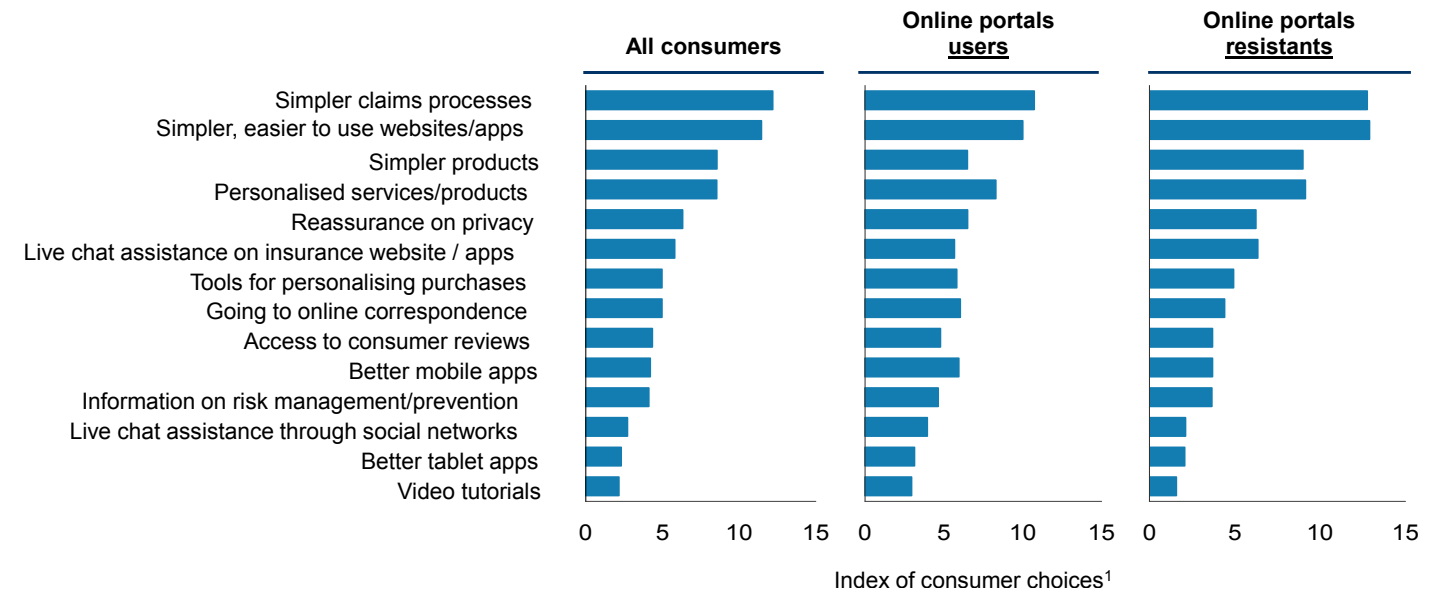
Consumers' satisfaction with motor insurer's online services decreases past the acquisition stage; which is unchanged from our 2014 consumer survey



1. Question: Please let us know whether you would agree or disagree with the following descriptions of your motor insurance company's online services? 2. Net Promoter Score = (% of "Strongly Agree") - (% of "Neutral" + "Somewhat disagree" + "Strongly disagree") Source: Morgan Stanley and BCG Insurance Customer Survey 2016, BCG analysis, Morgan Stanley Research

Exhibit 56:

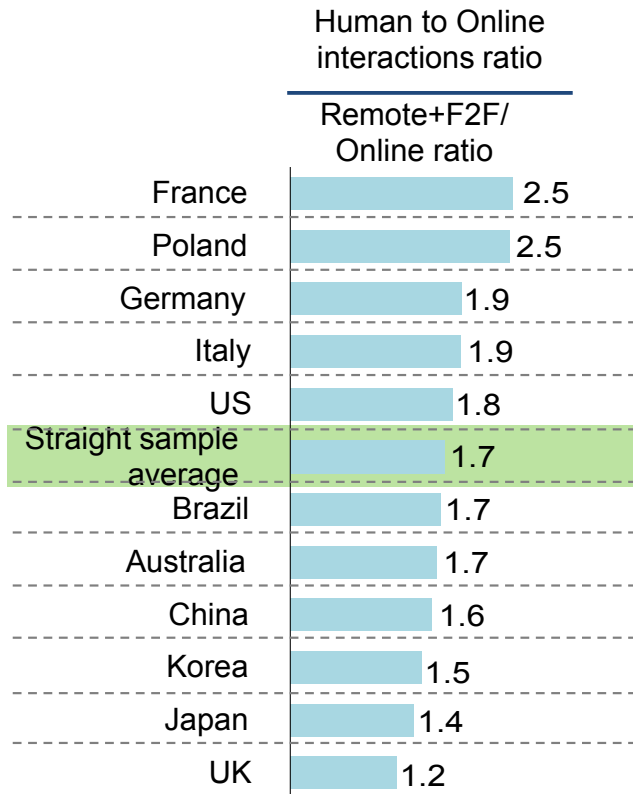
When asked which improvements to a motor insurance company's online services would be valued the most, consumers answered simpler claims processes and simpler easier to use website and apps



1. Question: Among the following options, which improvements to a motor insurance company's online service would you value most? Source: Morgan Stanley and BCG Insurance Customer Survey 2016, BCG analysis, Morgan Stanley Research

Exhibit 57:

Human to online interactions ratio still remains high in some European countries. It is lowest in the UK where distribution is online and intermediated



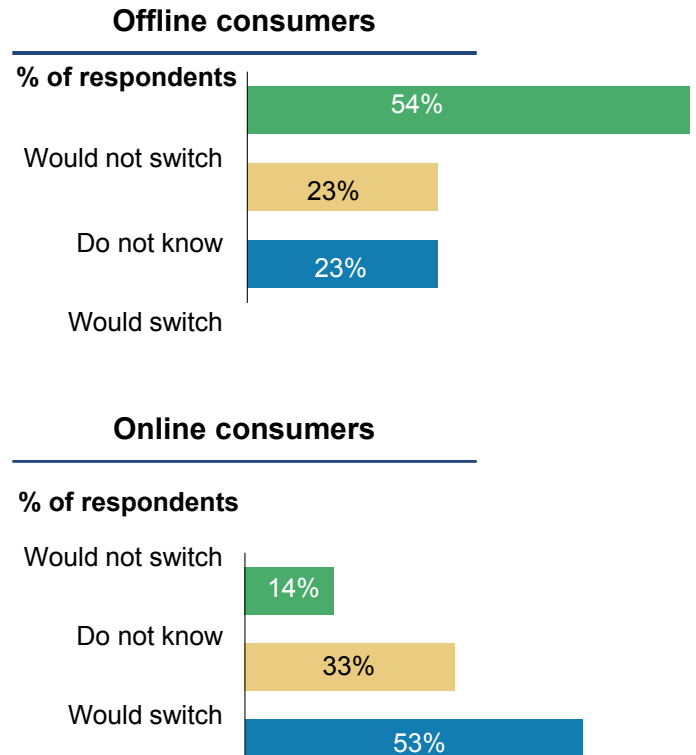
1. Online channels: Insurers and bank sites and portals, insurers mobile and tablet apps, car sale, price comparison websites, other third party sites and social media.
 2. Remote channels: Insurers and banks (phone/email), agents phone/email, brokers phone/email 3. Insurers and banks F2F, brokers F2F, agents F2F, OEMs F2F. Source: Morgan Stanley and BCG Insurance Customer Survey 2016, BCG analysis, Morgan Stanley Research

Threat of new entrants

From a consumer perspective, there appears to be a low barrier to entry for new players. 55% of respondents on our survey are willing to buy motor insurance from other nontraditional players. These included players such as OEMs (~40% would purchase), but start-ups, telco companies and tech giants were also included (~30% would purchase), as we show in [Exhibit 59](#). We think that consumers view motor insurance as being commoditised, since 27% are willing to buy from a brand that they have never heard of. Somewhat unsurprisingly, younger drivers are the most keen on buying motor insurance products from other nontraditional players. However,

Exhibit 58:

There is a degree of customer inertia, with 54% of offline consumers not willing to switch to online



1. Question: If you felt that an alternative motor insurance company would offer you a better online experience, would you switch to them from your current motor insurance provider? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

price remains the key purchasing decision so new entrants delivering cheaper coverage are a particular threat ([Exhibit 63](#)). As we show in [Exhibit 61](#), ~45-60% of 18-34 year olds would buy motor insurance from a car manufacturer, start-up or tech giant such as Google, compared to 5-17% of 65+. For all buyers of online insurance price remains the key consideration.

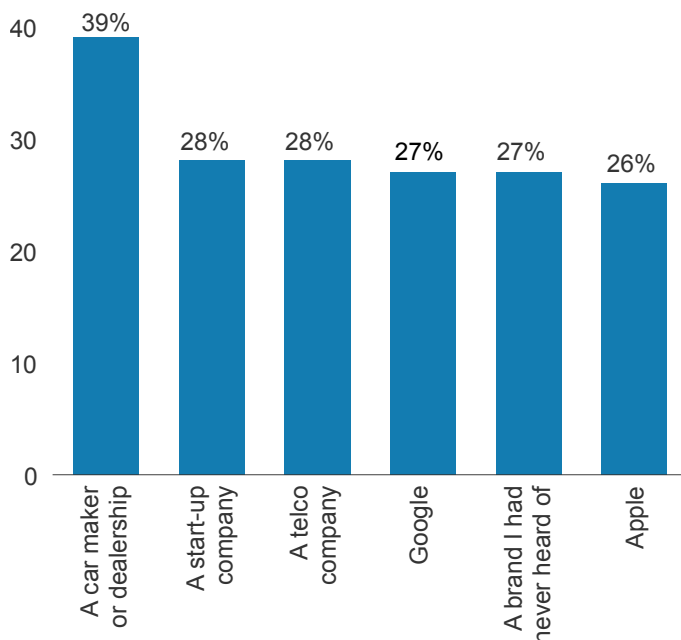
Passengers and drivers of new mobility services were indifferent as to who they bought their insurance from. Around 50% of such passengers said that they would buy insurance from the new mobility provider, with the other 50% saying that they would turn to an insurance company. The outcome is similar for new mobility drivers/providers.

OEMs seem to represent the main threat, but consumers still resist buying insurance from them. On average, 9% of the consumer journey is done through an OEM, especially in research (~12%) and purchase (~14%). These findings are consistent across different markets, with Japan, Italy and the US already interacting with OEMs for 10% or more of their insurance journey, the lowest being 7% in the UK. 40% of consumers will buy insurance from OEMs, but of those who would not, the main reason is because consumers preferred to keep insurance buying and car buying separate. The other reasons are listed in **Exhibit 62**. ~20% of those 'resistant' consumers may reconsider purchasing insurance from an OEM if there is an agent available to answer questions, or if a telematics device were fitted to get a better deal.

Exhibit 59:

Most consumers would purchase motor insurance from other players, with a preference for OEMs

% of respondents agreeing or strongly agreeing¹

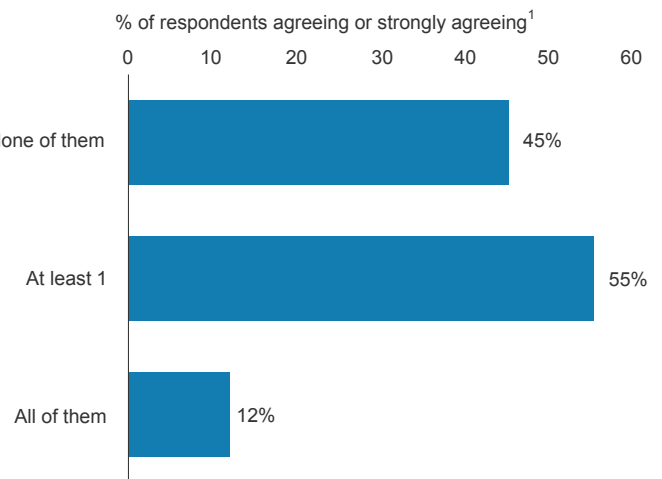


1. Question: Please let us know whether you agree or disagree with the following statements. "I would be happy to buy motor insurance from..." Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

The consumer view on data privacy still favours insurers. As we show in **Exhibit 64**, 54% of consumers would place the insurance sector within the top 3 industries they would consider for handling their driving data (this is higher than 40% trust level we found in our 2014 consumer survey, which asked about trust for home and motor data). This compares to 41% for an OEM and ~20% for a telco company or a tech giant (Google in this example). Consumers are still concerned about the lack of privacy of their driving data (but the majority in our survey agree that insurers or non-traditional players will have access to it in any case), with 60% of all consumers expressing concern. However, as we show in the Usage Based Insurance section below, consumers are willing to share data in exchange for lower motor premiums.

Exhibit 60:

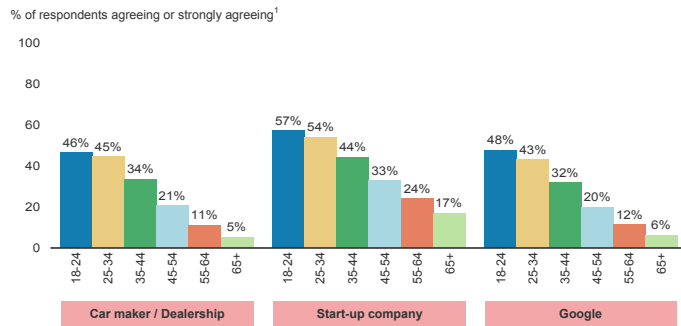
55% of consumers said that they will buy insurance from at least one of the non-traditional players



1. Question: Please let us know whether you agree or disagree with the following statements. "I would be happy to buy motor insurance from..." Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 61:

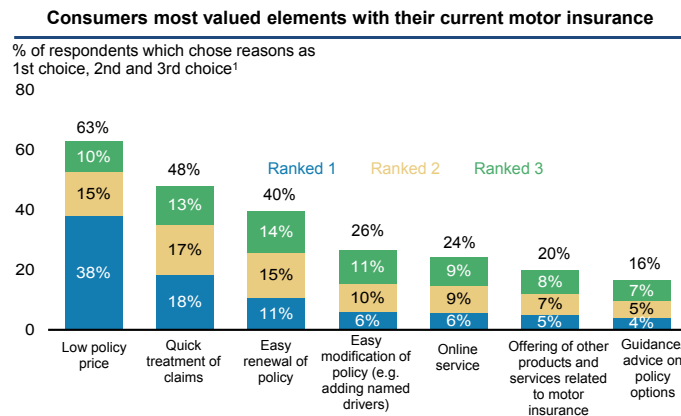
Young drivers are the most keen on buying motor insurance products from other non traditional players



1. Question: Please let us know whether you agree or disagree with the following statements. "I would be happy to buy motor insurance from..." Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG Analysis, Morgan Stanley Research

Exhibit 63:

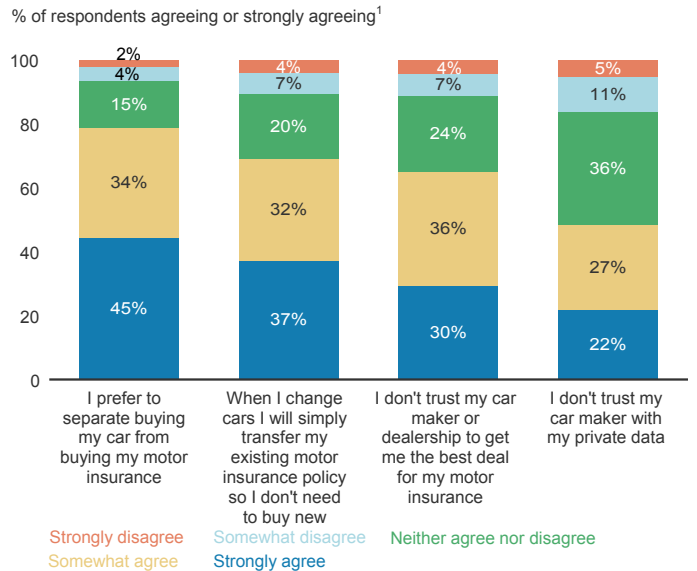
Price remains the key purchasing decision, so new entrants delivering cheaper coverage are a particular threat



1. Question: Among the following options, which improvements to a motor insurance company's online service would you value most? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG Analysis, Morgan Stanley Research

Exhibit 62:

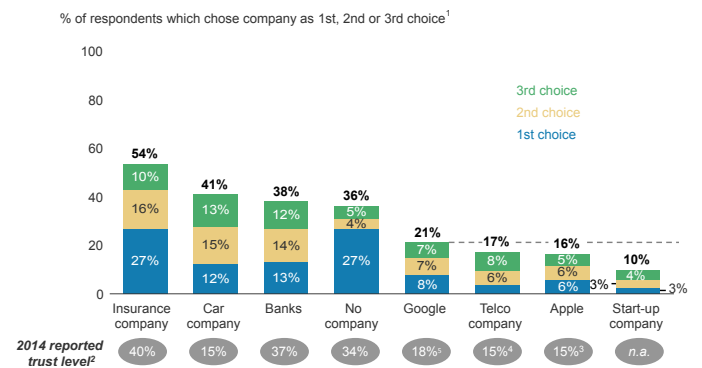
Almost ~80% of consumers who would not buy motor insurance from OEMs agreed that this is because they want to separate car buying from motor insurance buying



1. Question: You have stated that you would not be happy to buy motor insurance from a car maker or dealership. Please let us know whether you agree or disagree with the following statements. Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 64:

Insurers have a slight advantage as consumers trust them the most to handle their driving data, more than double that of Google

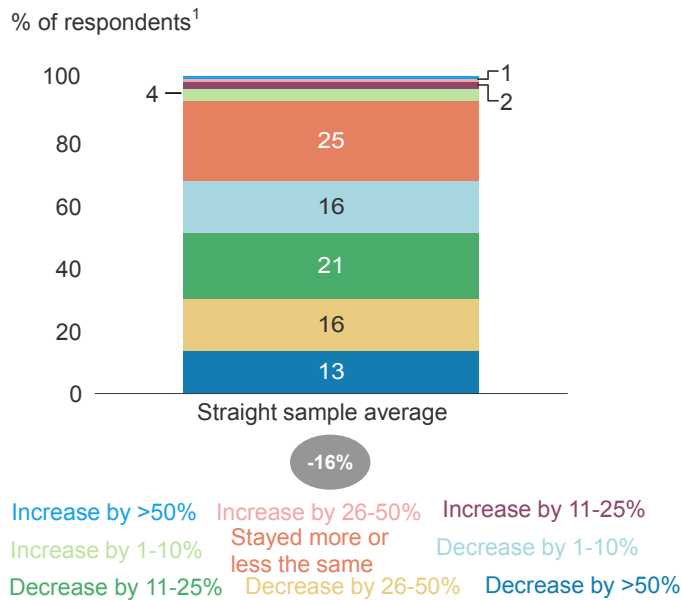


1. Question in 2016 survey: "Which type of company would you trust most with data on where and how you drive?" 2. Question in 2014 survey: % of respondents which chose company as 1st, 2nd or 3rd choice to the question "In the future one single platform could control all automated items in our homes and motors. Which of the companies below would you trust the most to manage them" 3. 2014 comparable reported trust level is based on the responses for average between Computer companies and Electronic Entertainment companies 4. 2014 comparable reported trust level based on Broadband providers 5. 2014 comparable reported trust level based on Internet search companies. Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Usage Based Insurance

Exhibit 65:

On average, UBI premiums were 16% lower (20% lower for Pay-As-You-Drive), but 32% consumers have the same or higher premiums when using UBI



1. Question: What has been the impact on your insurance premium since you switched to a 'usage-based motor insurance' policy?

Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Over 70% of consumers in our survey switched to Usage Based Insurance (UBI) mainly to reduce and increase control over motor insurance costs. On average consumers witnessed a 16% drop in motor premiums, with a third of consumers not seeing any change in premiums or seeing an increase. Of those consumers who did see a decrease in premiums, there is a large variation in the amount of the decrease (see [Exhibit 65](#)), with some consumers

reporting a 50%+ decrease but some only reporting 10%. Pay-As-You-Drive (PAYD) consumers saw a 20% average decline in premiums, and Pay-How-You-Drive (PHYD) (telematics based) policies saw 17% average decline in premiums. There is a significant country variation of PAYD policies on premiums - with 27% decline in Italy and 15% decline in the US on average.

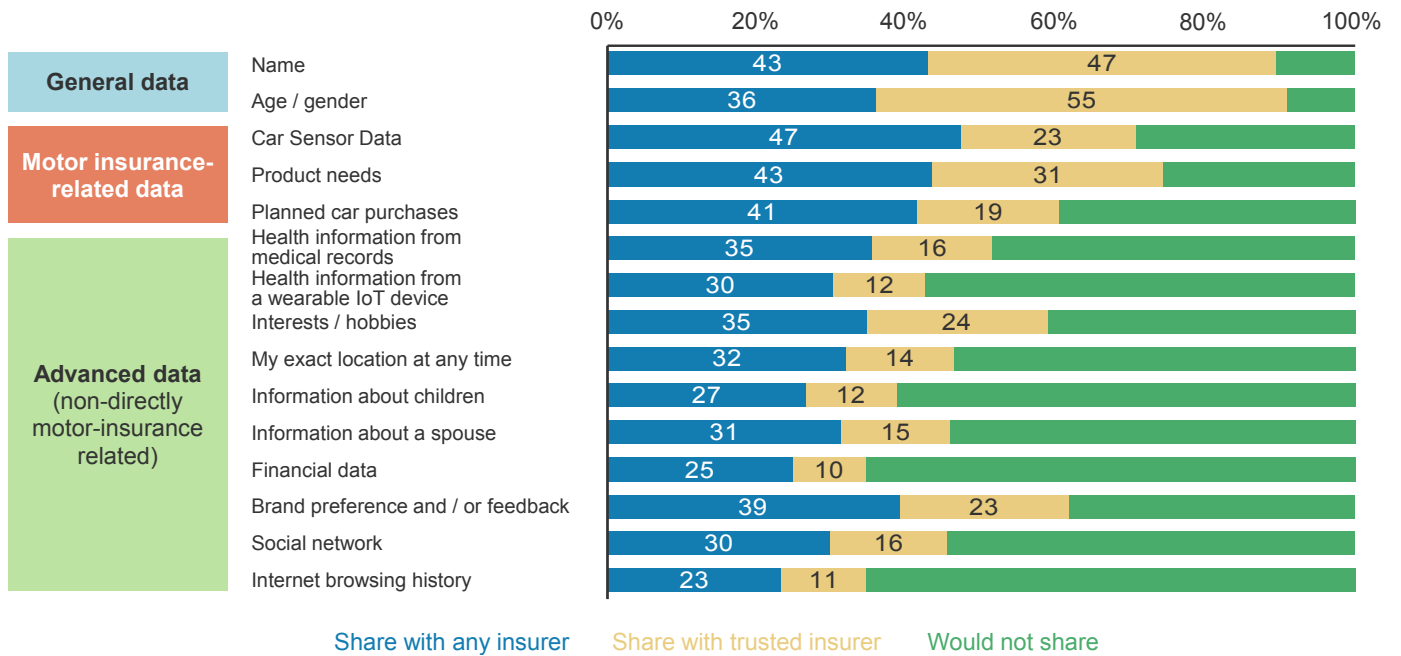
There is high retention in UBI policies, 82% of UBI consumers stating they would renew their policy regardless of whether the switch to UBI changed premium levels, and 95% of those willing to renew their UBI policy would remain with the same insurer.

45% of non-UBI users consumers are willing to switch to UBI, which increases if consumers have car connectivity (up to 56% for consumers with car embedded SIMs).

As a result we think that the penetration of UBI may accelerate due to technological adoption and willingness to share data. 55% of consumers have in-car connectivity either via an embedded SIM, a smartphone or external device. Consumers are generally willing to share data in exchange for a lower insurance premium, as we show in [Exhibit 66](#). They are highly willing to share general and motor insurance related data, but less so on personal data that is not directly related to driving ("advanced data"), e.g. exact location, financial data, health, etc. Willingness to share data also varies significantly between countries, as shown in [Exhibit 67](#). On this graph, the Y axis shows the average number of *motor insurance related* data categories (car sensor data, product needs, planned car purchase) that consumers are willing to share, and on the X axis we show the average number of *advanced data* fields that consumers are willing to share. China and Brazil appear willing to share both types of data, whereas Australia and Germany are least willing.

Exhibit 66:

Consumers are willing to share data in exchange for lower premiums, including driving data. Willingness to share is lower for more advanced information such as internet browsing history and financial data

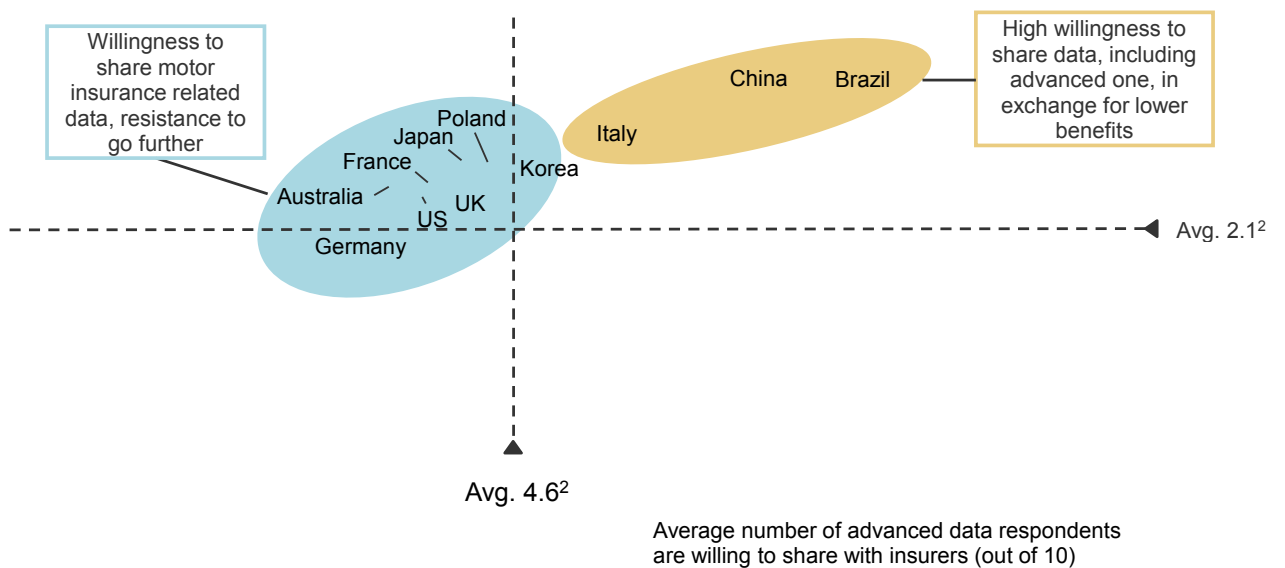


Question: Among the list of personal information below, which ones would you be comfortable / willing to share with insurers in exchange for benefits (e.g. lower premium)? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Exhibit 67:

Consumers from China, Brazil and Italy are more willing to share private data, including advanced data

Average number of motor insurance related data respondents are willing to share with insurers (out of 3)



1. Question: Among the list of personal information below, which ones would you be comfortable / willing to share with insurers in exchange for benefits (e.g. lower premium)? 2. Straight sample average Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

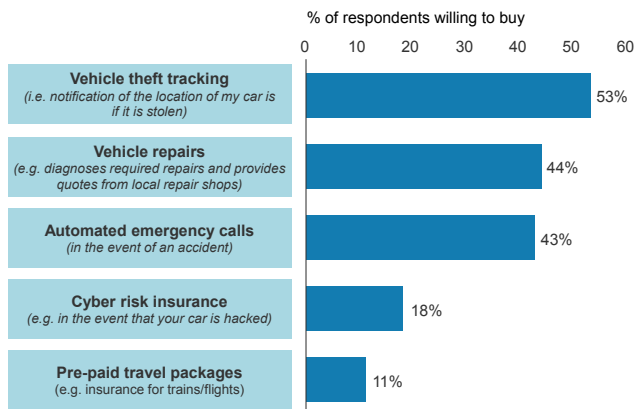
New products and models

According to our survey results, we believe that there is demand for value-added services. 53% of respondents would pay extra for vehicle theft tracking, and 43% for automated emergency calls, as shown in **Exhibit 68**. There is little interest in buying cyber insurance; however, suggesting a B2B approach might be more relevant. Willingness to pay for new products is the highest amongst younger drivers: for example, 64% of 18-24 year olds are willing to pay for vehicle-theft tracking compared to 45% of the 55+ year age group.

Consumers are currently confused over their insurance coverage when using shared mobility services. More than 50% of both users (passengers) and providers (i.e. the drivers) of shared mobility services expressed concerns about their lack of insurance coverage. There also appears to be confusion over who provides the insurance, with 50% of users saying that they expect to be either fully covered

Exhibit 68:

Consumers are keen on advancing to new products, but cyber risk appears to be more of a B2B opportunity



Question: For which of these products might you be willing to buy with your motor insurance for an additional premium? Source: Morgan Stanley and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

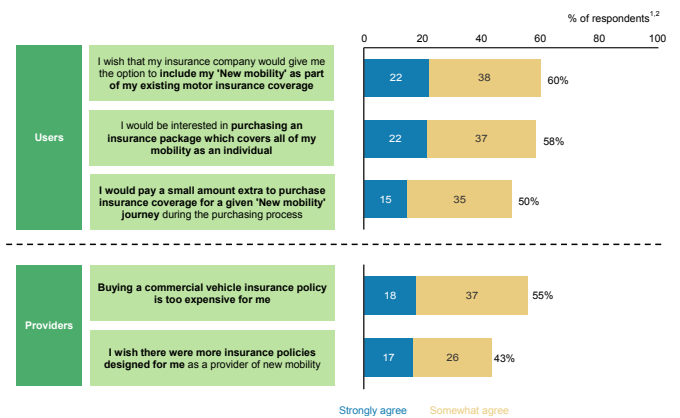
by their driver or the shared mobility company should an accident occur in the car. 50% of drivers expect to be fully covered by the shared mobility company.

