

# **Valuing Time in U.S. Department of Health and Human Services Regulatory Impact Analyses: Conceptual Framework and Best Practices**

Final Report  
June 2017

**Prepared for:**

Amber Jessup, Senior Economist  
Office of Science and Data Policy  
Office of the Assistant Secretary for Planning and Evaluation  
U.S. Department of Health and Human Services

**Prepared by:**

Jennifer R. Baxter (Industrial Economics, Incorporated)  
Lisa A. Robinson (Harvard University, Center for Risk Analysis  
and Center for Health Decision Science)  
James K. Hammitt (Harvard University, Center for Risk Analysis  
and Center for Health Decision Science)

**Under contract to:**

Industrial Economics, Incorporated  
GSA Contract Number: GS-10F-0061N

## **ACKNOWLEDGEMENTS**

This report was developed for Amber Jessup in the Office of the Assistant Secretary for Planning and Evaluation of the U.S. Department of Health and Human Services (HHS), under Industrial Economics, Incorporated's (IEc's) General Services Administration Contract Number GS-10F-0061N. It was prepared by Jennifer R. Baxter (IEc), Lisa A. Robinson (Harvard University, Center for Risk Analysis and Center for Health Decision Science), and James K. Hammitt (Harvard University, Center for Risk Analysis and Center for Health Decision Science). Ms. Baxter is the IEc Project Director. We thank Stephane Hess (RSG, Incorporated and University of Leeds) and Daniel Phaneuf (University of Wisconsin – Madison) for their advice and assistance in preparing the initial draft of the report, as well as Saritha Ramakrishna and Mary McGee (IEc) for their research support. We also thank Amber Jessup, Bradley Brown, and Clark Nardinelli (Food and Drug Administration) and Scott Grosse and Jamison Pike (Centers for Disease Control and Prevention) for their comments on previous drafts.

This report responds to the helpful peer review comments received on a previous (October 2016) draft. The peer reviewers were Anirban Basu (University of Washington), Chris Dockins, Charles Griffiths, Kelly Maguire, and Matt Massey (U.S. Environmental Protection Agency, National Center for Environmental Economics), David Greenberg (University of Maryland, Baltimore County), Louise Russell (Rutgers University), Darren Timothy (U.S. Department of Transportation), and Margaret M. Worthington (MMW Consulting).

**TABLE OF CONTENTS**

**ACKNOWLEDGEMENTS** ..... I

**TABLE OF CONTENTS**..... II

**EXECUTIVE SUMMARY** ..... III

**1.0 INTRODUCTION AND BACKGROUND** ..... 1

    1.1 THE HHS 2016 *GUIDELINES* ..... 1

    1.2 TYPES OF TIME USE AFFECTED ..... 3

    1.3 ORGANIZATION OF THIS REPORT ..... 5

**2.0 CONCEPTUAL FRAMEWORK** ..... 7

    2.1 MEASURING OPPORTUNITY COSTS ..... 7

    2.2 USING COMPENSATION-BASED MEASURES FOR VALUATION ..... 8

    2.3 APPLICATION TO HHS REGULATORY ANALYSES ..... 11

**3.0 AVAILABLE NONMARKET VALUATION RESEARCH** ..... 15

    3.1 VALUING TIME IN RECREATION DEMAND MODELING ..... 15

    3.2 VALUING TIME IN TRANSPORTATION MODELING ..... 17

        3.2.1 *U.S. Department of Transportation Guidance* ..... 18

        3.2.2 *Effects of Attributes on Values* ..... 20

    3.3 SUMMARY AND CONCLUSIONS ..... 22

**4.0 APPROACH FOR CONSTRUCTING COMPENSATION-BASED ESTIMATES** ..... 23

    4.1 KEY ASSUMPTIONS ..... 23

    4.2 ON-THE-JOB ACTIVITIES ..... 24

        4.2.1 *Wage Data* ..... 25

        4.2.2 *Benefits Data* ..... 26

        4.2.3 *Indirect Cost Data* ..... 27

        4.2.4 *Conclusions and Recommendations* ..... 40

    4.3 UNPAID ACTIVITIES ..... 40

    4.4 SUMMARY AND CONCLUSIONS ..... 41

**REFERENCES** ..... 43

**APPENDIX: METHODS USED BY ACCOUNTANTS TO CALCULATE INDIRECT COST RATES** ..... 52

## EXECUTIVE SUMMARY

Executive Order 12866, as supplemented by Executive Orders 13563 and 13771, requires that most U.S. government agencies assess the costs, benefits, and other impacts of their major regulations before they are promulgated.<sup>1</sup> Under the leadership of its Office of the Assistant Secretary for Planning and Evaluation, the U.S. Department of Health and Human Services' (HHS's) Department-wide Analytics Team recently finalized detailed guidelines for the conduct of HHS regulatory impact analyses.<sup>2</sup> In the process of developing these guidelines, HHS determined that more work was needed on the approaches used to value changes in time use and commissioned the research summarized in this report.

Review of previously completed HHS regulatory impact analyses as well as discussions with HHS staff suggest that the types of time use that most frequently require valuation relate to administrative and other tasks performed by employees on-the-job, and occasionally on their own time, such as drafting reports or filling out forms. Thus we focus largely on valuing time used for administrative and other activities associated with regulatory implementation and compliance.

Our research included three components: (1) examining the conceptual framework and general approach; (2) exploring primary nonmarket valuation research that addresses individual willingness to pay (WTP) or willingness to accept compensation (WTA) for changes in time use; and (3) investigating how to adjust compensation-based measures to reflect taxes and benefits, as well as indirect costs not associated with production of a particular good or provision of a specific service. These indirect costs include, for example, overhead costs such as space rental and utilities, and other costs such as office supplies and administrative oversight.

