Exploring Willingness to Pay for Autonomous Vehicles

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Full citation (APA style)

Introduction

- Automated Vehicles (AVs) defining the future of transportation
  - Collision avoidance systems enhance traffic safety
  - Enhanced mobility for those who cannot drive
  - Convenience for those who can drive, but would rather not

- Success of automated mobility depends on consumer adoption and willingness-to-pay (WTP)

Autonomous Vehicle Definition

An Autonomous Vehicle (AV) is a vehicle that drives itself without human supervision or control. It picks up and drops off passengers including those who do not drive (e.g., children, elderly), goes and parks itself, and picks up and delivers laundry, groceries, or food orders on its own. When AVs become available, ridehailing companies (e.g., Uber and Lyft) will use them to provide rides without a human driver in the vehicle. When answering the questions in this section, please assume a future in which autonomous vehicles (AVs) are widely adopted, but human-driven vehicles are still present.
Recent Survey Findings in Literature

• Average WTP $3,252 with a human-driven-vehicle mode option or $2,783 without it (Quarles and Kockelman, 2019)

• 26.3% unwilling to pay extra for the AV version of the vehicle (Liua et al., 2019)

• 36% willing to maintain basic vehicle utilization. Average WTP varied from $652 for basic vehicles, to $1,769 for fully automated (Asgari and Jin, 2019)

• Average WTP (dynamic rideshare without additional time) in the US is $0.74/mile during the day, $0.87 during the night (Gurumurthy and Kockelman, 2020)

TOMNET D-STOP Transformative Technologies in Transportation Survey (T4 Survey)

• Phoenix, Atlanta, Austin, and Tampa metro areas
• Summer and Fall 2019
• Random address-based sample with online instrument
• Comprehensive attitudinal survey on MaaS and AV
• Weighted to better represent Census distributions

<table>
<thead>
<tr>
<th>Region</th>
<th>Sample Size</th>
<th>Phoenix, AZ</th>
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<th>Austin, TX</th>
<th>Tampa, FL</th>
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<tr>
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<td>1,027</td>
<td>944</td>
<td>1,127</td>
<td>260</td>
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</table>
Survey Instrument

Attitudes and Preferences → Vehicles You Have and Where You Live → Current Travel Patterns → Mobility on Demand and Shared Mobility Services → Autonomous Vehicles → Background Information

Overview

Willingness to Pay
Ranked Purchase Preference

11. Suppose AVs are now available for purchase, lease/rent, or to use via automated ridehailing services, and half of the vehicles on the streets are AVs. What would you do when faced with your next car purchase decision in each of the following scenarios? Please rank the alternatives based on your preference (1=most preferred; 3=least preferred). Please do not give the same rank to multiple alternatives.

Scenario 1: Option A: Buy a regular vehicle
Option B: Buy an AV
Option C: Don't buy a vehicle and use AV ridehailing/rental services

<table>
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<tr>
<th>Costs</th>
<th>Rank</th>
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<td>$500/month + $0.75/mile Average wait time: 0 minutes</td>
<td>------</td>
</tr>
<tr>
<td>$500/month + $0.75/mile Average wait time: 0 minutes</td>
<td>------</td>
</tr>
<tr>
<td>$0/month + $2.25/mile Average wait time: 6 minutes</td>
<td>------</td>
</tr>
</tbody>
</table>

Scenario 2 (N=301)
Scenario 3 (N=376)
Scenario 4 (N=308)
Scenario 5 (N=280)
Scenario 6 (N=348)
Scenario 7 (N=344)
Scenario 8 (N=325)
Scenario 9 (N=356)
Scenario 10 (N=298)
Scenario 11 (N=346)
Scenario 12 (N=306)
Scenario 13 (N=322)
Scenario 14 (N=403)
Scenario 15 (N=384)
Scenario 16 (N=323)
Scenario 17 (N=301)
Scenario 18 (N=360)
All (N=6,008)

