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Time Well Spent: An Economic Analysis of Daylight Saving Time Legislation

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ARTICLES

TIME WELL SPENT: AN ECONOMIC ANALYSIS OF DAYLIGHT SAVING TIME LEGISLATION

*Steve P. Calandrillo**
*Dustin E. Buehler***

Several nations implemented daylight saving time legislation in the last century, including the United States. The United States briefly experimented with year-round daylight saving time twice—during World War II and the energy crises in the 1970s. Agency studies and congressional hearings from the 1970s show several benefits of year-round daylight saving time, along with potential disadvantages. These studies are dated, and much has changed in the last thirty years. While congressional efforts to extend daylight saving time in 2007 have again focused on the energy savings this legislation would produce, far more meaningful benefits have been largely ignored. This Article collects and analyzes modern research on daylight saving time, concluding that year-round daylight saving time would save hundreds of lives annually by decreasing motor vehicle and pedestrian fatalities. Furthermore, extra light in the evening hours reduces criminal activity and results in energy savings from decreased peak electricity demand. Finally, year-round daylight saving time would eliminate the negative effects caused by the current spring and fall time changes. These advantages significantly outweigh the potential costs of daylight saving during winter months. The time has come for Congress to enact year-round

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daylight saving time legislation—each year we wait costs hundreds of American lives and millions of dollars.

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*The very best way to lengthen the day
Is to steal a few hours from the night.*

Sir Henry Norman¹

INTRODUCTION

Americans do not like it when Congress messes with their clocks.² Early Sunday morning, March 11, 2007, the United States shifted its clocks forward an hour to daylight saving time, three weeks earlier than usual.³ Many individuals immediately cried foul. One Texan panned the change because she would “spend the next three weeks feeling late, rushed and sleepy.”⁴ A Chicago CEO lamented a critical mass of “sleepy workers, computer glitches and March Madness,” and said “it will be a miracle if any actual work gets done.”⁵ In Indiana, a candidate jumped into a gubernatorial race in which Democrats had accused incumbent Governor Mitch Daniels of being “out of sync with Hoosiers”⁶ because he forced the state to finally observe daylight saving time.⁷

The rant against daylight saving time was not unanimous, however, and many Americans voiced support. “Moving up daylight-saving time has the effect of moving up spring,” claimed one New Yorker.⁸ Others expressed gratitude for “extra hours of evening light”⁹ and more “quality family time in the evening.”¹⁰ One

1. See *Parliament*, TIMES (London), Mar. 6, 1909, at 4; see also *Cabinet and Secrecy*, TIMES (London), May 9, 1916, at 7 (describing the debate on Sir Henry Norman’s resolution for daylight saving time).

2. After the spring daylight saving time clock change in 2007, one newspaper columnist counted herself “among millions annoyed by fiddling with time, which seems wrong at its core, like calling a rock a marshmallow or declaring Christmas in July.” Susan Ager, *Standards Are for Changing*, DETROIT FREE PRESS, Mar. 13, 2007, Features Section, at 1.

3. Tom Abate, *Easy Start for Early Daylight Time; So Far, No Time Warp, No Digital Meltdowns Accompany March Shift*, S.F. CHRON., Mar. 12, 2007, at A2; *Change Your Clocks*, SUNDAY OREGONIAN, Mar. 11, 2007, at A1.

4. Jacquelynne Floyd, *Local News Online*, DALLAS MORNING NEWS, Mar. 12, 2007, at 2B.

5. Mike Penner, *Morning Briefing: From Crazy to Lazy, Like Clockwork*, L.A. TIMES, Mar. 13, 2007, at D2.

6. Mary Beth Schneider, *2nd Democrat Declares He’ll Run for Governor*, INDIANAPOLIS STAR, Mar. 20, 2007, Local: Metro & State Section, at 1.

7. Chris Cillizza, *Second Democrat Looks to Limit Indiana Governor to Single Term*, WASH. POST, Mar. 20, 2007, at A6; Lesley Stedman Weidenbener, *Daniels’ Legislative Agenda Is in Trouble*, COURIER-J. (Louisville, Ky.), Mar. 18, 2007, at 1A.

8. Keith Grubman, Letter to the Editor, *Adjusting Clocks Moves Up Spring*, NEWSDAY (N.Y.), Mar. 17, 2007, at A16.

9. David Hendrickson, Letter to the Editor, *DST Complainers Need to Get Out in the Sunshine*, INDIANAPOLIS STAR, Mar. 14, 2007, Editorial Section, at 9.

10. Karen Simonson Smith, Letter to the Editor, *Evening Daylight Helps Build Stronger Families*, INDIANAPOLIS STAR, Mar. 14, 2007, Editorial Section, at 9.

individual even suggested that Congress should extend daylight saving time year round, since problems associated with the time shift “have everything to do with the biannual change and nothing at all to do with the relative timing of darkness and daylight.”¹¹

When Congress recently extended daylight saving time by three weeks in the spring and one week in the fall,¹² it once again waded into one of the world’s great controversies.¹³ For hundreds of years, the idea of shifting clocks has been praised and ridiculed, advocated and demonized. Even public leaders have weighed in on the debate. Benjamin Franklin lampooned the idea of daylight saving time.¹⁴ Winston Churchill fought for it on the floor of Parliament.¹⁵ Mahatma Gandhi refused to observe it.¹⁶ And Richard Nixon advocated year-round daylight saving time in an address to the nation.¹⁷

Over the last hundred years, Congress held numerous hearings, collected reports, and received testimony attesting to the benefits and drawbacks of shifting clocks.¹⁸ However, there are two significant problems in the existing literature on daylight saving time. First, many of the key studies and reports on the effects of extended and year-round daylight saving time are outdated.¹⁹ As a

11. Catherine Kemp, Letter to the Editor, *Let’s Save Daylight All Year Long*, N.Y. TIMES, Mar. 18, 2007, § 14, at 13. Similarly, a Maryland resident suggested “switching one-half hour into daylight saving time and never changing back” in order to “end this semiannual nuisance once and for all.” Mary J. Wendehack, Letter to the Editor, *Same Time All Year*, WASH. POST, Mar. 14, 2007, at A14.

12. Energy Policy Act of 2005, Pub. L. No. 109-058, § 110, 119 Stat. 615 (codified as amended at 15 U.S.C. § 260a (Supp. V 2007)); Richard Simon, *Daylight Saving Time Advances*, L.A. TIMES, July 22, 2005, at A12 (noting the weeks of the change).

13. See Michael Downing, *Our Perplexing Rite of Spring (and Fall)*, WASH. POST, May 1, 2005, at B2.

14. MICHAEL DOWNING, *SPRING FORWARD: THE ANNUAL MADNESS OF DAYLIGHT SAVING* 3 (2005).

15. *Mr. Churchill and the Daylight Saving Bill*, TIMES (London), Jan. 21, 1911, at 10.

16. Herbert L. Matthews, *Gandhi, Fast Over, Is Happy but Weak*, N.Y. TIMES, Mar. 4, 1943, at 4 (“Gandhi, . . . like most old-fashioned Indians, does not observe the government’s daylight saving.”).

17. Linda Charlton, *‘Energy Crisis’ May Begin at Home Soon*, N.Y. TIMES, Nov. 8, 1973, at 32 (reporting on proposals in Nixon’s address to the nation).

18. E.g., *Energy Conservation Potential of Extended and Double Daylight Saving Time Before the Subcomm. on Energy of the H. Comm. on Science*, 107th Cong. (2001) [hereinafter *Hearing on H.R. 704 and 1647*] (regarding H.R. 704 and H.R. 1647); *Daylight Saving Time Act of 1975: Hearing on S. 980 and S. 2566 Before the S. Comm. on Commerce*, 94th Cong. [hereinafter *Hearing on S. 980 and S. 2566*]; *Daylight Saving Time: Hearings on S. 385, S. 1260, S. 2568, and S. 2602 Before the S. Comm. on Commerce*, 93d Cong. (1973) [hereinafter *Hearings on S. 385, S. 1260, S. 2568, and S. 2602*].

19. See, e.g., *Hearing on H.R. 704 and 1647*, *supra* note 18, at 27 (statement of Linda Lawson, Acting Deputy Assistant Secretary for Policy, U.S. Department of Transportation) (noting that the Department of Transportation’s

result, policymakers are placed in the untenable position of making decisions based on research produced decades ago. Second, debates on daylight saving time in Congress and other public forums have been dominated far too frequently by catch phrases, questionable assumptions, and anecdotal evidence.²⁰ Now more than ever, the debate needs a new analysis of the advantages and disadvantages of daylight saving time—especially given that Congress recently asked Americans to “spring forward” three weeks early. In other words, one of the most controversial and long-standing debates of the twentieth century needs to be recast and reanalyzed with twenty-first century evidence.

This Article provides the bridge for that gap. Part I examines the history of daylight saving time, from its origins as satirical fodder to the debates of the present day. This history shows that the United States has had an inconsistent (and not always rational) experience with daylight saving time. The nation oscillated between periods of uniform time observance and local time observance.²¹ It has twice experimented with year-round daylight saving time.²² If nothing else, the current summer observance of daylight saving time in the United States constitutes a middle point between the extremes of the past.

Part II of this Article examines empirical results, focusing in particular on studies and research from the United States’ 1974 experiment with year-round daylight saving time during the energy crises. Agency studies and congressional hearings from the 1970s highlight several advantages and disadvantages of extended daylight saving. This portion of the Article also stresses that these dated studies should inform our analysis of the issue, but they should not dictate our conclusions—much has changed in the last thirty years.

Finally, Part III examines current studies and research using cost-benefit analysis and argues that Congress should implement year-round daylight saving time. Studies show that year-round daylight saving time has several significant advantages, including a decrease in motor vehicle and pedestrian fatalities, energy savings

1975 study on the effects of year-round daylight saving time “is very old and it was also for a very limited time”); *see also infra* notes 217–19 and accompanying text.

20. *See, e.g.,* Marjorie Hunter, *House Sets Rules on Daylight Time*, N.Y. TIMES, Mar. 17, 1966, at 41 (noting that opponents criticized daylight saving as “the golfer’s delight” and argued without evidence that it would endanger young children by forcing them to walk to school in the dark); Andy Soltis, *Senators OK Bill for Sunnier Days*, N.Y. POST, July 30, 2005, at 2 (noting that Rep. Edward Markey, the main congressional proponent of the 2005 legislation extending daylight saving time, argued that “[t]he beauty of daylight savings time is that it just makes everyone feel sunnier.”).

21. *See infra* notes 115–41 and accompanying text.

22. *See infra* notes 108–09, 155–56 and accompanying text.

from reduced peak electricity demands, and a potential decrease in crime.²³ Additionally, year-round daylight saving time avoids negative effects caused by the current spring and fall time changes. Finally, year-round daylight saving time does not endanger school children, and its benefits outweigh other notable disadvantages. Thus, on balance, the benefits of extending daylight saving time dramatically outweigh its costs, and Congress should step up to adopt year-round daylight saving time legislation before hundreds of additional lives are sacrificed by those who seek nothing better than the status quo.

I. HISTORY OF DAYLIGHT SAVING TIME

Without a doubt, daylight saving time is “one of the most persistent political controversies of the last century.”²⁴ Benjamin Franklin’s satirical wit and William Willett’s tireless advocacy birthed the concept of shifting clocks.²⁵ Several nations, including the United States, first implemented summer daylight saving time during World War I.²⁶ The United States also experimented with year-round daylight saving time during World War II and the oil embargos of the 1970s.²⁷ Ultimately, the country settled into uniform summer observance of daylight saving time,²⁸ and most recently extended the period of observance in 2007.²⁹

A. *Springing Forward from Satire and Horseback Rides: Benjamin Franklin and William Willett Introduce Daylight Saving Time*

Like many great ideas, daylight saving time started as satirical fodder. On April 26, 1784, the *Journal de Paris* published a whimsical letter titled *An Economical Project*, signed by a “Subscriber” later unmasked as Benjamin Franklin.³⁰ Franklin, a

23. See *infra* notes 181–84, 255–56, 278–79 and accompanying text.

24. Downing, *supra* note 13.

25. See David Prerau, *DST: Take a Look Back in Time to Examine Its Origins*, INDIANAPOLIS STAR, Mar. 28, 2006, at 7A.

26. *Daylight Saving Which Begins Today*, N.Y. TIMES, Mar. 31, 1918, at X14.

27. Harold M. Schmeck, Jr., *Daylight Time Begins*, N.Y. TIMES, Jan. 6, 1974, at 1; *Clocks to be Advanced an Hour February 9 Throughout Nation*, WALL ST. J., Jan. 21, 1942, at 3; *Roosevelt Signs Daylight Time Act*, N.Y. TIMES, Jan. 21, 1942, at 19.

28. DAVID PRERAU, *SEIZE THE DAYLIGHT: THE CURIOUS AND CONTENTIOUS STORY OF DAYLIGHT SAVING TIME* 204–06 (2005).

29. Energy Policy Act of 2005, Pub. L. No. 109-058, § 110, 119 Stat. 615, 615 (codified as amended at 15 U.S.C. § 260a (Supp. V 2007)). Although the Act was passed in 2005, its provisions took effect in 2007. *Id.*; see also Simon, *supra* note 12.

30. Benjamin Franklin, Letter to the Editor, *An Economical Project*, J. DE PARIS (Apr. 26, 1784), reprinted in BENJAMIN FRANKLIN, AUTOBIOGRAPHY, POOR RICHARD, AND LATER WRITINGS 244–48 (J.A. Leo Lamay ed., Literary Classics of

man known for staying up all night to play chess,³¹ went to bed one night in Paris several hours after midnight.³² According to Franklin, an “accidental sudden noise” woke him at 6:00 the next morning, and he was surprised to find his room “filled with light” because his servant had neglected to close the shutters the night before.³³ To confirm this shocking discovery, he “repeated this observation the three following mornings.”³⁴ Tongue in cheek,³⁵ Franklin wrote to the *Journal*, “[y]our readers, who with me have never seen any signs of sunshine before noon . . . will be as much astonished as I was, when they hear of his rising so early; and especially when I assure them, *that he gives light as soon as he rises.*”³⁶

From his observations, Franklin concluded that shifting sleeping patterns to coincide with sunlight would save money on candles.³⁷ He calculated the amount he would save on candles by waking up (and going to bed) six hours earlier, and then multiplied these savings by the estimated number of families in Paris.³⁸ Franklin’s tedious calculations indicated that Paris residents would save more than ninety-six million *livres tournois* each year simply by adjusting their schedules to rise with the sun³⁹—a sum equivalent to approximately \$200 million today.⁴⁰

the United States, Inc., 4th prtg. 1997), available at <http://webexhibits.org/daylightsaving/franklin3.html>. Several biographies of Franklin contain a historical account of this letter. See generally ALFRED OWEN ALDRIDGE, *BENJAMIN FRANKLIN: PHILOSOPHER & MAN* 358–59 (1965); ALFRED OWEN ALDRIDGE, *FRANKLIN AND HIS FRENCH CONTEMPORARIES 177–80* (1957); H.W. BRANDS, *THE FIRST AMERICAN: THE LIFE AND TIMES OF BENJAMIN FRANKLIN 640–42* (2000).

31. ALDRIDGE, *FRANKLIN & HIS FRENCH CONTEMPORARIES*, *supra* note 30, at 178.

32. FRANKLIN, *supra* note 30, at 244.

33. *Id.*; Prerau, *supra* note 25.

34. FRANKLIN, *supra* note 30, at 245.

35. Historians recognize that Franklin was enjoying one of his many satirical moments. See ALDRIDGE, *FRANKLIN & HIS FRENCH CONTEMPORARIES*, *supra* note 30, at 178 (“The mild satire of this combined literary parody and moral parable resembles [Jonathan] Swift’s writings in a mellow mood.”); DOWNING, *supra* note 14, at 3 (“[E]ven [daylight saving time’s] most ardent advocates believe that when Ben Franklin took pen in hand and wrote the first detailed proposal to save daylight . . . he had his tongue in his cheek.”).

36. FRANKLIN, *supra* note 30, at 244–45.

37. *Id.* at 245–46; PRERAU, *supra* note 28, at xii.

38. FRANKLIN, *supra* note 30, at 246. Franklin assumed that the average family in Paris burned candles for seven hours during each of the 183 days between March 20th and September 20th, and multiplied the total number of hours for this six month period (1281) by 100,000 (the estimated number of families in Paris), giving him 128,100,000 total hours “spent at Paris by candlelight.” *Id.* He then multiplied this figure by the estimated cost of candles “at half a pound of wax and tallow per hour.” *Id.*

39. *Id.*; see also BRANDS, *supra* note 30, at 641 (summarizing Franklin’s findings).