### Conceptual Framework and Valuation Research

The conceptual framework for benefit-cost analysis is derived from the discipline of welfare economics, and focuses on assessing how resources can be best allocated to maximize the well-being of individuals in society. This well-being, or "utility," generally cannot be measured directly. Instead, economists combine theoretical models with various empirical methods to estimate the value of alternative resource allocations. Economic theory recognizes that, because resources are limited, any decision to use them for one purpose means that they cannot be used for other purposes. Hence the value of a resource can be determined based on the value of its best alternative use; i.e., its opportunity cost.

In regulatory analysis, as in other types of analysis, the opportunity cost of changes in time use is often valued based on simplifying assumptions that allow analysts to use readily accessible compensation data. The starting point generally involves distinguishing between paid and unpaid time; i.e., between market production and nonmarket activities including leisure, household tasks, and volunteer work. Analysts usually assume that the regulatory activities to be undertaken by paid employees will displace other paid work tasks, while activities to be undertaken during nonmarket time will replace other types

---

<sup>1</sup> This report was drafted and underwent peer review in the fall of 2016, prior to the publication of Executive Order 13771 on January 30, 2017. Thus, it does not directly address the requirements of this latest executive order and accompanying guidance (OMB 2017), and discussions within HHS regarding the implementation of the order are ongoing.

<sup>2</sup> The HHS 2016 *Guidelines* are available at: <https://aspe.hhs.gov/pdf-report/guidelines-regulatory-impact-analysis>; they are accompanied by a primer that is available at: <https://aspe.hhs.gov/pdf-report/guidelines-regulatory-impact-analysis-primer>.

of nonmarket time use. Under these assumptions, changes in paid time use are typically valued using estimates of the cost to the employer; changes in unpaid time use are typically valued using estimates of costs from the perspective of the individual. Distortions in the labor market, such as taxes, mean that these values are not necessarily equal.

The value of time from the perspective of the employer can be directly inferred from market data. The value of time from the perspective of the individual is more difficult to measure, because it depends on the characteristics of the activity (i.e., the extent to which it is pleasurable) as well as the individual's ability to adjust the balance between paid work and other activities. For example, if employers require that employees work 40 hours per week, employees will not be free to vary the number of hours worked to equate the value of paid and unpaid time at the margin. Other methods, such as surveys, can be used to address these limitations by collecting information on individual WTP or WTA for changes in time use. Many existing studies focus on the value of travel time in the recreation or transportation context. While this research provides insights into the extent to which compensation-based measures approximate the values that individuals place on changes in their time use, it does not provide estimates that can be readily used to value time spent on unpaid administrative or other regulatory compliance tasks.

Thus the compensation-based measures now used in HHS and other regulatory and policy analyses are currently the most defensible and appropriate approach for valuing these types of changes in time use. Compensation-based measures have the advantage of being based on actual market transactions and data are easily accessible, comprehensive, and detailed. However, applying such measures requires addressing several issues related to determining the appropriate wage rates and whether and how to account for taxes, benefits, and indirect costs.

### **Application of Compensation-Based Measures**

For market (paid) work associated with regulatory implementation, analysts can often identify both the occupation and industry of the affected individuals. Analysts typically assume that those affected would be involved in market work in the same broad industry and occupation category in the absence of the regulation, but would be pursuing different tasks for the same or similar employer. For example, employees may need to attend additional training sessions, conduct new inspections, maintain additional records, or complete new reports as a result of the regulation – rather than completing other tasks. In such cases, compensation rates for individuals working in the affected industry and occupation are typically used to estimate the opportunity costs of this time.

For nonmarket (unpaid) time associated with regulatory implementation, it may not be possible to identify the characteristics of those affected except in very general terms. Some regulations may primarily affect those in particular age groups, in particular geographic areas, or who experience particular health conditions; other regulations may affect the general population nationally. The nonmarket work or leisure activities that the individuals would be pursuing in the absence of the regulation are likely to encompass a wide range. In these cases, analysts typically assume that the individuals affected and the activities that they would otherwise pursue reflect population averages.

Exhibit ES-1 summarizes the default assumptions recommended for use in HHS regulatory analyses. Analysts may diverge from these default assumptions when justified by the characteristics of the regulation or the findings of relevant research. Analysts should explicitly address associated uncertainties when presenting their analytic results, and explore the extent to which changes in these assumptions might affect their conclusions regarding which policy option provides the greatest net benefits.

**Exhibit ES-1: Default Assumptions for Valuing Changes in Time Use**

Regulatory Activity	Displaced Activity	Valuation Approach
Employees undertaking administrative and other tasks during paid work time.	Other market work in the same industry and occupation.	Pre-tax wages + benefits + other indirect costs
Individuals undertaking administrative and other tasks on their own time.	Average mix of nonmarket work and leisure activities for the affected groups.	Post-tax wages

**Notes:**

- a. “Pre-tax wages” refers to wages before the deduction of Federal and state income taxes and payroll taxes (employee’s contribution to Social Security and Medicare and other mandatory deductions).
- b. “Post-tax wages” refers to wages net of Federal and state income taxes and payroll taxes (see “a” above).
- c. “Benefits” refers to paid leave (vacation, holiday, sick, personal), supplemental pay (overtime and premium, shift differentials, nonproduction bonuses), insurance (life, health, short- and long-term disability), retirement and savings (defined benefit, defined contribution), and legally required benefits (employer’s contribution to Social Security and Medicare, Federal and state unemployment insurance, workers’ compensation).
- d. “Indirect costs” reflect resources necessary for the administrative oversight of employees and generally include time spent on administrative personnel issues (e.g., human resources activities such as hiring, performance reviews, personnel transfers, affirmative action programs), writing administrative guidance documents, office expenses (e.g., space rental, utilities, equipment costs), and outreach and general training (e.g., employee development).

The assumption that the opportunity cost of paid work is best approximated by the cost of labor to the employer is based on the standard economic model, which assumes that employers are willing to incur labor costs less than or equal to the value of workers’ marginal product. Conceptually, this amount represents the value of what a worker would have otherwise produced if his or her efforts were not altered in response to a regulation or other policy. At minimum, the cost of labor includes pre-tax wages and benefits. The proportionate share of indirect costs used to support regulatory compliance, rather than other productive work, is also included. Such indirect costs reflect resources devoted to activities such as space rental and other expenses. The use of these resources to support compliance activities, rather than to support the other productive work that would be pursued in the absence of the regulation, represents an opportunity cost of the regulation.

