

Can Public Transportation Compete with Automated and Connected Cars?

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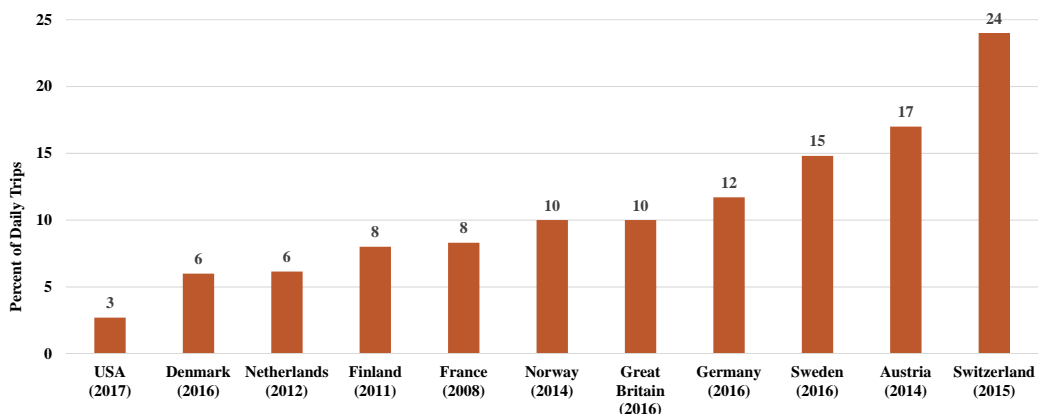
Based on: Buehler, R. 2018. "[Can Public Transportation Compete with Automated and Connected Cars?](#)" Journal of Public Transportation, Vol. 21, No.1 and research conducted for "Planning for walking and cycling in an automated vehicle future" sponsored by



Outline

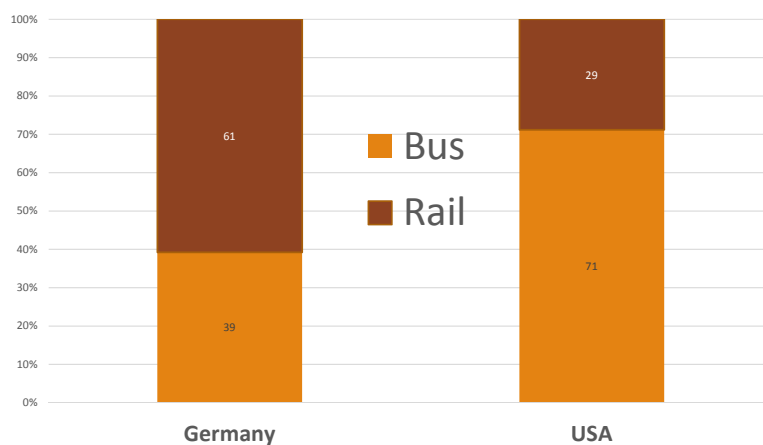
- **Characteristics of PT in the USA (international comparison)**
- **Short Introduction: Automated Vehicles**
 - Levels of AVs
 - Challenge for PT
 - Limitations of Increasingly Automated Vehicles
- **Public Transportation's Response**
 - Automated and Connected Public Transport Vehicles
 - Integration of Public Transportation with other Mobility Services
 - Regional Coordination and Integration of Public Transportation Services
 - Coordinating Planning for Public Transportation and Land Use
- **Conclusion**

Percentage Share of Daily Trips Made by Public Transport (latest available year), 2008-2017



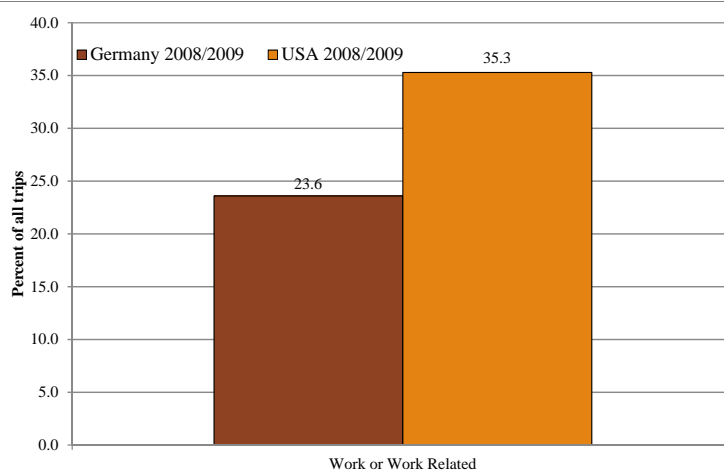
Note: Travel survey results are not fully comparable between countries due to differences in survey methodologies and definitions. Passenger trips are reported as 'linked trips.' Source: Buehler, R. 2018. "Can Public Transportation Compete with Automated and Connected Cars?" *Journal of Public Transportation*, Vol. 21, No. 118.

