

[Transcript] FYI - For Your Innovation / Big Ideas Monday Mini: Autonomous Ride Hail

Welcome to the Big Ideas Monday mini-series, brought to you by the For Your Innovation podcast.

Big Ideas is meant to enlighten investors on the long-term impact of innovation.

This annual research report seeks to highlight the technological breakthroughs evolving today and creating the potential for super-exponential growth tomorrow.

We believe that innovation is taking off now, corroborating our original research and boosting our confidence that our strategies are on the right side of change.

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Hi everyone, I'm Tasha Keeney, Director of Investment Analysis and Institutional Strategies at ARC.

And today I'm going to talk to you about Autonomous Ride Hail.

This is from our Big Ideas 2023 deck.

Please check out all the sections.

Before I get started, there are risks in investing and innovation among them, regulatory hurdles which are applicable here, know these risks as investors, and ARC also does take into account these risks as we assess market opportunities.

Let's get into it.

Autonomous Ride Hail.

Today, Autonomous Ride Hail services are already available across about 15 cities internationally, whether those be full-blown commercial opportunities or currently testing with a specific group of individuals or employees, but the point is autonomous cars are on the roads today.

We think that autonomous technology should reduce the cost of mobility to about 12% of the average cost of human-driven ride hail today, and ultimately we think that autonomous ride hail platforms could scale to \$14 trillion in enterprise value off of \$4 trillion in revenue over the next five years.

And why is autonomous technology innovative to begin with?

Well, we've estimated that the price per mile that you could profitably charge a consumer for an autonomous taxi or ride hail service could be as little as \$0.25 per mile, and this is going to be what causes widespread adoption and what drives demand for these services. We do expect autonomous technology will be much safer than human-driven cars, roughly 80% safer if you look at some of our prior research, but ultimately demand will be driven by price.

And why does price matter?

Well, if you look back over the past 100 years, the cost of personally-owned travel

really hasn't changed since the 1930s.

It's been around \$0.70 per mile for all of that time, but it's changing now.

We expect, again, the cost of an autonomous taxi could be as little as \$0.25 per mile.

That's less than half the cost of driving a personal car.

It's a lot less expensive than today's taxis, and this is what's going to open up the ride hail market to many people that do not have access to inexpensive point-to-point travel options today.

So I said that prices could be as little as \$0.25, but actually, we think especially in the early days of the market, there should be support for higher price points.

So ride hail today in Western markets or in higher cost countries comes in at around \$2 to \$4 per mile.

So we see some amount of price support there, about \$34 billion of addressable market. We've done some analysis on how consumers value their time, specifically for work and non-work-related miles, and we think there should be \$1 to \$3 trillion worth of demand at the \$1 to \$0.60 price point.

There'll be an additional long tail priced roughly equivalent to where we see ride hail options today in countries like China where it's already relatively inexpensive at around \$0.50 per mile, and then ultimately, the magic happens at the \$0.25 per mile price point. This is where you bring those people into the market that are not necessarily in the ride hail universe today, that all of a sudden get access to very inexpensive, very convenient travel.

That's an additional \$5 trillion of addressable opportunity.

So the point here is there's a very big market potential, much bigger than what we see in ride hail today.

And as I said in the beginning, autonomous taxis are already on the road.

So here in the US, Waymo and Cruz have already launched commercial services.

There are customers from the general public that are in these cars, and there's no one behind the wheel of the car.

It's a fully autonomous vehicle.

Baidu has also committed to launching any day now in China.

They're already testing in over 10 Chinese cities.

Pony AI plans to launch in the next year or so.

The midpoint of our Tesla analysis would suggest a 2024 launch time, and then finally, ExPang coming later between, say, 2025, 2026.

So while we have some players that have already commercially launched, the question is, when and how will this technology scale?

Well, we go back to what we've learned from studying artificial intelligence broadly.

And what we believe is that the more data that you have, the better your system should be.

We've learned that with past large models that we've seen cause these major breakthroughs in other areas of AI.

And so ultimately, companies that have vehicles on the road today collecting data at scale have a great advantage.

So I'll point out that while Tesla has not launched, it has almost 3 million cars on

the road collecting information today, acting like little R&D centers, collecting corner cases to then feed back to the autonomous neural net training system that helps the car improve.

That is much larger than, that fleet is much larger than the fleet that we see at competitors that might number in the hundreds or at most 1,000.

And then finally, in China, ExPang is also using customer cars to collect information while they will not necessarily be the cars that are running in the RoboTaxi service.

They're still able to collect information today.

So they have hundreds of thousands on the road today.

We think that data will provide a significant competitive advantage here.

And the effects of autonomous driving are going to be very widespread across a number of industries.