The assumption that the opportunity cost of unpaid time is best approximated by post-tax wages is based in part on the standard economic model, which assumes that individuals choose to engage in household or volunteer work or leisure activities when the value of this unpaid time exceeds the incremental income they would receive from paid work. However, in this case, it is less clear how to measure “income.” It is unlikely that the individual takes employer-paid taxes into account in these decisions, because these go directly to the government. It is unclear whether the individual is likely to

consider employer-paid benefits (such as health insurance), because these benefits may not vary with small changes in the number of hours worked. In addition, the value of these benefits may be less obvious to the employee.

Thus the use of post-tax wages to approximate the value of unpaid time, rather than full compensation, is based on the assumption that individuals focus on their take-home pay when trading-off work and non-work time at the margin. In other words, it assumes they typically do not consider taxes, employment-related benefits (such as health care), or indirect costs paid by the employer when deciding whether to work an additional hour. Under these assumptions, the value of unpaid time is at least equal to the post-tax wage, although it may vary depending on pleasantness or unpleasantness of the particular activities that the individual undertakes. The validity of these assumptions is particularly uncertain for individuals who do not participate in the labor force, given that their decisions to not engage in paid work may reflect numerous factors other than post-tax wages forgone, such as mandatory retirement requirements or poor health.

These defaults assume that the allocation of time across paid work and other activities is fixed. In other words, individuals do not move from unemployment to employment, or spend more time at work and less time in leisure and other unpaid activities, as a result of the regulation. As noted earlier, analysts may diverge from these assumptions when warranted given the characteristics of the regulation or the findings of relevant research.

Regardless of the approach, analysts should use screening analysis to appropriately target analytic resources on those issues that most affect their conclusions; i.e., the determination of which regulatory option, if any, is likely to lead to the largest net benefits. In addition, analysts should clearly state the advantages and limitations of the analytic approach and indicate the extent to which it may under- or overestimate the effects of the options considered. Sensitivity analysis and probabilistic analysis should be used to quantify the effects of uncertainty to the extent possible.

## 1.0 INTRODUCTION AND BACKGROUND

Under Executive Order 12866 (Clinton 1993), as supplemented by Executive Orders 13563 (Obama 2011) and 13771 (Trump 2017), most U.S. government agencies must assess the costs, benefits, and other impacts of significant regulations before they are promulgated, and must also assess regulatory and non-regulatory alternatives if annual economic impacts are expected to be \$100 million or more.<sup>3</sup> The U.S. Office of Management and Budget (OMB) in the Executive Office of the President is responsible for reviewing the regulations and the accompanying analyses before they are finalized, and has developed general guidance under *Circular A-4* (OMB 2003a).

The U.S. Department of Health and Human Services' (HHS's) Department-wide Analytics Team, under the leadership of the Office of the Assistant Secretary for Planning and Evaluation (ASPE), recently finalized more detailed guidelines for the conduct of HHS regulatory analyses (HHS 2016). The goal was to address common challenges and promote consistency throughout HHS. In the process of developing these guidelines, HHS determined that more work was needed on the approaches used to value changes in time use, and asked the Industrial Economics, Incorporated (IEc) team to address related issues. This effort includes three components: (1) examining the conceptual framework and general approach; (2) exploring primary nonmarket valuation research that addresses individual willingness to pay (WTP) or willingness to accept compensation (WTA) for changes in time use; and (3) refining how compensation-based measures are adjusted to reflect taxes, benefits, and indirect costs, such as those associated with administrative oversight and office expenses. In this introductory section, we provide background information on the HHS *Guidelines* and the types of time use affected by HHS regulations, then provide an overview of the remainder of the report.

### 1.1 The HHS 2016 *Guidelines*

HHS's *Guidelines for Regulatory Impact Analysis* (HHS 2016) provide the starting point for this project.<sup>4</sup> The *Guidelines* describe the overall framework for assessing the benefits, costs, and other impacts of HHS regulations and provide detailed guidance for each analytic component. To encourage consistent categorization of impacts as "costs" or "benefits," the *Guidelines* define costs as the value of the inputs required to implement a policy (including labor, capital, and materials) as well as any offsetting savings. Benefits are defined as the intended policy outcomes, which typically involve reductions in mortality and morbidity risks, as well as any countervailing effects on these outcomes, such as risk increases. Chapter 4 of the *Guidelines*, "Assess Costs," specifically addresses the valuation of changes in time use, including basic concepts and default assumptions. Other chapters provide additional information; for example, on using screening analysis to target analytic work, on discounting impacts to reflect the implications of their timing, and on characterizing uncertainty and nonquantified impacts.

---

<sup>3</sup> This report was drafted and underwent peer review in the fall of 2016, prior to the publication of Executive Order 13771 on January 30, 2017. Thus, it does not directly address the requirements of this latest executive order and accompanying guidance (OMB 2017), and discussions within HHS regarding the implementation of the order are ongoing.

<sup>4</sup> The HHS 2016 *Guidelines* are available at: <https://aspe.hhs.gov/pdf-report/guidelines-regulatory-impact-analysis>; they are accompanied by a primer that is available at: <https://aspe.hhs.gov/pdf-report/guidelines-regulatory-impact-analysis-primer>.



The HHS *Guidelines* recommend using estimates of market compensation to value changes in time use, consistent with well-established and widely-accepted practices.<sup>5</sup> Wages are recommended as the starting point for valuation in standard benefit-cost analysis and health economics texts (e.g., Boardman et al. 2011, Drummond et al. 2015), in U.S. guidelines for cost-effectiveness analyses of health care and medical treatment decisions (Gold et al. 1996, Sanders et al. 2016, Neumann et al. 2016), and in guidelines for analyses conducted by other U.S. regulatory agencies (EPA 2014, DOT 2016). When applying compensation-based measures to market work time, the major issues concern determining the appropriate wage rates and whether and how to account for taxes, benefits, and indirect costs. For nonmarket work and leisure time, additional issues include whether and how to adjust these measures to reflect the values individuals place on different activities in comparison to the value of paid work. Often, a constant adjustment factor is used, rather than factors (or functions) that tailor the estimates to each particular context.

