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Metro Transport Corporations: A New Model for Managing the Surface Transportation Revolution

Joseph M. Giglio[1], Charles Chieppo[2]

(1. College of Business Administration, Northeastern University, USA;

2. Principal of Chieppo Strategies LLC, a Boston-area Public Policy Writing and Communication Firm, USA)

Abstract: The benefits of a coming revolution that will be marked by the rise of shared, electric autonomous vehicles (AVs) and the transition from vehicle ownership to a transportation-as-a-service model can only be captured if the transformation is properly managed. To maximize these potential benefits, we propose replacing traditional departments of transportation with quasi-public or quasi-private Metro Transport Corporations that would oversee all surface transportation in a metropolitan area.

Maximizing economic, environmental and quality-of-life benefits will require putting customers first, traditionally not an area in which government agencies excel. It will necessitate culture changes that may well be beyond the grasp of political leaders, bureaucrats and unions that too often view transportation agencies first and foremost as a source of jobs.

Under our proposal, municipalities would deed their transportation assets to the Metro Transport Corporations in exchange for ownership shares. The public sector would continue to hold the largest share, but would be joined by two other classes of owners: companies such logistics and retail companies, as well as banks, whose success is heavily dependent on rising levels of economic activity in the region, and investors simply seeking dividend income.

Key words: governance; autonomous vehicles; future of transportation; technology

JEL codes: R4

1. Introduction

The way people move around urban environments in on the cusp of dramatic change. New technologies are transforming transportation, and the effects of that transformation will be felt throughout society.

Driverless cars and other autonomous vehicles (AVs) have the potential to make transportation far safer, cheaper, and more efficient and environmentally friendly. The combination of autonomous vehicles, "micro mobility" as represented by dockless bikes and scooters, and the smartphone apps that bring all these options together, allowing consumers to conveniently reserve and pay for them, can democratize mobility, bringing freedom of movement to groups like the elderly, children and the disabled who have not previously enjoyed it.

Joseph M. Giglio, Ph.D., Executive Professor, Northeastern University D'Amore McKim College of Business.; research areas/interests: transportation, public-private partnerships, capital markets, corporate strategy. E-mail: jmg9512@yahoo.com.

Charles Chieppo, J.D., Principal of Chieppo Strategies LLC, a Boston-area Public Policy Writing and Communication Firm; research areas/interests: transportation, k-12 education, public pensions, public employee labor issues. Email: cchieppo@verizon.net.

Change of this magnitude will have massive human and economic impact.

Much has been written about the urban mobility transformation we're about to experience, but far less about oversight of the coming revolution. This paper attempts to outline the changes we are likely to see, their effects on various parts of society, the economy and major urban transit properties. It also asks whether traditional transportation governance structures are up to the challenge of overseeing this level of disruption. We close by proposing a new approach to urban transportation governance for a new era.

2. The Road Ahead

Transportation is the second highest average household expenditure, behind only housing. Since drivers are usually the biggest expense in any transportation business, driverless cars could cut those costs dramatically. By nearly eliminating human error, autonomous, connected vehicles could more than double throughput and dramatically reduce accidents. Roads will be able to accommodate many more vehicles, thanks to higher speeds, less space needed between them and smoother traffic flow due to less frequently hitting the brakes in response to accidents and other events.

The combination of more stringent emissions standards, improving battery technology and the fact that extended range is less of an issue for urban transportation means that an ever-increasing number of vehicles are likely to be electric, which will yield environmental benefits.

How we access mobility is also likely to change, going from vehicle ownership to a "transportation as a service" or subscription model. The lure of less expensive transportation means a growing number of automated vehicles will probably be shared.

3. Selected Impacts of the Mobility Revolution

Even without AVs, transportation would be experiencing disruption due to changes in the nature of work. According to Intuit, 40 percent of U.S. workers will either be self-employed or independent contractors by 2020. Many of those who remain employed won't have traditional commutes, since jobs are more spread out. Gone are the days when the vast majority of jobs are contained in a downtown core and most commuters use hub-and-spoke transportation systems to travel between them and their suburban homes. Add the technology-based advances in mobility, and the change becomes transformative.

