Permanent Standard vs. Daylight Time

What does the economic evidence say?

Patrick Baylis (UBC)

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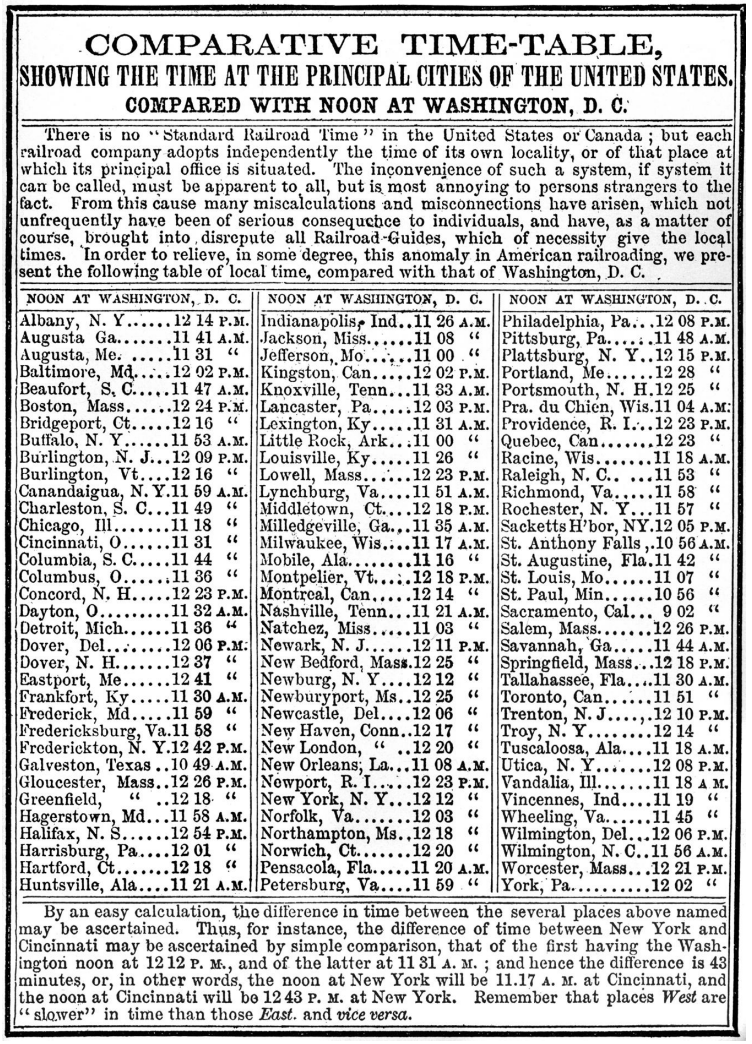
Time is an important social construct



COMPARATIVE TIME-TABLE,

SHOWING THE TIME AT THE PRINCIPAL CITIES OF THE UNITED STATES.

COMPARED WITH NOON AT WASHINGTON, D. C.

There is no "Standard Railroad Time" in the United States or Canada; but each railroad company adopts independently the time of its own locality, or of that place at which its principal office is situated. The inconvenience of such a system, if system it can be called, must be apparent to all, but is most annoying to persons strangers to the fact. From this cause many miscalculations and misconnections have arisen, which not unfrequently have been of serious consequence to individuals, and have, as a matter of course, brought into disrepute all Railroad Guides, which of necessity give the local times. In order to relieve, in some degree, this anomaly in American railroading, we present the following table of local time, compared with that of Washington, D. C.

