PUBLIC TRANSPORT THAT WORKS: INSIGHTS FROM GERMANY

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Rutgers Climate Change Conference

Panel 3: Climate Change and Transport in Europe

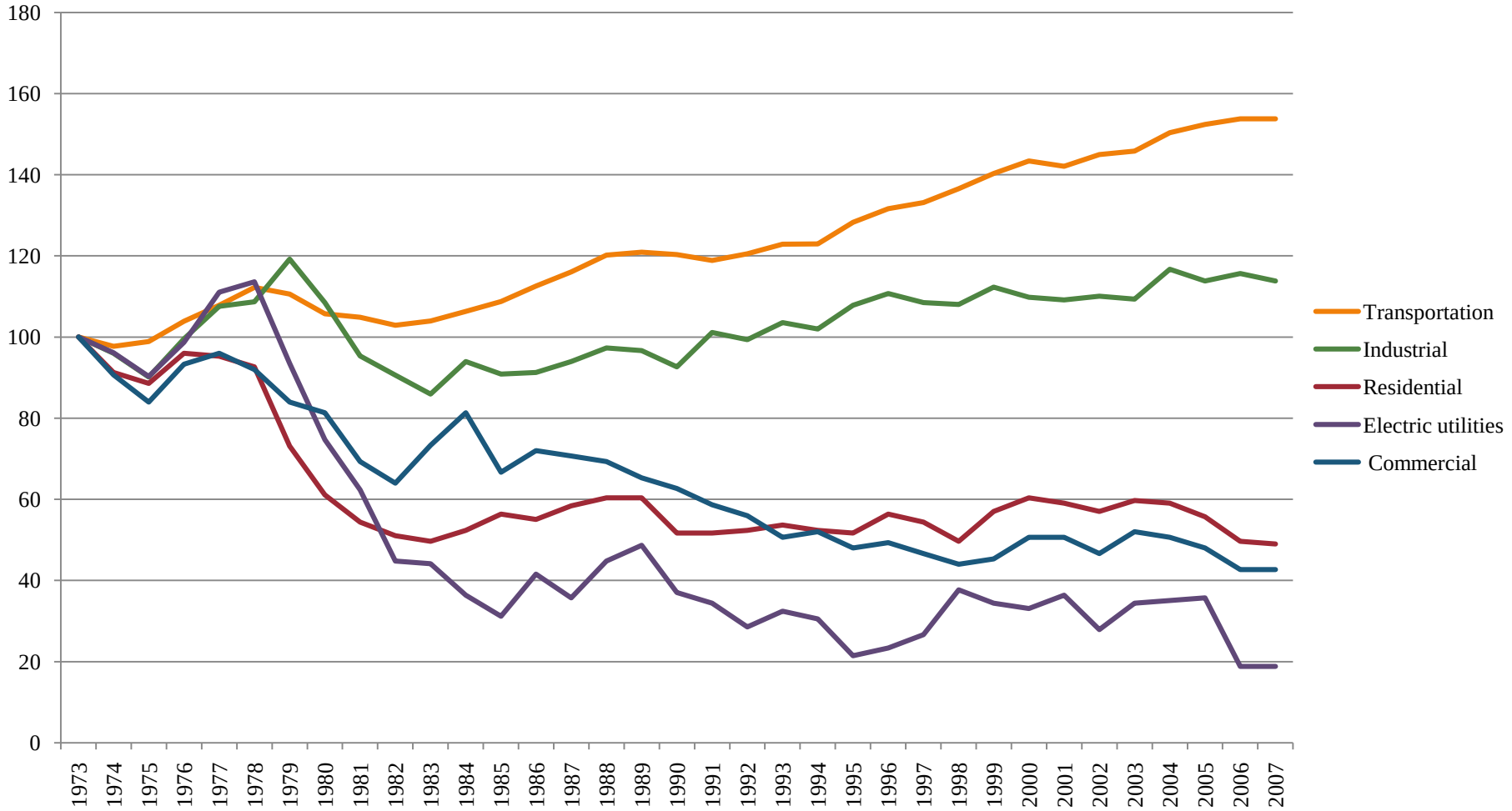
Overview

- Transport, Energy Use, & Climate Change
- Public Transport Demand in Germany and the USA
- Policies that Promote Public Transport
- Summary – Lessons for the USA

Energy Use in Passenger Transport

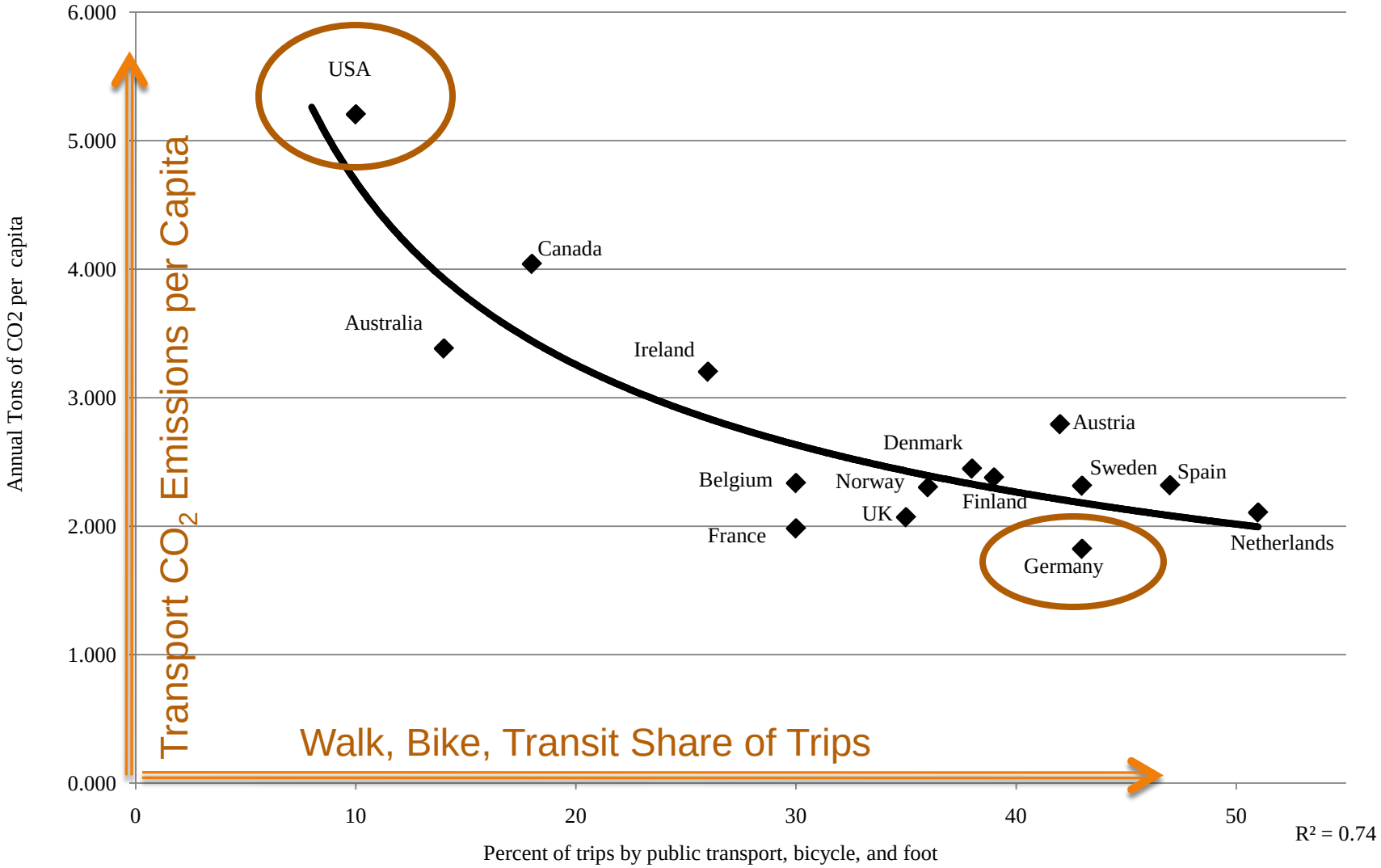
- Mode of Transport
- Energy Intensity/Efficiency
- Fuel Type
- Amount of Activity (number of trips; miles traveled)