3.1 Transit

There are differing theories about the impact coming changes will have on public transit systems. Some say transit investment will be critical if we are to reap their potential benefits, but competing with automated shared-mobility vehicles will be challenging. Currently, it costs about $0.55 per mile to operate a vehicle with a single occupant. For an AV carrying two-to-three passengers, that could dip as low as $0.15 per mile (Daniel Sperling, 2015), threatening the price advantage traditionally enjoyed by subsidized transit systems.

But if too many people rely on AVs rather than transit for short trips, particularly in downtown areas, worsening congestion could result. One traffic simulation model for Boston showed that while shared AVs would reduce travel times and the number of vehicles on the road even as miles traveled rose 16 percent overall, they would actually worsen congestion downtown, where travel times would increase 5.5 percent because the vehicles would substitute for transit use (World Economic Forum, 2018). A number of surveys have found that the majority of transportation network company users in major U.S. cities would use transit if ride hailing were not available.

Others argue that few transit systems are sufficiently nimble to weather the level of disruption they are about to face and won't be able to compete. Energy and Transportation Disruption Expert Antonio Seba believes most won't survive. Silicon Valley software architect Brad Templeton says governments should just lay concrete and let innovators decide what rides on top of it. Rail, he said, precludes all possibilities other than the train (Emily Badger, 2018).

Given this uncertainty, it should come as no surprise that opponents of major transit investments in Indianapolis, Detroit and Nashville have argued that that buses and trains will soon seem antiquated. Clearly, routes like the New York City "express bus" that made 85 stops and took nearly three hours to travel between Staten Island and Manhattan (Winnie Hu, 2018) won't cut it in the era of shared mobility.

The urban transportation landscape is already beginning to shift with the rise of ride hailing companies like Uber and Lyft, and dockless micro-mobility options. In just the last six years, the number of ride-hailing trips is up 241 percent in nine major U.S. cities (Robin Chase, 2018).

But the disruption we've seen is minimal compared to what is ahead, and the early data are not encouraging for transit. Ridership is declining, particularly on buses and in mid-sized cities. According to the American Public Transit Association, U.S. transit ridership fell by 2.9 percent in 2017.

Even in transit-dependent New York City, subway ridership was down by around 2 percent in 2017 compared to 2015 (Emma G. Fitzsimmons, 2018). The drop was sharper in the outer boroughs, with the number of subway trips falling by 8.2 percent in the Bronx and 6.6 percent in Queens from 2017 to 2018 alone (New York Post, 2018). By the end of 2018, the number of taxi and ride-hail trips in the city is for the first time projected to be higher than the number of trips on city buses. .Bus ridership is down nearly 4.5 percent this year.

New York is seeking to redesign its bus routes to better align with 21st century demand. A similar effort has been successful in Houston, which went from a traditional hub-and-spoke model to a grid model and has seen a 7.4 percent increase in ridership over two years, even as statewide bus ridership declined by 8.1 percent (Susan Milligan, 2018).

Another strategy that may be unavoidable if transit systems hope to survive is to discontinue less-used routes, often farther from the urban core, and replace them by subsidizing ride-hailing trips. In 2016, Florida's Pinellas Suncoast Transit Authority eliminated some bus routes in the wake of an 11 percent overall ridership decline and instead offered customers $5 discounts on Uber, taxis, and later Lyft, to and from 24 popular bus stops. Since then, at least 27 U.S. communities have established similar partnerships, according to DePaul University's Chaddick Institute for Metropolitan Development (Laura Bliss, 2018). Thus far these partnerships have had mixed success and some have been discontinued.

