

Quarterly Review

Q3 2019

Wenlock Global Fund

Has the Private Equity bubble burst?

Autonomous driving The Actors and Who wins

Wenlock Global Fund
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Wenlock Global Fund - September 2019

Net Performance	3m	1yr	SI
Wenlock Global Fund	-5.2%	-2.6%	+24.0%
MSCI World Net Total Return (AUD)	-2.6%	+9.2%	+35.2%

Source: Mainstream Fund Services, Thomson Reuters. ^Calculations are based on total returns and net of all fees but before tax or the buy/sell spread. Performance figures are based in AUD.

SI = Since Inception 9 August 2017.

Past performance is not a reliable indicator of future performance.

Dear Investors,

Q3 turned out to be a disappointing period for the Fund. A rotation from growth to value persisted throughout the quarter which led to the Fund's underperformance.

We are uncertain when this will subside or reverse but believe that when this current bout of defensive posturing ends, the Fund's holdings will continue their long-term outperformance. We are confident that the fund's holdings will find investor favour as affinity to growing cash flow businesses rekindles. Investee companies continue to benefit from long term secular tailwinds and in turn continue to deliver strong sales and cash flows. In fact, their earnings reports have thus far been strong and yet the market hasn't given them credit. As much as this is frustrating, we are steadfast in our view that over the long-term companies that produce growing cash flows will be ascribed the appropriate valuation. Times like this allow us to deeper test the conviction in each of the Fund's holdings. Business models and valuations for each investment are examined and scrutinised to ensure they are consistent with the initial investment thesis and the Wenlock Capital investment process. We admit the valuation multiple that investors attach to companies varies depending on several factors but ultimately it should be dependent on the quality and quantum of cash flows a company generates. The average free cash flow growth generated by companies in the Fund is 19%. We are confident this is sustainable in the long term.

Investors have become discerning regarding valuation and quality. Companies that are perceived to have flaky business models and little or no sight to profitability have underperformed significantly. This provides opportunity for investors that are looking for inefficiencies in the market. By and large, many companies that have weak business models are unlikely to gain much investor interest. However, by the same token, this sentiment also drags down perfectly strong companies that are perceived in the same light. This provides investors with opportunities for those willing to do the work and establish a better understanding of the underlying business drivers.

Several of the Fund's satellite holdings have fallen into this category. As such, the performance of this cohort has had a negative impact on the Fund. Examining each holding over the course of the past few months has given us an opportunity to question our own as well as the markets' perception on valuations. In our view, many of these holdings have relatively low valuations given the growth they are delivering and those that are about to break into profitability are not well understood by the market. To this end, we have slowly added to positions that have underperformed but continue to deliver growing revenues and cash flows. We envisage, that as prices fall, we will add to the most compelling and highest conviction investments.

Private Equity Bubble – Pop!

We had mused previously that there was a bubble in private equity markets, and it appears some of that luster has oxidised. Over the past few months the mood towards IPOs has dramatically diminished. Companies that came to market have witnessed their share prices take a beating. So much so that we believe that in all the carnage there could be some gems. However, in the meantime many IPOs will have to adapt their narrative in this unforgiving and highly sceptical market.

We noted in the June newsletter that companies like WeWork didn't understand themselves or the markets perception of their business model. This ultimately led to their IPO downfall. For those that missed WeWork's misfortune, the company had to abandon its IPO. This after what turned out to be a highly dubious valuation of above \$40bn. Its business model wasn't disruptive enough and one that spent copious amounts of money in essentially a service or experience that wasn't vastly different from that was already being offered by

others.

Days of easy money for venture capital companies have possibly come to an end. The US west coast venture capital scene resembled a 'multivariant Ponzi Scheme' as Chamath Palihapitiya stated in 2018. VCs were hell-bent in handing out capital to start ups in order to grow at all costs. This led to a higher revaluation of those private companies who subsequently went back to raise more money. VCs took advantage and raised new funds for later funding rounds, gathering assets but with little substance. Industry participants looked like heroes in this revaluation and funding round merry-go-round. VCs knew this party wasn't sustainable and throughout 2019, rushed to list their investments attempting to take advantage of public appetite for 'unicorns'. Although some unicorns showed strong demand from public investors, many have greatly disappointed to the extent that private investors are underwater. The party has truly come to an end for the VC community. Public investors wanted upside but were left with all the downside.

However, all is not lost to public investors. The antipathy towards IPOs has created a headwind for other attractive IPOs that have been dragged down by this negative sentiment. Those with robust business models and a clear path to profitability will provide reward to those that are willing to do the research others avoid and who are able to weather some volatility.

To this end, we believe Lyft, in the USA is a clear victim of this downward draft. Its business model has a path to profitability which was recently pulled forward by one year. Revenues grew over 60% year on year in the last quarter and operating cash flow for the quarter was positive. Sitting on \$3bn of cash and trading on a 12-month forward EV/Sales of less than 3x, we think this provides a base for strong performance. Thus, we see a projected cash flow return on invested capital of >30% in a few years.

