# Business models for Autonomous Vehicles


## Abstract

Autonomous vehicles are emerging as a promising technology to improve urban mobility while saving energy and space. However, positive externalities are not a sufficient condition for their full scale deployment. A sustainable and profitable business model has to be invented. This paper aims to describe and classify existing main business models and, then, apply them on the domain of autonomous vehicles. Six factors influencing the creation of the value are defined. A rating system is then constructed. Nine business models are scored against these factors. Results are discussed.


*"The technology is essentially here… We have machines that can make a bunch of quick decisions that could drastically reduce traffic fatalities, drastically improve the efficiency of our transportation grid, and help solve things like carbon emissions that are causing the warming of the planet."*

Over the last year, we have seen many groundbreaking announcements regarding autonomous cars, from companies like Ford promoting its autonomous vehicle leader to the position of CEO, to Tesla's NHSTA investigation showing a 40 percent decrease in accidents with Autopilot enabled and Audi beginning mass-market sales of a "Level 3" autonomous car.

Nevertheless, many questions in the world of autonomous vehicles remain unanswered. How will autonomous cars make ethical decisions, as in the case of the "trolley problem"? How will cities, streets and parking change? What will happen to the millions of people employed as ridesharing drivers or long-haul truck drivers? What is the right package of sensors to drive autonomous vehicles?

We believe that many of the open questions about autonomous vehicles will be answered not just by technological innovation but by the emerging business models around autonomous vehicles. For example, if regulators decide to tax autonomous vehicles based on miles traveled within a city, there will be different incentives for vehicles to stay close by to maximize trips and minimize costs. If car companies decide to sell cars directly to fleet operators instead of consumers, they will allocate marketing and research and development dollars differently.

There is no better indicator for how companies will make decisions across many technology, business and societal questions than their underlying business models and profit motives.

Here are what we see as several of the key questions and implications for autonomous vehicles today.

**It will be difficult to strike a balance between letting the industry guide regulation and letting regulation dictate what the industry decides to build.**

The more we veer toward the transportation-as-a-service world, the more differently car companies will operate in the future. Automobile manufacturers are today the biggest spenders in the entire advertising industry. If consumers no longer purchase cars and only purchase Uber rides and Zipcar rentals, that will drastically change the billions of dollars spent on automobile advertising. It also will change the set of profit pools across the entire automotive industry.

If ridesharing companies can "commoditize" automobiles such that consumers no longer care what type of car they are in to get from place A to place B, they will be able to capture a significant portion of the profits in the transportation industry and reinvest those profits in their technology platforms and marketplaces.

What does it mean if ridesharing companies take more and more revenue and profits away from car and truck manufacturers? One major impact will be that ridesharing companies will be more likely to invest in automation to cut costs rather than focus on ways to employ drivers (who will buy cars), and this could rapidly accelerate the loss of driving jobs. Another major impact would be that car dealerships become less relevant as a distribution channel for cars as ridesharing companies would likely prefer to buy in bulk from automakers to lower costs.

**The world isn't going to flip a switch one day to go from humans driving automobiles to autonomous vehicles.**

However, this industry is still young, and everyone — from automotive suppliers like Delphi to pure technology companies like Alphabet — want to make sure they can capture a piece of the transportation value chain. This could happen in many different ways. Perhaps Tesla will be able to develop an integrated supply chain from parts to rides that creates the best possible user experience, or maybe Ford will find a way to bring the most efficient driving software to market that every other manufacturer needs to license.

Companies that are providing higher-level services to consumers and businesses that are in the best position to bring supply and demand together are likely to create the most value and profit pools.

In any case, whoever wins this race to capture profits will be in a position to invest more in research, invest more in marketing and continue to innovate faster than competitors. This will lead to the winners helping to craft the public messages on autonomous vehicles, leading the industry on recommendations for tax policies and working closely with local, state and national officials to reshape cities and society.