While compensation rates are a convenient and accessible proxy for the value of time, researchers and analysts recognize that market imperfections and other issues mean that these proxies do not accurately measure the true value of time. In addition, the use of constant adjustment factors ignores many sources of heterogeneity, including the characteristics of the specific individuals and activities affected. This report explores these issues, addressing the concerns most relevant to the conduct of HHS regulatory analyses.

In this report, we focus primarily on the estimation of regulatory costs; i.e., the value of the time needed to implement the regulation and comply with its requirements. The benefits of HHS regulations often include reductions in mortality and morbidity risks, which (as discussed in detail in the *Guidelines*), should be valued using estimates of individual WTP. Such estimates presumably reflect the effect of the risk reduction on the affected individual, including changes in his or her own time use.<sup>6</sup> However, these estimates may not include the effects of the risk reduction on others, such as family or friends involved in caregiving. In such cases, these third party costs may be added to the WTP estimates if they are significant.<sup>7,8</sup>

---

<sup>5</sup> The terminology conventionally used to refer to various valuation methods in the context of U.S. regulatory analysis differs in some respects from the terminology used in other countries and in other fields (e.g., by some health and transportation economists). We rely on the terminology typically used by U.S. regulatory analysts throughout this report, clarifying the meaning of each term when it is first introduced.

<sup>6</sup> Time losses that accrue to an ill individual are typically treated differently in benefit-cost analysis than in cost-effectiveness analyses because of differences in the outcome measures used. In cost-effectiveness analysis, health outcomes are generally measured as quality-adjusted life year (QALY) losses or gains. There has been a substantial debate in the literature regarding whether such measures include patient time losses over the course of the illness (Gold et al. 1996, Miller et al. 2006, Sanders et al. 2016, Neumann et al. 2016). In addition, in this context the time a patient spends seeking treatment may be counted as part of the costs of producing improved health.

<sup>7</sup> Where such caregiving costs are significant, they should be valued based on research that addresses the specific conditions of concern rather than through the approaches applicable to the administrative tasks that are the primary focus of this report. Different conditions are likely to require different degrees and types of care, and the characteristics of those involved in caregiving (such as their employment status) are likely to vary. For example, an acute condition that primarily affects young children will have very different caregiving implications than a chronic condition that primarily affects the elderly. See, for example, Levine et al. (2005), Anderson et al. (2007), and Tilford et al. (2009), as well as the publications of the Family Caregiving initiative of the United Hospital Fund (<https://www.uhfnyc.org/initiatives/family-caregiving>).

## 1.2 Types of Time Use Affected

The value of changes in time use depends on the characteristics of the individuals and the activities affected. Hence we begin by reviewing the types of time use addressed in recent HHS regulatory analyses. A search of the December 2015 Unified Agenda (available at [reginfo.gov](http://reginfo.gov)) indicated that HHS expected to propose or finalize more than 50 major regulations over the next several years that address a variety of policy areas. Almost two-thirds were being developed by the Centers for Medicare and Medicaid Services (CMS) and address reimbursement for medical care as well as requirements for medical care providers. Most of the remaining regulations were being developed by the Food and Drug Administration (FDA) and address food labeling, food, drug, and medical device safety, and control of tobacco products. Whether a comprehensive assessment of costs and benefits will be prepared for each of these regulations depends on several factors, such as the extent to which the regulation imposes real resource costs rather than primarily affecting payments that transfer funds across entities.

The sectors or types of industries potentially affected by HHS regulations include the following; Industries other than those listed may also be affected:<sup>9</sup>

- Federal, state, local, and Tribal government agencies;
- Hospitals and medical care providers;
- Health insurers;
- Pharmaceutical firms;
- Food manufacturers;
- Tobacco manufacturers;
- Farms;
- Child care providers;
- Law firms;
- Wholesalers and importers;
- Transportation and storage firms;
- Retailers (e.g., grocery, convenience, and drug stores).

As indicated by the list, the industries affected by HHS regulations are diverse. Not all of these categories are mutually exclusive. For example, large manufacturers or retailers in a particular industry may also be importers.

Individual regulations typically focus on particular industrial sectors. To understand how these sectors may be affected by time losses or gains, we reviewed six regulatory impact analyses in detail. We selected examples that (1) quantified and monetized costs or benefits; (2) represented the agencies (CMS and FDA) responsible for the majority of HHS's regulatory activity; and (3) affected a broad range of industries. Exhibit 1 summarizes the range of potential impacts on a per entity basis, focusing on the time costs associated with regulatory compliance.

---

<sup>8</sup> In the health economics literature, patient and caregiver time is often valued using compensation data rather than the types of nonmarket valuation research that we discuss in Chapter 3. (See, for example, Tranmer et al. 2005, Russell 2009, and Zhang et al. 2011). However, nonmarket valuation methods have been used by some researchers to value caretaker time, including several European studies (e.g., van den Berg et al. 2005, de Meijer et al. 2010).

<sup>9</sup> Personal communication with Amber Jessup, Senior Economist, Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services, March 15, 2016.

