

## Insight

### DRIVERLESS CARS: WHERE ARE THEY HEADING

The IPOs of Lyft and Uber are notable not just for their astounding valuations but because they mean that the new business models of ride-hailing and ride-sharing are finally going mainstream.

More than a century ago, Henry Ford revolutionised automobile ownership with the introduction of the Model T in 1908. Mass production made it the first genuinely affordable car and although it was famously available in all colours as long as they were black, the Model T profoundly changed the course of American cities and society. Owning a car provided the freedom to travel greater distances in search of better opportunities and experiences. Demand for the Model T was so enormous that to this day it is one of the bestselling cars of all time. Mass produced, affordable cars (as well as trucks and tractors) were a disruptive technology and are one of the major reasons the US is the wealthiest country on earth; and they play a similar role in other countries to this day.

Today new technologies are disrupting old ones and attitudes to car ownership have changed. New business models are everywhere. Companies like BlaBlaCar (ride sharing) and ZipCar (car sharing) have joined Uber and Lyft, to reduce the need for people to own a car. With so many on-demand personal transportation options, it is questionable if owning a car means as much to millennials as it did to previous generations. The signs are that it does not.

### AUTOMATION

With car-ownership in question, what of the vehicles themselves? Electric cars are getting better, more sophisticated and also more affordable (Tesla Model 3s come in six colours, including black...). But how far will it go? If and when electric cars are widely adopted, will they, or any other type of car, ever be fully autonomous (i.e., self-governing)? Or will driverless cars and robo-taxis stay in the realm of science fiction? It is notable that both Lyft and Uber, which are ride hailing and ride sharing businesses, are also developing autonomous car technology. Wages paid to drivers are a significant percentage of their costs. If there was no driver, these platforms could become highly profitable.

To put these questions around autonomous cars in context, it is useful to take a more granular look at the various stages of driving automation. According to SAE International (the Society of Automotive Engineers, which develops technical standards), there are five key levels:



Today, the most advanced vehicles are using Level 2, partial automation. This includes features such as parking assistance, automatic emergency braking and road edge detection. Situational awareness remains the preserve of the driver. Level 3 is conditional automation, which means vehicles can assume dynamic driving tasks like lane changing, steering and braking, and alert the driver when human assistance is required. Level 4, high automation,

# J. STERN & CO.

*The Value of Long-Term Investing*

will take over most driving tasks without any human input in well-mapped and geo-fenced areas. Level 5 is full automation; there is no human input whatsoever. This is the holy grail of autonomous vehicles.

The gap between Level 2 and Level 5 is significant. The airline industry offers a parallel. Electronic systems, autopilot and fly-by-wire have been installed for decades. That is why planes are often assumed to have high levels of automation. But it may come as a surprise to some that airliners are rated only at Level 2 despite operating in a highly controlled environment. They have the benefit of outside assistance from air traffic control and other sources, and when needed, at least one pilot to take over. There are only so many planes in the sky and so many hazards to hit.

However, the fatal recent crashes involving Ethiopian Airlines and Indonesia's Lion Air, which led to the grounding of the Boeing's 737 Max aircraft and an ongoing investigation into its anti-stall software, are a reminder of why aeroplanes remain at such a relatively low level of autonomy.

But while individual car accidents on average do not cause as many fatalities as plane crashes, the environment in which ground-based vehicles must operate is far more hazardous. There are an estimated more than one billion cars. Autonomous car testing, must take place in the real world, with all the associated risks that implies. Only last year there was a fatality in Arizona when an Uber self-driving car struck a pedestrian after failing to perform an emergency stop.



The ethical considerations are complex. In medical trials, patients volunteer to take part. With autonomous vehicles, is there any consent from other road users or pedestrians in the vicinity? Is one life lost in testing worth all those saved if autonomous cars do eventually prove safer than humans? Will Boeing's anti-stall software, if it is found to be linked to the two crashes, ultimately end up preventing an exponentially larger number of deaths?

Regulatory risk is another issue. We have seen in many areas that technology moves faster than regulation which, after all can hinder progress if it is allowed to become overbearing. For example, in the late 19th century there were a series of Acts of Parliament in the UK called the Locomotive Acts, which sought to regulate the use of mechanical vehicles on public highways. The second of these, enacted in 1865 and more commonly known as the Red Flag Act, not only restricted automobiles to 2mph in the city, but required them to have a man walking in front waving a red flag to warn of the impending danger of this vehicle. With hindsight this sounds absurd (although it did provide jobs for flag wavers). However, regulation is struggling to catch up and we wonder, what are the equivalent absurd regulations today which hinder technological development?

## THE POTENTIAL WINNERS

Four types of companies could benefit from full adoption of self-governing cars. The first group comprises the car makers and platform providers themselves. This includes the old guard such as General Motors, Toyota and Volkswagen, Mercedes and BMW with their different brands and profiles, newer breeds such as Tesla or Rivian or even the platform companies such as Uber and Lyft. The second category includes companies which manufacture sensors and controls, converting real-world visual information into data. The third group are those businesses focused on computing and processing the data using complex artificial intelligence algorithms to interpret the information. Google has invested billions in Waymo, perhaps the most advanced self-governing software, but has not yet revealed its application or how it intends to monetize it. Lastly, there are those companies associated with facilitating connectivity, storing and transmitting that data back and forth from the car to the datacentres.

