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Assignment no 4

- Let us begin by a world tour thanks to J.Kenworthy and F. Laube – “The Millennium Cities. Data base for Sustainable Transport” sponsored by the UITP
- A follow-up to the 1989 “Cities and Automobile Dependence” by P.Newman and J.Kenworthy

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… And it is complemented by its follow-up

- A set of 50 cities with evolution of performance between 1995 and 2001, plus mobility policies in 2006

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Urban Density is critical...

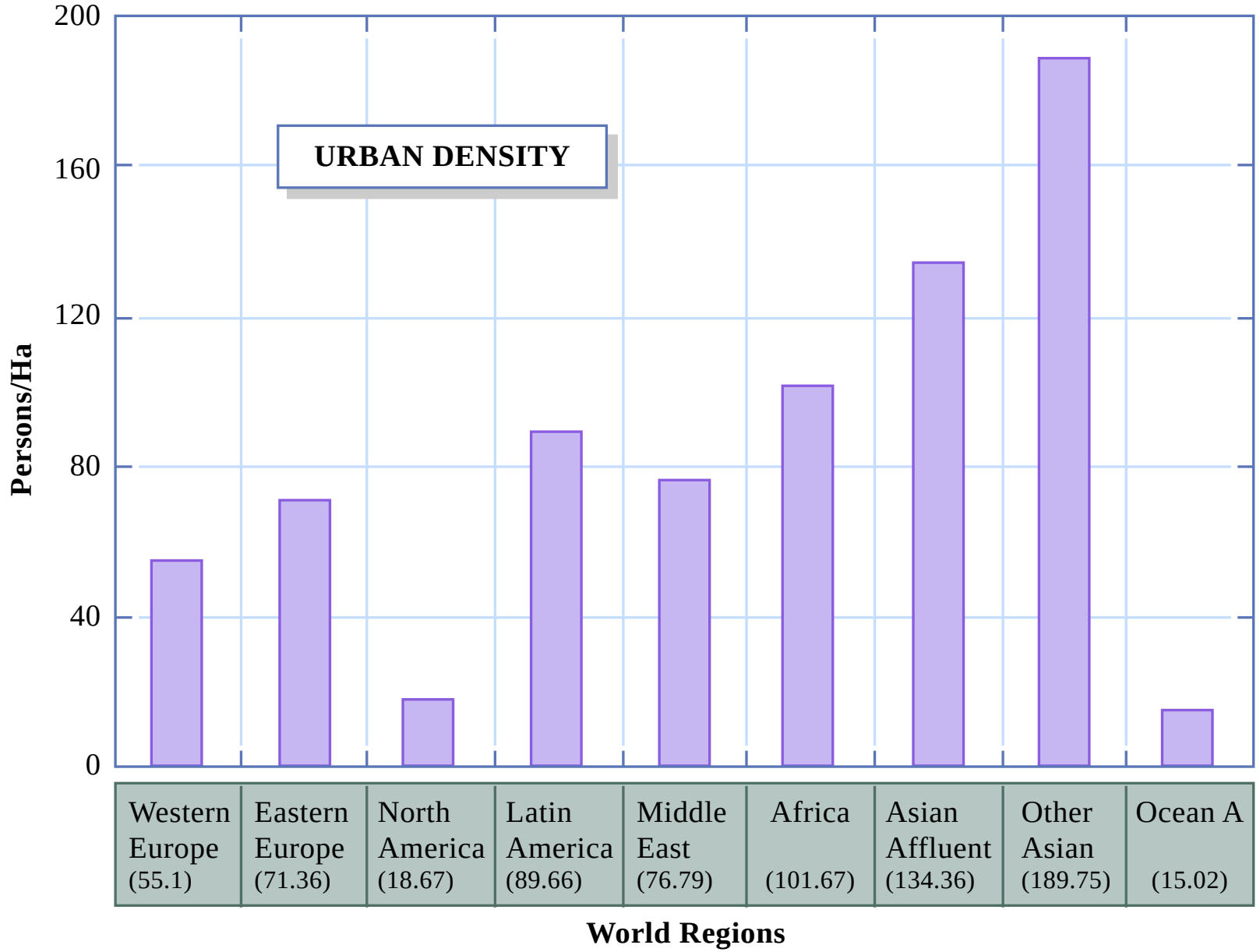

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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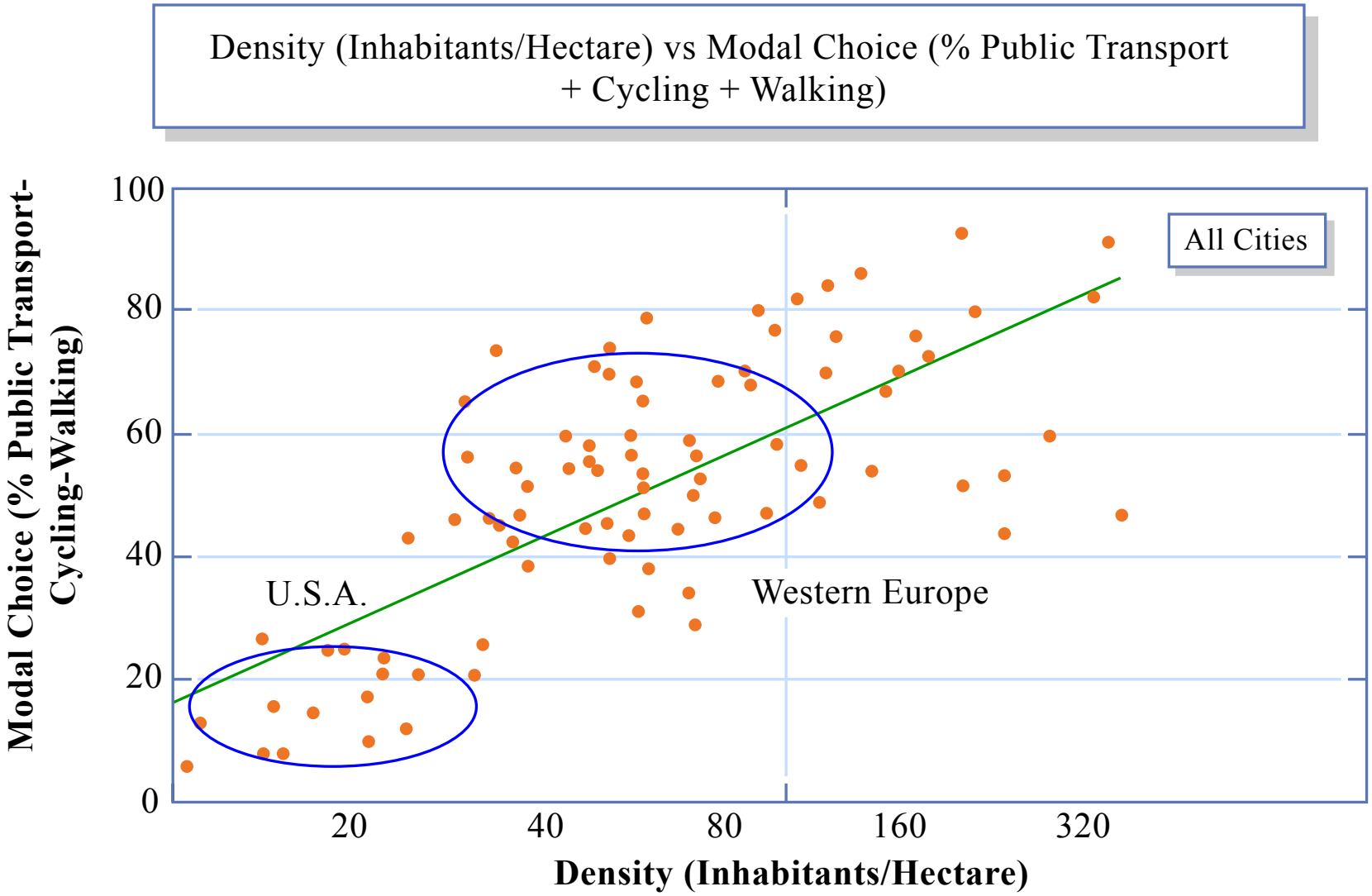
The higher the density, the higher...