Many transit systems will attempt to turn stations into mobility hubs, with access to AVs bicycles and electric scooters. Going forward, consumers will be able to enter their destination into a smartphone app, which will incorporate multiple modes to determine the best route and allow customers to make reservations and pay for services such as transit rides and micro-mobility rentals. A trip to the dentist might involve taking an autonomous ride-hailing vehicle to a transit stop for a subway trip, followed by a rented bicycle to the dentist's office. The Metropolitan Atlanta Rapid Transit Authority is currently testing an "On the Go" app that would be a one-stop source for information on mobility choices across modes.

3.2 Economic Impacts

Effects of the coming mobility revolution will be felt throughout the economy. One obvious result will be increased productivity from freeing up time previously spent driving.

According to a study from McKinsey & Company and Bloomberg New Energy Finance, the most positive impact will be felt in cities that embrace sharing, incentivize the electrification of shared vehicles, maintain efficient public transit, and invest in both physical and software infrastructure. The cities most likely to realize this "seamless mobility" are high-income, dense metropolitan areas. According to a McKinsey analysis, these cities could see GDP increase by up to 3.9 percent by 2030, with residents experiencing $30-$45 billion in additional societal benefits (Bloomberg New Energy Finance, McKinsey & Company, 2016).

But these economic benefits won't extend to all sectors of the economy. Figure 1 shows the likely impacts of the mobility revolution on parking and land use, Figure 2 describes its potential effect on government revenue, and Figure 3 looks at how selected economic sectors could be affected, according to Morgan Stanley analyses (Brian Connery, 2016).