NOON AT WASHINGTON, D. C.	NOON AT WASHINGTON, D. C.	NOON AT WASHINGTON, D. C.
Albany, N. Y.....12 14 P.M.	Indianapolis, Ind..11 26 A.M.	Philadelphia, Pa...12 08 P.M.
Augusta Ga.....11 41 A.M.	Jackson, Miss.....11 08 "	Pittsburg, Pa.....11 48 A.M.
Augusta, Me. .....11 31 "	Jefferson, Mo.....11 00 "	Plattsburg, N. Y..12 15 P.M.
Baltimore, Md.....12 02 P.M.	Kingston, Can.....12 02 P.M.	Portland, Me.....12 28 "
Beaufort, S. C.....11 47 A.M.	Knoxville, Tenn...11 33 A.M.	Portsmouth, N. H.12 25 "
Boston, Mass.....12 24 P.M.	Lancaster, Pa.....12 03 P.M.	Pra. du Chien, Wis.11 04 A.M.
Bridgeport, Ct.....12 16 "	Lexington, Ky.....11 31 A.M.	Providence, R. I...12 23 P.M.
Buffalo, N. Y.....11 53 A.M.	Little Rock, Ark...11 00 "	Quebec, Can.....12 23 "
Burlington, N. J...12 09 P.M.	Louisville, Ky.....11 26 "	Racine, Wis.....11 18 A.M.
Burlington, Vt....12 16 "	Lowell, Mass.....12 23 P.M.	Raleigh, N. C.. ...11 53 "
Canandaigua, N. Y.11 59 A.M.	Lynchburg, Va....11 51 A.M.	Richmond, Va.....11 58 "
Charleston, S. C...11 49 "	Middletown, Ct....12 18 P.M.	Rochester, N. Y...11 57 "
Chicago, Ill.....11 18 "	Milledgeville, Ga...11 35 A.M.	Sacketts H'bor, NY.12 05 P.M.
Cincinnati, O.....11 31 "	Milwaukee, Wis....11 17 A.M.	St. Anthony Falls,.10 56 A.M.
Columbia, S. C.....11 44 "	Mobile, Ala.....11 16 "	St. Augustine, Fla.11 42 "
Columbus, O.....11 36 "	Montpelier, Vt.....12 18 P.M.	St. Louis, Mo.....11 07 "
Concord, N. H.....12 23 P.M.	Montreal, Can.....12 14 "	St. Paul, Min.....10 56 "
Dayton, O.....11 32 A.M.	Nashville, Tenn...11 21 A.M.	Sacramento, Cal... 9 02 "
Detroit, Mich.....11 36 "	Natchez, Miss.....11 03 "	Salem, Mass.....12 26 P.M.
Dover, Del.....12 06 P.M.	Newark, N. J.....12 11 P.M.	Savannah, Ga.....11 44 A.M.
Dover, N. H.....12 37 "	New Bedford, Mass.12 25 "	Springfield, Mass...12 18 P.M.
Eastport, Me.....12 41 "	Newburg, N. Y....12 12 "	Tallahassee, Fla....11 30 A.M.
Frankfort, Ky.....11 30 A.M.	Newburyport, Ms..12 25 "	Toronto, Can.....11 51 "
Frederick, Md.....11 59 "	Newcastle, Del....12 06 "	Trenton, N. J.....12 10 P.M.
Fredericksburg, Va.11 58 "	New Haven, Conn..12 17 "	Troy, N. Y.....12 14 "
Frederickton, N. Y.12 42 P.M.	New London, " ..12 20 "	Tuscaloosa, Ala....11 18 A.M.
Galveston, Texas ..10 49 A.M.	New Orleans, La...11 08 A.M.	Utica, N. Y.....12 08 P.M.
Gloucester, Mass..12 26 P.M.	Newport, R. I.....12 23 P.M.	Vandalia, Ill.....11 18 A.M.
Greenfield, " ..12 18 "	New York, N. Y...12 12 "	Vincennes, Ind....11 19 "
Hagerstown, Md...11 58 A.M.	Norfolk, Va.....12 03 "	Wheeling, Va.....11 45 "
Halifax, N. S.....12 54 P.M.	Northampton, Ms..12 18 "	Wilmington, Del...12 06 P.M.
Harrisburg, Pa....12 01 "	Norwich, Ct.....12 20 "	Wilmington, N. C..11 56 A.M.
Hartford, Ct.....12 18 "	Pensacola, Fla.....11 20 A.M.	Worcester, Mass...12 21 P.M.
Huntsville, Ala....11 21 A.M.	Petersburg, Va....11 59 "	York, Pa.....12 02 "

