

1. TREATMENT OF TIME

1.1 APPROACH

This section addresses the treatment of the value of time saved or lost as a result of investments in transportation facilities or regulatory actions. It is based in large part upon guidance furnished by the Office of the Secretary of Transportation (OST), hereafter referred to as DOT guidance.¹

Many FAA rulemaking initiatives can affect the time passengers spend traveling. Some proposed rules are designed to improve the efficiency of the National Airspace System and thus reduce delay and travel time. Actions in pursuit of other goals such as improved safety may also have the intended or unavoidable consequence of increasing the cost of travel, and hence travel time.

As a result, changes in travel time by passengers, pilots, and other persons engaged in providing air transport, are often an important event that is monetized within a regulatory or investment analysis.

For the purpose of evaluating an investment or regulatory action, it is understood that time is a valuable economic resource that may be devoted to work or leisure activities. Because traveling consumes time, it imposes an opportunity cost equal to the individual's value of time in the forgone work or leisure activity. Moreover, since travel may take place under undesirable circumstances, including waiting or riding aboard a crowded or uncomfortable vehicle, it can impose an additional cost on travelers. Travel time saved or lost as a result of investments or regulatory actions should be valued in benefit-cost analyses to reflect both the opportunity cost and discomfort, if any, people experience when traveling.

Economic theory postulates that individuals will adjust the amount of time they devote to work and leisure such that an additional small increment of either may be valued at the wage rate.² More realistic models recognize that constraints on the ability of workers to alter work schedules or the conditions under which time is devoted to either work or leisure can cause the value people place on an incremental gain or loss of time to deviate, perhaps significantly, from the wage rate.³ Nonetheless, contemporary practice is to value travelers' time as a proportion of the wage rate.

¹ *Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis*, Office of the Secretary of Transportation, September 27, 2016.

² For a presentation of the conventional theory, see James M. Henderson and Richard E. Quandt, *Microeconomic Theory-A Mathematical Approach*, New York, McGraw-Hill, 1958, pp. 23-24.

³ Nils A. Bruzelius, *The Value of Travel Time: Theory and Measurement*, London: Croom Helm, 1979, and Kenneth A. Small, *Urban Transportation Economics*, Reading, Harwood, 1992, pp. 36-45.

1.1.1 Recommended Values

The Department of Transportation (DOT) recommended values for aviation passenger travel time, as derived from the wage rates, are presented by user type in Table 1-1. These values are used by the FAA. The CPI-U can be used to adjust these values to correspond to the year of analysis. Data for the value of time for military aircraft operations are not contained in the DOT Guidance and are not included in this section.

**Table 1-1: Recommended Hourly Values of Travel Time Savings (VTTS)
(2015 U.S. \$ per person-hour)**

| Category | Surface Modes (except High-Speed Rail) | Air and High Speed Rail Travel ^{N6} | Range Values Surface Modes | Range Values Air and High Speed Rail |
|--|---|--|----------------------------|--------------------------------------|
| Local Travel | | | | |
| Personal ^{N1} | \$13.60 | | \$9.50--\$16.30 | -- |
| Business ^{N2} | \$25.40 | | \$20.30--\$30.50 | -- |
| All Purpose ^{N3} | \$14.10 | | \$10.00--\$17.00 | -- |
| Intercity Travel^{N4} | | | | |
| Personal ^{N5} | \$19.00 | \$36.10 | \$16.30--\$24.50 | \$31.00--\$46.50 |
| Business ^{N2} | \$25.40 | \$63.20 | \$20.30--\$30.50 | \$50.60--\$75.80 |
| All Purpose ^{N3} | \$20.40 | \$47.10 | \$17.20--\$25.80 | \$38.90--\$58.30 |
| Airline Pilots and Engineers ^{N7} : | \$86.70 | | \$69.40-104.10 | |

Notes:

N1: For local personal travel, VTTS is estimated at 50% of hourly median household income as reported by the U.S. Census Bureau, Table H-8. Median Household Income by State: 1984 to 2015. Median household income in 2015 (\$56,516) was divided by 2,080 to yield an hourly income.

N2: For local and intercity business travel by conventional surface mode, VTTS is estimated at 100% of median gross compensation which is the sum of median hourly wage and an estimate of hourly benefits. Median hourly wages are obtained from Bureau of Labor Statistics, May 2015 Occupational Employment and Wage Estimates. Median benefits are approximated by the ratio of average total compensation to average wages multiplied by median hourly wages. A detailed discussion of data sources and methodology is presented in DOT guidance.