Both passengers and drivers using shared mobility are keen to buy specific insurance coverage. For example, 60% of passengers would like to include 'new mobility services' as part of their existing motor insurance coverage, and 50% say that they would pay a small amount extra to purchase insurance coverage for a given 'new mobility' option. 55% of drivers declare that buying a commercial policy is too expensive, with 43% wishing there were insurance policies designed for suit their specific needs as drivers.

Consumers show interest in new models of motor insurance, with over 38% of them open to buying peer-to-peer insurance, and 50% willing to consider independent 'driving score' type insurance. Interest is even higher in emerging markets such as China and Brazil, with Germany and Japan showing the least interest.

Exhibit 69:

A significant share of both users and providers seem to be keen on advancing to more adapted insurance policies



1. Question: As a passenger, please let us know whether you agree or disagree with the following statements. 2. Question: As a provider, please let us know whether you agree or disagree with the following statements. Source: Morgan Stanley Research and BCG Insurance Customer Survey 2016; BCG analysis, Morgan Stanley Research

Implications for Insurers - Assessing the Value at Risk

We see four key disruptive threats facing the motor insurance market: 1) contraction of insurable risk pools, 2) a shift of premiums from personal to commercial lines, 3) new entrants with access to data and distribution seeking to disrupt the traditional competitors and 4) emerging markets continuing to grow premiums while developed markets experience contraction. We consider the third threat in more detail in the next section - see [Deep Dive: Potential Disruptive Competitors](#).

The combination of these disruptive threats places a significant proportion of ~\$200 billion of motor insurance linked market value at risk. For the major insurers globally, motor represents anything from ~8% of P&C premiums to ~99%. We believe that insurers may become increasingly marginalised by disruptive forces and that a significant proportion of this ~\$200bn of motor insurance related market cap could be at risk. Given the scale of premium declines we foresee in a heavily disrupted scenario (for example, a ~84% fall in Japan motor premiums to 2040), significant restructuring would be required in order to avoid ongoing losses.

Although motor is often not the most profitable line of business, it shares expenses with many other product lines, and in some markets is a loss leader, and therefore losing market share in motor would result in a larger impact than that measured through pure motor profits. Distribution is one such area, where motor insurance is often an anchor product, which underpins the viability of expensive face-to-face agency models for a multitude of other products (including life and savings in many markets).

We see the 'most at risk' insurers as having the following features: i) high overall exposure to motor insurance, ii) limited capabilities in commercial motor, iii) business mix skew to developed markets, iv) within developed markets, mix skew to more price transparent markets such as the UK, and v) limited track record of establishing partnerships with likely disruptors such as OEMs.

We model 7 major motor insurance markets bottom-up - in both a 'Limited' and a 'Heavy' disruption scenario. In a Heavy disruption scenario a combination of technological, regulatory and social factors accelerate the reduction of market size in mature markets, reducing it by 18-60% by 2030 and 54-84% by 2040.

We believe that the size of the premium pool will shrink dramatically, but also expect the shape of the remaining risk pool will look very different. The adoption of active safety technology significantly reduces accident frequency, given that ~90% of accidents are caused by human error. External technologies facilitating speed control and accident analysis will also lead to safer driving. Although claims severity could rise we think that the impact will be small because the higher cost of repairs for advanced cars will be counterbalanced by lower bodily injury costs as collisions happen at a slower speed. Not all of the remaining risk pool will be addressable by traditional players due to the rise of product liability, bulk buying of fleet insurance, and new models.

Value at stake

Due to inter-linkages, value impact of motor is materially higher than just motor reported profits

Based on a bottom-up analysis of profitability of the motor insurance segment - we estimate that a significant part of \$200 billion of market capitalisation could be at risk from the changes we foresee to the motor insurance market (please see Appendix 4 for a list of companies included in this calculation).

Our market modeling shows that in a heavily disrupted scenario that a large proportion of the current motor market could be eliminated in certain countries - requiring significant restructuring in order to avoid significant ongoing losses (and for value to move negative). For example, in a heavily disrupted scenario we see Japan motor premiums falling by 84% to 2040, the UK by 74%, US by 66% and France by 54%.

However, this estimate almost certainly understates the risk as it looks narrowly at motor insurance profits (capitalised at an appropriate multiple):

- **Motor insurance makes a significant contribution to the shared overhead** - in particular in areas such as marketing / brand spend and distribution. Challenges to the economics of motor would have significant knock-on impacts for other product lines. In particular we would be

concerned about the effect on the viability of traditional agency networks - which in many countries sell both life and P&C products.

- **Our methodology is to take reported (or estimate) underwriting profits and notional investment income for motor insurance** - however, this may overlook ancillary (and highly profitable) services such as premium financing. For some of the UK insurers where there is clear disclosure, we have been able to include ancillaries.
- **Motor insurance is in some instances a 'loss-leader' product** which attracts customers to other, more lucrative products.

Which insurers are most exposed to motor insurance?

Exhibit 70 shows the percentage of P&C premiums from motor for major listed global insurers. We estimate that this represents about ~\$260bn of motor premiums in 2015 (out of ~\$700bn globally - the balance of which is underwritten by mutuals and/or insurers that are not covered by Morgan Stanley Research).

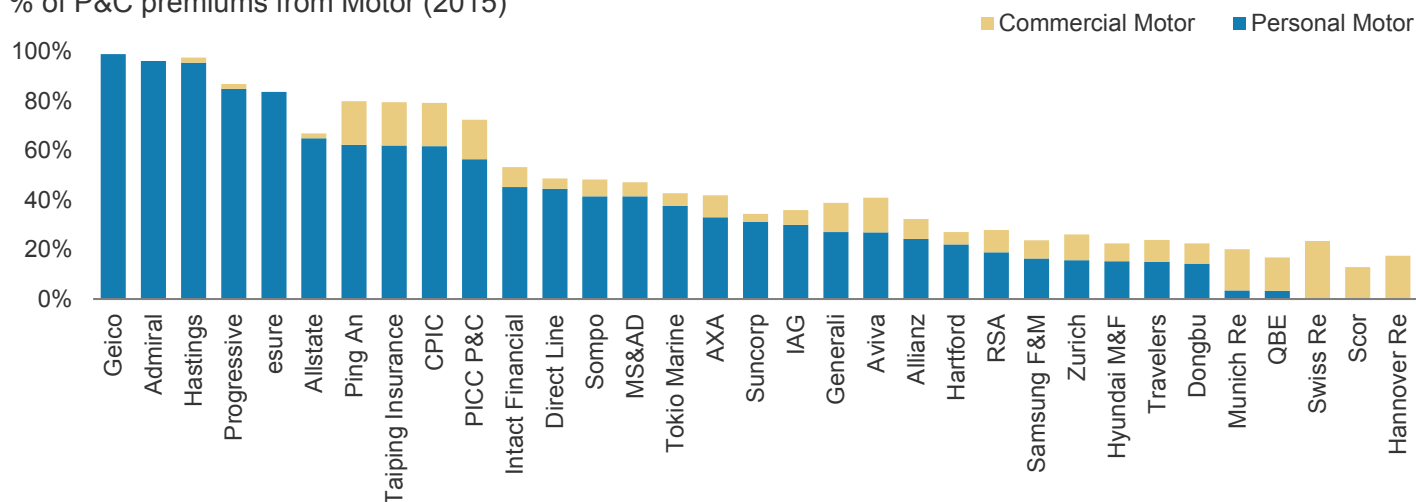
The specialist US and UK motor insurers (such as Geico and Admiral) are most exposed, followed by the Chinese insurers.

Least exposed are the global reinsurers and multi-line companies - where motor is diluted by other P&C lines and life products. These players also have the natural hedge of being able to best take advantage of the nascent opportunities in commercial lines.

Exhibit 70:

Percentage of P&C premiums from motor FY15. The pure play personal motor insurers are most exposed to changes in shared mobility and autonomous driving trends.

% of P&C premiums from Motor (2015)



Source: Company Data, Morgan Stanley Research, BCG analysis. Aviva premium is estimate based on disclosed UK split.

Which insurers are most at risk from the trends we have identified

The risk factors that we have identified are:

1) High percentage of premiums from motor. In [Exhibit 70](#), we have calculated the 2015 premiums from motor as a guide to P&C exposure to motor. For the composites, we have considered motor as a proportion of overall P&C revenues (given the difficulties of finding a sensible 'revenue' metric for life & savings).

2) Reliance on personal motor premiums (vs commercial motor premiums). In most markets, we forecast personal premiums to see immediate downwards pressure, due to shared mobility trends (less miles driven for personal use) and to an extent the impact of more accident proofing technology permeating the car parc.

3) Geographic exposure to developed markets. As we explain later, we think that premiums in all mature markets will eventually decline, but emerging markets should rise. For example, China could still be a growth opportunity due to rising car ownership, higher miles driven, and higher natural claims inflation.

4) Price transparency in the market. Markets that are more price transparent (the UK for example) could see motor insurance prices fall (and therefore revenues) even in anticipation of a technology driven decline in risk, whereas others (where the price transmission mechanism is slower) might even see a period of super-normal profitability as insurers capture the benefit of falling claims before this is passed onto the customer.

5) Current partnerships and innovation. We think the ability to form partnerships with some of the potential disruptors (for example OEMs and tech giants) is a crucial defensive strategy. However, we think that global insurers are likely to be the most attractive partners followed by those with a substantial share of a market that is large by global standards.

The first three of these factors we have sought to show in the heat map ([Exhibit 71](#)) - for each insurer we have indicated whether we think there is low (green), medium (amber) or high (red) exposure to each risk factor (the quantitative criteria are shown in the footnote to the exhibit).

The latter two factors are harder to assess quantitatively - however, we would highlight the UK market as one where pricing transparency is relatively high. Several insurers have partnerships with OEMs - for example, Allianz's relationship with BMW - however, there is not sufficient public information available to allow a fair and consistent comparison between the various players.

Exhibit 71:

We have quantitatively mapped out exposures of global insurers to three of the five risk factors we have identified - we see those with highest exposure to personal motor, limited commercial lines capability and greatest exposure to markets with declining premiums as potentially exposed



1) Large share of premiums from motor: <25% low exposure, 25-50% medium exposure, >50% high exposure. 2) Writes more personal motor: if more than 75% of motor premiums are from personal motor then high exposure, 25-50% is medium exposure, <25% is low exposure. 3) Geographic exposure to markets where we think premiums will decline - we look at total P&C exposure, as we do not have enough public disclosure of the geographic split of motor premiums. Source: Morgan Stanley Research, BCG analysis

Overall, we find that the UK insurers are most at risk - given their typical heavy reliance on personal motor and the unusually high price transparency of the UK market. US insurers are next most at risk - however, the market's pricing structure (state by state pricing, high penetration of traditional distribution) is a relative insulating feature.

Continental Europe and South Korea are relatively low risk regions - given the relatively low reliance on personal motor and local distribution structures.

Impact on insurable risk pools

We anticipate that, despite a rise in global miles driven due to shared mobility, global premiums and insurable risk pools will fall dramatically. We have built a bottom-up model to outline the potential development of motor insurance industry dynamics in seven markets (Australia, China, France, Germany, Japan, US, UK), which covers 63% (\$438bn) of global motor premiums. We think that the disruption is immediate and we could start seeing a shift in the market over the next 12-24 months, but we have tried to map out our best estimate of the long-term trend to 2040.

We have defined the auto market as miles traveled rather than units sold, in line with our global Auto team's Morgan Stanley Global Miles Model. Please refer to the [Autos & Shared Mobility: Global Investment Implications of Auto 2.0](#) report for more detail on Morgan Stanley's view on motor market development globally. If mobility becomes increasingly measured by miles vs. cars, motor insurance likely also will be measured on the same terms, in our view. Therefore we have also modeled premiums on a per mile basis.

We see the following trends playing out:

Initial phase (Wave 1, today)

Low penetration of shared mobility, which is not expected to have a material impact on the size of the car parc. There are some level 1 and 2 vehicles on the road, telematics is gaining traction and data is better utilised with digitisation under way.

Transition phase (Wave 2)

New mobility starts to have a stronger impact on volume and products. Higher penetration of level 1 & 2 vehicles, introduction of level 3 & 4 vehicles, which significantly reduces accident frequency. Claims severity will increase as the cost of repairs is higher for advanced cars, but bodily injury costs may be lower as collisions happen at a slower speed.

Data is becoming the key driver of competitive advantages, and new players (tech giants, OEMs, start-ups) disrupt the value chain.

Deeply reshaped market (Wave 3)

Significant proportion of miles are shared, and the introduction of advanced level 5 driverless technology massively reduces the insurable risk pool (we assume 95% collision reduction). The remaining motor market shifts from a B2C (personal) to B2B (commercial market), although there is an opportunity for product liability insurance.

Telematics is no longer relevant as big data/analytics are embedded into vehicles and the key actor of all operational processes. It is a fully digitised world, with artificial intelligence adopted in all operational processes.

We explore two scenarios: a 'Limited disruption' scenario and a more 'Heavy disruption scenario'. In the Limited disruption scenario, we envisage a steady and smooth transition to higher level and autonomous cars, with limited immediate impact on overall premiums.

Although the dynamics vary by market, our key conclusions in the Limited disruption scenario are as follows:

1) Motor premiums in the short to medium term are quite resilient, but premium growth will still be lower than historical trend. It will take some time for accident preventing technology and the move to shared mobility to work through the vehicle fleet, partly as we also see 'miles driven' continuing to increase and some growth in the car parc, combined with naturally rising motor claims inflation. However, the end state will look very different. Based on our forecasts, we think that the largest decline will be in Japan, with a 72% fall in premiums. We think China premiums will continue to grow, but at much lower rates than trend.

2) A shift from personal motor premiums to commercial. In the US market, for example, we forecast overall premiums to decline by 40% in 2040; however, we think personal premiums can decline by 82% but commercial premiums may rise by 3.7x. In [Exhibit 77 - Exhibit 83](#), we show our forecast of the split of the motor market between personal and commercial lines by 2040. Globally, we think that the impact will be much more profound for the insurers with high exposure to retail motor lines. For 2015, we show the percentage of P&C premiums from retail and commercial lines globally in [Exhibit 70](#).

3) Emerging market premiums will continue to grow. We have modeled China and forecast premiums to rise by 3x from 2015 to 2040 in a Limited disruption scenario. We think that although premiums per mile could fall over time as safer cars come on to the road, the car parc and total miles driven are still growing by enough to more than compensate for this.

4) Premium development is still affected by existing frequency and severity trends that affect natural claims inflation. For example, Japan is deflationary whereas France has higher claims inflation, and this partly explains the difference in the end state of premiums in 2040.

However, it is entirely possible that policy or regulatory change are catalysts for a 'Heavy disruption' scenario, which sees a much faster change in motor premiums. In this scenario, we forecast higher scrappage rates, more investment by shared mobility providers leading to faster adoption of level 5 driverless cars, and higher utilisation of such vehicles leading to a higher growth in miles. We outline possible regulatory and policy catalysts below. In the Heavy disruption scenario we model for faster adoption of technology at all levels, but note that the catalysts may even result in a kink in the demand curve e.g. if all level 0 cars must be taken off the road.

1) Voluntary retro-fitting of safety features into older vehicles, driving even faster penetration of collision-reduction technology and reduction in accident frequency.

2a) Regulatory stimulus. As shown in [Exhibit 72](#), regulators are already taking action that will facilitate the adoption of autonomous vehicles, and we believe that the pace of technological change will spur even more regulatory action.






2b) Policy change. The WHO estimates that car accidents cost ~3% of GDP globally. ~90% of accidents are caused by human error, making autonomous driving a safer transport method. We have estimated that the economic cost of fatalities in the US could be ~\$160-316bn a year (see [Key Trends Impacting the Motor Insurance Market](#)). If these costs could be avoided, the potential savings are sufficient to fund car scrappage schemes, allowing drivers to trade up their car for one with more safety features. Wider externalities also include fewer harmful emissions and improved fuel consumption. Various scrappage schemes in the past ([Exhibit 73](#)) on a similar basis have generally been very successful, and some schemes were extended due to high demand.

3) The early introduction of shared, driverless, electric vehicles (especially in urban areas) further propelling a feedback loop of safer cars and lower pollution, which leads to faster introduction of newer cars. New mobility players have a strong economic incentive to roll out shared, driverless fleets as removing drivers could materially improve their profitability.

There could be a period of supernormal profits before the market settles back to a newer, smaller profit pool. The effect is hard to quantify so we have not included it in our model, but we think that the initial claims slowdown may cause a short-term boost to overall market profitability in the period before prices adjust. This is most likely to happen in markets with regulatory constraints, price opacity, and low levels of competition. We think that the UK is likely to have the fastest adjustment, followed by the US, Australia, and European markets such as France and Germany. Asian countries such as China, with price controls, will adjust the slowest.

Exhibit 72:







Regulators are already taking action that could accelerate the adoption of autonomous vehicles

Region	Regulation
	<ul style="list-style-type: none"> From 2019 all countries in the EU will have to start making legislative changes to allow autonomous cars in their country. CityMobil2 is a project (running from 2012-2016) co-funded by the EU that is testing a platform for automated road transport systems.
	<ul style="list-style-type: none"> The National Highway Traffic Safety Administration (NHTSA) released a range of definitions and interpretations related to autonomous vehicle testing As part of these definitions, the NHTSA decided to treat Google's autonomous self-driving system as a 'driver.'
	<ul style="list-style-type: none"> On 11 2016 July UK government launched consultation so that 1) automated vehicles can be insured for use on the roads and 2) Highway code to be altered to allow ADAS (that can change lanes) In July 2016 London Mayor proposed an emission charge (on top of London's existing congestion charge) for the most polluting cars in central London (to apply from 2017 for cars sold before 2005).
	<ul style="list-style-type: none"> Launched its first Internet of Things network in July 2016, which will allow smart devices to communicate with each other over the network. SK Telecom is providing the service, and is investing up to 100bn KRW (~90m USD) by the end of 2017 for develop the infrastructure.
	<ul style="list-style-type: none"> OECD to launch paper on 'Implementation of the Safe System' urging member governments to act because of huge GDP loss in road crashes. Paper is based on underlying principles that human can make mistakes leading to road crashes, and that it is a shared responsibility between stakeholders (including manufacturers) to take action.

Source: Morgan Stanley Research, BCG analysis

Exhibit 73:

Regulators are already taking action that could accelerate the adoption of autonomous vehicles

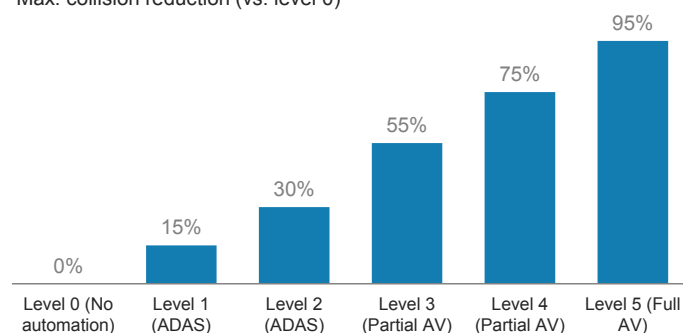
Country	Maximum Subsidy	Time frame	Min. age of car	Emissions Requirement	Take up rate
	\$4500	2009	< 25 years	No, fuel efficiency	NHTSA expected 3000 dealer requests per day, received 22400 on average during first 10 days
	€2500	2009	> 9 years	No	1.2m applications within 2 months, scheme extended to €4-5bn from original €1.5bn cost
	£2000	2009-2010	> 10 years	No	Original £300m government funding forecast to run out before the scheme ended, increased to £400m
	€1000	2009-2011	> 10 years	Yes	New car registrations increased 40% YoY in Dec 2009
	€3500 (higher subsidy for low emission cars)	2009 (there were several before)	> 10 years	Yes	In Dec 2009, new car sales amounted 165400, of which 100600 bought under the scrappage scheme
	CNY 6000	2009-2010	-	Yes	Low uptake; 100000 new vehicles sold through program in first year, government then increased subsidy to CNY 5000-18000

Source: Morgan Stanley Research, BCG analysis

How our model works

Exhibit 74:

We think that level 5 vehicles could reduce collision by 95% vs level 0
Max. collision reduction (vs. level 0)



Source: Morgan Stanley Research, BCG analysis

Our model works off the assumption that any changes in claims are reflected immediately in premiums, i.e. there is no lag and there is no erosion or expansion of margin. We also highlight that our model output is very sensitive to the natural rate (YoY CAGR) of claims frequency and severity, since this is reflected one for one in the premiums growth/decline, as well as other inputs. We have assumed a different frequency and severity trend in each market. All numbers are nominal.

Exhibit 74 shows our collision reduction assumptions for each vehicle level. We also assume a 2% reduction in frequency due to lower fraud claims. For severity, we assume a 3% increase in severity between each level.

Please see **Appendix 1: Global Motor Model Methodology** for a detailed explanation of the model methodology and the inputs used for each country and scenario. Please also see **Appendix 2: Global Motor Model Detailed Output** for a breakdown of the model forecasts for each country in the limited and heavy disruption scenarios.

Key differences between markets

China is the only modeled market where we forecast premiums to grow. In China, we forecast miles per person to grow much faster than other markets, which on a market level offsets the decline in premium per mile. We also forecast slightly slower adoption of higher level technologies.

In the Limited disruption scenario, excluding Japan, commercial lines growth offsets some of the decline in retail premiums. For example, in the US we forecast commercial premiums grow 3.7x which marginally offsets the 82% decline in personal premiums. Similarly, in the UK commercial premiums growth of 44% somewhat offsets the 76% decline expected in personal retail premiums.

France premium growth shows the smallest divergence versus its 10-year growth trend, whereas Japan witnesses the largest divergence from trend. The steep decline in Japan is in part attributable to the faster adoption of advanced vehicles, which are safer and thus attract lower premiums per mile. The second reason for the difference in these markets is the claims inflation assumption, which, based on historical trends, stands at 4.1% for France versus 1.5% for Japan. The higher inflation in France offsets, to a large extent, the decline in premiums from adoption of new technology vehicles.

The US and Japan have the largest decline in premiums per mile (-5% CAGR for both in Limited disruption, and -8% in Heavy), followed by the UK and then Germany.

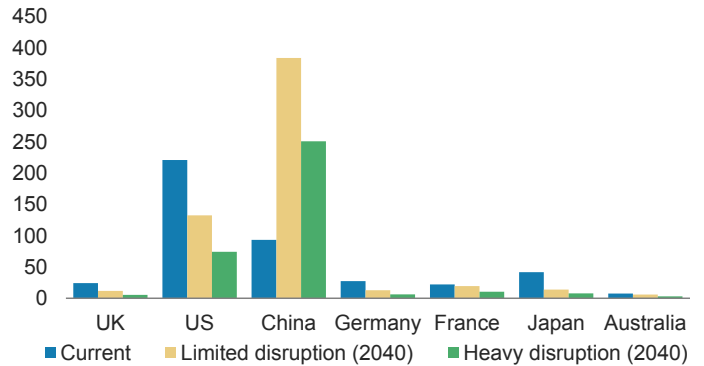
Premium declines in China and France are smaller due to higher natural claims inflation. In the Limited disruption scenario, China and France premium per mile is declining at CAGR of -2% and -1%, respectively. In the Heavy disruption scenario, China and France CAGR is -5% and -4%.

For China we forecast the highest growth in miles with 8.4% and 9.3% CAGR in Limited disruption and Heavy disruption, respectively. This is primarily due to the rapid rise in the car parc (4% CAGR) versus a decline of 1.2% to flat in all the other markets. The US is second with a CAGR of 3.0% and 3.7% in Limited disruption and Heavy disruption, respectively. We forecast miles CAGR of 1% or less for France, Germany and Japan in both scenarios.

Exhibit 75:

Motor premium forecast: we think that China's motor insurance market could surpass the US by 2040

Motor premium development (USD bn)



Source: Morgan Stanley Research estimates, BCG analysis. *Current premiums are FY15 premiums converted to USD using FX rates at 31/12/2015, forecast premiums are converted to USD using FX rates at 26/09/2016

Exhibit 76:

Motor model output summary

Limited Disruption (2015-2040)												Composition of vehicles on the road (2015)					Composition of vehicles on the road (2040)					
Country	Miles growth	CAGR	Premium growth	CAGR	Commercial premium growth	CAGR	Personal owned premium growth	CAGR	Premium per mile growth	CAGR	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Australia	41%	1.4%	-25%	-1.2%	217%	4.7%	-32%	-1.5%	-47%	-2.5%	85%	15%	0%	0%	0%	0%	0%	1%	23%	27%	29%	20%
China	654%	8.4%	322%	5.9%	1165%	10.7%	66%	2.0%	-44%	-2.3%	90%	10%	0%	0%	0%	0%	2%	4%	27%	33%	20%	13%
France	15%	0.6%	-15%	-0.7%	118%	3.2%	-49%	-2.7%	-26%	-1.2%	85%	15%	0%	0%	0%	0%	8%	7%	25%	24%	23%	14%
Germany	18%	0.7%	-55%	-3.2%	4%	0.1%	-79%	-6.1%	-62%	-3.8%	85%	15%	0%	0%	0%	0%	7%	7%	23%	23%	23%	16%
Japan	6%	0.2%	-72%	-5.0%	-56%	-3.2%	-81%	-6.4%	-74%	-5.2%	85%	15%	0%	0%	0%	0%	2%	2%	12%	31%	29%	24%
UK	40%	1.3%	-45%	-2.3%	44%	1.5%	-79%	-6.0%	-60%	-3.6%	85%	15%	0%	0%	0%	0%	5%	5%	21%	25%	26%	18%
US	107%	3.0%	-40%	-2.0%	367%	6.4%	-85%	-7.2%	-71%	-4.8%	85%	15%	0%	0%	0%	0%	1%	1%	14%	33%	28%	23%

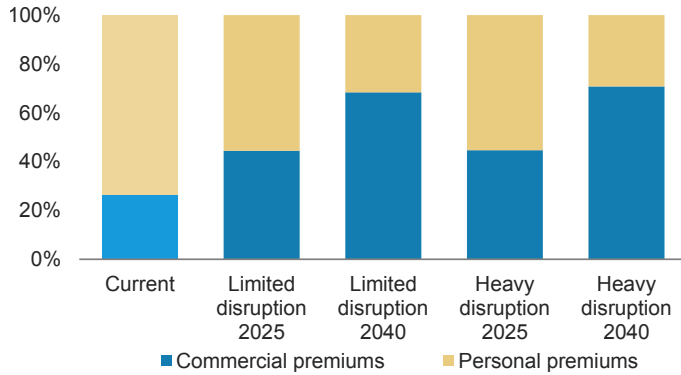
Heavy Disruption (2015-2040)												Composition of vehicles on the road (2015)					Composition of vehicles on the road (2040)					
Country	Miles growth	CAGR	Premium growth	CAGR	Commercial premium growth	CAGR	Personal owned premium growth	CAGR	Premium per mile growth	CAGR	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Australia	56%	1.8%	-62%	-3.8%	311%	5.8%	-78%	-5.9%	-76%	-5.5%	85%	15%	0%	0%	0%	0%	0%	0%	3%	15%	32%	50%
China	820%	9.3%	176%	4.1%	744%	8.9%	4%	0.1%	-70%	-4.7%	90%	10%	0%	0%	0%	0%	0%	0%	10%	29%	29%	32%
France	24%	0.9%	-54%	-3.0%	23%	0.8%	-73%	-5.1%	-63%	-3.9%	85%	15%	0%	0%	0%	0%	1%	0%	6%	25%	32%	36%
Germany	32%	1.1%	-78%	-5.8%	-47%	-2.5%	-90%	-8.8%	-83%	-6.8%	85%	15%	0%	0%	0%	0%	1%	0%	2%	24%	31%	42%
Japan	23%	0.8%	-84%	-7.1%	-73%	-5.2%	-90%	-8.7%	-87%	-7.9%	85%	15%	0%	0%	0%	0%	0%	0%	4%	13%	31%	51%
UK	74%	2.2%	-74%	-5.2%	-30%	-1.4%	-91%	-9.1%	-85%	-7.3%	85%	15%	0%	0%	0%	0%	1%	0%	3%	15%	32%	50%
US	148%	3.7%	-66%	-4.3%	168%	4.0%	-92%	-9.6%	-86%	-7.7%	85%	15%	0%	0%	0%	0%	0%	0%	4%	12%	34%	50%

Source: Morgan Stanley Research estimates , BCG analysis

Exhibit 77:

UK: commercial premiums to be 68% by 2040 in a Limited disruption scenario, 71% in Heavy disruption

UK motor premium split

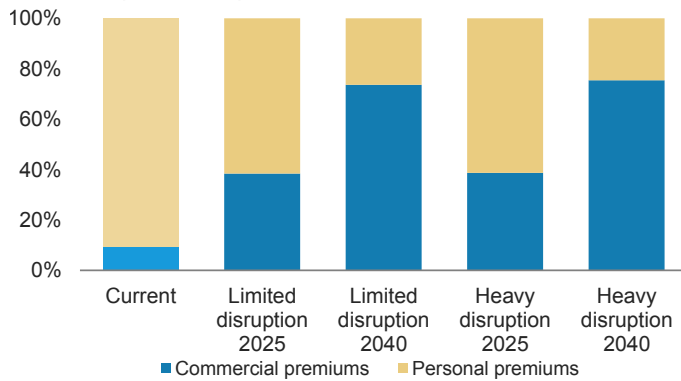


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 78:

US: commercial premiums to be 74% by 2040 in a Limited disruption scenario, 75% in Heavy disruption

US motor premium split

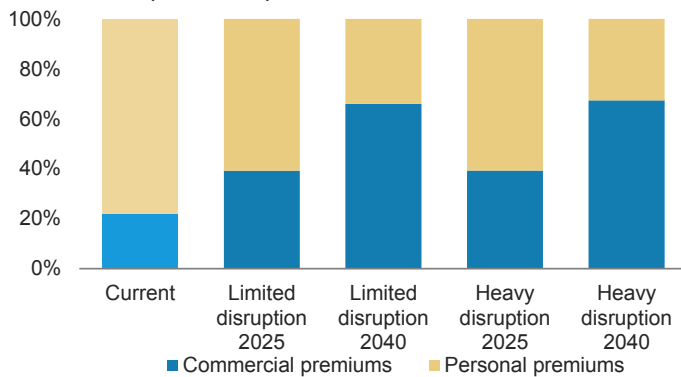


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 79:

China: commercial premiums to be 66% by 2040 in a Limited disruption scenario, 67% in Heavy disruption

China motor premium split

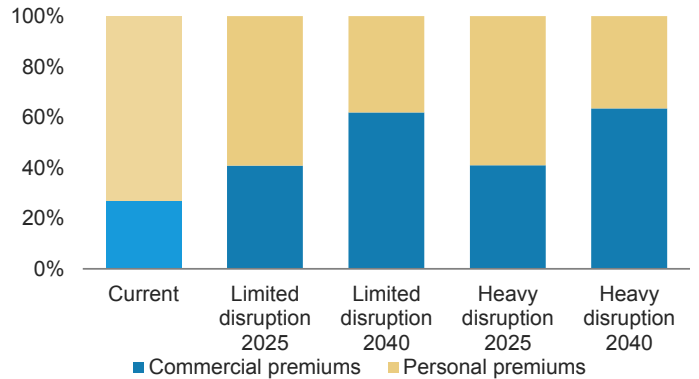


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 80:

Germany: commercial premiums to be 62% by 2040 in a Limited disruption scenario, 64% in Heavy disruption

Germany motor premium split

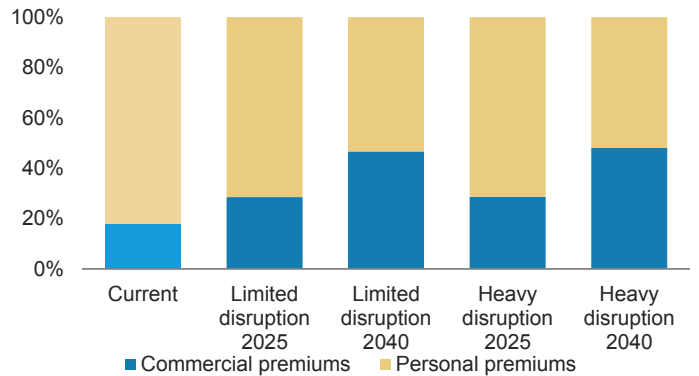


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 81:

France: commercial premiums to be 47% by 2040 in a Limited disruption scenario, 48% in Heavy disruption

France motor premium split

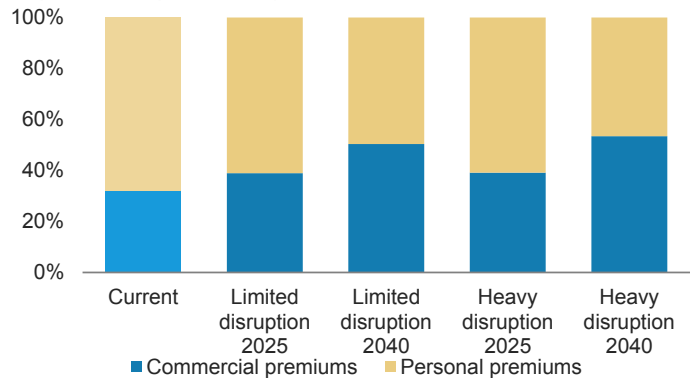


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 82:

Japan: commercial premiums to be 50% by 2040 in a Limited disruption scenario, 53% in Heavy disruption

Japan motor premium split

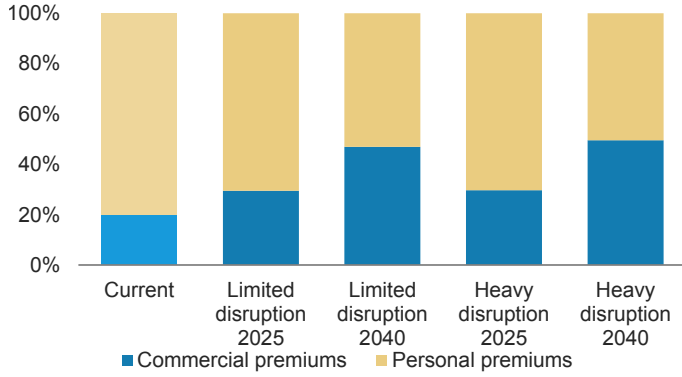


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 83:

Australia: commercial premiums to be 47% by 2040 in a Limited disruption scenario, 50% in Heavy disruption

Australia motor premium split



Source: Morgan Stanley Research estimates, BCG analysis

Deep Dive: Potential Disruptive Competitors

As discussed in the previous section, we think the structural changes that we envisage in the motor insurance market create significant opportunities for disruptors to challenge the incumbents. In this section, we consider the response to date from the traditional players and assess the threats from potential new entrants.

As the value of insurers' proprietary data and traditional expertise diminishes, the traditional motor insurance model is likely to be heavily disrupted. We expect data to become a major point of contention in the years to come - traditional insurers may very well find themselves forced to pay to access driving data unless they can secure it directly through much stronger customer relationships.

The industry is not standing still: we are seeing increasing signs of innovation across the value chain from incumbent motor insurers. However, while many of these initiatives are novel and create points of differentiation (for example, Direct Line's 7 day motor vehicle repair promise in the UK) they do not represent a transformation of the business model in our view.

Organisations with access to data insights and customer relationships are particularly well placed to disrupt the industry. This could include retailers, telematics providers, aftermarket players and other financial institutions.

Among them, we believe that four types of organisations present the most credible disruptive threat and have analysed possible entry models: new mobility players, tech giants, OEMs and telecom companies.

New mobility players could significantly disrupt the insurance value chain. These players could choose to self-insure or use an insurer purely as the capital provider in an insurance partnership. We discuss a hypothetical example using Uber. We have not attempted to model a 'market share' estimate - partly as we think that there is potential overlap with OEMs (given that several OEMs are seeking to establish shared mobility operations). However, we consider the impact on the size of the car parc and global motor insurance revenues in the previous section [Implications for Insurers - Assessing the Value at Risk](#).

We have attempted to size the threat from the three other sectors - arguing that together they could credibly capture ~20% of the global motor insurance market by 2020. This potential market share would not be addressable by traditional insurers without the use of partnerships.

1) Tech giants: We explore a conceptual example for tech giants to use driver smartphone data from a location services or maps app to push tailored insurance offers.

2) OEMs: Car manufacturers could use telematics information to price insurance products and distribute directly to the dashboard of a driver's connected car. We note that OEMs already have large financial services balance sheets.

3) Telecom Companies: Using smartphone data collected via a downloaded usage-based insurance app, combined with other customer insights could allow telcos to make attractive insurance offers. We think this is less likely than the first two disruptors, but outline a possible scenario analysis.

As the value of insurers' proprietary data and traditional expertise diminishes, the traditional motor insurance model is likely to be heavily disrupted. We see a number of non-traditional entrants whose capabilities allow them to extract value from the market. Indeed, a number of the innovations we are already seeing have been driven by other players: for example, OEMs developing tailored products for their drivers, parts manufacturers mapping the roads, and telematics providers delivering value-add propositions to the digital customer.

We expect data to become a major point of contention in the years to come. Traditional insurers may very well find themselves forced to pay to access driving data unless they can secure it directly through much stronger customer relationships. Moreover, sophisti-

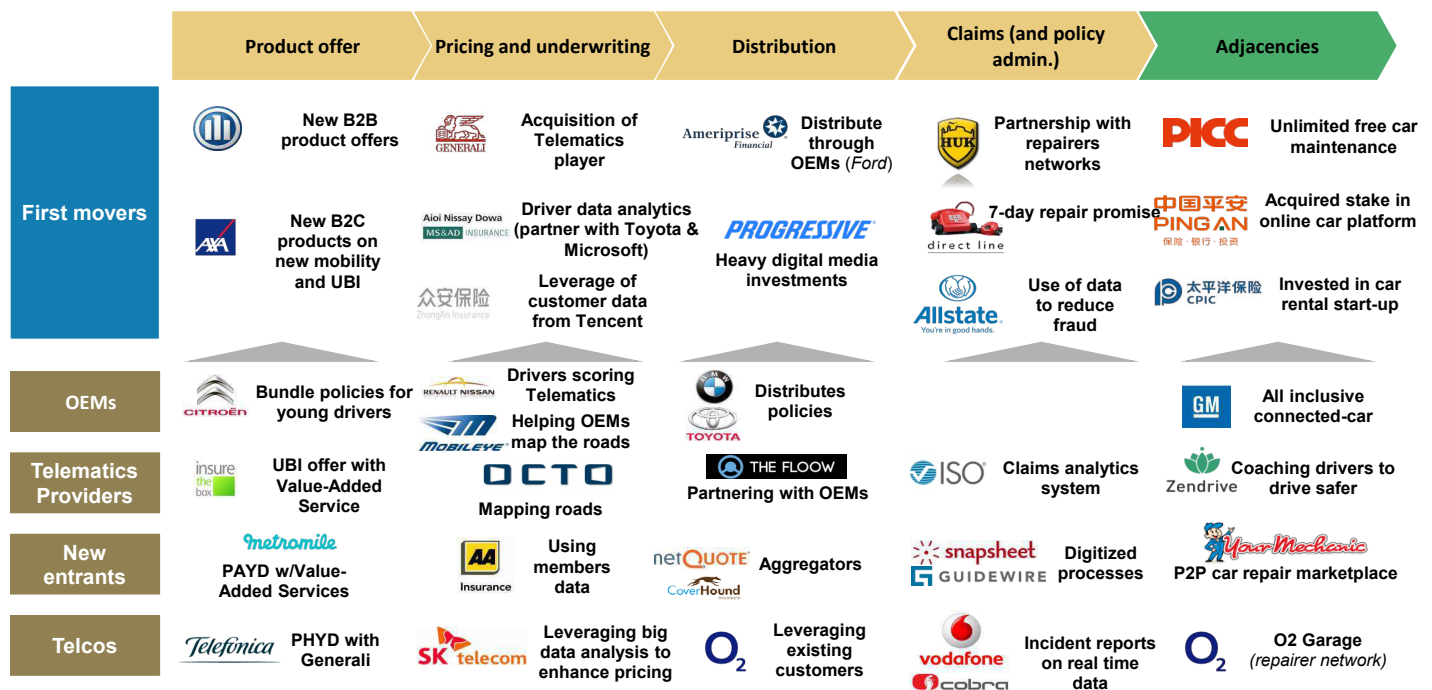
cated counterparties such as shared mobility fleet owners will not only own the data but are likely to perform their own analytics – dramatically reducing the value proposition of an insurer.

First mover incumbents starting to respond

We are beginning to see signs of a strategic response to the disruptive threat to the motor insurance model from the incumbents. Exhibit 84 highlights some novel initiatives across the value chain. We have included first mover incumbents as well as examples from OEMs, telematics providers, new entrants and telcos.

Exhibit 84:

First mover incumbents are starting to respond, but a lot of value is being created elsewhere



Source: Morgan Stanley Research, BCG analysis

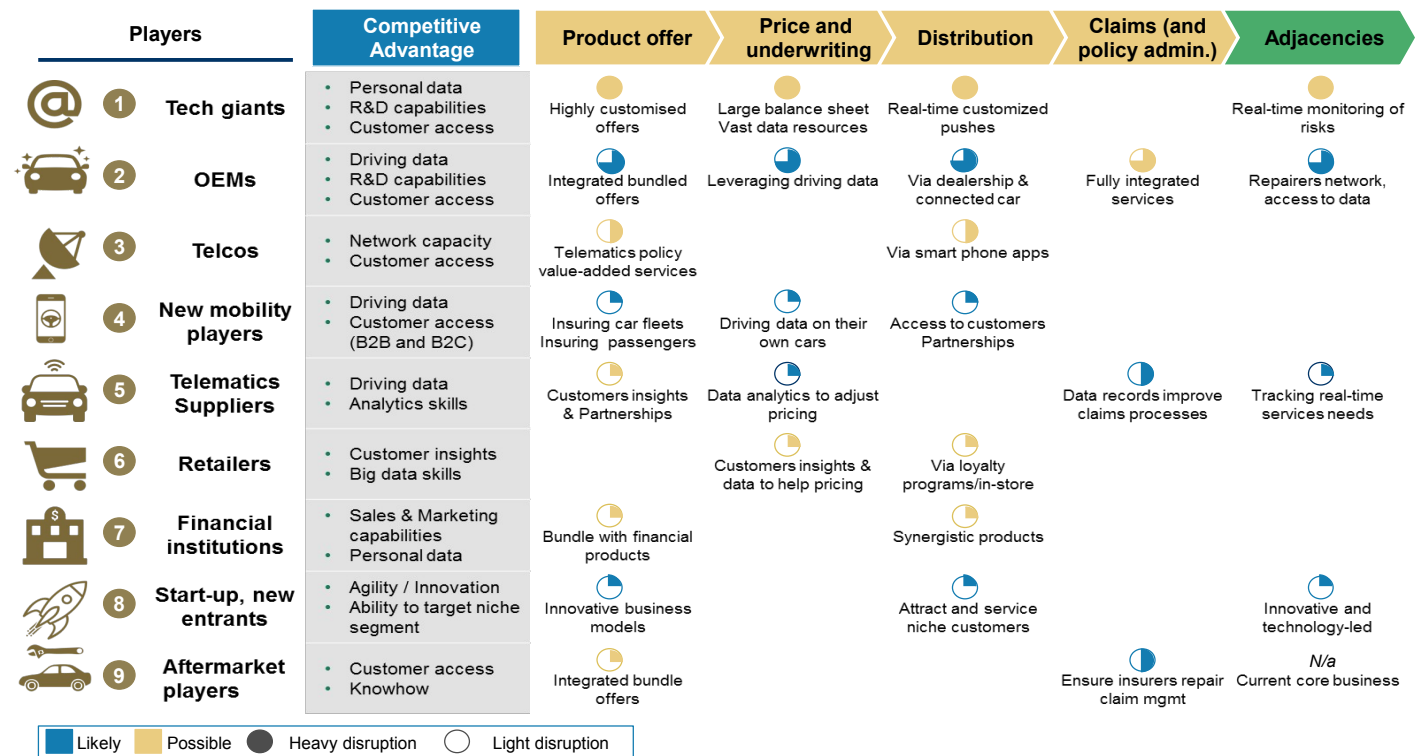
Some innovative examples include: AXA's new mobility proposition - "Ma Mobilite Auto" - which covers all of an individual's mobility needs. **Allianz's** partnership with Octo Telematics in order to insure the first scooter sharing service in Italy. Chinese insurer **Zhong An** is leveraging customer information from Tencent and Alibaba to price products and risk. **Ameriprise** has partnered with Ford to offer a "one-stop shop" to customers enabling them to purchase insurance at the point of sale in dealerships. **Direct Line** in the UK has launched a 7-day car repair promise - seeking to differentiate its product on service rather than price. Although none of these initiatives seek to transform the business model they are signs of a more innovative approach than has historically been the case in the motor insurance market.

Broader disruptive threats

There are various non-traditional players that could credibly seek to disrupt the insurance value chain. Exhibit 85 assesses the risks from various sectors including tech giants, OEMs, telcos, new mobility players, telematics suppliers, retailers, financial institutions, start-ups, and after-market players; we highlight the likelihood and the extent of the disruption we think could be possible.

Exhibit 85:

Disruptive entrants with access to customer data and captive customer relationships pose a threat



Source: Morgan Stanley Research, BCG analysis

Of the various players, we think two common themes are access to customers and data insights. The ability to directly market an insurance offer to an existing customer set gives customer access, and collection and ownership of risk data independent of the insurers gives data insights. For example, driving data can be collected on a fleet of shared mobility vehicles, and customer shopping insight data from a retailer (although there is likely to be less correlation between shopping habits and driving behaviour).

In our view, the first four categories, i.e. tech giants, OEMs, telcos and new mobility players, present the most likely threat to traditional insurers. The other categories appear less likely to be disruptive on a global scale, although they could be very relevant in certain niches and / or markets.





What are the potential disruptive threats?

We believe various new models are foreseeable by 2020, which we estimate could deny insurers access to ~20% of the market.

Losing a degree of access to the market would exacerbate the threat to insurers, which already face the prospect of a shrinking market, as we explained in a previous section. Although not exhaustive, in **Exhibit 86** we consider three potential disruptive business models, which could plausibly account for ~20% of the motor insurance market by 2020.

Exhibit 86:

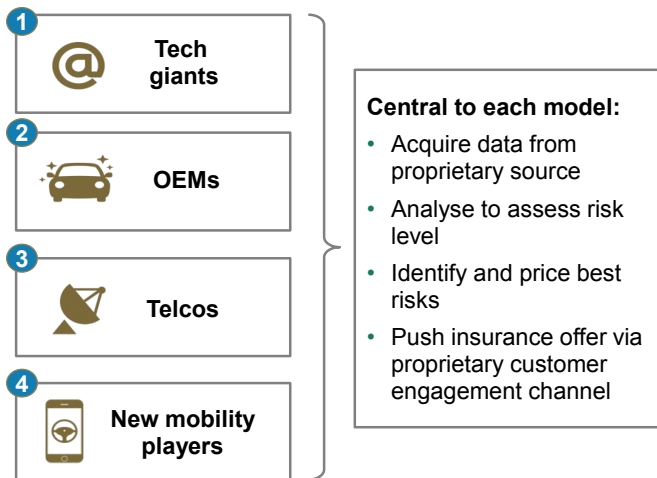
We forecast ~20% of the motor insurance market could be grabbed by the disruptors

Disruptor	Models	2020 Share	Likelihood
 Tech giants	<ol style="list-style-type: none"> <ul style="list-style-type: none"> Tech giants push tailored insurance offers to drivers via their smartphones Pricing and distribution leverages proprietary maps data & customer access 	~9%	<ul style="list-style-type: none"> Main question mark is appetite For example, Google Compare exited the market (likely due to cannibalisation concerns) But size of prize is higher this time
 OEMs	<ol style="list-style-type: none"> <ul style="list-style-type: none"> OEMs push tailored insurance offers to connected car drivers via their dashboards Pricing leverages driving data from connected cars 	~4%	<ul style="list-style-type: none"> Interviews suggest that OEMs are targeting the insurance market and making necessary partnerships Analytics likely provided by partners (e.g. telematics companies)
 Telcos	<ol style="list-style-type: none"> <ul style="list-style-type: none"> Telcos push motor insurance policy through their strong distribution channels 	~7%	<ul style="list-style-type: none"> Telcos could leverage their strong access to drivers (also strong targeting capacities thanks to the personal data they own) But Telcos don't have strong competitive advantage for pricing
<p>Taken by disruptors <u>and their partners</u> (not addressable by other insurers)</p>		~20%	

Source: BCG analysis, Morgan Stanley Research

Exhibit 87:

Each of the new models we envisage disrupting the traditional insurance market involves leveraging superior data to 'cherry-pick' the best risks



Source: BCG analysis, Morgan Stanley Research

While this segment of the market may not be entirely lost to the insurance industry, we are arguing that it would only be available to those insurers which partnered with one of the disruptive entrants. We see the three principal disruptive threats (tech giants, OEMs, telcos), and as we show in [Exhibit 87](#) we think that these three models have certain core characteristics in common. It is also possible to envisage disruptive threats from a broader range of new entrants such as new mobility players, as we discuss in our Uber case study in this chapter.

1) Tech giants: A possible model is for a tech player to push targeted insurance offering to customers via smartphones. The pricing and distribution would leverage data and insights from apps such as Google Maps or Apple Maps.

2) OEMs: car manufacturers could push tailored insurance offers to connected car drivers via the dashboard. Pricing would be informed

by data collected from the car, with analytics possibly sourced from partners.

3) Telecom companies: Telcos could leverage strong access to smartphone customers, along with the customer data they collect - partnering with third parties for pricing and underwriting

We detail these three models in the sections below.

In addition, we believe that the rapid growth in penetration of shared mobility is a significant disruptive threat to the industry as it is likely to catalyse a significant shift in the market from being predominantly B2C (Business to Consumer) to B2B (Business to Business), due to retail premiums shrinking but commercial premiums growing (albeit from a much lower base).

New mobility players

Possibly the biggest disruptive threat to the motor insurance market is the steady shift we expect to see in the market towards shared mobility. A significant risk for the traditional insurers is that they may not have access to this emerging shared mobility model and shared miles market. We believe that there is potential for the shared mobility providers to self-insure or use an insurer purely as the capital provider in an insurance partnership, as we outline in our example with Uber below.

We have not attempted to model a 'market share' estimate as with the other key disruptive players. Partly, we think that there is potential overlap with OEMs, but we also think that another disruptive threat of new mobility players is a shrinkage of the current pool for traditional insurers (particularly mono-line personal motor insurers) even without new mobility players actively looking to enter the insurance space. We have modeled the impact in detail, based on the assumptions that commercial miles increase, personal miles decrease, and eventually the car parc reduces because drivers stop owning second or third cars.

Uber's potential to disrupt the insurance value chain

1) Uber has a vast amount of vehicle travel data (in December 2014 Uber announced that it was doing 1 million trips per day),¹⁷ and we think that it is acquiring the analytics capacity to use the data for risk pricing. For example, we note that Uber is hiring for actuarial analysts, with a function listed as supporting 'Uber's actuarial price and reserve monitoring processes', 'Update, build, and enhance recurring actuarial forecasts and analyses', and 'Select and test actuarial assumptions'. Whilst data analytics is core to Uber and this can be provided by an actuary, as well as being used to analyse insurance partnerships, we believe that the skill set could ultimately be deployed for Uber's own insurance purposes.

Uber currently uses maps data from Google Maps/Waze, but we think it is increasingly evolving into a data company as it is also collecting its own maps data (in the US from 2015, the UK from 2016), reducing reliance on other service providers.

We also think that Uber could potentially provide pre-packaged data for insurers to use in their risk pricing models.

2) Uber has access to customers and distribution. We believe that the Uber brand is stronger than an insurance brand, and Uber also has access to a vast base of customers through its Uber and UberEats services. In this scenario, we envisage that the insurance company could purely become the capital provider as its ability to add value is much lower.


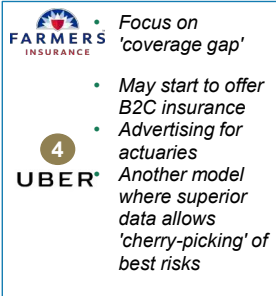
3) Historically, commercial motor fleet insurance has not been a profitable line for insurers. With the asymmetry of data, we think that profitability for insurers will further deteriorate. We think that the fleet of cars could become increasingly commercial in nature given the move to autonomous technology.

4) Uber could self-insure. Uber has announced that it will roll out a fleet of autonomous cars from September 2016 in Pittsburgh USA. We think that this pool of risk may be initially too 'niche' for traditional insurers to write (or too difficult to price), and see the potential for Uber to self-insure the fleet. In this scenario we think that insurers could miss out on collecting valuable data on driving behaviours of the fleet. Over time, the insurer becomes sidelined as Uber collects more and more of its own data as well as growing its own analytic capability. However, one disadvantage we see to this option is the potential for cyber accumulation risk - connected cars are prone to data hacks and one fleet of vehicles being hacked could amass to potentially unlimited losses. In addition, it's possible that given the amount of third-party capital in the market, Uber may choose to insure itself through alternative capital (e.g. collateralised reinsurance).

Traditional insurers may also struggle to take part in insurance of emerging risks from shared mobility models. As outlined in [Exhibit 88](#), we think that there is a B2B opportunity from liability insurance emerging during provision of services, and secondly a B2C opportunity to insure the 'coverage gap' (we discuss the coverage gap in more detail in [Opportunities for insurers](#)).

Exhibit 88:

Traditional players may struggle to take part in either potential model

Model	How it works	Examples
B2B	<ul style="list-style-type: none"> Insurers cover new mobility companies for liability incurred during provision of services 	
B2C	<ul style="list-style-type: none"> Insurers cover new mobility drivers for liability whilst not performing services 	 <ul style="list-style-type: none"> Focus on 'coverage gap' May start to offer B2C insurance Advertising for actuaries Another model where superior data allows 'cherry-picking' of best risks

Source: Morgan Stanley Research, BCG analysis

Disruptive threat #1: Tech giants

When thinking of potential disruptive threats to any industry the tech giants - e.g. Amazon, Apple, Facebook and Google are naturally front of mind. The same is true of insurance, although to date the apparent level of appetite to disrupt the sector has been relatively limited. However, as we discussed in our original [Insurance and Technology Blue Paper](#) these technology players have the benefit of a frequency of interaction and depth of engagement with customers, which highlights how remote many insurers are from customers.

First move is potentially into distribution. The highly regulated nature of the insurance sector and the relatively low returns on capital mean that we believe it is more likely that the tech players will initially attack the lucrative (and capital light) distribution end of the value chain. Indeed, we have seen examples in the past from tech giants, such as Google Compare (now defunct insurance price comparison site) - which was in line with this thinking.

Tech giants remain a credible threat given the depth of customer insight, potentially augmented by data that is highly relevant to pricing motor insurance. As we detail in [Exhibit 89](#), we think it is possible to envisage a credible entry strategy for tech giants that leverages driver data collected by navigation apps such as Google Maps, Waze, or Apple Maps services. This would allow a tech giant to push competitive, tailored insurance offers to its customers.

Exhibit 89:

We believe that Tech giants could have ~9% share of the motor insurance market by 2020 given their customer access and superior data analytics

Model description	
<ul style="list-style-type: none"> • Tech giants assess quality of driving risk via their navigation/maps app • Tech giants pushes tailored insurance offers to 'good risk' drivers via their online maps app 	

Market Sizing		What you need to believe	
% of smartphone users worldwide	70% ~	Tech giants have the appetite to enter the motor insurance market	<ul style="list-style-type: none"> • For example, Google has showed interest in motor insurance with Google Compare • However, it has now exited, due to cannibalisation concerns
% of drivers with smartphone	70% x	Tech giants have access to data that can help it better price motor risk	<ul style="list-style-type: none"> • Access to driving data (for example, Google maps or Apple maps) • Access to other user data
% of drivers using smartphone for navigation assistance	50% x	Tech giants have analytics to use this data to its competitive advantage	<ul style="list-style-type: none"> • Existing capabilities • Large balance sheet for investment
Navigation/maps app	100% x	Tech giants can access customers	<ul style="list-style-type: none"> • We simplistically assume that 100% of the smartphone navigation market is owned by tech giants through their maps app • Tech giants can push notifications direct to apps
Drivers targeted (good risks)	50% x	Customers are willing to buy insurance from tech giants	<ul style="list-style-type: none"> • Survey respondents showed interest in buying from a tech giant
% subscribing	50% =		
Total market share	~9%		

Likely Possible Unlikely

Source: BCG analysis, Morgan Stanley Research

We think it possible that a tech giant could initially partner with an insurer in order to offer the motor insurance product. However, we think that over time the economics of this relationship would be heavily skewed in favour of the tech company, which would own the customer and supply a significant proportion of the data required to price the risk.

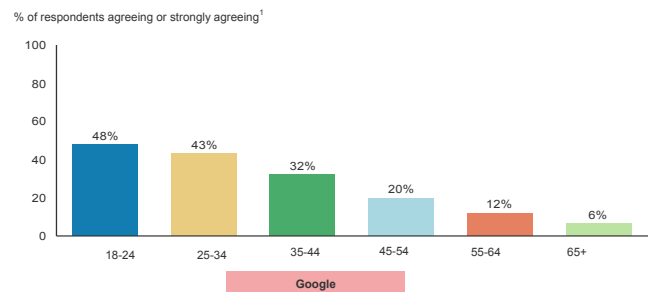
What is the model predicated on?

Through its Google Maps and Waze services Google has the ability to assess the quality of an individual's driving. Using this data, Google could potentially push tailored insurance offers to 'attractive' drivers through smartphones.

What do you need to believe?

Exhibit 90:

Consumer willingness to purchase motor insurance products from nontraditional players: young drivers (43-48% of 18-34 year olds) are the most keen on buying motor insurance products from tech giants such as Google



Source: Morgan Stanley and BCG Insurance Customer Survey 2016, Morgan Stanley Research, BCG Analysis

As we explore in Exhibit 89, we believe that such a strategy would make sense. For example, Google has previously shown interest in the motor insurance market and has access to bespoke driving data and other customer information. We note that insurers have been increasingly experimenting with smartphone solutions but there are significant costs and practical limitations. However, data analytics is a core capability for tech companies, which suggests that they have the ability to extract valuable insights from its data in order to price motor insurance (particularly if it were to partner with an existing insurer in the first instance).

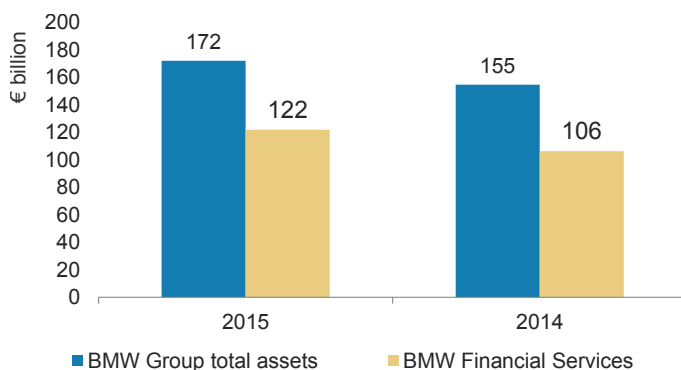
Apple has also made an initial move into financial services. Apple launched its iPhone Upgrade Program in 2015, where it provides financing to consumers to purchase their handsets. Apple has partnered with a retail bank for the program.

A tech company's customer reach would also be a significant competitive advantage. For example, Android users make up ~86% of smartphone users at 2Q16, and second was iOS at ~14%. Assuming that Android and iOS use Google Maps/Waze and Apple maps respectively, in our calculation we have simplistically assumed that 100% of users are using a navigation app from a tech giant. Our global consumer survey also suggests that customers would be comfortable buying from tech giants such as Google - albeit with a higher propensity from younger customers, see [Exhibit 90](#). However, the demographic attracted is likely to be both riskier and more price sensitive than the market as a whole.