1 Regular vehicle - 2 AV - 3 Ridehailing only
1 Regular vehicle - 2 Ridehailing only - 3 AV
1 AV - 2 Regular vehicle - 3 Ridehailing only
1 AV - 2 Ridehailing only - 3 Regular vehicle
1 Ridehailing only - 2 Regular vehicle - 3 AV
1 Ridehailing only - 2 AV - 3 Regular vehicle
### Ranked Purchase Preference (Same Price)

#### Costs
- **Option A:** Buy a regular vehicle
  - $500/month + $0.75/mile
  - Average wait time: 0 minutes
- **Option B:** Buy an AV
  - $500/month + $0.75/mile
  - Average wait time: 0 minutes
- **Option C:** Don’t buy a vehicle and use AV/ridehailing/rental services
  - $0/month + $2.25/mile
  - Average wait time: 6 minutes

#### Scenario 1 (N=327)
- 1 Regular vehicle – 2 AV – 3 Ridehailing only
- 1 AV – 2 Regular vehicle – 3 Ridehailing only
- 1 Ridehailing only – 2 Regular vehicle – 3 AV
- 1 Regular vehicle – 2 Ridehailing only – 3 AV
- 1 AV – 2 Ridehailing only – 3 Regular vehicle
- 1 Ridehailing only – 2 AV – 3 Regular vehicle

### Ranked Purchase Preference (AV Cheaper)

#### Costs
- **Option A:** Buy a regular vehicle
  - $500/month + $0.75/mile
  - Average wait time: 0 minutes
- **Option B:** Buy an AV
  - $375/month + $0.25/mile
  - Average wait time: 0 minutes
- **Option C:** Don’t buy a vehicle and use AV/ridehailing/rental services
  - $0/month + $1.50/mile
  - Average wait time: 9 minutes

#### Scenario 1 (N=327)
- 1 Regular vehicle – 2 AV – 3 Ridehailing only
- 1 AV – 2 Regular vehicle – 3 Ridehailing only
- 1 Ridehailing only – 2 Regular vehicle – 3 AV
- 1 Regular vehicle – 2 Ridehailing only – 3 AV
- 1 AV – 2 Ridehailing only – 3 Regular vehicle
- 1 Ridehailing only – 2 AV – 3 Regular vehicle

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**TOMNET Transportation Center**

Teaching Old Models New Tricks
When do respondents expect to purchase an AV?

- Phoenix (N=1014):
  - Would not buy: 43%
  - Eventually buy: 52%
  - One of the first to buy: 5%

- Atlanta (N=908):
  - Would not buy: 37%
  - Eventually buy: 59%
  - One of the first to buy: 4%

- Tampa (N=253):
  - Would not buy: 46%
  - Eventually buy: 52%
  - One of the first to buy: 2%

- Austin (N=1109):
  - Would not buy: 32%
  - Eventually buy: 62%
  - One of the first to buy: 6%

Among those who are willing to purchase an AV, how much are they willing to pay?

*Additional price considering they are purchasing a new regular car of $25,000*

- One of the first (N=160):
  - Zero: 9%
  - Up to $1k: 17%
  - $1k to $3k: 21%
  - $3k to $5k: 19%
  - $5k to $8k: 8%
  - $8k+: 4%

- Eventually (N=1,886):
  - Zero: 4%
  - Up to $1k: 8%
  - $1k to $3k: 22%
  - $3k to $5k: 17%
  - $5k to $8k: 17%
  - $8k+: 43%
Willingness to Pay by AV Familiarity

- Never heard of AVs (N=509)
  - Would not buy: 49%
  - Zero: 45%
  - Up to $1k: 30%
  - $1k to $3k: 20%
  - $3k to $5k: 16%
  - $5k to $8k: 0%
  - $8k+: 10%

- Don't know much about them (N=1215)
  - Would not buy: 45%
  - Zero: 30%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

- Somewhat familiar (N=1163)
  - Would not buy: 44%
  - Zero: 32%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

- Very familiar (N=418)
  - Would not buy: 42%
  - Zero: 36%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

- AV rider (N=45)
  - Would not buy: 42%
  - Zero: 36%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