**Exhibit 1: Examples of Time Losses Quantified in HHS Regulatory Analyses**

Regulation	Time Losses Per Affected Entity <sup>a</sup>	Sector Affected	Staff Affected
CMS, Medicaid and Children’s Health Insurance Program (CHIP) Programs (2015a)	11,959 hours (annually) <sup>b</sup>	Plan providers	- Business operations specialist - Call center employee/customer service representative - General and operations manager - Mail clerk - Nurse - Office and administrative support worker
	7,761 hours (annually) <sup>b</sup>	State governments	- Accountant - Actuary - Business operations specialist - Computer programmer - General and operations manager - Mail clerk - Office and administrative support worker
CMS, Reform Requirements for Long-term Care Facilities (2015b)	1,384 hours (annually)	Care facilities <sup>b</sup>	- Administrator/coordinator - Attorney - Compliance liaison - Compliance officer - Dietitian - Director of Nursing - Infection prevention control officer - Nutrition service member - Nursing home administrator - Office clerk - Physician - Registered nurse - Social worker
FDA, Administrative Destruction of Certain Drugs Refused Admission to the United States (2015a)	240 hours (one-time)	FDA	- Import branch staff
	26 hours (one-time)	U.S. Customs and Border Protection	- Staff
	10 hours (one-time)	U.S. Postal Service	- Staff
FDA, Current Good Manufacturing Practice (2015b)	2,181 hours (annually)	Manufacturing facilities	- Line worker - Facility manager/qualified worker - Legal analyst
	152 hours (annually)	Warehouse and wholesale facilities	- Line worker - Facility manager/qualified worker - Legal analyst
FDA, Permanent Discontinuance of Interruption of Manufacturing of Certain Drug or Biological Products (2015d) <sup>d</sup>	1,560 hours – 3,640 hours (annually) <sup>c</sup>	FDA	- Drug shortages staff
	1,092 hours – 1,296 hours (annually) <sup>e</sup>	Pharmaceutical manufacturers	- Regulatory affairs manager
FDA, Standards for Growing, Harvesting, Packing and Holding of Produce for Human Consumption (2015e)	1,313 hours (annually)	Farms <sup>b</sup>	- Operator - Worker - Supervisor

**Notes:**

- a. For rules presenting both one-time and annual, recurring time losses, only the recurring losses are listed for simplicity and comparability.
- b. Not all entities in the affected sectors incur time costs. For example, some entities may follow the practices required by the regulation regardless of whether it is implemented, and hence incur no additional costs. The totals in the exhibit may overstate the costs to those entities that comply with some requirements, because they sum the anticipated per entity time costs associated with all provisions affecting a given sector.
- c. Time costs are reported as full-time equivalents (FTEs), which we multiply by 2,080 hours for comparison with the other regulations listed.
- d. Regulation also reduces the time spent by pharmacists, pharmacy technicians, physicians, and nurses in managing drug shortages. We exclude these shortage-related time savings from the exhibit because FDA does not separate the time savings from the other shortage-related costs.
- e. Total time loss for entire industry; per entity estimates are not readily available.

This exhibit demonstrates that the time required to complete compliance activities can be as little as a few hours for a government agency to update its guidelines, as in the case of FDA's rule allowing administrative destruction of certain drugs refused admission to the United States (FDA 2015a). For other rulemakings, the amount of time spent by each entity to complete compliance activities is several orders of magnitude higher. For example, to comply with Medicaid regulations addressing the usage of managed care delivery systems, each plan provider or State may be required to undertake thousands of hours of administrative tasks, such as conducting legal review of the new requirements, drafting strategies and business plans, conducting evaluations, updating websites and other materials, certifying rates charged for services, and notifying customers of changes (CMS 2015a).

Whether these changes are significant from the perspective of the affected firms and industries will depend on numerous factors, such as the relative importance of labor to production, the required skills, and the total number of people employed. For example, assuming a 2,080 hour work year per employee, a firm with 1,000 employees (i.e., a total of 2,080,000 labor hours per year) may find it much easier to accommodate the types of changes listed in Exhibit 1 than an otherwise similar firm with 10 employees (i.e., a total of 20,800 labor hours per year). None of these regulatory analyses included changes in unpaid time.

The staff undertaking compliance activities also varies across regulations, ranging from individuals typically engaged in administrative or support functions to those engaged in production, service provision, or other output. The expertise involved ranges from positions that may require only a high school diploma and minimal work experience (e.g., mail clerks, office and administrative support workers) to specialists with advanced degrees and many years of experience (e.g., doctors, lawyers, accountants).

The relative importance of time losses or gains when compared with other monetized costs and benefits also varies. For three of the six regulations, including the two CMS regulations (CMS 2015a; CMS 2015c) and FDA's regulation to manage and prevent drug shortages (FDA 2015d), the cost of undertaking administrative tasks comprises all or nearly all of quantified costs. For the remaining three regulations, time costs are a large portion of the compliance costs although other types of costs are also incurred.

Given the results of this review as well as conversations with HHS staff, in this report we focus on valuing the time associated with these sorts of compliance activities, undertaken by employees as part of their paid work. We also discuss the valuation of similar administrative activities that may be undertaken by individuals on their own time, such as filling out forms.

### **1.3 Organization of this Report**

The remainder of this report consists of three additional chapters and a technical appendix.

- Chapter 2 explores the conceptual framework for valuing changes in time use in more detail.
- Chapter 3 investigates the available primary research on individual WTP and WTA for changes in time use.

- Chapter 4 develops recommendations for estimating wage rates and adjusting them to reflect taxes, benefits, and indirect costs, when using compensation-based measures to value changes in time use.

The appendix provides more detailed information on the estimation of indirect rates within an accounting framework.

## 2.0 CONCEPTUAL FRAMEWORK

In this chapter, we first discuss key concepts from neoclassical welfare economics that provide the basis for valuation in benefit-cost analysis, particularly as they relate to the measurement of opportunity costs. We then discuss the relationship of compensation-based measures to this framework, and summarize the general assumptions that underlie the work described in the remainder of this report.

### 2.1 Measuring Opportunity Costs

The conceptual framework for benefit-cost analysis is derived from the discipline of welfare economics, and focuses on assessing how resources can be best allocated to maximize the well-being of individuals in society. This well-being, or “utility,” generally cannot be measured directly. Instead, economists combine theoretical models with empirical data to estimate the value of alternative resource allocations. The basic neoclassical economic model assumes that individuals make choices that maximize their utility given available resources, and that each individual is the best judge of his or her own welfare. This principal of consumer sovereignty means that values should be based on the preferences of the individuals affected by the regulation or other policy.