One possible pushback is that tech giants may not want to enter a heavily regulated balance sheet business. In 2015 Apple launched its Upgrade Program, but despite having nearly ~\$200bn in net cash, Apple is partnering with a retail bank, and can avoid being treated as a financial institution with regulatory implications.

Exhibit 91:

BMW Financial Services accounts ~70% of the Group assets



Source: Company Data, Morgan Stanley Research, BCG analysis

How big a share of the market would be possible?

As we tentatively calculate in Exhibit 89, we believe that it is possible that tech giants could capture around 9% of the overall market. However, clearly these assumptions are illustrative - in particular the proportion of drivers targeted and the subscription rate.

However, in the future tech giants could time its insurance offer to coincide with a driver's forthcoming motor insurance contract renewal date. Or, if it had data that could anticipate the purchase of a new vehicle, both factors could materially influence the success rate.

In terms of marketing sizing, we think that a "tech giant" could have the most immediate impact on the size of the addressable market for the insurers.

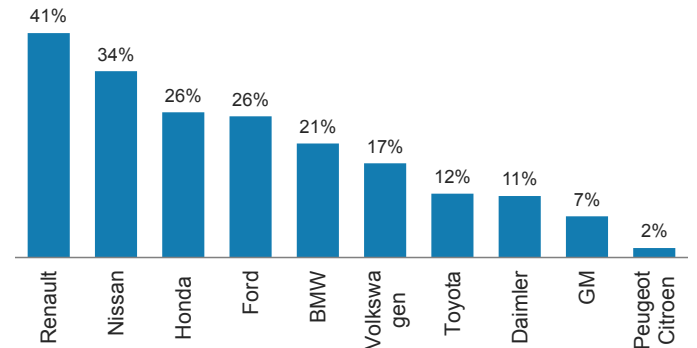
Disruptive threat #2: OEMs

We believe OEMs represent a very credible disruptive threat to the insurance industry. Significant investment has been made into developing connected car offerings and we believe that insurance offers a material opportunity for monetising some of the data collected. Unlike tech giants which we believe are typically reluctant to build up a highly regulated financial services balance sheet, the OEMs through their highly developed proprietary car financing / leasing operations already incorporate very large financial services business units. BMW for example (see [Exhibit 91](#)) has a finance operation that has a significantly larger balance sheet footprint than the manufacturing business. Across the industry, financial services accounts for a significant proportion of earnings (see [Exhibit 92](#)).

Exhibit 92:

Most OEMs are already large financial services companies

FS EBIT as % Group, 2015



Source: Company Data, Morgan Stanley Research, BCG analysis

Initially we think that OEMs will partner with insurers. Due to the different nature of the financial services risk (insurance underwriting versus the vehicle finance risks of credit and residual value), it may take some time before OEMs take over the entire insurance value chain. However, as with any partnering arrangement we believe the long-run economics will become progressively less attractive for the insurer reflecting an increasing level of insurance knowledge transfer and sophistication of the OEMs. Ultimately, the OEM will own the customer relationship, we think.

Different models are possible. A likely model is that the insurance is white-labeled (as is the case with many current OEM insurer offers), which reduces the bargaining power of the insurer.

Importantly, much of the relevant data for pricing risk will be owned by the OEM. With the development of embedded telematics and the connected data, and depending on the data protection environment, the OEM and vehicle driver could be owners of the data

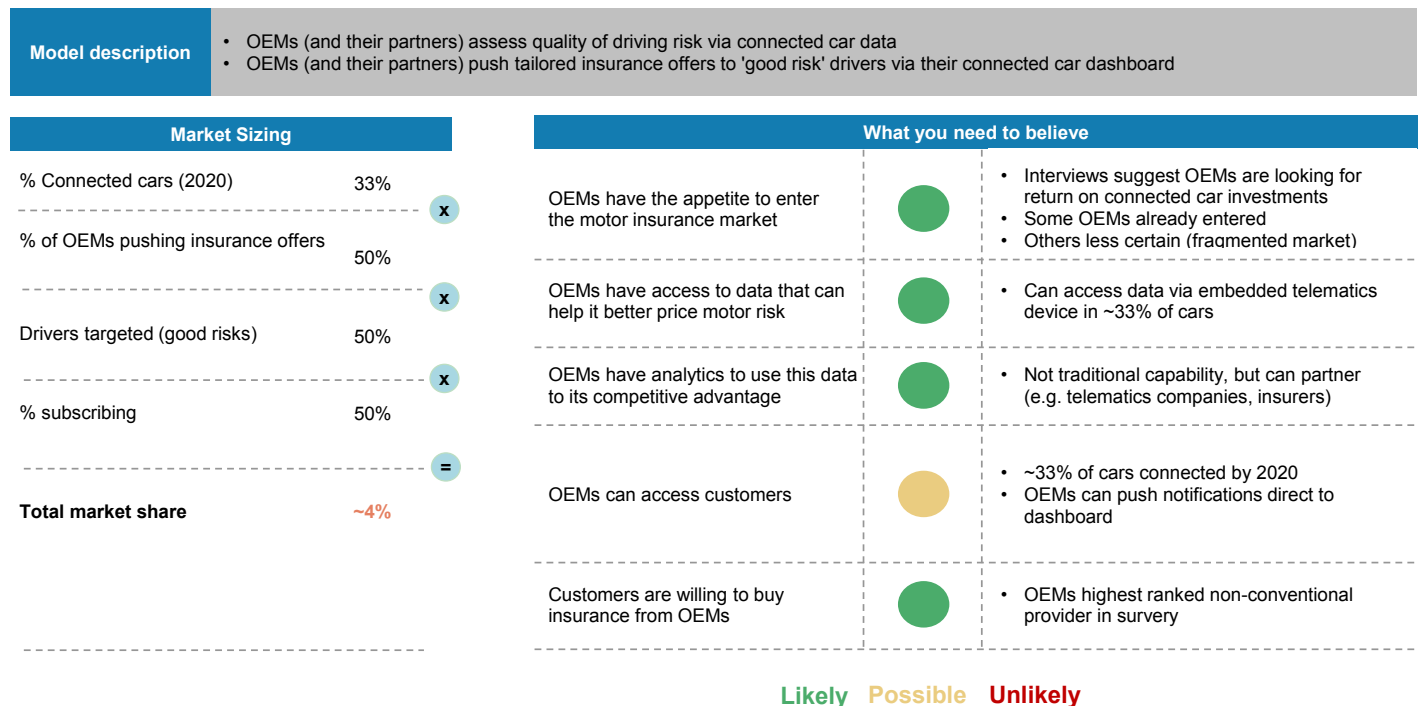
rather than the insurer. **This raises the prospect that the insurers will effectively have to pay to access the data necessary to price risk.** We note that the state of the art in telematics is already at the stage that pricing based only on telematics data is already the equal of a product priced through traditional actuarial techniques.

We believe the data trend will become increasingly important, with the new sources of data disrupting the traditional advantage that insurers have had in pricing risk. Data ownership is also highly relevant when thinking of the impact of scale. For example for B2B shared mobility counterparties such as Uber, which in the future are likely to have highly developed insights into the risk characteristics of its vehicle fleet.

How could the model work?

Exhibit 93:

OEMs and their partners could push tailored policies through connected car dashboard



Source: BCG analysis based on SDB data 2015, Morgan Stanley and BCG Insurance Customer Survey 2016

Exhibit 93 summarises how an OEM-led disruptive model might work. OEMs (and their insurance partners) would assess the quality of driving risk through connected car data and then use this in order to push tailored insurance offers to 'good' risk drivers via the vehicle

dashboard. It is possible to envisage models where there is a pre-selected insurer that takes the risks, a panel-style operation (i.e. a limited pre-selected group) or where the OEM takes the underwriting risk onto its own balance sheet.

OEM Example #1 - PSA Peugeot Citroën and IBM

In 2015, PSA Peugeot Citroën announced a partnership with IBM that they would help various industries within the Internet of Things (IoT) economy to analyse data and deliver new services from connected vehicles.

PSA plans to use the data for new business opportunities in many industries including auto distribution, smart cities, and retail. For example, an IoT ecosystem in smart cities can use the data to warn of roadwork, traffic patterns or congestion from the car.

In the partnership, IBM and PSA plan to share responsibilities to develop, sell and market the connected services to new and existing clients.

PSA has approximately a fleet of 1.8m connected vehicles on the road, which we estimate to be ~12% of its total addressable cars.¹⁸

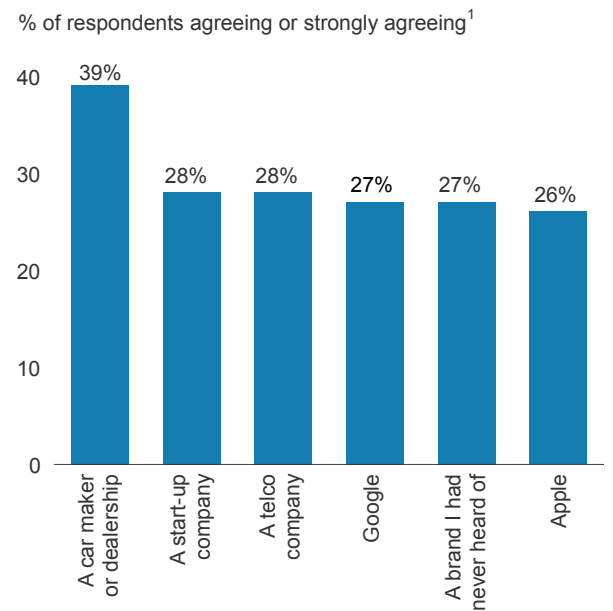
What do you need to believe?

One clearly needs to believe that OEMs have an appetite to enter the motor insurance market. Our interviews with various industry participants suggest that OEMs are actively looking for opportunities to make returns on the significant sums invested in developing connected cars. We also note an increasing number of strategic partnerships that are being established between OEMs and insurers. Over time, we think these will result in the data collected from vehicles being increasingly optimised for use by the insurance industry.

The penetration rate of connected cars is steadily increasing, which will gradually increase the size of the addressable market as the vehicle fleet is steadily replaced. We think that around 33% of cars will be connected by 2020.

Exhibit 94:

I would buy motor insurance from...



Survey question: Please let us know whether you agree or disagree with the following statements. Source: Morgan Stanley and BCG Insurance Customer Survey 2016

A relative weakness in the OEM's capability is in data analytics.

However, while this is not a traditional area of strength, we note it is an area of continued investment by OEMs. Furthermore, there are several specialist telematics providers which are able to provide advanced data analytics on a partnership basis.

OEMs also need to be able to access customers. We believe that the connected car will make this significantly easier. Manufacturers

will be able to push specific insurance offers to customers through the vehicle dashboard.

Consumers appear willing to purchase insurance from OEMs.

Our global consumer survey suggests that, along with car dealerships, car manufacturers are non-traditional players that drivers would be most likely to purchase insurance from (see [Exhibit 94](#)).

OEM Example #2 - GM OnStar

OnStar delivers GM's connected car solutions to customers. The service is initially free, with drivers then moving to a subscription model.

Services are delivered in five categories:

- 1) Emergency:** Automatic crash response, emergency services communication and remote assistance if there is severe weather or natural/man-made disaster. If the vehicle breaks down the OnStar service centre will locate a close by service provider and direct them to the car's location.
- 2) Security:** Stolen vehicle assistance, including remote ignition block. The OnStar mobile app can be linked to a vehicle, allowing the driver to call OnStar if the vehicle's been stolen. It also allows the driver to remotely block the vehicle and slow down the speed of the vehicle (to help authorities recover the car).
- 3) Navigation:** Turn by turn navigation, remote destination downloading. Through the dashboard, drivers can make hands-free calls to the GM OnStar call centre, and request a 'destination download' to their next stop. The operator in the call centre will then download the route to the in-car maps system. This is particularly useful when the driver can not stop the car for any particular reason.
- 4) Connections:** OnStar subscriptions can come bundled with 4G data, remote services and a concierge service. The car also becomes a wi-fi hotspot and can connect with up to seven tablets, laptops and other devices.
- 5) Diagnostics:** Monthly diagnostic reports of the vehicle and information exchange with the dealer in case of required service.

GM OnStar is developing partnerships to improve and extend the service offer. For example, Progressive Insurance offers insurance discounts to GM OnStar customers who sign up to the Snapshot programme and agree to share driving data.

How big an impact on the market could there be?

We think that the potential market impact of OEMs is likely to be below that of the Tech giant model. However, we do think there is a credible path to achieving around 4% of the overall market by 2020. As with the other disruptive models discussed, this share is not necessarily lost to the insurance industry, but would only be accessible through partnering with an OEM.

In our view, there is likely to be a significant advantage for those insurers that are able to partner with OEMs globally. Unless an insurer has a very strong share of a sizeable and attractive market, we believe OEMs' preference will be for a smaller number of partners. We note that the partnership agreement between BMW and Allianz has seen the launch of over 50 joint insurance products in 27 markets.

In calculating the 4% potential market share we have used the same assumptions for the proportion of attractive drivers and subscription rate as for the Tech giant example.

Disruptive threat #3: Telcos

A third potential disruptive threat comes from telco players that have the potential to leverage strong access to drivers and data insights into selling motor insurance. We think that this is the least likely of the three disruptors, given that the telco industry has so far failed to fully monetise the Internet of Things revolution. However, we explore the potential for telcos to be more active in the space.

How could the model work?

Similar to tech giants, the smartphone would be the key tool for the telco to access the customer. In the future, telcos are going to connect many types of new devices to their mobile contracts, mainly for the purposes of air time and data transmission. However, we have seen some telcos develop partnerships with telematics providers to build services (see examples #1 and #2) that can be used for insurance purposes. It is possible that insurance offers are pushed to the customer based on driver behaviour data collected from an app in partnership with the telematics provider (using the location, speed and accelerometer capabilities of the smartphone).

Telco Example #1: Vodafone and Cobra Automotive

Vodafone acquired telematics player Cobra in 2014 in order to build up connected car capabilities and services. It is now branded as Vodafone Automotive.

Vodafone Automotive is part of Vodafone's Machine-to-Machine (M2M) business, which connects devices to the internet. Through Cobra's technology, the black box collects real time driver behaviour for risk pricing, and can also be used for stolen vehicle tracking and location based services. Vodafone Automotive's customers include OEMs such as Audi, Bentley, Lamborghini and Renault, as well as insurance companies.

Cobra telematics is used for young driver insurance and motor home insurance, whereby the policyholder can get an upfront discount on their premiums if they install the telematics device. The insurance policy is underwritten by an insurer and distributed through an intermediary.

Telco Example #2: Verizon Telematics

Verizon has acquired several Internet of Things businesses and has moved into the connected cars space. For example, in August 2016 it acquired Fleetmatics for \$2.4bn, which offers GPS vehicle tracking for fleets (to help save fuel and payroll). Verizon has partnerships with OEMs such as Mercedes-Benz and Volkswagen to offer services such as in-vehicle infotainment, vehicle diagnostics and remote vehicle access. It has also partnered with insurance companies to offer usage based insurance.

What do you need to believe?

As with the other models, one needs to believe that telcos have the appetite to enter the motor insurance market. So far, telcos have failed to move up the value chain in the context of smartphones and 4G (with a few exceptions), and mainly use their strong customer relationships to sell airtime (voice, SMS, data) to their subscribers. Our interviews suggest there is appetite in the distribution space, with some players already distributing insurance policies (for example O₂). While telcos have significant amounts of personal information about drivers, not all of this is relevant to pricing motor insurance risk - the model would therefore be reliant on users downloading a usage-based insurance (UBI) app. This would be a similar approach to that taken by several of the insurers, for example Aviva.

We think that there is currently a significant cost advantage to using smartphones as a data collection tool. There is a high cost of installing a high specification telematics device. However, as telematics becomes increasingly embedded in connected cars this advantage will diminish. The richness of data from a smartphone purely for driving data may be inferior, but it could have more data on lifestyle and buying behaviours not available through an embedded car device.

As with the OEMs, data analytics is not a traditional strength. While the capability is being developed, there are several third-party data analytics vendors. Access to customers is high, with a very high proportion of drivers (~70%) having a smartphone subscription.

How big an impact on the market could there be?

The need to proactively download and use an app is likely to be the major limiting step on the market. However, we believe it is possible that a telco led model could capture around 7% of the market, as shown in [Exhibit 95](#). In calculating these numbers, we have used the assumption that 70% of drivers have a smartphone subscription and of those users, 10% download and subscribe to the telco mobile insurance offer. Our consumer survey showed interest in buying from telcos; however, this was small in comparison to other potential providers and was dependent on the pricing model.

Telco Example #3 - O₂ entering the insurance market

O₂ entered the UK motor insurance market in 2016 with O₂ Drive. The product is backed by a panel of insurers and is available on price comparison websites and through direct channels. The product offers discounts on car servicing and maintenance, as well as discounts for current O₂ members.

An associated mobile app allows drivers to monitor their policy. Users also receive feedback on driving performance via a score and tips on how to improve driving. The customer driving data is not currently used to price the product, although we believe this is a natural extension.

Call to Action and Strategic Plays

Whilst significant pain may not be felt in the short term, we believe that the next few years will be crucial for motor insurers to lay the foundations for success in the long term. Given the extent of expected disruption, each motor insurer should fundamentally reconsider all aspects of its operating model. Incremental change is not an option: insurers must adapt.

In order to deliver the changes that are required change, we see three non-exclusive strategic plays:

1) Digital play: By leveraging technology throughout the value chain, insurers will be able to exchange data and engage with the digital consumer, optimise distribution, and achieve superior cost efficiency. We believe that insurers need to take this step in order to remain competitive; however, the current organizational structure of insurance companies is a major impediment to this model.

2) Partnership play: To keep growing revenues within the motor insurance value chain and defend against potential disruptors, insurers may turn to strategic partners to secure access to data and customers, and launch new offers. OEMs, new mobility players, telematics manufacturers and telcos are the most likely partners, although others will emerge, along with new ecosystems.

3) Adjacency play: Insurers may also look to expand into mobility related adjacencies in order to increase consumer engagement, collect more data, replace lost revenues and fuel future growth. New business lines could include car safety features, car repairs, services related to roadside assistance, new mobility solutions, and products covering new risks such as cyber.

Exiting motor is also an option, which would allow resources to be allocated to other areas, through a sale or by winding down the business. However, motor insurance remains important - in some markets it is purely a loss leader for a broader set of customer relationships. Exiting the market would also mean reduced contribution to shared fixed costs and potential loss of higher margin ancillary business.

An insurer's choice of strategy will depend on size, global reach, and business mix. There is no standardized approach and the path to the future state is unlikely to be linear.

Call to Action

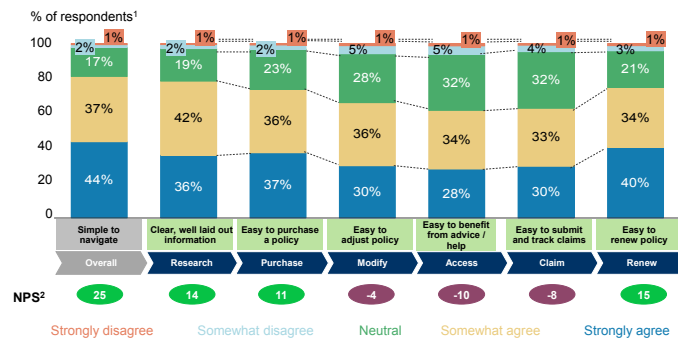
Although certain insurers are anticipating change, we think that the industry as a whole is underestimating the extent and timing of disruption. Many of the trends and impacts identified in this report may be unsurprising when viewed in isolation. We also detect a sense of security around how far into the future disruption will take place.

However, whilst significant pain may not be felt in the short term, the next few years will be crucial for motor insurers to lay the foundations for success in the long term. Strategies, partnerships and investments made now will need to prepare motor insurers for dramatic change further down the road. Furthermore, there are many opportunities for insurers to prepare for this disruption.

We believe that incremental change is not an option: insurers must adapt. Now is the time for each motor insurer to fundamentally reconsider all aspects of its operating model (including product and business mix, underwriting capabilities, distribution channels, cost structure, and acquisition strategy) as well as the potential response of competitors.

Exhibit 96:

Consumers' satisfaction with an motor insurer's online services decreases past the acquisition stage with a negative net promoter score. The view is unchanged from the findings from our 2014 consumer survey



1) Question: Please let us know whether you would agree or disagree with the following descriptions of your motor insurance company's online services? 2. Net Promoter Score = (% of "Strongly Agree") - (% of "Neutral" + "Somewhat disagree" + "Strongly disagree"). Morgan Stanley and BCG Insurance Customer Survey 2016. Source: Morgan Stanley Research, BCG analysis

Strategic Plays

In order to deliver required change, we see three non-exclusive strategic plays: (1) Digital play, (2) Partnership play, (3) Adjacency play.

1) Digital play

By leveraging technology throughout the value chain, insurers will be able to fulfill the expectations of the modern consumer, improve data capture, analytics and risk management capabilities and achieve superior cost efficiency.

We consider three elements of this play in detail: (a) opportunities to improve the consumer digital experience, (b) shift towards digital/direct distribution, and (c) cost efficiency opportunities for a 'digitally-borne insurer'.

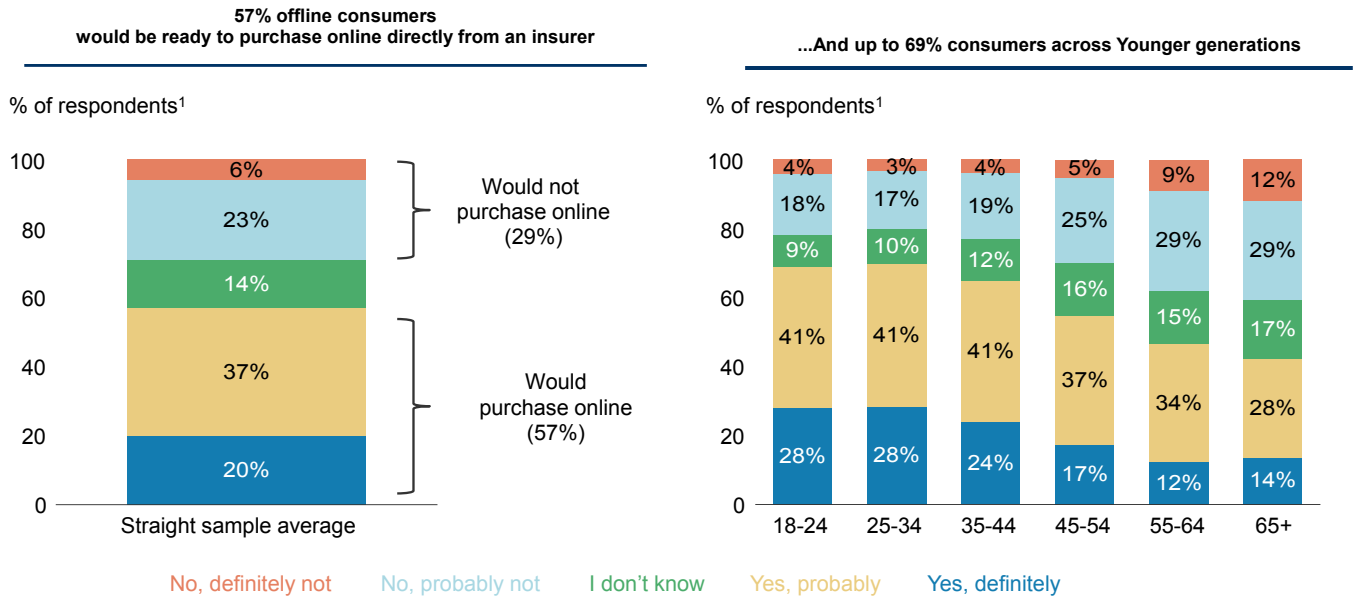
a) Customer Digital Experience

We think that insurance is still an industry that lags others in terms of using technology to improve customer experience. For example, in our consumer survey we found that 46% of consumers do not characterize their online experience with insurers as 'good' or 'excellent'. Satisfaction decreased past the acquisition stage, particularly at the 'modify', 'access' and 'claim' stages. As we show in [Exhibit 96](#), these stages all demonstrated a negative net promoter score.

Insurers can gain by using simpler processes to buy insurance, and more personalised products. Most consumers surveyed would purchase directly from an insurance company with a better digital experience, including offline consumers. As we show in [Exhibit 97](#), 57% of offline consumers would be ready to purchase online directly from an insurer, which increases to 69% for younger (18-34) consumers. Consumers who are already online are also willing to switch current providers, with 53% of respondents saying that they will switch with a better online experience.

Exhibit 97:

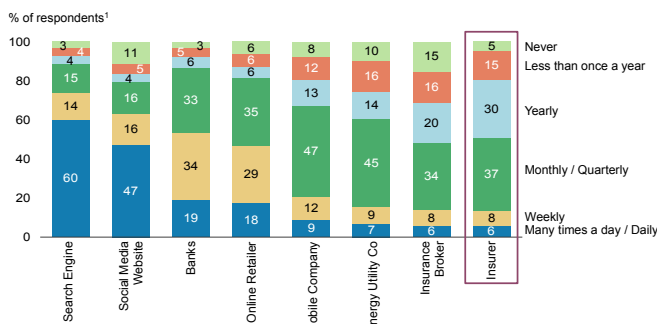
Most consumers using only indirect channels would purchase directly online with improved digital experience



Question: If insurance companies were to improve their online experience, would you consider buying motor insurance directly from an insurance company's website, mobile app or tablet app (i.e. without using a third party agent or broker)? Morgan Stanley and BCG Insurance Customer Survey 2016, Morgan Stanley Research, BCG analysis

Exhibit 98:

Insurers have a low number of interactions per consumer. Almost 50% of consumers interact with their insurer once a year or less



Source: Morgan Stanley and BCG Insurance Customer Survey 2014, BCG e-intensity index, Morgan Stanley Research

Even with improved digital experience, consumers still interact less with their insurer than any other industry (see Exhibit 98). Insurers have a low number of interactions per consumer - although it varies by geography, the number of yearly interactions varies between 1 and 3. However, technology can increase the number of touch points through new offers and services.

A mobile app can attract interest and dramatically improve the level of interaction, whilst also increasing loss prevention. For example, apps that have integrated maps can highlight areas by criminality rate or alert on adverse weather information.

Diagnostic tools integrate with black box functionalities that can provide driving diagnostics. Accident support can provide the geo-location of the accident and upload pictures of the damage for an insurance claim. We think it's possible that the apps are not stand-alone but could integrate with popular mobile apps and platform already in the market, such as Google Maps, Waze, etc.

Insurers are also beginning to use apps for 'gamification' of driving and insurance - for example, Maif in France has launched "Maif & Go", where players - need to install an app and a telematics box in the vehicle, and can gain points vs other users for safe driving behaviour. In Indonesia, AXA has launched "The Crazy Crash" game with the aim of educating the population on insurance products, where there is low insurance penetration. Within the first month the game had 30k unique users, over 55k plays and 335k page views on the AXA website according to the Digital Training Academy.

Metromile: US based digital insurer that provides insurance by the mile

Metromile offers pay-as-you-drive insurance. Consumers pay a monthly base rate and then a rate per mile for every mile driven. Metromile uses an On-Board Diagnostic (OBD) device, which plugs into the diagnostic port in the car. It connects to the Metromile driving app to measure mileage data. In addition, the app allows customers to see the location of their car when parked, and in certain cities alerts drivers to street sweeping to prevent fines. When there is an error, the app alerts the driver, specifies the problem, and drivers can then contact a Metromile mechanic within the app.

Metromile has partnered with Uber to provide insurance for the 'coverage gap' grey area - when a driver has the app switched on, is seeking a passenger, but not yet matched with one. During that time, they can be insured with Metromile on a per-mile basis, and the Uber commercial coverage will take over when a ride is matched.

b) Direct/Digital Distribution

Direct channels of insurance distribution comprises ~30% share in developed markets for P&C insurance, and an even higher share for motor as a result of commoditisation. However, there are regional differences. E.g. in the UK, aggregators dominate the markets, selling the majority (>60%) of policies, but in the US, German and French markets, distribution is principally through tied agents, though direct players and aggregators are gaining share.

We think that the shift to 'direct' will be accelerated by recent and potential disruptions. These include 1) expansion of aggregators/price comparison websites such as moneysupermarket.com, and gocompare.com, 2) FinTechs and new business models including Metromile in the US, Bought By Many in the UK, and Friendsurance in Germany, 3) entry from adjacent players such as OEMS (General Motors OnStar, Ford Insure). We discuss each in turn:

1) Price comparison websites. In the UK, ~80% of new motor insurance sales are transacted via the internet, and ~65-75% of new motor insurance sales are transacted via aggregators, although brokers also use aggregators. In Germany, various 'digital broker' apps have recently entered the market. GetSafe is one example - it is an online digital insurance broker that consumers can use to manage their personal insurance through the GetSafe app. A user can appoint GetSafe as their authorised broker, and specify which providers they use. GetSafe will obtain information from the provider and creates an overview of all contracts and rates on the app, and can identify any over-

lap or savings potential. Service features include one-click damage claiming, and access to independent agents for advice. It's currently available in Germany only but is exploring new markets such as the UK and US.