40. PRERAU, *supra* note 28, at xiii.

Given the “immense sum” that Paris could save, Franklin whimsically proposed a series of government regulations to force residents to rise with the sun, including (1) “a tax . . . on every window that is provided with shutters to keep out the light of the sun”; (2) “guards . . . placed in the shops of the wax and tallow chandlers” so no family could purchase more than one pound of candles each week; (3) guards “posted to stop all the coaches [on] the streets after sun-set, except those of physicians, surgeons, and midwives”; and (4) the ringing of all church bells at sunrise, and “if that is not sufficient, let cannon be fired in every street, to wake the sluggards effectually, and make them open their eyes to see their true interest.”⁴¹

The *Journal* published Franklin’s satirical proposal, but another century passed before others seriously considered the idea of shifting clocks to save daylight. On a summer morning in 1905, wealthy architect and businessman William Willett awoke early in the village of Chislehurst, England, for his usual horseback ride before breakfast.⁴² He noticed that “practically no one was up except an occasional labourer going to work, postmen, milkmen, and sweeps.”⁴³ Also mindful that his afternoon golf games frequently ended abruptly due to the onset of darkness, Willett came up with the idea of shifting Britain’s clocks forward.⁴⁴

Two years later, Willett authored and distributed *The Waste of Daylight*, in which he advocated shifting clocks eighty minutes forward during summer months.⁴⁵ Willett proposed that “at 2 a.m. on each of four Sunday mornings in April, standard time shall advance 20 minutes; and on each of four Sundays in September, shall recede 20 minutes.”⁴⁶ Willett argued that the extra daylight during summer evenings “makes for health and strength of body and mind” because “[t]he brief period of daylight now at our disposal is frequently insufficient for most forms of outdoor recreation.”⁴⁷ Echoing the arguments of Benjamin Franklin’s *Economical Project*,⁴⁸ Willett noted that everyone, “rich and poor alike, will find their ordinary expenditure on electric light, gas, oil and candles considerably reduced for nearly six months in every year.”⁴⁹ The

41. FRANKLIN, *supra* note 30, at 246–47.

42. Prerau, *supra* note 25; *see generally* PRERAU, *supra* note 28, at 1–9 (describing William Willett’s contribution to the development of daylight saving time).

43. *Parliamentary Committees*, TIMES (London), May 8, 1908, at 23.

44. *See* Terry Oberg, *Seeing the Light*, COURIER-MAIL (Brisbane, Austl.), Dec. 31, 2005, at M06.

45. WILLIAM WILLETT, *THE WASTE OF DAYLIGHT* (1907), *reprinted in* DONALD DE CARLE, BRITISH TIME 152 (1947), *available at* <http://webexhibits.org/daylightsaving/willett.html>.

46. *Id.*

47. *Id.* at 153.

48. *See* FRANKLIN, *supra* note 30, at 244–48.

49. WILLETT, *supra* note 45, at 154. Indeed, much like the calculations in

idea of shifting daylight was born.

B. Ridicule, Adoption, and Retreat: The Onset of World War I Prompts Temporary Adoption of Daylight Saving Time

Ideas are fickle, and daylight saving time is no exception. The concept went from national joke to the law of the land in less than a decade. British society initially responded to Willett's proposal "with ridicule and derision."⁵⁰ In 1908, a "Daylight Saving Bill" was introduced on the floor of the House of Commons "amid laughter and ironical cheers."⁵¹ Most criticism of the legislation centered on Willett's proposal for shifting time gradually over four weeks each spring and fall.⁵² In light of this criticism, a parliamentary committee recommended simplifying Willett's original proposal so that clocks would be "put forward an hour on the third Sunday in April, and put back an hour on the third Sunday in September."⁵³ Although the daylight saving bill received substantial support⁵⁴ and raised several debates in Parliament,⁵⁵ the legislation failed to

Franklin's *Economical Project*, Willett's calculated savings stated that "[a]ssuming the cost of artificial light, for each unit of the population, averages only, one-tenth of a penny per head, per hour, the figures with which I conclude this paper show that 210 additional available hours of daylight can be gained and at least 2,500,000 a year can be saved." *Id.*

50. Suzanne McGonagle, *Remember to Put Your Clock Back Winter Time Begins: The History of the Gained Hour That Marks the Onset of Winter*, IRISH NEWS (Belfast), Oct. 29, 2005, at 3; see also *Parliamentary Committees*, TIMES (London), May 20, 1908, at 9 (discussing a member of Parliament who "had met hundreds of thinking men . . . opposing what they called this 'wild-cat' scheme" of daylight saving time). The United States observed Britain's consideration of daylight saving time with amusement. See *Daylight Bill Gaining*, N.Y. TIMES, Mar. 7, 1909, at C2 ("The House of Commons closed the legislative week by wasting a day over the Daylight Saving bill . . .").

51. *Parliamentary Debate*, TIMES (London), Mar. 27, 1908, at 11. Willett also wrote letters to every member of Congress, urging the adoption of daylight saving time in the United States. *Would Add an Hour to Our Summer Day*, N.Y. TIMES, Feb. 7, 1909, at C3.

52. See *Parliamentary Committees*, TIMES (London), May 20, 1908, at 9; see also David Gill, Letter to the Editor, *The Daylight Saving Bill*, TIMES (London), May 12, 1908, at 3 ("It is one thing to change the origin of time once for all, it is quite another to chop and change it about in the manner proposed by the Bill.").

53. *Political Notes*, TIMES (London), July 2, 1908, at 12.

54. *Daylight Saving*, TIMES (London), May 5, 1911, at 9 ("It is not to be disputed that the movement in favour of what is known as daylight saving . . . is steadily advancing in public favour."); *Mr. Churchill and the Daylight Saving Bill*, TIMES (London), Jan. 21, 1911, at 10 (noting that William Willett claimed that "163 corporations, town councils, &c., nearly 50 trade unions, besides 45 Chambers of Commerce (including the Associated Chambers), 54 clubs, and 64 associations and societies" had passed resolutions in favor of daylight saving, and Winston Churchill assured Willett that "as many as 230 members of the present House of Commons had expressed themselves favourable to the principle of the Bill").

55. See, e.g., *Parliament*, TIMES (London), Mar. 6, 1909, at 4 (recalling an account of a House of Commons debate on the Daylight Saving Bill).

pass.⁵⁶

Despite these early setbacks, the implementation of "summer time" in Germany during World War I rejuvenated the daylight saving movement in Britain.⁵⁷ Immediately after Germany implemented summer daylight saving time on April 30, 1916, the *Frankfurter Zeitung* boldly stated that "it is characteristic of England that she could not rouse herself to a decision."⁵⁸ Roused into action, Sir Henry Norman moved for the adoption of daylight saving time on the floor of the House of Commons, with the backing of the government⁵⁹ and most of Britain's Chambers of Commerce.⁶⁰ Support for daylight saving time had shifted drastically, and the resolution passed with only two members of the House of Commons opposed.⁶¹

Britain's experiment with daylight saving time was an instant success. Immediately after the switch to "summer time," the *London Times* reported that "a week of perfect evenings has proved so emphatically the charm of an added hour of daylight . . . and in succeeding years the coming of Summer Time will be looked forward to with as much eagerness as the coming of the summer season."⁶² Workers expressed "hope that daylight saving will be put into operation every year."⁶³ When Britain ended "summer time" on October 1, 1916 by moving the hands of three million clocks back an hour, observers considered the experiment a "success,"⁶⁴ and they noted that "even the farmers, who at first objected to it, [have] become reconciled to the innovation."⁶⁵

The United States soon followed Britain's lead. Many prominent organizations and individuals lined up behind daylight saving time,

56. *Daylight Saving*, TIMES (London), Apr. 22, 1916, at 2.

57. *Id.* (noting that only days after Germany announced that it would be shifting its clocks forward an hour, "it was stated by the Home Secretary in the House of Commons that the question of taking the same step here was receiving the attention of the Government").

58. *Through German Eyes*, TIMES (London), May 6, 1916, at 5 (internal quotation marks omitted).

59. *Daylight-Saving Plan in Britain*, N.Y. TIMES, May 3, 1916, at 13.

60. *Daylight Plan Spreads*, N.Y. TIMES, May 10, 1916, at 24.

61. *Cabinet and Secrecy*, TIMES (London), May 9, 1916, at 7.

62. *Summer Time*, TIMES (London), May 29, 1916, at 10.

63. *Id.*

64. *See Indorses Daylight Saving*, N.Y. TIMES, Jan. 14, 1917, at 7. The *New York Times* later published an in-depth article containing several statistical benefits from global observance of daylight saving time, including a nine percent average savings in consumption of gas in Britain and savings of about 442,500 tons of coal in France. *See Daylight Saving Which Begins Today*, *supra* note 26, at X14.

65. *British Clocks Set Back*, N.Y. TIMES, Oct. 1, 1916, at 4. In addition to Germany and Britain, several other countries implemented daylight saving time, including Australia, Austria, Belgium, Denmark, France, Holland, Iceland, Italy, Norway, Portugal, Sweden, and parts of Canada. *See Daylight Saving Which Begins Today*, *supra* note 26.

including President Woodrow Wilson,⁶⁶ the American Railway Association,⁶⁷ the National Chamber of Commerce,⁶⁸ and the president of baseball's National League.⁶⁹ Advocates of summer daylight saving time in the United States argued that it would save oil, gas, and electrical power; increase manufacturing production; stimulate outdoor recreation; and improve military training conditions.⁷⁰ Proponents claimed that daylight saving legislation would conserve more than 1,500,000 tons of coal each year⁷¹ and millions of dollars in fuel costs.⁷²

Congress found these arguments persuasive. In March 1918, an overwhelming majority of both the House and Senate passed legislation establishing seven months of daylight saving time, extending from the last Sunday in March until the last Sunday in October.⁷³ President Wilson signed the bill into law,⁷⁴ and the United States began observing daylight saving time early Sunday morning, March 31, 1918.⁷⁵ The nation's initial response to daylight saving time was favorable, with praise for savings in electricity, gas, and coal, and another hour of trading time between the New York and London stock exchanges.⁷⁶

66. *President Favors Saving of Daylight*, N.Y. TIMES, Feb. 1, 1917, at 7.

67. *For Daylight Saving*, N.Y. TIMES, Jan. 29, 1917, at 17.

68. *Plea for Daylight Saving*, N.Y. TIMES, Mar. 3, 1918, at 6.

69. *Foster for Longer Day*, N.Y. TIMES, Jan. 7, 1917, Section 8, at 1. Despite wide support, not everyone favored daylight saving time. For example, some observed that "[t]he setting back or forward of all clocks an hour on two days in each year will involve inconvenience and annoyance." *Split on Daylight Saving*, N.Y. TIMES, Jan. 1, 1917, at 7. Not surprisingly, Harvard students voted 689 to 393 against a university daylight saving proposal, rejecting the idea of holding classes an hour earlier. *See Harvard Rejects Daylight Saving*, N.Y. TIMES, Jan. 23, 1918, at 18.

70. *See Daylight Saving Bill Signed by President*, N.Y. TIMES, Mar. 20, 1918, at 14.

71. *See Plea for Daylight Saving*, *supra* note 68.

72. *See 7 Months' Saving of Daylight Voted*, N.Y. TIMES, Mar. 16, 1918, at 1.

73. Act of Mar. 19, 1918, ch. 24, § 3, 40 Stat. 450, 451 (repealed 1919); *see also 7 Months' Saving of Daylight Voted*, *supra* note 72 (reporting that the House passed the daylight saving bill by a vote of 252 to 40); *Daylight Saving Plan Approved by Senate*, N.Y. TIMES, Mar. 17, 1918, at 8 (reporting that the Senate concurred in the House amendments to the daylight saving bill without a roll call vote).

74. *Daylight Saving Bill Signed by President*, N.Y. TIMES, Mar. 20, 1918, at 14.

75. *Move Clocks Ahead at Patriotic Rally*, N.Y. TIMES, Mar. 31, 1918, at 13. Many cities held celebrations commemorating the event. For example, in New York City, "a patriotic meeting was held in Madison Square Park" in which "after the parade by the Boy Scouts, headed by the Police Department Band, several thousand spectators listened to addresses on behalf of the forthcoming Liberty Loan and the sale of war savings stamps." *Id.*

76. *See Report Big Success in Daylight Saving*, N.Y. TIMES, Apr. 2, 1918, at 13; *Wants Clocks Kept Ahead*, N.Y. TIMES, Oct. 8, 1918, at 10. For example, proponents of extending daylight saving time heralded statistics showing that residents in the District of Columbia saved \$60,000 in their gas bills and that

Early enthusiasm did not sustain daylight saving time, and the United States' experiment with advanced clocks did not outlast the war. Although several national leaders and organizations urged retention of daylight saving time,⁷⁷ agricultural interests successfully lobbied Congress for repeal of the law.⁷⁸ In June 1919, Congress passed a rider as part of the annual agricultural appropriation bill that repealed daylight saving time when clocks shifted back in October.⁷⁹ President Wilson vetoed the appropriations bill, objecting specifically to the repeal of daylight saving time.⁸⁰ Although Congress failed to override the President's veto of the appropriations bill,⁸¹ it quickly passed a stand-alone bill repealing daylight saving time.⁸² The President once again vetoed the legislation,⁸³ but this time Congress overrode his veto.⁸⁴ The United States' war-time experiment with daylight saving time ended less than two years after its implementation.

C. Local Standards Yield to "War Time": The United States Implements Year-Round Daylight Saving Time During World War II

Congress's repeal of national daylight saving time following World War I did not keep Americans from advancing their clocks during summer months. The debate shifted to local communities,⁸⁵

17.5 tons of coal were saved for every thousand residents in St. Louis. See *Counting the Gains of Daylight Saving*, N.Y. TIMES, Oct. 13, 1918, at 13.

77. See, e.g., *For Daylight Saving Law*, N.Y. TIMES, June 18, 1919, at 6 (reporting the views of the National Tuberculosis Association); *Labor for Daylight Saving*, N.Y. TIMES, June 9, 1919, at 12 (reporting the views of the Vice President of the American Federation of Labor); *Uphold Light-Saving Law*, N.Y. TIMES, May 28, 1919, at 25 (reporting the views of the Merchants' Association).

78. *Congress for Repeal of Daylight Saving*, N.Y. TIMES, June 19, 1919, at 15.

79. *Id.*; *Cuts Out Daylight Saving*, N.Y. TIMES, Feb. 21, 1919, at 5.

80. *Wilson Rejects Agricultural and Sundry Civil Bill*, N.Y. TIMES, July 13, 1919, at 1. Wilson stated that repeal of daylight saving time would "involve a serious economic loss" and that "the overwhelming testimony of its value which has come to me convinces me that I should not be justified in acquiescing in its repeal." *Id.*

81. *Daylight Law Repeal Beaten in the House*, N.Y. TIMES, July 15, 1919, at 17. Congress passed the agricultural appropriations bill without the rider repealing daylight saving time, and the President signed the bill into law. *Passes Agricultural Bill*, N.Y. TIMES, July 24, 1919, at 15; *Signs Bill with Daylight Rider Out*, N.Y. TIMES, July 26, 1919, at 13.

82. Act of Aug. 20, 1919, ch. 51, 41 Stat. 280; see also *Daylight Issue up Again*, N.Y. TIMES, Aug. 2, 1919, at 14.

83. *President Vetoes Daylight Repeal*, N.Y. TIMES, Aug. 16, 1919, at 7; *President Vetoes Daylight Savings Repeal Bill*, WALL ST. J., Aug. 16, 1919, at 4.

84. *Daylight Saving Act Now Stands Repealed*, N.Y. TIMES, Aug. 21, 1919, at 1; *House Kills Veto of Daylight Law*, N.Y. TIMES, Aug. 20, 1919, at 17.

85. See *Plan Local Action to Save Daylight*, N.Y. TIMES, Aug. 23, 1919, at 11 ("The [National Daylight Saving Association] will urge upon Boards of Aldermen, City Councils, State Legislatures, and other authoritative bodies

and several states and municipalities immediately enacted daylight saving time.⁸⁶ When the New York Stock Exchange decided it too would observe daylight saving during summer months,⁸⁷ stock exchanges in Baltimore, Boston, Chicago, Detroit, Philadelphia, and Pittsburgh quickly followed suit.⁸⁸ Several railroads “capitulated to the demands of their commuters” and published revised daylight saving time schedules.⁸⁹ By 1925, Americans observed daylight saving throughout Rhode Island and Massachusetts, and in 280 cities in twelve other states.⁹⁰ Six years later, the number of cities observing daylight saving time grew to 483.⁹¹ As a result, daylight saving time observance became “an almost unsolvable puzzle.”⁹²

Once again, it took a war to provoke national observance of daylight saving time in the United States. After the start of World War II, several countries implemented daylight saving time to assist their war effort.⁹³ Organizations started lobbying Congress for daylight saving time as a means of furthering national defense interests.⁹⁴ In July 1941, President Franklin Roosevelt sent a

that legislation be enacted to have the clock officially set forward in order to conserve daylight.”).

