Digital Inclusion for Economic Mobility

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Federal Reserve Bank of Dallas
The views expressed are my own and do not necessarily reflect official positions of the Federal Reserve System.
“The dogmas of the quiet past are inadequate for the stormy present... As our case is new, so we must think anew, and act anew.”
— A. Lincoln 1862
The Fourth Industrial Revolution: The Future of Work is Here

- Technological advancements are transforming work
- Growth of automation & technological complexity are changing required job skills (i.e., manufacturing)
- E-commerce and the disruptions in brick and mortar retail
- Artificial intelligence advancements (augment labor → replace labor)
- Remote models for provision of services (i.e., Telemedicine, Banking)
- Growth in contingent workforce (i.e., gig economy)
- Algorithms, 3D printing, self-driving vehicles, Blockchain . . .
What is the Digital Divide?

- The gap between people who have access to broadband services and know how to use the internet and those who do not have such access or knowledge.

- *Who’s on the wrong side of the digital divide?* Low-income people, rural populations, those with less formal education, the elderly and minorities.

- For households with a broadband subscription across multiple devices (desktop or laptop and smartphone or tablet), incomes above $150,000 per year have a rate of 80 percent and households with incomes under $25,000 per year, the rate is 20 percent (U.S. Census, ACS, 2016).
### U.S. Cities with 100,000+ Households Ranked by ‘Worst Connection’:

#### Median Household Income vs. Percent of Households With No Fixed-Broadband Connection

<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
<th>Median Household Income</th>
<th>% of households with no fixed internet access</th>
<th>Rank</th>
<th>City</th>
<th>Median Household Income</th>
<th>% of households with no fixed internet access</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Detroit, Michigan</td>
<td>$26,249</td>
<td>57.3%</td>
<td>26</td>
<td>Arlington, Texas</td>
<td>$53,574</td>
<td>34.7%</td>
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<tr>
<td>2</td>
<td>Memphis, Tennessee</td>
<td>$36,975</td>
<td>49.9%</td>
<td>27</td>
<td>Oklahoma, Oklahoma</td>
<td>$50,070</td>
<td>34.0%</td>
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<tr>
<td>3</td>
<td>Cleveland, Ohio</td>
<td>$26,583</td>
<td>57.3%</td>
<td>28</td>
<td>Phoenix, Arizona</td>
<td>$49,328</td>
<td>33.6%</td>
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<tr>
<td>4</td>
<td>Miami, Florida</td>
<td>$31,642</td>
<td>47.6%</td>
<td>29</td>
<td>Tuscal, Arizona</td>
<td>$37,973</td>
<td>33.6%</td>
</tr>
<tr>
<td>5</td>
<td>New Orleans, Louisiana</td>
<td>$37,488</td>
<td>43.1%</td>
<td>30</td>
<td>Fort Worth, Texas</td>
<td>$54,876</td>
<td>33.3%</td>
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<tr>
<td>6</td>
<td>Dallas, Texas</td>
<td>$45,215</td>
<td>42.3%</td>
<td>31</td>
<td>Oklahoma, Oklahoma</td>
<td>$49,398</td>
<td>33.2%</td>
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<tr>
<td>7</td>
<td>Buffalo, New York</td>
<td>$53,119</td>
<td>42.2%</td>
<td>32</td>
<td>Atlanta, Georgia</td>
<td>$50,156</td>
<td>32.1%</td>
</tr>
<tr>
<td>8</td>
<td>Milwaukee, Wisconsin</td>
<td>$36,801</td>
<td>42.1%</td>
<td>33</td>
<td>Mesa, Arizona</td>
<td>$48,265</td>
<td>32.0%</td>
</tr>
<tr>
<td>9</td>
<td>Baltimore, Maryland</td>
<td>$44,262</td>
<td>41.6%</td>
<td>34</td>
<td>Jacksonville, Florida</td>
<td>$48,256</td>
<td>32.0%</td>
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<tr>
<td>10</td>
<td>Indianapolis, Indiana</td>
<td>$43,101</td>
<td>40.8%</td>
<td>35</td>
<td>Fort Wayne, Indiana</td>
<td>$44,449</td>
<td>31.8%</td>
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<tr>
<td>11</td>
<td>Greensboro, North Carolina</td>
<td>$42,802</td>
<td>39.4%</td>
<td>36</td>
<td>Los Angeles, California</td>
<td>$51,538</td>
<td>31.6%</td>
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<tr>
<td>12</td>
<td>Philadelphia, Pennsylvania</td>
<td>$39,770</td>
<td>39.4%</td>
<td>37</td>
<td>Omaha, Nebraska</td>
<td>$50,827</td>
<td>31.5%</td>
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<tr>
<td>13</td>
<td>Toledo, Ohio</td>
<td>$34,548</td>
<td>38.8%</td>
<td>38</td>
<td>Las Vegas, Nevada</td>
<td>$50,882</td>
<td>31.3%</td>
</tr>
<tr>
<td>14</td>
<td>Houston, Texas</td>
<td>$47,010</td>
<td>38.2%</td>
<td>39</td>
<td>Louisville/Jefferso, Kentucky</td>
<td>$46,881</td>
<td>31.2%</td>
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<tr>
<td>15</td>
<td>San Antonio, Texas</td>
<td>$48,183</td>
<td>38.2%</td>
<td>40</td>
<td>New York, New York</td>
<td>$55,191</td>
<td>30.7%</td>
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<tr>
<td>16</td>
<td>St. Louis, Missouri</td>
<td>$36,809</td>
<td>37.8%</td>
<td>41</td>
<td>Nashville-Davidson, Tennessee</td>
<td>$49,891</td>
<td>30.6%</td>
</tr>
<tr>
<td>17</td>
<td>Cincinnati, Ohio</td>
<td>$34,629</td>
<td>37.3%</td>
<td>42</td>
<td>Pittsburgh, Pennsylvania</td>
<td>$42,450</td>
<td>30.6%</td>
</tr>
<tr>
<td>18</td>
<td>El Paso, Texas</td>
<td>$43,322</td>
<td>37.1%</td>
<td>43</td>
<td>Anchorage municipality, Alaska</td>
<td>$58,669</td>
<td>30.1%</td>
</tr>
<tr>
<td>19</td>
<td>Tulsa, Oklahoma</td>
<td>$43,045</td>
<td>36.3%</td>
<td>44</td>
<td>Anchorage municipality, Alaska</td>
<td>$57,778</td>
<td>30.1%</td>
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<tr>
<td>20</td>
<td>Fresno, California</td>
<td>$41,842</td>
<td>36.1%</td>
<td>45</td>
<td>Anchorage municipality, Alaska</td>
<td>$57,778</td>
<td>29.7%</td>
</tr>
<tr>
<td>21</td>
<td>Chicago, Illinois</td>
<td>$50,434</td>
<td>35.9%</td>
<td>46</td>
<td>Anchorage municipality, Alaska</td>
<td>$55,303</td>
<td>29.6%</td>
</tr>
<tr>
<td>22</td>
<td>Kansas, Missouri</td>
<td>$47,489</td>
<td>35.6%</td>
<td>47</td>
<td>Anchorage municipality, Alaska</td>
<td>$63,361</td>
<td>29.5%</td>
</tr>
<tr>
<td>23</td>
<td>Albuquerque, New Mexico</td>
<td>$48,127</td>
<td>35.3%</td>
<td>48</td>
<td>Anchorage municipality, Alaska</td>
<td>$52,071</td>
<td>29.4%</td>
</tr>
<tr>
<td>24</td>
<td>Corpus Christi, Texas</td>
<td>$52,154</td>
<td>35.3%</td>
<td>49</td>
<td>Anchorage municipality, Alaska</td>
<td>$52,611</td>
<td>28.5%</td>
</tr>
<tr>
<td>25</td>
<td>Wichita, Kansas</td>
<td>$46,775</td>
<td>34.9%</td>
<td>50</td>
<td>Anchorage municipality, Alaska</td>
<td>$52,115</td>
<td>28.4%</td>
</tr>
</tbody>
</table>

Broadband: A Platform for all Areas of CRA and Community Development

- Essential Infrastructure
- Workforce Development and Education
- Access to Financial Services
- Small Business Development
- Civic Engagement
- Affordable Housing/Essential Infrastructure
- Health Care
- Disaster Recovery/Resilience
Three Legs of the Stool of Broadband Adoption