Economic theory recognizes that, because resources are limited, any decision to use them for one purpose means that they cannot be used for other purposes. Hence the value of a resource can be determined based on the value of its best alternative use; i.e., its opportunity cost. Generally, estimates of individual WTP or WTA are the most appropriate measure of such values. For an improvement, such as increased time spent in pleasant or desirable activities, WTP is the maximum amount of money an individual would voluntarily exchange to obtain the improvement, subject to his or her budget constraints, while WTA is the least amount an individual would accept to forego the improvement. For a harm, such as increasing the amount of time spent in unpleasant or undesired activities, WTP is the maximum amount an individual would exchange to avoid the harm, while WTA is the minimum amount he or she would accept to consent to the harm.<sup>10</sup> In this context, money represents an individual’s willingness to trade-off consumption of different goods and services so as to maximize utility.

One question is whether the choice of measure matters, given that the empirical literature may not provide estimates of both WTP and WTA for the outcome of concern. Under conventional assumptions, the choice should not make much difference in many contexts.<sup>11</sup> However, significant differences have been found by some researchers. One explanation for these differences is loss aversion: values may depend in part on whether the change is expressed as an improvement or decrement from the status quo. Other explanations include variation in study design as well as other factors. However, the

---

<sup>10</sup> More precisely, these measures are based on the concepts of compensating and equivalent variation (or compensating and equivalent surplus for public goods). The two measures differ in their starting points: for a beneficial outcome, compensating variation references the level of utility without the improvement, while equivalent variation references the level with the improvement.

<sup>11</sup> Willig (1976) demonstrates that for private goods, where the individual can choose the quantity consumed, WTP and WTA should be similar as long as income effects are negligible. Hanemann (1991) finds that for public goods, where the individual cannot choose the quantity, WTP and WTA can diverge when there are no private goods that are close substitutes.

differences between WTP and WTA appear to be relatively small in much of the value of time research.<sup>12</sup>

When applied to changes in time use, the welfare economic framework assumes that individuals take opportunity costs into account in their decision-making, allocating their time to those activities that produce the greatest utility subject to their budget and other constraints.<sup>13</sup> Time is a direct source of utility or disutility, in that its consumption or use can be pleasant or unpleasant. Time is also an input into the production of utility, because its allocation often includes intermediate activities that are instrumental to pursuing other activities. For example, an individual may use time to earn income, which in turn can be used to purchase other goods and services, or to travel to a recreational site or to a workplace, so as to engage in onsite activities. The value of time is associated with its scarcity; using time for one purpose means that the same block of time cannot be invested in another activity.

In principle, when an individual substitutes one activity for another, the effect on his welfare is determined by the difference in the pleasurable-ness of the activities, the benefit to the individual and to others (including household members and employers) from whatever is produced, and any resulting changes in income. As a practical matter, estimates of the value of time (whether paid or unpaid) are based on compensation rates and do not account for differences in the pleasurable-ness to the individual. Similarly, the use of these measures only partially accounts for variation in productivity. For paid work, compensation measures that vary by industry and occupation are available. However, such measures do not discriminate between the productivity of specific tasks nor address the variation in productivity associated with unpaid tasks.

In HHS regulatory analyses, as in benefit-cost analyses more generally, valuing time thus requires first determining how the time would be used without and with the policy. Typically, analysts assume that the activities pursued in the absence of the regulation reflect the preferred use of time given market conditions, the attributes of the organizations and individuals affected, and other factors. Hence the value of the changes in time use should be calculated as the cost of replacing these preferred activities with those required by the regulation. At times, the result is an improvement rather than a detriment. For example, a regulation may remove barriers to automation, allowing industry to reallocate employee time to more productive tasks rather than to performing the previously manual activity.

## **2.2 Using Compensation-Based Measures for Valuation**

Typically, the value of time is estimated based on compensation measures. However, due to market distortions, the values used differ depending on whether they are measured from the perspective of the

---

<sup>12</sup> For example, a series of meta-analyses explore the extent to which this divergence depends on the nature of the good, the method used for valuation, and other factors. The most recent (Tunçel and Hammitt 2014) found that the difference between WTA and WTP was smaller for those studies that address leisure or travel time (a factor of 1.5) than for the full set of studies considered (a factor of 3). An earlier review of the transportation literature found relatively small differences (Von Wartburg and Waters 2004); another review (Small 2012) reports that some studies (such as De Borger and Fosgerau 2008 and Hess et al. 2008) found larger differences. For more discussion of the implications of this divergence for benefit-cost analysis, see Robinson and Hammitt (2011), Hammitt (2015), Knetsch (2015), and Viscusi (2015).

<sup>13</sup> For a more detailed and technical discussion of this theoretic framework, see in particular the pioneering work by Becker (1965) and DeSerpa (1971).

employer or employee. The standard economic model assumes that workers' pay reflects the value of their output at the margin. Presumably, goods or services will not be produced unless the price paid by consumers covers the cost to the producer, and the producer will not pay an employee more than that individual is worth to the company. Thus the value of paid work time can be estimated by its cost to the employer.

The standard model also assumes that individuals will allocate time between paid work and other activities up to the point where, at the margin, the value of the compensation they would receive is equal to the value of the uncompensated activity. This relationship is often described as the labor-leisure trade-off. However, due to taxes and other factors, the compensation received by the employee may not be equal to the compensation paid by the employer, as discussed in more detail below.

For paid work time, in the absence of a regulation or other policy change, we expect employees will be working on those tasks most highly valued by their employer, given market demand for the resulting product as well as the technologies that can be used to produce it.<sup>14</sup> The opportunity costs associated with the regulation are thus the value of those tasks that would not be pursued given the need to instead complete tasks related to regulatory implementation. Assuming that these tasks are undertaken by employees in the same general occupation and industry, related costs can be valued using compensation data for that occupation and industry. For example, if a manager of a food-processing facility must spend four hours per month on record-keeping and reporting related to regulatory compliance, rather than on the tasks he or she would otherwise pursue, the opportunity cost of that time would be estimated based on the compensation rate for food-processing facility managers. A major challenge in applying this approach is how to best estimate the value of the associated benefits, taxes, and indirect costs including overhead. We explore these issues in more detail in Chapter 4.