N3: All-purpose travel is calculated as a weighted average using distributions of travel by trip purpose on various modes. Distribution for local travel by surface modes: 95.4% personal, 4.6% business. Distribution for intercity travel by conventional surface modes: 78.6% personal, 21.4% business. Distribution for intercity travel by air or high-speed rail: 59.6% personal, 40.4% business.

N4: Intercity Travel is based on a trip of 50 miles or more.

N5: For intercity personal travel, VTTS is estimated at 70% of hourly median household income as reported in note 1.

N6: Intercity personal travel by air or high-speed rail: median hourly household income from (1), multiplied by 1.9. Intercity business travel by air or high-speed rail: median hourly household income from (1), multiplied by 2.5 and by the ratio of median national employee compensation to median household income.

N7: Travel time savings for Airline Pilots and Engineer is based on 100 percent of the weighted average median hourly wages from BLS National Occupational Employment and Wage Estimate (May 2015); expanded to total compensation by the ratio of total compensation to wages for transportation and material moving occupations from the 2015 Employer Cost for Employee Compensation series.

1.2 APPLICATION

General Applications: The value of travel time savings (VTTS) reported in Table 1-1 should primarily be used when monetizing changes in travel time for *passengers*. Separate values are reported for both personal and business travel. All-purpose, or composite, estimates are also provided for use when it is not possible to differentiate travel by the purpose of the trip. A VTTS for “Airline Pilots and Engineers” is also reported in Table 1-1 and should be considered a

fallback value and only be used when no other pilot wage data is available.⁴ When conducting an economic regulatory analysis involving changes in the travel time for pilots, the analyst should use pilot wage survey data as a means to determine the appropriate VTTS for these pilots. Pilot wage surveys adjusted to include fringe benefits will generally better match the targeted population of pilots that proposed regulatory actions are likely to affect.

General Aviation: For general aviation (GA) passengers and or pilots who are engaged in recreational and other activities, DOT no longer publishes an estimate of VTTS for this population. Unless the analysts is able to obtain wage data for the affected groups and adjust the data in accordance with the general methodology described in DOT guidance , the VTTS for GA passengers and or pilots should be based in the *Surface Mode Intercity Travel* values as reported in Table 1-1.

Valuing the Reduction of Leisure Activities: Other regulatory actions can impinge on an aircraft operator/owner’s leisure time. For example, a regulatory initiative may require a pilot to engage in training and or other time consuming activities which come at the expense of leisure time activities outside the normal work day. Standard economic theory suggests that the opportunity cost of reduced leisure time should ideally be valued at the person’s wage rate. However, as noted above institutional constraints, such as the “40 hour work week”, may limit the ability of some workers to alter their work schedule and optimize their work-leisure tradeoff. Consequently, the value that people place on the value of leisure can deviate from the wage rate. To address this uncertainty, range values should be used when valuing reductions in leisure activities. Lacking specific knowledge of the income levels of the affected groups, it is recommended that these range values be derived on the basis of the underlying data used to construct the DOT’s VTTS. In particular, hourly median household income (\$27.20) should be used as the upper bound and 50 percent (\$13.60) of this value should be used as the lower bound. No preference should be given to either of these values.

Value of Small Time Savings or Losses: There has been significant discussion about whether small increments of time should be valued at lower rates than larger increments. Arguments for valuing smaller increments of time less than larger ones emphasize the difficulties of making effective use of smaller increments, particularly when unanticipated. However, the present state of theoretical and empirical knowledge does not appear to support valuing small increments of time less than larger ones. Therefore, the values in Table 1-1 should be used for all valuations, irrespective of the size of individual increments of time either saved or lost.

Sensitivity Analysis: Because uncertainty surrounds the recommended values, a range of values is also presented in Table 1-1. Analysts should test the sensitivity of analyses to the ranges of uncertainty specified. Should the outcome of an analysis change across the range of values, this should be identified and reported.

Updating Values: Updates of the recommended values utilizing newly published source data upon which the recommended values are built will be provided periodically by OST.

⁴ Note that DOT guidance currently values travel time for “Airline Pilots and Engineers” at 100 percent of the wage rate.