Willingness to Pay by Location

- Phoenix (N=1027)
  - Would not buy: 42%
  - Zero: 36%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

- Atlanta (N=940)
  - Would not buy: 36%
  - Zero: 44%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

- Tampa (N=260)
  - Would not buy: 44%
  - Zero: 32%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%

- Austin (N=1126)
  - Would not buy: 32%
  - Zero: 44%
  - Up to $1k: 20%
  - $1k to $3k: 16%
  - $3k to $5k: 10%
  - $5k to $8k: 0%
  - $8k+: 0%
Attitudes &
Willingness to Pay

Willingness to Pay by Attitudinal Profile

- Tech averse suburbanites (N=774)
  - Would not buy: 44%
  - Zero: 36%
  - Up to $1k: 10%
  - $1k to $3k: 5%
  - $3k to $5k: 5%
  - $5k to $8k: 2%
  - $8k+: 1%

- Transit advocates (N=769)
  - Would not buy: 39%
  - Zero: 25%
  - Up to $1k: 15%
  - $1k to $3k: 10%
  - $3k to $5k: 5%
  - $5k to $8k: 2%
  - $8k+: 1%

- Tech friendly environmentalists (N=378)
  - Would not buy: 38%
  - Zero: 20%
  - Up to $1k: 15%
  - $1k to $3k: 10%
  - $3k to $5k: 5%
  - $5k to $8k: 2%
  - $8k+: 1%

- Sprawling techy multitaskers (N=724)
  - Would not buy: 35%
  - Zero: 17%
  - Up to $1k: 10%
  - $1k to $3k: 5%
  - $3k to $5k: 5%
  - $5k to $8k: 2%
  - $8k+: 1%

- Transit averse urbanites (N=692)
  - Would not buy: 29%
  - Zero: 20%
  - Up to $1k: 10%
  - $1k to $3k: 10%
  - $3k to $5k: 5%
  - $5k to $8k: 2%
  - $8k+: 1%
Willingness to Pay by AV Concern

I am concerned about the potential failure of AV sensors, equipment, technology, or programs.

Concerned Agree (N=2278)
- 37% Would not buy
- 47% Zero
- 34% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Neutral (N=588)
- 47% Would not buy
- 42% Zero
- 40% Up to $1k
- 41% $1k to $3k
- 42% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Not Concerned Disagree (N=480)
- 25% Would not buy
- 20% Zero
- 37% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Willingness to Pay by AV Concern

I am concerned about the potential failure of AV sensors, equipment, technology, or programs.

Not Concerned - Austin (N=163)
- 13% Would not buy
- 32% Zero
- 36% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Concerned - Austin (N=741)
- 32% Would not buy
- 32% Zero
- 36% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Not Concerned - Tampa (N=39)
- 36% Would not buy
- 51% Zero
- 40% Up to $1k
- 41% $1k to $3k
- 42% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Concerned - Tampa (N=172)
- 51% Would not buy
- 42% Zero
- 37% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Not Concerned - Atlanta (N=93)
- 37% Would not buy
- 34% Zero
- 37% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Concerned - Atlanta (N=676)
- 34% Would not buy
- 34% Zero
- 37% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Not Concerned - Phoenix (N=184)
- 26% Would not buy
- 42% Zero
- 37% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+

Concerned - Phoenix (N=679)
- 42% Would not buy
- 42% Zero
- 37% Up to $1k
- 37% $1k to $3k
- 38% $3k to $5k
- 51% $5k to $8k
- 36% $8k+
Willingness to Pay by Technology Savviness

Learning how to use new technologies is often frustrating for me.