86. See, e.g., *Chattanooga for Daylight Saving*, N.Y. TIMES, Dec. 26, 1919, at 4 (reporting that Chattanooga, Tennessee adopted daylight saving time); *Chicago Moves up Clocks*, N.Y. TIMES, June 13, 1920, at 17 (reporting that Chicago adopted daylight saving time); *City and Suburbs Set Clocks Ahead*, N.Y. TIMES, Mar. 28, 1920, at 1 (noting that several cities adopted daylight saving time); *Jersey City Adopts Daylight Saving*, N.Y. TIMES, Jan. 15, 1920, at 2 (reporting that Jersey City, New Jersey adopted daylight saving time); *Set the Clock Back One Hour Tonight*, N.Y. TIMES, Oct. 25, 1919, at 11 (reporting that New York City adopted daylight saving time).

87. *Stock Exchange to Save Daylight*, N.Y. TIMES, Mar. 25, 1920, at 17.

88. *Adopt Wall Street Time*, N.Y. TIMES, Mar. 26, 1920, at 17; *City and Suburbs Set Clocks Ahead*, *supra* note 86.

89. *Daylight Saving Gaining Ground*, N.Y. TIMES, Mar. 26, 1920, at 17; see also *Jersey Suburbs Adopting New Time*, N.Y. TIMES, Mar. 27, 1920, at 12.

90. *14 States Observe Daylight Saving*, N.Y. TIMES, June 30, 1925, at 9.

91. *Daylight Saving Returns; 483 Cities Turn Clocks Ahead*, N.Y. TIMES, Apr. 26, 1931, at 1.

92. *Daylight Saving Puts Europe in a Muddle*, N.Y. TIMES, Apr. 17, 1923, at 2. Global observance of daylight saving time was mixed as well. In 1922, the German government announced that it had “received so many petitions against [daylight saving time] that it has been decided to leave German clocks alone this Summer.” *No Daylight Saving for Germany*, N.Y. TIMES, Mar. 25, 1922, at 1. However, other countries adopted and maintained daylight saving time. By 1932, Belgium, Britain, Canada, France, Holland, and Portugal observed daylight saving. See *7 Nations to Go on Daylight Saving*, N.Y. TIMES, Apr. 15, 1932, at 13.

93. For example, Germany, France, and Italy implemented daylight saving time. *Merchant Group Urges Daylight Saving Law of World War Re-enacted for U.S. Defense*, N.Y. TIMES, Mar. 2, 1941, at 19. Britain implemented year-round daylight saving time and shifted its clocks ahead an additional hour during summer months. *British Daylight Saving to be 2 Hours in Summer*, N.Y. TIMES, Mar. 5, 1941, at 8.

94. See, e.g., *Merchant Group Urges Daylight Saving Law of World War Re-*

message to Congress in support of daylight saving time.⁹⁵ He argued that the nation faced a serious power shortage⁹⁶ and that daylight saving time would contribute meaningfully to the national defense effort.⁹⁷ Citing statistics provided by the Federal Power Commission, Roosevelt claimed that year-round daylight saving time would reduce annual electricity consumption by more than 736 million kilowatt-hours.⁹⁸ Noting that "it is also important that such a program have sufficient flexibility to meet varying regional conditions,"⁹⁹ the President asked Congress to empower him to alter regional time standards through executive orders.¹⁰⁰

Congress did not act immediately,¹⁰¹ perhaps reflecting national polls showing only thirty-eight percent of Americans in favor of year-round daylight saving time in June 1941.¹⁰² However, public sentiment shifted following the United States' entry into World War II.¹⁰³ In January 1942, a Gallup poll showed that fifty-seven percent of Americans supported year-round daylight saving time.¹⁰⁴ Although members of Congress from rural districts objected to daylight saving time,¹⁰⁵ the House and Senate passed legislation advancing the nation's clocks by one hour.¹⁰⁶ The act specified that

enacted for U.S. Defense, supra note 93.

95. *President Favors Law to Cut Power Use by Extension of Daylight Time*, WALL ST. J., July 16, 1941, at 3; *Proposal on Daylight Time*, N.Y. TIMES, July 16, 1941, at 10.

96. This claim would later be supported by Federal Power Commission Chairman Leland Olds, who testified before a congressional committee that the nation would experience a shortage of fifty-five million kilowatt-hours of electricity in 1943 as a result of the nation's accelerated national defense program. *National Daylight Saving Urged by FPC Chairman*, WALL ST. J., Aug. 6, 1941, at 2.

97. *See President Pushes Saving Daylight*, N.Y. TIMES, July 16, 1941, at 10; *Proposal on Daylight Time, supra note 95.*

98. *See Proposal on Daylight Time, supra note 95.*

99. *Id.*

100. *President Pushes Saving Daylight, supra note 97.* Roosevelt asked Congress for authority to order the nation to advance its clocks up to two hours ahead of standard time for the whole year or any part of the year. *Id.*

101. *See Wheeler Offers a Bill for Daylight Saving*, N.Y. TIMES, Dec. 31, 1941, at 11 ("[T]he President asked Congress six months ago for authority [to implement daylight saving time], but no action was taken.").

102. George Gallup, *Change to Daylight Time All Year 'Round Found Favored by Majority in Gallup Poll*, N.Y. TIMES, Jan. 4, 1942, at 41.

103. *See id.*

104. *Id.* Polling of individual demographics showed strong support for daylight saving time in urban areas and significant opposition among farmers. For example, in cities with a population of more than 100,000, 72% supported year-round daylight saving time; among farmers, only 36% supported year-round daylight saving time, and 45% opposed. *See id.*

105. *See, e.g., House Passes Bill for Daylight Time All Over Country*, N.Y. TIMES, Jan. 10, 1942, at 1.

106. Act of Jan. 20, 1942, ch. 7, 56 Stat. 9, 9 (repealed 1945); *see also House Daylight Bill is Passed by Senate*, N.Y. TIMES, Jan. 15, 1942, at 1. The Senate had previously passed legislation giving President Roosevelt the power to

daylight saving time would expire six months after the end of the war.¹⁰⁷ President Roosevelt signed the legislation, and the nation converted to year-round daylight saving time on February 9, 1942.¹⁰⁸ The new year-round daylight saving scheme became known as "War Time."¹⁰⁹

Despite studies showing that War Time conserved energy,¹¹⁰ the end of the war brought renewed calls for an end to daylight saving time.¹¹¹ Opponents of War Time argued that it had deprived Americans of millions of hours of sleep, subjected school children to morning darkness, forced farm workers to wait an extra hour for dew to evaporate from fields, increased factory worker absenteeism, and even contributed to increased juvenile delinquency.¹¹² Both the House and Senate unanimously passed legislation ending War Time,¹¹³ and the United States turned back its clocks to standard time on September 30, 1945.¹¹⁴

D. Congress Enacts the Uniform Time Act After Failed Experiments with Local Observance of Daylight Saving Time

After congressional repeal of War Time in September 1945, the drive for daylight saving time once again shifted to states and municipalities.¹¹⁵ By 1965, local action had produced a "clock

implement daylight saving time, but later opted for the House version of the bill, which advanced the nation's clocks uniformly by one hour. *See id.*

107. Act of Jan. 20, 1942, ch. 7, § 2, 56 Stat. 9 (repealed 1945).

108. *Clocks to be Advanced an Hour February 9 Throughout Nation*, WALL ST. J., Jan. 21, 1942, at 3; *Roosevelt Signs Daylight Time Act*, N.Y. TIMES, Jan. 21, 1942, at 19.

109. *See, e.g., Topics of The Times*, N.Y. TIMES, Feb. 7, 1942, at 16; *War Time to Begin in Nation Tomorrow*, N.Y. TIMES, Feb. 8, 1942, at 1.

110. The War Production Board estimated in 1945 that year-round daylight saving time had saved nearly 5 billion kilowatt-hours of electricity during the war. *See Farmers Demand 'Sun Time' Again*, N.Y. TIMES, July 15, 1945, at E8. A study published by the Association of Edison Illuminating Companies found a net electric utility fuel savings of 4.60% in December 1942. *See Daylight Saving Time: Hearings on S. 385, S. 1260, S. 2568 and S. 2602 Before the S. Comm. on Commerce*, 93d Cong. 131 (1974).

111. *See Ask Congress Repeal of 'Daylight Time'*, N.Y. TIMES, Feb. 24, 1945, at 26; *Farmers Demand 'Sun Time' Again*, *supra* note 110.

112. *Congress Leaders Promise to End Daylight Saving Time by Sept. 30*, N.Y. TIMES, Sept. 9, 1945, at 1.

113. Act of Sept. 25, 1945, ch. 388, 59 Stat. 537 (1945); *see also House Votes Standard Time*, N.Y. TIMES, Sept. 13, 1945, at 14 ("The House . . . passed without opposition a resolution to return the country to standard time . . ."); *What's News*, WALL ST. J., Sept. 21, 1945, at 1 ("The Senate unanimously approved . . . a measure ending daylight saving time . . .").

114. *Turn Back Clocks One Hour Tonight*, N.Y. TIMES, Sept. 29, 1945, at 1.

115. *See, e.g., Daylight Saving Ends at 2 a.m. Tomorrow*, N.Y. TIMES, Sept. 28, 1946, at 1 (reporting that "Connecticut, New Jersey, Massachusetts, and New Hampshire, observed [daylight saving time] under State laws," and cities in fifteen other states observed daylight saving time under local laws); *Most of State to Shift Clocks*, N.Y. TIMES, Apr. 3, 1946, at 17 (reporting that a majority

scramble chaotic enough to confound Father Time, himself."¹¹⁶ During the 1950s, "Iowa had 24 systems for starting and ending daylight time."¹¹⁷ In Minnesota, St. Paul observed daylight saving time while neighboring Minneapolis did not.¹¹⁸ During the summer of 1965, St. Paul police officers wore two watches because the police and fire departments used separate measures of time.¹¹⁹ Travelers on the thirty-five minute bus ride from Steubenville, Ohio, to Moundsville, West Virginia had to change their watches seven times.¹²⁰ "One airline reported 4,000 calls a day from customers asking what time it would be in their destination cities."¹²¹ A time scientist at the U.S. Naval Observatory dubbed the United States "the worst timekeeper in the world."¹²²

In response to this widespread confusion, Congress once again considered daylight saving time.¹²³ Legislation introduced in the House mandated uniform national observance of daylight saving time during summer months, unless entire states opted to remain on standard time.¹²⁴ Most importantly, the bill prohibited cities and localities from enacting separate local time standards.¹²⁵ After years of confusion, the discussion on daylight saving time had a different tone. Farmers supported efforts to impose time uniformity,¹²⁶ and

of cities in New York State implemented daylight saving time).

116. Felix Belair, Jr., *Uniform Daylight Saving Time Sought*, N.Y. TIMES, Mar. 7, 1965, at 24.

117. Mike Toner, *Daylight Saving Once Ticked People Off*, ATLANTA J.-CONST., Apr. 3, 2005, at B1.

118. *Hearing on H.R. 704 and 1647*, *supra* note 18 (statement of Linda Lawson, Acting Deputy Assistant Secretary for Policy, United States Department of Transportation).

119. Toner, *supra* note 117. Minnesotans bore the brunt of daylight saving confusion. During a particular part of the year, parts of the state observed central standard time, daylight saving time, and extended daylight saving time at once, leading Minnesotans to joke that "convicts do time; soldiers do double time; Minnesotans do triple time." *Uniform Time Bill to Ease Confusion*, N.Y. TIMES, Apr. 3, 1966, at 68 (internal quotation marks omitted).

120. Belair, *supra* note 116. Indeed, if bus passengers on this route wanted to keep the correct local time at all stops, they had to change their watches an average of once every five miles. *Id.*

121. Michael Downing, *Endless Summer*, N.Y. TIMES, Aug. 9, 2005, at A19.

122. Belair, *supra* note 116 (quoting Dr. William Markowitz).

123. *See Bill Offered on Uniformity in Daylight Saving Time*, N.Y. TIMES, Mar. 9, 1965, at 37; *Daylight Time Hearing Set*, N.Y. TIMES, Mar. 31, 1965, at 43.

124. Marjorie Hunter, *House Sets Rules on Daylight Time*, N.Y. TIMES, Mar. 17, 1966, at 41.

125. *Id.*

126. Belair, *supra* note 116. Although it is possible that the confusion created by erratic local time observance created support for uniform daylight saving time among farmers, it is also possible that farmers took a pragmatic stance in response to declining clout in Congress. *See Uniform Time Bill Sent to President*, N.Y. TIMES, Mar. 31, 1966, at 41 ("[T]he advance of state and Federal reapportionment giving greater political weight to urban areas has diminished the political voice of the farmer and will reduce the chances of states

“[n]o one argued that time should be keyed to the cows’ milking schedule.”¹²⁷ Instead, opponents criticized daylight saving as “the golfer’s delight,” and argued that it would endanger young children by forcing them to walk to school in the dark.¹²⁸ Despite this criticism, the bill easily passed in the House.¹²⁹ Days later, the Senate passed the legislation,¹³⁰ and President Lyndon Johnson signed the bill into law.¹³¹

The new Uniform Time Act of 1966¹³² required all states to uniformly advance clocks by one hour from the last Sunday of April until the last Sunday in October.¹³³ The Act superseded all local daylight saving laws and ordinances,¹³⁴ and a state could exempt itself from observing daylight saving time only if the entire state remained on standard time.¹³⁵ Observance of daylight saving time remained optional for 1966, but the Act mandated the start of national daylight saving time in April 1967.¹³⁶

On April 30, 1967, national daylight saving time went into effect.¹³⁷ Clocks shifted forward an hour in all but a few states.¹³⁸ In 1968, only Hawaii and Arizona chose to remain on standard time

remaining off daylight time in the future.”).

127. Hunter, *supra* note 124.

128. *Id.*

129. *Id.* (reporting that the House passed the Uniform Time Bill by a vote of 291 to 93).

130. *Uniform Time Bill Passed by Senate*, N.Y. TIMES, Mar. 23, 1966, at 17. The Senate amended the bill to permit state legislatures to exempt either an entire state or a “single contiguous part” of a state from daylight saving time. *See Uniform Time Bill Sent to President*, N.Y. TIMES, Mar. 31, 1966, at 41. However, a House-Senate conference committee subsequently eliminated this amendment, and the resulting bill only allowed entire states to opt out of daylight saving time. *See Daylight Time Bill Approved by Senate*, N.Y. TIMES, Mar. 30, 1966, at 32.

131. *Uniform Time Bill Signed by Johnson*, N.Y. TIMES, Apr. 15, 1966, at 37.

132. Uniform Time Act of 1966, Pub. L. No. 89-387, 80 Stat. 107 (1966) (codified as amended at 15 U.S.C. §§ 260–63, 266–67 (2000)).

133. Uniform Time Act § 3(a).

134. *Id.* § 3(b).

135. *Id.* § 3(a).

136. *Id.* § 6. Although observance was optional during 1966, states could not deviate from the Act’s prescribed start and end times for daylight saving time. *See id.*

137. *Clocks Set Ahead for Daylight Time*, N.Y. TIMES, Apr. 30, 1967, at 1.

138. *Id.* The Hawaii and Michigan legislatures passed laws exempting the states from daylight saving time. *46 States Will Observe Daylight Time April 30*, N.Y. TIMES, Apr. 23, 1967, at 57. Additionally, the Department of Transportation, the agency charged with the responsibility of administering the Uniform Time Act, granted dispensations to three states with exceptional circumstances. Douglas E. Kneeland, *Most States Act on Uniform Time*, N.Y. TIMES, Apr. 30, 1967, at 33. The Department granted a temporary reprieve to Kentucky because its legislature was not scheduled to come into session until the following year. *Id.* The Secretary of Transportation also delayed implementation of daylight saving time in Indiana and Alaska because these states were contemplating changes in time zones. *Id.*

during summer months.¹³⁹ After oscillating on exemption, Michigan decided to shun daylight saving time, starting in 1969.¹⁴⁰ In the early 1970s, Indiana took advantage of an amendment to the Uniform Time Act, allowing states straddling time zones to exempt portions of the state from observing daylight saving time.¹⁴¹ Other than these few exceptions, the United States uniformly advanced its clocks one hour during summer months.

E. Oil Embargos and Energy Crises: The United States Returns to Year-Round Daylight Saving Time

In 1973, the United States encountered a "prolonged peace-time energy shortage," caused by an oil embargo by the Organization of Petroleum Exporting Countries ("OPEC").¹⁴² The energy crisis prompted efforts to extend daylight saving time to winter months as an energy conservation measure.¹⁴³ Senators Claiborne Pell and John O. Pastore introduced a bill requiring year-round daylight saving time, arguing that the legislation would "reduce crime, cut traffic accidents and lessen demands on electric power."¹⁴⁴ State legislatures began considering implementation of year-round daylight saving time.¹⁴⁵ An editorial in the *New York Times* cited a study by Consolidated Edison showing that year-round daylight saving time would reduce peak-hour loads by five percent, and concluded that "nationwide reduction in fuel consumption would evidently be significant."¹⁴⁶

139. *Clocks Set Ahead for Daylight Time*, *supra* note 137.