... the percentage of sustainable modes

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Job density is also a critical parameter

As Joel Garreau says (The Edge Cities), when the president moves to the suburbs, he takes the office along

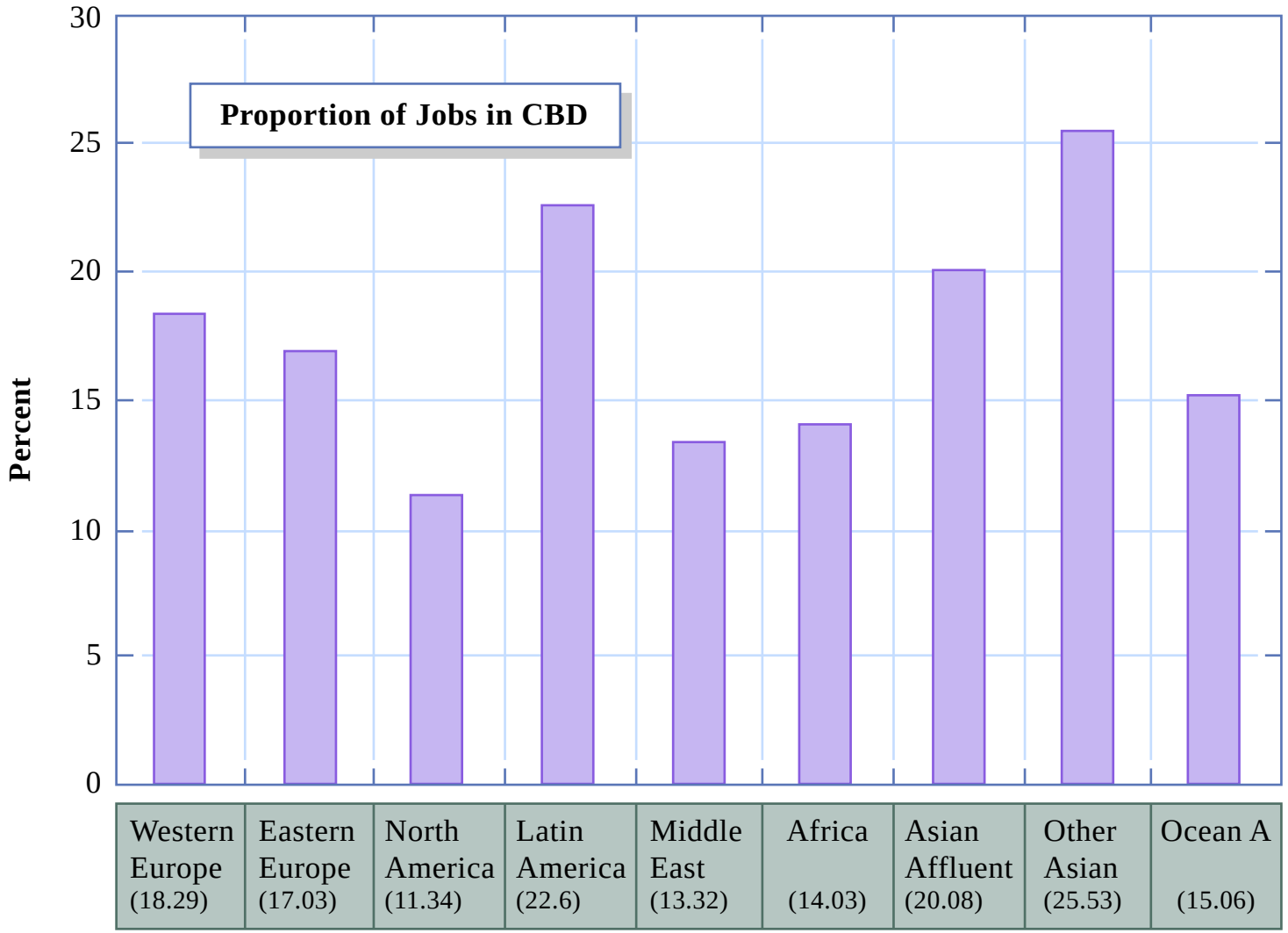

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Number of trips, nearly a constant

- The number of trips result from the activities profile
- But be aware that non-motorized trips may go unaccounted for, in some surveys

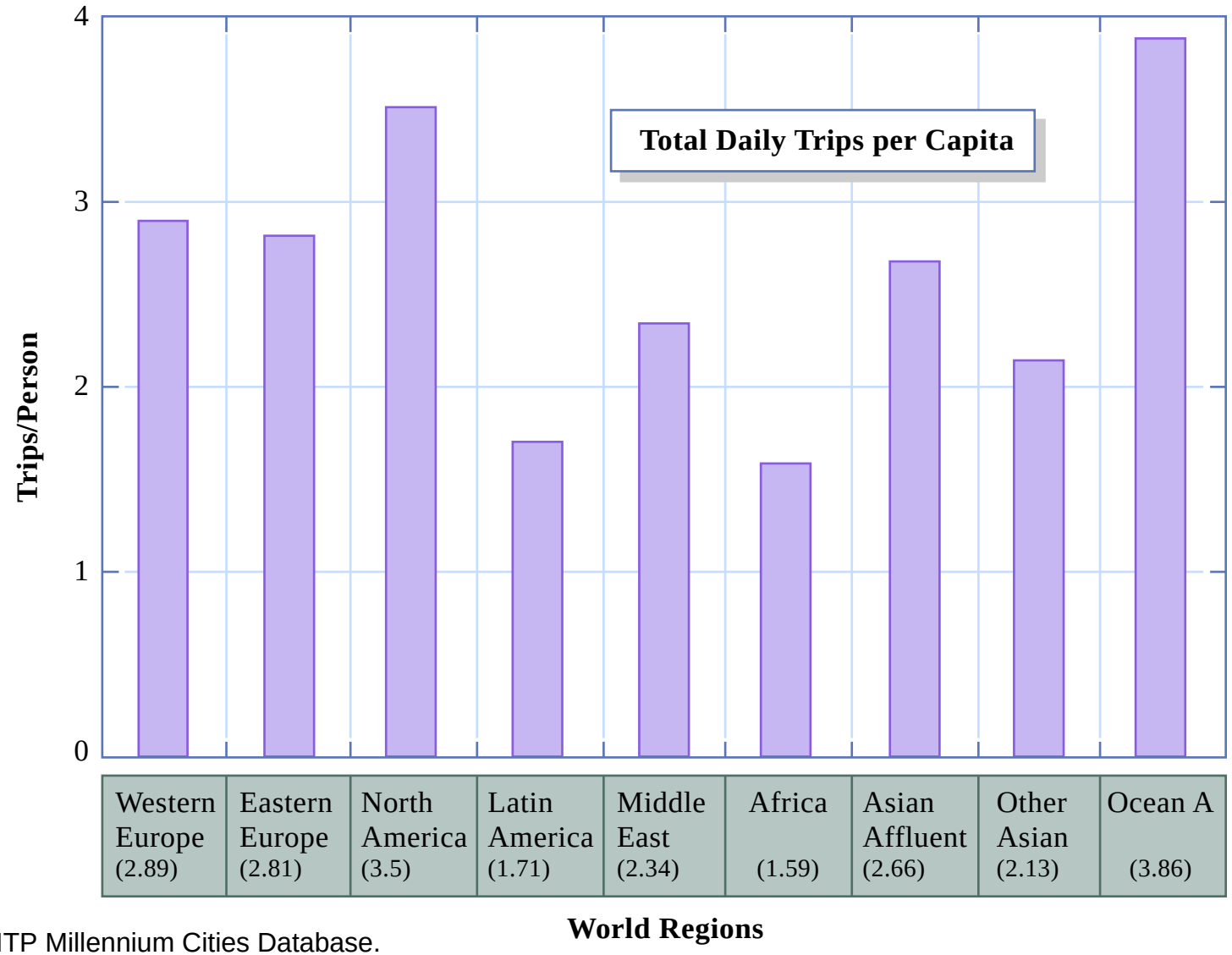

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Percentage of non-motorized trips

Is this a surprise?

