

Investment Spotlight

April 2021

Each quarter we highlight an investment theme from the Disruptive Innovation Strategy, focusing on the megatrends driving disruption and the companies we believe are best positioned to capitalize. Companies mentioned in this series should not be perceived as specific stock recommendations.

Electric Vehicles

Disrupting the Automotive Industry

Introduction

Two years before selling its first Electric Vehicle (EV), Tesla CEO Elon Musk published “The Secret Tesla Motors Master Plan (just between you and me)” where he stated that the company’s *purpose* was to “help expedite the move from a mine-and-burn hydrocarbon economy towards a solar electric economy”¹. At the time, in 2006, the average price of gasoline was only \$2.60 per gallon and the most eco-friendly option for a car was the Toyota Prius, with meager sales representing fewer than 2% of cars sold in the US². As such, major automakers had no clear economic incentive to move away from gasoline-powered cars. To the contrary, they had stronger reasons to stay the course and meet the demands of employees and shareholders without throwing scarce resources at an unproven market. Tesla’s purpose led them down a different path that *capitalized* on automakers risk aversion and applied lessons learned from Musk’s role as a founder of PayPal. As PayPal had done with the payment industry at the dawn of eCommerce, Tesla completely reimagined the modern car company, with an EV-first design and manufacturing process, continuous innovation through software updates, and a sales and distribution channel built on top of the internet.

The next chapter for Tesla, described in the 2016 “Master Plan, Part Deux”³ is shaping up to be even more interesting and disruptive to the automotive industry with the introduction of completely new technologies like autonomous mode, and the potential for dramatically higher utilization of EVs, which is key to reducing traffic congestion and the environmental impact of transportation. We believe this next chapter will bring structural change to the automotive industry on par with Apple’s impact on the cell phone market, Amazon’s on department stores, and Uber’s on the taxi industry.

¹ <https://www.tesla.com/blog/secret-tesla-motors-master-plan-just-between-you-and-me>

² https://en.wikipedia.org/wiki/Toyota_Prius

³ <https://www.tesla.com/blog/master-plan-part-deux>

In this note, we first look back on how Tesla was able to disrupt the automotive industry to become the largest car company in the world by market cap. We then share our perspective on how we think the industry will evolve, why we believe Tesla, as well as two leading EV makers in China, XPeng and Nio, are particularly well-positioned, and why we think today's largest makers of gas-powered cars may struggle. Timing for the next chapter is uncertain, and, in some respects, will depend on how quickly technologies from companies like NVidia, MobileEye, CATL and QuantumScape can become road-worthy. It would be a mistake, however, to think the success of Tesla and its competitors hinges solely on the availability of components like batteries and lidar sensors. Business strategy and incentives are just as important, particularly at the early stage of industry disruption. In our previous piece "What's Next in Disruptive Innovation", we described Tesla's success at creating a business where environmental and profitability goals were not just aligned, but synergistic⁴. In this note, we explore the strategies and incentives among key participants in the automotive industry as the world shifts to EVs and, ultimately, autonomous vehicles.

Tesla

In 2016, Elon Musk noted that only two US car companies had managed to avoid bankruptcy: Tesla and Ford. In the US market, where the Seasonally Adjusted Annual Rate (SAAR) of sales for cars and trucks has been flat since the 1970s⁵, the well-worn path to profitability, however marginal, has been to reduce costs. For the auto industry, this has meant standardizing on common platforms, leaning on suppliers and only doing final assembly in-house. This horizontal-integration strategy makes sense when differentiating on price, but when *structural* change is afoot, it puts companies at a *disadvantage* since their supply chain is not organized around developing technology-intensive parts for nascent markets like EVs.

Since parts did not exist for EVs in 2006, Tesla embarked on a vertical-integration strategy, designing a family of cars from scratch and building key components internally, including battery packs and semiconductors that were integrated. Tesla chose a high-end roadster to start, believing certain customers would pay a premium for one of the world's fastest production cars, which also happened to be an EV. Tesla then reimagined the sales and service model, relying on the internet as its primary sales channel⁶ and over-the-air updates to introduce new software features. Executing this extraordinarily risky strategy now has put Tesla in a strong position to follow through on the rest of its plan to sell higher volumes of more-affordable cars along with renewable energy generation and storage³.