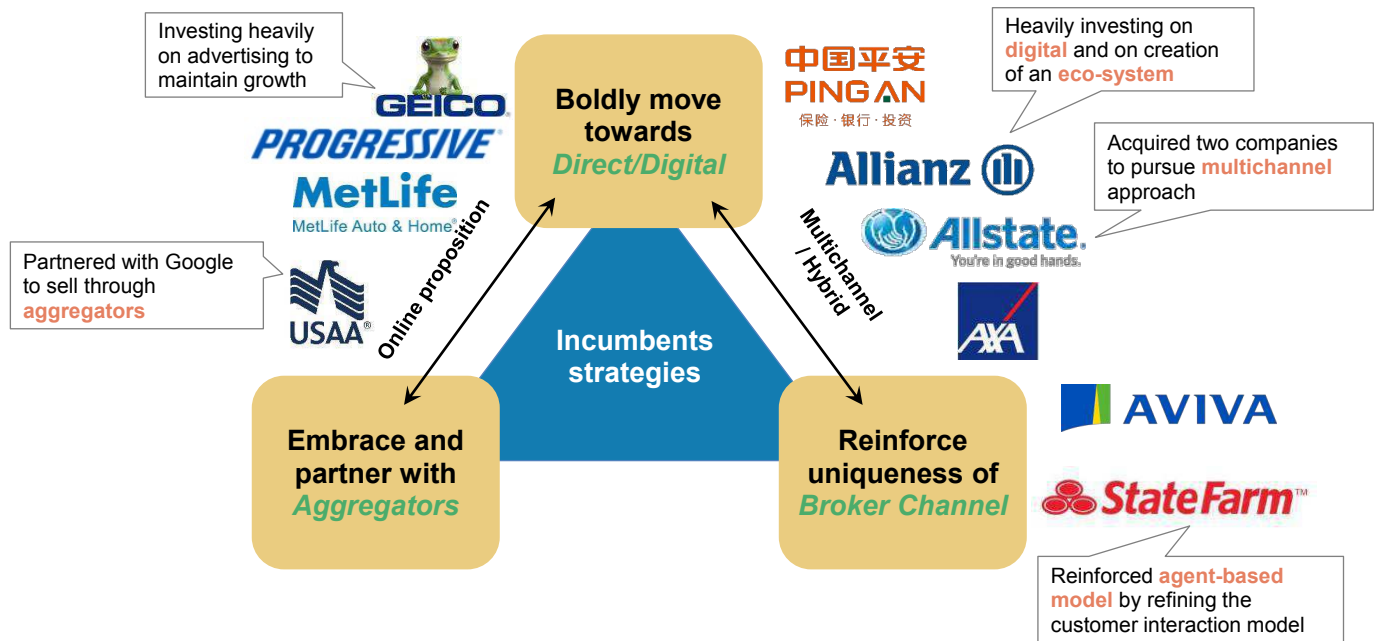
2) FinTechs and new business models are disrupting traditional insurance and side-lining traditional insurance distribution. As an example, Bought By Many is a start-up that allows users to group together to buy specialty insurance, achieving savings through group purchasing power (see [The Emerging Role of Ecosystems in Insurance](#) for a detailed case study on Bought By Many). Friendsurance is a German start up that offers customers a combination of insurer peer-to-peer cover for home, personal liability and legal expenses.

3) Adjacent players expanding into insurance. We discuss potential disruptive threats in more detail in [Deep Dive: Potential Disruptive Competitors](#), but would like to highlight the potential for OEMS, tech giants, and (to a lesser extent) telcos to distribute insurance. General Motor's Onstar partnered with Progressive to offer insurance discounts based on driving behaviour. Rakuten – the Japanese online marketplace – has moved into insurance (acquiring an underwriter) and is using its broad set of consumer interactions as a platform to identify sales leads and as an extensive source of data.

In the distribution space, we think insurers have adopted three strategies to respond to the growth in digital. As we show in [Exhibit 99](#), insurers have taken a straight move towards direct/digital, partnered with aggregators, or reinforced the uniqueness of the broker channel.

Exhibit 99:

Insurers are responding in different ways to the growth of direct, most focusing on digital



Source: Company reports, BCG analysis, Morgan Stanley Research

Drawing examples from South Korea, what impact have online sales had on profitability?

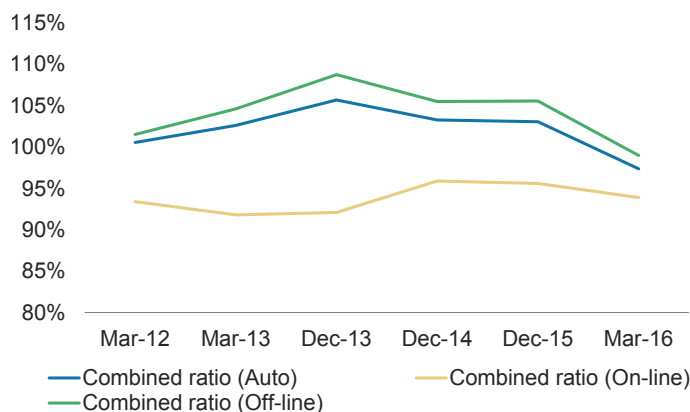
Samsung Fire & Marine began to sell auto insurance online from 2009, based on a pricing algorithm. Now, it comprises around 30% of group auto insurance premiums, with a ~30% market share. The online channel has grown rapidly due to its price competitiveness (as there are no commissions), where prices are ~15% lower than the offline channel. In the case of minor accidents, drivers/policyholders can take pictures and send them to the claims adjustment team by mobile. The drivers are also sent locations of repair shops to fix the damage.

Given the economies of scale of policies and cost reduction in claims adjustment, expense ratios for auto insurance has been declining. This allows the insurer to continuously offer lower prices than the competition. We show the combined ratios for Samsung Fire & Marine's auto business in **Exhibit 100 - Exhibit 101**. The combined ratio of online channels have been ~5-17ppt lower than the offline channel between 2012-2016. Within the combined ratio, the loss ratio is in fact higher in the on-line channel (86% vs 76% in March 16), but the expense ratio is significantly lower (8% vs 23%).

We think that Samsung F&M has established a strong market position in online auto insurance and we believe that it has pricing competitiveness to gain increased share.

Exhibit 100:

Samsung F&M's combined ratio for online-distribution for auto insurance is significantly lower than that for the offline channel



Source: Company Data, Morgan Stanley Research, BCG analysis

c) 'Digitally born insurer'

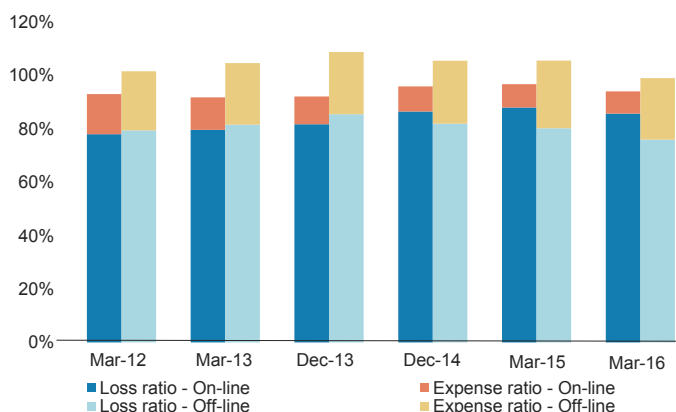
In our 2014 report, we explored the opportunity for a pure play 'digitally born motor insurer', and estimated that it could achieve a combined ratio approximately 17-21ppts below traditional peers. Our exercise took a baseline pure-play European motor insurer and transformed the business model through the adoption of 10 initiatives across the value chain.

Please refer to the report ([Insurance and Technology: Evolution and Revolution in a Digital World](#)) for a detailed explanation of each impact as outlined in [Exhibit 102](#).

Since we published this report, it is questionable how many traditional insurers have launched a 'digitally-born' operation. We believe that this is an even more necessary step for motor insurers to

Exhibit 101:

However, the loss ratio is actually higher in the online channel, but the expense ratio at March '16 was significantly lower



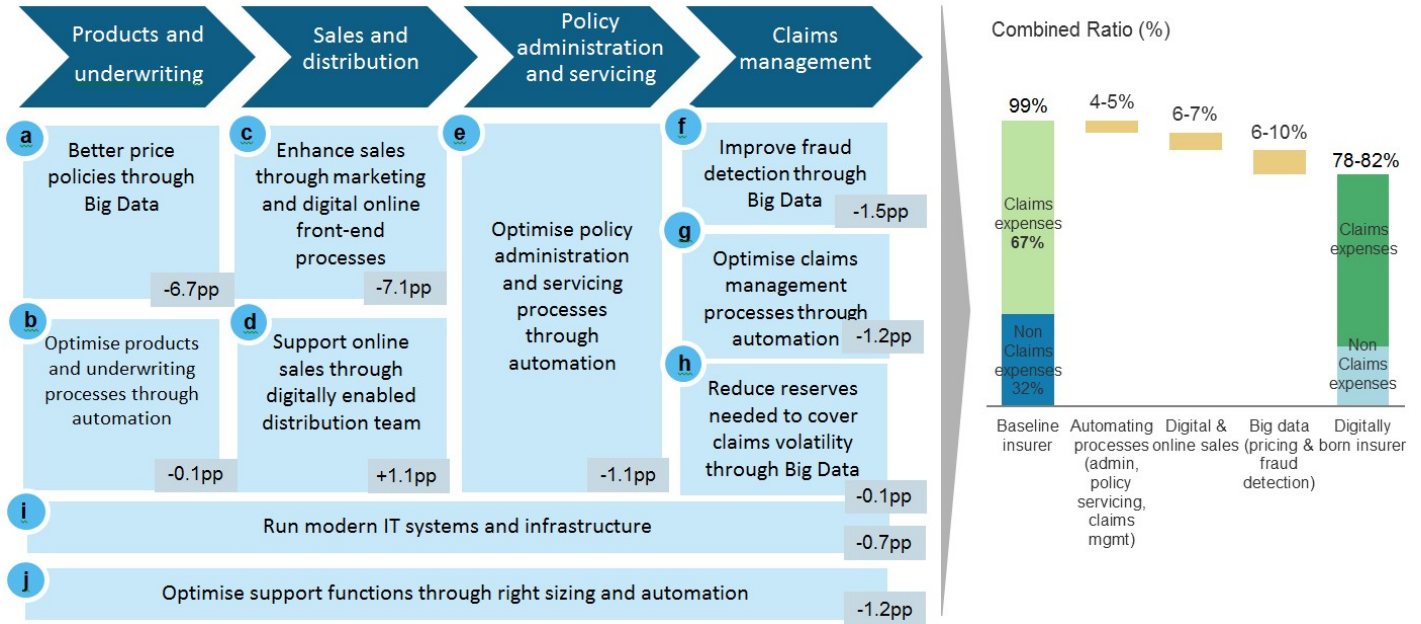
Source: Company Data, Morgan Stanley Research, BCG analysis

remain competitive. As well as the opportunity to deliver superior cost efficiency, a digital transformation will enable next generation customer engagement and distribution as described in (a) and (b) previously.

We see the current organizational structure of insurance companies – with separate underwriting, servicing and claims functions – as a major impediment to a customer-centric model. Engaging with connected customers requires insurers to collect data from multiple sources and use it in a more integrated way across the entire organization. We see a rising need for one function that collects and shares data with customers, regardless of how that data is used internally. It is not, however, an easy change, requiring the breakdown of existing organizational silos.

Exhibit 102:

We believe that there are 10 drivers that can reduce the combined ratio by 17-21ppts.

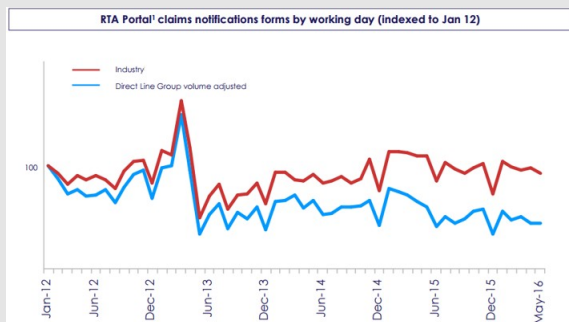


Note: Our assumptions are based on a baseline motor insurer: \$1bn average European motor monoline with pure agent model, excluding asset management results. All benefits considered at end-state; no initial investments included. All technology benefits are translated into cost benefits, assuming constant total premiums. Estimated benefits based on market data for European insurers, interviews with technology and insurance companies, BCG benchmarking databases, and BCG case experience. Numbers may not add due to rounding Source: Annual reports for European insurers, interviews, BCG Insurance Benchmarks Database, BCG case experience; BCG analysis, Morgan Stanley Research

Case Study: Direct Line

Direct Line is attempting to de-commoditise its traditional insurance product by offering add-on or enhanced services. It offers a car repair service promising to fix vehicle damage within 7 days, or it will continue to pay the insured £10 a day (up to £70) until the vehicle is fixed. On top, Direct Line will also include replacement child car seats in the event of an accident, even if there is no apparent damage.

We think that Direct Line has also successfully used technology and data for risk selection purposes and claims management. Its claims frequency has been consistently lower than peers (see exhibit below) with a diverging trend over time.



Source: Direct Line 1H16 analyst presentation

2) Partnership play

To keep growing revenues within the motor insurance value chain and defend against potential disruptors, insurers may turn to strategic partners. Leveraging a partnership play can deliver insurers many opportunities. We focus on: (a) B2B new offers in the new mobility space, (b) access to new data, (c) new ecosystems, and (d) refined telematics propositions.

a) New offers

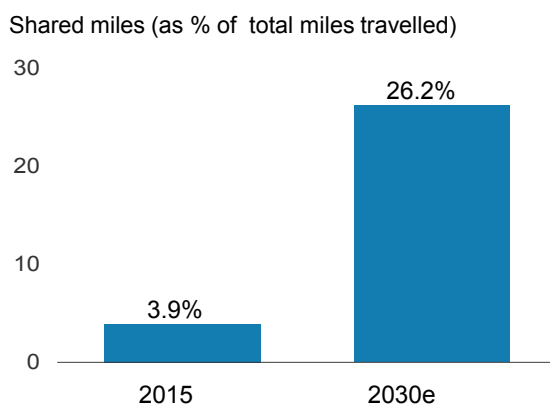
We discuss three opportunities for insurers that may compensate for the shrinkage in the risk pool: 1) a bigger share of commercial insurance and the coverage gap for ride shares, 2) increase in product liability, and 3) cyber insurance.

1) Commercial insurance and the coverage gap

As discussed in [Implications for Insurers - Assessing the Value at Risk](#), we believe that new shared mobility will shift the motor insurance market from personal lines to commercial lines, with a high proportion of 'shared miles' driven. From a total of the 7 countries that we model, we forecast commercial lines to increase from ~17% of the market in 2015 to ~68% by 2040 ([Exhibit 104](#)). Morgan Stanley auto analysts expect that shared miles (taxis + ride sharing firms, excluding car rental) could grow from 4% of total miles traveled in 2015 to 26% by 2030 ([Exhibit 103](#)).

Exhibit 103:

We expect shared miles to grow from 4% of total miles traveled in 2015 to 26% by 2030.



Source: Morgan Stanley Research estimates, please see [Morgan Stanley Blue Paper: Global investment implications for Auto 2.0](#)

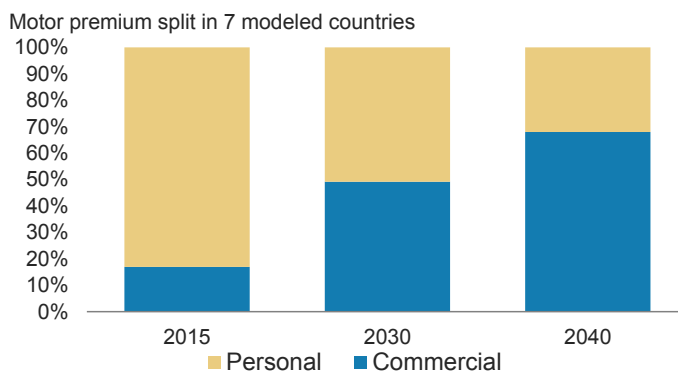
Emergence of new mobility creates an opportunity for innovative new offers and partnerships. For example, B2B partnerships can be formed with ride sharing and car sharing operators. For example, insurers can provide insurance during the 'coverage gap' for ride-sharing drivers when the app is on but no trip has been accepted on a B2B basis, or even directly on a B2C basis.

Uber and Intact Financial in Canada have a partnership to insure the drivers, starting in July 2016 and covering all rides in Ontario.

The coverage will include the standard third-party liability, property damage, uninsured automobile coverage, and contingent collisions. More importantly, the policy addresses the 'coverage gap' issue - it provides \$1 million of third-party liability and uninsured automobile coverage, along with the coverages previously discussed, during the period when the ride-sharing Uber is available in the app but has not yet accepted a trip.

Exhibit 104:

In our global motor model, we think commercial premiums could be 68% of total premiums by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Limited near-term market opportunity for insurers from ride-sharing

There are four phases of auto insurance risk for ride-sharing drivers: (0) driving for personal use, (1) driving around looking for jobs after turning on the ride-sharing apps, (2) driving to pick up a passenger after accepting an assignment, and (3) driving a passenger to a destination. Phase 0 is typically covered under the driver's personal auto insurance. The next three phases are periods associated with ride-sharing activities: Period 1 - available but before accepting an assignment, Period 2 - en route to pick up rider after accepting a trip, and Period 3 - on trip after picking up passenger. While Periods 2 and 3 are typically covered under a commercial auto policy (usually provided by ride-sharing company to the drivers), Period 1 is a grey area between personal and commercial coverage.

We could see a market to provide insurance for Period 1, but the opportunity is small in our view. In January 2015, Farmers Insurance in the US announced a new ride-sharing endorsement in Colorado, specifically covering Period 1 for ~25% increase in premiums. USAA also offers similar policies in the state for additional premiums of \$72 to \$96 per year. Based on the US, if we assume that 100-200k of ride sharing drivers purchase ~20% additional coverage (on ~\$1,000 base annual premiums), this results in a \$20-40m in annual premiums for personal motor insurance, but it is immaterial for the ~\$200bn US auto insurance industry. Please see the Exhibit below.

A small opportunity for the E&S market too. Current commercial coverage for Periods 2 and 3 for major ride sharing companies are provided by Excess & Surplus (E&S) underwriters. Assuming ~\$3,000 annual premiums (about half of a typical full commercial auto coverage), 100-200k ride share drivers could imply \$300-600m annual revenues, ~1% of ~\$40bn E&S market.

More opportunity in commercial auto? As ride-sharing companies' coverage transitions from E&S to normal commercial auto coverage in future (for example, the Progressive partnership with Uber in Texas), there could be an opportunity for incremental \$600m-1,200m in revenues, or 2-4% of overall commercial auto insurance premiums in the US.

	Personal Auto	E&S Underwriters	Commercial Auto
	Period 1	Period 2 & 3	Period 2 & 3
# of Drivers	100k - 200k	100k - 200k	100k - 200k
Additional annual premiums (MSe)	\$200	\$3,000	\$6,000
Addnl Premium Opportunity	\$20m - \$40m	\$300m - \$600m	\$600m - \$1200m
Industry Premiums	~\$200b	~\$40b	~\$29b
% Industry Premiums	~0.02%	~1%	~2-4%



Source: screenshot from Lyft website, Morgan Stanley Research estimates (e)

In Italy, Allianz and Octo Telematics have partnered with Eni-Enjoy (ENI Spa) to insure new shared scooter fleets in various cities.

In the case of an accident, video cameras on the front and back of the scooter record the ten seconds prior to and following the event to improve transparency and reduce fraud, and speed up claims settlement.

BlaBlaCar in France is partnering with AXA, which provides additional insurance on top of the mandatory motor insurance for

the driver. This includes: insured arrival at destination and reimbursed deductible in case of an incident when a passenger drives.

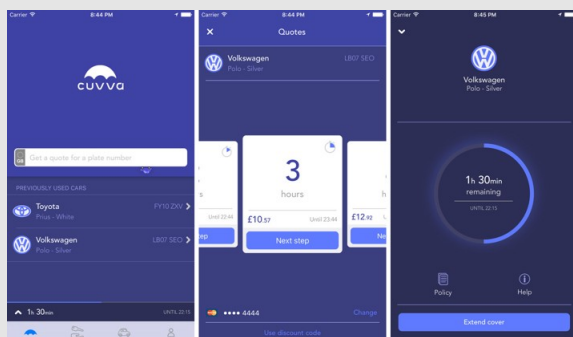
We think that shared mobility providers (and OEMs) themselves may look to price and distribute insurance for their drivers' vehicles over time. Whilst for now Uber has a partnership with Intact Financial, we could envisage a scenario where Uber underwrites its own insurance policies.

Cuvva: an insurance disruptor providing hourly on-demand motor insurance

Short-term car insurance is not new, with policies ranging from 1 to 28 days. However, Cuvva (a UK based start-up) has launched an app that offers *hourly* insurance. There are three steps required to obtain coverage on the app: 1) enter car registration plate number and approximate value, 2) choose time coverage that is required, and 3) take a picture of the car and submit. Policies are fully comprehensive, and start from £7 an hour, with lower hourly prices for longer journeys.

By using Cuvva, the user has to give permission for the app to query the DVLA (Driver and Vehicle Licensing Agency, the UK driving licence issuer) database to check drivers' details and flag any potential issues, as well as upload a photo of their driving licence.

Below we show some snapshots from the app. Although prices per hour are more expensive than buying a yearly policy, it enables users to lend cars to friends and family. We think that ease of use is key - access to DVLA data means that users can obtain insurance almost immediately.



Source: screenshots from Cuvva app on iTunes store

2) Increase in product liability

There is an ongoing debate about 'who is liable?' with regards to autonomous cars. In many cases it seems likely that liability will shift to manufacturers in the form of product liability. When the autonomous feature is switched on, it's clearly arguable that any accidents are no longer caused by the driver, but rather the technology inside the car.

To what extent is complex and remains unclear, but OEMs are likely to take on additional liability. For example, Volvo Cars' CEO has said that "Volvo will accept full liability whenever one of our cars is in autonomous mode"¹⁹. Initially, we would envisage a scenario where there is both a traditional insurance policy covering risks when the car is in manual mode (as well as other loss such as theft), and a policy covering liability to the manufacturer when the car is in autopilot/autonomous mode. However, given the niche nature of these risks in the current market, we think that manufacturers may choose to self insure, pushing out the need for a traditional insurance company - but presenting an opportunity to others to partner with OEMs.

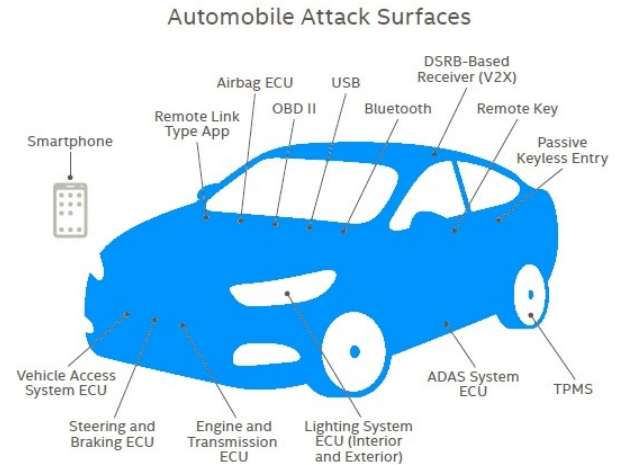
For autonomous vehicles, we are seeing the first insurers developing new offers that address the issue of product liability. For example, UK motor insurer Adrian Flux launched driverless car insurance policies in June 2016, aimed at drivers who may have autonomous features in their existing car or may be thinking of buying a new car with driverless/autopilot features such as the Tesla range. The policy covers specific technology risks associated with autonomous car technology, such as loss or damage from: cyber hacks, risks caused by software not updating within 24 hours of release, satellite/navigation failure, failing *when able* to use the manual override to avoid a collision or accident in the event of software or mechanical failure, other manufacturers software or authorised in-car software failures. These risks covered are in addition to the standard car insurance that is provided.

However, if risk accumulates too much around one-off system events, some risks may be uninsurable in the future. For example, if there was a system fail that caused all cars to simultaneously crash, the losses are unimaginable. Therefore we think it is important that the insurer/underwriter sets up limits on its policies, but also accurately models the risk and considers which risks may be accumulated together.

3) Cyber insurance

Exhibit 105:

Cyber attack surfaces for an connected car could range from the remote key to the engine and transmission system



Source: McAfee Labs Report 2016 Threats Predictions

Connected cars pose various cyber threats that can be insured.

The risks may include criminal activity or usage of the car as a weapon, hacking and theft of the vehicle, ransomware (hackers take control of the car and return control upon payment of a ransom fee), or breaches of data privacy/information theft. **Exhibit 105** shows some of the attack surfaces possible for a connected car.

There are already examples of car hacking, currently being tested in a controlled environment.

In 2015, Fiat Chrysler recalled 1.4m cars after software engineers demonstrated that it was possible to hack into a connected car (Jeep Cherokee) through the car's native 3G phone connection. The engineers took control of the infotainment functions and critical operations including braking and power.

Cyber insurance policies typically cover: data and systems recovery, costs incurred relating to a data breach, investigation costs in determining cause of systems failure, cyber extortion costs, business interruption costs and public relations costs. From a pricing standpoint, the technology inside the car also helps. Insurers can make use of the connectivity and data collection in the car to accurately price policies per risk.

From our consumer survey, we found that consumers were less willing to pay for cyber insurance (Exhibit 106).

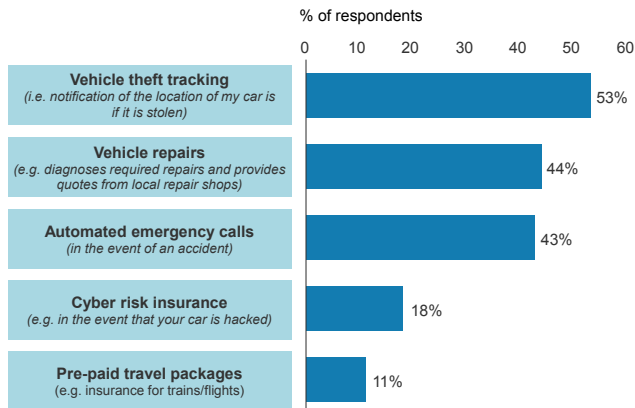
18% of consumers were willing to pay an additional premium for cyber insurance, compared to 53% for vehicle theft tracking. The responses suggest that a B2B approach for cyber may be more relevant, given the large scale of potential risks but low interest (and perhaps awareness) of consumers.

We think that cyber insurance is one of the fastest growing areas of insurance, albeit from a low base. We believe that premiums could grow from ~\$2-3bn in 2014 to grow 3-4x by 2020 to ~\$8-10bn (**Exhibit 107**), and ~\$25bn by 2025. Currently, the market is weighted towards the US but regulatory change in Europe that requires manufacturers to provide notification of a data breach within 24 hours may be a catalyst for faster growth in the region.

b) Access to new data

New data in the motor insurance industry challenges the competitive advantage that traditional insurers have had. Previously, traditional insurers owned proprietary data on accident information reported by the driver or authorities and held (limited) personal information. This was a barrier to entry for new players who did not have a rich and historical data set. However, data is now available in real time from new sources such as connected cars, smartphones, **Exhibit 106:**

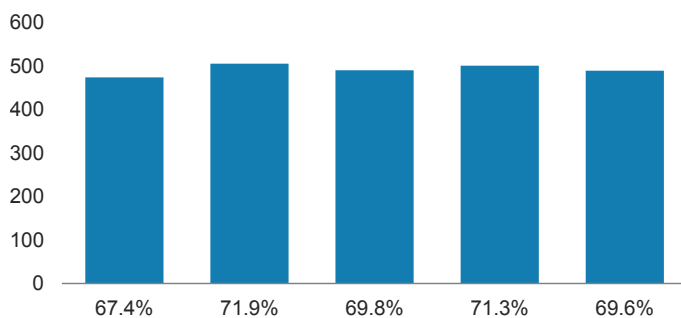
Consumers would be keen on advancing to new products; Cyber Risk might be more a B2B opportunity



Question: Which of these products might you be willing to buy with your motor insurance for an additional premium? Morgan Stanley and BCG Insurance Customer Survey 2016; (n=1 500 p. country for US and China; n=1000 p. country for UK, Australia, France, Germany, Italy, Poland, Japan, South Korea, Brazil), BCG analysis, Morgan Stanley Research

Exhibit 108:

Loss risks randomly distributed
Severity of loss



Source: BCG analysis, Morgan Stanley Research

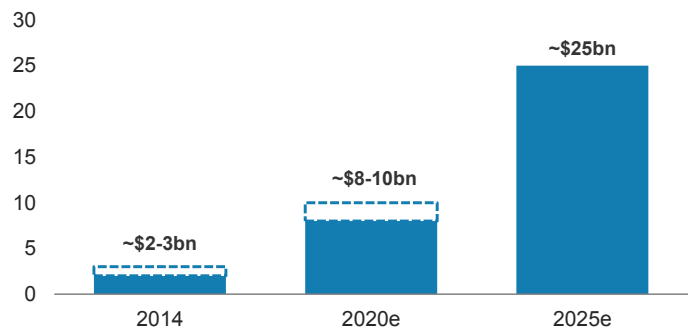
government data, and driving associations, but data from these sources are largely proprietary to other parties. For example, OEMs, software or hardware providers, telecom companies and tech giants will also have access to much more detailed information on driving and non-driving behaviour than the insurers traditionally had.

Therefore we think there may be opportunities for insurers from the new data; however, it is important for them to secure access to data early. Access to new data allows insurers to improve pricing and underwriting through better risk profiling of drivers based on both driving behaviour and broader personal information. The data can help optimise claims management by improving fraud detection and provide data backed-up context. By leveraging data, an insurer could 'cherry pick' the best risks in the pool. As we show in **Exhibit 109**, we have modeled the severity of loss by quintile, and estimate that the top quintile of risks can be ~9x better than the bottom quintile.