For Lyft the market concerns revolve around three major points:

- i. Share overhang from lock-up expiry. In the September quarter restrictions on insider selling were removed and shares have been under pressure ever since. However, over time this will fade, and we feel its valuation will slowly reflect the business model.
- ii. Ride sharing industry dynamics. The ride share sector had witnessed heavy discounting to attract

riders. Over the past 6 months both Uber and Lyft have restricted the number of discounts made available to riders. Both have also changed their revenue-share models with drivers. This has led to improved profitability as the market moves to a rational pricing model. It will be difficult for incumbents and new entrants to break the oligopoly in the US as users, especially millennials, are wedded to certain apps despite cheaper offerings.

- iii. Overall profitability. In our view Lyft and Uber understand the market is only interested in profitable growth. The 'growth at all cost' paradigm is now a relic. Thus, the message is ringing loud and clear in the ears of the CEOs. We feel the first step towards profitability is underway and expect Lyft to deliver profitability even earlier than the company has stated. Many unicorns have excess fat and the recent focus on profit versus growth has meant that CEOs are razor focused on ensuring they deliver on profit expectations and exceed them in some cases.

We estimate that cash flow return on invested capital (CFROI) for Lyft can reach over 35% in 2022. Our view is that margins will exceed market expectations as autonomous ride sharing starts to dominate trips over the longer term. Excluding autonomous from our estimates we still expect significant upside to Lyft.

Why doesn't the market appreciate Lyft's business model today? The biggest drag to the name is poor sentiment around companies that have recently listed and unprofitable. It the combination of these factors we think supports the negative sentiment. However, Lyft has delivered positive operating cash flow over the past two quarters, but the market only looks at reported earnings, which are negative due to non-cash items. We perceive cash earnings as a stronger and better indicator of a company's quality (adjusting for dilution from share-based compensation). Ultimately, cash is what really matters for investors. Over the course of the next 12 months we believe that Lyft will have positive operating cash flows, and that during this period investors will reassess their view on Lyft.

Threat of new entrants has probably disappeared as a result of capital discipline from private equity backers. No longer are we seeing private equity throw capital at loss making entrants vying for 3rd or 4th place. Entrants from foreign markets will need to fight for app dominance. A trend we have observed is that app users find affinity to one or two apps for the provision of a

certain service. Price become less important (within reason) when selecting which app to use. Service usually drives stickiness. Hence, we feel Lyft or Uber to maintain their respective market dominance.

Uber, is also a victim to negative investor sentiment. Unlike Lyft, Uber has a more complex business model with Uber Eats. The Eats segment unfortunately is sapping profitability from the ride sharing unit and investors are struggling to understand how food delivery can be profitable.

Portfolio Review

During the quarter we made a few strategic shifts, the impacts of which we expect will play out over the longer-term. In the healthcare sector we choose to exit Moderna, because we believe that though the long-term outlook for the company hasn't changed, in the medium-term opportunities elsewhere provide attractive risk reward payoffs. Moderna's drugs have shown promising results when injected into mice and primates. We will continue to monitor it's progress as it works through clinical trials into humans.

We replaced Moderna with Invitae, a leading company in the area of genetic testing, focused on conditions like cancer, heart disease, and rare disorders, as well as infertility and pregnancy. The company uses its proprietary AI to constantly get a better understanding of one's genetic makeup to deliver more accurate results to ultimately lower the cost of its testing. This massive database of customer tests has the potential to become its everlasting moat. CEO Sean George purported, Invitae is not just providing information about your health but also about the health of your children and family. By bringing to light the genetic information that the world's experts across all disease areas could use to provide better diagnostics and insights. Also, we see upside for this company from non-invasive prenatal screening (NIPS), which is a recurring revenue model that addresses every pregnant woman. Currently, Invitae notes that there are 6m pregnancies a year in the U.S. and with the recent acquisition of SingularBio in June 2019, the CEO [suggested that](#) within 18 months the NIPS business could become a 50% gross margin business.

In the Financial sector, we initiated new positions in electronic trading technology service providers. Last quarter, we added Tradeweb Markets, the global leader in electronic fixed income trading that spun out

of Thomson Reuters. However, this quarter we added to MarketAxess to the portfolio. The primary reason for this was the fact that the two businesses are complimentary in nature. While Tradeweb is the market leader in treasuries and interest rates, MarketAxess has been a consistent front-runner in investment-grade and high-yield markets. While the former is a high-volume lower margin business, MarketAxess is a lower volume and high margin business. MarketAxess is the market leader in the electronically-traded (vs. voice-traded) corporate bond market. This market still represents a much smaller market which is growing expeditiously and gaining market share over voice-trading.

In the ridesharing sector, we had previously initiated positions in Lyft, after what many called a disastrous IPO. However, our analysis suggested that the industry possessed a large and growing target addressable market. Additionally, we found Lyft to be a well-managed business with a clear strategy and road to profitability. We then compared Lyft to Uber and found the main reasons why Lyft was more attractive were follows;

- Lesser complexity: Lyft operates only in USA and thus is focused in one geography having to deal with similar regulatory and political frameworks.
- Growing market share: Within USA, while the overall market for ride sharing duopoly of Uber and Lyft may be growing at a fast pace, Lyft is growing even faster. Its growth is driven by overall market growth as well as continuous inroads into Uber's market share.
- Clearer road to profitability: Again, Lyft is benefiting from operating in a single country. Its road to breaking even, after its results for the quarter ended June 2019, seems to be much clearer when compared to Uber.