140. After the Michigan legislature exempted the state from daylight saving time in 1967, the state's citizens pressed for a referendum on the matter. *Single Time Act Going into Effect*, N.Y. TIMES, Apr. 1, 1967, at 34. State officials offered a compromise in which "[t]he Upper Peninsula will go on Central Daylight (which is, of course, the same as Eastern Standard); the rest of the state will stay on Eastern Daylight." *Referendum Row*, TIME, July 7, 1967, at 47, available at <http://www.time.com/time/magazine/article/0,9171,899572,00.html>. Although Michigan observed daylight saving time in 1968, voters opted to return to standard time in a statewide referendum. *Drive to Begin to Restore Daylight Saving in Michigan*, N.Y. TIMES, Nov. 16, 1969, at 47.

141. *Daylight Saving Time Will Start Tomorrow*, N.Y. TIMES, Apr. 28, 1973, at 35; *Daylight Time Begins at 2 a.m. Tomorrow*, N.Y. TIMES, Apr. 24, 1971, at 31.

142. 1 OFFICE OF THE ASSISTANT SEC'Y FOR POLICY, PLANS & INT'L AFFAIRS, U.S. DEP'T OF TRANSP., FINAL REPORT ON THE OPERATION AND EFFECTS OF DAYLIGHT SAVING TIME 23 (1975) [hereinafter FINAL DAYLIGHT SAVING REPORT].

143. See Editorial, *Energy-Saving Time*, N.Y. TIMES, Oct. 28, 1973, at E14.

144. *Year-Round D.S.T. Urged*, N.Y. TIMES, Mar. 16, 1973, at 54.

145. See, e.g., *All-Year Use Asked on Daylight Saving*, N.Y. TIMES, Oct. 25, 1973, at 53 (reporting that a proposal for year-round daylight saving time was introduced in New York Assembly); *Total Daylight Saving Urged*, N.Y. TIMES, Nov. 2, 1973, at 6 (reporting that the Massachusetts House of Representatives voted to extend daylight saving time to the entire year).

146. *Energy-Saving Time*, *supra* note 143. The editorial also cited preliminary figures from a Rand Corporation study, showing energy savings

On November 7, 1973, President Richard Nixon addressed the nation and advocated a series of policies to address the energy crisis.¹⁴⁷ President Nixon claimed that the winter supply of petroleum could fall short of anticipated demands by as much as seventeen percent and bluntly stated that the United States was “heading toward the most acute shortages of energy since World War II.”¹⁴⁸ The President asked Congress to develop an emergency energy act, with a provision for “immediate return to daylight saving time on a year-round basis.”¹⁴⁹

Congress acted quickly. The Senate Commerce Committee immediately held hearings on legislation establishing year-round daylight saving time.¹⁵⁰ Year-round daylight saving legislation passed overwhelmingly in both the House and Senate.¹⁵¹ Advocates claimed that the bill would save the equivalent of three percent of the nation’s energy shortage.¹⁵² Opponents of year-round daylight saving time called the legislation nothing more than “gimmickry” that would do little to save energy and would force children to wait in darkness for early morning school buses.¹⁵³ However, the urgent atmosphere of the national energy crisis reframed the debate over daylight saving, and the legislation “whisked through both houses by voice vote with little debate.”¹⁵⁴ On December 15, 1973, President Nixon signed the year-round daylight saving bill into law, claiming that it would reduce fuel consumption by the equivalent of 150,000 barrels of oil each day during winter months.¹⁵⁵

The new law provided for daylight saving time on a year-round

from year-round daylight saving time equal to one-half of the projected three percent energy shortage for 1973. *Id.*

147. Richard Nixon, Address to the Nation About Policies to Deal With the Energy Shortages, 1973 PUB. PAPERS 323 (Nov. 7, 1973), available at http://www.nixonfoundation.org/clientuploads/directory/archive/1973_pdf_files/1973_0323.pdf [hereinafter Nixon’s Address]; see also Linda Charlton, ‘Energy Crisis’ May Begin at Home Soon, N.Y. TIMES, Nov. 8, 1973, at 32 (reporting on proposals in Nixon’s address to the nation).

148. Nixon’s Address, *supra* note 147, at 916.

149. *Id.* at 918.

150. Richard L. Madden, *Senate Panel Speeds Bill to Meet Energy Shortage*, N.Y. TIMES, Nov. 10, 1973, at 69.

151. Richard L. Madden, *Daylight Saving All Year ‘Round Voted by Senate*, N.Y. TIMES, Dec. 5, 1973, at 1 (noting that the Senate approved year-round daylight saving time by vote of 67 to 10); Richard L. Madden, *Daylight Saving for Next 2 Years Is Voted by House*, N.Y. TIMES, Nov. 28, 1973, at 1 (reporting that the House approved year-round daylight saving time by vote of 311 to 88).

152. Madden, *Daylight Saving for Next 2 Years Is Voted by House*, *supra* note 151.

153. *Id.* (internal quotation marks omitted).

154. Richard L. Madden, *Congress Votes Daylight Saving for Two Years to Save Energy*, N.Y. TIMES, Dec. 15, 1973, at 17.

155. Richard Nixon, Statement on Signing the Emergency Daylight Saving Time Energy Conservation Act of 1973, 1973 PUB. PAPERS 359 (Dec. 15, 1973); see also John D. Morris, *President Urges Congress to Act on Energy Bills*, N.Y. TIMES, Dec. 16, 1973, at 1.

basis for a trial period, starting in January 1974 and expiring in April 1975.¹⁵⁶ The act also required the Secretary of Transportation to study the effects of year-round daylight saving time on "the use of energy in the United States, traffic safety, including the safety of children traveling to and from school, and the effect on school hours," and submit a report to Congress.¹⁵⁷

The nation's experiment with daylight saving time started on January 6, 1974.¹⁵⁸ The jolt to daylight saving time in the middle of winter caught many off guard, and the *New York Times* reported that "[c]ommuter trains from New Jersey were delayed, many school children missed their free breakfasts, some workers walked to subways and buses with trepidation, and many people felt strange yesterday as the day began an hour earlier for most in an eerie darkness."¹⁵⁹ However, preliminary statistics showed a reduction in nationwide consumption of electricity.¹⁶⁰ The Senate Commerce Committee later estimated that daylight saving time saved approximately 100,300 barrels of oil daily from January through April 1974.¹⁶¹

Advocates for a return to standard time focused in particular on the danger to school children caused by another hour of morning darkness.¹⁶² In January 1974, accidents in Florida killed eight school-age children, a noticeable increase from the two children that had been killed during the same period the year before.¹⁶³

Responding to national concerns about winter daylight saving,

156. Emergency Daylight Saving Time Energy Conservation Act of 1973, Pub. L. No. 93-182, §7, 87 Stat. 707, 709. Exemptions from the act could be made by law by "any State with parts thereof in more than one time zone, and any State that lies entirely within one time zone and is not contiguous to any other State." *Id.* § 3(a). Additionally, the President had the power to grant exemptions upon a proclamation by a state's governor that the law would cause "undue hardship." *Id.* § 3(b).

157. *Id.* § 4(a).

158. Harold M. Schmeck, Jr., *Daylight Time Begins*, N.Y. TIMES, Jan. 6, 1974, at 1.

159. Mary Breasted, *Daylight Saving Puts Most in Dark as Week Opens*, N.Y. TIMES, Jan. 8, 1974, at 20.

160. Gene Smith, *Power Use Down by as Much as 10%*, N.Y. TIMES, Jan. 17, 1974, at 1 (reporting that Edison Electric Institute released statistics showing that production of electricity during the first week of daylight saving time was 4.1% less than the same week a year earlier and attributed this reduction to the combination of voltage reductions, daylight saving time, and voluntary conservation programs).

161. Anthony Ripley, *Senate Votes Return to Standard Time for Four Months and Sends Bill to Ford*, N.Y. TIMES, Oct. 1, 1974, at 81.

162. See B. Drummond Ayres, Jr., *Benefits of Daylight Saving in Winter Widely Doubted*, N.Y. TIMES, Feb. 3, 1974, at 40; *House Unit Asks Hiatus in Daylight-Saving Time*, N.Y. TIMES, Aug. 13, 1974, at 22.

163. Evan Jenkins, *Schools Ask End to Daylight Time*, N.Y. TIMES, Jan. 31, 1974, at 17. A Florida state education department spokesperson claimed that "six of the deaths were clearly attributable to the fact that children were going off to school in darkness." *Id.*

Congress passed legislation returning the nation to standard time from late October until late February.¹⁶⁴ Lamenting this retreat, a *New York Times* editorial emphasized the benefits of daylight saving during winter months, particularly “the reduction in auto accidents yielded by an additional hour of daylight for weary home-bound motorists in the evening traffic rush” and an estimated five percent reduction in peak-hour electricity loads.¹⁶⁵ Although it noted that parents of school children are “understandably concerned” by morning darkness, the *New York Times* reasoned that “for those very few weeks the schools could surely move their schedules up an hour.”¹⁶⁶

Upon expiration of the Emergency Daylight Saving Time Energy Conservation Act on April 27, 1975, the Uniform Time Act of 1966 once again went into effect.¹⁶⁷ After experimenting briefly with year-round daylight saving time, the United States returned to its observance of daylight saving from the last Sunday in April to the last Sunday of October.¹⁶⁸

F. 2007 Extension of Daylight Saving: Congress Extends Daylight Saving Time Observance in the United States

Although members of Congress from rural areas blocked

164. Act of Oct. 5, 1974, Pub. L. No. 93-434, 88 Stat. 1209 (amending the Emergency Daylight Saving Time Energy Conservation Act of 1973, Pub. L. No. 93-182, § 7, 87 Stat. 707, 709 to provide for uniform standard time from the last Sunday in October 1974 through the last Sunday in February 1975); see also *House Votes for a Return To Standard Time In '74*, N.Y. TIMES, Aug. 20, 1974, at 16 (reporting that the House of Representatives voted 381 to 16 to return to standard time during winter months); Ripley, *supra* note 161. Congressional action against year-round daylight saving time is not surprising, since public support for winter daylight saving had dropped dramatically. A study by the National Opinion Research Center showed that only 42% favored winter daylight saving time in February 1974, down from 79% in December 1973. Anthony Ripley, *Senate Votes Return to Standard Time for Four Months and Sends Bill to Ford*, N.Y. TIMES, Oct. 1, 1974, at 81. Public opinion polls in 1974 also revealed that 38% of respondents were concerned about the safety of school children during year-round daylight saving time. See *Hearing on H.R. 704 and 1647*, *supra* note 18, at 16 (2001) (statement of Linda Lawson, Acting Deputy Assistant Secretary for Policy, United States Department of Transportation); see also Toner, *supra* note 117 (“A rash of early morning traffic deaths among school children in Florida in 1974 prompted Congress to lift DST during the winter months.”).

165. Editorial, *SOS for DST*, N.Y. TIMES, Sept. 20, 1974, at 38.

166. *Id.*

167. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 30; Emergency Daylight Saving Time Energy Conservation Act of 1973, Pub. L. No. 93-182, § 7, 87 Stat. 707, 709 (“This Act . . . shall terminate at 2 o'clock antemeridian on the last Sunday of April 1975.”).

168. Uniform Time Act of 1966, Pub. L. No. 89-387, § 3(a), 80 Stat. 107, 107; *Daylight Saving Time Ends at 2 A.M. Sunday*, N.Y. TIMES, Oct. 28, 1976, at 35; *Daylight Saving Time to Begin Tomorrow*, N.Y. TIMES, Apr. 24, 1976, at 26.

attempts to extend daylight saving time in the early 1980s,¹⁶⁹ Congress subsequently extended daylight saving observation twice. In 1986, Congress passed legislation moving the start of daylight saving time from the last Sunday of April to the first Sunday of April.¹⁷⁰ The Department of Transportation estimated that another month of daylight saving time would save \$28 million in costs associated with traffic accidents and would prevent more than 1500 injuries and twenty deaths.¹⁷¹

Most recently, Congress also extended daylight saving time by four weeks as part of the Energy Policy Act of 2005, the provisions of which took effect in the spring of 2007.¹⁷² Under the act, Americans advance clocks on the second Sunday of March rather than the first Sunday of April, and the nation falls back on the first Sunday of November, rather than the last Sunday in October.¹⁷³ Supporters claim that small energy savings will add up over the years.¹⁷⁴ For example, the American Council for an Energy-Efficient Economy estimates that expanded daylight saving time will save \$4.4 billion and will reduce carbon emissions by 10.8 million metric tons by 2020.¹⁷⁵ Unlike prior years, opposition from agricultural interests was not a major factor in the debate.¹⁷⁶ Instead, the airline industry, schools, and religious groups unsuccessfully opposed the extension of daylight saving time.¹⁷⁷

169. See, e.g., *House Defeats Move on Daylight Savings*, N.Y. TIMES, July 16, 1983, at 48 (“House of Representatives, bowing to rural lawmakers, has defeated legislation to extend daylight saving time.”); Marjorie Hunter, *Debate on Daylight Saving Time Leads to Talk of Thermometers*, N.Y. TIMES, June 30, 1983, at B6 (“Scarcely anything so stirs the oratorical flights of fancy of farm state Congressmen as proposals for expanding daylight saving time.”).

170. Act of July 8, 1986, Pub. L. No. 99-359, § 2(b), 100 Stat. 764, 764; Jonathan Fuerbringer, *An Early-April Start for Daylight Saving Is Backed by Senate*, N.Y. TIMES, May 21, 1986, at A1; *Measure to Extend U.S. Daylight Time Is Sent to President*, N.Y. TIMES, June 25, 1986, at A18.

171. *Bill Signed to Advance Start of Daylight Time*, N.Y. TIMES, July 9, 1986, at A12. The extension was also “backed by more than 8,000 fast-food outlets, sporting goods manufacturers and garden centers that all saw more daylight as a key to more sales.” Toner, *supra* note 117.

172. Energy Policy Act of 2005, Pub. L. No. 109-058, § 110, 119 Stat. 594, 615 (codified as amended at 15 U.S.C. § 260a (Supp. V 2007)). President George W. Bush signed the bill into law on August 8, 2005. Edwin Chen, *Bush Signs Overhaul of U.S. Energy Policy*, L.A. TIMES, Aug. 9, 2005, at A10.

173. Energy Policy Act § 110; Richard Simon, *Daylight Saving Time Advances*, L.A. TIMES, July 22, 2005, at A12.

174. See Steve Lohr, *Time Change a “Mini-Y2K” in Tech Terms*, N.Y. TIMES, Mar. 5, 2007, at C1.

175. *Id.*

176. Indeed, one daylight saving time critic claimed that the extension of daylight saving time was inevitable, since “the number of Americans living on golf courses is greater than the number living on farms.” Downing, *supra* note 13.

177. Richard Simon, *Daylight Plan Not Greeted as Sunny News*, L.A. TIMES, July 21, 2005, at A12. The airline industry claimed that “putting the United

In sum, daylight saving time history is long and convoluted. The United States and other nations first experimented with the idea of daylight saving time during World War I. Although Congress repealed the act at the end of the war, local observance by states and municipalities kept daylight saving time alive. The United States experimented with year-round daylight saving time twice, during World War II and the oil embargos of the 1970s. Unfortunately, the nation's experiments with year-round daylight saving time did not last, largely due to concern that school children were at risk during early morning hours. Congress has more recently extended summer daylight saving twice, but has not revisited the idea of year-round daylight saving time.

II. EMPIRICAL RESULTS FROM YEAR-ROUND DAYLIGHT SAVING TIME IN THE UNITED STATES

In evaluating whether Congress should restore year-round daylight saving time, it is crucial to weigh the costs and benefits of such a plan. Fortunately, year-round daylight saving time is not a new concept, and the issue has been studied carefully—especially during the United States' brief experiment with year-round daylight saving time in 1974. First, agency studies from the 1970s show substantial benefits of extended daylight saving.¹⁷⁸ On the other hand, several congressional hearings have discerned potential drawbacks of winter daylight saving time.¹⁷⁹ Finally, experts emphasize that these studies should inform our modern analysis of the issue but should not dictate our conclusion—after all, much has changed in the last thirty years.¹⁸⁰

A. *Studies Demonstrated the Benefits of Year-Round Daylight Saving Time Following the 1974 Experiment in the United States*

As Congress debated various daylight saving proposals over the last century, agencies and other researchers produced several studies highlighting the benefits from daylight saving time. Most notably, researchers found that year-round daylight saving time decreased fatal motor vehicle and pedestrian accidents, saved energy, and reduced crime.