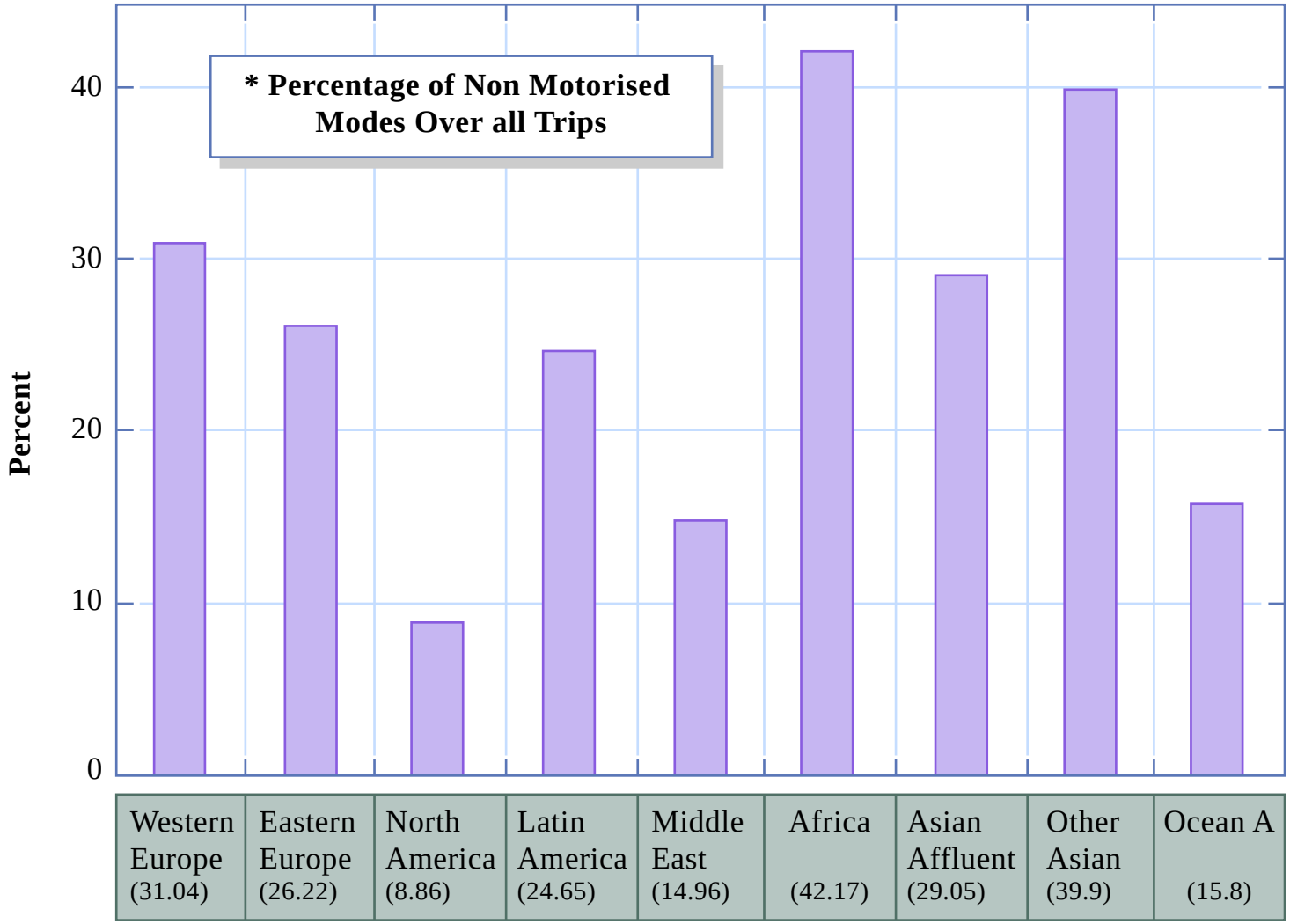

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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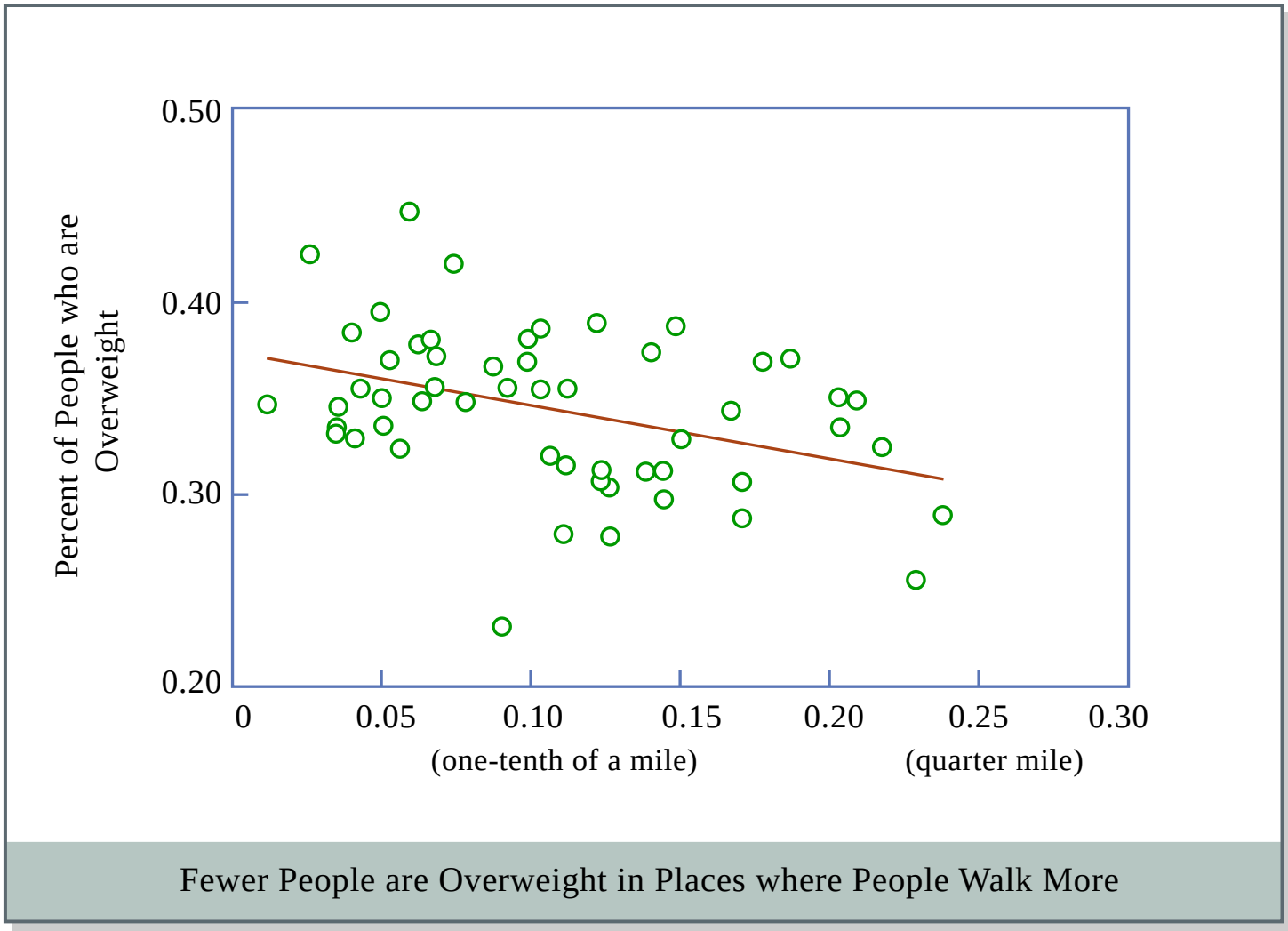
... not to be taken lightly

From Mean Streets 2000 by the Surface Transportation Project Policy (STPP)



Fewer People are Overweight in Places where People Walk More

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

Road building

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Notice that the U.S. ratio doubles the one of Western Europe

