Introduction

This is the first of a series of reports on accelerating technological change and its implications for state and local governments.

We hope these discussions will be helpful for portfolio managers, state and local officials and planners, credit analysts, and other members of the Federal/state/local “equation.” We welcome feedback and suggestions for new aspects and directions to consider.

This study will consider five key factors.

First, any discussion of technological change is going to include considerable speculation and disagreement. Technology futurists, economists and other observers differ regarding the potential timing, magnitude, and direction of the effects of technological change. Our goal is to bring our readers the best analysis and research we can find, while also identifying key areas of disagreement and uncertainty.

Second, the economic, policy, political and financial implications of technological change for state and local governments are going to be profound, and sometimes jarring. In many cases, technologies that affect the functioning of state and local governments are turning over every 3½-4 years. This comment was made by Washington, D.C. CFO Jeff Dewitt on a panel in May at the National Municipal Analysts (NFMA) Conference. He asked the audience how this was likely to match up with long-term fixed-rate funding that is often 20 years or longer. We begin with a very short answer: the relationship between state and local governments and the private sector is going to change dramatically.

Three components of that change are:

1. A key role for the private sector, and universities, in helping state and local governments stay current with new technologies that will transform both the design of the urban environment and the nature of service delivery;

2. Vastly greater use of design/build strategies as opposed to design/bid/build, so that newly emerging technologies can be incorporated as rapidly as possible at every phase of key projects; and,

3. Substantially greater use of what we call “New-style P3s,” which are specifically intended to enable a given governmental function to incorporate and adapt to technological change, rather than merely provide a private sector financing source.
**Third**, technological change is very likely to radically transform the planning, design and financial/credit outcomes in states and cities nationwide.

**Fourth**, technological change will almost always be a “good news/bad news” construct, with new pressures on various aspects of our economy, governments and politics, along with potentially exciting advances. Quite simply, that is the nature of disruption, and technological change is nothing if not disruptive.

**Fifth**, we view “Fintech,” such as Blockchain, cryptocurrencies, robo managers and automated trading systems as playing an important role in how technological change will affect state and local governments.

### Part I: Technological Change and implications for state and local governments

Now to get started. There is a lot to discuss, with important, or even profound, implications for:

a) How local governments function;

b) Winners and losers among local governments as industries change, and as the price of some kinds of labor come under considerable pressure;

c) The planning and design of government services and infrastructure in response to emerging technologies, such as “Transportation as a Service” (TaaS), discussed below.

d) Levels of productivity and inflation; and,

e) Relative credit strength of various cities and states as winners and losers arise for different reasons than in the past.

Below, we begin to tackle three components of this impending transformation/disruption: 1) An important newly announced example of the application of AI/Big Data/Machine Learning to urban analysis and planning; 2) The projected near-ending of broad car ownership and how it would affect cities; and, 3) Impact of technological change on jobs/disposable income.

We have been observing with great fascination as technological change played out in a number of ways, including:

- Potential downward pressures on the number of jobs and on after-tax disposable income;

- Clustering of economic activity around cities/regions with a large proportion of tech-related economic activity (“Smart Industry Cities,” as defined by Brookings);

- Varying degrees of urban adaptation to the availability of “big data” and other technological advances to become more effective sources of governmental service (Smart Cities);
• In a newer and equally important pattern, some key sectors, such as surface transportation, begin to reshape themselves around new technologies such as self-driving electric cars and new forms of ownership (“TaaS”); and,

• Government relationships with private sector technology companies begin to evolve in profound ways (more design/build, less design/bid/build; greater use of technology-based public-private partnerships (P3s)).

Next we will look at three examples of how technological change affect urban planning, car ownership and the implications on jobs and disposable income.

**An example of the application of AI/Big Data/Machine Learning to urban analysis and planning.**

In a recently completed first phase of a major new study, MIT and Harvard researchers combined AI, Big Data and Computer Vision techniques to examine the factors that most impact changes in economic trends in neighborhoods in 5 cities. They examined 1.6 million pairs of photos taken seven years apart.

Researchers have now used a new computer vision system to quantify the physical improvement or deterioration of neighborhoods. They then assigned causality, and concluded that education level, not income level, had the greatest impact on relative change in the quality of a neighborhood. Our point is not about their conclusion; it is more about the way technological change is affecting activities such as urban planning. Soon, many cities will be able to apply these “smart city” techniques to better identify attributes that will lead to improved economic growth potential and quality of life.

**The End of Car Ownership?**

Three recent major analyses have looked at factors that are likely to radically change patterns of car ownership and use, and as in the study above, lead to radical changes in how cities plan, design and “behave.”

One was a Wall Street Journal special section, dated June 20, headlined: “The End of Car Ownership: Ridesharing and self-driving vehicles will redefine our relationship with cars. Auto makers and startups are already gearing up for the change.” The second was an earlier and more extensive study of a transition to what the authors call “TaaS”: “Transportation as a Service.”