In conclusion, higher growth and clearer visibility with regards to its path to profitability, Lyft provides a better a risk-reward incentive.

Last quarter, in recognition of the semiconductor sector's extremely tough prior year, the improving dynamics in inventory levels and the early signs of a pick-up in demand we initiated a small position in Siltronic. It is a dominant player in the Silicon ingot and wafer manufacturing market. While our investment thesis remained intact, the stock initially headed downwards before recovering towards the latter half

of the quarter. Thus, we used intermittent corrections as buying opportunities and added to our position. Also, during the quarter we took advantage of sporadic weakness in two other portfolio companies – Blue Prism and Align Technologies, to make opportunistic additions.

We booked profit during the quarter in companies that had rallied significantly in the past quarter, namely – Insulet, London Stock Exchange and Diageo; and exited our position in Fortive Corp as it reached close to our long-term price target.

Protection

The Fund employed an average of 67% protection throughout the quarter.

Decrypting Autonomous Driving: Software is Key

When we think about autonomous vehicles, we think about the likes of Tesla; and not the traditional automotive manufacturing companies. That is because the new age disruptors have taken the lead when it comes to autonomous technology with the traditional incumbents lagging. However, the autonomous landscape is constantly changing, and traditional automobile manufacturers are starting to play catch-up.

In July 2019, Ford and VW said they would expand their [global alliance](#) to include electric and self-driving vehicles in the US and Europe. This marked the beginning of a new era, as past competitors joined forces and to work together on highly strategic projects. Partnerships, though, are only one of the many recent announcements in the field of autonomous vehicles, with OEMs scrambling to catch-up with new competitors such as Google’s self-driving vehicle unit Waymo and the now publicly listed Uber. Technology platforms are seemingly becoming increasingly more valuable and scientifically advanced, much to the chagrin of traditional vehicle manufacturers.

Meanwhile, the global automotive industry continues to pour billions of dollars into research and technology start-ups, with the urgency to find new people with the appropriate skills. According to research from [BCG and the Michigan Mobility Institute](#), the US automotive industry alone will require around 45,000 mobility engineers and 70,000 skilled trades workers for the

testing and rollout of autonomous vehicles in the next decade.

As a result of the growing efforts behind making autonomous a reality (despite the recent excessively optimistic push for Level-5 ie full autonomy), the favoured scenario that seems to be emerging is obsolescence of car ownership. This has the potential to disrupt a number of current business models, including; car insurance, financing, fleet management, etc.

Industry Segmentation

In order to grasp the magnitude and understand the blurring boundaries between vehicle manufacturers, traditional automotive suppliers and technology companies, we have broken-down the autonomous driving space into seven different segments.

Autonomous driving systems offer full-stack autonomous driving software and technologies for their customers. These may include advanced driver assistance systems (ADAS) which aim to augment certain driver capabilities, to technologies approaching complete autonomous driving systems.

Data and simulation firms offer data analysis, image annotation and clustering, training data and advanced simulation tools for customers looking to train their autonomous driving systems. These must provide an extremely high level of accuracy and reliability; hence accurate simulation data and annotation is crucial.

Light detection, ranging and sensing includes hardware and software to enable the analysis and comprehension of vehicle surroundings in real time. Included are radar, light detection and ranging (LIDAR) systems, ultrasound, cameras, and chip and software technology start-ups.

Autonomous vehicle manufacturers build vehicles with autonomous driving capabilities akin to OEMs. While fully autonomous vehicles with the primary purpose of transporting passengers may still be a few years away, current autonomous products are becoming more entrenched in industrial practices. These are special purpose vehicles that range from street cleaning vehicles to last mile delivery pods.

Map and location-based services in their simplest form allow modern vehicles to locate their destination with pinpoint accuracy and even provide

supplementary data vital for autonomous mobility in the future (i.e. curb-side availability, live traffic and parking data). These services, rely on highly precise geolocating, enable vehicles to understand their surroundings, and interpret and deduce actions from the data received from hardware sources.

Apps and mobility infrastructure companies offer mobility services, provide software or physical infrastructure for autonomous vehicle testing purposes, along with next generation mobility-as-a-service platforms (MaaS).

Connected car and V2X infrastructure companies allow communication between devices, vehicles and their environment to enable a fully autonomous mobility ecosystem. In the future, 5G communication technology will play an imperative role here.

Autonomous Vehicle Landscape



Source: Firstmile

Top 20 Autonomous Vehicle Start-ups (by total funding volume)