First and most importantly, studies of the 1974 year-round daylight saving time experiment showed a decrease in motor vehicle

States 'out of sync with most of the world's clocks'" would disrupt airline schedules. School groups expressed concern that children would be forced to "wait for morning buses or walk to school in the dark." And Agudath Israel of America, a nationwide Orthodox Jewish organization, claimed that delayed sunrise would force observant Jews to choose between morning prayer and punctuality at work. *Id.*

178. See *infra* Part II.A.

179. See *infra* Part II.B.

180. See *infra* Part II.C.

and pedestrian fatalities.¹⁸¹ The Department of Transportation ("DOT") studied the effect of winter daylight saving time on fatal accidents. It compared March and April 1974 (when daylight saving time was in effect) with March and April 1973 (when no daylight saving time was in effect). Adjusting for other effects, including seasonal trends and a reduced speed limit, the DOT demonstrated that daylight saving time reduced traffic fatalities by 0.7%.¹⁸² At the time, Department analysts also believed that "further study may reveal that daylight saving time actually reduces fatalities on the order of 1.5 to 2 percent."¹⁸³ While 1 to 2% may not sound like much at first blush, that translates into hundreds of American lives annually.¹⁸⁴

Second, studies from the mid-1970s show that year-round daylight saving time saves energy. Prior to the year-round daylight saving time experiment in 1974, the American Public Power Association ("APPA") conducted an informal survey of several of its member utilities and estimated that year-round daylight saving time would reduce energy demands by approximately one to two percent, measured in kilowatt-hour sales.¹⁸⁵ The DOT examined Federal Power Commission data for the four daylight saving time transitions during the 1974 year-round daylight saving time experiment¹⁸⁶ and affirmed the APPA's estimates.¹⁸⁷ The DOT concluded that extended daylight saving time likely reduces electricity consumption by one percent in March and April, representing approximately 100,000 barrels of oil per day during those two months.¹⁸⁸ The report found minimal savings in home

181. *Hearing on S. 980 and S. 2566, supra* note 18 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, and International Affairs, Department of Transportation).

182. *See id.*

183. *Id.*

184. *See* EZIO C. CERRELLI, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., TRENDS IN DAILY TRAFFIC FATALITIES, 1975-1995, at 1-2 (1996), available at http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/RNotes/1996/day_note.pdf.

185. *Hearing on S. 980 and S. 2566, supra* note 18, at 74 (statement of the APPA).

186. *Hearing on H.R. 704 and 1647, supra* note 18, at 18 (statement of Linda Lawson, Acting Deputy Assistant Secretary for Policy, U.S. Dep't of Transp.).

187. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 88 ("It is apparent that electricity usage is consistently less during the DST period at each transition by an average amount of about 1%. . . . The evidence is thus very strong that electricity savings are associated with DST at winter, spring and fall transitions.")

188. *See Hearing on S. 980 and S. 2566, supra* note 18, at 15 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans and International Affairs, Department of Transportation). *But see id.* at 37 (statement of Marvin H. Kahn, Senior Economist, Energy, Resources, and Environmental Systems Analysis Department, Mitre Corp.) (noting that the Department of Transportation study's comparison of total load electricity demands during years with and without winter daylight saving time could be affected by

heating fuel consumption, and no measurable effect on gasoline use.¹⁸⁹ Based on the DOT's findings, APPA estimated that a one percent energy saving would have reduced system demands by two billion kilowatt-hours in 1973, which at the time was the equivalent of saving 3.8 million barrels of oil each year.¹⁹⁰

However, there is some disagreement as to whether this decrease in energy consumption is attributable to daylight saving time. Because the data sample for the DOT study was limited, the DOT deemed its energy savings findings "probable" rather than conclusive.¹⁹¹ The National Bureau of Standards ("NBS") later examined the same data from the DOT study and concluded that there was "no *conclusive* evidence for decreased production of electrical energy during Daylight Saving Time."¹⁹² However, DOT officials disagreed with the NBS evaluation, and reiterated their conclusion that "[t]he magnitude of the DST saving is about 1 percent."¹⁹³ Ultimately, even if one study from the mid-1970s is not "conclusive," all available studies do show that there are potential energy savings from year-round daylight saving time.

Third, an often ignored benefit of daylight is the salutary effect it has on stopping criminals in their tracks. In theory (and in practice), the percentage of violent crimes committed outdoors is higher during dark evening hours than during morning hours, and shifting an hour of sunlight from morning to evening decreases exposure of individuals to violent outdoor crime.¹⁹⁴ Indeed, limited statistics from the 1970s show that year-round daylight saving time

seasonal weather variations).

189. *Id.*, at 15 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, and International Affairs, Department of Transportation).

190. *Id.* at 75 (statement of the APPA).

191. *Hearing on H.R. 704 and 1647, supra* note 18, at 18 (statement of Linda Lawson, Acting Deputy Assistant Secretary for Policy, United States Department of Transportation).

192. NATIONAL BUREAU OF STANDARDS, REVIEW AND TECHNICAL EVALUATION OF THE DOT DAYLIGHT SAVING TIME STUDY E-3 (1976) (emphasis added); *see also* STAFF OF H. COMM. ON INTERSTATE & FOREIGN COMMERCE, 94TH CONG., THE UNIFORM TIME ACT OF 1966 AND OTHER RELATED ACTS AND BACKGROUND INFORMATION FOR COMMITTEE CONSIDERATION OF H.R. 13089 AND SIMILAR BILLS RELATING TO DAYLIGHT SAVING TIME 24-25 (Comm. Print 1976) ("NBS warn[ed] that . . . [g]ross electricity production data, without detailed corrections for known influencing factors and trends (temperature, sky cover, etc.) are not sufficient for assessing size or direction of a possible DST-related effect on electricity consumption.").

193. STAFF OF H. COMM. ON INTERSTATE & FOREIGN COMMERCE, 94TH CONG., *supra* note 192, at 24.

194. *See, e.g., Daylight Saving Time: Hearings on S. 385, S. 1260, S. 2568 and S. 2602 Before the S. Comm. on Commerce*, 93d Cong. 25 (1974) (statement of Sen. Claiborne Pell) ("With the extra hour of daylight saving time at a time when most of the work force is enroute home, criminals would be less apt to threaten individuals returning to their families.").

reduces crime.¹⁹⁵ Hence, after the nation's experiment with year-round daylight saving time during the Nixon Administration, daylight saving advocates argued that shifting an hour of light from morning to evening reduced overall crime rates and should therefore be continued.¹⁹⁶

The sole empirical study from the 1970s supports the concept that year-round daylight saving time can reduce crime. The Law Enforcement Assistance Administration ("LEAA") of the Department of Justice conducted a limited study during the 1974 year-round daylight saving time experiment, examining the effect of daylight saving on crime in Washington, D.C. and Los Angeles.¹⁹⁷ The results showed a ten to thirteen percent reduction in violent crime for daylight saving time periods in Washington, D.C., but were inconclusive as to the effect in Los Angeles.¹⁹⁸ DOT officials cautioned that the study should not be viewed as conclusive evidence that daylight saving time reduced crime, especially given both the limited time and limited sample area.¹⁹⁹

Finally, advocates have claimed that year-round daylight saving time incurs additional advantages—from additional sunlight for after-work shopping,²⁰⁰ to the economic benefit from cities in the eastern United States sharing three hours overlap in the working

195. See *Hearing on S. 980 and S. 2566*, *supra* note 18, at 17 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, and International Affairs, Department of Transportation).

196. See, e.g., *Hearing on H.R. 704 and 1647*, *supra* note 18, at 9 (statement of Rep. Brad Sherman) ("Because people get home from work and school earlier and complete more errands and chores in daylight, daylight saving time seems to reduce people's exposure to various crimes, which are more common in darkness than in light."); WebExhibits, Daylight Saving Time: Incidents and Anecdotes, <http://webexhibits.org/daylightsaving/k.html> (last visited Dec. 28, 2007) ("It is clear that for most crimes where darkness is a factor, such as muggings, there are many more incidents after dusk than before dawn, so light in the evening is most welcome.").

197. *Hearing on S. 980 and S. 2566*, *supra* note 18, at 17 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, and International Affairs, Department of Transportation).

198. *Id.*; FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 93–94 (indicating that Washington, D.C. crime statistics in one-hour intervals showed a decrease in crime attributable to daylight saving time; Los Angeles crime statistics were only available in two-hour intervals, yielding data that "proved to be too coarse in resolution to reveal a DST effect if there was one").

199. *Hearing on S. 980 and S. 2566*, *supra* note 18, at 17 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans and International Affairs, Department of Transportation); FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 93 (reporting results for two locations over the course of about two years).

200. See *Daylight Saving Time: Hearings on S. 385, S. 1260, S. 2568 and S. 2602 Before the S. Comm. on Commerce*, 93d Cong. 26 (1974) (statement of Rep. Craig Hosmer) ("People do not shop between 6 and 9 in the morning, but in the evening. Year-round Daylight Saving Time . . . would also make after work shopping more attractive because of the added hour of daylight.").

day with western European cities (rather than two hours under standard time).²⁰¹ Proponents argued that year-round daylight saving time would serve as an effective method for boosting retail sales and recreation²⁰² and that it would end the confusion associated with changing clocks twice a year (a practice that Congressman Craig Hosmer labeled the “Mickey Mouse Factor”).²⁰³ Thus, studies and analysis from the 1970s demonstrate that the United States’ experiment with year-round daylight saving time in 1974 produced several notable benefits.

B. Congressional Hearings Have Identified Potential Disadvantages of Year-Round Daylight Saving Time

Despite several benefits of extended daylight saving, opponents persuaded Congress to abandon year-round daylight saving time. Congressional hearings on the matter identified a number of disadvantages, including fatal accidents involving school-age children, opposition among farmers, and sign-on time problems for AM radio stations.

First, school officials and parents argued forcefully that morning darkness jeopardized the lives of school-age children commuting to school.²⁰⁴ They pointed to a noticeable increase in deaths of school children in Florida during the early months of the 1974 winter daylight saving time experiment.²⁰⁵ In addition to concerns arising out of the deaths in Florida, Britain’s experiment with year-round daylight saving time indicated that “the accident rate for children going to school in the morning in the dark increased despite the fact that many more parents took their children to school”—leading to “a slight increase in road casualties among children.”²⁰⁶

Second, year-round daylight saving time presents problems for

201. *See id.* at 84 (letter from New York Economic Development Administration) (“The economic effects of making daylight savings a year-round practice would be nothing less than profound. . . . Because national investment decisions are so dependent on an intimate, timely knowledge of international commerce, American business in general would inevitably benefit from an additional hour’s daily contact with Europe.”).

202. *See id.* (“Retail prosperity would certainly be promoted by such a policy. . . . The leisure industry, a dynamic growth sector in our currently haphazard economy, prospers while the sun shines.”).

203. *Id.* at 26 (statement of Rep. Craig Hosmer).

204. *See, e.g.,* Ayres, *supra* note 162 (“Many parents say their children must start off to school in darkness, easy prey for drowsy motorists.”).

205. Accidents in Florida killed eight school-age children in January 1974 (immediately after the implementation of the Emergency Daylight Saving Time Energy Conservation Act of 1973), a noticeable increase from the two children killed during January 1973. *See* Jenkins, *supra* note 163.

206. *Hearings on S. 385, S. 1260, S. 2568, and S. 2602, supra* note 18, at 45 (memorandum from Deputy Assistant Director for Research, Department of the Interior).

farmers and the agricultural sector. A representative of the Kentucky Farm Bureau Federation testified before the Senate Committee on Commerce in 1975 that in winter months it is often 10:00 in the morning before farmers can work in a hay field, due to dew on the crops during dark morning hours.²⁰⁷ Additionally, many farm workers commute from populated towns and urban centers and desire working hours that are similar to those of urban employees.²⁰⁸ Farm employers dislike winter daylight saving time because the additional hour of morning darkness forces farm employees to "sit around and kill time" while waiting for morning dew to evaporate.²⁰⁹

Third, extended daylight saving time in the 1970s was problematic for radio broadcast stations. The physical characteristics of the broadcast spectrum allow much greater range for radio broadcast during darkness than during daylight.²¹⁰ Recognizing this limitation, the Federal Communications Commission ("FCC") licenses some stations as full-time stations, and others only as daytime stations.²¹¹ When daylight saving time pushes back the time of sunrise, it delays the time when daytime stations can sign on for broadcast, and some daytime radio stations lose a portion of their audience.²¹² Although part of this audience loss from dark morning hours is offset by an evening commute during daylight, the FCC reported that radio stations suffered a net loss in audience and revenue during the 1974 daylight saving time experiment.²¹³ Daytime AM radio stations experienced a 2.5% decrease in their audience during the winter months of 1974.²¹⁴

207. *Hearing on S. 980 and S. 2566, supra* note 18, at 59 (statement of John Koon, Exec. Secretary, Kentucky Farm Bureau Federation).

208. *Id.*

209. *Id.* at 60.

210. *Hearing on S. 980 and S. 2566, supra* note 18, at 75-76 (statement of the National Association of Broadcasters) ("[M]ore broadcast stations can be operated in daylight hours with little or no interference to other full time broadcasters while the same operations at night would impair signal quality of the same full time broadcasters."); FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 106 ("[M]ore stations can broadcast from different locations on a single channel without interference during the day than at night.").

211. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 106; *Hearings on S. 385, S. 1260, S. 2568 and S. 2602, supra* note 18, at 82 (statement of Sen. Marlow Cook) ("[T]here are literally thousands of small radio stations in the United States whose only authority is to go on the air from sunrise to sunset . . .").

212. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 106.

213. *Hearing on S. 980 and S. 2566, supra* note 18, at 17 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, & International Affairs, Department of Transportation); FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 106-07 ("[A] detailed examination by the FCC of revenue changes in January - April 1974 and March - April 1975 shows that a net loss of revenue is experienced (especially in the winter) at many locations.").

214. *Hearing on S. 980 and S. 2566, supra* note 18, at 17 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, & International Affairs, Department of Transportation). Additionally, five hundred of the twenty-three

With a one-hour delay in sunrise during the winter, many stations could not come on the air “until after the businessman has already driven to work, until after the farmer has already completed his chores around the house,” allowing lucrative advertising time to slip away.²¹⁵ The tendency of morning radio listeners to prefer television during the evening exacerbated the problem.²¹⁶

Thus, the United States’ experiment with year-round daylight saving time in 1974 highlighted several negative effects of daylight saving during winter months and framed the tradeoffs of year-round daylight saving time.

C. Studies from the 1974 Year-Round Daylight Saving Time Experiment Are Informative, but Not Conclusive

As policymakers evaluate proposals to extend daylight saving time, they certainly should consider the previously mentioned results from the United States’ experiment with year-round daylight saving time in the 1970s. Even so, a sound policy choice on this issue cannot be based on those studies alone. The Department of Transportation itself has admitted that the relevant studies are dated and analyzed only a limited set of data.²¹⁷ Patterns of energy use in the United States have changed considerably since the mid-1970s.²¹⁸ Officials caution that the LEAA crime study should not be viewed as conclusive evidence that daylight saving time reduced crime, especially given both the limited time and limited sample area.²¹⁹

In sum, for those advocating a return to year-round daylight saving time, dated studies on the effect of the 1974 experiment are informative but not conclusive. This Article attempts to bridge the gap by collecting and analyzing modern research and studies. The following analysis shows that the benefits of year-round daylight saving time outweigh its costs.

hundred AM daytime stations experienced revenue losses (averaging \$1,500 for that winter) because they were operating on Mexican and Canadian clear channels and were prevented by international treaties from making presunrise time adjustments for signing on. *Id.* at 17, 25–26.

215. *Id.* at 64 (statement of J.B. Crawley, President, Radio Station WMSK, Morganfield, Ky.).

216. *See id.*

217. *Hearing on H.R. 704 and 1647, supra* note 18, at 27 (statement of Linda Lawson, Acting Deputy Assistant Secretary for Policy, U.S. Department of Transportation) (“[I]t is very old and it was also for a very limited time.”).

218. *See, e.g., id.* at 3 (statement of Rep. Roscoe G. Bartlett, Chairman, Subcomm. on Energy) (“It is important to recognize that our patterns of energy use have changed considerably since [the 1970s], so that it is not a foregone conclusion that significant energy savings will result from extended Daylight Savings today.”).

219. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 93–94.