By an easy calculation, the difference in time between the several places above named may be ascertained. Thus, for instance, the difference of time between New York and Cincinnati may be ascertained by simple comparison, that of the first having the Washington noon at 12 12 P. M., and of the latter at 11 31 A. M.; and hence the difference is 43 minutes, or, in other words, the noon at New York will be 11.17 A. M. at Cincinnati, and the noon at Cincinnati will be 12 43 P. M. at New York. Remember that places *West* are "slower" in time than those *East*. and *vice versa*.

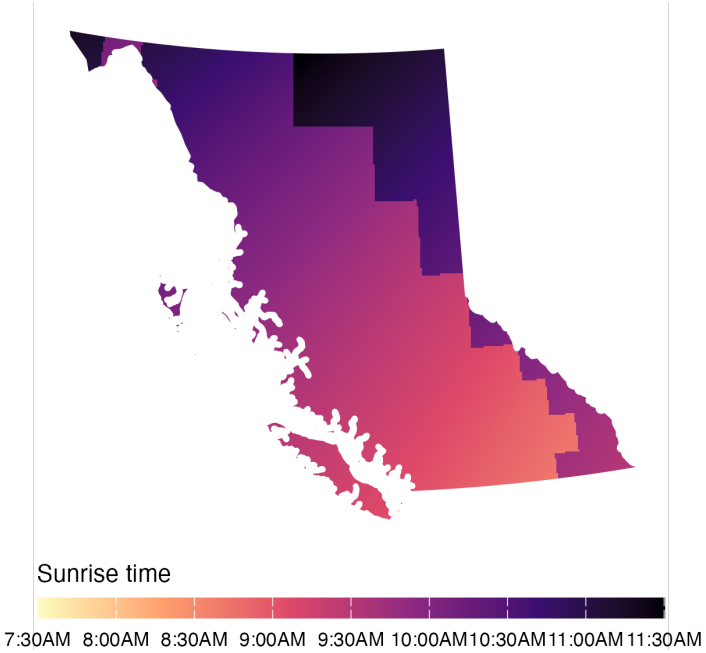
Dinsmore's *American Railroad and Steam Navigation Guide and Route-Book* (1857)

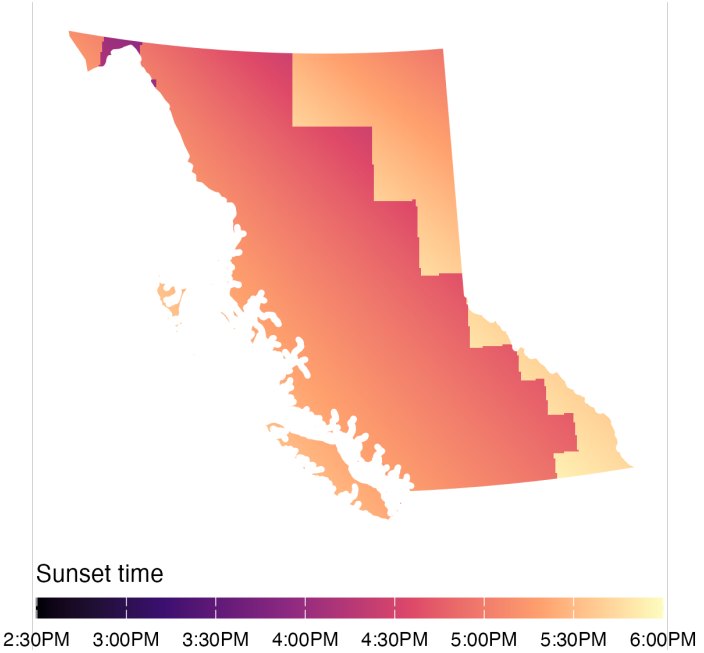
Switching twice a year was clearly a bad idea