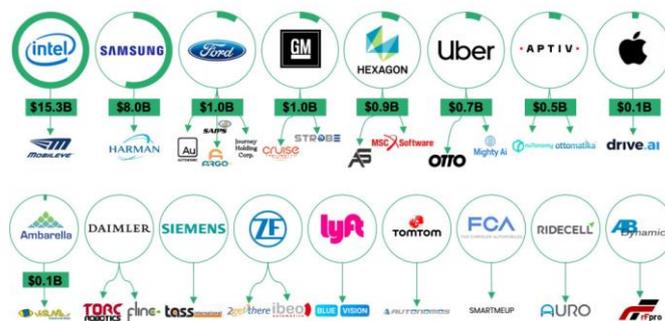
Company	Segment	Description	Funding received (USD m)	Location
Waymo	Autonomous driving systems	Developer of AI software designed to offer self-driving technology.	\$3,600	Pittsburgh, USA
Wayve	Light detection / ranging and sensing	Developer of a face recognition technology for object recognition and processing.	\$2,600	Beijing, China
Faraday Future	Autonomous driving systems	Manufacturer of intelligent EVs created to provide sustainable transportation.	\$2,200	Gardena, USA
XPeng	Autonomous vehicle manufacturer	Developer of electric and autonomous car technology.	\$1,600	Guangzhou, China
Lucid	Autonomous vehicle manufacturer	Designer and manufacturer of EV technology and smart cars.	\$1,300	San Francisco, USA
Nuro	Autonomous vehicle manufacturer	Manufacturer of electric vehicles designed to offer luxury mobility.	\$1,100	Newark, USA
Zoox	Autonomous vehicle manufacturer	Developer and manufacturer of a self-driving vehicle for good transportation.	\$1,000	Mountain View, USA
Wayve	Autonomous driving systems	Developer of an autonomous driving ecosystem for transport services.	\$790	Foster City, USA
Wayve	Autonomous driving systems	Developer of AI-based automated driving software.	\$700	Beijing, China
Byton	Autonomous vehicle manufacturer	Developer and manufacturer of electric and autonomous vehicles.	\$700	Nanjing, China
Aurora	Autonomous driving systems	Developer of an autonomous car technology designed to create self-driving cars.	\$690	Palo Alto, USA
Cheriton	Autonomous driving systems	Developer of a proactive ride system for autonomous vehicles.	\$279	Billerica, USA
Wayve	Autonomous vehicle manufacturer	Developer of new battery and energy solutions for autonomous vehicles.	\$278	Hangzhou, China
Wayve	Autonomous driving systems	Developer of a full-stack autonomous driving technology.	\$264	Frankfurt, USA
Innoviz	Light detection / ranging and sensing	Developer of LiDAR-based remote sensing sensors and systems.	\$252	Rotterdam, Israel
Luminar	Light detection / ranging and sensing	Developer of LiDAR technology on a chip-level for vehicles.	\$250	Portola Valley, USA
Wayve	Autonomous driving systems	Developer of an open in-car operating system for developers and carmakers.	\$233	Shanghai, China
Momenta	Autonomous driving systems	Developer of an AI-based mapping technology for autonomous vehicles.	\$202	Beijing, China
Wayve	Autonomous driving systems	Developer of camera-based computer vision technology for self-driving trucks.	\$178	San Diego, USA
TTTech	Autonomous driving systems	Developer of automotive network and communication technologies.	\$162	Vienna, Austria

Source: Firstmile

50% of the top 20 autonomous vehicle start-ups are from America and 40% are from China. The remaining two are from Israel (Innoviz Technologies) and Austria (TTTech). Interestingly, 55% of the highest funded start-ups offer either advanced driver assistance systems (ADAS) or develop full-stack autonomous driving software, highlighting the value of owning the entire autonomous software value chain. 30% of the

start-ups are manufacturers of autonomous vehicles and the remaining 15% are active in the LIDAR segment, focussing on hardware components.

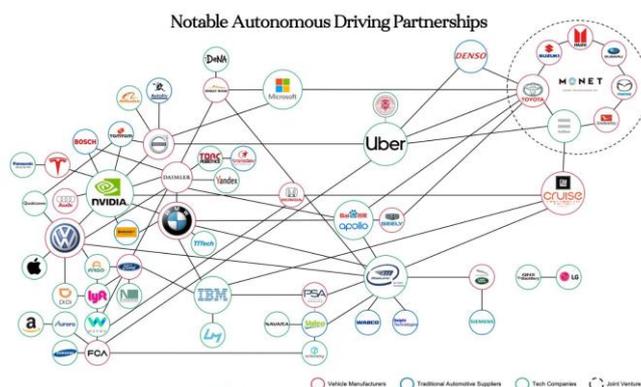
Notable Autonomous Driving Acquisitions



Source: Firstmile, Crunchbase, Pitchbook, Tracxn

Intel's acquisition of Mobileye in 2017 was perceived by many as an inflection point in the autonomous driving industry, as it proved to traditional automotive OEMs that the market was no longer solely based on physical vehicle components and that incumbents now must stay alert. Other notable acquisitions include Ford's acquisition of Argon AI and Journey Holding, GM's investment into Cruise, Aptiv's (formerly Delphi Technologies) purchase of nuTonomy and Ottomatika, and Apple's recent acquisition of Drive.ai, as the iPhone maker struggles to gain a foothold in autonomous driving.

Notable Autonomous Driving Partnerships



Source: Firstmile

At first glance the sheer volume of partnerships and alliances can be quite overwhelming. However, when looking more closely we were able to identify three key trends:

1. A new wave of next generation, automotive software focused firms is emerging.

In the year 1977 the GM Oldsmobile Toronado was the [first ever vehicle](#) to feature an electronic control unit to manage spark timing. By 1981, GM had deployed around 50,000 lines of code across their passenger car line and today, the Chevrolet Volt, for example, runs on more than [10 million lines of code](#). Hardware suppliers and automotive OEMs have painstakingly developed their software skills over time, but remain hardware manufacturers at the core.