It is hard to say today with any certainty which of these would profit most from the rise of autonomous cars. For the auto manufacturers it is likely to be a question of whether they are able to adapt their business models to a sufficient degree, or whether they are usurped by the tech giants, either directly or through a company like Aurora, the autonomous technology developer in which Amazon has recently taken a stake. The eventual level of automation could tip the scales one way or the other: if Level 2 or 3 is as good as it gets, the incumbents may yet prevail.

## DO WE EVEN WANT AUTONOMOUS CARS?

Perhaps the most fundamental question of all is whether we want cars that do everything themselves. Brands like BMW with its long-time advertising slogan 'The Ultimate Driving Machine', are based on the pleasure of driving. Will those of us who like to drive, who value handling characteristics and speed want to forgo the enjoyment of driving a car for sitting in one doing nothing? Or does the Millennial generation (and the one behind it, Generation Z) perceive the car as a functional utility that offers transportation from A to B.

In a future of increasingly urbanized global populations, paramount environmental concerns, and societies based on sharing economies in which people prefer to rent not own and their quality of life, satisfaction and status come from having experiences and receiving services, why own a car at all? If the Model T is no longer a symbol of freedom and of progress but of hassle and pollution, the industry is ripe for disruption.

## AMARA'S LAW

US scientist Roy Charles Amara has coined an adage now known as 'Amara's Law', which states that "We tend to overestimate the effect of technology in the short run and underestimate the effect in the long run".

Perhaps that is an apposite way to view autonomous vehicles. There is a cohort of believers who assume driverless cars will be ubiquitous in a few years' time. In reality, it could be 30 years, or longer. Given that duration, the nature of advance could be radically different than we envisage today and the impact, in addition to the known threats to existing jobs and current markets, could be profound. Will cities have to change to accommodate the shift to automotive automation? Will separate carpool lanes need to be created for the exclusive use

of autonomous cars? How will gas stations, service centres, the tyre industry, insurance companies, finance companies, and all the other industries involved in the cars adapt?

Established car companies have been deliberate in introducing hybrid technology and electric cars so as not to disrupt their combustion-engine based franchises. The same is likely to be true for autonomous driving and it is always possible that entrenched vested interests and the sheer level of investment in existing infrastructure will prove to be a lasting impediment to the widespread adoption of driverless cars.

## PORTFOLIO EXPOSURE



Among our portfolio companies, *Alphabet* and *Amazon* – the latter via its logistics process transporting goods and merchandise between fulfilment centres and customers – are the two most exposed to the theme of autonomous driving.

Alphabet's Waymo has made the most progress in terms of miles driven without requiring human intervention. Morgan Stanley produced a report last year where they believed that Waymo could be worth up to \$175 billion. That would be significant even for Alphabet. As with Amazon's AWS cloud computing business when it was at an early stage, we simply do not know. But we do know how to ask the question and where to look for the answers. If Waymo means that people no longer need to have their eyes on the road and drive, perhaps it will be no more than a way to maximise the time that people can spend on their phones and computers (i.e. using Google more)? Or it is more likely that Alphabet recognises Amara's Law and there is something far greater at play: that autonomous driving can allow Alphabet to diversify into a \$2 trillion global industry it thinks it can disrupt, with significant scale, technological advantage and the possibility for significant revenues and profits, and without facing competition issues.

It is hard to make a pure-play investment case today and it is too soon to make a definitive judgment on the probable success of driverless cars. However, autonomous driving is an area we will continue to monitor closely and will look to for opportunities for long-term investment and value creation.

*Giles Tulloch*  
*April 2019*

# J. STERN & Co.

*The Value of Long-Term investing*

J. Stern & Co. provides this document for information only. The information provided should not be relied upon as a recommendation to purchase any security or other financial instrument, nor should it be considered as a form of investment advice or solicitation to conduct investment business. Our services are only provided to clients, in certain jurisdictions and under a signed mandate. The views expressed from the date of publication are those of J. Stern & Co. and/or the actual author(s) and are subject to change without notice. Information within this document has been obtained from sources believed to be reliable at the date of publication, but no warranty of accuracy is given. The value of any investment can fall as well as rise; past performance is not a reliable indicator of future results; and returns may increase or decrease as a result of currency fluctuation.

J. Stern & Co. includes J. Stern & Co. LLP, Star Fund Managers LLP and/or J. Stern & Co. (Switzerland) AG. J. Stern & Co. LLP and Star Fund Managers LLP are both authorised and regulated by the Financial Conduct Authority, and where relevant, J. Stern & Co. LLP has approved it for distribution. J. Stern & Co. (Switzerland) AG is a member of Polyreg and adheres to the PolyAsset Code of Conduct.

More information on J. Stern & Co. can be found at [www.jsternco.com/legal](http://www.jsternco.com/legal), including our privacy notice, other regulatory disclosures and registered office information.

© J. Stern & Co.