- Fatal vehicle crashes spike after spring forward (Smith 2016)
- Acute increase in heart attacks and strokes (Manfredini et al. 2019; Toro, Tigre, and Sampaio 2015)
- Sleep loss, more hospital admissions (Jin and Ziebarth 2020)
- Stock returns dip on the Monday after change (Kamstra, Kramer, and Levi 2000)
- Medical societies (AASM, SRS, AMA) endorse abolishing the switch (Rishi et al. 2024)

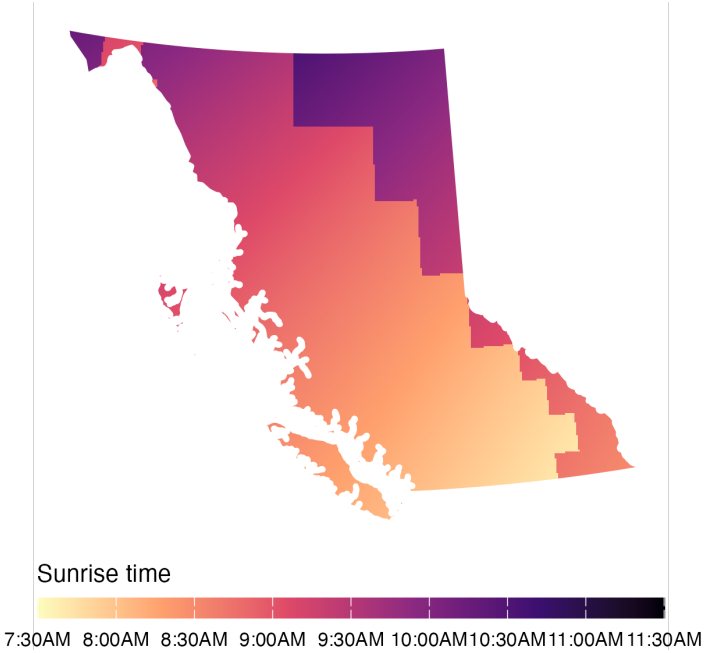
- 👏👏It's great that we're not doing that any more! 👏👏
- But, we still need to coordinate: should we coordinate on permanent **standard time** or permanent **daylight time**?