III. CONGRESS SHOULD ENACT YEAR-ROUND DAYLIGHT SAVING TIME LEGISLATION

Congress should enact legislation to return the United States to year-round daylight saving time. Although the previously mentioned studies on daylight saving time are dated, new studies and analysis continue to show that year-round daylight saving time would be advantageous for the United States. Daylight saving time involves tradeoffs, and in evaluating these tradeoffs, we should use a cost-benefit analysis. Extension of daylight saving to winter months undoubtedly will produce some adverse effects from additional darkness during morning hours. However, the benefits resulting from another hour of light during late afternoon and early evening (when far more people are awake and can benefit from daylight) will outweigh these costs. Ultimately, although we all would prefer a daylight saving policy that accrues benefits without costs, there are only so many hours of sunlight in a given day. The question before us, then, is how to make the best possible use of the hours we have.

Year-round daylight saving time would be advantageous to the current piecemeal system for several reasons. First, it would save lives by reducing overall fatalities among pedestrians and motor vehicle occupants.²²⁰ Second, extending daylight saving to winter months will likely save energy by reducing peak electricity demand.²²¹ Third, year-round daylight saving time likely will reduce some types of criminal activity by providing another hour of afternoon light.²²² Fourth, year-round daylight saving time will eliminate negative effects caused by the current spring and fall time changes.²²³ Finally, contrary to conventional wisdom, the evidence shows that winter daylight saving time does not endanger school children²²⁴ and does not irreparably harm farmers and radio stations.²²⁵ Thus, on balance, the benefits of extending daylight saving time outweigh its costs.²²⁶

220. See *infra* Part III.A.

221. See *infra* Part III.B.

222. See *infra* Part III.C.

223. See *infra* Part III.D.

224. See *infra* Part III.E.

225. See *infra* Part III.F.

226. At this point, it is worth noting briefly that it is not our intention to weigh every possible advantage or disadvantage of daylight saving time in this Article. Certainly, there are hundreds of other advantages and disadvantages—beyond those mentioned here—that policymakers could consider. By weighing the *primary* advantages and disadvantages of year-round daylight saving time, we hope to contribute significantly to existing literature on the subject. We encourage others to contribute meaningfully to the debate by weighing additional policy advantages and disadvantages of year-round daylight saving time.

A. *Year-Round Daylight Saving Time Saves Lives by Reducing Pedestrian and Motor Vehicle Fatalities*

It is somewhat disappointing that the majority of congressional debate in 2005 centered on the ability of daylight saving time to reduce oil consumption when Congress had a far more noble argument it could have made: hundreds of lives per year are currently being sacrificed by critics of daylight saving. Year-round daylight saving time would result in a significant net decrease in fatal accidents involving pedestrians and motor vehicle occupants. Darkness increases the risk of fatal accidents and is most problematic during the irregular evening commute.²²⁷ Several studies show that winter daylight saving time would decrease accidents in the evening while increasing accidents in the morning.²²⁸ Because individuals are more accident prone during the evening rush hour (and more individuals are on the road during evening than morning), hundreds of American lives would be saved on balance.²²⁹

First, “darkness increases the risk of motor vehicle crashes” that are fatal to pedestrians and motorists.²³⁰ A study by researchers at the University of Michigan Transportation Research Institute examined eleven years of national crash data across the United States. It found that “fatal pedestrian crashes are three to four times more likely in darkness than they are during the daytime,” and fatal motorist crashes are “marginally more likely in darkness.”²³¹ Another study sponsored by the Insurance Institute

227. See, e.g., DOUGLAS COATE & SARA MARKOWITZ, PEDESTRIAN FATALITIES, MOTOR VEHICLE OCCUPANT FATALITIES, AND DAYLIGHT SAVING TIME 7 (2002), <http://www.cornwall.rutgers.edu/pdf/Daylight%20Saving%20Time-Report.pdf>.

228. See, e.g., *id.* at 7; Susan A. Ferguson et al., *Daylight Saving Time and Motor Vehicle Crashes: The Reduction in Pedestrian and Vehicle Occupant Fatalities*, 85 AM. J. PUB. HEALTH 92, 95 (1995).

229. See, e.g., *Hearing on H.R. 704 and 1647, supra* note 18, at 26 (statement of James C. Benfield, Bracy Williams & Co.); COATE & MARKOWITZ, *supra* note 227, at 7; Ferguson et al., *supra* note 228, at 92; John M. Sullivan & Michael J. Flannagan, *The Role of Ambient Light Level in Fatal Crashes: Inferences from Daylight Saving Time Transitions*, 34 ACCIDENT ANALYSIS & PREVENTION 487, 493 (2002).

230. Ferguson et al., *supra* note 228, at 92; see also COATE & MARKOWITZ, *supra* note 227, at 7 (“Daylight is an important determinant of morning and evening pedestrian fatalities in the U.S.”); HILARY GREEN, SOME EFFECTS ON ACCIDENTS OF CHANGES IN LIGHT CONDITIONS AT THE BEGINNING AND END OF BRITISH SUMMER TIME 4 (1980) (“[D]arker conditions increase accident frequency and the effect is more pronounced for fatal and serious accidents than for those less severe.”); Sullivan & Flannagan, *supra* note 229, at 493.

231. Sullivan & Flannagan, *supra* note 229, at 493. The study examined crash data from the National Highway Traffic Safety Administration’s Fatality Analysis Reporting System from 1987 to 1997, focusing in particular on fatal pedestrian crashes at intersections, fatal pedestrian crashes on dark rural roads, and fatal single-vehicle run-off-road crashes on dark, curved roads. *Id.* at 488–89. Data were compared for time periods that “straddled the daylight

for Highway Safety analyzed five years of crash data in the contiguous United States and found a similar effect, estimating that a change from daylight to twilight causes a 300% increase in fatal pedestrian crashes.²³² The negative effect of darkness in the United States is confirmed by the experience of other countries. For example, a three-year study in Britain found that accidents are about 50% more likely in darkness, and that fatal and serious accidents are about 100% more likely.²³³

Second, it would be better to allocate daylight in the evening because fatal accidents are more likely to occur during afternoon and evening hours than during morning hours.²³⁴ A variety of factors lead to more accidents during the afternoon and evening:

The morning rush hour is shorter than the afternoon rush hour. Children and traffic follow a highly regimented routine in the morning and drivers are rested. Contrast that with the afternoon. Many children are riding bicycles and enjoying unsupervised outdoor play. More drivers will have alcohol in their bloodstream, the rush hour is long and more irregular in the afternoon, and drivers are tired and in a hurry to get home.²³⁵

In the United States, there are more than twice as many fatal accidents during evening hours than during morning hours.²³⁶ In Britain, there are 50% more fatal and serious road accident injuries among adults during the hours between 4:00 p.m. and 7:00 p.m. than the period between 7:00 a.m. and 10:00 a.m.²³⁷

Extending daylight saving time to winter months would save hundreds of lives by shifting an hour of daylight from morning to evening.²³⁸ A recent study by researchers at Rutgers University²³⁹

saving time changeover periods in time windows that abruptly changed from dark to light (or light to dark) across the time change." *Id.* at 489.

232. Ferguson et al., *supra* note 228, at 95. The study found that the negative effects of darkness "are far more pronounced for pedestrians than for vehicle occupants," attributing this to vehicle headlights, since pedestrians "rarely carry a flashlight during periods of darkness and do not often wear reflective material." *Id.*

233. GREEN, *supra* note 230, at 4.

234. E.g., COATE & MARKOWITZ, *supra* note 227, at 7 ("[P]edestrian activity is greater in the evening period than in the morning period."); Ferguson et al., *supra* note 228, at 92 ("[T]here is typically more traffic during the affected evening hours than during the morning."); Sullivan & Flannagan, *supra* note 229, at 493 ("[M]ore crashes occur in the evening.")

235. *Hearing on H.R. 704 and 1647*, *supra* note 18, at 26 (statement of James C. Benfield, Bracy Williams & Co.).

236. See Sullivan & Flannagan, *supra* note 229, at 493 figs.9 & 10.

237. MAYER HILLMAN, *TIME FOR CHANGE: SETTING CLOCKS FORWARD BY ONE HOUR THROUGHOUT THE YEAR 6* (1993). There also are three times as many accidents among children in Britain during the period between 3:00 p.m. and 6:00 p.m. than the period between 7:00 a.m. and 10:00 a.m. *Id.*

238. COATE & MARKOWITZ, *supra* note 227, at 7-8.

demonstrates that year-round daylight saving time would save hundreds of lives. The researchers examined Fatality Analysis Reporting System data for every county in the United States for both 1998 and 1999.²⁴⁰ They concluded that year-round daylight saving time would cause a one-third reduction in evening pedestrian fatalities and a one-third increase in morning fatalities.²⁴¹ Because pedestrian activity is greater in the evening than morning, year-round daylight saving time would have reduced pedestrian fatalities by 343 lives during 1998 and 1999, a net decrease of thirteen percent of all pedestrian fatalities.²⁴² Additionally, the study concluded that year-round daylight saving time would have decreased motor vehicle occupant fatalities by 390 over the same two-year period, representing a three-percent decrease in motor vehicle occupant fatalities.²⁴³ Thus, year-round daylight saving time would have saved nearly 370 lives each year in the United States had it been in effect in the late 1990s.²⁴⁴

The Rutgers findings mirror the conclusions of other studies. A study of fatal crash data for the contiguous United States estimated that 901 lives would have been saved from 1987 through 1991 if year-round daylight saving time had been in effect—an average savings of approximately 180 lives per year.²⁴⁵ Results from a British study were even more dramatic. A recent analysis of Britain's three year experiment with year-round daylight saving

239. *Id.* at title page. The study was conducted by two Department of Economics faculty members through a research grant from the Cornwall Center for Metropolitan Studies at Rutgers-Newark. *Id.* The researchers later published their findings in *Accident Analysis and Prevention*. Douglas Coate & Sara Markowitz, *The Effects of Daylight and Daylight Saving Time on US Pedestrian Fatalities and Motor Vehicle Occupant Fatalities*, 36 ACCIDENT ANALYSIS & PREVENTION 351 (2004).

240. COATE & MARKOWITZ, *supra* note 227, at 1, 4. The only counties the researchers did not examine as part of the study were counties in Alaska and Hawaii. *Id.* To ensure the accuracy of its findings, the study took into account variables such as miles traveled, weather, income per capita, local speed limits, seat belt and motor vehicle inspection regulations, and alcohol control policies. *Id.* at 5.

241. *Id.* at 6.

242. *Id.* at 7.

243. *Id.* The study attributed the smaller savings in motor vehicle occupant lives to "the presence of vehicle lights, which make vehicles visible to other drivers during darkness." *Id.* at 7–8.

244. This conclusion represents the sum of the net pedestrian lives that would have been saved during 1998 and 1999 (343) and the net motor vehicle occupant lives saved during the same two-year period (390), divided by two in order to approximate annual savings. *See id.* (providing a summary of lives that would have been saved during 1998 and 1999 through year-round daylight saving time).

245. Ferguson et al., *supra* note 228, at 95. The study found far greater benefit for pedestrians than for vehicle occupants. The estimated 901 lives that would be saved through year-round daylight saving time consisted of 727 fewer fatal pedestrian crashes and 174 fewer crashes fatal to vehicle occupants. *Id.*

time between 1968 and 1971 concluded that approximately 2500 fewer people had been killed or seriously injured during the experiment's first two winters.²⁴⁶

Sunrise and sunset times demonstrate why year-round daylight saving time saves lives. During January, the average standard time sunrise in Los Angeles is 6:57 a.m., and the average sunset is 5:08 p.m.²⁴⁷ Assuming that the average workday starts at 8:00 a.m. and ends at 5:00 p.m., most of the morning commute is in daylight while nearly all of the evening commute is in darkness. If clocks were shifted forward an hour during winter months, however, the average January sunrise in Los Angeles would be 7:57 a.m., and the average sunset would be 6:08 p.m.²⁴⁸ Thus, year-round daylight saving time would give Los Angeles commuters another hour of daylight during the evening commute. Because drivers generally are more alert in the morning and more accident prone during the evening commute,²⁴⁹ year-round daylight saving time will save lives.

Lives would be saved in northern cities as well. For example, the average January standard time sunrise in Minneapolis is 7:46 a.m., and the average sunset is 4:59 p.m.²⁵⁰ If one again assumes that the average workday starts at 8:00 a.m. and ends at 5:00 p.m., most Minneapolis residents travel to work in the dark during *both* morning and evening commutes. Under year-round daylight saving time, however, the morning commute would still be in darkness but there would be light for the evening commute—since the sun would not set until 5:59 p.m.²⁵¹ Although nobody likes waking up to darkness, one commute in daylight is better than none.

In sum, year-round daylight saving time will save hundreds of lives by shifting an hour of daylight to the afternoon. The lives saved during the evening commute will more than offset any increase in morning fatalities. It is well past time for Congress to step up and recognize this most worthy advantage of permanently turning our clocks forward.

246. The study found that Britain's experiment with year-round daylight saving time "had resulted in an 11% reduction in casualties during the hours affected by the time change in England and Wales and a 17% reduction in Scotland" and noted that "[a]lthough casualties in the morning had increased, the decrease in casualties in the evening far outweighed this." ROYAL SOCIETY FOR THE PREVENTION OF ACCIDENTS, SINGLE/DOUBLE SUMMER TIME POLICY PAPER 8 (2003), http://www.rospa.com/roadsafety/info/summertime_paper2006v2.pdf.

247. *Hearing on H.R. 704 and 1647, supra* note 18, at 11 (statement of Rep. Brad Sherman).

248. *Id.*

249. *See, e.g., Hearing on H.R. 704 and 1647, supra* note 18, at 26 (statement of James C. Benfield, Bracy Williams & Co.); COATE & MARKOWITZ, *supra* note 227, at 7; Ferguson et al., *supra* note 228, at 92; Sullivan & Flannagan, *supra* note 229, at 493.

250. *Hearing on H.R. 704 and 1647, supra* note 18, at 12 (statement of Rep. Brad Sherman).

251. *See id.*

B. Year-Round Daylight Saving Time Saves Energy by Reducing Evening Peak Electricity Loads

Although daylight saving time's energy saving effect is more difficult to quantify than its effect on pedestrian and motor vehicle occupant fatalities, it is likely that year-round daylight saving time would at least marginally reduce evening peak electricity loads. A recent study by the California Energy Commission demonstrates that year-round daylight saving time would produce a net decrease in electricity consumption.²⁵² Even a marginal savings in electricity could have a drastic effect.

Two factors produce peaks in evening electricity use. First, electricity demand spikes in the early evening because of the *time of day*. In the early evening many individuals arrive home from work and turn on appliances and heat, but workplaces are still using energy to complete their day of operations.²⁵³ Second, electricity demand also increases due to *sunset and falling temperatures*. When sunset occurs, individuals are more likely to be indoors, they turn on lights at home, heaters operate more often, and streetlights turn on.²⁵⁴

Daylight saving time should reduce evening peak electricity loads because it allows the peak in electricity use associated with time of day to *precede* the increase in electricity use caused by sunset and falling temperatures.²⁵⁵ By contrast, under winter standard time, these two electricity use factors coincide with one another, producing an unnecessarily pronounced evening peak load.²⁵⁶

In 2001, the California Energy Commission concluded that year-round daylight saving time produces a *net decrease* in overall electricity use during winter months of about 3.4%.²⁵⁷ This net decrease results from a significant reduction in evening peak load, which outweighs a smaller increase in the early-morning load.²⁵⁸ As a result, year-round daylight saving time would save approximately 3400 MegaWatt hours of electricity per day in California during winter, amounting to approximately one-half of one percent of the

252. CAL. ENERGY COMM'N, EFFECTS OF DAYLIGHT SAVING TIME ON CALIFORNIA ELECTRICITY USE 3 (2001), available at http://www.energy.ca.gov/reports/2001-05-23_400-01-013.PDF.

253. *Id.* at 8.

254. *Id.*

255. *Id.*

256. *Id.*

257. *Id.* at 3.

258. *Id.* at 7. Morning peak load is always less than evening peak load because many people do not wake up until after sunrise (thus, demands associated with darkness and cold temperatures are less pronounced), while others "wake up in the dark but spend less than an hour at home before leaving for work." *Id.* at 8.

state's winter electricity use.²⁵⁹ The Commission estimated that Californians would save between \$100 million and \$350 million during winter months with year-round daylight saving time, depending on electricity prices.²⁶⁰

Although critics may question the significance of a small net savings in electricity, even a modest effect—especially on peak electricity demand—could have drastic implications. For example, the rolling blackouts in California only a few years ago resulted from electricity demand exceeding supply by only *one or two percent*.²⁶¹ Thus, year-round daylight saving time not only reallocates sunlight; its marginal effect on peak electricity use has the potential to literally keep individuals out of the dark.

C. Year-Round Daylight Saving Time Reduces Criminal Activity by Providing Another Hour of Afternoon Light

Extending daylight saving to winter months likely will decrease crime. On balance, several American and British studies show that improved street lighting reduces crime. Additionally, many crime rates are low during morning hours and peak during late afternoon

259. *Id.* at 3.

