

# Cautious Optimism About Driverless Cars and Land Use in American Metropolitan Areas

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Driverless vehicles will enhance mobility in America's metropolitan areas, connecting people to a greater set of jobs and amenities. Fleetwide autonomy will mean lighter vehicles, many of which will be electric—reducing the environmental costs associated with many of today's individual trips in private cars. Driverless vehicles also will create the potential for a big change in the spatial structure of American cities. The accessibility of land on the urban periphery will improve, as will the accessibility of urban land that currently lacks access to transportation services. In addition, land that currently is used for cars—such as surface parking lots—can be reallocated to other uses, such as parks, foot traffic, cycling, housing, or retail goods and services.

I am very optimistic about the *potential* for driverless cars to enable beneficial changes in land use. The extent to which driverless cars *actually* lead to beneficial change, however, will depend in part on the willingness of local authorities to remove regulatory barriers to the efficient reallocation of land.

Note that it may be some time before we see substantial changes in land use as a result of driverless cars. A fully autonomous fleet of vehicles would mean that every vehicle is capable of operating without a driver or driver controls. Even if regulators and firms are very close to clearing the legal and technological hurdles to full autonomy, typically a fleet takes 20 years to turn over (Poole, 2016a). Retrofitting could speed up the timeline, but only if costs come down significantly. In the interim, the introduction of semiautonomous vehicles and mixed fleets will generate improvements in safety and efficiency, but the benefits are likely to be modest compared with those from full autonomy.

For this article I assume that the entire fleet of vehicles eventually becomes fully autonomous. Better reaction times will make fully autonomous vehicles safer than the current fleet, allowing them to be smaller, follow more closely, and maintain position in narrower lanes. With fewer accidents, less rubbernecking, and each car occupying fewer square feet of roadway at any speed, congestion will decline and the throughput of existing roads will increase. This could, in principle, reduce the amount of space necessary for roads, including highways and arterials.

The potential for saving on the use of road space and road maintenance will be offset to some degree, however, by a likely increase in vehicle miles of travel (VMT). VMT is likely to rise in part because many more people will have access to door-to-door mobility, including young, elderly, and disabled people who are otherwise unable to drive a vehicle. With no need for a driver, average vehicle occupancy also would likely decline. The combination of more people using cars and lower vehicle occupancy would lead to higher VMT, offsetting some of the potential road space savings from driverless cars (Poole, 2016b).

Although predicting whether driverless cars will save on use of road space and road maintenance is difficult, such vehicles have the potential to greatly reduce the use of urban land for parking. The amount of land that driverless cars free from parking will depend in part on whether shared fleets of for-hire driverless cars (robotaxis) replace personal vehicle ownership and in part on whether land use regulations allow for the efficient reallocation of land.

Ownership decisions about driverless cars will be influenced by whether people live in high- or low-density areas. The majority of trips in American metropolitan areas take place outside dense city centers, from suburb to suburb. In the New York City metropolitan area, for example, nearly three-fourths of trips are suburb to suburb (Bertaud, Fuller, and Stewart, 2014).

Driverless cars will improve suburban mobility—both between suburbs and for trips from the suburbs to the center city—by improving first- and last-mile transportation to and from mass transit hubs. To the extent that driverless cars enable people to cover distances more quickly, such cars will—as with many transportation innovations before them—encourage the physical expansion of urban areas, as land on the urban fringe becomes more accessible.

Households in lower-density suburbs characterized by single-family detached homes may be more inclined to own driverless cars than would households living in or closer to a center city. Land for parking in lower-density suburbs is easier to come by and less expensive. Furthermore, less-dense areas may not have the market size to support fast, around-the-clock access to for-hire driverless cars. Residential land that currently is devoted to carports and garages in low-density suburbs may remain so dedicated even after driverless cars become widely available.

Although the prospect of suburban growth is unsettling for some urbanists and environmentalists, both groups have good reason to believe that driverless cars can significantly reduce the environmental costs of moving about in the suburbs. The safety of fleetwide driverless technology will enable cars to be lighter. Combined with their ability to travel in drag-reducing pods and the trend toward greater electrification of vehicles, driverless cars will improve energy efficiency and reduce pollution. (If the carbon intensity of electricity generation continues to decline, electric driverless cars also will mean fewer greenhouse gas emissions.)