Percentage share of PT trips by rail and bus in Germany and the USA, 2008/2009



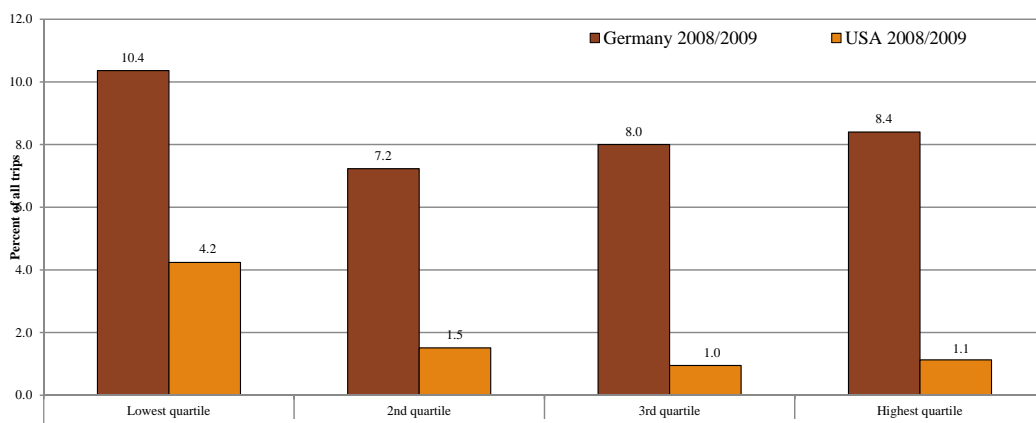
Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Work Share of PT Trips in Germany and the USA, 2009



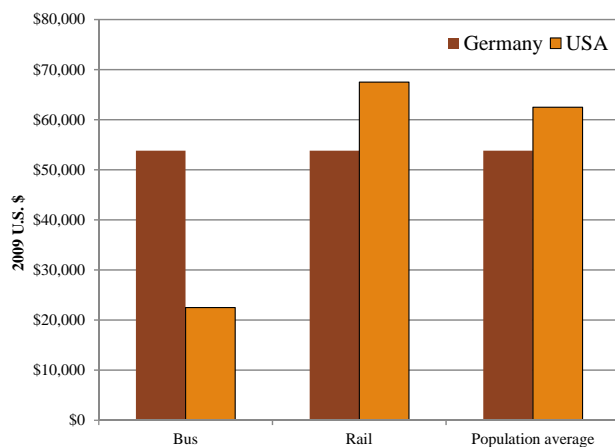
Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Percentage share of trips by PT in Germany and the USA by income quartile, 2009



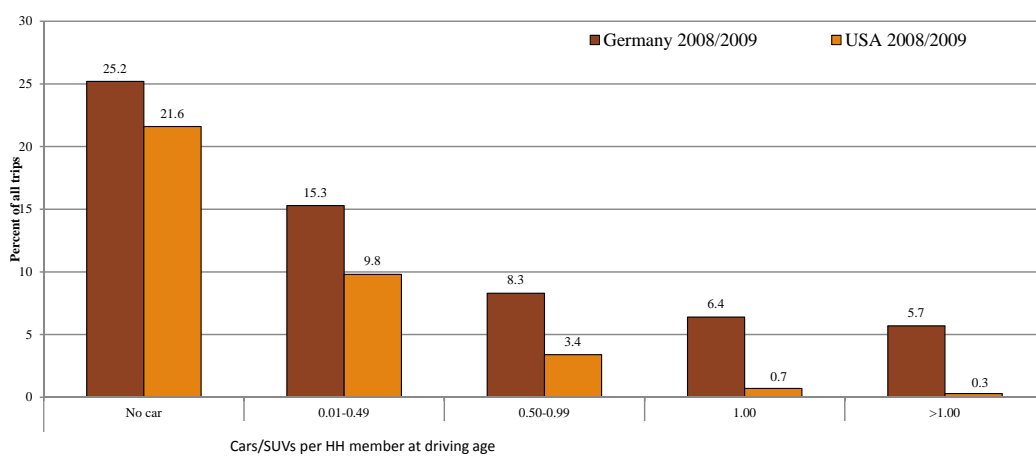
Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Median annual family income for bus and rail passengers, compared to population average, in Germany and the USA, 2008/2009 (in 2009 U.S. Dollars)



