

Counterpoint Global Insights

Driving Change: Autonomous Vehicles Revisited

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WELCOME TO THE EDGE.

Morgan Stanley Investment Management's Counterpoint Global, shares their proprietary views on big ideas that have the potential to trigger far-reaching consequences—ideas such as blockchain, autonomous vehicles, machine learning and gene editing.

Counterpoint Global's long-term ownership mindset emphasizes perspective and cross-disciplinary thinking, while our investment process focuses on identifying unique companies with sustainable competitive advantages. Through the EDGE, we share our framework for thinking about change and our process for recognizing patterns that may drastically alter the investment landscape over the long term.

This work complements our team's more traditional, fundamental research to create a framework for long-term investing that is grounded in intellectual curiosity and flexibility, perspective, self-awareness and partnership.

Ever since OpenAI's ChatGPT burst on the scene in November 2022, it seems that all Wall Street analysts and the general public want to talk about is artificial intelligence (AI).¹ ChatGPT, which now has multiple competitors, uses a large language model (LLM) to produce the generative AI that takes prompts and generates novel responses. A transformer model is the key technology behind LLMs. Developed by researchers at Google in 2017, a transformer model is a neural network that learns context by tracking relationships in sequential data.

Transformer models have applications beyond LLMs because they are built to anticipate what is likely to come next. In fact, transformers may allow for the creation of completely new industries. One significant opportunity is in autonomous driving.

People have dreamed of autonomous driving for a long time, but the technology was never up to the task. The capabilities are now improving rapidly and the potential impact is massive. Consider that there were 3.2 trillion miles driven in the U.S. in 2023 alone.² Assuming that the autonomy providers are paid per mile that they drive,

¹ As of 11/30/2024, the Growth Representative Account had 0% position in OpenAI

² Alternative Fuels Data Center: Maps and Data – Annual Vehicle Miles Traveled in the United States



the industry could have an addressable market of over a \$1 trillion per year just in the U.S.

We wrote about autonomous driving in August 2017, and many of our hypotheses had not yet been proven. Since then, the technology and the business models have evolved and recent breakthroughs have validated many aspects of our original theses. At the end of the day, the adoption of autonomous vehicles will be based on the promises of increased safety and lower costs.

Autonomous systems are designed to eliminate human error, which is a leading cause of traffic accidents. In 2021, there were nearly 43,000 fatalities from motor vehicle crashes³ in the U.S. and it is estimated that human error caused 94% of them.⁴ Autonomous vehicles use sensors and real-time data processing to react faster than human drivers can, reducing the number of collisions and fatalities.

We now have concrete evidence that commercial adoption of autonomous driving reduces accidents and, likely, deaths. Waymo, an autonomous car company owned by Alphabet (the parent company of Google), launched commercial service in San Francisco (2021) and Phoenix (2022).⁵ In 2024, the company reported that in the first 25 million miles driven in those markets it has seen 57% fewer police-reported crashes, 72% fewer injury-causing crashes, and 81% fewer airbag-deployment crashes as compared to what would be expected from humans driving comparable distances in those cities.⁶

Autonomous vehicles can also improve service and lower costs, thus introducing new business models. Trucking is one of the best examples. Autonomous trucking promises to address the shortage of drivers, improve terms of service, increase efficiency, and reduce operating costs.

For instance, federal regulations currently say that a truck driver can be on the road no more than 11 hours per day.⁷ This limit means that it takes five days for a freight shipment to cross the country with one driver. Autonomous trucks do not feel fatigue and are therefore not subject to that restriction. An autonomous truck can move freight from coast to coast in just two days, significantly improving delivery times and enhancing supply chains.

In addition to the benefit of better service, autonomous trucking may also provide cost savings. In 2023, the average cost of driver wages and benefits was \$0.97/mile in the U.S.⁸ Autonomous trucking companies believe that the benefit of saving on driver and fuel costs will allow them to price their services at \$0.65-0.85/mile. Class 8 trucks, which include those 18-wheel trucks you see on the highway, drive 180 billion miles each year in the U.S.⁹ That equates to a total addressable market of \$115-150

³ <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813509.pdf> pg 2

⁴ <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>

⁵ As of 11/30/2024, the Growth Representative Account had 0% position in Alphabet

⁶ Safety Impact

⁷ <https://www.fmcsa.dot.gov/regulations/hours-service/summary-hours-service-regulations#:~:text=14%2DHour%20Limit,extend%20the%2014%2Dhour%20period>

⁸ American Transportation Research Institute, "An Analysis of the Operational Costs of Trucking: 2024 Update" June 2024, pg 16

⁹ <https://www.truckinfo.net/research/trucking-statistics>

billion. Further, the autonomous trucking companies that operate today have made significant investments in data collection and model training, which may be a barrier to entry that limits the risk from new competitors.