In higher-density areas closer to the city center, the factors affecting decisions about whether to own a driverless car will change. What is not clear is the extent to which local authorities will establish high entry barriers to local markets for for-hire driverless car services. The track record of restrictive licensing of taxis and some of the recent hostility toward ride-hailing services such as Uber and Lyft suggest that we should anticipate at least some resistance to for-hire driverless cars. Assuming that resistance is overcome, households in neighborhoods closer to the city center

will have better access to fleets of for-hire driverless cars and less need to own a vehicle. Some of the land devoted to garages and carports in denser suburban areas, therefore, could possibly be converted from parking areas for privately owned vehicles to other uses, such as additional housing. That conversion will be even more likely if such communities relax any restrictive zoning rules or approval processes that would otherwise prevent the sort of project that would, for example, convert a garage into an accessory dwelling unit.

Households in very-densely populated urban neighborhoods—those that are in or near city centers and are characterized by a preponderance of multifamily housing—will be even more inclined to make use of robotaxis. That inclination will exist in part because parking for private vehicles in such neighborhoods can be costly and in part because a robust market for for-hire, driverless cars will ensure that they are readily available at any time of day.

The more people opt to rely on for-hire service rather than owning a driverless vehicle, the greater the potential for converting land that is currently used for parking to other uses. But even if many people end up owning driverless vehicles, the potential to reallocate land from parking to other uses will be substantial. Driverless cars can park themselves much closer together, reducing the amount of land necessary for surface lots and parking garages and reducing the need to devote street space to curbside parking. During times that they would otherwise sit idle in a parking space, driverless cars will also be able to run errands for the owner—and for other people, if regulators resist the urge to stifle peer economy applications.

Land currently devoted to off-street parking could be reallocated to residential, commercial, or recreational uses. But whether such land is located in low- or high-density areas, local authorities will have to relax land use and zoning restrictions that would otherwise prevent property owners from reallocating their land from parking to higher-value uses in the face of driverless technology. The political economy of redevelopment will prove difficult in some circumstances, particularly if incumbent owners of adjacent property can too easily block the redevelopment of a parcel—as is commonly the case in high-demand urban areas characterized by restrictive zoning codes.

The perceived necessity for on-street parking on public roads in high-density neighborhoods—already highly questionable—will disappear entirely with the advent of driverless cars. Cities routinely underprice (or give away) on-street parking in densely populated neighborhoods, effectively subsidizing the car owners who are lucky enough to find spots. Aside from misallocating valuable urban real estate, on-street parking reduces urban mobility by contributing to traffic congestion. Because driverless cars will reduce the amount of space necessary for parking, they will allow cities to put the curbside space on public roads in high-density neighborhoods to better uses, including bike lanes, expanded sidewalks, space for vendors, and green space or “pocket parks.”

Driverless cars also will make high-density urban neighborhoods more pleasant places to live and work by reducing pollution and congestion and by improving safety for motorists, pedestrians, and cyclists. By reducing the labor costs of transportation services, driverless vehicles—be they private cars, buses, or jitneys—also will improve the accessibility of low-income urban areas that currently face limited transportation options.

As driverless cars make high-density areas in American cities more attractive, demand for housing in such neighborhoods—many of which already are experiencing revivals—will increase. If local authorities continue to restrict the ability of developers to increase the quantity of housing in response to higher demand, those improvements in urban life will be captured entirely in higher housing costs. If, however, local authorities allow the redevelopment of land formerly devoted to parking and work to remove broader restrictions on the supply of housing, driverless cars will usher in a range of better choices in high- and low-density neighborhoods for American households of all income levels.

Fleetwide, fully autonomous vehicles will create the potential for tremendous efficiency gains in urban land use. Whether those gains are realized will depend on whether our land use policies coevolve with the changes in driverless technology. Good reasons for optimism abound; but, given the trend toward restrictive land use policies in America's most productive metropolitan areas and the recent instances of municipal hostility toward innovative ride-hailing services, good reasons also exist for the optimism to be somewhat restrained.

## Author

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