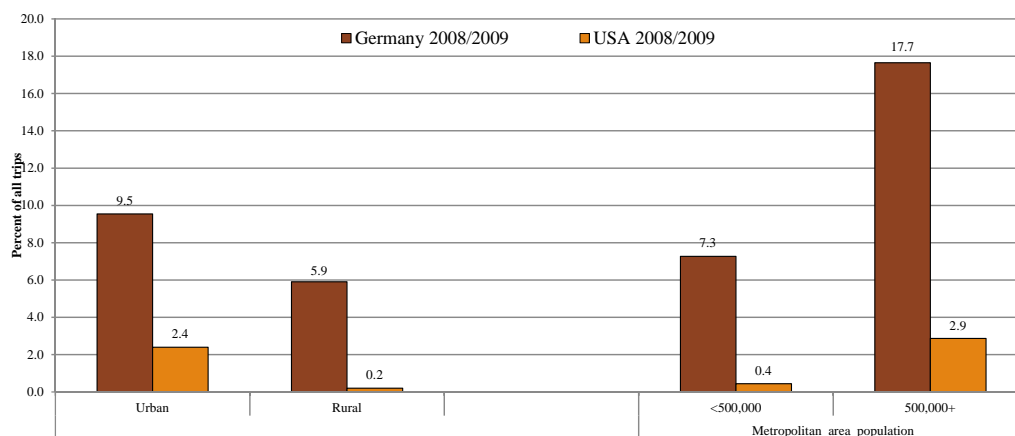
Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Percentage share of trips by PT in Germany and the USA by car ownership, 2009



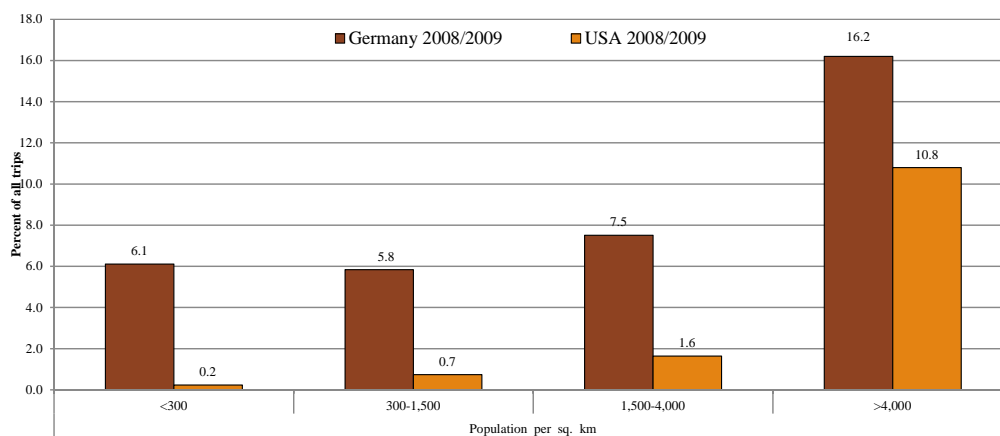
Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Percentage share of trips by PT in Germany and the USA by urban vs. rural household location and metro area size, 2009



Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Percentage share of trips by PT in Germany and the USA by population density, 2009



Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

Compared to PT in Germany, PT in the USA...

- accounts for a lower share of trips
- is more commute oriented
- relies more on buses
- has a greater share of lower income riders
- attracts a lower share of riders from households with many cars
- is more concentrated in urban and higher density areas

Source: Buehler, R., Pucher, J. 2012. "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, Vol. 32, No. 5, pp. 541-567.

AVs: Some Observations and Predictions

- **Levels of AVs**
 - Speed of technological change is unknown
 - Long period of transition: reaching a nationwide fully automated fleet of cars (level 5) will take many decades
 - Shared or Private?
- **Key Challenges of Increasingly Automated Vehicles for PT**
 - Mimicking one of PT's competitive advantages: more convenient car travel; lower time cost of car travel
 - Technological innovation around AVs will likely capture the imagination of the public and policy makers
- **Key limitations of Increasingly Automated Vehicles (PT view)**
 - Roadway capacity in urban areas during peak hours
 - Complex roadway environments in cities
 - New technology will be expensive

PT's Response?