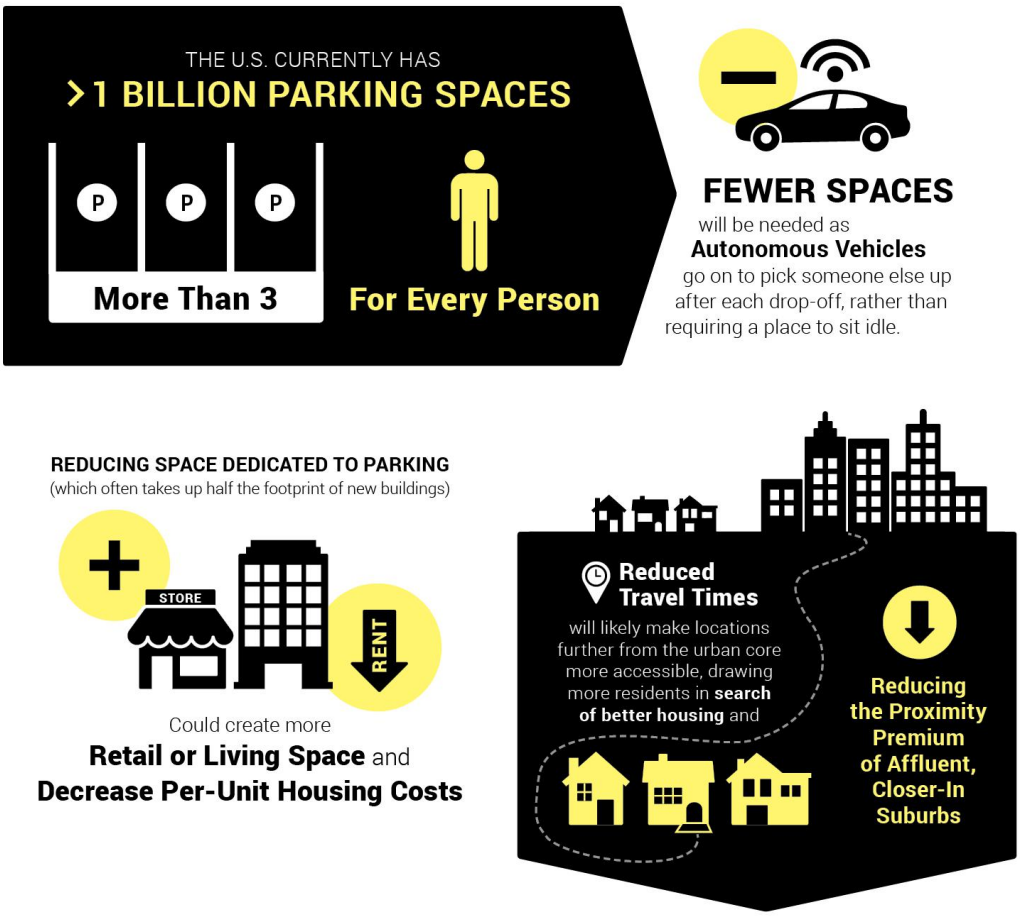

Figure 1 Potential Parking and Land USA Impacts of the Mobility Revolution

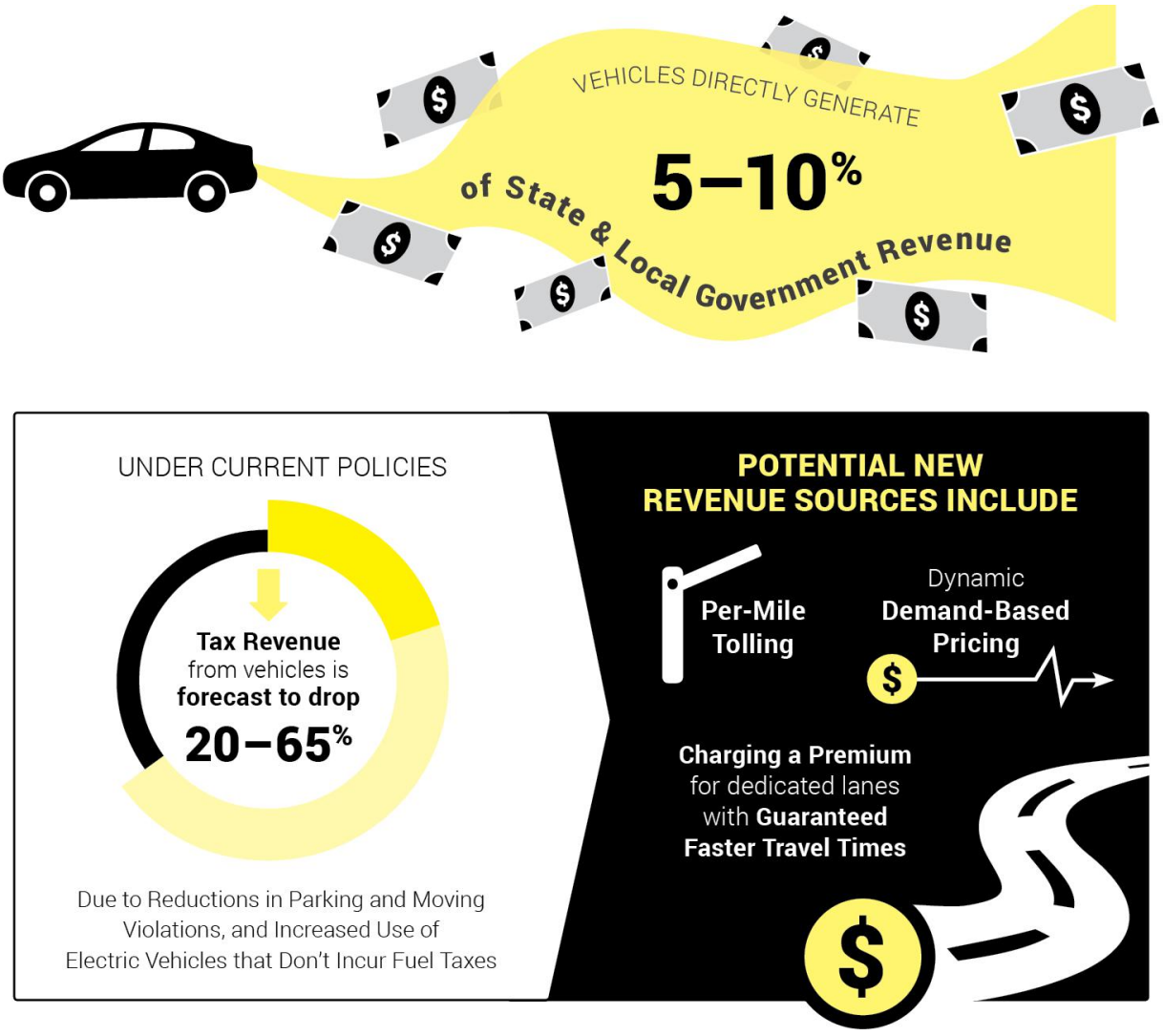

Figure 2 Potential Impact on Government Revenue

4. A Better Approach to Urban Transportation Governance

Autonomous vehicles and shared mobility are ascendant for one simple reason: Customers want them. A successful mobility revolution will require putting customers first, which is not an area in which government agencies have a particularly strong record. Putting customers first means thinking the way they think – about getting from point A to point B, not in terms of separate transportation modes. Officials need to make decisions with an eye toward what is best for the overall mobility network.

Putting customers first means putting them ahead of politics, and that will require culture changes that may well be beyond the grasp of traditional agencies. Witness what's happening in New York, where the city has adopted legislation that limits the number of ride-hail drivers by putting a one-year hold on the issuance of new for-hire vehicle licenses (unless the vehicles are wheelchair accessible) while the city conducts a year-long study of the industry.