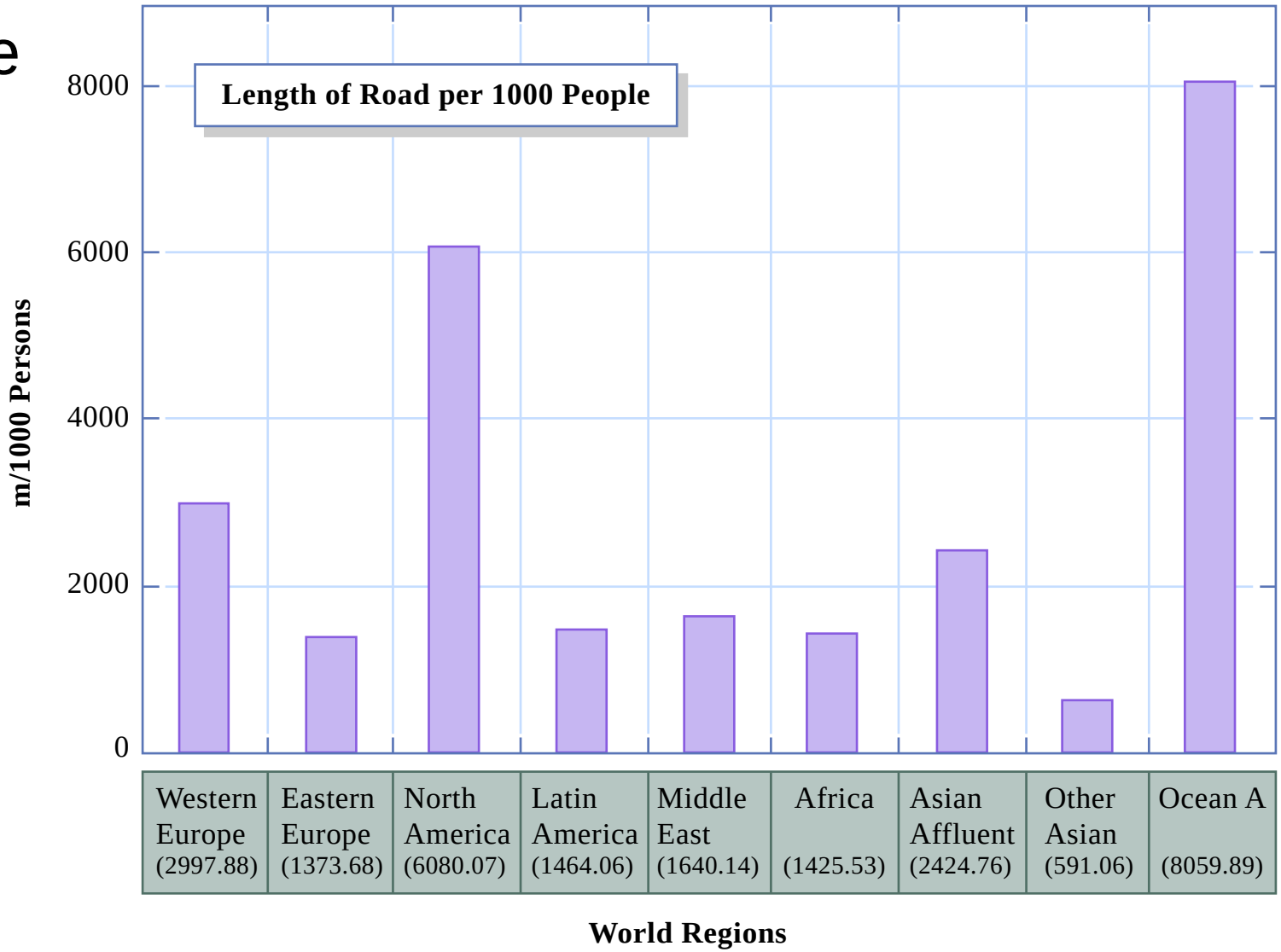

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Automobile ownership

As the difference is not as big as the supply of roads...

... is congestion in Western Europe higher than in the States?

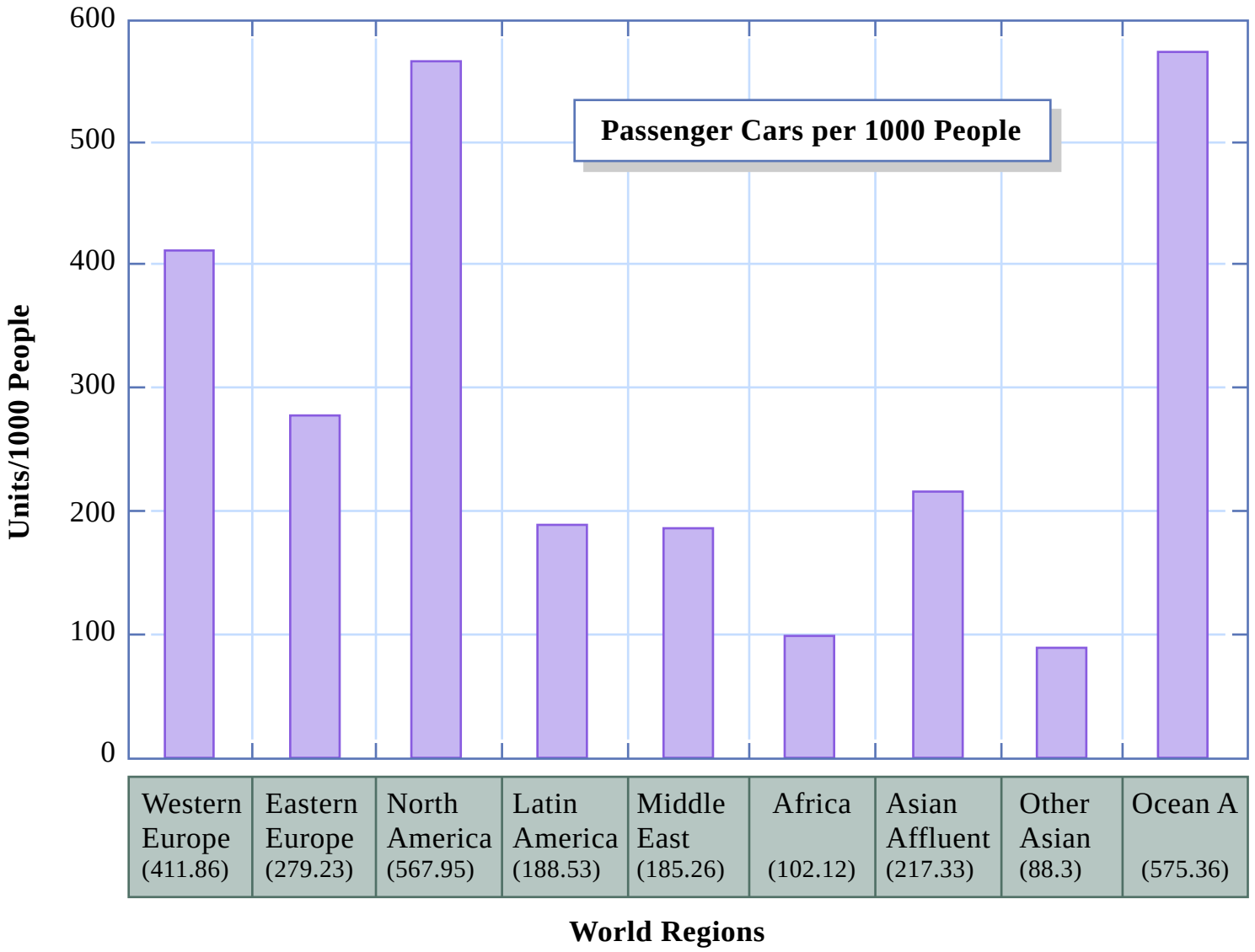

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

Trip length by car

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If the number of trips are comparable...

Does the average car trip length increase inversely proportional to the metropolitan density?

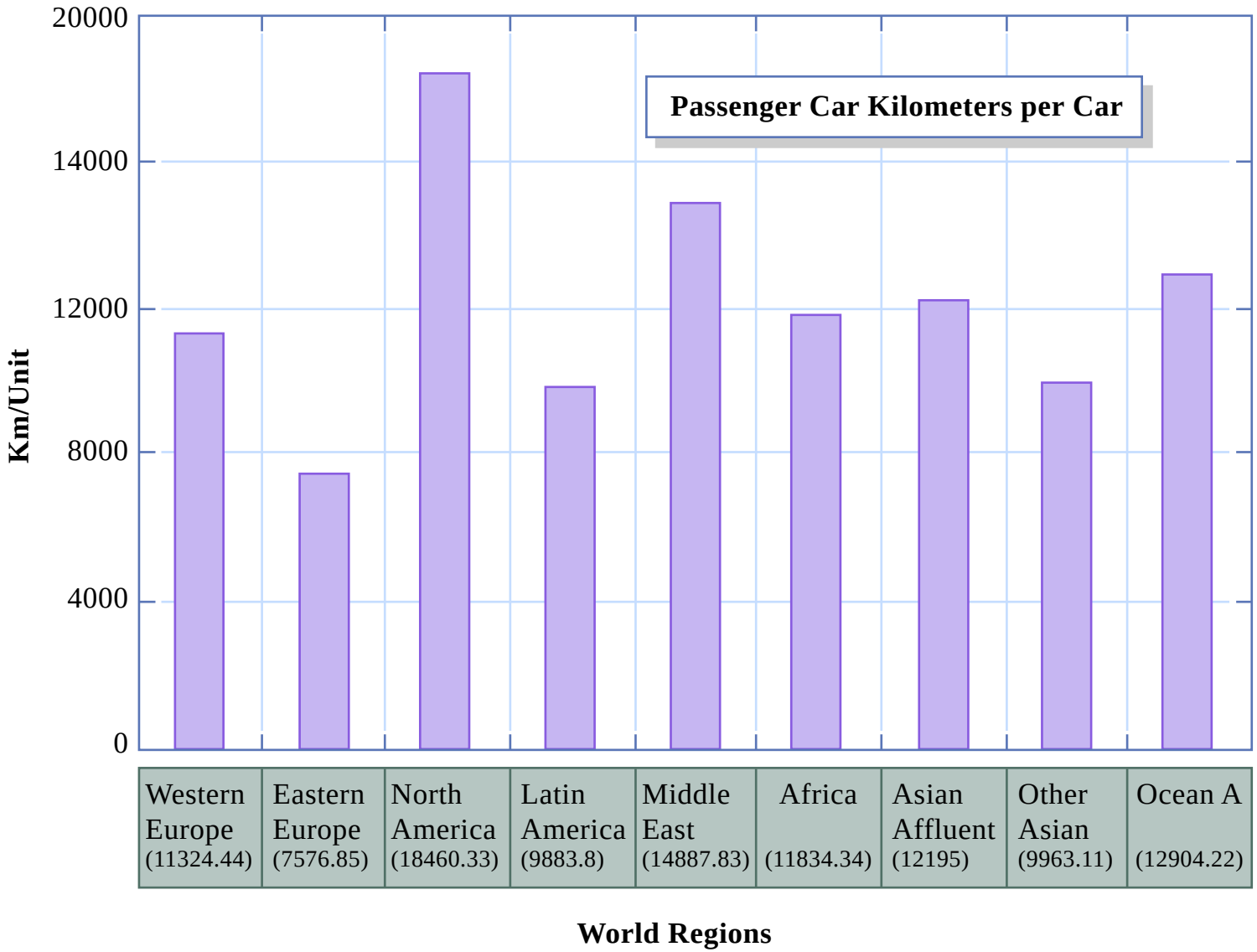

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

Transit coverage

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Notice that the Western Europe ratio more than doubles the US ratio