- **Public transportation agencies and governments can shape PT's future attractiveness and competitiveness with the car**
- Automated and Connected Public Transport Vehicles
- Integration of PT with other Mobility Services
- Regional Coordination and Integration of PT Services
- Coordinating Planning for PT and Land Use

Automated and Connected PT Vehicles

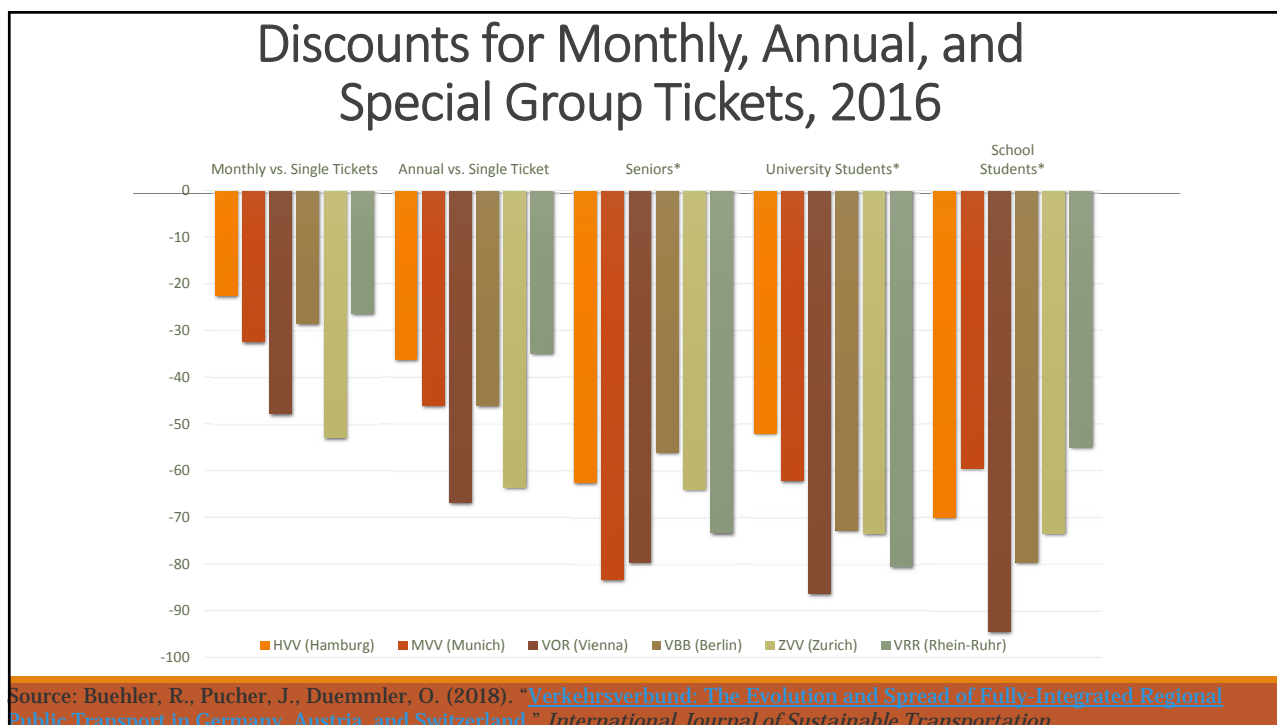
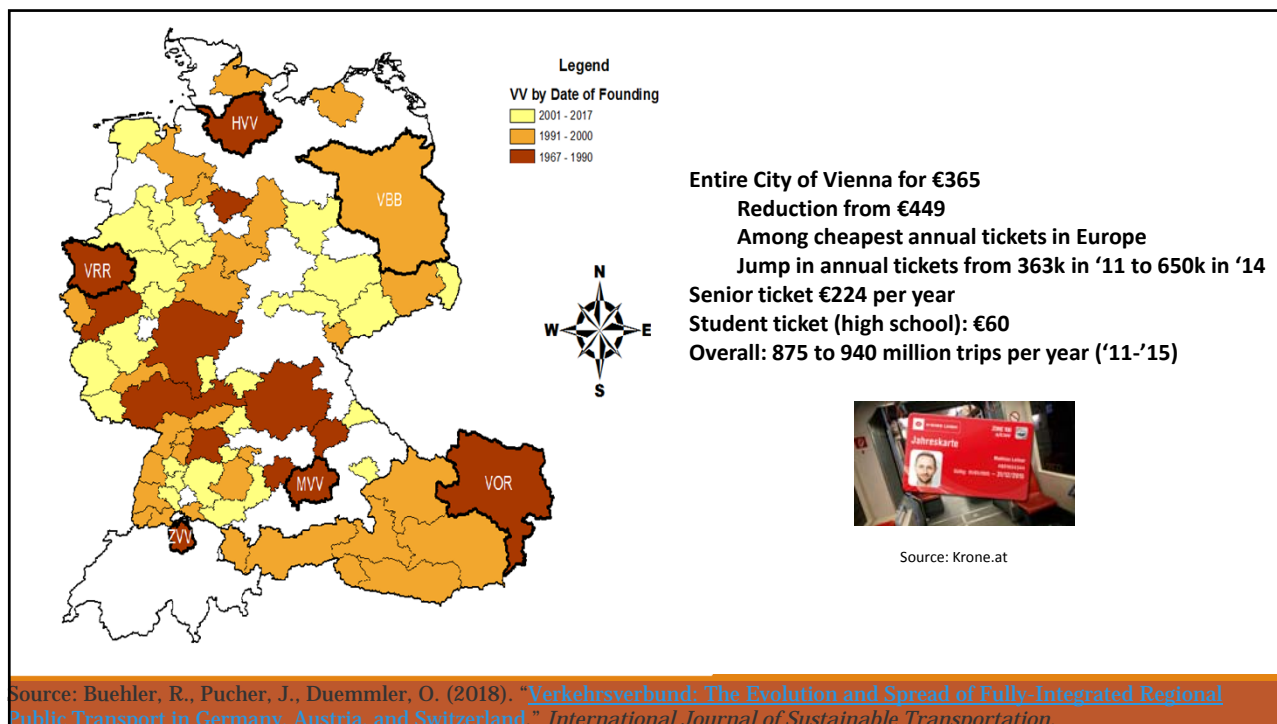
- Automated feeder buses can increase the catchment area of PT in the suburbs, help solve the "last mile" problem, and allow PT agencies to get closer to serving passenger trips from origin to destination
- Increasing connection to and information exchange with public infrastructure and other PT vehicles can help increase PT's attractiveness
 - Connected bus vehicles can trigger advanced green lights or communicate about passenger transfers with other vehicles at important transfer nodes
- Automated and connected PT vehicles can take advantage of special lanes designated for the sole use of AVs—speeding up and increasing the reliability of buses
- But, slow automated PT in complex urban areas