For unpaid work and leisure activities, valuation is more challenging because there is no directly observable market price for time spent in these activities. Such activities are diverse and have varying attributes, both pleasant and unpleasant, and hence are likely to be valued differently. For example, nonmarket time may include relatively enjoyable activities such as watching TV or participating in sports, as well as less enjoyable activities such as housework – and filling out forms and standing in line for reasons other than regulatory compliance. While on average these activities may be more pleasurable than the activities required by the regulation, presumably those affected would reduce the time spent in the least valuable of these activities if required to spend time on regulatory compliance. Because the labor-leisure trade-off introduced earlier suggests that the marginal value of unpaid time is at least as great as income foregone, the use of compensation-based measures to value such time appears reasonable. We explore related issues in more detail in Chapter 3 as well as in Chapter 4.

In some types of analysis, the value of unpaid time is estimated based on the cost of paying a replacement worker, rather than on opportunity costs. The use of compensation-based measures for valuation is often referred to as the “human capital” approach, because these measures reflect the contribution of labor to production and ignore other factors that affect individual and societal well-

---

<sup>14</sup> Furthermore, the standard model assumes that, among the jobs available to them, workers chose the job that maximizes their own utility, given both the income it provides and the relative pleasantness of its other attributes.



being.<sup>15</sup> Several researchers have extended the human capital approach to encompass unpaid productive work; e.g., in the household or as volunteers, based the wages paid for similar work.<sup>16</sup> For household production, a simple approach is to assume that the value of this replacement worker is the same as the wage rate of domestic workers. A more complicated approach uses a composite of the wage rates paid for the diverse range of activities associated with nonmarket work, such as the payments for cooks, childcare providers, gardeners, and others.<sup>17</sup> Time-use studies can be applied to allocate nonmarket activities across different job categories to develop this composite, including both household tasks and volunteer activities.

This focus on comparable jobs does not, however, fully account for the opportunity costs associated with choosing to engage in nonmarket work or leisure rather than in market work. In electing to undertake unpaid labor, an individual is not necessarily forgoing a job involving similar activities. For example, if a highly paid individual chooses to stay home to care for a child, his or her opportunity cost (i.e., forgone market wages) may well exceed the cost of hiring a childcare worker. Alternatively, some individuals engage in essential nonmarket work because the cost of hiring a replacement worker exceeds their market wage. These individuals presumably value the nonmarket work time at minimum at their own market wage rate. Thus the opportunity cost of nonmarket time is best estimated based on the market compensation the affected individual would otherwise receive. Unlike the replacement cost approach, which focuses solely on productive work, this opportunity cost approach also can be applied to value leisure time. As is the case for nonmarket production, the decision to engage in leisure involves foregoing the income that would be associated with instead engaging in paid work.

The opportunity costs for an individual are likely to differ, however, from the costs to the employer. Distortions in the labor market, such as taxes, mean that the compensation paid by the employer is not equal to the compensation received by the employee. In addition, individuals' choices may be constrained in ways that prevent them from achieving the desired balance between market work and other activities. For example, they may not be well-informed about their options and employers may require that they work a set schedule (see Chapter 3 for more discussion). Other market imperfections that restrict competition, such as monopoly or monopsony conditions, will also lead to wage rates that diverge from the value of the worker's marginal product. These and other labor market conditions affect individuals' ability to equalize the value of paid and unpaid time at the margin. Hence these compensation-based approaches are best described as reasonable proxies for the value of unpaid time, given the advantages and limitations of the research available.

---

<sup>15</sup> In the health economics literature, the "friction cost" method is at times used instead of the human capital method to value time losses due to illness (Koopmanschap et al. 1995). The friction cost method assumes that productivity will decrease temporarily while the employer implements measures to replace the absent individual, rather than over the full course of the illness. The "friction period" is defined as the time it takes to find and train a new employee or reallocate duties among existing employees. The comparison in this case differs from the comparison relevant to regulatory analysis; the friction cost method essentially assumes that the ill individual is replaced by someone who would be otherwise involuntarily unemployed. The default assumption for regulatory analysis is that an employed individual changes which tasks he or she is pursuing.

<sup>16</sup> See Cooper and Rice (1976) for pioneering work on this issue.

<sup>17</sup> See Grosse et al. (2009) for an example of this approach.

The conceptual framework introduced in this section focuses on marginal changes; e.g., a one hour change in the amount of time expended on paid or unpaid activities. As discussed in more detail in Chapter 4, mean or median compensation is often instead used for valuation due to the difficulties inherent in estimating marginal values. The extent to which this approach under- or overstates these values is uncertain and will depend on the magnitude of the change associated with the regulation. These and other uncertainties should be explored when presenting the analytic results, as discussed in more detail in the HHS *Guidelines*.

### **2.3 Application to HHS Regulatory Analyses**

The value of changes in time use is likely to vary depending on the characteristics of the individuals affected (such as employment status and age) and the activities affected, including their duration and frequency as well as their relative pleasantness or unpleasantness. However, HHS and other regulatory agencies, as well as benefit-cost analysts more generally, typically rely on simplifying assumptions rather than expending the substantial time and money that would be needed to investigate the values of the specific effects of each regulation or policy. In general, the degree of precision needed in characterizing the affected individuals and activities will depend on the nature of the impacts and on the importance of the impacts to the overall analytic conclusions. The HHS *Guidelines* discuss the use of screening analysis to target analytic resources, so as to allocate these resources to the analytic components that require the greatest attention within a particular context, and also describe approaches for addressing associated uncertainties.