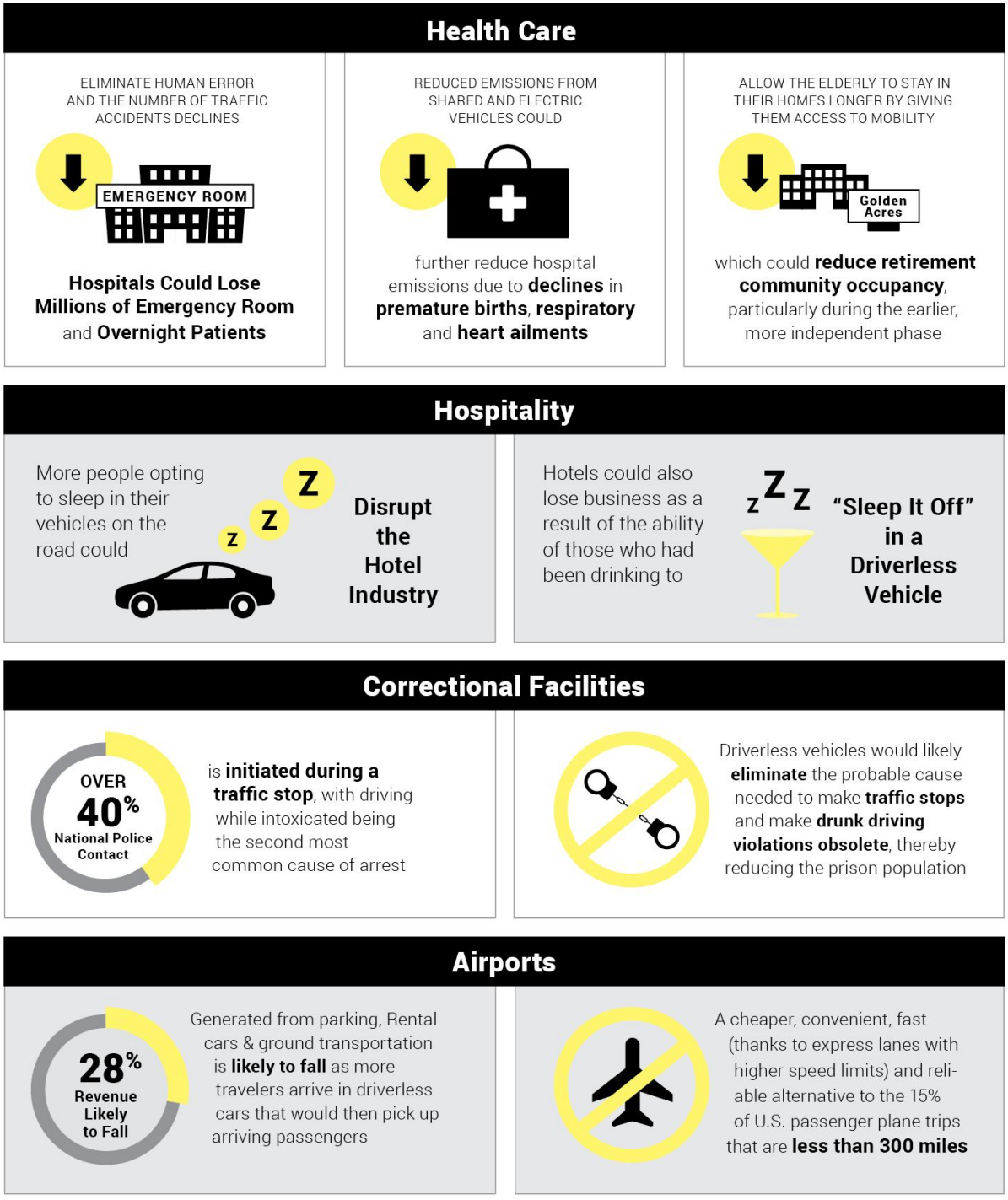

Figure 3 Selected Economic Impacts

Yet New Yorkers have already spoken. Customer demand has led to the number of for-hire vehicles rising from 63,000 to over 100,000 since 2015 (Emma G. Fitzsimmons, 2018). On-demand services are only likely to become more popular, given that millennials and subsequent generations take the luxury of choice for granted. Given current driver attrition rates, the one-year moratorium on new licenses would significantly shrink the number of available vehicles and reduce service levels, particularly in outer-borough neighborhoods with less

transit access.

The coming mobility revolution represents an existential threat to the status quo. Despite that threat, New York City's action highlights a critical choice: Will political leaders, bureaucrats and unions allow customer choices to control products and services, or will they continue attempting to exert their control over customers, even if it ultimately spells their agencies' demise?

5. The Future of Urban Transit Systems

The need to prioritize customers is particularly pressing at transit agencies. When a series of devastating snowstorms brought metropolitan Boston's already-teetering Massachusetts Bay Transportation Authority (MBTA) to its knees in 2015, a Fiscal Management and Control Board was created and given enhanced powers to oversee it, and the agency was granted a three-year exemption from a state anti-privatization law. Several competitive contracts saved millions and improved performance, and the threat of competition brought the MBTA's biggest union back to the table to renegotiate a contract that saves money and drives increased productivity.

But the authority still spends nearly twice as much to maintain buses as its peer agencies (Gregory W. Sullivan, 2017), and the potential savings from reforming bus maintenance were far greater than from previous outsourcing contracts. Yet when the control board attempted to outsource bus maintenance in the same way it's done at Massachusetts' 15 Regional Transit Authorities, political opposition doomed the effort notwithstanding the exemption. When the anti-privatization law exemption expired in 2018, there was no effort to extend it.

Similarly, transit systems and the interest groups that have grown up around them will try and limit private providers to providing "last-mile" service between transit stations and travelers' destinations. But the rise transportation network companies like Uber and Lyft, which are more expensive and less convenient than shared AVs will be, indicates that customers want private providers to play a larger role. If transit systems are to survive, they will likely need to shift their focus to reducing downtown congestion and transform into customer-service entities. Neither seems very likely.

Then there is the condition of transit system assets and finances. Again using Massachusetts' MBTA as an example, it has a $7.3 billion maintenance backlog. A decade ago, the authority contributed $37 million to its pension system; this year it will be $94 million. Over that time the fund's assets have shrunk and its unfunded liability has spiked to more than $1 billion.