The number of players with only software and technology-based backgrounds in the automotive industry are growing rapidly. Thus, it is no longer enough to produce the best motor vehicle. It is becoming more and more evident that software will be the crown jewel in the future, and it has to be developed in situ rather than in siloed business units.

2. The magnitude of technical challenges is creating new alliances among large OEMs and technology firms. Only a few select firms are developing technology in-house.

After experiencing some of the challenges imposed by developing largely complicated autonomous driving technology, large OEMs have changed their siloed approach to an open architecture thereby forming partnerships with established technology firms, enhancing their expertise and gaining access to state-of-the-art IP. Recruiting experts from within their own ranks is proving to be more difficult than anticipated and thus OEMs need these partnerships to acquire outside knowledge. The approach of traditional OEMs is still mixed - while BMW still relies on in-house development, Volkswagen has jumped ahead by partnering up with Argo AI and Ford.

Technology giants like Microsoft, NVIDIA, and IBM are also joining the playing field and entering into partnerships. On the other hand, Tesla and Apple seem to be circumspect when it comes to entering into partnerships, as they pursue their own agendas.

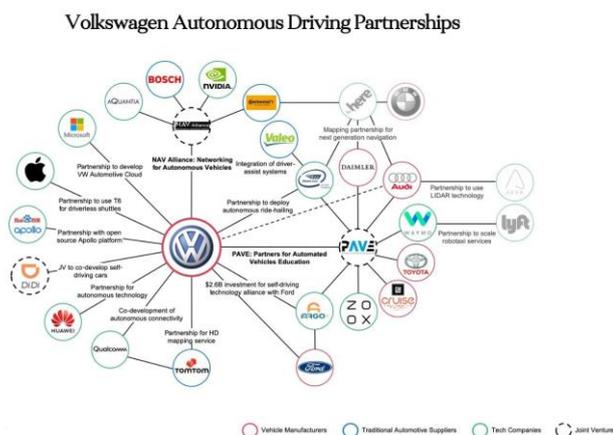
3. New and emerging players are concentrated in the US and China with Europe lagging behind.

Along with the recent announcement that [five automakers are joining the self-driving technology joint venture](#) backed by Toyota and Softbank's Monet Technologies, Asian start-ups are leveraging their technological expertise to make rapid advancements in self-driving vehicle technology. Baidu's autonomous driving platform, Apollo, is an example of how Asian

technology companies have grasped the value of wide partnerships before anyone else. A glimpse at their partnership [page](#) has the potential to make German automotive executives dizzy.

However, even though German automotive firms have largely remained silent regarding their autonomous technology, a closer look under the hood (pardon the pun) reveals an extensive network of partnerships, alliances and joint ventures looking to shape the future of autonomous mobility. The most important ones are detailed below.

Volkswagen (VW)



Source: Firstmile

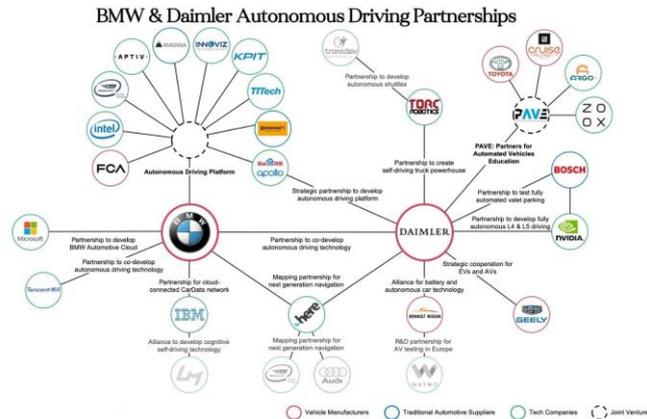
While the drive towards electrification plays a central role in Volkswagen's new mobility strategy, the company also has a broad positioning in the field of autonomous driving with a diverse set of partners. Two key alliances form the foundation of its recently stronger foothold - The Partners for Automated Vehicles Education ("PAVE") alliance with other global OEMs and the Networking for Autonomous Vehicles ("NAV") alliance for the interconnectivity of vehicles.

This July, VW decided to cut the cords with Aurora, a leading technology player in developing self-driving vehicle technology, and joined Ford by investing USD\$ [2.6Bn](#) in Argo AI as part of a broader alliance for autonomous and electric vehicles. This enables Argo AI to step up its game in the global race for developing autonomous technology - specifically, its goal is to develop a Society of Automotive Engineers ("SAE") Level-4 capable self-driving system and dramatically boost its staff by [40%](#).

Finally, VW is displaying strategic intent through partnerships with Asian partners to strengthen its international presence. Forming partnerships with

technology companies to give itself wider access to new innovations and building partnerships with the likes of Microsoft and Baidu to boost its [automotive cloud](#).