The first is we expect oil demand could decline by 30% by 2030.

This is thanks to both autonomous and electric platforms.

So we believe that every autonomous vehicle will be electric.

Just based on our EV forecast alone, we'd already expect a decline in oil demand.

Autonomous technology will accelerate that because these cars will have a much higher utilization rate than today's personally owned cars.

Personally owned cars are used less than 5% of the day today.

Taxi gets a very well utilized taxi, gets a 30% utilization rate.

We think autonomous taxis could have even a higher utilization rate, say 50%.

That means that even more miles are going to travel over electric platforms if this takes off.

And ultimately oil demand could decline by 30 million barrels per day by 2035.

And that is, of course, a lot lower than the consensus expectation for oil demand.

We also estimate that auto sales might have peaked, at least for the short term, in 2017.

So we've been producing our big ideas report for a number of years now.

And back in 2017, we estimated that overall auto sales could be less than expectations by about 24 million units by 2025.

So actually since we made that prediction, auto sales have declined even more than we had initially predicted.

But of course that's because of COVID and the supply chain crisis that we've seen over the past few years.

Going forward, we still expect there to be a shortfall relative to expectations in the next 5 to 10 years.

We're now estimating there will be a 29 million unit gap relative to consensus by 2027.

And this again is because you can imagine that a two car household becomes a one car household, a one car household moves to zero cars as autonomous taxis begin to dominate urban transit, which is where most miles happen today.

It's roughly two thirds of miles that happen in urban centers.

This is where autonomous taxis will really take hold.

And that'll incrementally affect the marginal buyer of an automobile.

Longer term, auto sales could increase again as over the coming decades, autonomous travel gets even more popular, but of course those will be autonomous cars.

They won't be today's traditional, personally owned vehicles.
And ultimately we think autonomous taxis could eliminate about 60% of shortfall flights.
We've done this analysis across of our full price range for our per mile estimates for robotaxi is what the prices that consumers will pay per mile.
And ultimately that 60% of flights is worth about \$100 billion in revenue or about 20% of airline revenues in total.
So this could be a pretty significant hit to the airline industry.
So and ultimately if you look at just price alone, excluding time at 25 cents per mile, robotaxis are actually more cost effective than most shortfall journeys.
And when you include time, the trade off of cost and time will be even more dramatic for group travel.
So if you're traveling with a family, let's say you have a dog and a baby, you might not want to take a car, drive to the airport, go through security, get out of the plane, take your car on the other end, there'll be a much more seamless option to take an autonomous taxi, even if it takes you longer to get there.
So the graph here that you're seeing is our 25 cents per mile analysis at various short haul flight options.
And ultimately, you know, the bottom half here is what we're looking at for flights that we think could go to robotaxis that currently exist on short haul planes.
So it might take slightly longer, but we still think that in some of those cases, that autonomous taxi will be a more attractive option, because it's that seamless point to point option.
And ultimately, we think autonomous taxis could generate about \$4 trillion in revenue by 2027.
We think that these platforms will be highly casual positive.
They'll have software like margins.
It'll be a recurring revenue stream to the platform provider, which we expect to be the company that develops and operates the autonomous technology stack that actually makes the car drive itself.
So these companies that operate the robotaxi services are really the ones that we think will get the lion's share of the economics.
And you can see that on the next slide.
So you know, we expect, again, \$14 trillion in enterprise value attributable to autonomous platform providers.
The other two pieces of the market that we've observed.
Well, first of all, I'll note that this may not be the ride, help companies and all of the companies that we see working on autonomous transport today.
We do expect there to be further consolidation in this industry.
It'll be a winner takes most market by our estimates and select geographies.
And not every company is going to be successful in this transition.
Not every automaker is going to be successful in this transition.
So if you look at the enterprise value attributable to automakers as of the beginning of this year was about \$2.7 trillion, we think that autonomous electric auto manufacturers could be worth about \$1.9 trillion in enterprise value in the next five years.
Not every automaker will be successful in electric and even fewer will be successful

in autonomy.

And the ones that aren't will actually have to partner with technology providers.

And they might be able to get a sliver of the economics on robotaxi and of course get the car sale.

Lastly, the owners and the maintenance providers.

These could be companies that house and maintain the autonomous cars.

You might consider car rental companies today that are mostly renting out gas powered cars.

Their business model is threatened by this transition.

It might be in their best interest to transition into being an autonomous fleet owner.

We think that the autonomous platform providers will have the assets held on a third party company balance sheet over time and of course these companies can help maintain the vehicles and take care of them over time as well.

So that's about \$300 billion in enterprise value.

For more research, visit arc-invest.com.

Thanks for sharing this with me today.

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