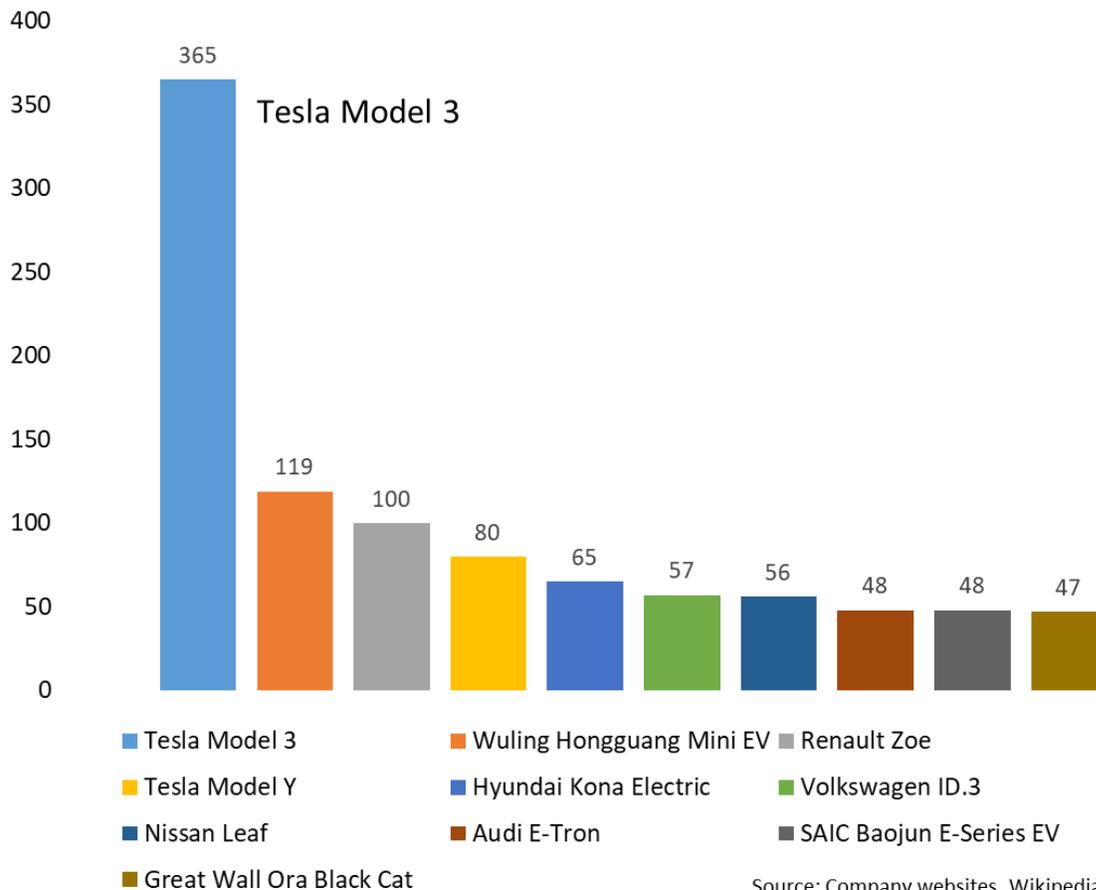
In less than one year, the company went from breaking ground to full-scale production in Shanghai of the mass-market Model 3, catapulting it to the number 1-selling EV in the world last year by a 3-to-1 margin, and outselling the Volkswagen ID.3, introduced in 2019, by more than 6 times. Tesla also revealed that every car sold since 2016 has been gathering traffic data to train its machine-learning algorithms in support of its soon-to-be-released AutoPilot feature.

⁴ <https://1919ic.com/wp-content/uploads/2021/02/Whats-Next-in-Disruptive-Innovation-1.pdf>

⁵ <https://www.statista.com/statistics/199983/us-vehicle-sales-since-1951/>

⁶ To this day Tesla spends very little on advertising compared to larger OEM's.