BMW and Daimler



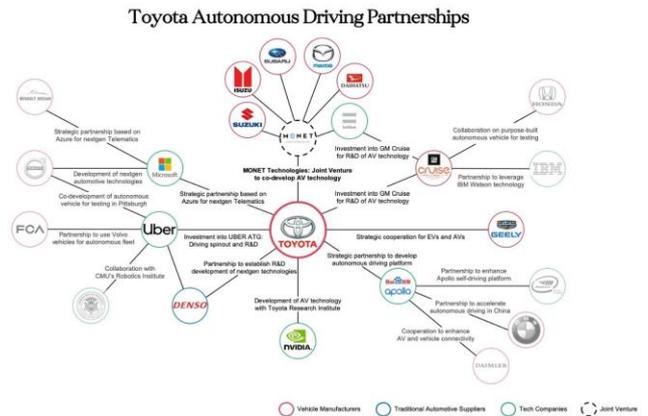
Source: Firstmile

The recently announced [partnership](#) between BMW and Daimler came as a surprise to many, as prior to the partnership both the companies were favouring internal technology development. However, even combined, both players seem to have fewer autonomous driving partnerships than VW.

On the other hand, BMW’s partnerships with cloud and technology specialists, like those with [Microsoft](#), [Tencent](#) and [IBM](#); and Daimler’s efforts to expand its network to Asia with [Geely](#), as well as self-driving truck technology through [TORC Robotics and Transdev](#); makes this partnership stand out. Another particularly notable partnership is the one between Daimler, Bosch and Nvidia to develop Level-4 and Level-5 driving technology, starting with an [automated valet parking](#) test run.

While the level of knowledge-sharing in the [autonomous driving platform](#) driven by BMW and Daimler may be difficult to assess externally, compared to the PAVE or the NAV alliance; the depth and level of the platform seems to be shallower. It does however, include a variety of traditional automotive suppliers, technology players and autonomous vehicle start-ups to drive the development process forwards, and includes the likes of [Intel](#), [Aptiv](#), [Innoviz Technologies](#), [TTTech](#) and Baidu’s [Apollo](#) platform.

Toyota



Source: Firstmile

[MONET Technologies](#), which was formed earlier this year, lays the groundwork for positioning Toyota as a core tenant in vehicle technology with strategic partnerships across the globe. Together with SoftBank, Suzuki, Isuzu, Subaru, Mazda, and Daihatsu the joint venture combines data and know-how from all members to create a dominant player in the Asian market.

The clear geographic focus on the Asian market allows Toyota to explore the realms of autonomous driving technology with less regulatory boundaries, which many of its competitors in the [United States](#) and [Europe](#) face. Additionally, the company is in close proximity to leading [cloud infrastructure and technology firms](#) with similar interests of leading the race in developing fully autonomous vehicle technology.

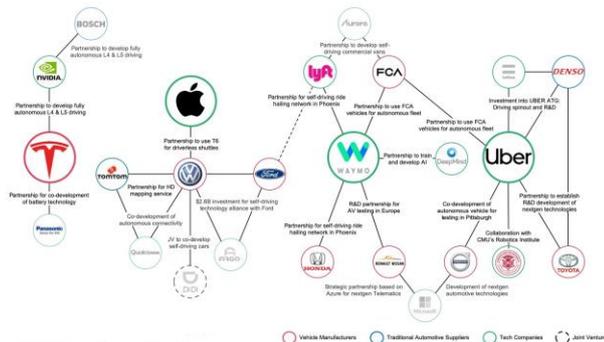
Aside from the major OEMs, other notable participants include: Tesla, Apple, Waymo (Alphabet), Lyft and Uber. All five have strong backgrounds in technology with a clear strategic objective to develop autonomous driving technology in-house and are starting to augment the same with select strategic partnerships.

Apple

Apple has been sending mixed signals with its efforts in autonomous driving, hiring former Tesla Engineering VP [Steve MacManus](#) in July along with two other chief engineers, while [terminating 190 employees](#) in the self-driving car division, during February. Recent commentary has highlighted the unfavourable working conditions and high attrition of employees, and stated that the [difficulties](#) faced in advancing autonomous driving technology at Apple were the primary culprits

of this. However, the acquisition of Drive.ai in July for around [USD\\$ 77Mn](#) now offers Apple the opportunity to make use of seasoned engineers to refine its self-driving car efforts.

Further Autonomous Driving Partnerships



Source: Firstmile

Tesla

As has come to be expected, Tesla is especially radical in its public appearance and opinion on autonomous driving technology. Firstly, LIDAR technology has been [brutally shunned](#) by Tesla’s CEO Elon Musk. Secondly, partnerships do not seem to be a high priority, as evidenced by the company’s few publicly known partnerships. While Tesla is considered by many to be the pioneer in this field and has made sizable progress in autonomous driving technology through its in-house technical capabilities, the company continues to maintain an almost siloed position within the industry. In some camps Tesla’s autonomous initiative is highly regarded given the quantity of data collected with its current install base. Its autopilot has clocked up over [2bn miles](#) from Tesla car drivers compared to 10m miles that Waymo has undertaken. This data set is extremely valuable to the company and regulators as we move to full autonomous. No other company can claim to have this level of data. Despite this no other car manufacturer has shown an appetite to work with Tesla.

Waymo, Lyft and Uber

Waymo and Uber both develop their technology and software in-house, partnering only with firms that are willing and able to provide them with required resources. These companies harbour the ambition to develop a full-stack autonomous driving technology in-house and hence collaborate only with a limited number of technology partners. For them, the primary purpose of a [partnership](#) is to test and improve the self-driving vehicle technology on cars, while fine tuning their customer value-proposition. In order to further

achieve these goals, earlier this year in March, Waymo [formed an alliance](#) with Uber’s rideshare industry rival Lyft. While details regarding this deal were scant, the alliance recently opened their [Level 5 data set](#) (containing 55,000 3D frames) to the public, in a move to get the research community involved in developing self-driving technology through innovative models and algorithms. Waymo also works closely with DeepMind, another one of Alphabet’s Other Bets companies, to develop new AI training models.