Robotaxis, which should benefit individuals and society, are another way to monetize autonomous driving technology. Robotaxis should allow people to better use their time. The average American spends just over two years of his or her life driving.¹⁰ We believe that robotaxis will evolve over time from looking like traditional cars to allowing new use cases that are impossible today. For instance, you might imagine a robotaxi equipped with a spin bike that allows a passenger to take a spin class on the way to work.

Finally, the cost of a robotaxi should decline as the technology improves and the companies realize economies of scale. This will boost the addressable market. Due in part to its high cost per mile, ride-hail usage is typically limited to special circumstances such as difficult or expensive parking or avoiding driving under the influence of alcohol. In the future, robotaxis are likely to be the lowest-cost transportation alternative because they will have significantly higher utilization rates (the average vehicle that is personally owned and operated sits parked 95 percent of the time).¹¹ Finally, robotaxis will be safer than human drivers.

The increased use of autonomous vehicles offers society other positive externalities. For example, studies suggest that there

are now three to eight parking spots per car, including one at home, one at work, and several at retailers and other service providers. In Los Angeles, 14 percent of the surface area of the city is dedicated to parking.¹² Robotaxis will reduce the need for parking and urban planners can then repurpose that space into parks or additional housing. Further, housing without dedicated parking is cheaper to build and therefore improves affordability for lower-income people.

Finally, traffic is a large challenge in most major cities today. Human reaction times dictate the distance required between cars on the highway today. Autonomous vehicles, with their instantaneous reaction times, have the potential to accommodate more passengers in our existing infrastructure.

We believe we are on the cusp of a paradigm shift. Children born today may never learn to drive. Tesla, a multinational electric vehicle and clean energy company, is one of the leaders in autonomous driving technology.¹³ At Tesla's Robotaxi Day in October 2024, Elon Musk, the company's chief executive officer, suggested that their robotaxi service could reach a cost of the \$0.40/mile.¹⁴ Because the average cost for a driver in the U.S. is \$0.88/mile, it will not make economic sense for most people to own and operate their own cars if Tesla can reach its target. We are just beginning to realize the opportunities that autonomous driving presents.

Despite the significant advancements, autonomous vehicle technology faces several challenges that companies,

consumers and governments need to address before widespread adoption can occur. Safety and reliability remain paramount concerns. Autonomous systems must be able to handle an extensive range of unpredictable scenarios. Today, some of those challenges are met with teleoperators who intervene when a vehicle gets stuck. Reducing the need for teleoperation is key to making the economics viable.

Regulatory and legal frameworks are still developing, with governments grappling with how to establish standards and policies to ensure the safe deployment of self-driving cars. Public acceptance and trust in autonomous technology also pose challenges, necessitating rigorous testing and transparent communication about the benefits and risks.

Autonomous vehicle technology has made extraordinary strides in recent years and has brought us closer to a future of self-driving cars. The advancements in hardware, software and artificial intelligence have significantly enhanced the capabilities and reliability of autonomous systems. The benefits of increased safety, reclaimed time and lower costs will likely pave the way for the adoption of autonomous vehicles. The potential for monetization in trucking and robotaxi services further underscores the technology's transformative potential. However, addressing the current challenges will be crucial to realizing the full potential of autonomous vehicles to make sure they are safely and successfully integrated into our transportation systems.

¹⁰ Study: How much time do Americans spend in their cars (Daily, Monthly, Yearly & Over a Lifetime)

¹¹ <https://www.reinventingparking.org/2013/02/cars-are-parked-95-of-time-lets-check.html>

¹² ASU study: Limit parking to decrease automobile use

¹³ As of 11/30/2024, the Growth Representative Account had 7.41% position in Tesla.

¹⁴ <https://www.newsweek.com/tesla-cybercab-five-takeaways-elon-musk-unveils-robotaxi-1967466>

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