Consumption of Petroleum by End-Use Sector, 1973–2007 (percent relative to 1973)



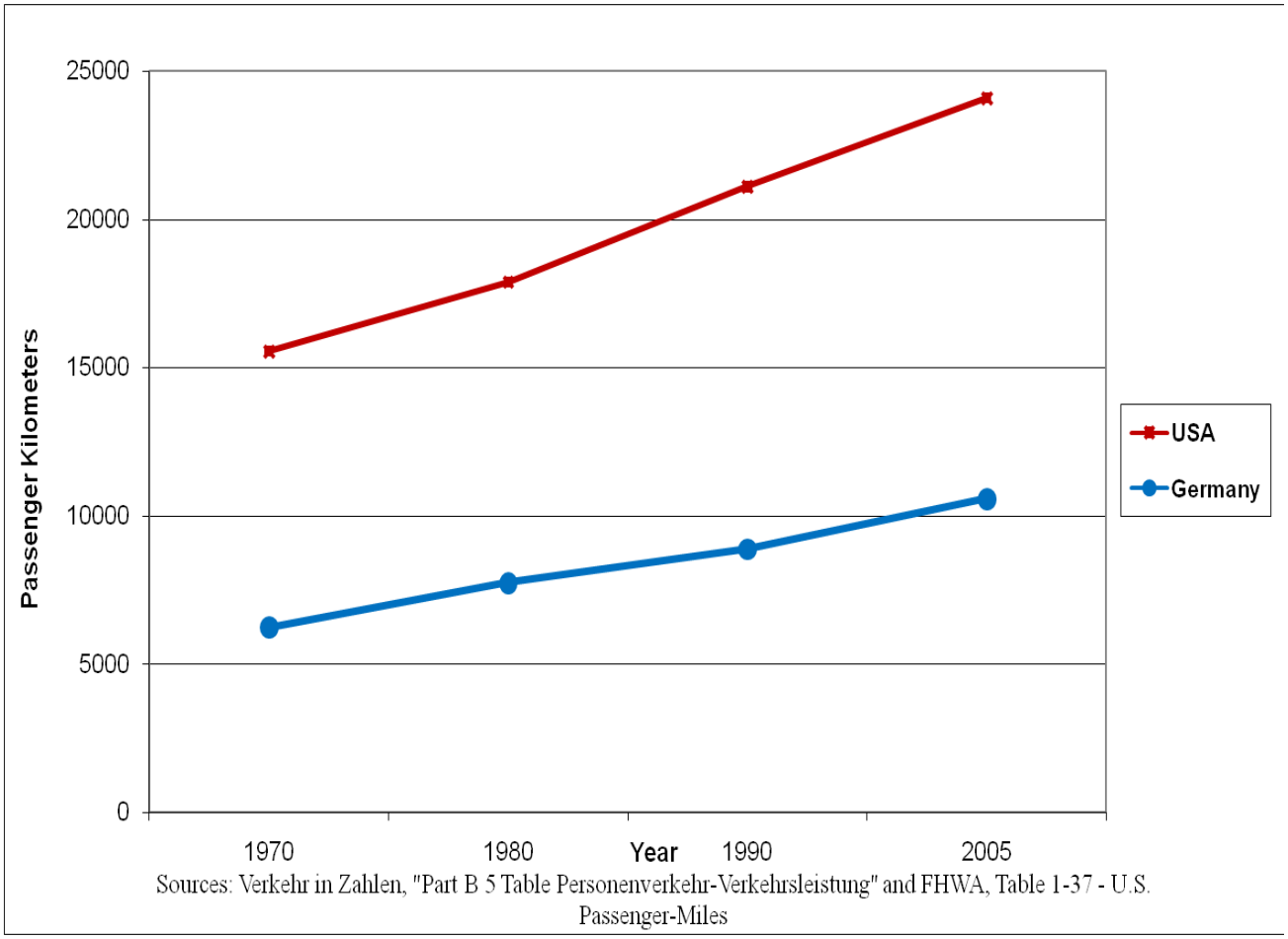
(Sources: ORNL, Energy Data Book, 2008)

Relationship between Share of Urban Trips by Transit, Bicycle, and Foot and Per Capita Annual CO_2 Emissions from Road and Rail Transport in Australia, Canada, the USA and the EU 2000-08



Sources: (Bassett, Pucher, Buehler, Thompson, & Crouter, 2008; BMVBS, 1991-2008; IEA, 2009)

USA and Germany: similar trends in car ownership….



….but Germans drive less

Source: (Buehler, Pucher, and Kunert 2009: “Making Transportation Sustainable: Insights from Germany”)

Public Transport Energy Use per Passenger Kilometer in Germany and the USA

	USA	Germany
BTU per Passenger Mile		
Transit Bus	4,200	1,000
Light Rail	2,700	1,200
Heavy Rail	2,500	1,400

Source: (Buehler, Pucher, and Kunert 2009: “Making Transportation Sustainable: Insights from Germany”)

More sustainable ground passenger transport in Germany

- ~3 times more CO_2 emissions per capita in USA
  - Co_2 emissions of transport sector('95-'05):
    - G:-8%; USA+4%
    - Per capita: G: -7%, USA: +2%
- U.S. households spend more for transport (~$2,700 p.a.)
- Higher annual per capita government expenditures for roads and public transport in the USA ($625 vs. $460)
- 2.3 times higher traffic fatalities per capita in USA

Source: (Buehler, Pucher, and Kunert 2009: "Making Transportation Sustainable: Insights from Germany")

Trends in Public Transport Demand in Germany and the USA, 1990-2007

	1990	1995	2000	2005	2007	Change 1990-2007
Total Linked Transit Trips per Year in USA (million)	5,499	4,852	5,852	6,134	6,404	16%
Linked Transit Trips per Inhabitant per Year (USA)	***22***	***18***	***21***	***21***	***21***	***-4%***
Total Transit Trips per Year in Germany (million)	9,156	9,265	9,638	11,069	11,203	22%
Linked Transit Trips per Inhabitant per Year (Germany)	***114***	***113***	***117***	***134***	***136***	***20%***
Total Transit Passenger Kilometer in the USA (million)	65,829	63,693	76,266	79,485	85,365	30%
Transit Passenger Kilometers per Inhabitant (USA)	***265***	***239***	***271***	***269***	***283***	***7%***
Total Transit Passenger Kilometers in Germany (million)	77,300	86,700	90,900	97,300	100,300	30%
Transit Passenger Kilometers per Inhabitant (Germany)	***963***	***1,060***	***1,104***	***1,179***	***1,220***	***27%***
Public Transport Mode Share of All Trips (Germany I)	10.0	10.5	11.0	11.4	n.a.	n.a.
Public Transport Mode Share of All Trips (Germany II)	10.0	n.a.	8.0	n.a.	n.a.	n.a.
Public Transport Mode Share of All Trips (USA)	2.0	1.8	1.6	n.a.	n.a.	n.a.

Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Factors Influencing Public Transport Use

- Socioeconomic and Demographic Factors
- Spatial Development Patterns
- Transport Policies (towards public transport *and* other modes)
- Land Use Planning and Policies
- Culture

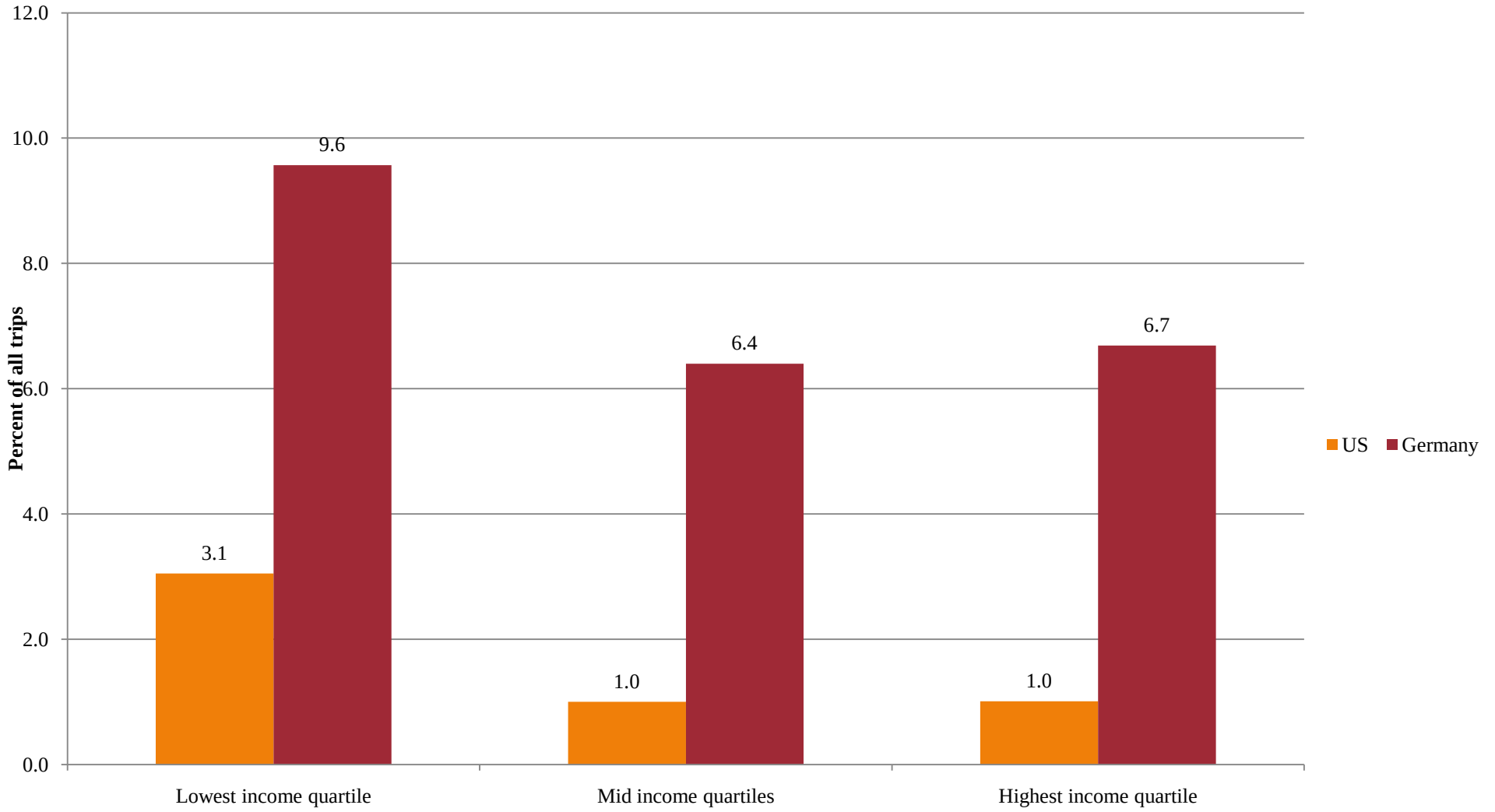
Potential Sources of Divergence in National Travel Surveys and Comparability of NHTS and MiD

	*Range of NTS**	*MiD (Germany)*	*NHTS (U.S.)*
Survey Period	*10 weeks to 14 months*	14 months (11/01 - 12/02)	14 months (03/01 - 04/02)
Collection Rhythm	*annually to irregularly*	76, '82, '89, '02	69, '77, '83, '90, '95, '01
Sample Size	*3,000 to 63,000 HH*	25,848 HH	26,082 HH
		61,729 individuals	60,228 individuals
		167,851 trips	248,512 trips
Survey Method	*phone, person, mail*	CATI (95%)	CATI (100%)
Target Population	*civilian population*	civilian	civilian
Eligibility of HH Members	*adults, children, age cap*	adults and children	adults and children
Sampling Technique	*RDD to pop. register*	stratefied rand. sample	list assisted RDD
Survey Period	*1 to 7 days*	1 day travel diary	1 day travel diary
Response Rates	*often below 40% of HH*	42% of HH	41% of HH
Inclusion Criteria		HH where at leat 50% of HH members respondend	HH where at leat 50% of HH members over 18 yearsold respondend
Nonresponse Treatment		collection of HH data	collection of HH data
Weights		selection reciprocal, non-response, HH size, weekday, month, regional charactertistics	selection reciprocal, non-response, HH size, weekday, month, regional charactertistics
Data Level	*HH, person, trip, or car*	HH, person, trip, car	HH, person, trip, car
Representative	Country, subsections	Germany, States	U.S., Census Regions
Add-ons		Yes	Yes

*based on 9 recent national travel surveys

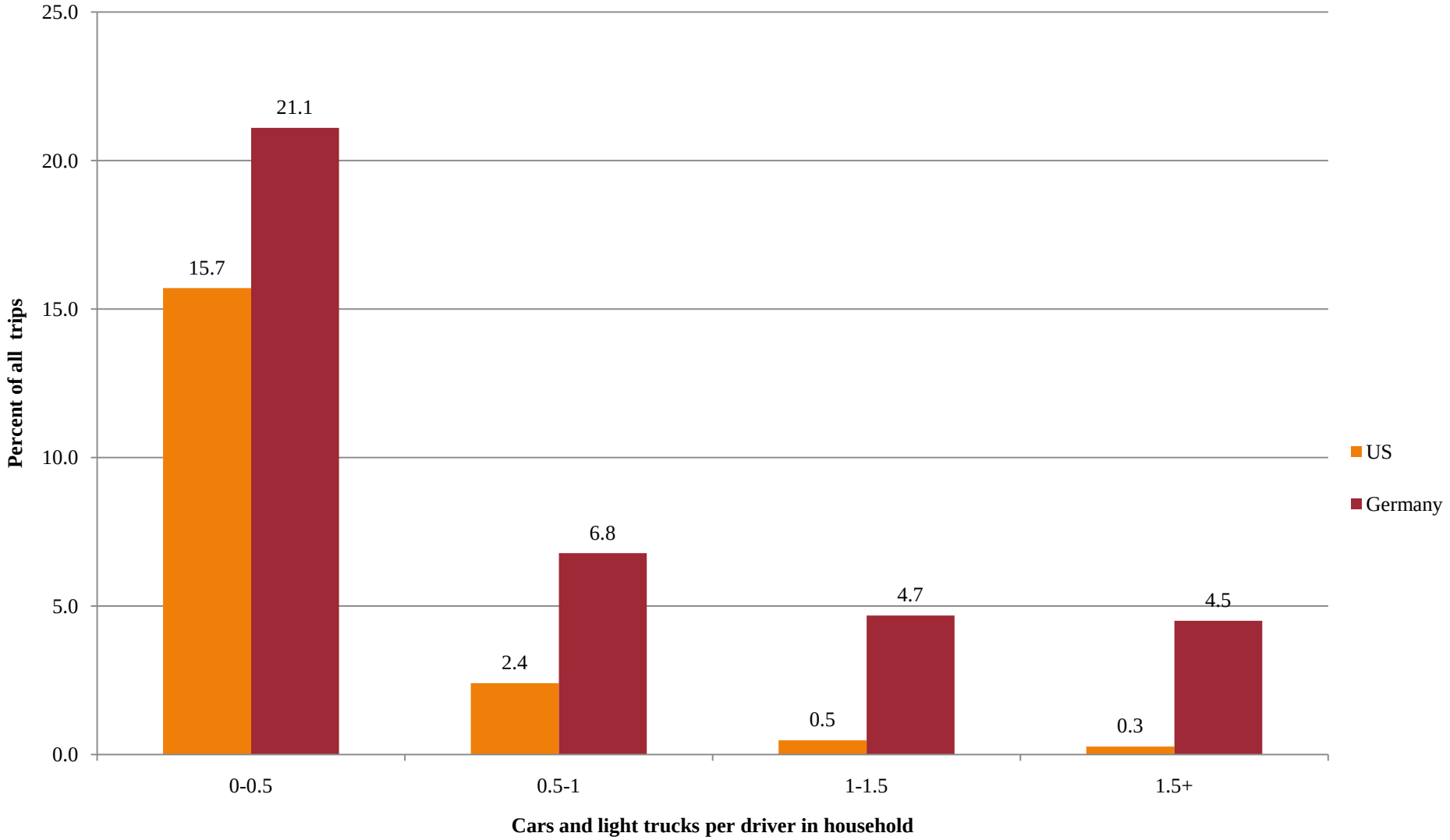
Source: (Buehler, Pucher, and Kunert 2009: “Making Transportation Sustainable: Insights from Germany”)