260. *Id.* at 16. In January 2007, two researchers at the University of California released a working paper questioning studies that show a net savings in energy from daylight saving time. See Ryan Kellogg & Hendrik Wolff, *Does Extending Daylight Saving Time Save Energy? Evidence From an Australian Experiment 2-4* (Univ. of Cal. Energy Inst., Working Paper No. 163, 2007), available at <http://www.ucei.berkeley.edu/PDF/csemwp163.pdf>. The study examined data from Australia's brief two-month daylight saving time extension in 2000 (enacted to facilitate the Olympic Games in Sydney) and concluded that "the extension failed to conserve electricity." *Id.* at 3-4. Although this University of California study adds meaningful analysis to the daylight saving time debate, it should not be read as disproving the California Energy Commission's findings. The study examined an extremely limited period of time, did not analyze the effects of *year-round* daylight saving time, and, as the authors themselves admit, "we cannot directly apply our results to other countries without adjustment for behavioral and climatic differences." *Id.* at 4. As the California Energy Commission stated in a follow-up report released in May 2007, "it is important to understand that the absence of statistical confidence does not mean there is no effect. It is entirely possible that early DST saved electricity as people used less light and heat in the evenings." CAL. ENERGY COMM'N, *THE EFFECT OF EARLY DAYLIGHT SAVING TIME ON CALIFORNIA ELECTRICITY CONSUMPTION: A STATISTICAL ANALYSIS 5* (2007); available at <http://www.energy.ca.gov/2007publications/CEC-200-2007-004/CEC-200-2007-004.PDF>. See also Justin Lahart, *Daylight Saving Wastes Energy*, WALL ST. J., Feb. 27, 2008, at D1 (noting that a recent study conducted by Mathew Kotchen and Laura Grant showed a slight increase in electricval consumption in Indiana due to increased air conditioning use after the switch to daylight saving time). Although more studies are needed to conclusively wuanitfy the net effect of dalight saving time, the great majority of the reserch performed to date verifies energy savings.

261. *Hearing on H.R. 704 and 1647, supra* note 18, at 6 (statement of Rep. Brad Sherman).

and evening hours. By shifting an hour of sunlight from morning to evening during winter months, year-round daylight saving time has the potential to significantly reduce crime.

First, improved street lighting appears to decrease crime. For decades, studies debated whether street lighting had any actual effect on crime rates,²⁶² and the effect of light appeared inconclusive.²⁶³ However, recent analysis of these studies indicates that street lighting does play a key role in reducing many criminal incidents.²⁶⁴ In 2002, researchers at Britain's Home Office gathered and screened all available American and British studies on the effects of improved lighting on crime.²⁶⁵ Conducting a systematic analysis,²⁶⁶ the researchers only relied on studies that included

262. Compare, e.g., Kate Painter, *The Influence of Street Lighting Improvements on Crime, Fear and Pedestrian Street Use, After Dark*, 35 LANDSCAPE & URB. PLAN. 193, 193 (1996) (arguing that study results "provide convincing evidence that sensitively deployed street lighting can lead to reductions in crime and fear of crime, and increase pedestrian street use after dark"), and Kate Painter & David P. Farrington, *Street Lighting and Crime: Diffusion of Benefits in the Stoke-on-Trent Project*, 10 CRIME PREVENTION STUDIES 77, 94 (1999) ("For all crime categories except burglary, prevalence decreased significantly in the experimental area after the street lighting was improved."), available at <http://popcenter.org/Library/CrimePrevention/Volume%2010/04-PainterFarrington.pdf>, with STEPHEN ATKINS ET AL., HOME OFFICE (LONDON), CRIME PREVENTION UNIT PAPER NO. 28, THE INFLUENCE OF STREET LIGHTING ON CRIME AND FEAR OF CRIME 20 (1991) ("[N]o evidence could be found to support the hypothesis that improved street lighting reduces reported crime."), available at <http://www.homeoffice.gov.uk/rds/prgpdfs/fcpu28.pdf>, and David Herbert & Norman Davidson, *Modifying the Built Environment: The Impact of Improved Street Lighting*, 25 GEOFORUM 339, 341 (1994) ("There is clearly no necessary relationship between lighting and crime."), and MALCOLM RAMSAY, HOME OFFICE (LONDON), CRIME PREVENTION UNIT PAPER NO. 29, THE EFFECT OF BETTER STREET LIGHTING ON CRIME AND FEAR: A REVIEW 24 (1991) ("Better lighting by itself has very little effect on crime."), available at <http://www.homeoffice.gov.uk/rds/prgpdfs/fcpu29.pdf>.

263. See LAWRENCE W. SHERMAN ET AL., UNIV. OF MD., PREVENTING CRIME: WHAT WORKS, WHAT DOESN'T, WHAT'S PROMISING: A REPORT TO THE UNITED STATES CONGRESS 203 (1997) (noting that the effect of lighting on crime is inconclusive in part "due to the lack of research on lighting, particularly in the United States" and in part because "the limited research on lighting continues to use weak designs (typically without control areas) which fail to substantially reduce our uncertainty about the effect of lighting on crime").

264. DAVID P. FARRINGTON & BRANDON C. WELSH, HOME OFFICE (LONDON), RESEARCH STUDY NO. 251, EFFECTS OF IMPROVED STREET LIGHTING ON CRIME: A SYSTEMATIC REVIEW 2 (2002) (noting that although initial research questioned the effect of street lighting on crime, "as further evidence accumulated, there were more signs that improved street lighting could have an effect in reducing crime"), available at <http://www.homeoffice.gov.uk/rds/pdfs2/hors251.pdf>.

265. *Id.* at 8 ("The main aim of this report is to present the findings of a systematic review of the available research evidence on the effects of improved lighting on crime."); see also David P. Farrington & Brandon C. Welsh, *Improved Street Lighting and Crime Prevention*, 19 JUST. Q. 313, 313 (2002) (publishing the findings of Farrington & Welsh's systematic review).

266. "Systematic analysis" refers to the use of "rigorous methods for locating,

before and after measures of crime in both experimental and control areas.²⁶⁷ A meta-analysis of eight American and five British studies that met these criteria showed a twenty percent decrease in crime in experimental areas (with improved street lighting) compared with control areas—"a significant effect of improved lighting."²⁶⁸

Second, studies show that many crime incidents are low during morning hours and peak during late afternoon and evening hours.²⁶⁹ In essence, time of day is one of the most important factors in crime rate.²⁷⁰ For example, one study compiled statistics for hourly

appraising and synthesizing evidence from prior evaluation studies." FARRINGTON & WELSH, *supra* note 264, at 7.

267. *Id.* at 9.

268. *Id.* at 34. Farrington and Welsh's systematic analysis later was criticized for "ignor[ing] the large variation (known as 'overdispersion') in the data and implicitly assum[ing] that crimes are independent events." P. R. Marchant, Research Note, *A Demonstration that the Claim that Brighter Lighting Reduces Crime Is Unfounded*, 44 BRIT. J. CRIMINOLOGY 441, 441 (2004). However, this criticism does not invalidate the conclusions of Farrington and Welsh's systematic analysis:

Dr Marchant's critique has drawn attention to our disciplines [sic] lack of knowledge about key criminology issues. . . . Contrary to Dr Marchant's arguments, however, we contend that the [studies] did provide evidence that improved lighting caused a decrease in crime. . . . Even if we assume that the variance of the total number of crimes greatly exceeds the mean, the conclusions of our meta-analysis hold up: namely that existing evaluations of the highest methodological quality, when analysed together, show that improved lighting, on average, causes a significant 20 per cent decrease in crime in experimental areas compared with comparable control areas.

David P. Farrington & Brandon C. Welsh, *Measuring the Effects of Improved Street Lighting on Crime: A Reply to Dr Marchant*, 44 BRIT. J. CRIMINOLOGY 448, 465-66 (2004).

269. See, e.g., MICH. METRO. INFO. CTR., WAYNE STATE UNIV., REALITY VS. PERCEPTIONS: AN ANALYSIS OF CRIME AND SAFETY IN DOWNTOWN DETROIT 7-8 (2005), available at http://www.tedconline.com/uploads/Downtown_Detroit_Crime_Study_2006.pdf; Marcus Felson & Erika Poulsen, *Simple Indicators of Crime by Time of Day*, 19 INT'L J. FORECASTING 595, 598 (2003). Violent crime rates in particular are higher per hour during the late afternoon and evening than during morning and early afternoon hours. According to the U.S. Department of Justice, 52.6% of violent crimes in 2005 occurred between 6:00 a.m. and 6:00 p.m. (an average hourly rate of 4.4%), while 34.5% of violent crimes occurred between 6:00 p.m. and midnight (an average hourly rate of 5.8%). BUREAU OF JUSTICE STATISTICS, U.S. DEPT' OF JUSTICE, CRIMINAL VICTIMIZATION IN THE UNITED STATES, 2005 STATISTICAL TABLES tbl.59 (2005), available at <http://www.ojp.usdoj.gov/bjs/pub/pdf/cvus05.pdf>.

270. See, e.g., MICH. METRO. INFO. CTR., WAYNE STATE UNIV., REALITY VS. PERCEPTIONS: AN UPDATED ANALYSIS OF CRIME AND SAFETY IN DOWNTOWN DETROIT 7 (2006) ("Criminal acts by nature do not remain constant over time. Rather, crime incidents vary by month, day of week and time of day."); Ellen G. Cohn & James Rotton, *Weather, Seasonal Trends and Property Crimes in Minneapolis, 1987-1988: A Moderator-Variable Time-Series Analysis of Routine Activities*, 20 J. ENVTL. PSYCHOL. 257, 266 (2000) ("[T]he primary determinants of criminal behavior are time of day and day of the week."); Felson & Poulsen, *supra* note 269, at 595 ("Crime varies more by hour of day than by any other predictor we know.").

robbery patterns in thirteen American cities for 2000 and 2001.²⁷¹ The researchers selected 5:00 a.m. as the starting point for each day (meaning that a particular “crime day” ended at 4:59 a.m. the next morning).²⁷² To demonstrate the hourly distribution of crime, the study calculated “quartile minutes” for robbery for each city—in other words, the average minute of the day when twenty-five percent of all robberies have occurred, as well as the minutes when fifty percent and seventy-five percent of all robberies have occurred.²⁷³

The results were telling. In ten of the cities, more than ten hours pass in the morning and early afternoon before the first twenty-five percent of robberies occur (meaning that the first quartile minute arrives sometime *after* 3:00 p.m.).²⁷⁴ By comparison, in all thirteen cities the next twenty-five percent of robberies occurred *in less than six hours* during the late afternoon and evening.²⁷⁵ These findings demonstrate that individuals are more likely to be victims of robbery during the late afternoon and evening, rather than during the morning.²⁷⁶ Several studies also show that other crimes—including assault, larceny, motor vehicle theft, and juvenile crime—are sparse during morning hours and peak during late afternoon and evening hours.²⁷⁷ For many crimes, Americans face a greater risk during the evening.

Whatever the reason that criminals are apparently late to rise

271. Felson & Poulsen, *supra* note 269, at 599. The thirteen cities included Albany, N.Y.; Akron, Ohio; Cincinnati, Ohio; Evansville, Ind.; Fort Wayne, Ind.; Hartford, Conn.; Lincoln, Neb.; Lowell, Mass.; Plano, Tex.; Rockford, Ill.; South Bend, Ind.; Springfield, Ill; and Tampa, Fla. *Id.*

272. *Id.* at 596.

273. *Id.* at 597, 599.

274. *See id.* at 599.

275. *See id.*

276. *See id.* at 598 (noting that only 8.9% of all robberies in Albany, New York occur between 6:00 and 11:00 a.m.; in comparison, 29.1% of all robberies occur between 6:00 and 11:00 p.m.).

277. *See, e.g.*, BUREAU OF JUSTICE STATISTICS, U.S. DEP'T OF JUSTICE, *supra* note 269 tbl.59 (recording that robbery, assault, motor vehicle theft, rape and sexual assault incidents during 2005 were, on average, higher per hour between 6:00 p.m. and midnight than between 6:00 a.m. and 6:00 p.m.); MICH. METRO. INFO. CTR., *supra* note 270, at 8 (noting that most criminal incidents of robbery, felonious assault, larceny and motor vehicle theft in downtown Detroit occurred during evening hours; morning incidents constituted less than twenty percent of those occurring during the evening); Office of Juvenile Justice and Delinquency Program, U.S. Dep't of Justice, *Juveniles as Offenders: Time of Day*, <http://ojjdp.ncjrs.org/ojstatbb/offenders/qa03301.asp> (last visited Dec. 29, 2007) (“Juvenile violence peaks in the afterschool hours on school days and in the evenings on nonschool days.”); STATISTICAL ANALYSIS CENTER, OFFICE OF JUSTICE ASSISTANCE (Wisconsin), *INCIDENT-BASED REPORTING, DATA EXAMPLES 224 graph 11*, <http://oja.state.wi.us/docview.asp?docid=4045&locid=97> (last visited Dec. 29, 2007) (noting that approximately 13.3% of Wisconsin robberies occur between 6:00 a.m. and 12:00 noon; in comparison, 42.4% of robberies occur between 6:00 p.m. and 12:00 midnight).

and late to bed, Congress should take advantage of it by enacting year-round daylight saving time. Doing so would reduce crime by shifting an hour of light to the time of day when it is needed most. Daylight saving during winter months would add an hour of light to the late afternoon and evening—the peak time of day for many crimes, including assault, larceny, motor vehicle theft, and juvenile crime.²⁷⁸ An additional hour of darkness in the morning is an acceptable tradeoff, since most crime rates are low during morning hours.²⁷⁹ Thus, year-round daylight saving time maximizes the effect of daylight on crime rates.

D. Year-Round Daylight Saving Time Will Eliminate Negative Effects Caused by Spring and Fall Time Changes

In addition to the benefits associated with an additional hour of evening light during winter months, year-round daylight saving time presents another significant advantage—eliminating the need to “spring forward” and “fall back.” The small change in time twice a year leads to significant consequences, and year-round daylight saving time would avoid the subtle interruption of sleep patterns caused by a twice-yearly time change. Our society has been labeled “chronically sleep-deprived,”²⁸⁰ and it is plagued with a host of problems resulting from insufficient sleep and disrupted circadian rhythms.²⁸¹ Because American society is already chronically sleep deprived, even small changes in sleep schedules can have drastic

278. See, e.g., MICH. METRO. INFO. CTR., *supra* note 270, at 8 (recording that robbery, felonious assault, larceny and motor vehicle theft in downtown Detroit peak during evening hours); Office of Juvenile Justice and Delinquency Program, *supra* note 277; BUREAU OF JUSTICE STATISTICS, U.S. DEPT OF JUSTICE, *supra* note 269 tbl.59 (noting that robbery, assault, motor vehicle theft, rape, and sexual assault incidents during 2005 were, on average, higher per hour between 6:00 p.m. and midnight than between 6:00 a.m. and 6:00 p.m.).

279. See, e.g., BUREAU OF JUSTICE STATISTICS, U.S. DEPT OF JUSTICE, *supra* note 269 tbl.59; MICH. METRO. INFO. CTR., *supra* note 270, at 8 (morning crime incidents constitute less than twenty percent of those occurring during the evening); STATISTICAL ANALYSIS CENTER, OFFICE OF JUSTICE ASSISTANCE (Wisconsin), *supra* note 277.