- **Infrastructure**
  - Expand broadband connectivity

- **Limited broadband infrastructure**

- **No broadband infrastructure**

- **Affordability**
  - Computer access programs

- **Training**
  - Digital inclusion programs

- **Infrastructure**
  - Deploy new broadband network

SOURCE: Federal Reserve Bank of Dallas.
The Digital Economy and the Workforce

- Broadband access → Ability to participate in internet economy
- Digital literacy → Participation in internet economy as consumers
- Financial literacy → Participation in internet economy through online personal finance
- Computer technical skills training → Participation in internet economy as a skilled worker
- Computer programming → Participation in internet economy as an entrepreneur

SOURCE: Federal Reserve Bank of Dallas.
The Homework Gap

- 1/3 of households with incomes below $50,000, with school-age children, do not have high-speed internet access at home (40% of all families with school-age children)
- Only 8% of households with incomes of $50,000 or more lack broadband at home
Attracting Business for Job Creation

- Broadband infrastructure and workers who have digital skills are necessary to attract business and industry, i.e., jobs to underserved communities
- Broadband Infrastructure and digital inclusion: The ecosystem for entrepreneurship
- Small business has been responsible for about 65 percent of job gains over the past 25 years (U.S. Bureau of Labor Statistics 2017)
- The key to growing entrepreneurship in the digital economy is to promote the expansion of broadband networks
- The intelligence of the network is now on the periphery—with a person and their computer (and a little knowledge of coding)
- Business platforms, efficiencies, and the expansion of the customer base
## Workforce Development

- Digital skills & access to broadband required for accessing jobs & training
- 80% of jobs are posted online
- Job training programs increasingly offered online
- Digitally-intensive middle skills jobs have grown twice as fast as other middle skills jobs in the past decade (higher wages); 82% of middle skills jobs require digital skills

- Automation, e-commerce, digital skills gap, digital divide → the shrinking middle class and job polarization

<table>
<thead>
<tr>
<th>Digital Inclusion</th>
<th>August 6, 2019</th>
<th>Federal Reserve Bank of Dallas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply Now</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Shrinking Middle Class: 
Job Polarization in the United States

Employment Shares by Skill Level
January 1979 - September 2016

- High-Skill Occupations: 25% (1979) to 39% (2015)
- Traditional Middle-Skill Occupations: 61% (1979) to 43% (2015)
- Low-Skill Occupations: 14% (1979) to 18% (2015)

NOTE: Data are restricted to workers ages 16 to 64 who are not self-employed and are not employed in military or agricultural occupations. SOURCE: The original chart is from "The Vanishing Middle: Job Polarization and Workers’ Response to the Decline in Middle-Skill Jobs,” Didem Tuzemen and Jonathan Willis, Federal Reserve Bank of Kansas City, 2013. The original chart has been updated to begin in 1979 and end in September 2016. Data was provided by Didem Tuzeman.
Low Wage Jobs and the Shrinking Middle Class

Change in Employment Shares by Wage Quartile, 1979-2014

Percent

Texas | U.S. Minus Texas

Lowest Wage Quartile | -10.7 | -9.2 | 15.5 | 13.4
Lower-Middle Wage Quartile | -11.0 | -10.8
Upper-Middle Wage Quartile | 6.7
Highest Wage Quartile | 6.2

Income and Wealth Inequality

- Income and wealth inequality are at the highest levels since the Great Depression. America’s upper-income families have a median net worth that is nearly 70 times that of the country’s lower-income families.

- The Digital Divide creates a structural barrier to closing the income and wealth gaps—and a barrier to LMI individuals’ ability to move up the economic ladder.

- The Gatsby Curve: The finding that greater income inequality is associated with diminished intergenerational mobility.
Related Dallas Fed Publications

- Closing the Digital Divide: A Framework for Meeting CRA Obligations
- Preparing Workers for the Expanding Digital Economy
- Telehealth Initiatives Highlight Need to Close the Digital Divide
Presentation Sources

“Closing the Digital Divide” and “Preparing Workers for the Expanding Digital Economy” (unless otherwise noted)

- Available at dallasfed.org/cd