Public Transport Use by Income Quartile



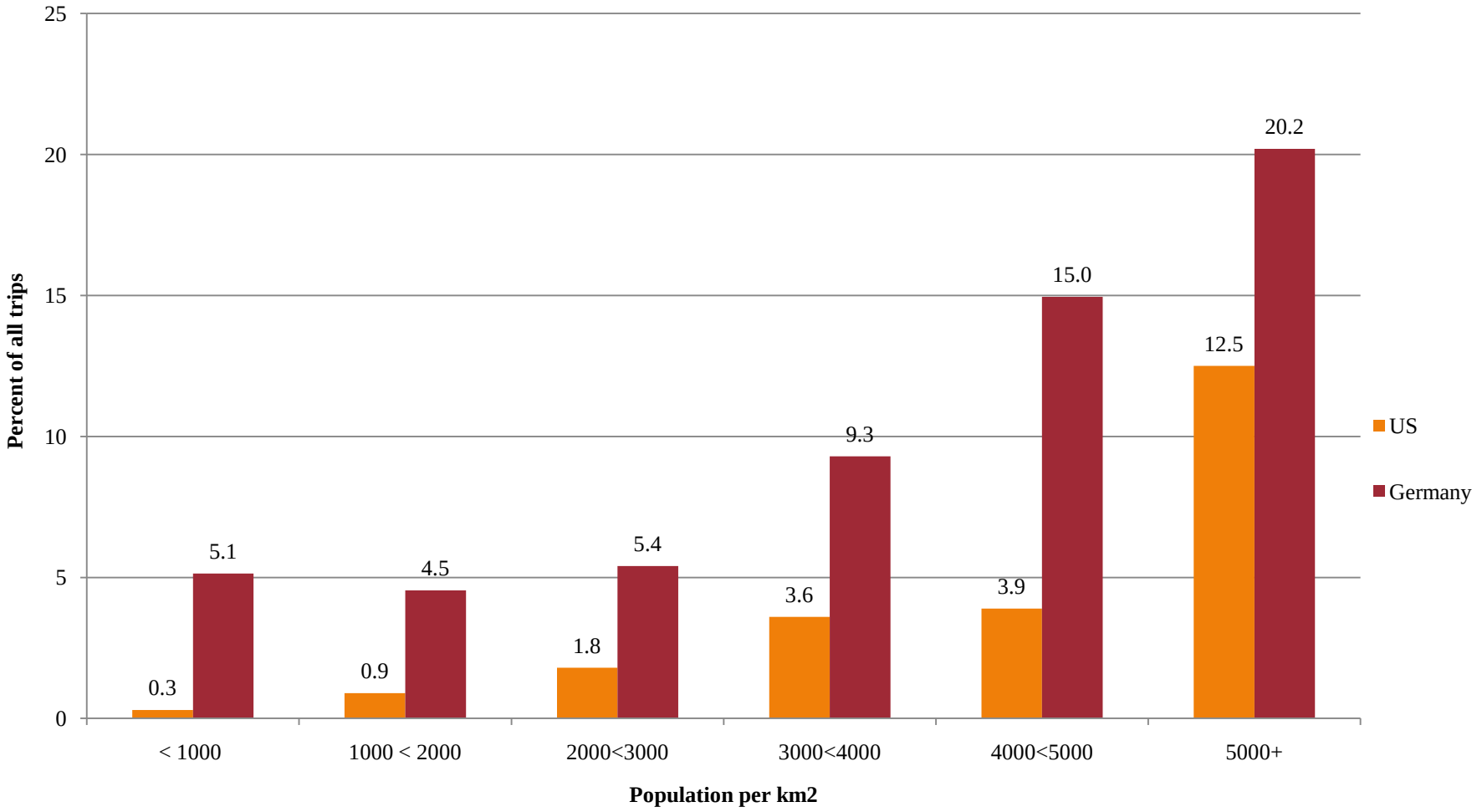
Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Public Transport Use by HH Car Ownership