Surprisingly, despite the close proximity of Tesla, Waymo and Uber headquarters, there are no public partnerships or alliances between these key industry players.

Autonomous Driving Companies – Location & Market Positioning

Notable Autonomous Driving Clusters



Source: Firstmile

European automotive players are well known for their manufacturing ability and have built a strong reputation as both OEMs and suppliers. Notable companies in this group include Continental, Bosch and Siemens. The Europeans have focused traditional on manufacturing rather than technology and perhaps their lagging ability to adapt to the fast-moving industry is evident by the small number of large pure play technology names in the European market.

America, on the other hand, seems to be much better suited for the impending wave of technological change within the automotive industry - Amazon, Apple, Microsoft are large technology players slowly dipping into the deep waters of autonomous driving technology. Aurora, Aptiv, Mobileye and Waymo already have a strong standing in this space. Tesla is in a similar position, at the top of the autonomous driving value chain, with Ford and GM playing catchup.

Asia offers a strong nurturing ground for technology firms and hence is home to many leading mobility firms and market challengers (i.e. Didi and Baidu's Apollo Platform). The MONET Technologies joint venture underlines the high level of ambition present.

Autonomous Driving Patent Applications

Who Leads the Autonomous Driving Patent Race?

Number of worldwide patent filings related to autonomous driving (January 2010-July 2017)



Based on a total of 5,839 patent filings related to autonomous driving identified and analysed by the Cologne Institute of Economic Research.

Source: Cologne Institute of Economic Research, WIPO

Painting a different picture compared to the spread of autonomous players across the world, when one looks at the top patent applicants' registered patents through the World Intellectual Property Organisation (WIPO). In Europe, the number of patent applications in autonomous driving has grown 20 times faster than other technologies in recent years, increasing by 330% compared to 16% across all technologies during the same period.

Overall, German firms have a strong presence when one looks at autonomous driving patents. This may be because of two reasons - Firstly, software components are only registered with the patent office under very specific conditions, some of which may not necessarily directly apply for future-oriented autonomous driving technologies. Secondly, Bosch, Audi and Continental have a history of registering separate patents for different variants of a particular type of hardware. Meanwhile among pure software players, only Google, widely considered to be a leader in autonomous driving research, makes the top 10 with 338 patents. Thus, the accuracy of interpretations made using this data and extrapolations made with regards to the competitive positioning of automotive firms using the number of registered patents may be limited. This indicates that, while all firms in the autonomous vehicle landscape share a similar vision and see the need to drive autonomous vehicle tech, the

statistic of top filers for autonomous driving patents should be interpreted with caution.

Autonomous Miles Driven per Disengagement

The Self-Driving Car Companies Going The Distance

Number of test miles and reportable miles per disengagement in California in 2018



Source: California Department of Motor Vehicles Disengagement Reports February 2019

Miles per disengagement is considered to be an indicator of technological advancement for autonomous driving companies. The California Department of Motor Vehicles defines a disengagement as a "deactivation of the autonomous mode when a failure of the autonomous technology is detected or when the test driver disengages the autonomous mode."

There is a lot of disagreement on the level of accuracy of this metric as it is considered by many to be too vague, is valid only for California, allows companies to avoid reporting certain road events and does not necessarily reflect the difficulty of the chosen driving environment. Nevertheless, it is a metric which can be used to show that there exists a large competitive advantage for American technology companies like Waymo, GM Cruise and ZOOX that are able to cover over 11,000; 5,200 and 1,900 autonomous miles, respectively, before a disengagement.

For context, however, Waymo (No.1 on the list) had driven 40x the number of miles that ZOOX (No. 3 on the list) had driven in 2018. Therefore, it is difficult to interpret the level of progress made by each of the companies just based on miles driven. Also, some disengagements may be deliberate to test the reaction of the software to new situations. Not to mention, the notable absentee from the list – Tesla, who do not make an appearance because it approaches autonomous testing through its new advanced driver assistance system, Tesla Autopilot.

The crux of the matter is that, though data related to the appropriate context and the exact routes driven

are missing; makes it insufficient for full comparison between players; the numbers do show that significant progress has been made and indicate noteworthy technological advancements within the industry.

Our Takeaway: Implications for the Future

From our analysis, we have found that all players, from automotive OEMs to technology challengers, are chasing fully autonomous driving technology. However, as of today, we can neither infer any definitive frontrunner or laggard, nor can we pinpoint any precise date by which fully autonomous driving will be commercially available. In our opinion, what is more important is how incumbent firms and new start-ups emerge, develop and evolve in the coming years; rather than the exact date when autonomous vehicles will hit the road. We believe that we are undoubtedly in one of the most exciting periods in the history of mobility.