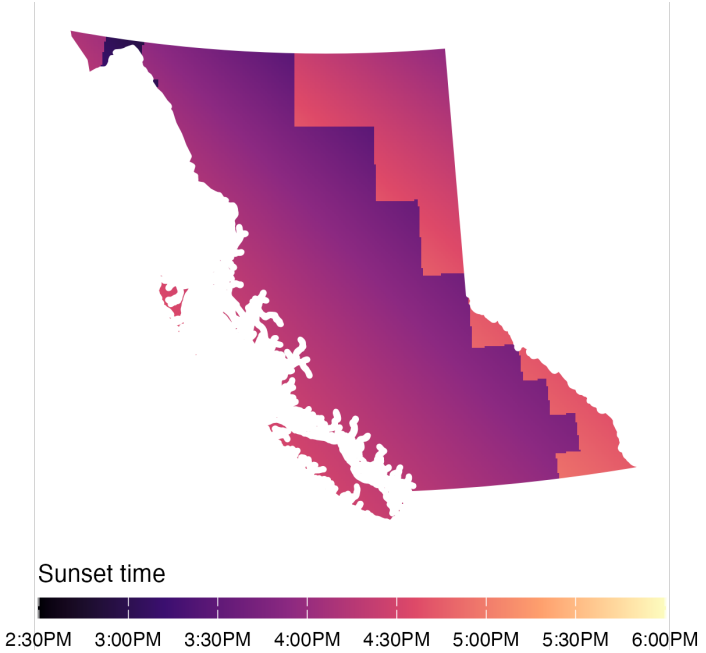
Permanent Daylight Time on December 21





Permanent Standard Time on December 21





The tradeoff in Vancouver

Winter Solstice (December 21) sunrise and sunset times in Vancouver, BC

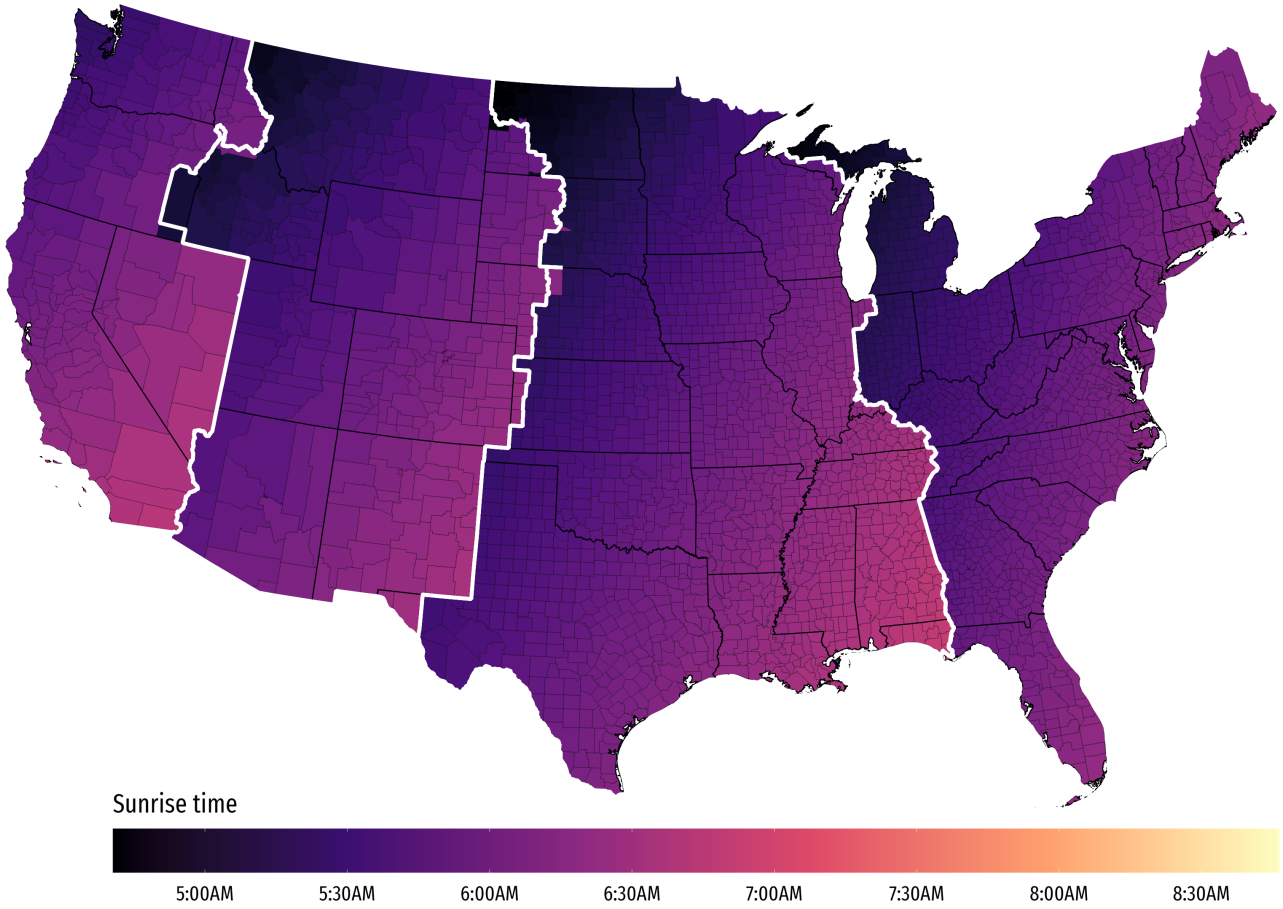
	Sunrise	Sunset
Standard time (PST)	8:06 AM	4:17 PM
Daylight time (PDT)	9:06 AM	5:17 PM