280. Stanley Coren, Correspondence, *Daylight Savings Time and Traffic Accidents*, 334 NEW ENG. J. MED. 924, 924 (1996).

281. See, e.g., *id.* (claiming that the cost of sleep-related accidents in 1988 “exceeded \$56 billion and included 24,318 deaths and 2,474,430 disabling injuries”); Damien Leger, *The Cost of Sleep-Related Accidents: A Report for the National Commission on Sleep Disorders Research*, 17 SLEEP 84, 91 (1994) (“The total economic cost of sleepiness related to accidents, including motor-vehicle, work-related, home-based, and public accidents, is estimated to have been between 43 and 56 billion dollars in 1988.”); Timothy H. Monk & Simon Folkard, Letter, *Adjusting to the Changes to and from Daylight Saving Time*, 261 NATURE 688, 689 (1976) (“[A]djustment to the time changes associated with DST is not instantaneous, and that significant disruptions in behaviour may occur during adaptation to the new cycle.”).

effects.²⁸²

Most notably, studies show a significant increase in traffic accident fatalities for the week following the spring daylight saving time change, when individuals lose an hour of sleep. For example, psychologist Stanley Coren analyzed United States traffic fatalities for the weeks preceding and following both the spring and fall daylight saving time changes.²⁸³ He found that accidents during the week of the spring daylight saving time change increased by 6.5% compared with the week before.²⁸⁴ Dr. Coren also concluded that the difference in accidents during the fall daylight saving time change was statistically insignificant.²⁸⁵

Some studies have concluded that accidents increase after *both* spring and fall daylight saving time changes simply because people's schedules have been thrown off their normal pattern.²⁸⁶ For example, researchers at Stanford and Johns Hopkins analyzed twenty-one years of vehicle crash data and concluded in 2001 that accidents increase the week following both spring and fall time changes.²⁸⁷ Similarly, researchers at San Jose State University studied traffic accidents in California from 1976 to 1978 and concluded that "there is a significant increase in traffic accidents during the week following the DST change which occurs *regardless of the season*."²⁸⁸ Comparing the daily number of accidents for the week before and week following the spring and fall time changes,

282. See Sharon Bernstein, *Time Change May Put Sleepier Drivers on Road*, L.A. TIMES, Mar. 31, 2005, at B2 ("[E]ven the loss of a small amount of sleep can affect driving"); Coren, *supra* note 280, at 924 ("Although one hour's change may seem like a minor disruption in the cycle of sleep and wakefulness, measurable changes in sleep pattern persist for up to five days after each time shift."); Dawn Fallik, *Body Clocks Don't Just Spring Ahead*, BOSTON GLOBE, Mar. 12, 2007, at C1 ("Studies have shown that the Monday after daylight saving time, car accidents increase 10 percent on the highways You're taking a sleep-deprived nation and cutting another hour off the board, not simply shifting the circadian rhythm." (quoting Dr. Charles A. Czeisler, chief of sleep medicine at Brigham and Women's Hospital)). *But see* Neeraj Sood & Arkadipta Ghosh, *The Short and Long Run Effects of Daylight Saving Time on Fatal Automobile Crashes*, 7 BERKELEY ELEC. J. ECON. ANALYSIS & POL'Y, Art. 11, at 15 (2007) (finding no increase in automobile crashes resulting from the short-term sleep disruption associated with daylight saving time changes, but admitting that this result "mostly contradicts findings in the existing literature").

283. Stanley Coren, *Accidental Death and the Shift to Daylight Savings Time*, 83 PERCEPTUAL & MOTOR SKILLS 921, 921 (1996).

284. *Id.*

285. *Id.* at 922.

286. See Sharon Bernstein, *supra* note 282; Robert A. Hicks et al., *Daylight Saving-Time Changes Increase Traffic Accidents*, 56 PERCEPTUAL & MOTOR SKILLS 64, 65 (1983).

287. Sharon Bernstein, *supra* note 282 (reporting findings of study by Jason Varughese of Stanford University and Richard P. Allen of Johns Hopkins University).

288. Hicks et al., *supra* note 286, at 65 (emphasis added).

the study found a 3.6% increase in accidents on Monday alone (compared with the Monday before the time change).²⁸⁹ The researchers warned that “[w]hen one considers that the numbers presented . . . represent several deaths, hundreds of injuries, and the loss of millions of dollars in lost work and damages to property, the *social costs* of our annual DST change ritual may be unacceptably high.”²⁹⁰

Additionally, several researchers have noted other unsettling behavioral habits that occur immediately after the spring and fall daylight saving time changes. A study of New Mexico accident reports during the period from 1989 to 1992 found that fatal alcohol-related accidents during the week following the spring and fall daylight saving time changes represented 71.2% of all traffic accidents, up significantly from 53.7% for the prior week.²⁹¹ A study of international financial markets even suggested a correlation between the spring and fall daylight saving time changes and large negative returns on financial market indices. On Mondays following the time changes, the United States apparently has averaged a “one-day loss of \$31 billion on the NYSE, AMEX, and NASDAQ exchanges.”²⁹²

Thus, in addition to the many benefits from evening daylight during winter months, year-round daylight saving time would also avoid complications associated with the twice-yearly time change.²⁹³

289. *Id.* at 66.

290. *Id.* at 66. It is worth noting that studies on the effect of the daylight saving time changes are not in complete agreement. Compare, e.g., Coren, *supra* note 280, at 924 (claiming that the spring shift to daylight saving time results in an eight percent *increase* in traffic accidents, and the fall shift results in a *decrease* in accidents of the same percentage), with Mats Lambe & Peter Cummings, *The Shift to and from Daylight Savings Time and Motor Vehicle Crashes*, 32 ACCIDENT ANALYSIS & PREVENTION 609, 609–11 (2000) (analyzing the effect of the shift to and from daylight saving time on motor vehicle crashes in Sweden and concluding that the shift had no measurable effects on crash incidence), and Alex Vincent, Correspondence, *Effects of Daylight Savings Time on Collision Rates*, 339 NEW ENG. J. MED. 1167–68 (1998) (questioning Dr. Coren’s findings). However, most studies show a net effect on lives that is at least marginally (and frequently significantly) negative, and no study shows a net savings in lives as a result of both spring and fall daylight saving time changes combined.

291. Gregory J. Hicks et al., *Fatal Alcohol-Related Traffic Crashes Increase Subsequent to Changes to and from Daylight Savings Time*, 86 PERCEPTUAL & MOTOR SKILLS 879, 880 (1998).

292. Mark J. Kamastra et al., *Losing Sleep at the Market: The Daylight Saving Anomaly*, 90 AM. ECON. REV. 1005, 1010 (2000).

293. As a counterargument, one should note that critics of year-round daylight saving contend that the switch in time during fall and spring is actually positive because it reminds Americans to change the batteries in their smoke detectors. See Josh Brown, *Points of Contention*, DALLAS MORNING NEWS, July 27, 2005, at 2A (stating that “firefighters who’ve used the ‘change your clock, change your battery’ slogan worry about dead smoke detectors” from extended daylight saving time); Kevin Duggan, *Has Time Run Out on Daylight*

E. Contrary to Critics' Claims, Year-Round Daylight Saving Time Will Not Endanger School Children

For decades, school officials and parents have fought attempts to extend daylight saving time, arguing that increased morning darkness will jeopardize the safety of children commuting to school.²⁹⁴ Parents point to a noticeable increase in school-age children deaths in Florida during the early months of the 1974 winter daylight saving time experiment.²⁹⁵ Although daylight saving time advocates argue that schools should adjust accordingly by shifting back the start of the school day, opponents claim that such a shift is not practical “when you have working parents and those going to and from work, having to meet work commitments.”²⁹⁶

These are serious concerns. However, the correlation between extended daylight saving time and school children fatalities does not withstand scrutiny. First, the evidence shows that year-round daylight saving time does not pose a serious threat to the safety of school children and confirms that the disturbing deaths in Florida thirty years ago are not indicative of a nationwide trend. One month after the United States started observing winter daylight saving time in January 1974, no state other than California and Florida had reported a significant increase in accidents involving school-age children.²⁹⁷ The National Safety Council (“NSC”) later surveyed forty-two states and the District of Columbia and

Saving?, FORT COLLINS COLORADOAN, Apr. 3, 2004, at B1 (“Fire officials say daylight-saving time is a good way to remember to change the batteries in smoke detectors.”). While this may be true, it seems curious to the authors why changing from daylight saving time to standard time should be the one and only impetus for Americans to think about fire safety. Why not choose July 4th or Christmas or Halloween or create national “Smokey the Bear Day” to address this concern?

294. See, e.g., Ayres, *supra* note 162 (“Many parents say their children must start off to school in darkness, easy prey for drowsy motorists.”); Editorial, *Don't Mess with Time*, ATLANTA J. CONST., Apr. 3, 1993, at A19 (“The worst thing about daylight-saving time is that darkness still lingers when some children are going to school.”); Dianne Stallings, *Parents Worry About Bus Stops in the Dark*, ST. PETERSBURG TIMES (Fla.), Oct. 1, 1987, at 1 (reporting that school and parent-teacher associations propose reducing daylight saving time observance to decrease risk of children waiting for school buses in the dark); Suzanne Wilder, *More Sun for Some Will Leave Others in Dark*, COLUMBUS DISPATCH (Ohio), Aug. 20, 2005, at A1 (reporting that the National Parent Teacher Association initially opposed the proposal to extend daylight saving time for eight weeks).

295. As noted above, accidents in Florida killed eight school-age children in January 1974 (immediately after the implementation of the Emergency Daylight Saving Time Energy Conservation Act of 1973), a noticeable increase from the two children killed during January 1973. See Jenkins, *supra* note 163.

296. *Hearing on S. 980 and S. 2566*, *supra* note 18, at 12 (statement of James E. Baker, Superintendent, Middlesboro Schools, Middlesboro, Ky.).

297. Ayres, *supra* note 162.

concluded that winter daylight saving time had "little or no effect on the number of early-morning traffic fatalities among school children."²⁹⁸ Other studies confirmed NSC's results, including the previously mentioned study by researchers at Rutgers University.²⁹⁹ The Rutgers study examined accident data for every county in the United States for 1998 and 1999, and found no increased risk to school children from year-round daylight saving time.³⁰⁰

Second, if there is any overall effect of daylight saving time on school children, it is likely a net positive effect after factoring in lives saved during sunlit evening hours. The DOT's study on the effects of winter daylight saving time showed a nationwide increase of ten school children fatalities during the morning hours during the winter of 1974, but this number was offset by the sixty fewer afternoon school children fatalities during the same period.³⁰¹

Third, there are ways to mitigate any problems associated with morning darkness. Past experience demonstrates that school districts *will* adjust to year-round daylight saving time by delaying the start of the school day during winter months.³⁰² For example,

298. *School Deaths Not Tied to Shift in Time*, N.Y. TIMES, Feb. 21, 1974, at 20; see also *Hearing on S. 980 and S. 2566*, *supra* note 18, at 50–51 (statement of Robert Currie, Director of the National Safety Council's Office of External Relations; Accompanied by Harry Rosenfield, General Counsel).

299. See, e.g., FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 77–83 (concluding that daylight saving time does not "have a significant effect on the number of children killed going to and from school"); COATE & MARKOWITZ, *supra* note 227, at 10 n.11 (finding "no increased risk to school children" from year-round daylight saving time and concluding that "sunrise is not an important variable" in fatalities of school-age children).

300. COATE & MARKOWITZ, *supra* note 227, at 10 n.11.

301. *Hearing on S. 980 and S. 2566*, *supra* note 18, at 19 (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, & International Affairs, Department of Transportation). A study by the National Bureau of Standards later questioned the validity of the Department of Transportation's findings. NATIONAL BUREAU OF STANDARDS, *supra* note 192, at E-3 ("There was a statistically significant increase of school-age children fatalities in the morning during the four-month period January–April 1974 as compared to the same period (non-DST) of 1973."). However, the NBS considered only injuries to pedestrians and pedal-cyclists, completely excluding the category of motor-vehicle occupant fatalities experienced by school-age children. *Daylight Saving Time Act of 1976: Hearings Before the Subcomm. on Transportation and Commerce of the Comm. on Interstate and Foreign Commerce on H.R. 13089, H.R. 13090 (and Similar Bills) and S. 2931*, 94th Cong. 51 (1976) (statement of Robert H. Binder, Assistant Secretary for Policy, Plans, & International Affairs, Department of Transportation). A comparison of standard time (1973) and winter daylight saving time (1974) showed motor-vehicle occupant fatalities for school-age children decreasing at all times of the day. *Id.* The NBS methods thus are incomplete and skew the analysis.

302. See, e.g., *Schools Starting Later to Protect the Children*, N.Y. TIMES, Jan. 14, 1974, at 21 (noting that school districts in Minneapolis; Norwalk, Conn.; Philadelphia; Winston-Salem, N.C.; and parts of Wisconsin had delayed start times); Ayres, *supra* note 162 ("Hundreds of schools, including those in Tallahassee, now open their doors a half an hour or so later than before.").

during the 1974 winter daylight saving time experiment, 44% of school districts in the United States—serving 47% of the nation's students—quickly shifted school hours to later times.³⁰³ Additionally, there are other viable solutions to early morning darkness, including increased funding for school crossing guard services and pedestrian safety training for school children.³⁰⁴

Although policymakers should seriously consider the concerns of school officials and parents, they should not allow tragic newspaper accounts to interfere with a rational policy choice. As the founder of the Daylight Saving Time Coalition explained to members of Congress in 2001:

If a child is killed in the morning hours, there will be finger-pointing at the bus driver, the school principal, the superintendent, and at YOU for having voted for this change. However, the fatal accident that is *avoided* because of more afternoon daylight will never be reported. The child whose life is saved because a driver slammed on the brakes in the nick of time will never see his photo in the news.³⁰⁵

In sum, winter daylight saving time either has no effect on school children fatalities or a net positive effect. Regardless, parents and school officials should implement other methods for ensuring the safety of school-age children during morning hours, allowing the rest of society as a whole to benefit from year-round daylight saving time.

F. Other Problems Associated with Year-Round Daylight Saving Do Not Outweigh Its Benefits

Two other potential drawbacks of year-round daylight saving time must be addressed—disadvantages to farmers and radio stations. Fortunately, the evidence shows that these disadvantages are minimal, and are easily outweighed by the significant

303. NATIONAL BUREAU OF STANDARDS, *supra* note 192, at S-6.

304. *Energy Hearing on H.R. 704 and 1647*, *supra* note 18, at 96 (post-hearing answers submitted by William R. Harris).

305. *Id.* at 56 (statement of James C. Benfield, Bracy Williams & Co.) (emphasis added); see also HILLMAN, *supra* note 237, at 5 (noting that the small increase in morning children fatalities during Britain's 1968–1971 experiment with year-round daylight saving time “seems to have been so imprinted on the public memory that the far more substantial decrease stemming from the lighter late afternoons in the winter and evenings in the summer has been overlooked”). Moreover, this problem relates to systematic misperception of risk—people fear and overreact to highly publicized risks that they see and hear about (even ones that are minimal) far more than they fear risks they do not see and hear about (even where they are far greater). See generally Steve P. Calandrillo, *Responsible Regulation: A Sensible Cost-Benefit, Risk Versus Risk Approach to Federal Health and Safety Regulation*, 81 B.U. L. REV. 957, 1000–02 (2001) (discussing the effect of societal misperception of risk on policy decisions).

advantages of daylight saving during winter months.

First, year-round daylight saving time does not irreparably affect the agricultural community. After the 1974 experiment with year-round daylight saving time, the Department of Agriculture reported that the experiment did not significantly affect agricultural activities or productivity.³⁰⁶ The agricultural community now appears to accept that daylight saving time has marginal effect on farmers. Although the agricultural sector vigorously lobbied against daylight saving legislation in the early twentieth century,³⁰⁷ farmers have not actively opposed extensions of daylight saving time in recent years.³⁰⁸

Second, year-round daylight saving time would have minimal effect on radio stations. The problem posed to AM radio stations (noted above)³⁰⁹ appears to be resolving itself over time. Some claim that the dramatic growth in FM band for local radio over the last thirty years—not to mention the increased use of internet broadcasting technology—has made daylight saving time concerns regarding AM radio sign-on times “a non-issue.”³¹⁰ Additionally, net losses by daytime radio stations have always been small when measured against total AM broadcast revenues.³¹¹ Thus, policymakers can enact year-round daylight saving time without irreparably harming the agricultural sector and radio stations.

CONCLUSION

Daylight saving time has a long, storied history in the United States, and the topic continues to elicit surprisingly strong opinions today. Despite these intense views, Congress should rationally assess the benefits and drawbacks of extended daylight saving time, using modern studies and analysis. In doing so, it should resist the urge to be swayed by unsubstantiated claims and powerful interests—both of which have led our country astray on this issue more than once in the past.

A rational cost-benefit analysis of existing research

306. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 113–14 (reporting the findings of Department of Agriculture).

307. *See, e.g., Congress For Repeal of Daylight Saving*, *supra* note 78 (reporting that agricultural interests successfully lobbied Congress for repeal of the first daylight saving law).

308. *See* Robert Tuttle, *Happy to Spring Ahead, More Daylight-Saving? Local Businesses Say It's Time For a Change*, *NEWSDAY* (N.Y.), Aug. 10, 2005, at A39.

309. *See supra* Part II.B.

310. *Hearing on H.R. 704 and 1647*, *supra* note 18, at 75 (statement of James C. Benfield, Bracy Williams & Co.).

311. FINAL DAYLIGHT SAVING REPORT, *supra* note 142, at 111 (stating that the FCC estimated that the 1974 experiment with winter daylight saving time resulted in a revenue loss of \$750,000, which is “statistically insignificant” when measured against total AM broadcast revenues of \$1.5 billion that year).

demonstrates numerous reasons why Congress should adopt year-round daylight saving time. The benefits of such a plan clearly outweigh the disadvantages: hundreds of lives would be saved each year, and rolling power blackouts could be avoided. Crime would decrease. Americans would stop losing sleep after adjusting their clocks. Another hour of morning darkness during winter months is a small price to pay for the far greater advantages of extended evening daylight. Ultimately, the evidence shows that it is past time for Americans—and Congress—to shift their thinking permanently forward on daylight saving time.