It's not hard to understand why. Massachusetts state employee pension contributions are set in statute at around 10 percent of salary, depending on income. MBTA employee contributions, which are subject to collective bargaining, are 6.5 percent of salary. Unlike state employees, MBTA workers also receive Social Security benefits. Even with the 6.2 percent of salary they pay in to that program, their total contribution is about the same as state employees, yet they receive far richer pensions. And finally, unlike state workers, they can retire at 55 and collect a full pension. Those hired before a pension reform law took effect in 2012 can retire with a full pension after 23 years, when many are still in their 40s.

In short, given its desperate finances and longstanding political alliances with an array of special interests, not to mention its status as a source of jobs for the beneficiaries of political patronage, it's hard to envision urban transit systems effectively managing the untamed urban mobility frontier.

This is unfortunate. As noted earlier, at least in the urban core, efficient transit systems would be an important antidote to congestion. But there have been few indications that public transit systems have the

wherewithal to play that role.

Even if public agencies had the will to pursue culture change, they lack access to the kind of analytics the private sector uses to understand, segment and target their customers. Successful firms mine social media to learn more about customers, but few public agencies have that capacity.

The public sector is also constrained by long approval processes, a lack of resources, time-consuming regulations that impede bringing new technologies to market. Another reason why governments have not been good at managing the implementation of groundbreaking technologies such as AVs is their salary structure. Pay is relatively low, and the salaries of elected officials tend to impose an artificial ceiling on how much public employees can earn. The inability to offer incentives such as stock options often makes it difficult to attract and retain superior information technology (IT) talent.

5.1 Metro Transport Corporations

Successfully rolling out emerging transportation technologies in urban areas will likely require a different organizational arrangement to oversee diffusion of the new products and services. One approach is to create a quasi-public or quasi-private corporation to oversee all aspects of surface transportation, including the deployment and integration of technology to improve customer service in a metropolitan area. We understand that the model we propose is a "perfect world" scenario and understand that any eventual move in this direction is likely to be incremental and adjusted for political realities.

A municipality would deed its transportation assets to an independent Metro Transport Corporation in exchange for ownership shares. Another class of private investors would purchase equity shares in the enterprise mainly because they have vested interests in assuring better transportation within the region. These investors would include private utility companies, local banks, large retail chains and other area firms whose future revenue growth depends heavily on rising levels of economic activity in the region.

A third class of private investors would be individuals and firms that purchase equity shares simply for dividend income, just as they would buy equity shares in utilities. Since government would have provided the bulk of the enterprise's capital assets, they would collectively hold a larger ownership share than either of the other two groups.

The board of directors would include members from the public sector, like municipal transit agencies, and the private sector, including project developers, banks, large utilities, major shippers, and transportation/logistics companies. Its private sector members bring characteristics of a commercial enterprise, such as a more entrepreneurial approach, while government members would ensure appropriate accountability and that the public interest is safeguarded.

The interests of the various stakeholders would also promote balanced policy making. Public sector board members would look to maximize votes for elected officials by supporting extensive transportation service and low prices. The profit maximizing impulses of private investors would rein in these public sector instincts that, left unchecked, have often led to insufficient maintenance and unsustainable finances. If there is a stalemate between the two, the third class of owners – firms whose main interest is a flourishing local economy – could serve as to be the referees between profit-focused investors and government.

5.2 Access to Capital

This quasi-private organization would have even broader access to capital financing sources than public sponsors for use on a regional portfolio basis to fund deployment, modernization and expansion, and otherwise enhancing transportation infrastructure assets. By its very nature, financing sources available to the entity would

include private equity from the corporation's shareholders.

This would reduce the need for debt capital to be issued by public agencies, thereby providing greater flexibility regarding the timing and relative use of equity and debt financing, which could enable the organization to achieve lower overall costs of capital when compared to conventional revenue bond debt used by most public authorities.