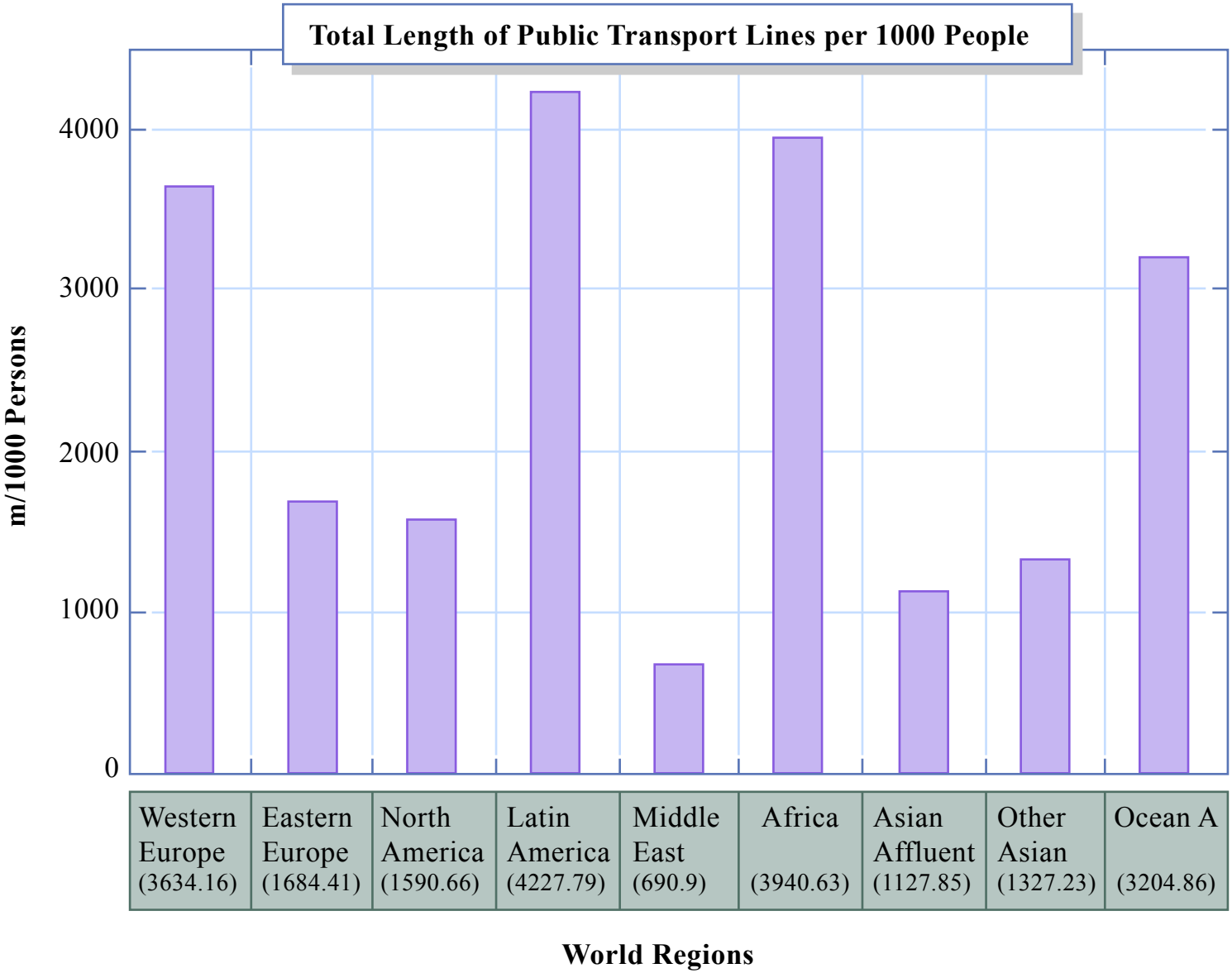

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Parking supply in downtown

Again the U.S. leads clearly over Western Europe

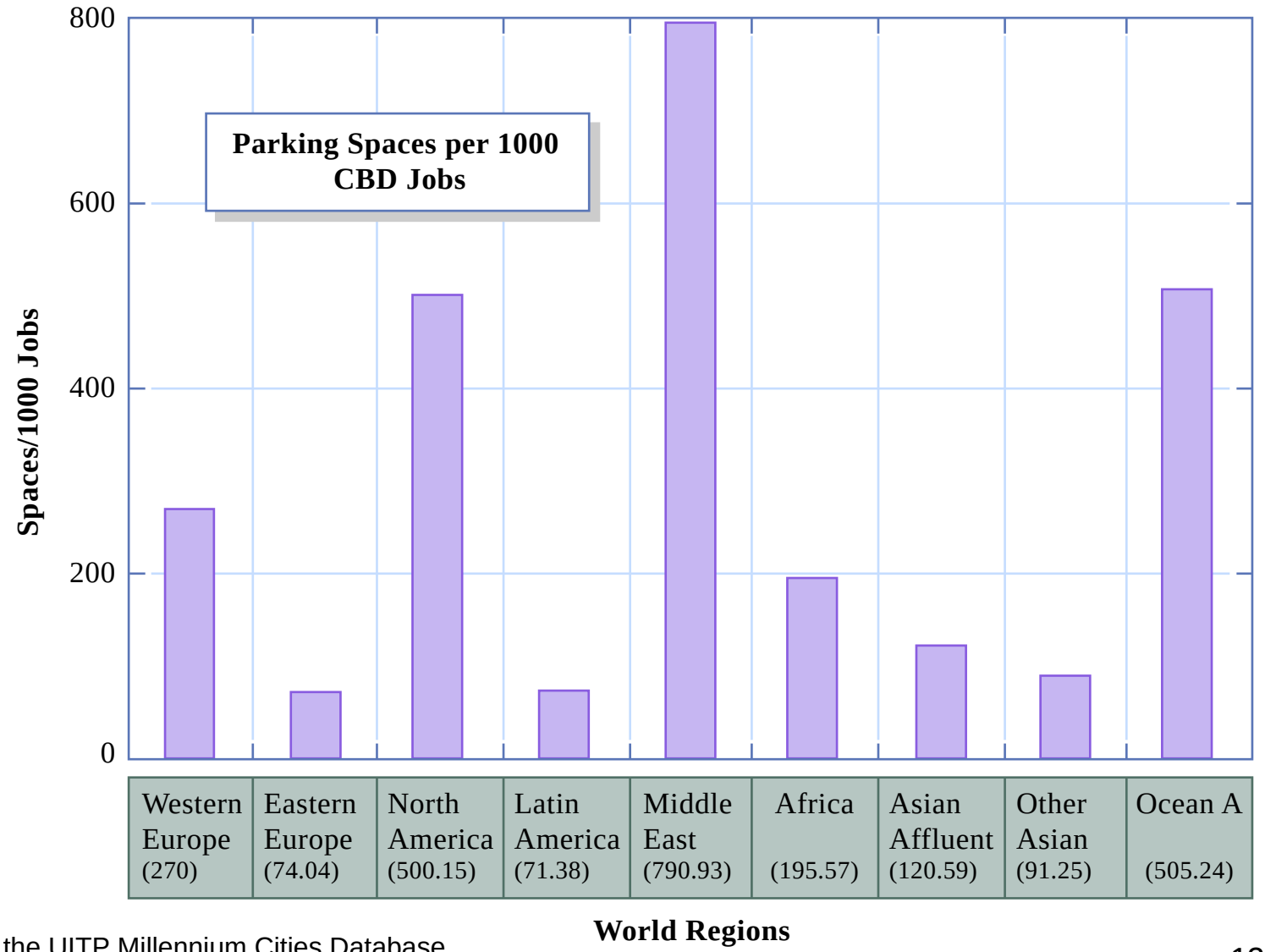

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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The role of the automobile