- Not Tech Savvy
  - Agree (N=799)
    - Would not buy: 28%
    - Zero: 56%
    - Up to $1k: 20%
    - $1k to $3k: 8%
    - $3k to $5k: 3%
    - $5k to $8k: 2%
    - $8k+: 0%

- Neutral (N=505)
  - Would not buy: 28%
  - Zero: 43%
  - Up to $1k: 25%
  - $1k to $3k: 14%
  - $3k to $5k: 8%
  - $5k to $8k: 7%
  - $8k+: 0%

- Tech Savvy
  - Disagree (N=2041)
    - Would not buy: 28%
    - Zero: 56%
    - Up to $1k: 16%
    - $1k to $3k: 10%
    - $3k to $5k: 7%
    - $5k to $8k: 4%
    - $8k+: 0%

WTP by Commitment to Green Transportation

I am committed to using a less polluting means of transportation (e.g., walking, biking, and public transit) as much as possible.

- Committed
  - Agree (N=1237)
    - Zero: 31%
    - Up to $1k: 40%
    - $1k to $3k: 18%
    - $3k to $5k: 6%
    - $5k to $8k: 3%
    - $8k+: 0%

- Neutral (N=1088)
  - Would not buy: 39%
  - Zero: 41%
  - Up to $1k: 21%
  - $1k to $3k: 18%
  - $3k to $5k: 9%
  - $5k to $8k: 8%
  - $8k+: 0%

- Not Committed
  - Disagree (N=1025)
    - Would not buy: 39%
    - Zero: 41%
    - Up to $1k: 22%
    - $1k to $3k: 18%
    - $3k to $5k: 10%
    - $5k to $8k: 9%
    - $8k+: 0%
Demographics, Travel &
Willingness to Pay

Willingness to Pay by Age and Gender

- Would not buy
- Zero
- Up to $1k
- $1k to $3k
- $3k to $5k
- $5k to $8k
- $8k+

18-30 years (N=853)  
29%

31-40 years (N=611)  
31%

41-50 years (N=580)  
31%

51-60 years (N=527)  
51%

61-70 years (N=445)  
50%

71+ years (N=333)  
55%

Female (N=1712)  
45%

Male (N=1632)  
29%
Willingness to Pay by Household Income

<table>
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<tr>
<th>Income Range</th>
<th>Less than $50,000 (N=1248)</th>
<th>$50,000 to $99,999 (N=1031)</th>
<th>$100,000 or more (N=983)</th>
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<tbody>
<tr>
<td>Would not buy</td>
<td>42%</td>
<td>43%</td>
<td>25%</td>
</tr>
<tr>
<td>Zero</td>
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<tr>
<td>$5k to $8k</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>$8k+</td>
<td>25%</td>
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</tr>
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Willingness to Pay by Commuter Status

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<tr>
<th>Commuter Status</th>
<th>Commuter - Austin (N=816)</th>
<th>Commuter - Tampa (N=169)</th>
<th>Commuter - Atlanta (N=616)</th>
<th>Commuter - Phoenix (N=633)</th>
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<tbody>
<tr>
<td>Not Commuter</td>
<td>Not Commuter - Austin (N=311)</td>
<td>Not Commuter - Tampa (N=91)</td>
<td>Not Commuter - Atlanta (N=324)</td>
<td>Not Commuter - Phoenix (N=391)</td>
</tr>
<tr>
<td>Would not buy</td>
<td>25%</td>
<td>30%</td>
<td>33%</td>
<td>33%</td>
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<tr>
<td>Zero</td>
<td>49%</td>
<td>56%</td>
<td>46%</td>
<td>57%</td>
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<tr>
<td>Up to $1k</td>
<td>40%</td>
<td>38%</td>
<td>30%</td>
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<tr>
<td>$8k+</td>
<td>25%</td>
<td>30%</td>
<td>25%</td>
<td>25%</td>
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Key Findings

• **Interest in purchasing AVs is mixed**: 38% would never buy an AV even when AVs are cheaper than regular vehicles (a significant share of respondents prefer a regular vehicle)

• **Results across jurisdictions are fairly similar**. Tampa has the lowest willingness to pay for and buy AVs.
  • High(er) willingness to pay was observed in Austin and Phoenix

• **Attitudes matter**: Those who are tech savvy, driving-oriented, and multi-taskers are more prone to pay higher amounts for AVs

• **Women and older individuals are less interested** in purchasing an AV and are less willing to pay a premium for it

Thank you!

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