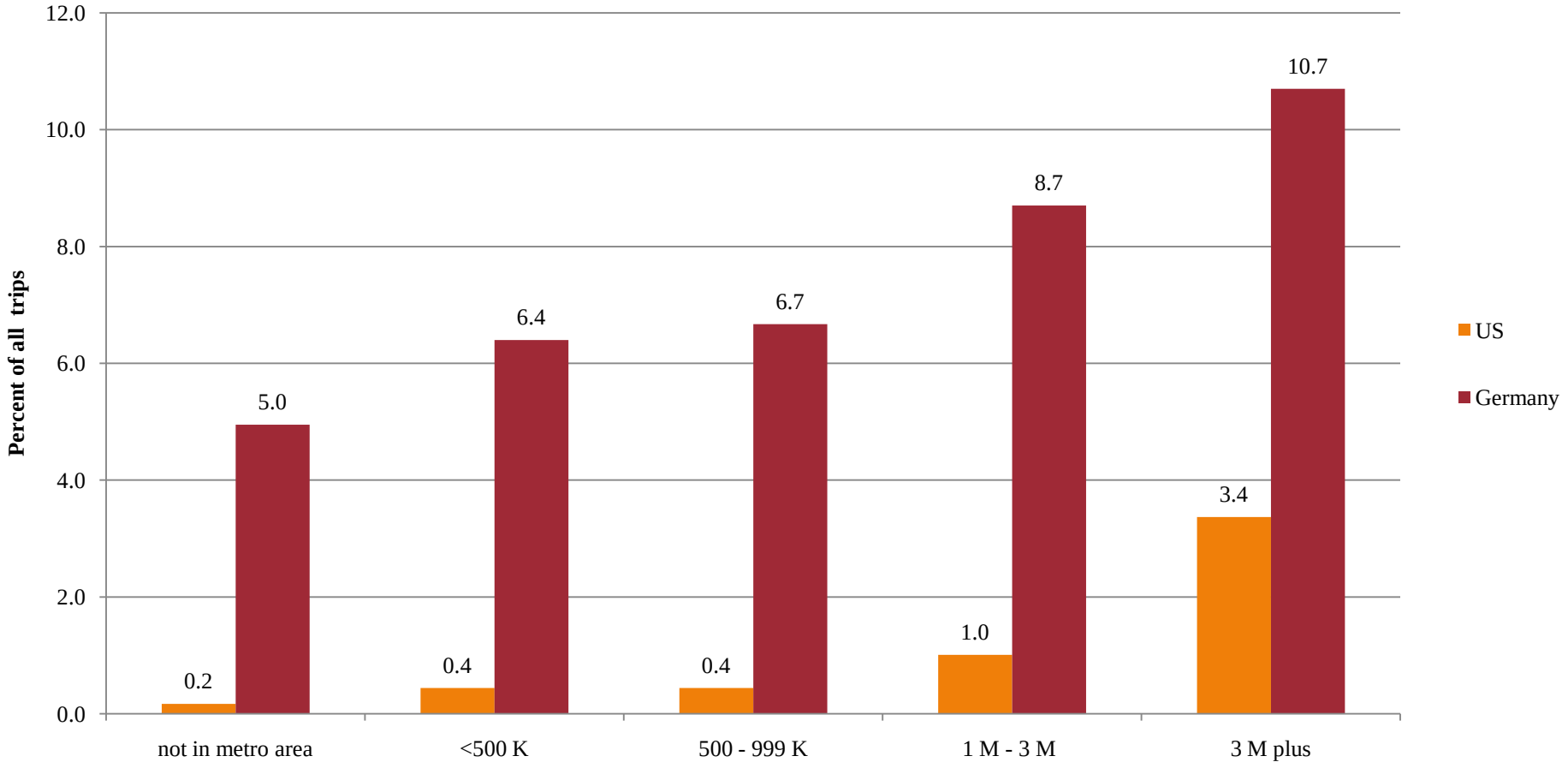
Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Public Transport Use by Population Density



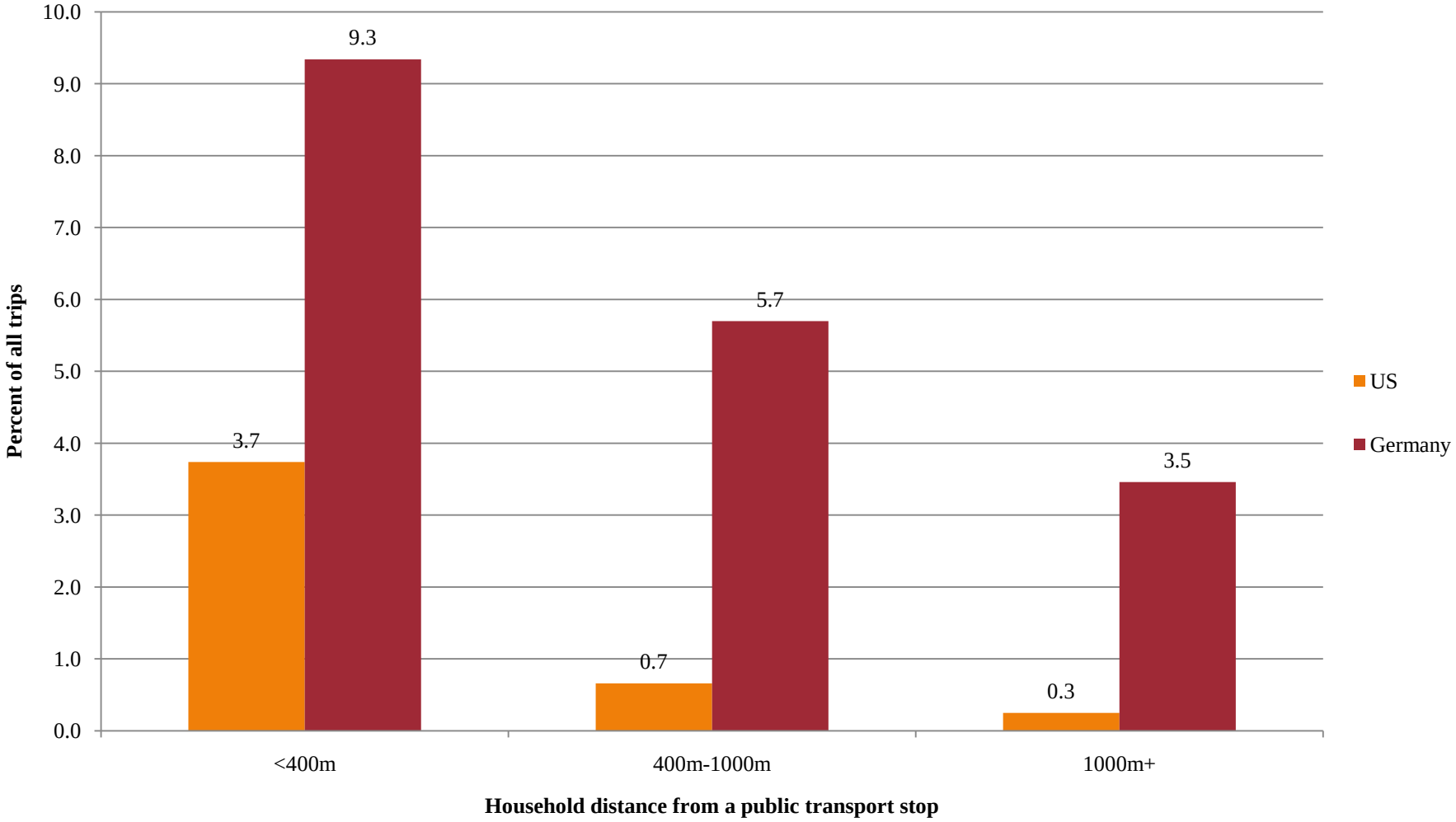
Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Public Transport Use by MSA Size



Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Mode Share by HH Distance from Public Transport



Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Overview of Policies that Encourage Public Transport in Germany

1) Improved, integrated, and coordinated public transport

2) Integration of walking and cycling with public transport services

3) Restrictions on car use

4)Land-use planning that discourages sprawl

Disincentives for car use and incentives for other modes

Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Differences in Transport Policies and Transit Supply

- Longer history and more efficient use of government subsidies in Germany
- More and higher quality of transit supply in Germany
- Better regional coordination and integration of transit services, timetables, financing, and tickets in Germany
- More multi-modal coordination with walking and cycling in Germany