The private aspects of the entity would push it to expedite deployment of new technologies and reap the benefits of improved system management, greater travel safety, integrated traveler information, and offer customers the luxury of choosing among various transportation modes.

These are prerequisites if domestic and international financial markets are to become major players in supplementing scarce public funds. This would end today's over reliance on municipal bond financing by introducing innovative financing tools and tapping new revenue sources such as pension and infrastructure funds. These sources have vast amounts of capital seeking long- term investment opportunities with stable, risk managed cash flows to support the necessary returns to their customers.

5.3 Balanced Policy Decisions

Just as Metro Transport Corporations could strike a balance among competing financial and structural interests, they would also be well suited to promote balanced public policy. The mobility revolution will raise myriad important questions. Some are big picture, such as the role of transit systems in a new urban mobility landscape.

But there will also be many smaller issues, the resolutions of which will be critical to unlocking the social benefits of AVs and shared mobility. During the decades of transition between the status quo and full penetration of autonomous, electric shared vehicles, managing the mix of traditional, semi-autonomous, autonomous, private shared, electric and internal combustion vehicles will be a monumental challenge.

Questions about priorities naturally lead to pricing. As revenue from traditional sources diminishes, mileage-based approaches will need to take their place. Metro Transport Corporations, which balance public and private interests with regional economic concerns, would be well positioned to established a fair and sustainable pricing regime.

Pricing will also be a critical tool for creating the incentives needed to realize the full potential of AVs and shared mobility. Pooling and the use of electric vehicles are among the policy priorities that can be encouraged through pricing. Discouraging single-occupancy rides, for example, could improve citywide travel times in Boston by 15 percent.

5.4 Cybersecurity

Another major advantage of Metro Transport Corporations would be deploying new technologies. As the urban mobility revolution takes hold, technology will play a bigger role than ever before.

In particular, the amount of data processed by transportation governance entities will increase exponentially. As cities contract with companies to promote goals like sustainability and equity, they will be confronted with data about usage volume, where micro-mobility vehicles are being used and whether users are complying with policies that, for example, prevent bikes and scooters from blocking sidewalks, doorways and parking spots. Putting this data to work for customers will require access to the kind of top-notch private IT expertise Metro Transport Corporations can provide.

While autonomous and connected vehicles provide many customer benefits, such as signaling other vehicles about traffic congestion or icy roadways, that connectivity also makes it a cybersecurity target. One potential

solution is blockchain, a digital record storage system that connects various encrypted records, or blocks. Since it is decentralized there is no central point to hack.

The concept could also be used in the not-too-distant future to secure automatic money exchanges between and the Metro Transport Corporation and connected vehicles for tolling or to pay vehicle registration fees. In addition, blockchain offers transparency advantages, since the record of the chain is unchangeable. For the reasons mentioned above, Metro Transport Corporations' private stakeholders make these quasi-private entities better suited to implement new technologies.

6. Conclusion

The list of social and economic benefits that could be ushered in by autonomous vehicles and shared mobility is long, but the realization of those benefits is by no means guaranteed. Congestion and air pollution, among other things, could worsen if the transformation is not effectively managed.

The challenge is daunting. From uncertainty about the speed with which autonomous vehicles and shared mobility will take hold to problems related to decades of old and new forms of surface transportation coexisting in urban areas, extracting the benefits from emerging technologies will require sound decision making over a decades-long transition.

We believe traditional departments of transportation and public transit agencies are not appropriate entities to guide the massive changes that are coming. Instead we propose Metro Transport Corporations: entities that would combine the public accountability of governments with the more efficient, entrepreneurial and technology-savvy influence of the private sector and include an additional layer of oversight to ensure responsiveness to customers. It is a design that features incentives for sustainable surface transportation management practices, as well as the expertise to deploy transformative technologies.

Perhaps the strongest incentive this governance structure would facilitate is a singular focus on customers. By combining that focus with the expertise needed to drive superior customer service, Metro Transport Corporations could unlock the full potential of the coming mobility revolution.

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