The study, “Rethinking Transportation 2020-2030: The Disruption of Transportation and the Collapse of the Internal-Combustion Vehicle and Oil Industries,” has generated massive attention and considerable controversy.
The study assumes that:

“We are on the cusp of one of the fastest, deepest, most consequential disruptions of transportation in history. By 2030, within 10 years of regulatory approval of autonomous vehicles (AVs), 95% of U.S. passenger miles traveled will be served by on-demand autonomous electric vehicles owned by fleets, not individuals.” They conclude that “the TaaS disruption will have enormous implications across the transportation and oil industries, decimating entire portions of their value chains, causing oil demand and prices to plummet, and destroying trillions of dollars in investor value — but also creating trillions of dollars in new business opportunities, consumer surplus and GDP growth.”

Our point is somewhat different: simply, under the assumption that this transition does occur —with timing uncertain, but the outcome less so— there are massive implications for state and local governments:

• Economic winners and losers;
• Massive changes in the design and planning of cities, transportation corridors, redevelopment projects, etc.;
• Sharply higher vehicle utilization;
• Sharply lower per-family costs of transportation; and,
• Potentially shorter commuting times, but also a strong need to manage road utilization using newly developed techniques.

And on and on and on.

**Will all of this come to pass?** Once again, our point isn't necessarily about accuracy of timing, but about the nature of change, disruption, the impact on urban planning and policy, and implications for creditworthiness. **The future is coming at us very quickly, and state and local governments and credits will clearly be affected.**


The McKinsey study predicts some of the same patterns as the other two pieces—a move to autonomous driving, shared mobility, and electrification. It then identifies some key issues that will likely result from these patterns, with more of an emphasis on implications for cities. These, they suggest, include greater mobility consumption, changes in mass transit patterns, greater demand for electricity coupled with declining battery prices, changing infrastructure needs (parking, charging); differing needs for urban planning; differing linkages with suburban areas, and so on.

This all comes back to our key points in this section: we are on the cusp of radical transformations of urban mobility, with dramatic implications for urban planning/smart cities, winners and losers, and by direct extension, changes in relative creditworthiness.

**Impact on jobs and disposable income.**

Andrew McAfee and Erik Brynjolfsson are among the best thought-leaders in this area. Their seminal work, “The Second Machine Age,” remains, in our view, the best work on the economic implications of ATC. They just came out with a new book, “Machine, Platform, Crowd: Harnessing Our Digital Future,” which talks about the ways in which matching of minds and machines, products and platforms, and the “core and the crowd” is shifting, with the latter playing a growing role relative to the former in each pair.

Here we discuss a sub-topic by these authors which has appeared in a number of print and online publications, entitled “How Many Jobs Will Be Killed by AI is the Wrong Question.” In the article, they note that AI-based technological change is happening even more rapidly than had been envisioned at the start of the decade, and “the fact that the world’s best players of both the Asian strategy game go and no limit heads up Texas hold-em poker are now AI systems indicates just how deeply they’re encroaching into human territory.” From there, however, they move into territory that we hadn’t expected, noting that total U.S. workforce has increased without fail for **eighty months** in a row, and that the total number of **hours worked** is now at an all-time high.

In other words, the “good news” side of the equation. However, they then come back to three ongoing challenges:

1) New jobs being created are largely lower middle class with more stagnant incomes, including low productivity service sector positions;
2) A large number of individuals have left the workforce, including a large proportion of job-age men who are not included when calculating the headline unemployment rate; and,

3) As automation takes over truck driving and other similar jobs, this mismatch between desired and available jobs is likely to grow. This is all consistent with their prior analyses.

The authors note a significant number of potential solutions, that in our view, are of questionable impact (unfortunately). These include:

1) Building better infrastructure (but with what funding?);

2) More rapid development of renewable energy sources;

3) Much greater use of the Earned Income Tax Credit (as opposed to a Universal Basic Income, which they agree potentially kills incentives to work);

4) Re-incentivizing entrepreneurship, which has been in decline despite technological change;

5) More secure access to healthcare, which would lead to greater job mobility; and,

6) Implicitly if not explicitly, more re-education and additional educational models that support incomes.

They conclude that “instead of trying to prepare for a jobless future, we should instead be preparing for one that’s a turbocharged version of what we already have: a job creation engine that has shifted into a lower gear, and a large number of people tempted to sit on the sidelines rather than contributing their skills to the economy.”

This is all well and good, but doesn't reduce our frank concerns. Overall, the view of techno-optimists is that ultimately, costs of production will be so low as to generate goods and services at an extraordinary rate. Our concerns, as always, are about the transitions: How do individuals and families adapt to this period of rapid change, and how do governments? Proposed solutions to coming disruptions, in our view, remain extremely uncertain, and fraught with the potential for political interference.

Again we note that in the three subjects started in this Special Focus:

1) New ways to examine urban patterns;

2) Potential radical change in our transportation model; and,

3) Pressures on jobs and wages.

There is much more to be discussed. Comments, observations and questions are welcomed.

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