Again, this should come as no surprise

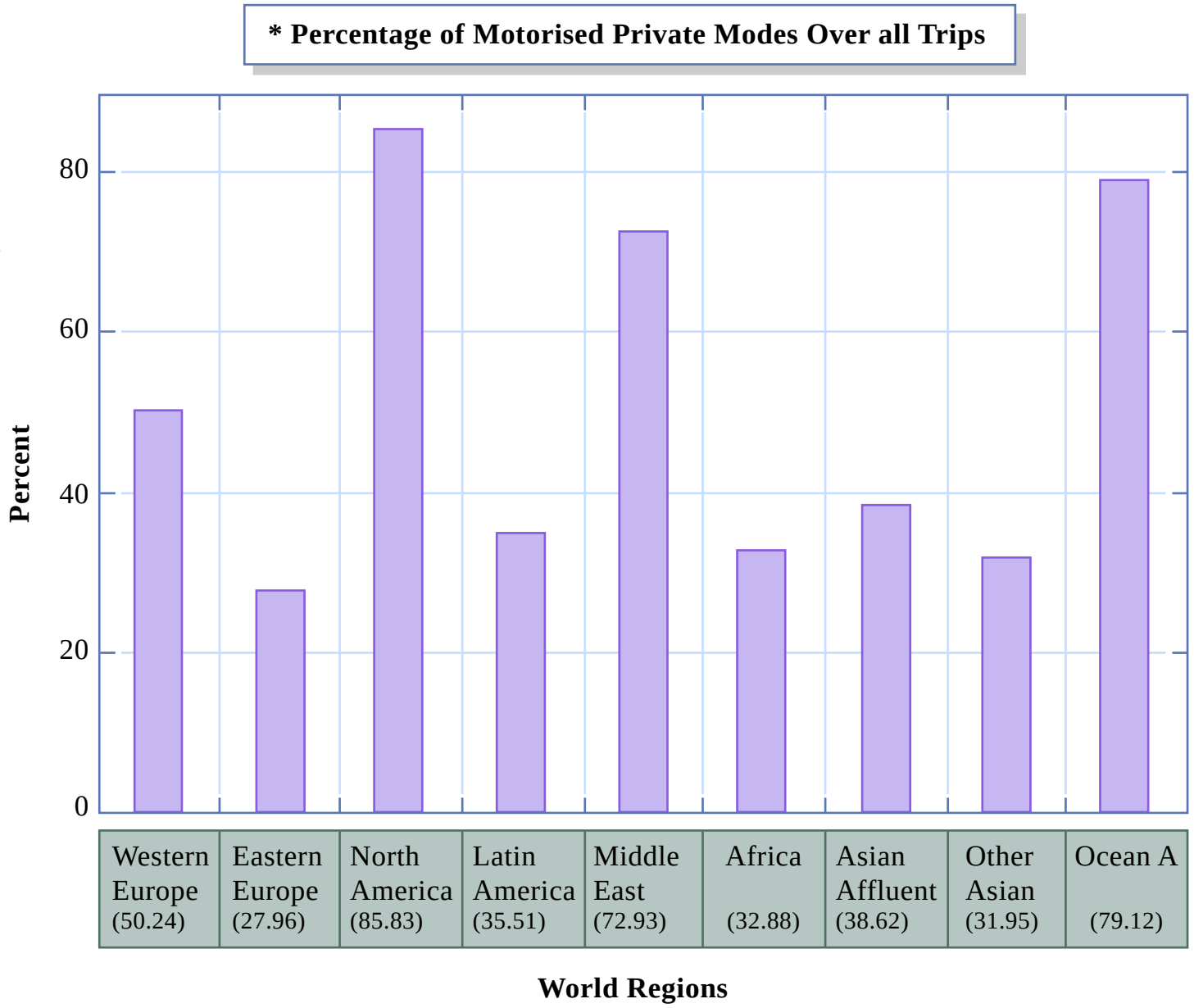

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Economic efficiency

- The arguments go well beyond environmental concerns, quality of life issues, moral grounds...
- Clear economic consequences