Global EV unit sales for 2020 (in 1000's)



Source: Company websites, Wikipedia, Statista

Master Plan, Part Deux

A car does not necessarily have to be electric in order to be self-driving, but the two technologies are complementary. For example, EVs have much simpler drive trains that allow them to stay in service longer, up to 1 million miles and thousands of charging cycles, before their battery packs need to be replaced⁷. A longer EV service life means that business plans, such as an autonomous robo-taxi service could become economically viable. Instead of sitting in garages 90% of the time, the utilization of cars could be pushed from today's ~10% level to 70% or 80% by participating in a shared fleet of EVs, which would reduce traffic congestion materially. Today, green shoots are appearing in the fully-autonomous transportation industry, with Google's Waymo unit now offering a commercial service in Arizona⁸ and, more recently, Domino's approval by the US Department of Transportation to use completely autonomous pizza delivery vans in the Houston area⁹. Likewise, TuSimple¹⁰, a pure-play autonomous trucking company, recently went public, providing investors with a way to invest in what likely will prove to be a highly disruptive technology. In our view, mass adoption of autonomous EVs will represent the point of no return for the automotive industry, much like the adoption of smartphones in the flip-phone era.

⁷ <https://www.autoweek.com/news/a34620676/million-mile-batteries-theyre-coming/>

⁸ <https://www.abc15.com/news/waymo/waymo-unveils-new-features-in-fully-autonomous-ride-hailing-service-waymo>

⁹ <https://www.theverge.com/2021/4/12/22379853/nuro-self-driving-robot-delivery-dominos-pizza-houston>

¹⁰ <https://www.tusimple.com/>

Self-Disruption is Hard

In January 2021, the Wall Street Journal described the internal struggle at Volkswagen, the world's largest car manufacturer by volume, to produce a viable competitor to Tesla's Model 3. After 5 years and \$50 billion, the Volkswagen ID.3 still lacked important features, like over-the-air updates, and was uncompetitive with features consumers cared most about, such as vehicle range and app selection¹¹. The old horizontal strategy of relying on multiple component suppliers for new technologies meant that software from one supplier was not integrated with hardware from another, and services from multiple cloud vendors did not mesh. In the end, Volkswagen ended up selling the first 50,000 ID.3s knowing customers would have to come back in for an update.

For the next few years, most auto manufacturers have plans to introduce new models in order to compete with Tesla. Their success will depend on their ability to drive cultural change internally and to realign their businesses to a new incentive structure. It also will depend on the availability of new technologies being developed by non-traditional suppliers. One important set of technologies to watch is the DRIVE AGX platform offered by NVidia¹², which uses an integrated hardware-software stack for automobiles, including semiconductors, software, and the datacenter infrastructure needed to deploy it. In development for nearly a decade, the DRIVE AGX platform is targeting autonomous vehicles expected to be manufactured in the next 5 years, controlled through 5G connectivity at the edge of the network. Many of the pieces NVidia is developing to train and deploy machine learning models for autonomous driving are shared with today's most complex Artificial Intelligence workloads, such as Natural Language Processing and gaming, where NVidia is the clear leader. Other companies to watch include lithium ion battery makers such as CATL, which is developing lithium iron phosphate (LFP) batteries that do not use scarce cobalt metal, and QuantumScape, a maker of solid-state batteries that hold promise for rapid charging and extended vehicle range.

Fast-Followers: Xpeng and Nio

The largest and fastest growing market today for EVs is China, which has set a clear policy goal that 20% of automobile sales by the year 2025 should be electric¹³. Two recent EV investments in our strategy are Xpeng (XPEV) and Nio (NIO), both of which are executing a "fast-follower" business strategy, with Chinese characteristics. Like Tesla, both companies were founded by strong entrepreneurs and both have the support of strong technology ecosystems in China, including Alibaba, which is an investor in Xpeng, and Tencent, which is an investor in Nio.