Exhibit 107:

We think that the cyber insurance market could grow by 3-4x by 2020, to be ~\$25bn by 2025

Cyber market size and potential

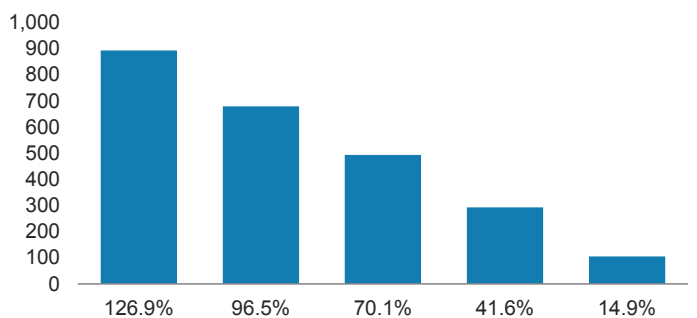


Source: Morgan Stanley research estimates (e), BCG analysis

Exhibit 109:

Loss risks ranked by quintile - the best is ~9x better than the worst

Severity of loss



Source: BCG analysis, Morgan Stanley Research

Exhibit 110:

Loss risks randomly distributed

	Loss	Premium	Loss ratio
Company A	518	712	72.7%
Company B	551	712	77.4%
Company C	475	712	66.7%
Company D	492	712	69.1%
Company E	456	712	64.0%
Total	2,491	3,559	70.0%

Source: BCG analysis, Morgan Stanley Research

We think that insurers may be able to access new proprietary data through partnerships, or by simply buying the data from the providers (OEM, tech giant etc.) as there are already plans from OEMs to sell data or sell proprietary insurance models based on data they have. For example, according to Nikkei Asian Review (13 April 2016, companies have not commented) Japanese insurer Aioi Nissay Dowa is partnering with Toyota and Microsoft in a joint venture to sell model insurance plans based on real time data and the driver's habits. Aioi Nissay Dowa will take 50% in the JV, Toyota will take 45% and Microsoft will take 5%. The JV will target US insurance companies and aims to launch in May 2017, selling expertise on insurance policy models for a cost of ~8% of premiums. The JV will aim for around 450,000 policies in 2020 and insurance premium income of \$55m.²⁰ Renault-Nissan is planning on leveraging its OEM customer data and selling it to insurers as reported by TU Automotive (12 March 2015, the companies have not commented)²¹ The car manufacturer partners with telematics company The Floow, which uses 'at source' telematics to analyse data from current and future Renault and Nissan vehicles.

c) New ecosystems

A wider ecosystem approach also makes sense to us, which benefits the underwriting, distribution and claims management stages. Ecosystems could transform the underwriting, distribution and claims management parts of the value chain, and we believe that insurers will need to orchestrate or join the ecosystem in order to maximise the benefit from these services. In the underwriting stage, insurers can leverage insight from novel data sources (such as connected devices). In the distribution stage, ecosystem models could trigger a shift to non-traditional channels with deeper levels of customer engagement and we think that insurers could partner with an

Exhibit 111:

Loss risks ranked by quintile - the best is ~9x better than the worst

	Loss	Premium	Loss ratio
80-100%	901	712	126.6%
60-80%	684	712	96.0%
40-60%	499	712	70.1%
20-40%	307	712	43.2%
0-20%	100	712	14.1%
Total	2,491	3,559	70.0%

Source: BCG analysis, Morgan Stanley Research

OEM to offer a 'one-stop-shop', for example. In the claims management stage, we expect ecosystem models to have an advantages position to control and minimize their risk exposure, but also it allows insurers to partner with service providers (such as repair companies) to offer a improved claims experience.

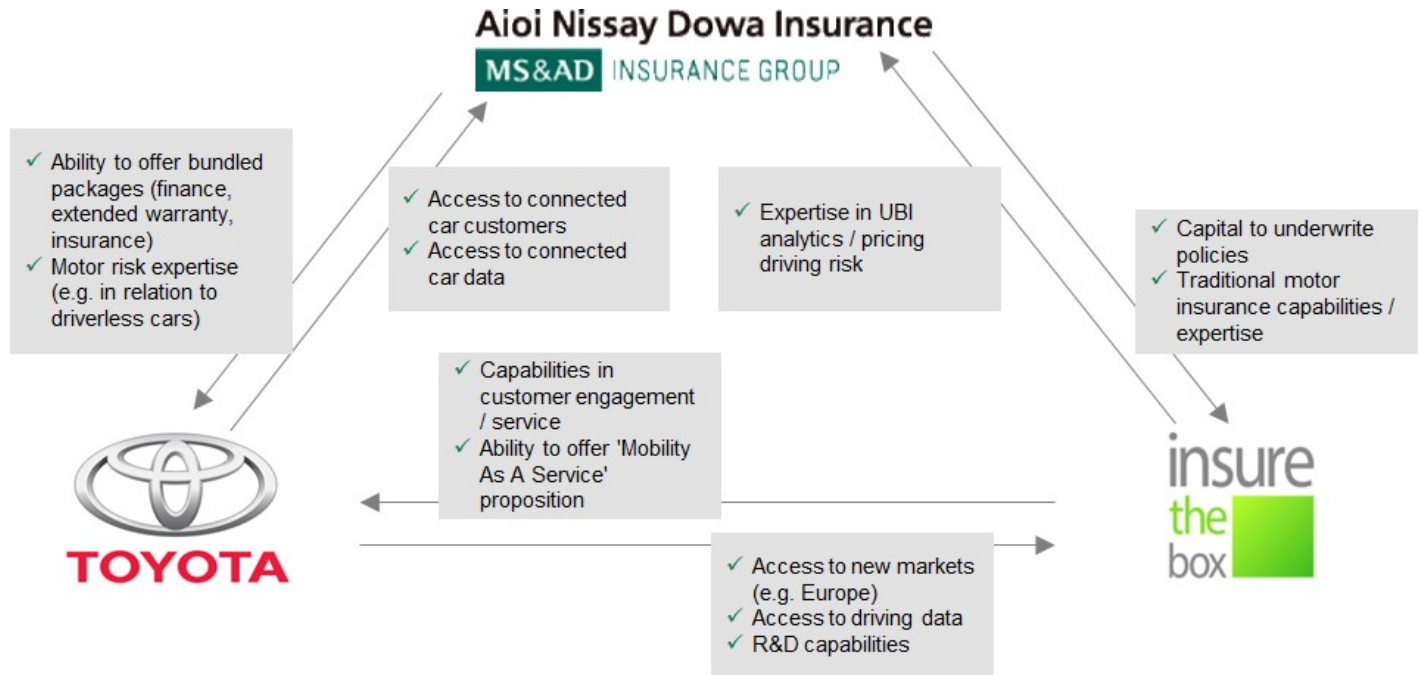
Changes along the operating model is also possible, although we think this could vary by insurer. Many insurers have already set up a 'digital innovation lab' and continue to invest in growing expertise around the subject. We note that some insurers have acquired technology companies, with the example of Generali's acquisition of MyDrive Solutions in mid-2015.

We think that the partnership between Toyota, Insure The Box, and Aioi Nissay Dowa is a good example of a motor insurer ecosystem. As we show in [Exhibit 112](#), Insure The Box can provide the telematics solution as well as data analytics to price the risk to Aioi Nissay Dowa, which can in return provide capital to underwrite policies and a large wealth of underwriting experience. Toyota can provide access to new markets such as continental Europe, a strong brand, the data itself to Insure The Box and Aioi Nissay Dowa, as well as a potential lead flow into the insurance product from future car purchasers. As an ecosystem, the three companies are able to offer bundled packages (for example, finance and extended warranty) alongside a telematics enabled motor insurance product.

Furthermore, forming an ecosystem with a potential disruptor could form a defence mechanism against their potential entry into the market.

Exhibit 112:

We think that the partnership between Toyota, Insure The Box, and Aioi Nissay Dowa is a good example of a motor insurer ecosystem



Source: Morgan Stanley Research, BCG analysis

d) Telematics

Telematics is also an opportunity for insurers to leverage data and strategic partnerships; penetration is growing; however, the economics remain challenging. Telematics allows for Usage Based Insurance (UBI) where the insurance policy price can be dependent on driver behaviour, location and time. Growth in penetration of UBI policies has been slow and varies by market. In the UK and Italy, telematics policies are gaining traction, mainly due to the high prices of traditional motor insurance policies especially for younger drivers. In other markets such as Poland, there has been a lack of traction because policies are already inexpensive.

In our 2014 report Insurance and Technology: Evolution and Revolution in a Digital World, we found that the economics of telematics were challenging for the mass market. For example, insurers typically need to offer an upfront premium discount for drivers to use telematics; however, insurers also need to pay for the upfront cost of the device, installation, and the ongoing analytics costs. In our analysis in 2014 we found that for a young driver, where discounts have typically been around 25%, it would require a 9ppt improvement in the loss ratio to break even if the insurer were to install a black box. For the mass market experienced driver, a 5% premium dis-

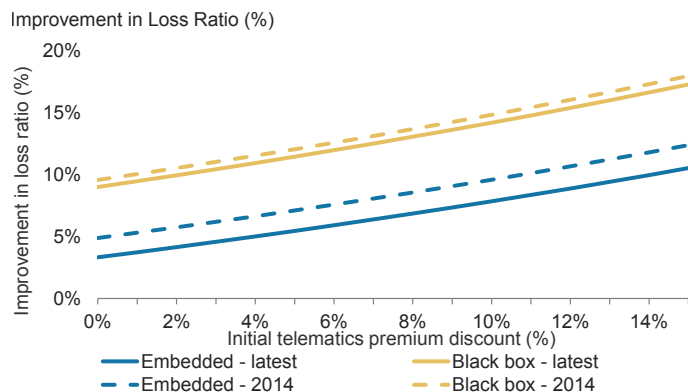
count requires a loss ratio improvement of 7ppts to break even. To us, the 5% illustrative discount seemed too low to persuade those concerned over privacy and other issues with the technology, furthermore the loss ratio improvement required was very ambitious.

In this report, we analyse the feasibility for the mass market given that telematics devices will be increasingly embedded within the car due to new connected car technology. For an embedded device, we have assumed that there is no upfront cost or installation cost, and only an annual data collection/ connectivity and customer services costs. We have repeated the analysis for the loss ratio improvement required to break even, and show the results in [Exhibit 113](#). We also show the output from our 2014 analysis for reference, given that the overall costs have decreased since then. We show the assumptions behind our model in [Exhibit 114](#).

For the mass market, we think that the economics of Usage Based Insurance via an embedded connected car device is still challenging. As shown in [Exhibit 113](#), for an embedded device, an experienced driver would need a 5ppt reduction in loss ratio to offset a 5% premium reduction. For a 10% upfront premium reduction, the loss ratio needs to improve by 8%, which we think is still ambitious.

Exhibit 113:

For the mass market driver, we estimate that for a 5% upfront premium discount, we would need to see a 5ppt improvement in loss ratio for an embedded device



Source: Company Interviews, Morgan Stanley Research, BCG analysis

However, some insurers are proceeding with UBI in a different way and through partnerships.

In South Korea, Dongbu launched UBI policies in April 2016 in partnership with SK Telecom's navigation system (Tmap). After driving more than 500km with the system switched on, drivers can qualify for cheaper insurance. If their driving score is >61%, they can subscribe to Dongbu insurance for a 5% discount. We think that this strategy is more efficient - the consumer does not need to be offered an eye-catching discount to use the telematics device, since they are already using it (the navigation system on their smartphone).

There is potential for Dongbu to reach a large consumer base, as Tmap has 1.8m drivers through smartphones. Despite the premium discount, Dongbu believes that the loss ratio of policyholders with good driving behaviour will be low enough to generate future profits. The regulator has also been supportive of the new service, as customers benefit from lower premiums. Dongbu will use SKT's T-Map navigation system to collect information about driving behaviour and use that to underwrite policies.

Telematics can also be used to offer value add services to improve the business case and potential adoption. Services may include driving assistance, fuel economy suggestions, trip data storage, which add value on top of reduced premiums. Metromile in the US provides a service that warns users if the streets are due to be swept near their car (which would incur a fine). For an insurer, these services increase touch points and engagement with consumers. However, we think that insurers will be in competition with OEMs who already provide in-car services, such as General Motor's OnStar system, which already provide services such as automatics crash response, stolen vehicle assistance, navigation, and infotainment.

Exhibit 114:

Telematics technology cost assumptions behind our various scenarios

Assumptions	Embedded	Black Box	Decrease in cost p.a.
Initial Cost (hardware)	\$0	-\$50	
Installation Cost	\$0	-\$110	
Annual Data Collection Connectivity	\$0	-\$24	10%
Annual Analytics Customer Services	-\$42	-\$42	10%

Source: Company Interviews, Morgan Stanley Research, BCG analysis

3) Adjacency Play

Insurers may also look to expand into mobility related adjacencies in order to replace lost revenues, increase consumer engagement, collect more data, and fuel future growth. Such moves could include expanding into adjacencies such as car safety features, car repairs, roadside assistance, new mobility solutions.

Consumers appear to be willing to pay an additional premium for extra services in their insurance policy. The most popular are vehicle-theft tracking (52% will pay), vehicle repairs (44%) and automated emergency calls (43%). As we show in [Exhibit 115](#) - [Exhibit 116](#), willingness to pay varies by age and income level, with younger consumers more willing to pay, as well as those in higher income brackets.

We have already seen examples of insurers targeting revenue opportunities from adjacencies. For example, in the US, StateFarm launched a mobile app that offers various insurance related services, including roadside assistance. PICC, Tencent and Castrol have launched an "i-maintenance" service, which offers unlimited free car maintenance for PICC customers. In France, Maif partnered with peer-to-peer car sharing start-up Koolicar and PSA Peugeot Citroen to equip more than 30,000 cars with a connected box.

Insurers may be able to develop new products and value added services in adjacencies to motor insurance that leverage existing networks and competitive advantage such as repair and breakdown services. However, we think the success depends on the insurer's ability to integrate new services seamlessly into its existing proposition. For example, Metromile in the US has an app that allows driv-

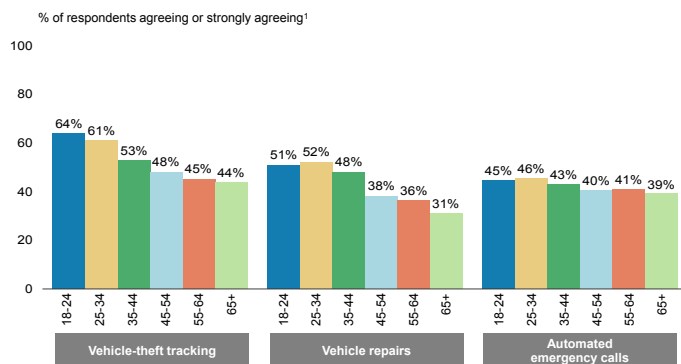
ers to see the most important information about their car such as last trip taken and insurance billing, but the app also provides alerts when there is street sweeping (vehicles cannot be parked on the street during street sweeping days) and car diagnostics. Drivers can also contact a Metromile mechanic within the app in case of any issues with the car.

Additionally, we think that insurers can build partnerships with players in other industries to launch and distribute new products. It allows both players to cross-sell new and existing products and may benefit from each other's brand. In France, Maif has partners with peer-to-peers car sharing start-up Koolicar and Peugeot Citroen to equip cars with a connected box. The box transmits data on mileage, lease duration and geo-location which can help facilitate transactions among car sharers.

In this scenario, we would expect insurers to define new corporate objectives and strategy to incorporate broader technology-enabled services. We think that there is a greater need to invest in capabilities that facilitates the new strategies, such as investing in experts on the new product, or in-house labs and incubators. For example, Sampo in Japan has built digital technology labs in Tokyo and Silicon Valley, which is aimed at identifying new trends and exploring possible partnerships or investments. By investing early, we think that Sampo can identify adjacent routes and products for customers

Exhibit 115:

Consideration for new products such as vehicle theft tracking, vehicle repairs and automated emergency calls is the highest amongst young drivers



1. Question: For which of these products might you be willing to buy with your motor insurance for an additional premium?

Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Exit

Exiting motor is also an option, which would allow resources to be allocated to other areas, through a sale or by winding down the business. Some insurers have already exited the market. For example, UK insurer RSA exited the personal brokered motor market in August 2015 due to competitive market pressures, where it saw tough trading with no sign of competition reducing and a number of competitors posting combined ratios of over 100%.

However, it seems unlikely to us that traditional insurers will exit the market altogether. Motor insurance is still important - in some markets it is purely a loss leader. Exiting the market would also mean reduced contribution to shared fixed costs and potential loss of higher margin ancillary business.

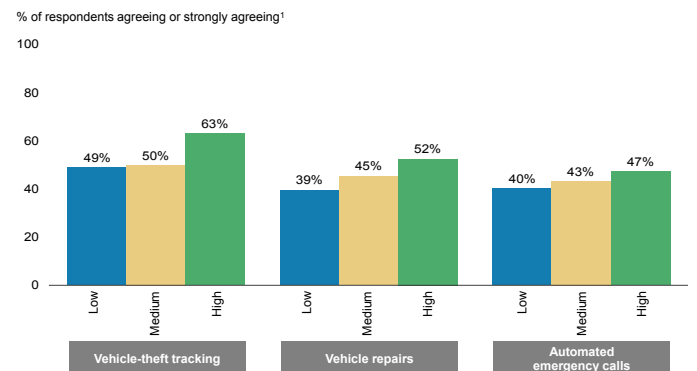
Choice of strategy

We believe that the choice of strategy and timing of execution will depend on an insurer's size, global reach and business mix.

Large insurers will be better positioned to make the investments required to keep pace with technology. Global insurers are more likely to be able to form partnerships with disruptors than local players. Insurers focused on personal lines or reliant on an agent network may feel the pressure to adapt their model earlier or more drastically. Players with a predominantly young and / or urban customer base may be affected sooner - this is particularly so in markets such as the UK and US where there is a record of rapid digital adoption. There is no standardised approach and the path to the future state is unlikely to be linear.

Exhibit 116:

Consideration for new products such as vehicle theft tracking, vehicle repairs and automated emergency calls is also the highest amongst affluent drivers



1. Question: For which of these products might you be willing to buy with your motor insurance for an additional premium?

Morgan Stanley and BCG Insurance Customer Survey 2016. Source: BCG analysis, Morgan Stanley Research

Appendix 1: Global Motor Model Methodology

Our motor model runs from 2015, where we use the observed data for each market, to 2040. For each market, we have two scenarios, Limited and Heavy disruption. The primary difference between the two scenarios is that in Heavy disruption we assume a faster adoption of advanced cars, a higher scrappage rate and a retrofit assumption.

Car parc: We use the observed data as our starting point for 2015, which is then split by technology levels 0 through 5, with level 0 being the least advanced, whilst level 5 constitutes very advanced fully autonomous cars.

We assume a natural growth rate for the car parc, which is somewhat offset by adoption of alternative mobility. We believe that due to increased sharing of miles, going forward there would be less need for a second or third car. We also assume a higher scrappage rate for levels 0 and 1 vehicle versus the other levels as we believe there would be a quicker uptake of higher level vehicles once they become available.

The car parc is composed of commercial vehicles (including taxis, buses, and light goods vehicles), personal shared (primarily used for personal use, but also shared with others when feasible) and person-

al owned (used for personal use only). We assume that the markets would shift towards more sharing and thus there would be growth in the number of commercial and personal shared vehicles, though it would come at the expense of personal owned vehicles. We show composition of vehicles in the UK limited disruption scenario as an example in [Exhibit 119](#).

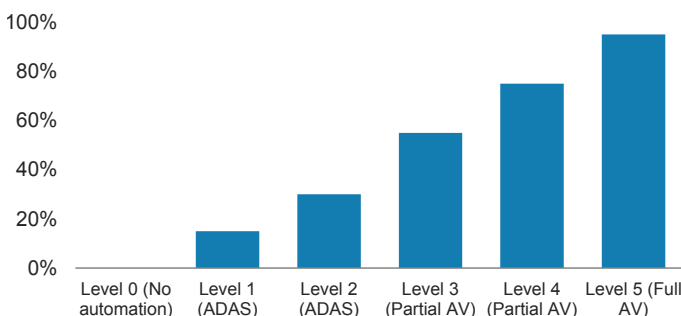
We assume the penetration of new vehicle sales such that over time the sales start to tilt in favour of higher level vehicles as new technology is adopted. This can be seen from the split of vehicles in [Exhibit 118](#) for the UK Limited disruption scenario. Whilst we assume 79% level 1 car sales in 2016 vs none for levels 4 and 5, by 2030 all new vehicles sold are level 2 and above.

In Heavy disruption scenarios, we also assume a 5% retrofitting of vehicles, which are at least level 1. Once retrofitted, we assume the vehicle would move up to the next level. For example a level 2 retrofitted vehicle would move to level 3.

Frequency vs severity: [Exhibit 117](#) shows our assumptions for collision reduction for each level (vs level 0). We also assume a 2% reduction in frequency in each level due to fraud avoidance technology. For severity, we assume a 3% increase in severity between each level.

Exhibit 117:

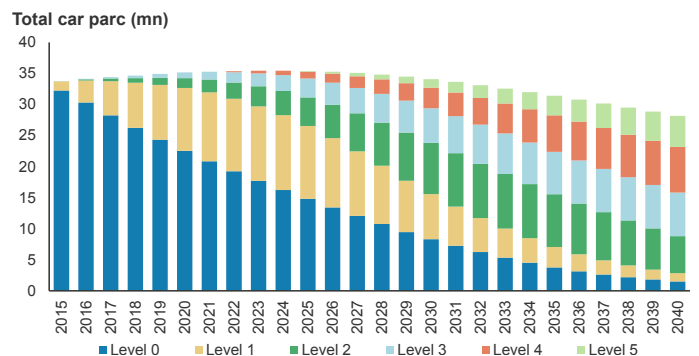
We think that level 5 vehicles could reduce collision by 95% vs level 0 Max. collision reduction (vs. level 0)



Source: Morgan Stanley Research, BCG analysis

Exhibit 118:

UK car parc split by levels

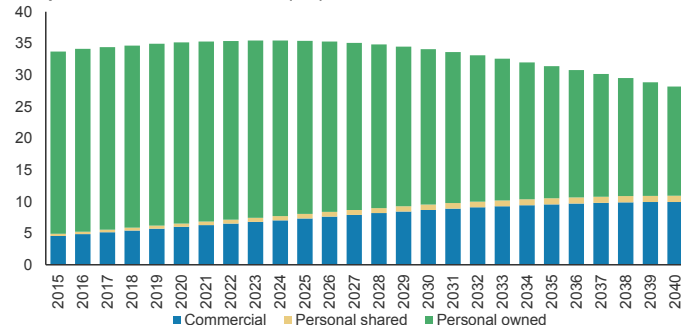


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 119:

UK car parc composition

Composition of vehicles on road (mn)

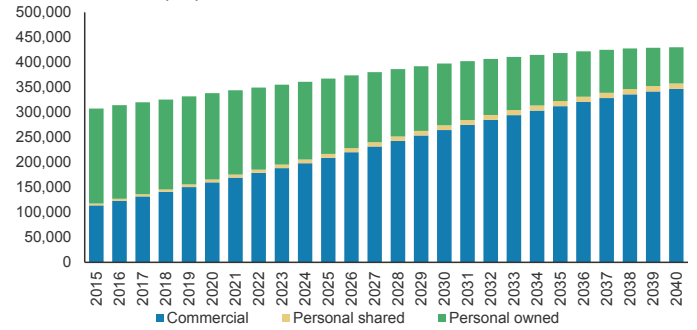


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 120:

UK miles driven

Total miles driven (mn)



Source: Morgan Stanley Research estimates, BCG analysis

Miles driven: Within each scenario, we model the various levels separately. For each level, we start with observed number of miles for each vehicle type, with commercial vehicles clocking the highest number of miles per year, followed by personal shared and personal owned. We assume that the commercial vehicles will continue to see growth in their mileage per vehicle, whilst personal owned mileage per vehicle will see a decline as more people would start using commercial shared services and make less use of their personal vehicles. We then arrive at the total miles driven by each vehicle type within each level. We show the UK Limited disruption miles driven in [Exhibit 120](#).

Premiums and Combined ratio: We use the observed data for claims ratio and the commission and admin expense ratios. These ratios are split by vehicle type (commercial vs personal), with commercial vehicle claims ratio being higher than personal vehicles. We assume the ratios remain constant going forward and across the different levels, for example, if commercial vehicle claims ratio is 80% in level 0 in 2015, it would be the same in level 3 in 2025.

For each level and each vehicle type, we make use of total miles driven, number of accidents per mile (accident frequency) and the average cost per claim (severity) to arrive at the total claims cost. We assume a natural rate of year-on-year change in frequency and severity based on the observed data. We then divide the claims amount each year by the claims ratio to arrive at the premiums for a particular level. The commissions and admin costs are then arrived at by multiplying the premiums with the respective ratio.

For higher levels, we assume a lower accident frequency versus level 0. Whilst improvement in technology makes vehicles safer, it adds to the cost of repair of such vehicles. We believe this is marginally offset by lower bodily injury costs as better technology on these vehicles would allow better enforcement of driving limits which would lead to accidents happening at lower speeds. We therefore assume that severity increases by 3% at each subsequent level vs the preceding level.

Exhibit 121:

Motor model assumptions summary

% of car parc made up of commercial vehicles	Limited disruption		Heavy disruption		Comments
	Initial	Growth in commercial car parc pa	Initial	Growth in commercial car parc pa	
Level 0-4					
Australia	21%	0.50%	Same	Same	We assume a starting split of vehicles between commercial, personal shared and personal owned, which is then changed each year.
China	14%	0.50%	Same	Same	
France	17%	0.60%	Same	Same	
Germany	20%	0.60%	Same	Same	
Japan	21%	0.25%	Same	Same	
UK	14%	0.70%	Same	Same	
US	3%	1.20%	Same	Same	
Level 5					
All countries	60%	-0.35%	80%	-0.85%	
	Limited disruption		Heavy disruption		
Year of introduction of Level 4 vehicles					
Australia		2022		2018	We assume the higher level cars hit the car parc in different years for different countries. For example, we assume level 4 cars start selling in 2020 in Japan, whereas in China they don't come in until 2024
China		2024		2020	
France		2022		2020	
Germany		2022		2018	
Japan		2020		2018	
UK		2022		2018	
US		2020		2018	
Year of introduction of Level 5 vehicles					
Australia		2025		2021	
China		2025		2022	
France		2025		2022	
Germany		2025		2021	
Japan		2023		2020	
UK		2025		2021	
US		2023		2020	
Growth in number of miles/car/year					
Commercial					
Australia		2.2%		Same	We assume a starting number of miles for each type of vehicle which then grows at various rates for various countries
China		2.9%		Same	
France		2.0%		Same	
Germany		2.0%		Same	
Japan		1.5%		Same	
UK		1.4%		Same	
US		0.3%		Same	
Personal shared					
Australia		No change		Same	
China		No change		Same	
France		No change		Same	
Germany		No change		Same	
Japan		No change		Same	
UK		No change		Same	
US		No change		Same	
Personal owned					
Australia		-0.3%		Same	
China		0%-(0.25)%		Same	
France		-0.2%		Same	
Germany		-1.0%		Same	
Japan		-0.2%		Same	
UK		-1.8%		Same	
US		-1.0%		Same	

Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 122:

Motor model assumptions summary continued

	Limited disruption	Heavy disruption	
Scrappage rate			
Australia	7%-8%	9%-10.5%	This is the proportion of the car parc which we assume is scrapped each year
China	7.0%	9.0%	
France	6.3%	8.0%	
Germany	6.5%	8%-9%	
Japan	8%-9%	9%-10%	
UK	7%-8%	9%-10.5%	
US	6%-9%	8.5%-11%	
Year on year change in accident frequency			
Australia	-1.1%	Same	This is the natural change in the accident frequency we expect per year. Based on historical trend
China	-1.1%	Same	
France	-2.0%	Same	
Germany	-1.3%	Same	
Japan	-2.1%	Same	
UK	-2.2%	Same	
US	-0.9%	Same	
Year on year change in severity			
Australia	3.0%	Same	This is the natural change in the severity we expect per year. Based on historical trend
China	3.4%	Same	
France	4.1%	Same	
Germany	0.8%	Same	
Japan	1.5%	Same	
UK	3.0%	Same	
US	1.5%	Same	
Retrofit assumption (Level 1-4 only)			
Percentage of vehicles retrofitted in each level			We assume the vehicles can only be retrofitted up one level
All countries	0.0%	5.0%	
Decrease in claims frequency (vs level 0)			
All countries			This is the decrease in claims frequency at higher levels due to technological advancement. For example, we expect the number of claims to be 57% less for level 3 vehicles versus level 0
Level 1	17%	Same	
Level 2	32%	Same	
Level 3	57%	Same	
Level 4	77%	Same	
Level 5	97%	Same	
Increase in claims severity (vs previous level)			
All countries			This assumption accounts for the fact that cost of repair would be higher for higher level vehicles, though partially offset by lower bodily injury cost.
Level 1-5	3%	Same	

Source: Morgan Stanley Research estimates, BCG analysis

Appendix 2: Global Motor Model Detailed Output

Discussing each market in turn

Our analysis attempts to map out the evolution of the insurance industry - for a detailed discussion on the possible factors affecting shared mobility and electric/autonomous vehicles, please see Morgan Stanley Blue Paper [Global Investment Implications of Auto 2.0](#).

Australia

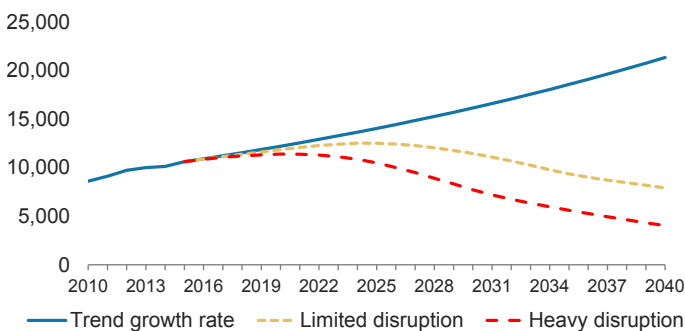
Limited disruption scenario

Motor premiums in Australia falls by 25% from ~AUD11bn in 2015 to ~AUD8bn by 2040. We forecast -1.2% CAGR in premiums. Australia 10-year CAGR in premiums has been very high at ~8%, partly due to wholesale repricing after 2011, which affected both home and motor. Going forward we think growth will be closer to GDP, and have overlaid GDP growth as the forecast 'trend growth rate' in [Exhibit 123](#).

Wave 1: As a starting point, we estimate the current premium pool to be ~80% personal motor. The premiums rise initially due to growth in the car parc and miles driven, in line with population growth. Although shared mobility and higher level technology is rising, it is still a small part of the current car parc.

Exhibit 123:

Australia: we forecast motor GWP to fall by 25% in a Limited disruption scenario and by 62% in a Heavy disruption scenario
Australia premium development (£m)



Source: Morgan Stanley Research estimates, BCG analysis

Wave 2: Although premiums per mile are declining from 2015, market premiums grow and peak at around 2025. Personal premiums have remained broadly stable and commercial premiums have grown due to shared mobility trends. However, autonomous technology is permeating the car parc. By 2030, we forecast that 17% of the car parc is semi or fully autonomous.

