

## The Unintended Consequences of Innovation

I often tell my wife it's quite possible my three young children won't have to drive if they don't want to once they reach that age because of the potential that we see self-driving cars by that time.

The benefits of self-driving cars could be enormous -- far fewer deaths on the roads, more efficient traffic patterns, reduced stress from being glued to the steering wheel in a traffic jam, more time to do other things while a computer drives your car, fewer parking headaches and much more.

When you add in the possibility of better electric car technology to the mix the entire automobile industry could be turned on its head in the coming decades.

Benedict Evans from Andreessen Horowitz recently talked with [Russ Roberts](#) about a piece he wrote on some of the potential second order consequences if these technologies come to fruition. He asked the following questions:

- Could car designs completely change if driving becomes much safer?
- What happens to all the gas stations if we go mostly electric?
- What will be the impact on tobacco sales (over half of all tobacco sales occur at gas stations)?
- What happens to the lost revenue from gasoline taxes or speeding tickets?
- How much of an impact will on-demand cars have on real estate?
- What happens when there are cameras and sensors all over the roads?
- What role will government regulations play in this development?

While there are loads of potential benefits from self-driving cars there are also unintended consequences. The last time we saw such a sea change in automobile technology was when they first reach mass appeal in the 1920s. The following comes from the book [Once in Golconda](#):

*Business was in charge of the country to an extent that it had not been since the post-Civil War era of railroad expansion; and its new leader was a newer kind of transportation, the automobile. Just between 1921 and 1923 the annual factory sales of passenger cars rose from under 1.5 million to over 3.6 million, the total number of motor vehicles on the American roads from 10.5 to 15.1 million by the end of the decade the latter figure would account for not quite one-tenth of all manufacturing wages and more than one-tenth of the value of all manufactured goods. Automobile stocks were to the stock market of the 1920s what electronics would be to the 1950s; by the time the really big market advances were under way, General Motors, Fisher Body, Du Pont, and Yellow Cab were called the Four Horseman of the boom, and it was a standard Wall Street joke to speak of the market collectively as "a product of General Motors."*

It sounds like the Four Horseman of the boom were the original FANG stocks. The pain from this big move into manufacturing was felt severely by farmers across the country:

*Of course, prosperity was not for everyone. The farmer, largely deprived of his huge wartime export trade, ill-equipped by temperament and technology to protect himself against suicide through overproductiveness, and virtually unassisted, in those days, by government, was in the direst of straights. The average price of all farm products was cut in half from 1920 to 1921, and was to regain only a fraction of the loss by 1927; per capita net income for persons on farms fell 62 percent between 1919 and 1921. These catastrophic declines, unprecedented in the country's agricultural history, meant defaulted mortgages and the failure of the rural banks that held them; in the great years of "prosperity" from 1923 to 1929, banks in the United States were failing steadily at a rate of nearly two per day.*

The obvious candidates for major disruption this time around are truck drivers, cab drivers and anyone working in the car repair industry. But even if you understand what's coming in terms of innovation it's really difficult to predict its impact.

Evans' colleague at Andreessen Horowitz, Marc Andreessen, has a great story that illustrates this point. He tells the backstory about how Thomas Edison invented the phonograph -- the device that first allowed people to record and reproduce music easily -- but didn't foresee that it would completely change the music industry forever. Edison assumed the phonograph would allow people to store and listen to religious sermons in the comfort of their own home, not music.

Here's the takeaway from Andreessen:

*The historical track record of technology innovators predicting the consequences of their innovations is very poor. So is everybody else's predictions.*

While the possibilities of self-driving electric cars are exciting it's going to be nearly impossible to predict who the winners and losers will be in all of this. Some of the winning companies may not even exist yet. And the biggest innovations may not even come from the cars themselves.

Tim Harford wrote a long piece on technology that began with a story about the movie Blade Runner, the 1980s Harrison Ford flick about the future:

*Blade Runner (1982) is a magnificent film, but there's something odd about it. The heroine, Rachael, seems to be a beautiful young woman. In reality, she's a piece of technology — an organic robot designed by the Tyrell Corporation. She has a lifelike mind, imbued with memories extracted from a human being. So sophisticated is Rachael that she is impossible to distinguish from a human without specialised equipment; she even believes herself to be human. Los Angeles police detective Rick Deckard knows otherwise; in Rachael, Deckard is faced with an artificial intelligence so beguiling, he finds himself falling in love. Yet when he wants to invite Rachael out for a drink, what does he do?*

*He calls her up from a payphone.*

It's much easier to come up with a sophisticated artificially intelligent robot than a simple improvement in communication technology. Harford discusses why:

*Forecasting the future of technology has always been an entertaining but fruitless game. Nothing looks more dated than yesterday's edition of Tomorrow's World. But history can teach us something useful: not to fixate on the idea of the next big thing, the isolated technological miracle that utterly transforms some part of economic life with barely a ripple elsewhere. Instead, when we try to imagine the future, the past offers two lessons. First, the most influential new technologies are often humble and cheap. Mere affordability often counts for more than the beguiling complexity of an organic robot such as Rachael. Second, new inventions do not appear in isolation, as Rachael and her fellow androids did. Instead, as we struggle to use them to their best advantage, they profoundly reshape the societies around us.*

If my kids truly are going to be riding around in self-driving cars I'm guessing it's going to look completely different than many of us predict.

Sources:

[Cars and Second Order Consequences \(Benedict Evans\)](#)

[Competing Against Luck \(a16z Podcast\)](#)

[Once in Golconda: A True Drama of Wall Street 1920-1938](#)

[What we get wrong about technology \(Tim Harford\)](#)

Further Reading:

[The Network Effect of Ideas & Innovation](#)

Now here's what I've been reading lately:

- Overcoming your demons ([Collaborative Fund](#))
- 10 investing ?s to ask yourself ([Humble Dollar](#))
- Profit margins and the danger of overconfidence ([Philosophical Economics](#))
- The Cobra Effect ([Of Dollars and Data](#))
- The history behind the first ever index fund ([Irrelevant Investor](#))
- Connections, good luck and just holding on ([Abnormal Returns](#))
- How to think about benchmarks ([EBI](#))
- When the hedge is worse than the thing being hedged ([Reformed Broker](#))
- The fickle fortunes of market timing ([Bloomberg](#))

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