Preparing U.S. Workers & Employers for an Autonomous Vehicle Future

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With S. Helper, J.P. MacDuffie, & C. Carson
Agenda

• Lessons from past innovations
• Sizing and timing AV’s impact on workers
• Next steps
Innovation is not new

• Industrial Revolution in England, 1750-1900
• Autopilot in aviation, 1912-now
• Computer numerical control in machine tools, 1960-1990
• Automation in auto assembly plants, 1980s-now
• Automatic teller machines, 1980s-now
• Trade expansion with China, 1990-now
• Self-driving trucks in Australian strip mines, 2000-now
Lessons from past transitions

• Full employment returns
• Costs to workers
  • Concentrated & high
  • Uncertain
  • Precede benefits
  • Fuel unrest & resistance
• Benefits accrue diffusely & unevenly
• Policy & implementation matter
AV adoption

Higher productivity
Lower transportation prices

Lost jobs
Displaced workers move without cost to new jobs

AV-supporting suppliers
We buy more new inputs for AV
New jobs

Transportation companies
We buy more transportation
New jobs

Non-AV companies
We buy more other things
New jobs
AV adoption

Higher productivity
Lower transportation prices

Lost jobs & income

Gaps hinder effective adjustment:
- Geography
- Skills
- Worker voice
- Investment

Transportation companies
- We buy more transportation
- New inputs for AV
- New jobs

AV-supporting suppliers
- New jobs

Non-AV companies
- We buy more other things
- New jobs

We buy more transportation
We buy more other things

New jobs
Reducing adjustment gaps

• Key to success
• Historically neglected
Sizing and timing AV’s impacts
1.3 – 2.3 million workers displaced
Unemployment: max +0.13 percentage pt in mid-2040s
Impact consequential & manageable

• Workers displaced (2018-2051): 1.3-2.3 M
  • +0.13 percentage pt to unemployment at peak
  • -0.1 percentage pt to participation at peak
  • ½ size of China shock
• Wealth losses: $200-$300 B
  • $80-$120K/worker
  • Worse in recessions
• Timing: max in mid-2040s
  • Starts slowly
Next steps
Choose a path

Mitigation Strategy Paths

- **Passive**
  - Deploy AV rapidly & accept high costs to workers at risk of social disruption and resistance

- **Reactionary**
  - Slow down AV adoption to allow current workforce system to handle transition without high costs

- **Investment**
  - Deploy AV rapidly & direct some benefits to invest in comprehensive cost mitigation
What would comprehensive cost mitigation look like?

<table>
<thead>
<tr>
<th>Strengthen existing system -- UI, Workforce Innovation &amp; Opportunity Act, CCs</th>
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<tbody>
<tr>
<td>Employers engaged</td>
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<td>Adequately funded for inclusive eligibility -- not only AV</td>
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<table>
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<tr>
<th>Multi-pronged</th>
<th>Evidence-based</th>
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<tbody>
<tr>
<td>• Worker voice</td>
<td>• Program experiments &amp; evaluations</td>
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<tr>
<td>• Training</td>
<td>• Relevant, high-quality official statistics</td>
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<tr>
<td>• Place-based</td>
<td>• Administrative data</td>
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<tr>
<td>• Income support</td>
<td>• Research</td>
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<td>• Search &amp; placement</td>
<td>• Stakeholder input</td>
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Some of many tested policy tools

- Wage insurance
- Works councils
- Worker training accounts
- Universal basic income
- Flexicurity
- Public sector jobs for infrastructure
- Place-based economic development
Conclusion on mitigation investment

• Advisable
  • Avoid consequential harm
  • Promote further innovation
  • Use workers’ skills & insights

• Doable
  • 10-20 years before costs mount
  • Many policy options
  • Annual AV benefits ($800 B) >> Total costs ($200-300 B)
Immediate steps

✓ **Employers**: start plans
  • Tap workers’ skills and insights
  • Retrain & retain existing staff

✓ **Local stakeholders**: hold planning forums
  • Workforce development system
  • Tech & transportation companies
  • Worker representatives
  • Civic leaders, foundations, researchers

✓ **National stakeholders**: craft an investment strategy
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The gap between productivity and a typical worker’s compensation has increased dramatically since 1973


1948–1973:
- Productivity: 96.7%
- Hourly compensation: 91.3%

1973–2016:
- Productivity: 73.7%
- Hourly compensation: 12.3%

Cumulative percent change since 1948

Note: Data are for compensation (wages and benefits) of production/nonsupervisory workers in the private sector and net productivity of the total economy. "Net productivity" is the growth of output of goods and services less depreciation per hour worked.

Source: EPI analysis of Bureau of Labor Statistics and Bureau of Economic Analysis data

Updated from Figure A in *Raising America’s Pay: Why It’s Our Central Economic Policy Challenge*
Artificial intelligence: who is right?

• AI: replicates routine brainwork

• Techno pessimists
  • AI destroys jobs
  • Employment falls
  • Permanent pool of poor unemployed

• Techno optimists
  • AI productivity makes us rich
  • Few will need to work

• Examples: BLS, driverless cars
AI impact on labor market: temporary but costly

• Techno optimists and pessimists both wrong
• Unless we’re all satisfied currently
  • Unemployment rises temporarily, perhaps a long time
  • We return to full employment
• Benefits not used to compensate displaced workers
  • Lifetime earnings losses of 1-4x previous annual earnings
  • More jobless and NLF spells, fewer hours, lower wages
→ Suicides, poor health, ..., and resistance to change
• Policy (not technology) can reduce losses by
  • Employer and government actions
  • Closing gaps to reduce unemployment and raise wages
  • Compensating job losers