The question really is when rather than if fully autonomous driving will hit the roads. Regardless of the waiting period, fully autonomous vehicles will arrive and when they do mobility will turn into a commodity. As is the case with the traditional automotive landscape today, it is unlikely that there will be a winner-takes-it-all situation. Regional differences in culture and regulation will allow different players to dominate local markets. However, software rather than hardware is likely to dominate this new automotive world.

Through vehicle autonomy new industries will develop that will make possible actions and events that were too difficult to imagine in the past and will trivialise seemingly complex tasks. Transport as a service (TaaS) could blossom into non-traditional markets. Much like how the locomotive market changed the horse and cart, autonomous vehicles will create new opportunities. The next generation of innovators will likely witness a greater passage of change than the previous.

Wenlock Global Fund

Fund Statistics – September 2019

Source: Mainstream Fund Services, Thomson Reuters, Wenlock Capital

Numbers rounded and may not sum to 100%

Sector Allocation (ex cash/options) % of NAV

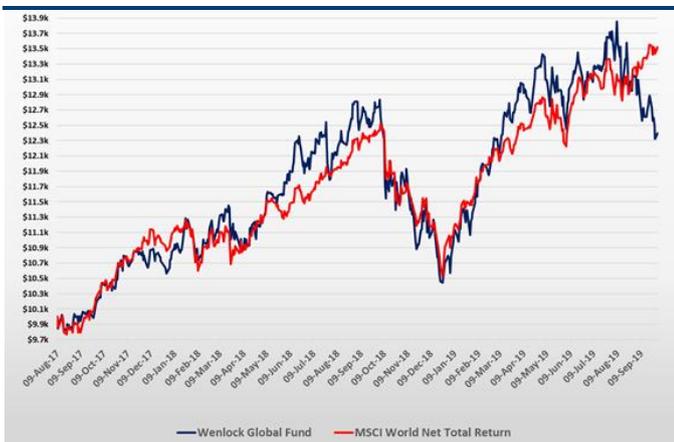
Sector	% of NAV
Healthcare	29%
Information Technology	18%
Communication Services	13%
Consumer Discretionary	12%
Financials	10%
Industrials	9%
Consumer Staples	6%

Currency Exposure % of NAV

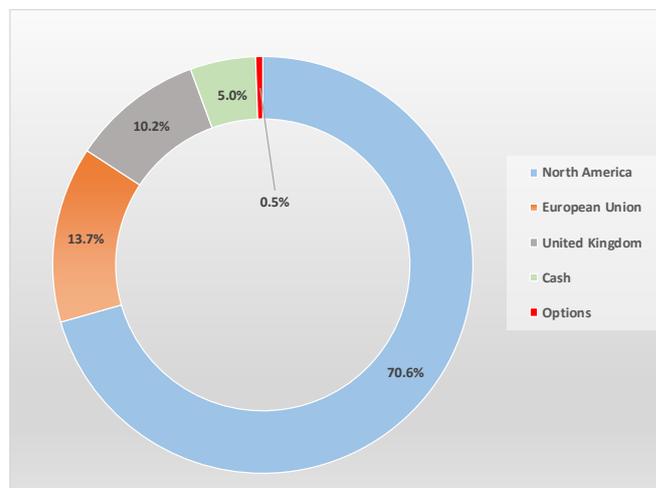
Currency	% of NAV
US Dollar	74%
UK Pound	13%
Euro	13%
Australian Dollar	1%

Source: Mainstream Fund Services, Thomson Reuters.
 ^Calculations are based on total returns and net of all fees but before tax or the buy/sell spread. Performance figures are based in AUD.
 SI = Since Inception 9 August 2017. **Past performance is not a reliable indicator of future performance.**

Performance of \$10,000 invested since inception



Country Allocation % of NAV



Top 10 Holdings

Company	Sector
Abbott Labs	Healthcare
Eli Lilly	Healthcare
Estee Lauder	Consumer Staples
Facebook	Communication Services
Insulet Corp	Healthcare
Microsoft	Information Technology
Network International	Financials
Neurocrine Biosciences Inc	Healthcare
Siltronic AG	Information Technology
Twitter Inc.	Communication Services

Net Performance Fund Index* Relative

Period	Fund	Index*	Relative
1 Month	-5.6%	+2.0%	-7.6%
3 Month	-5.2%	+4.6%	-9.8%
1 Year	-2.6%	+9.2%	-11.8%
Since Inception**	+24.0%	+35.2%	-11.2%

*MSCI Daily World Total Return Net Index AUD **Inception 9 Aug 2017

Source: Mainstream Fund Services, Thomson Reuters, Wenlock Capital.
 ^Calculations are based on total returns and net of all fees but before tax or the buy/sell spread. Performance figures are based in AUD.
 SI = Since Inception 9 August 2017.
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Wenlock Global Fund

- ❖ The Wenlock Global Fund targets long-term capital growth whilst ensuring capital preservation. The Fund invests in 20-40 superlative businesses across the world that are exhibiting strong long-term secular trends. At times, the fund employs protection to protect against large falls in asset prices.
- ❖ These superlative businesses are selected after rigorous fundamental bottom up research which provides the Fund potential long-term capital returns.

Investment Style		Bottom– up Fundamental Research based on Cash Flow Returns
Number of Holdings		20-40
Inception Date		9 August 2017
Currency		AUD
Minimum Investment		\$10,000

IMPORTANT INFORMATION

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