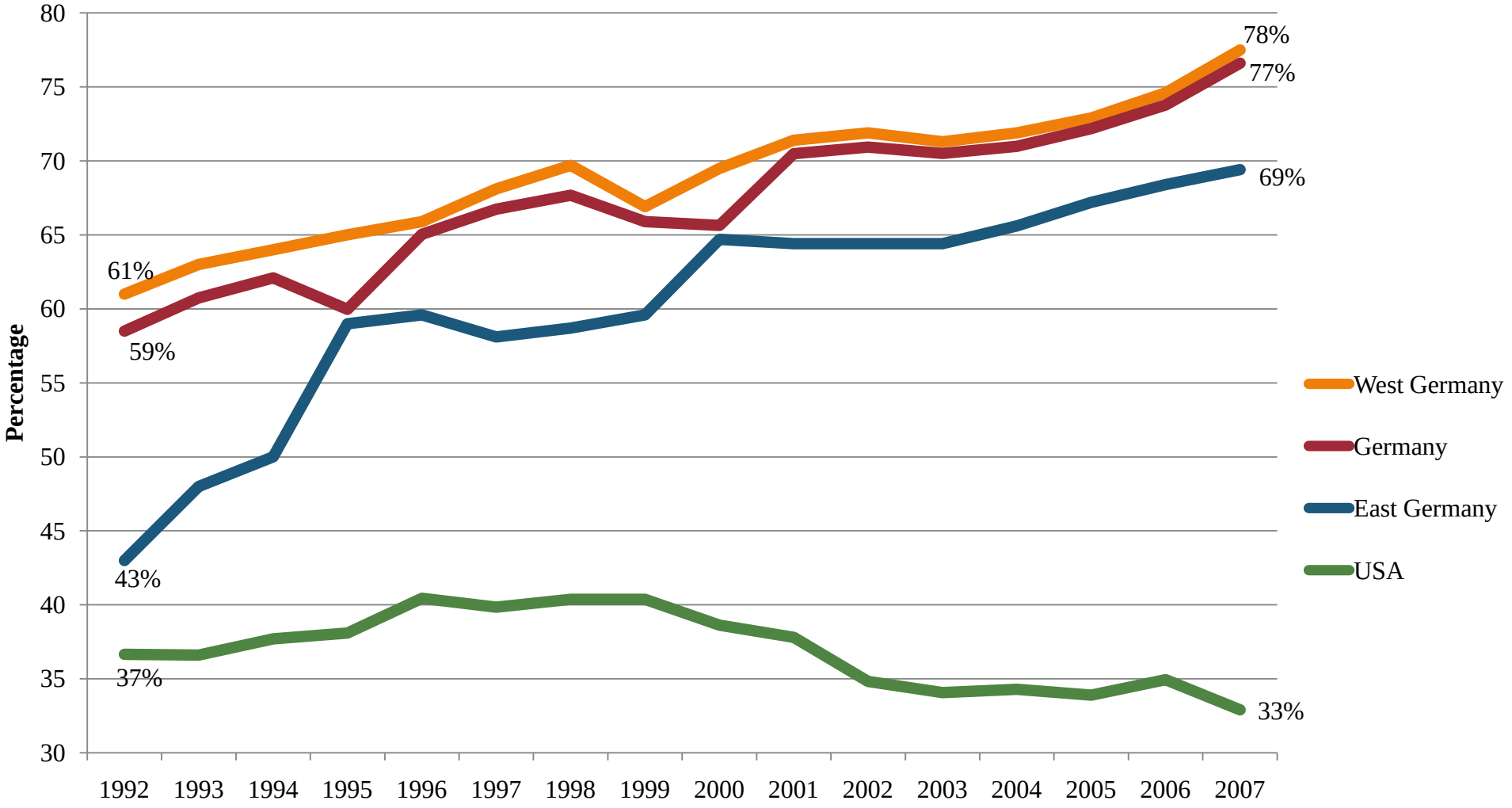
Source: (Buehler, 2009, “Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.”)

Government Subsidies/Spending on Transit

	Germany	***U.S.***
Subsidies (operating and investment)	long history of subsidies for operation from local governments; federal government subsidies for investments since the 1960s	history of private ownership; federal government subsidies foer operation and investments since 1970s; steep increase in federal subsidies for transit since ISTEA
Average annual transit subsidies since 2000	$19 billion	$28 billion
Average annual transit subsidy per inhabitant	$230	$94
Average transit subsidy per transit passenger trip	$1.70	$2.90
Average transit subsidy per transit passenger kilometer	$0.20	$0.40
Share of operating expenses covered by farebox revenue	70%	35%

Source: (Buehler, Pucher, and Kunert 2009: “Making Transportation Sustainable: Insights from Germany”)

Trend in Farebox Revenue as Share of Transit Operating Expenditure in Germany and the USA, 1992-2007

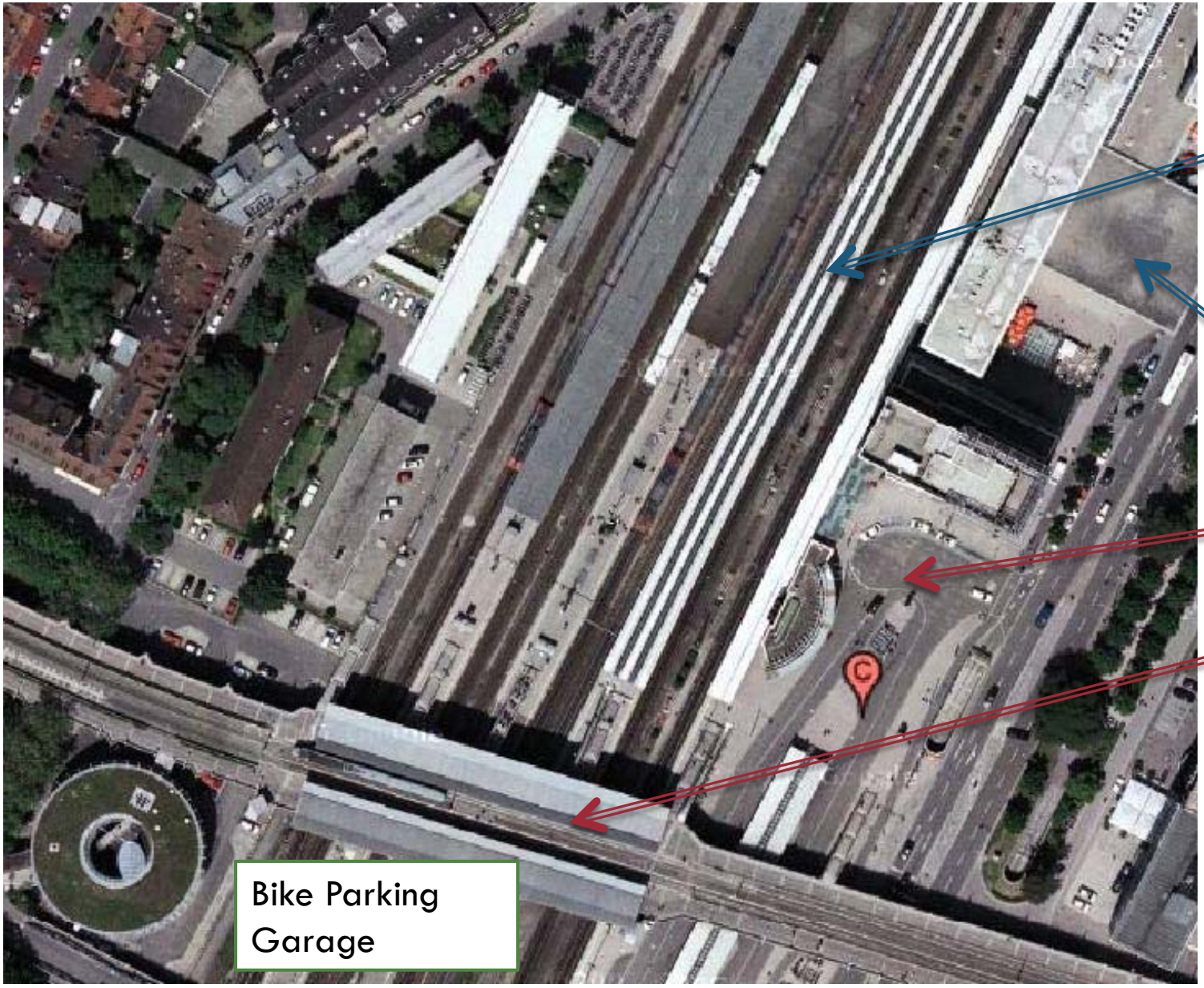


Source: (Buehler, 2009, "Promoting Public Transportation: A Comparison of Passengers and Policies in Germany and the U.S.")