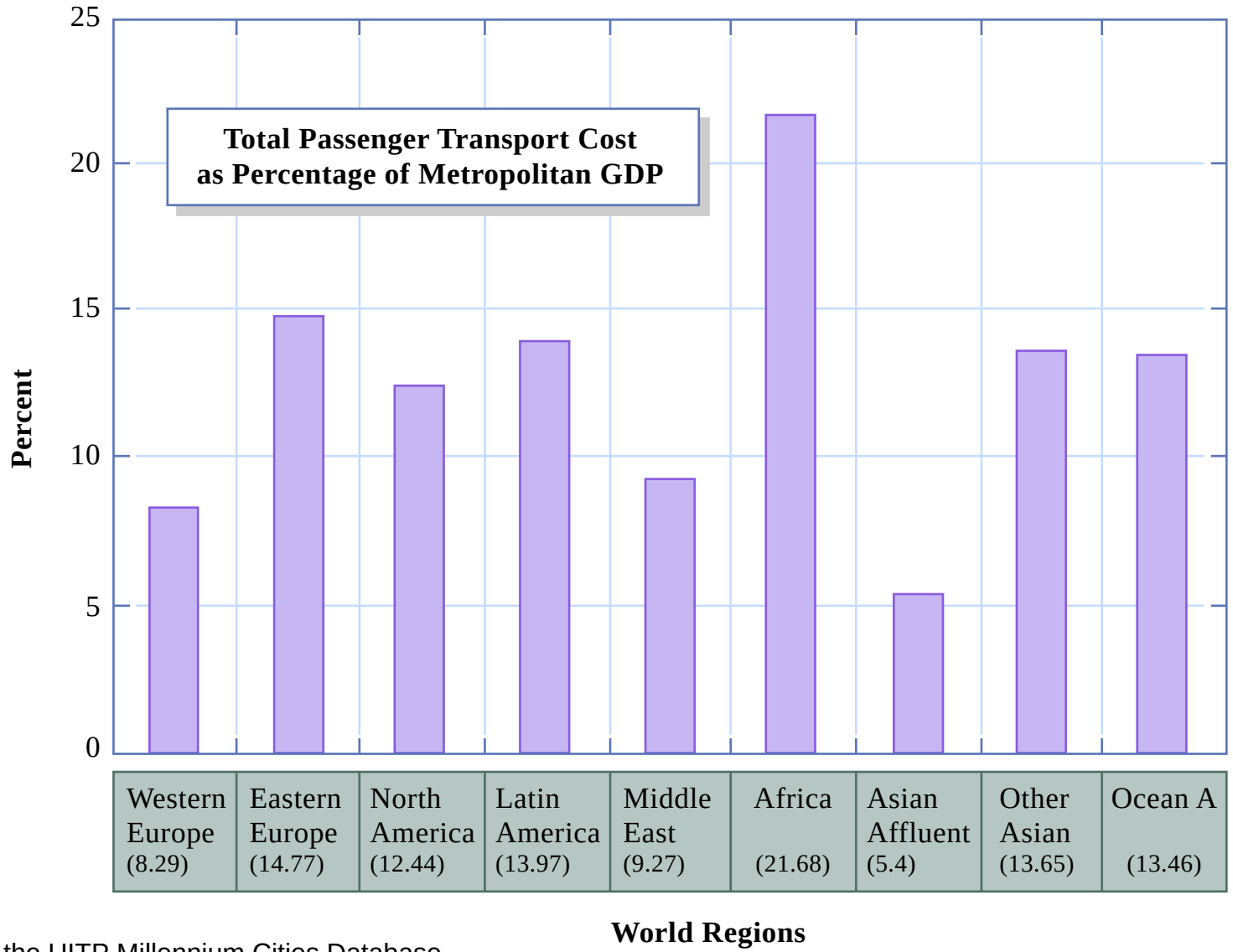

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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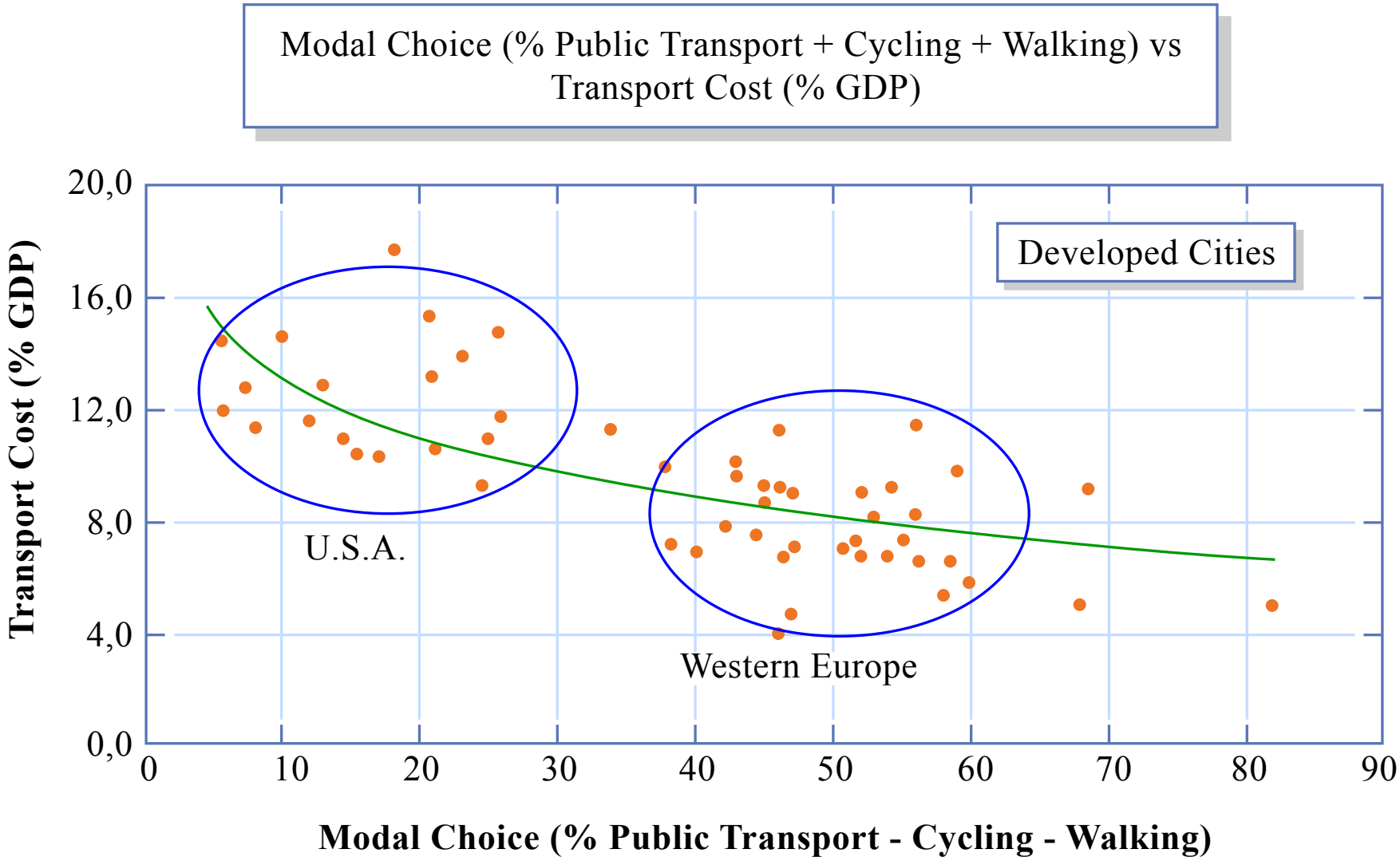
The cost of a balanced system



Economic sustainability

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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CO emissions per capita

The Environmental cost

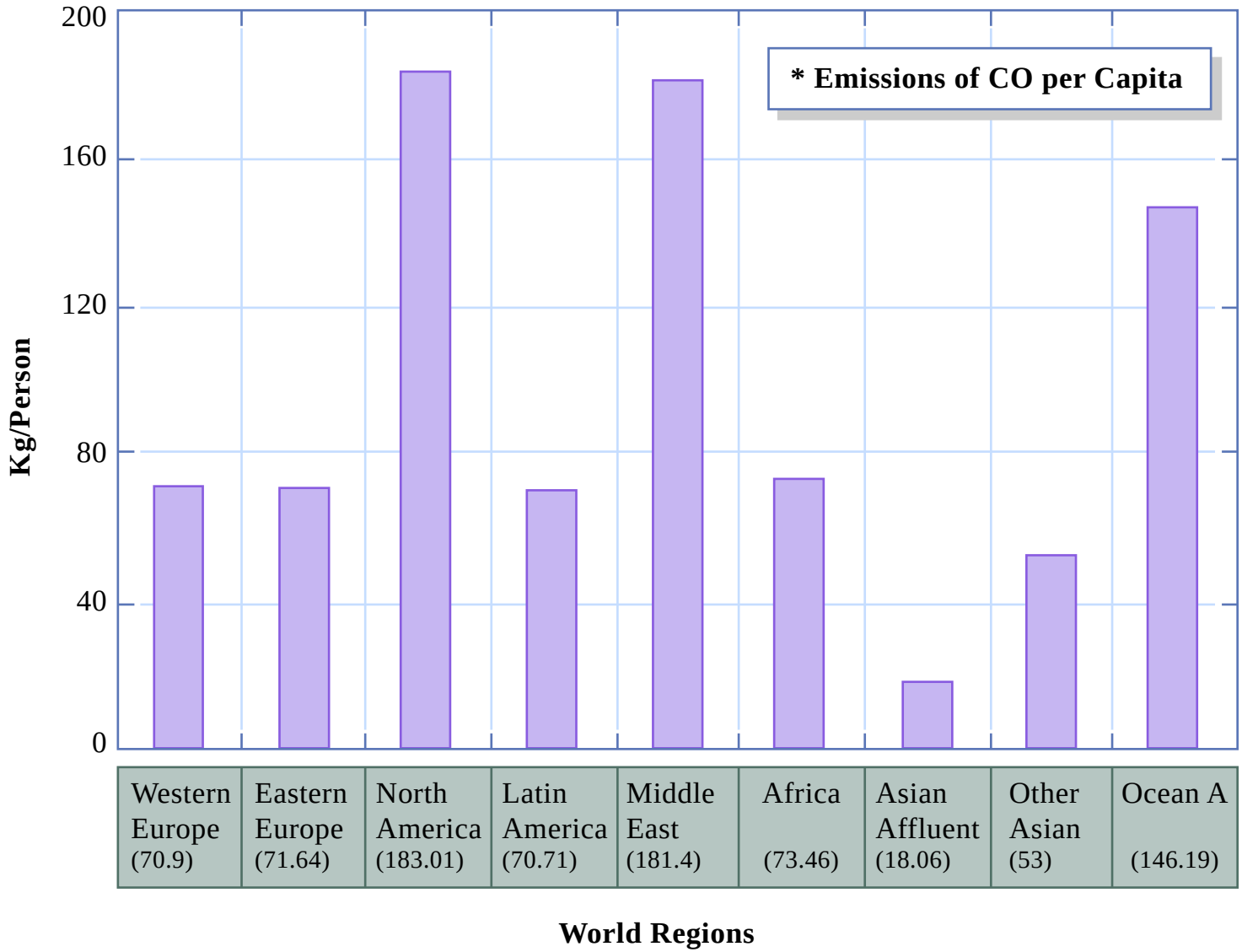

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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The high price of road fatalities