- Focusing on the negative outcome for each:
  - → Standard time: **Sunset** will be **before 4:30pm** from Nov 15 - Jan 6
  - → Daylight time: **Sunrise** will be **after 9am** from Dec 14 - Jan 17
- My goal: summarize the economic evidence on this tradeoff

What would the ideal experiment look like?

- Randomly assign each location to either standard or daylight time, hold all else constant, measure outcomes
- David Eby has not returned my call about this, so we need to rely on **quasi-experimental evidence** instead
- Main source of quasi-experimental variation: **space-based** comparisons
  - → share a clock but face different solar times (e.g., different longitudes within a time zone), or
  - → share a solar time but face different clocks (e.g., across a time zone boundary)

Space-based comparisons



Reproduced from Baylis, Borenstein, and Rubin (2026)

Labour productivity and earnings

- Gibson and Shrader (2018): instrument for sleep using **sunset time within US time zones**

  → 1 hour later sunset: 0.93 fewer hours/week of sleep, 5% decrease in long-run earnings

- Costa-Font, Fleche, and Pagan (2024): similar instrument strategy applied to Germany, finding similar results
- Giuntella and Mazzonna (2019): workers on late-sunset side of TZ borders earn less, work fewer hours

  → Late sunset side of border: 3.5% decrease in earnings

- Summary: Economically **large** negative effects of later sunset times on productivity and earnings

Human capital: schooling and test scores

- Heissel and Norris (2018): instrument for pre-school sunlight using the **Florida time-zone boundary**
  - → Extra hour of sunlight before school starts → **+0.08 SD math**, **+0.06 SD reading** for adolescents
  - → Effects strongest at puberty (when circadian rhythm shifts later)
  - → Holds for both cross-border and mover comparisons
- Jagnani (2024): within-district sunset variation in India
  - → Later sunsets → less child sleep, less study time, worse education outcomes
  - → Back of the envelope: an hour later sunset, 30 minutes less sleep, 0.3 SD reduction in test scores

Coordination, time use, and recreation

- Hamermesh, Myers, and Pocock (2008): ATUS time-use data (2003-2004) using spatial variation: Residents adjust **work schedules** to coordinate with people elsewhere
- Baylis, Borenstein, and Rubin (2026): Twitter, (anonymised) visits to retail locations, and Census all adjust 15-35 minutes per hour of sunset time difference

- Implication: schedules **do** adjust to clock-time choices, but **only partially** – so a permanent-time policy is not just a re-labelling exercise
- This may explain why people prefer permanent daylight time, since it makes available more post-work time for outdoor recreation, retail activity, etc.

Pulling the evidence together

Favouring permanent standard time

- Sleep / circadian health (Giuntella and Mazzonna 2019)
- Labour productivity and earnings (Gibson and Shrader 2018; Costa-Font, Fleche, and Pagan 2024)
- Child human capital / test scores (Heissel and Norris 2018; Jagnani 2024)

(Perhaps) favouring permanent daylight time

- Evening leisure / outdoor recreation / coordination (Hamermesh, Myers, and Pocock 2008)
- Retail activity and consumption (Baylis, Borenstein, and Rubin 2026)

- My view: weight of evidence favours **permanent standard time**, though the costs to leisure / retail / other after-work activities are non-trivial
- Policy adjustments could **mitigate** costs of either regime: for standard, later school start times; for daylight, more support of nighttime leisure (e.g., better lighting, more evening events, etc.)

Thanks!

patrick.baylis@ubc.ca

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