Real-time arrival and departure information at public transport stops

Source: Pucher

Integration of modes



(Source: Google Maps)

Regional coordination of services, timetables, financing, and tickets

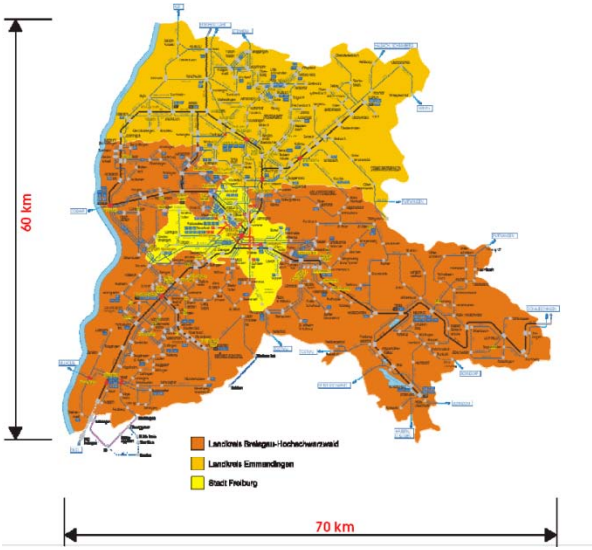
- Virtually all metropolitan areas have a Verkehrsverbund
- Integrate public transport fares and timetables
- Seamless transfers across operators and modes
- Steep discounts for monthly/annual tickets; students and elderly (average: 60%)
- Unified online information systems
- State wide public transport coordination and tickets

Source: http://www.oepnv-info.de/dkarte/index.php

Source: (Buehler, Pucher, and Kunert 2009: "Making Transportation Sustainable: Insights from Germany")

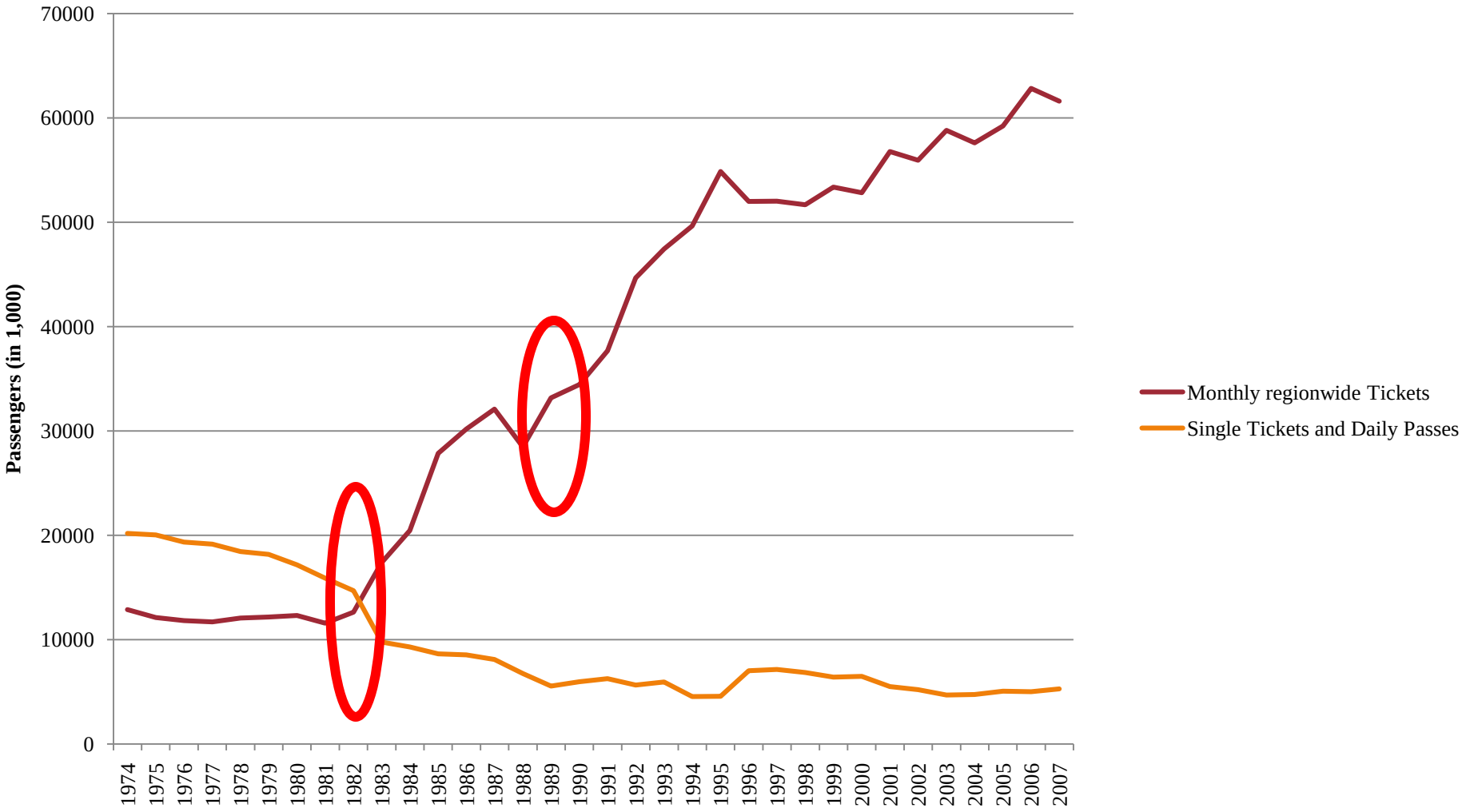
Regional coordination of services and ticketing

- Transferable “Environmental Protection” since1984
- Regional monthly transit ticket since 1991
- Regional Transit Authority (75 towns, 187 operators, 3,050km of routes)
- Annual ticket: 450 Euros
- Ticket for students: 69 Euros for 6 months
- RegioMobilCard including car sharing etc.
- Signal priority for light rail



(Source: City of Freiburg, 2009; Buehler & Pucher, 2009: "Sustainable Transport that Works: Lessons from Germany")

Trend toward monthly region wide tickets in Freiburg, 1974-2007 (in 1,000 passengers)



(Source: Buehler & Pucher, 2009: "Sustainable Transport that Works: Lessons from Germany")