Xpeng was founded by He Xiopeng in 2015, after selling his former company, UCWeb to Alibaba. Its two models, the G3 and P7, are designed to be feature-rich and target the mass consumer market with mid \$30K price points. Xpeng unit sales grew 487% YoY in 1Q21¹⁴, at a 53,000 annual run rate, and likely will grow by more than 100% this year and next as new models are introduced. In April 2021, Xpeng introduced a third model, the P5, which is the first production car in the world to use lidar, a key technology for autonomous driving. Like Tesla, Xpeng began as an EV-first company and is considered the technology leader in China.

Nio, founded a year earlier than Xpeng, focuses on the high-end luxury segment by offering a differentiated service-based business model. Nio's most important service is battery swapping, which appeals to urban residents who cannot plug into a home charging station. In 3 minutes, a Nio customer can swap her battery pack for a fully-charged, upgraded battery at a Nio service station. Other services include free wireless

¹¹ <https://www.wsj.com/articles/how-volkswagens-50-billion-plan-to-beat-tesla-short-circuited-11611073974>

¹² <https://www.nvidia.com/en-us/self-driving-cars/>

¹³ <https://www.reuters.com/article/us-china-autos-electric/new-energy-vehicles-to-make-up-20-of-chinas-new-car-sales-by-2025-idUSKBN2710W9>

¹⁴ <https://ir.xiaopeng.com/news/news-details/2021/XPeng-Announces-Vehicle-Delivery-Results-for-March-and-First-Quarter-2021/default.aspx>

connectivity, free roadside assistance, an unlimited warranty as well as a set of premium fee-based services. Lastly, both Nio and Xpeng were among the first companies to commit to using NVIDIA's most advanced autonomous driving chips, Orin, which are expected to reach production in 2022¹⁵ and support level-5 automation (full self-driving capabilities).

Xpeng and Nio are not the largest auto manufacturers in China, but they are two of the largest *pure-play* companies leveraged to the secular shift towards EVs. While their product segments do not overlap, they both are embarking on a time-honored fast-follower strategy, making smart *build vs. buy* decisions in partnership with NVIDIA. They both also are profitable at the gross margin level¹⁶ and are well capitalized, after recent rounds of fund-raising. Given current regulations in China, the quickly evolving technology landscape and significant market opportunity, we think a fast-follower strategy is a smart approach.

Conclusion

Tesla may be the world's largest seller of pure EVs today, but at its current 740,000/year run-rate, it is far from the largest for all types of automobiles. Virtually every major car company has expressed a desire to participate in EVs, but to date, actions have been limited mostly to roadmaps, acquisitions of technology startups or new model introductions that have been uncompetitive, like Volkswagen's ID.3. Most markets that face disruption ultimately become realigned around a few leading companies and we believe Tesla will be one of them, possibly with Xpeng and Nio included as well. To frame the opportunity, assuming flat car sales globally of 100 million cars, of which Tesla captures 10% at an average selling price of \$40,000/vehicle, the addressable market would be $100M \times 10\% \times \$40,000 = \$400$ billion, or roughly 10x its current sales. This figure does not include its Solar Roof, Powerwall (home batteries), or future subscriptions like a possible robo-taxi service which is being discussed¹⁷. This figure also does not attach a time frame, recognizing the inherent uncertainty of disruptive innovation¹⁸. Today, the important question is whether major car manufacturers will create the incentives to disrupt *themselves* as the industry transitions to EVs and embraces autonomous driving. Today's leading pure-play EV companies such as Tesla, Xpeng and Nio, are not waiting around to find out.

¹⁵ <https://nvidianews.nvidia.com/news/nio-partners-with-nvidia-to-develop-a-new-generation-of-automated-driving-electric-vehicles>

¹⁶ Gross profit is equal to sales minus manufacturing costs, and excludes certain expenses related to marketing, product development and taxes.

¹⁷ <https://www.inverse.com/innovation/hail-tesla-robo-taxi>

¹⁸ Our approach to managing risk following Tesla's meteoric rise in stock price is to reduce position size when it becomes more than 5% of the portfolio, which we have done several times. However, that does not mean we are any less enthusiastic about their opportunity.



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20 Years of Experience



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