Integration of PT with Other Mobility Services

- Mobility as a Service (MaaS)
 - Integrate information about PT, bikesharing, carsharing, and ridesharing services in an online platform
 - PT operators have to link into MaaS-like services to connect with potential riders and to provide access and egress options from transit—through bikesharing, carsharing, or ridesharing
 - Some public transportation providers could become MaaS operators themselves
- PT passengers are by definition multimodal, because of access and egress trips made by modes other than public transportation. Thus, combining information about PT with data on other modes will greatly enhance the convenience of PT

Coordination & Integration of PT

- One key element will be the coordination of PT services across jurisdictional boundaries and between operators
- Integrated monthly and annual tickets mimic the cost structure of automobile use, where most of the cost occurs up-front, such as the car purchase, registration fees, insurance, or filling up the gas tank
- Special fares



Coordinating Planning for PT and Land Use

- Demand for PT is highest in urban areas with greater population densities and a mix of land use
- Advantages over AV may be greatest in these areas

Conclusions

- PT most competitive compared to AVs in urbanized areas and during commute hours
- PT will retain its important role in assuring mobility for all (high cost of AVs)
- PT and governments will have to make PT more attractive to compete effectively with cars that are more convenient:
 - Automated and Connected PT Vehicles
 - Integration of PT with other Mobility Services
 - Regional Coordination and Integration of PT Services
 - Coordinating Planning for PT and Land Use
 - Cost of driving
- Requires customer orientation and a focus on how to make PT most attractive and competitive compared to the car
- Customers of the future, as today, will ride PT if it is fast, convenient, reliable, safe, clean, and attractively priced

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<http://ralphbu.wordpress.com>



THANK YOU