Wave 3: By 2040 we forecast premiums per mile to have declined by 47%; however, due to overall miles growth we think that total premiums will more likely decline by ~25%. We see the car parc eventually shrinking due to rise of alternative mobility, which leads drivers to stop owning a second or third car.

Heavy disruption scenario

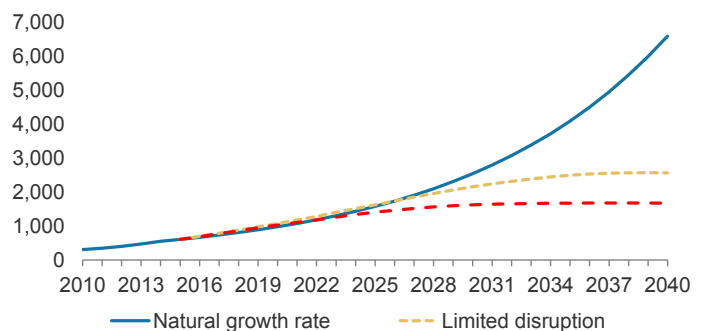
Motor premiums in Australia fall by 62% from ~AUD11bn in 2015 to ~AUD4bn by 2040. We forecast -3.8% CAGR in premiums vs the 10 year trend of 8%.

In this scenario, we have assumed much faster adoption of higher level technology, with over 80% of the car parc being semi or fully autonomous vehicles by 2040. In this scenario, we think that we are much more likely to see the peak of premiums earlier, in ~2021, and then dramatically decline.

China

Exhibit 124:

China: we forecast motor GWP to grow by 3x in a Limited disruption scenario and by 2x in a Heavy disruption scenario
China premium development (RMBbn)



Source: Morgan Stanley Research estimates, BCG analysis

Limited disruption scenario

Motor premiums in China rise by 3x from ~RMB606bn in 2015 to ~RMB2.6tn in 2040. We forecast 5.9% CAGR in premiums, which is lower than the historical trend growth rate of ~20%. However, we think that the market growth going forward will naturally slow down (due to the 10-year CAGR being calculated from a low base), as well as external factors such as price deregulation. Therefore, we think a 10% growth rate going forward is a sensible assumption for the natural growth rate (see [Exhibit 124](#)).

Wave 1: China's motor market is still in its growth phase. The vast majority of cars on the road are level 0 with an immaterial amount of level 1 and 2 cars. We do not have disclosure on the premium split for commercial vs retail for the industry so we estimate this to be ~22% commercial and ~78% personal (based on individual company premiums split). We model China to have a high natural rate of claims inflation (3.4% YoY) but for frequency to decline by 1.1% YoY due to safer motorways, rules on drink driving, and new no-claims bonus. Currently, shared mobility remains a relatively new concept.

Wave 2: The motor market is growing due to higher mileage driven and higher claims inflation, which outweighs the downward premium pressure from adoption of accident proofing technology. Of the countries in our consumer survey, China was among the most willing countries to adopt new technology. We believe that China will lag the US in terms of accident proofing technology adoption and ride-sharing, but its booming internet and app market bode well for the prevalence of ride-hailing apps. We forecast autonomous cars on the road from 2024, although think that it may take longer for country-wide adoption of technology due to less supporting infrastructure.

Wave 3: By 2040 China is the only market in our global model that has seen an increase in premiums, with 5.9% CAGR. However, we think it will be lower than the forecast natural rate of ~10% (assuming no disruption). Miles driven also increases dramatically (we forecast 8% CAGR), and premium per mile increases from 2015-2035, but the growth tails off as the impact of accident reducing technology takes effect.

Heavy disruption scenario

Motor premiums to grow from ~RMB606bn in 2015 to ~RMB1.7tn in 2040. We forecast 4.1% CAGR in premiums vs the assumption of a 'natural' rate of growth in the market of ~10% per year.

We think that it is plausible there may be some form of policy response, which could boost the increase of advanced technology

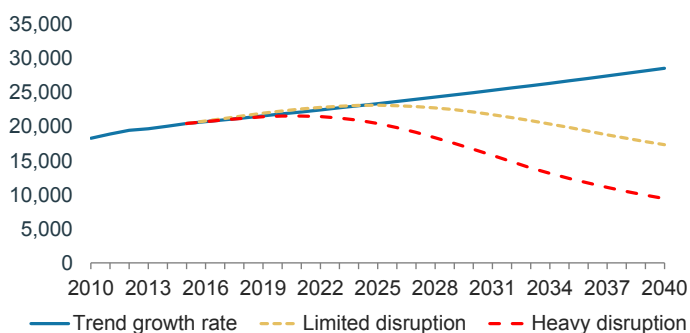
and shared mobility, due to its positive impact on air pollution levels. We expect increasing urbanisation could also drive higher mileage (although potentially in the form of public transport, which the government is investing heavily in) and boost premium growth. We assume a higher scrappage rate and faster introduction of autonomous vehicles (2021).

France

Exhibit 125:

France: we forecast motor GWP to fall by 15% in a Limited disruption scenario and by 54% in a Heavy disruption scenario

France premium development (€m)



Source: Morgan Stanley Research estimates, BCG analysis

Limited disruption scenario

Motor premiums in France shrinks by 15% from ~€20bn in 2015 to ~€17bn in 2040. We forecast -0.7% CAGR in premiums vs the 10-year trend of 1.3%.

Wave 1: We think that France is seeing relatively higher claims inflation than other countries, which leads to an initial increase in premiums over the next 10 years of 1.2% CAGR (although it is still lower than the 10-year historical trend, as we show in [Exhibit 125](#)). The car parc entirely consists of level 0 and level 1 vehicles with an immaterial amount of level 2 vehicles. Commercial premiums make up 18% of the market initially.

Wave 2: Premiums peak in 2025-2026 as the effect of lower accident frequency due to safer cars overtakes the 'natural' rate of claims inflation. We believe that France will be slower to adopt higher level vehicles compared to the US - in 2030 we forecast that ~57% of the car parc is still level 0 and level 1 (compared to the US at 32%). There is a heavy shift to commercial premiums from personal premiums.

Wave 3: Due to the higher level of forecast claims inflation, disruption in France has not been as heavy as other countries in our model. By 2040 we estimate that premiums decline by 15%, with a 49% decline in personal owned premiums counterbalanced with a 1.2x

increase in commercial premiums. We also think that adoption of higher technology vehicles will be slightly slower than Germany and the UK. Premiums per mile have not fallen as much as other countries, declining by 26% over the forecast period.

Heavy disruption scenario

Motor premiums in France decline by 54% from ~€20bn in 2015 to ~€9bn by 2040. We forecast -3.0% CAGR in total premiums vs a 10-year trend of 1.3% CAGR.

In a Heavy disruption scenario we assume a modestly higher scrap-age rate boosted by a public policy response. We note that in Europe, from 2019 all countries in the EU will have to start making legislative changes to allow autonomous cars in their country. For France, we forecast that level 5 autonomous cars on the road by 2021 in a Heavy disruption scenario vs 2025 in Limited disruption scenario.

Germany

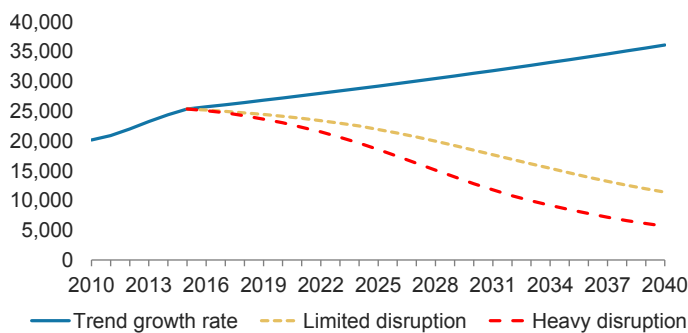
Limited disruption scenario

Motor premiums in Germany shrinks by 55% from ~€25bn in 2015 to ~€11bn in 2040. We forecast -3.2% CAGR in premiums vs the 10-year trend of 1.4%.

Wave 1: We think that the German motor market is already in a deflationary environment, which we factor in our forecasts, and estimate a natural net 0.4% YoY decline in frequency and severity (and another 0.1% reduction due to telematics). Initially, the car parc is mainly level 0, and there is an immaterial amount of shared mobility in the German car parc and miles driven. Total premiums begin to decline immediately.

Exhibit 126:

Germany: we forecast motor GWP to fall by 55% in a Limited disruption scenario and by 78% in a Heavy disruption scenario
Germany premium development (€m)



Source: Morgan Stanley Research estimates, BCG analysis

Wave 2: By 2030, total premiums have already declined by 27%, due to the 'double impact' of an already deflationary premium environment and further reduction in premiums due to accident proofing technology. We think that level 4 (partially autonomous cars) may be introduced by 2022 and autonomous cars by 2025. Although commercial premiums grow in the initial period from a switch to shared mobility, we think that eventually even commercial premiums begin to fall.

Wave 3: We think that Germany (along with Japan) demonstrates the highest variation in premium CAGR growth between forecast and a stable trend, with a 10-year average of 1.4% and our forecast premium CAGR of -3.2%. The market sees Heavy disruption with premiums per mile falling by almost 62% in 2040. Along with other developed markets, we think that the car parc will decline as ownership of second and third vehicles falls in favour of shared mobility.

Heavy disruption scenario

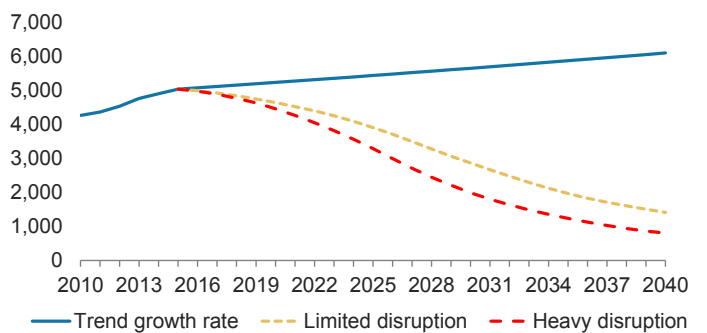
Motor premiums fall from ~€25bn in 2015 to €5.7bn in 2040. We forecast -5.8% CAGR in premiums vs the 10-year trend of 1.4% growth.

Assuming higher scrappage and an earlier introduction of level 5 vehicles (2021) and other levels, premiums in our 'Heavy disruption' scenario decline by 78%. We think that premiums per mile will decline dramatically to €0.009 per mile (from €0.06 per mile currently). In this scenario, the rate of decline falls over time, due to our higher miles driven forecast.

Japan

Exhibit 127:

Japan: we forecast motor GWP to fall by 72% in a Limited disruption scenario and by 84% in a Heavy disruption scenario
Japan premium development (Yen bn)



Source: Morgan Stanley Research estimates, BCG analysis

Limited disruption scenario

Motor premiums in Japan falls by 72% from ~JPY5.0tn in 2015 to JPY1.4tn in 2040. We forecast -5.0% CAGR in premiums vs the 10-year trend of 0.8%.

Wave 1: There is a low penetration of higher level vehicles and shared mobility. We assume a natural YoY decrease in frequency of 2.1% and 1.5% increase in severity, which leads to a natural decline in claims and therefore premiums. As a starting point, we estimate the current premium pool to be ~68% personal motor.

Wave 2: Along our forecast period, we forecast miles driven to be broadly stable, due to a declining population (we think miles per person will increase due to shared mobility). We think that ride sharing will also be more common, shifting the shrinking premium pool away from personal to commercial. By 2030, we forecast that 57% of premiums will be personal, with 43% commercial. However, Japan is the only market where we think both personal and commercial premiums will decline (in the Limited disruption scenario), given a YoY net decrease in frequency and severity before overlaying the effects of disruption. We assume that Japan and the US are the two leading countries in our model to adopt driverless cars - by 2023.

Wave 3: By 2040 we forecast premiums to decline dramatically by 72%, since miles growth is low, and premiums per mile decline due to accident proofing technology in new higher level vehicles. We forecast a -5.0% CAGR compared to the 10-year trend of 0.8% CAGR. Compared to 2015, we think that the split of the remaining motor risk pool could be broadly evenly shared between commercial and personal lines.

Heavy disruption scenario

Motor premiums in Japan fall by 84% from ~JPY5.0tn in 2015 to ~JPY0.8tn in 2040. We forecast -7.1% CAGR in premiums vs the 10-year trend of 0.8%.

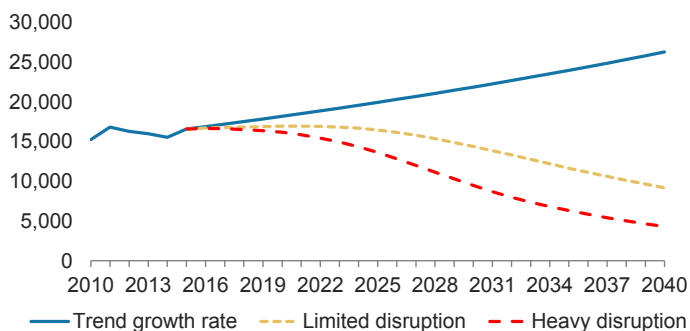
We forecast a faster adoption rate of level 2-5 vehicles (which reduces premiums per mile), but we also increase our miles driven assumption (from 0.2% CAGR in the Limited scenario, to 0.8% CAGR in the Heavy scenario). Therefore, overall premium decline for the market is not dramatically different to the Limited disruption scenario.

United Kingdom

Exhibit 128:

UK: we forecast motor GWP to fall by 45% in a Limited disruption scenario and by 74% in a Heavy disruption scenario

UK premium development (£m)



Source: Morgan Stanley Research estimates, BCG analysis

Limited disruption scenario

Motor premiums in the UK shrinks by 45% from £16.6bn in 2015 to £9.2bn in 2040. We forecast -2.3% CAGR in premiums vs the 10-year trend of 1.9%.

Wave 1: Miles traveled begin to increase, and along with a net ~1% natural increase in claims frequency and severity, we forecast GWP to grow initially. The car parc is mainly level 0 with a small portion of level 1 vehicles and an immaterial amount of level 2. The majority of cars and miles driven are personal/private, and >70% of market GWP is retail.

Wave 2: By 2022, 50% of the car parc is level 1 or above, meaning that accident reducing technology begins to be reflected in lower claims frequency and lower premiums overall, which more than offset the increase due to higher claims severity. However, more miles are shared and this boosts the growth of commercial motor insurance. GWP growth peaks in ~2021. Driverless cars are on the road from 2025.

Wave 3: By 2040, the market has shrunk to 55% of its 2015 size. Personal premiums have fallen by 79% and commercial premiums have grown by 44%. 81% of miles are from commercial vehicles, and 44% of the car parc is semi-autonomous or fully autonomous, with autonomous fleets of shared mobility transport possible. Although miles driven has increased dramatically (1.3% CAGR from ~300bn to ~430bn), premiums per mile has more than halved from £0.05p per mile to £0.02p per mile due to the positive impact on claims from accident proofing technology. The car parc has also decreased in size as we think consumers do not see the need to own second or third cars.

Heavy disruption scenario

Motor premiums in the UK shrink by 74% from £16.6bn to 4.3bn in 2040. We forecast -5.2% CAGR in premiums vs the 10-year trend of 1.9%.

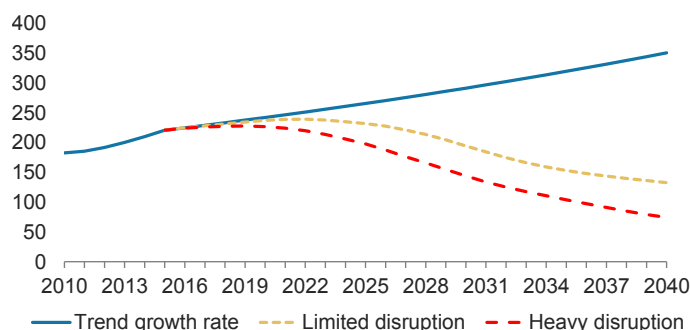
Under this scenario driverless cars (both private and shared) hit the road in 2021. We think this is plausible given recent announcements made by technology companies for pilot schemes. We assume that a policy change can drive an economic incentive for consumers to scrap their cars and buy safer, more environmentally friendly, cars - such as the HM Treasury Plug-In Car Grant. We also think it is possible that commercial fleets may see regulation enforcing that they meet certain criteria. Therefore, we increase our scrappage rate to 9%, from 7% in the Limited disruption scenario.

United States

Exhibit 129:

US: we forecast motor GWP to fall by 40% in a Limited disruption scenario and by 66% in a Heavy disruption scenario

US premium development (\$bn)



Source: Morgan Stanley Research estimates, BCG analysis

Limited disruption scenario

Motor premiums in the US shrinks by 40% from ~\$221bn in 2015 to ~\$133bn in 2040. We forecast -2.0% CAGR in premiums vs the 10-year trend of 1.9%.

Wave 1: We think that miles driven will increase most dramatically in the US. We assume a natural YoY increase in severity (1.5%) and decrease in frequency (0.9%), which leads to an initial rise in premiums. The initial car parc is entirely level 0 and level 1 vehicles, with an immaterial amount of level 2, but higher level vehicles are introduced from 2016. 89% of premiums in 2015 are personal.

Wave 2: Premiums peak in ~2022, by now personal premiums are 67% of the industry total but it begins to fall dramatically. We think that the US is one of the earliest countries for driverless cars on the road - from 2023 in our forecasts. By 2030, 68% of the car parc is level 2 or above. Miles are becoming increasing shared, which we capture through a growing proportion of commercial miles. Personal premiums have fallen by 56%, and commercial premiums have risen by 3.9x as a result. Overall, from 2015-2030 the motor insurance market has declined by 12%.

Wave 3: We think that the US will be one of the fastest countries to adopt new accident proofing technology. By 2040, almost 100% of the car parc is level 2 and above. Miles driven has doubled since 2015 but premiums per mile have fallen from \$0.07 per mile to \$0.02 per mile due to the impact of accident proofing technology. 26% of premiums are personal, and 74% of premiums are commercial. Commercial premiums have actually grown over the period as miles driven shifts to shared miles, which we think are insured under a commercial/fleet policy (and may be autonomous). Against a 10-year trend growth of 1.9% CAGR in premiums, we forecast the next 25 years to grow at -2.0% CAGR.

Heavy disruption scenario

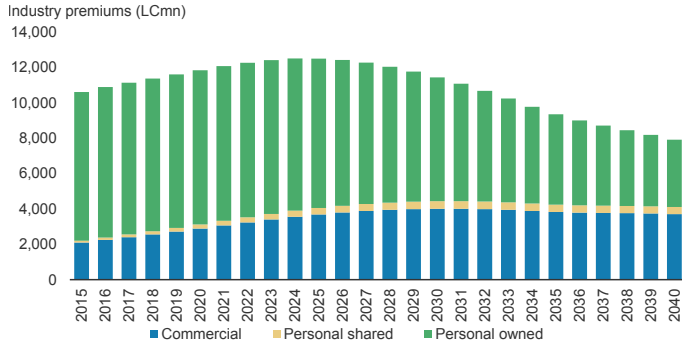
Motor premiums in the US shrinks by 66% from ~\$221bn in 2015 to ~\$74bn in 2040. We forecast -4.3% CAGR in premiums vs the 10-year trend of 1.9%.

In this scenario, we think it likely that driverless cars could be on the road sooner, and forecast level 5 vehicles in our model from 2020. As with other countries, we think that regulation may stimulate growth in adoption, a higher scrappage rate, and a more significant decline in the motor risk pool, which we incorporate into our forecasts. On our estimates, miles driven increase by 3.7% CAGR but premiums per mile fall even more, from \$0.07 per mile in 2015 to \$0.01 per mile in 2040.

Australia motor market forecasts

Exhibit 130:

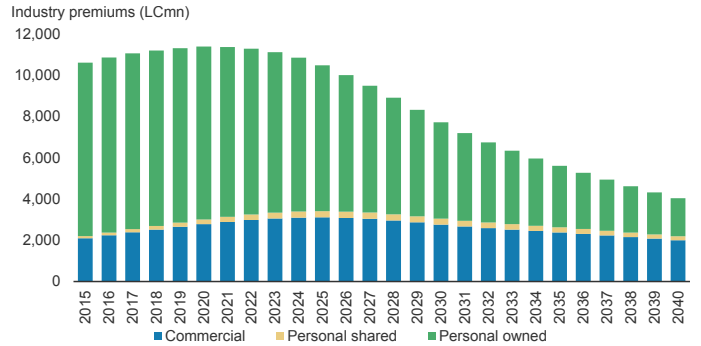
Australia Limited Disruption: we forecast industry premiums to decline 1.2% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 131:

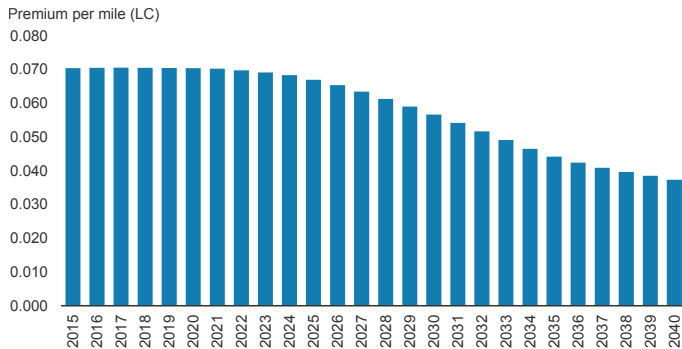
Australia Heavy Disruption: we forecast industry premiums to decline 3.8% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 132:

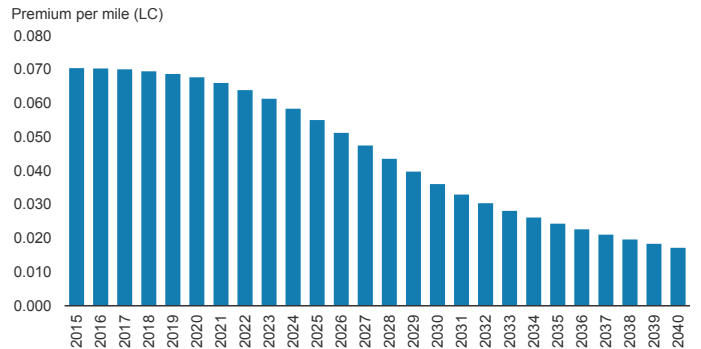
Australia Limited Disruption: we think premiums per mile could fall 47% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 133:

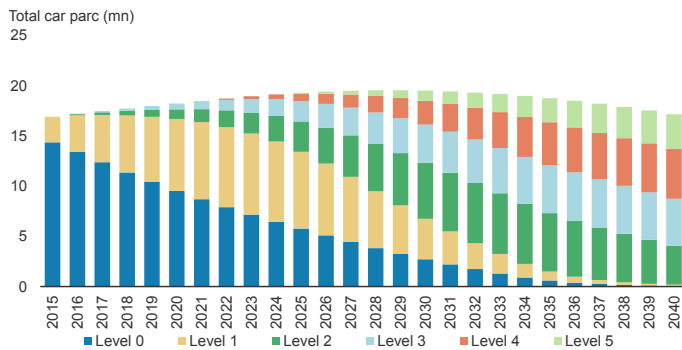
Australia Heavy Disruption: we think premiums per mile could fall 76% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 134:

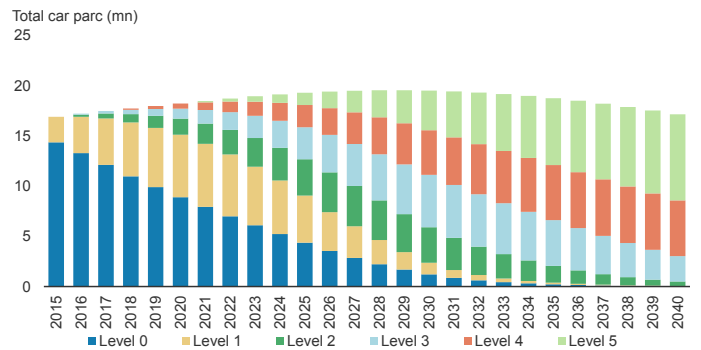
Australia Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 135:

Australia Heavy Disruption: A faster shift to levels 2-5 and higher scrap-page rate of vehicles

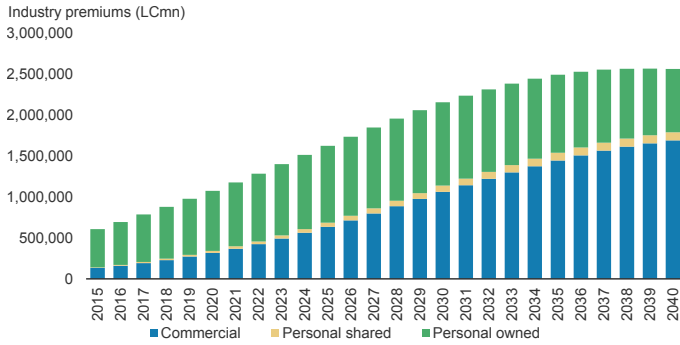


Source: Morgan Stanley Research estimates, BCG analysis

China motor market forecasts

Exhibit 136:

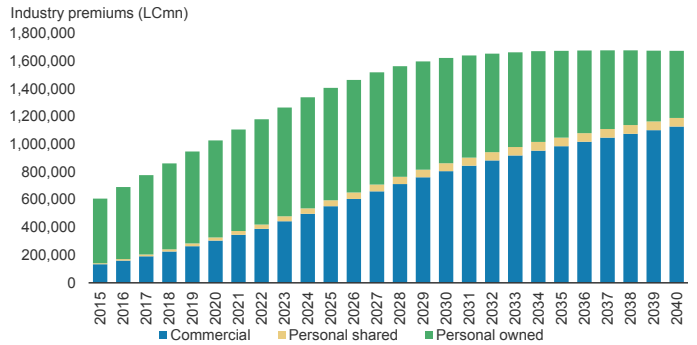
China Limited Disruption: we forecast industry premiums to increase 5.9% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 137:

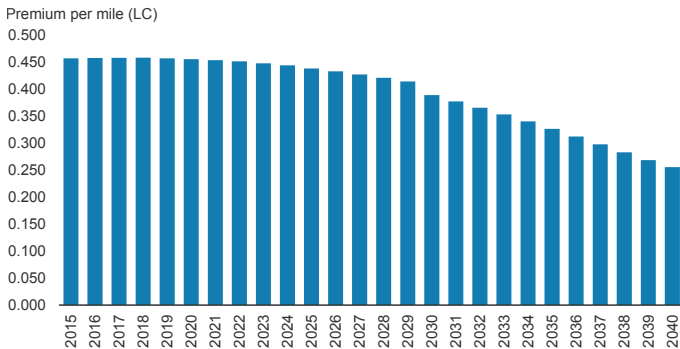
China Heavy Disruption: we forecast industry premiums to increase 4.1% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 138:

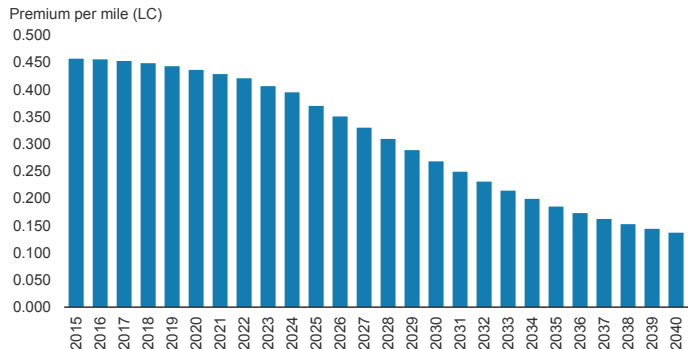
China Limited Disruption: we think premiums per mile could fall 44% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 139:

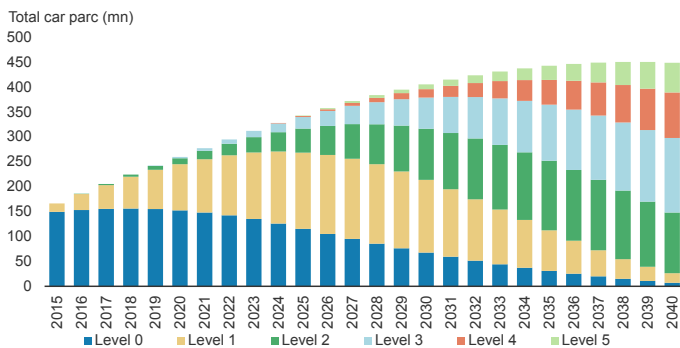
China Heavy Disruption: we think premiums per mile could fall 70% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 140:

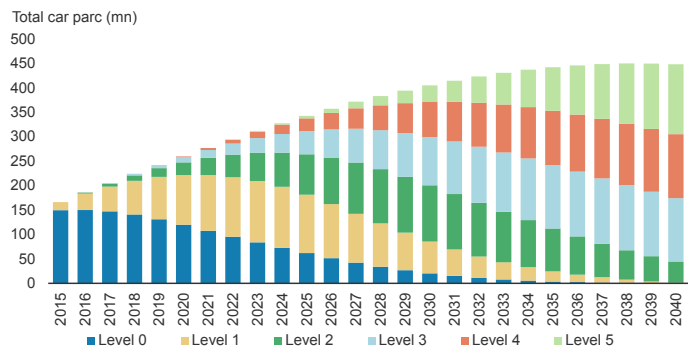
China Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 141:

China Heavy Disruption: A faster shift to levels 2-5 and higher scrap-page rate of vehicles

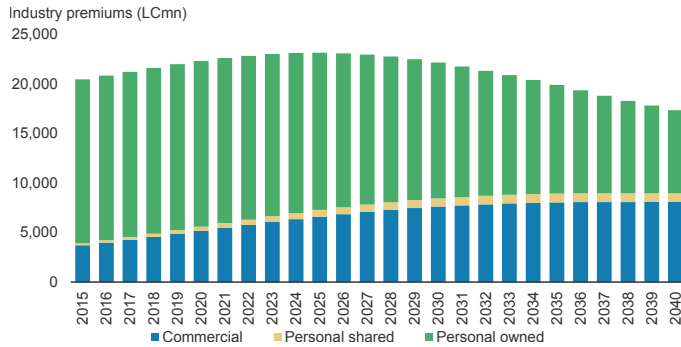


Source: Morgan Stanley Research estimates, BCG analysis

France motor market forecasts

Exhibit 142:

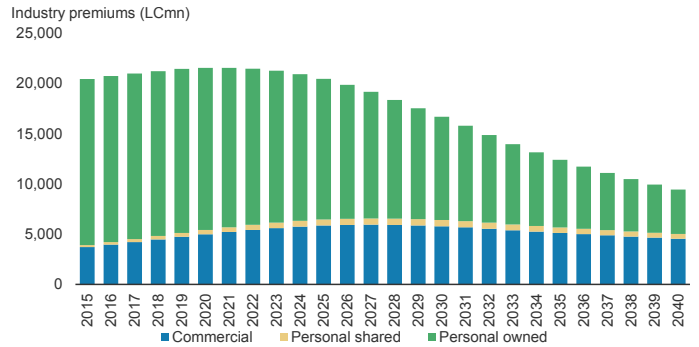
France Limited Disruption: we forecast industry premiums to decline 0.7% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 143:

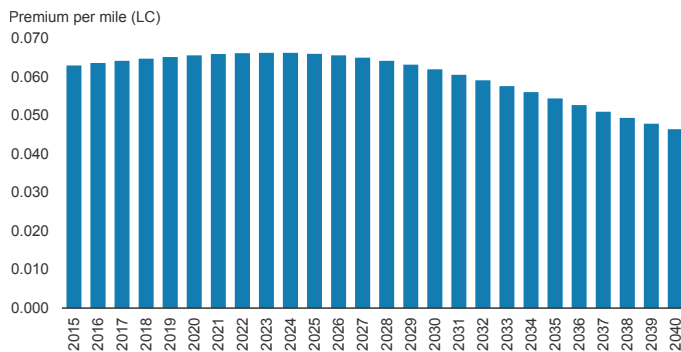
France Heavy Disruption: we forecast industry premiums to decline 3.0% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 144:

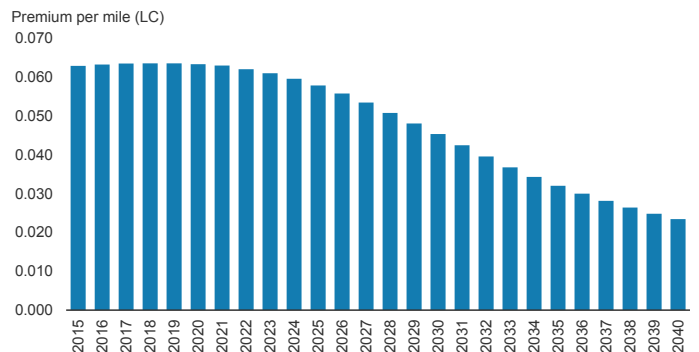
France Limited Disruption: we think premiums per mile could fall 26% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 145:

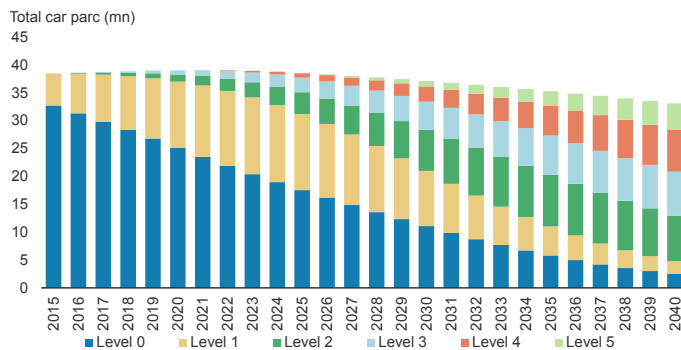
France Heavy Disruption: we think premiums per mile could fall 63% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 146:

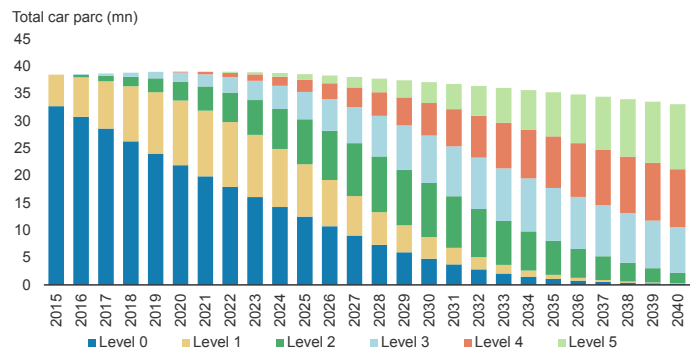
France Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 147:

France Heavy Disruption: A faster shift to levels 2-5 and higher scrap-page rate of vehicles

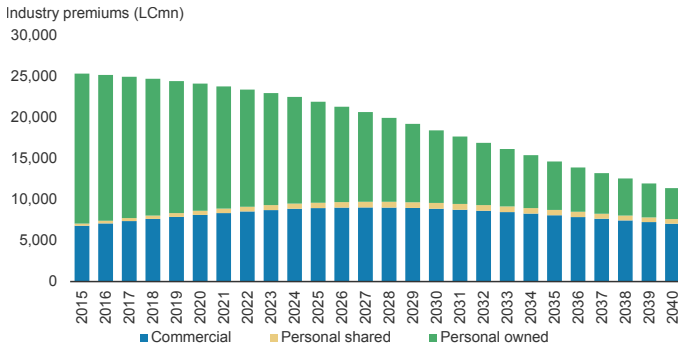


Source: Morgan Stanley Research estimates, BCG analysis

Germany motor market forecasts

Exhibit 148:

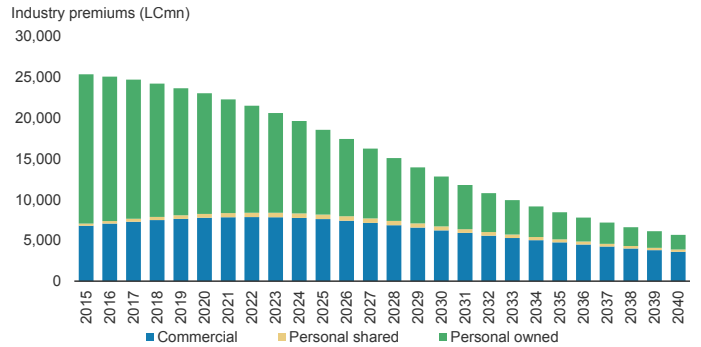
Germany Limited Disruption: we forecast industry premiums to decline 3.2% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 149:

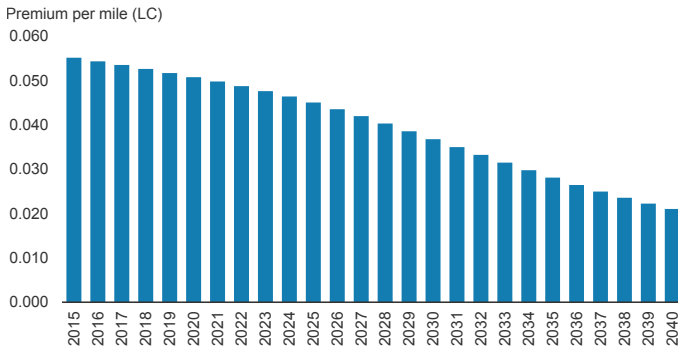
Germany Heavy Disruption: we forecast industry premiums to decline 5.8% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 150:

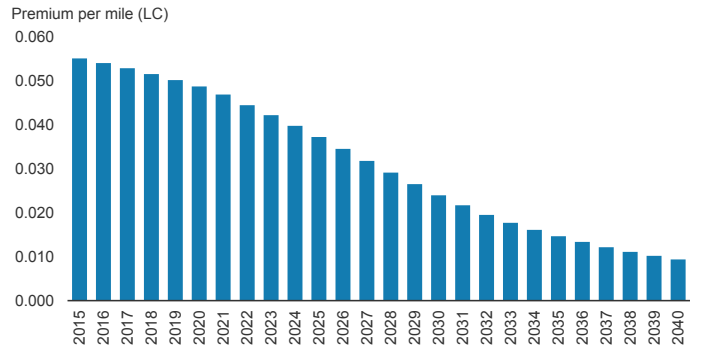
Germany Limited Disruption: we think premiums per mile could fall 62% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 151:

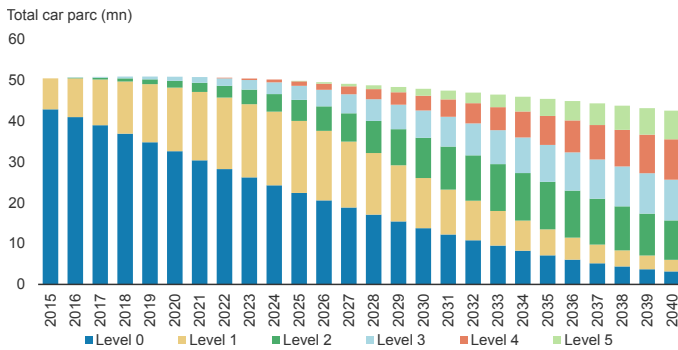
Germany Heavy Disruption: we think premiums per mile could fall 83% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 152:

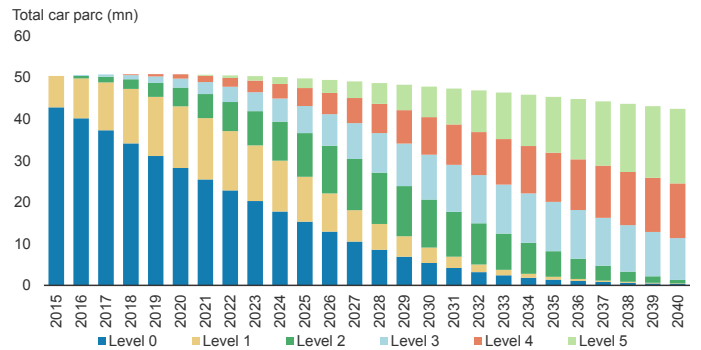
Germany Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 153:

Germany Heavy Disruption: A faster shift to levels 2-5 and higher scrap-page rate of vehicles

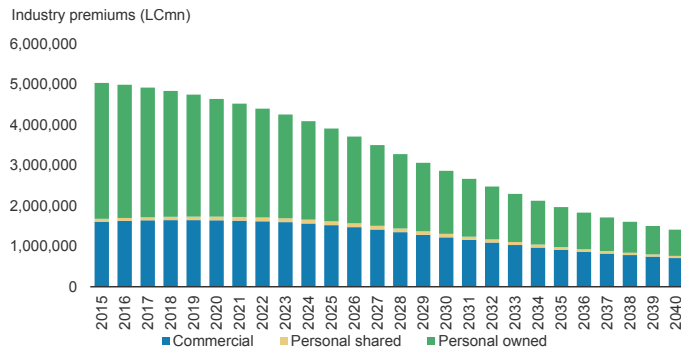


Source: Morgan Stanley Research estimates, BCG analysis

Japan motor market forecasts

Exhibit 154:

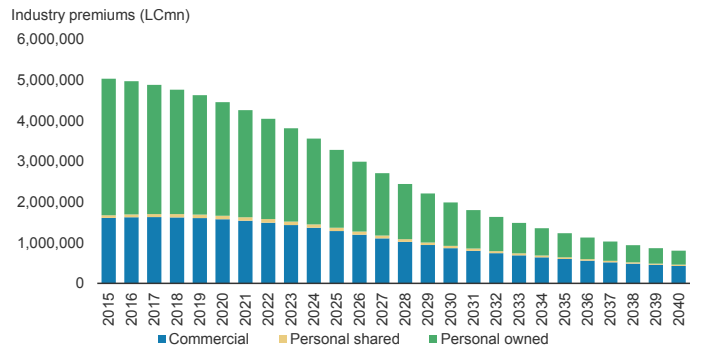
Japan Limited Disruption: we forecast industry premiums to decline 5.0% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 155:

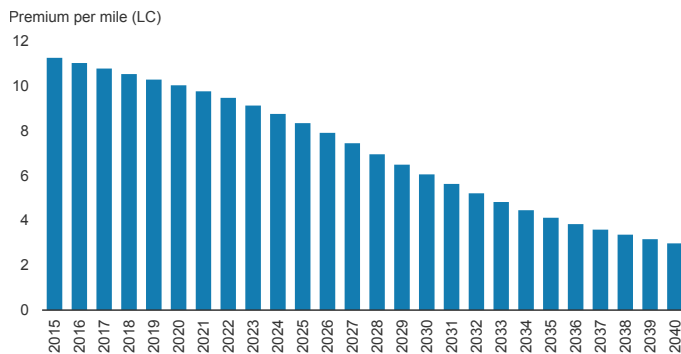
Japan Heavy Disruption: we forecast industry premiums to decline 7.1% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 156:

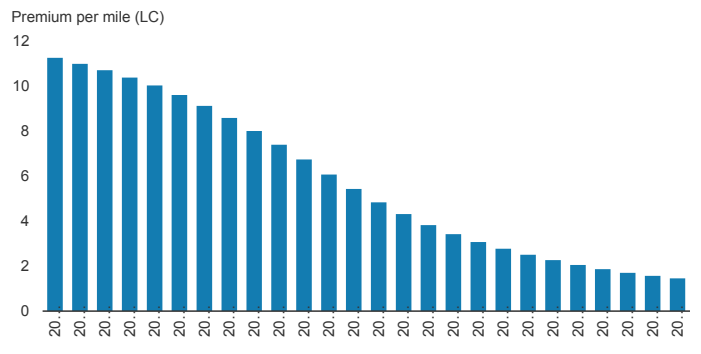
Japan Limited Disruption: we think premiums per mile could fall 74% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 157:

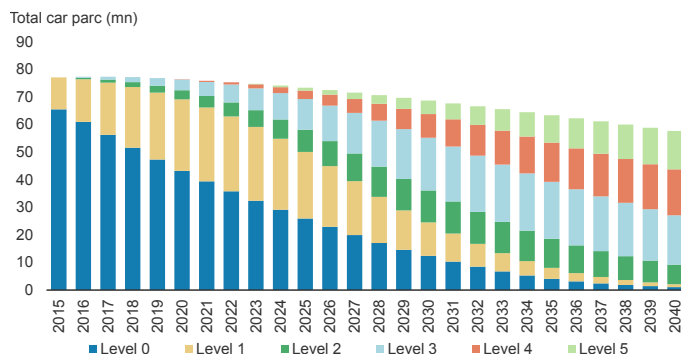
Japan Heavy Disruption: we think premiums per mile could fall 87% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 158:

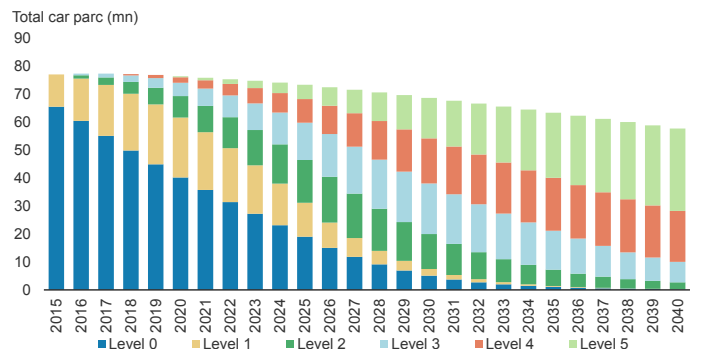
Japan Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 159:

Japan Heavy Disruption: A faster shift to levels 2-5 and higher scrap-page rate of vehicles

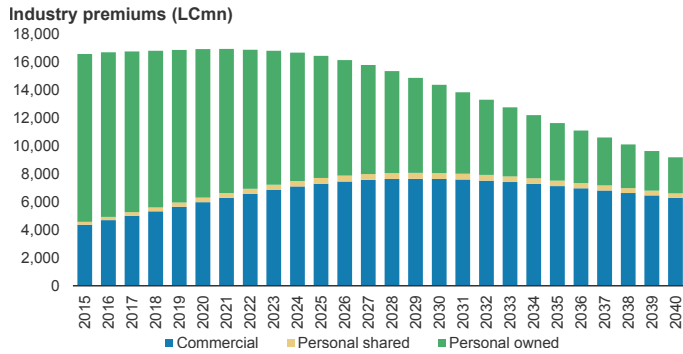


Source: Morgan Stanley Research estimates, BCG analysis

United Kingdom motor market forecasts

Exhibit 160:

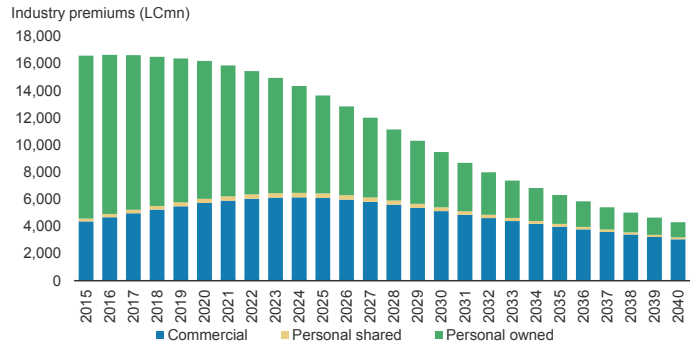
UK Limited Disruption: we forecast industry premiums to decline 2.3% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 161:

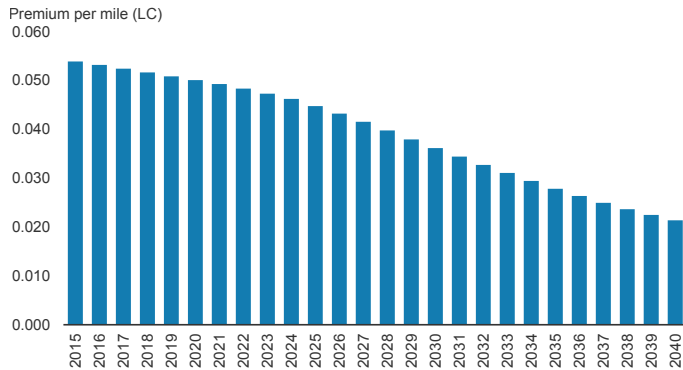
UK Heavy Disruption: we forecast industry premiums to decline 5.2% CAGR to 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 162:

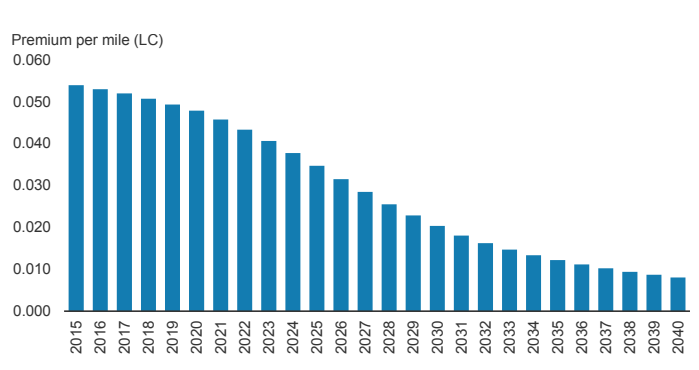
UK Limited Disruption: we think premiums per mile could fall 60% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 163:

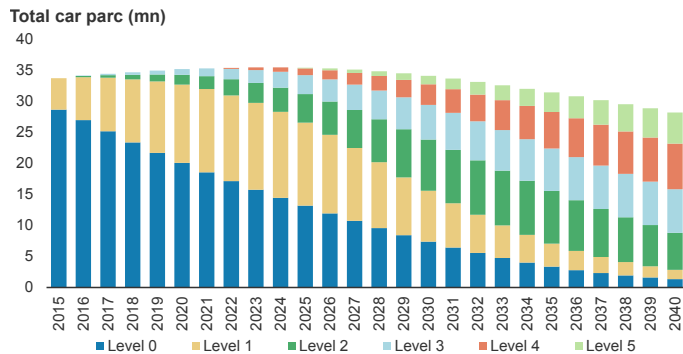
UK Heavy Disruption: we think premiums per mile could fall 85% by 2040



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 164:

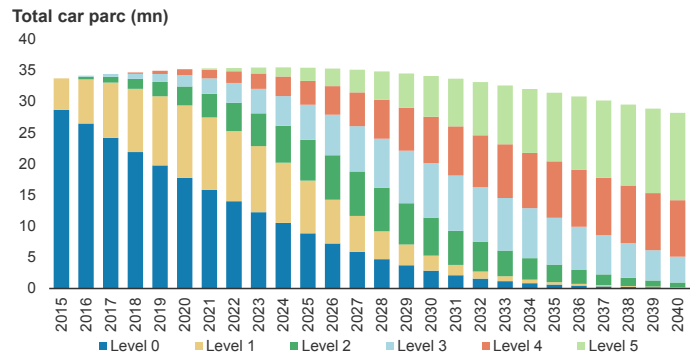
UK Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles



Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 165:

UK Heavy Disruption: A faster shift to levels 2-5 and higher scrappage rate of vehicles



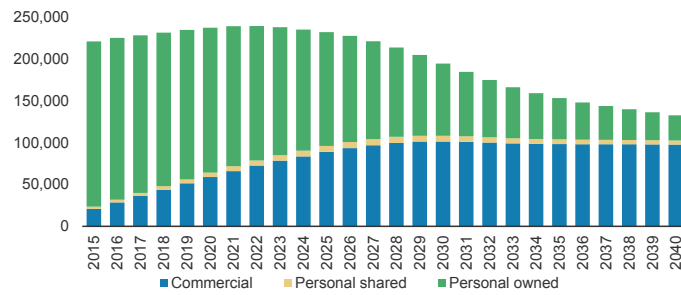
Source: Morgan Stanley Research estimates, BCG analysis

United States motor market forecasts

Exhibit 166:

US Limited Disruption: we forecast industry premiums to decline 2% CAGR to 2040

Industry premiums (LCmn)
300,000

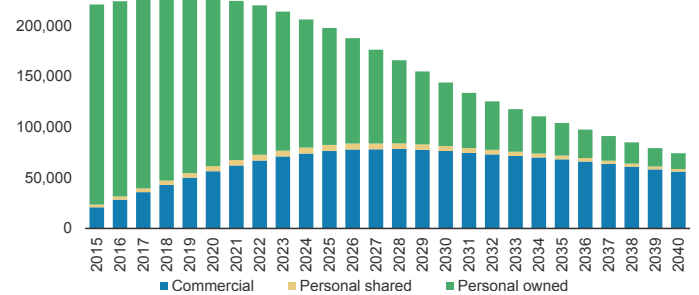


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 167:

US Heavy Disruption: we forecast industry premiums to decline 4% CAGR to 2040

Industry premiums (LCmn)
250,000

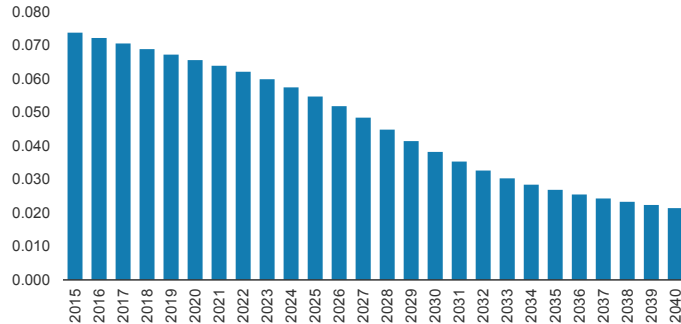


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 168:

US Limited Disruption: we think premiums per mile could fall 71% by 2040

Premium per mile (LC)

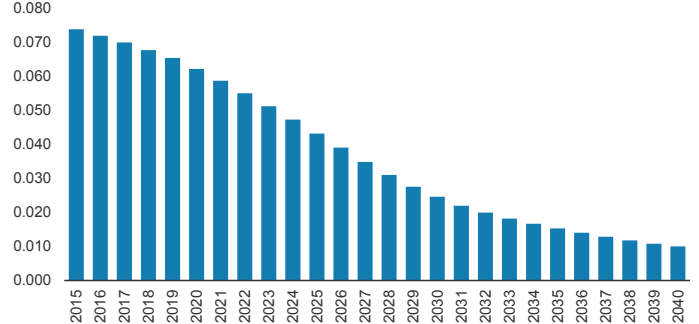


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 169:

US Heavy Disruption: we think premiums per mile could fall 86% by 2040

Premium per mile (LC)

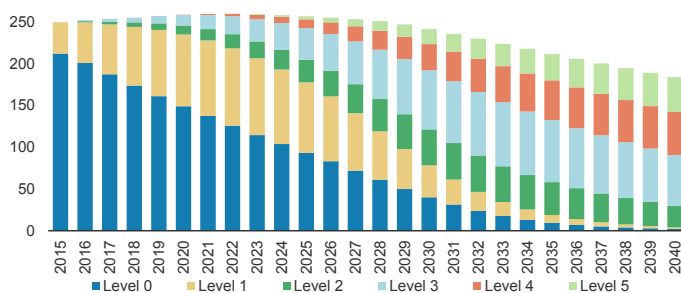


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 170:

US Limited Disruption: The overall car parc shrinks and there is a shift towards higher level vehicles

Total car parc (mn)
300

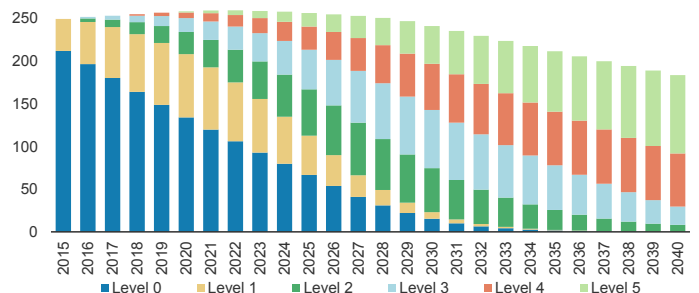


Source: Morgan Stanley Research estimates, BCG analysis

Exhibit 171:

US Heavy Disruption: A faster shift to levels 2-5 and higher scrappage rate of vehicles

Total car parc (mn)
300



Source: Morgan Stanley Research estimates, BCG analysis

Appendix 3: Consumer Survey Methodology

Scope of global consumer survey

For our global consumer survey, we composed and presented the same questionnaire to a population of over 1000 respondents in each of 11 territories.

The territories sampled were: the US, Brazil, the UK, Germany, France, Italy Poland, China Japan, South Korea and Australia, bringing the total sample size to 12,277 respondents.

We surveyed licensed drivers only, aged between 18-65. Responses were not weighted to match effective distribution of income, residential area or age in each countries.

The survey was carried out online, and took place in June 2016.

Consumers were asked to answer questions relating to:

- The cars they or their household own
- Their perception on the adoption of new car technologies
- The relationship, satisfaction and expectations they have with their motor insurance
- Their usage and perception of alternative modes of transportation (vs. private cars)

Appendix 4: Stocks Included in Market Cap at Risk Calculation

The \$200bn market cap at risk number was calculated based on the following stocks:

Covered by Morgan Stanley Research

Admiral	IAG	PICC P&C
Aviva	Suncorp	Ping An
AXA	QBE	CPIC
Allianz	Tokio Marine HD	Taiping Insurance
Direct Line	Sompo Holdings	Allstate
Generali	MS&AD	Progressive
RSA	Samsung F&M	Travelers
Zurich	Dongbu	Hartford Financial Services
Swiss Re	Hyundai M&F	Intact Financial
Munich Re		
Hannover Re		
Scor		

Not covered by Morgan Stanley Research

esure	Berkshire Hathaway
Hastings	

Endnotes

- 1 please see Appendix 4 for full list of companies included in this calculation
- 2 please see Appendix 4: Stocks Included in Market Cap at Risk Calculation for a list of stocks covered in this calculation
- 3 global motor market forecasts based on CAGR assumptions from Swiss Re
- 4 <http://uk.businessinsider.com/report-10-million-self-driving-cars-will-be-on-the-road-by-2020-2015-5-6>
- 5 see Morgan Stanley report: Autonomous Uber Fleet for Public Use by End of this Month, August 18 2016
- 6 CEO on General Motors 2Q16 conference call
- 7 Autos & Shared Mobility: Apple Auto: The Elephant in the Car? September 22 2015,
- 8 <http://www.wsj.com/articles/apple-speeds-up-electric-car-work-1442857105>
- 9 <https://www.uber.com/info/mapping/privacy-statement/>
- 10 Ford press release, August 16 2016 <https://media.ford.com/content/fordmedia/fna/us/en/news/2016/08/16/ford-targets-fullyautonomous-vehicle-for-ride-sharing-in-2021.html>
- 11 <http://www.bbc.co.uk/news/business-37181956>
- 12 <https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf>
- 13 <http://media.ofcom.org.uk/news/2014/tablets-help-drive-increase-in-older-people-going-online/>
- 14 <https://www.transportation.gov/AV/federal-automated-vehicles-policy-september-2016>
- 15 <https://www.gov.uk/government/speeches/queens-speech-debate-transport-and-infrastructure>
- 16 please see Appendix 4 for full list of companies included in this calculation
- 17 <https://newsroom.uber.com/our-commitment-to-safety/>
- 18 Assuming PSA sells 3m units globally, a 20 year life leading to 60m cars on the road, but only cars sold in the last 5 years would have connected/telematics technology, therefore assuming 15m 'addressable' cars.
- 19 <http://www.volvocars.com/int/about/our-innovation-brands/intellisafe/intellisafe-autopilot/c26>.
- 20 <http://asia.nikkei.com/Business/Deals/Toyota-Aioi-Nissay-eye-US-venture-for-usage-based-car-insurance>
- 21 <http://analysis.tu-auto.com/insurance-legal/qa-oems-enter-ubi-space-renault-nissan-case>.

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	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MISC
Overweight/Buy	1140	34%	250	39%	22%	564	35%
Equal-weight/Hold	1458	44%	305	47%	21%	727	46%
Not-Rated/Hold	73	2%	7	1%	10%	10	1%
Underweight/Sell	651	20%	86	13%	13%	291	18%
TOTAL	3,322		648			1592	

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