Multi-modal coordination with walking, cycling, and the car

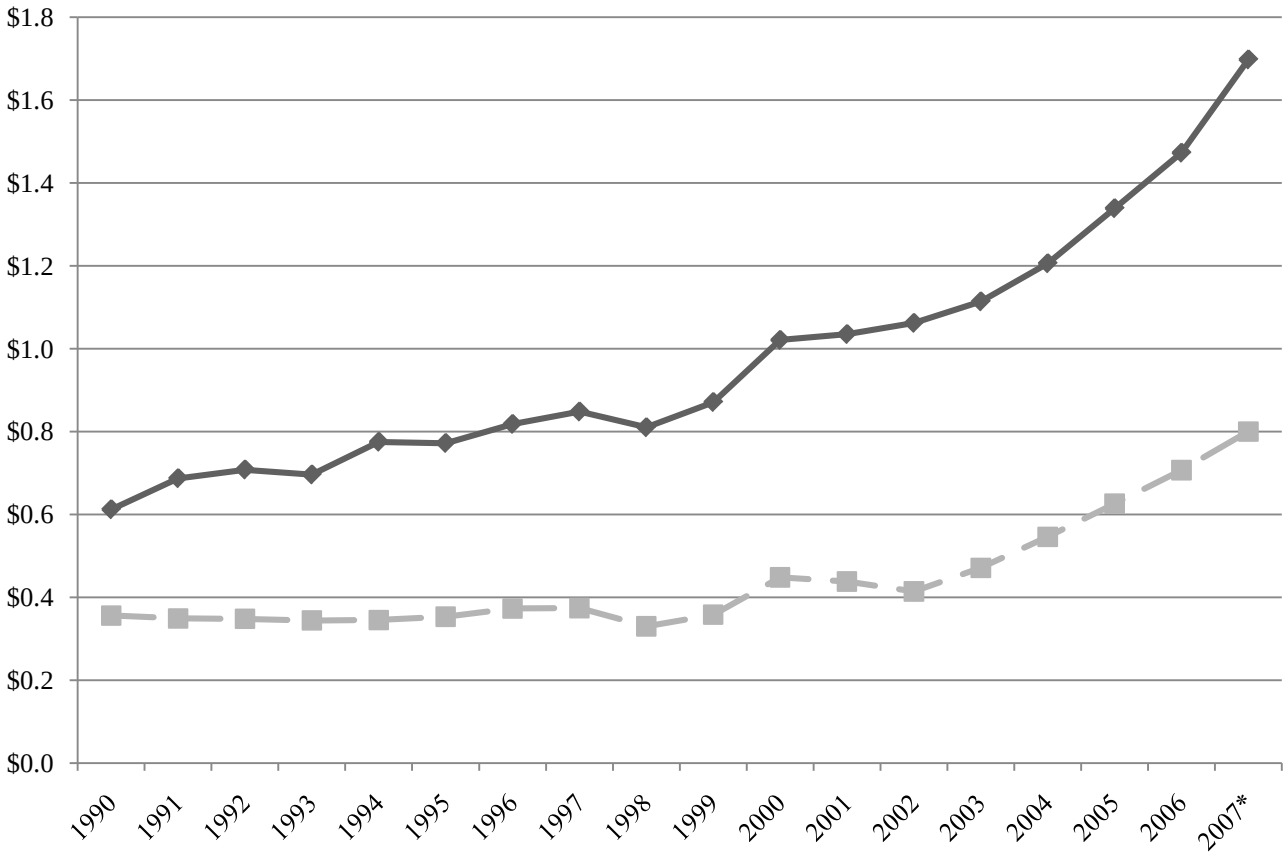
Source: author's picture, City of Muenster, Pucher

Restrictions and Taxes on Automobile Use andOwnership

- High taxes on gasoline and new car purchases
- Expensive and limited car parking in cities
- High cost of obtaining a driver's license
- Tempo 30km/h zones in most residential neighborhoods
- Turn restrictions, artificial dead-ends, thru traffic restrictions for cars
- Enforcement of traffic regulations

Source: (Buehler, 2009, "Determinants of Automobile Use: A Comparison of Germany and the U.S.")

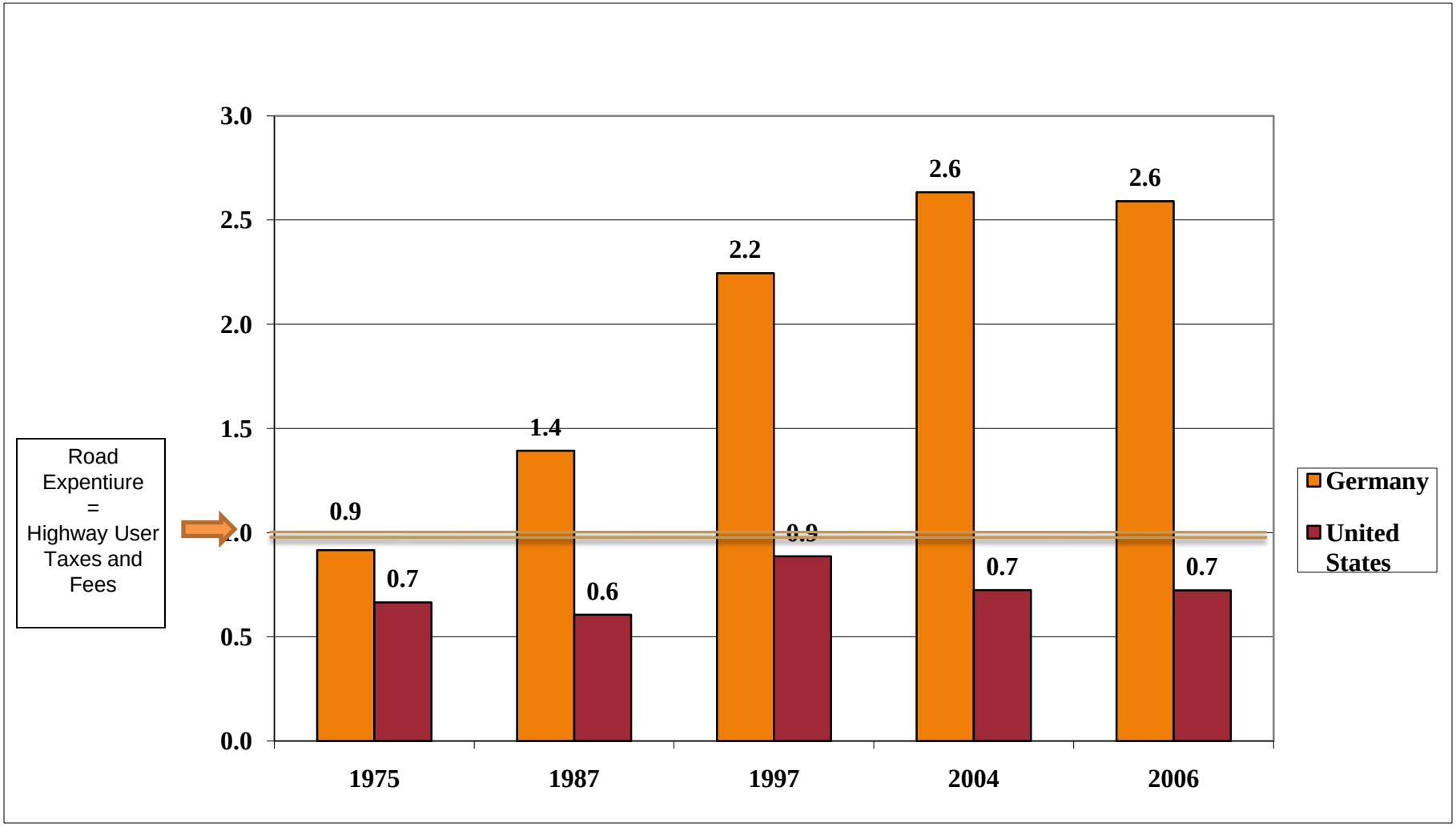
Unleaded gasoline prices per liter in the U.S. and Germany, 1990 - 2008 (in U.S. dollars, using PPP conversion)



*preliminary for 3rd Quarter 2007

Source: (Buehler, Pucher, and Kunert 2009: “Making Transportation Sustainable: Insights from Germany”)

Highway user taxes and fees as share of road expenditures by all levels of government in Germany and the United States



Source: (Buehler, Pucher, and Kunert 2009: “Making Transportation Sustainable: Insights from Germany”)

Insights from Germany

1) Regionally integrated, attractive, and frequent transit services
2) Regional tickets with steep discounts for monthly and annual tickets
3) Coordinated land-use and transport policies
4) Integration of public transport, walking and cycling to foster the synergies of these complementary modes
5) Restrictions on car use that make it less convenient, slower, and more expensive in cities
6) Combination of all policies helps leveling the “playing field” for public transport, walking, and bicycling

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