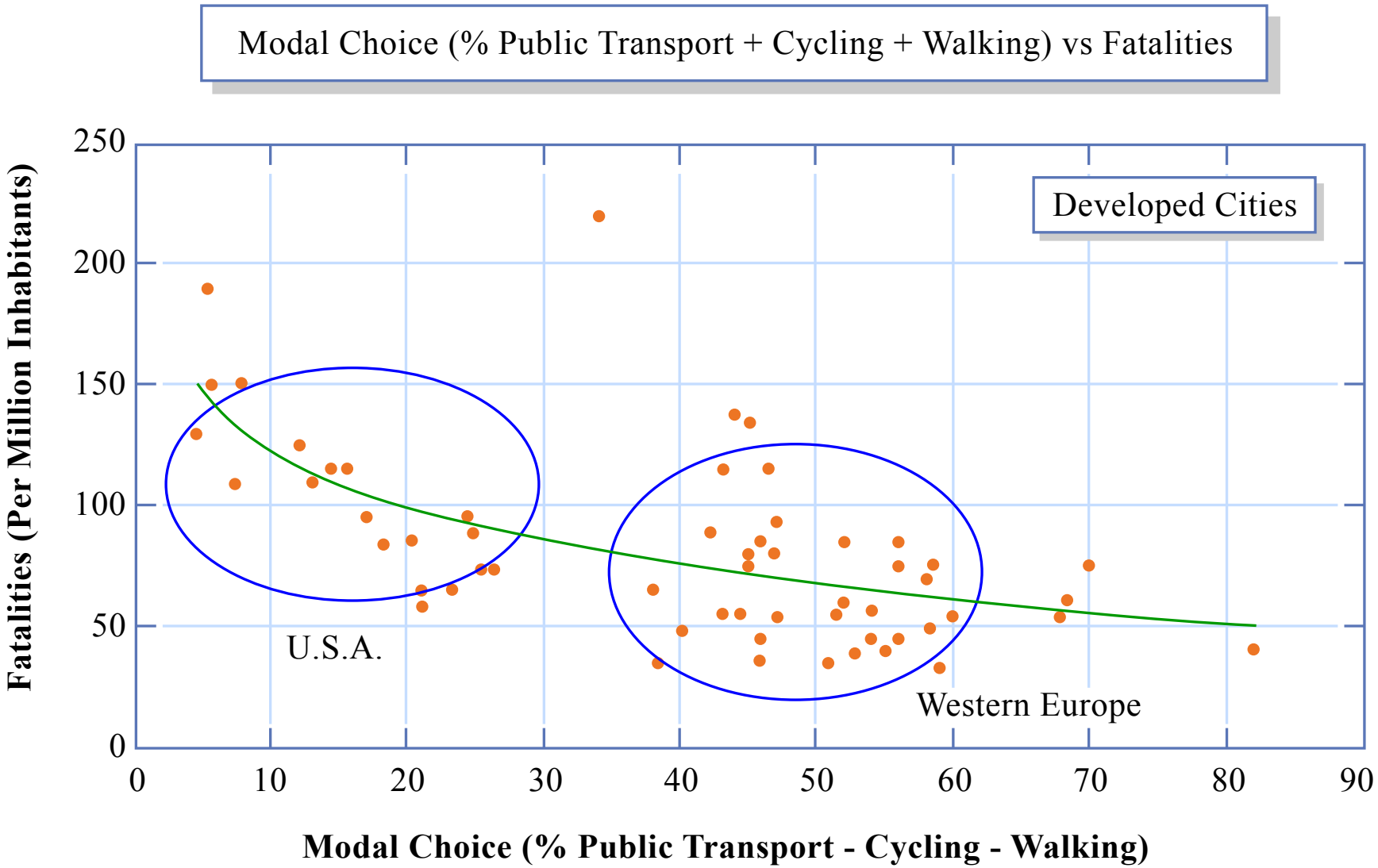

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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A congestion index

- In spite of the differences, a similar congestion ratio
- One reason the higher trip length in the States
- Is traffic like an expanding gas?

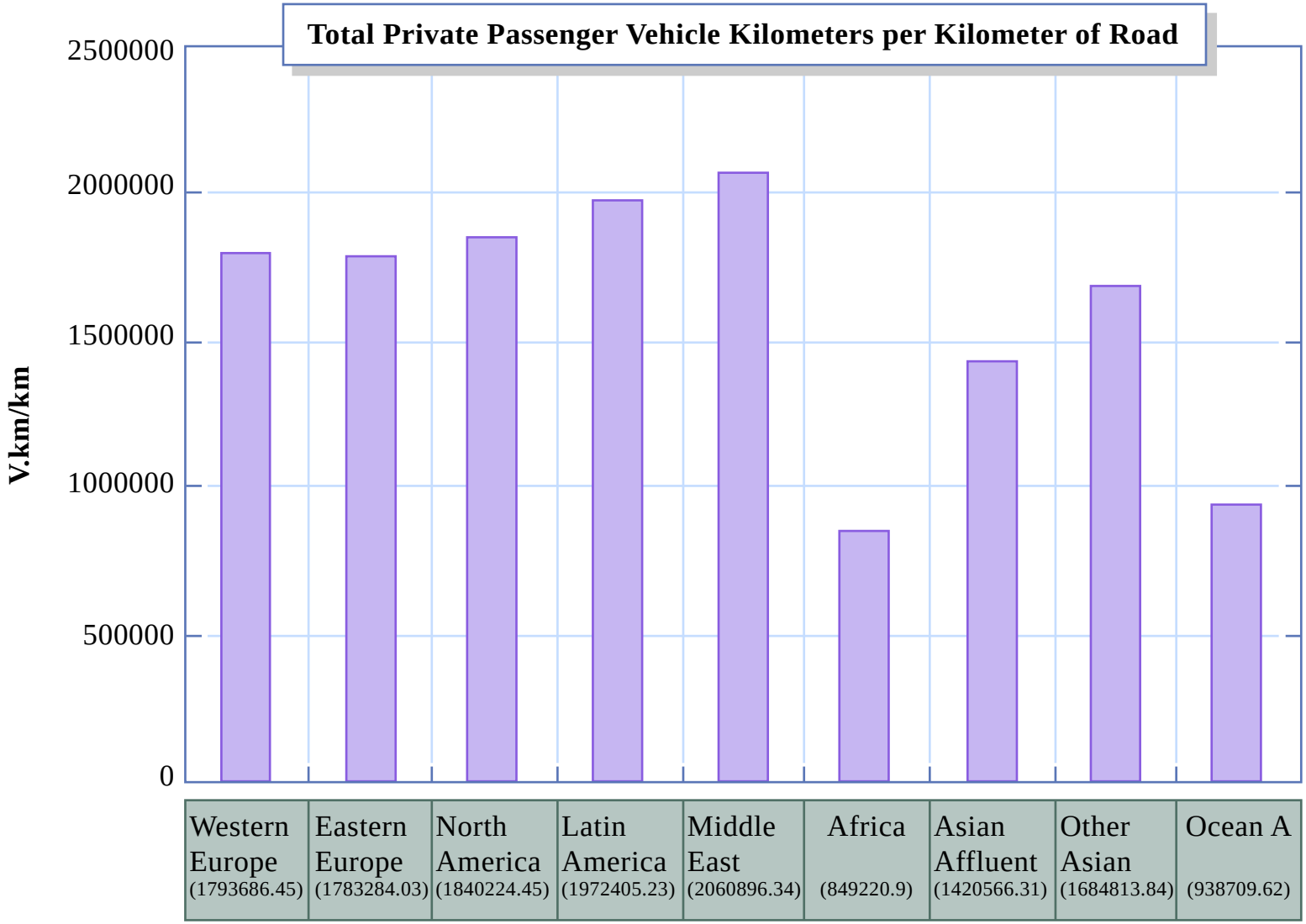

Figure by MIT OCW, adapted from the UITP Millennium Cities Database.

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Some Lessons by the Database Authors

1. Transit is the least cost option when density is higher than 20 people per hectare
2. Growth and income does not necessarily imply sprawl and automobile reliance
3. In fact, sharp growth in automobile traffic in cities in developing countries may compromise economic development
4. In sprawling affluent cities where the auto dominates, speeds may be high but so are the total travel times (while no-car households may lack accessibility)

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Lessons by the Database Authors

5. Car ownership while usually has an impact on transit ridership, may be balanced through mobility management policies
6. Parking policies are critical to curb the auto and provide transit priority
7. Transit supply and demand are clearly correlated
8. Rail modes are more attractive and competitive, and most cost efficient in major cities
9. The ratio of transit to automobile speed is most critical to explain modal split

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Lessons by the Database Authors

10. Low transit fares, while necessary in social terms, are not critical to capture motorists
11. Sustainable policy = urban planning + traffic and parking controls + public transport with traffic priority
12. In developing countries, transit supply shortage and high operator profits

See “Millennium Cities Database for Sustainable Mobility. Analyses and Recommendations” by Jean Vivier, UITP

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Our suggestions and lessons

- Main issue is quality of life
- Not auto vs. transit, rather auto versus transit + non-motorized trips
- The virtuous cycle: low fares ⏩ higher ridership ⏩ higher frequencies
- Accessibility varies greatly within a metropolitan area (walk trips in Beacon Hill and auto trips in Framingham)

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Our suggestions and lessons

- Cost based on local GDP obscures the fact that some costs are local (ie driver wages) with multiplier effects, while others are international (ie. fuel, automobiles...)
- If you substract the transportations costs from the average GDP in a city, you may find that many such cities have a higher GDP than equivalent US cities
- Metropolitan area as an archipelago of transport arrangements
- Let us continue the discussion on how to deal with the “ocean of red circles”

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A few tips...

- Frustration while interpreting someone else data (or sometimes even yours)
- Work in pairs with complementary skills
- We are dealing with a complex problem (with social, economic and technical issues), simple hypotheses will not suffice (no magic bullets)
- Simple linear regression or multi-regression?
- “We love our cars in the US” (and in Rome, Nairobi, New Delhi, Copenhagen ..)
- The myth about income and transit use
- Do work with this database in the future

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- Good luck and enjoy...