As discussed in the previous chapter, review of recent HHS regulatory analyses as well as our discussions with agency staff suggest that such valuation is most often needed when individuals must spend time on administrative activities related to implementing regulatory requirements rather than pursuing their normal activities. The types of time use affected usually involve paid work. For example, employees of regulated entities and government agencies may need to attend additional training sessions, conduct new inspections, maintain additional records, or complete new reports as a result of the regulation – rather than pursuing their usual tasks. For such market work, analysts can often identify both the occupation and industry of the affected individuals. They typically assume that those affected would be involved in market work in the same broad industry and occupation category in the absence of the regulation, but would be pursuing different tasks for the same or a similar employer.<sup>18</sup>

Occasionally, regulations may instead or in addition require that individuals pursue activities such as reading instructions and filling out forms on their own time, rather than using this time for their normal household and volunteer work or leisure activities. In such cases, it may not be possible to identify the characteristics of those affected except in very general terms. For example, some regulations may primarily affect those in particular age groups, in particular geographic areas, or who experience particular health conditions; other regulations may affect the general population nationally. The nonmarket work or leisure activities that the individuals would be pursuing in the absence of the regulation are likely to encompass a wide range. Thus for nonmarket time, analysts typically assume that

---

<sup>18</sup> Regulations that significantly affect long-term unemployment, resulting in net job losses or gains, raise several issues that are beyond the scope of this project. See, for example, Bartik (2012), Morgenstern (2013), and OMB (2015) for more discussion.

the individuals affected and the activities that they would otherwise pursue reflect population averages.<sup>19</sup>

In this report, we focus on the value of these types of administrative tasks in comparison to the affected individuals' usual activities. The HHS *Guidelines* provide detailed information on valuing other types of costs and benefits, for which separate estimates of the value of time generally are not needed.

Exhibit 2 summarizes the default assumptions developed as part of our previous work on the HHS *Guidelines* (HHS 2016), supplemented by the work as described in this report. HHS analysts may diverge from these default assumptions when justified by the characteristics of the regulation or the findings of relevant research. Analysts should explicitly address associated uncertainties when presenting their analytic results, and explore the extent to which changes in these assumptions might affect their conclusions regarding which policy option provides the greatest net benefits.

---

<sup>19</sup> The American Time Use Survey (<http://www.bls.gov/tus/>) provides detailed data on the allocation of time across activities.

**Exhibit 2: Default Assumptions for Valuing Changes in Time Use**

Regulatory Activity	Displaced Activity	Valuation Approach
Employees undertaking administrative and other tasks during paid work time.	Other market work in the same industry and occupation.	Pre-tax wages + benefits + other indirect costs
Individuals undertaking administrative and other tasks on their own time.	Average mix of nonmarket work and leisure activities for the affected groups.	Post-tax wages

**Notes:**

- a. "Pre-tax wages" refers to wages before the deduction of Federal and state income taxes and payroll taxes (employee's contribution to Social Security and Medicare and other mandatory deductions).
- b. "Post-tax wages" refers to wages net of Federal and state income taxes and payroll taxes (see "a" above).
- c. "Benefits" refers to paid leave (vacation, holiday, sick, personal), supplemental pay (overtime and premium, shift differentials, nonproduction bonuses), insurance (life, health, short- and long-term disability), retirement and savings (defined benefit, defined contribution), and legally required benefits (employer's contribution to Social Security and Medicare, Federal and state unemployment insurance, workers' compensation).
- d. "Indirect costs" reflect resources necessary for the administrative oversight of employees and generally include time spent on administrative personnel issues (e.g., human resources activities such as hiring, performance reviews, personnel transfers, affirmative action programs), writing administrative guidance documents, office expenses (e.g., space rental, utilities, equipment costs), and outreach and general training (e.g., employee development).

This approach assumes that the opportunity cost of paid work is best approximated by the cost of labor to the employer. As noted above, the standard economic model assumes that employers are willing to incur labor costs less than or equal to the value of workers' marginal product. Conceptually, this amount represents the value of what a worker would have otherwise produced if his or her efforts were not altered in response to a regulation or other policy. At minimum, the cost of labor includes pre-tax wages and benefits. The proportionate share of indirect costs used to support regulatory compliance, rather than other productive work, is also included. Such indirect costs reflect resources devoted to activities such as administrative oversight and office expenses. The use of these resources to support compliance activities, rather than to support the other productive work that would be pursued in the absence of the regulation, represents an opportunity cost of the regulation.

For unpaid time, the default assumes that opportunity costs can be best approximated by post-tax wages; i.e., that individuals choose to engage in household or volunteer work or leisure activities when the value of this unpaid time exceeds the incremental income they would receive from paid work. Post-tax wages are used rather than full compensation under the assumption that individuals focus on their take-home pay in their personal decision-making and do not consider taxes or indirect costs paid by the employer.<sup>20</sup>

---

<sup>20</sup> While taxes fund the services the government provides, there is generally little relationship between the taxes an individual pays and the government services he or she receives. The exceptions include social security and other taxes designated for specific purposes; however, the use of these taxes may be poorly understood. Thus individuals face few incentives to take the relationship between taxes and government services into account in their decision-making.

Note that this approach assumes that the allocation of time across paid work and other activities is fixed.<sup>21</sup> In other words, individuals do not move from unemployment to employment, or spend more time at work and less time in leisure and other unpaid activities, as a result of the regulation. To the extent that a regulated entity requires additional employees, this approach assumes that individuals in the same occupation and industry move across employers, rather than shifting across occupations or industries or changing their employment status. In other words, wage data for the affected occupation can be used for valuation; analysts do not need to account for the opportunity costs – or the changes in wages – resulting from individuals transitioning from one occupation (e.g., nursing) to another occupation (e.g., administrative assistant). As noted earlier, analysts may diverge from these assumptions when warranted given the characteristics of the regulation or the findings of relevant research.

---

<sup>21</sup> This approach implies that the opportunity cost of unpaid time is smaller than of paid time and hence that the cost of a regulation may be reduced by shifting the burden from market to nonmarket time. This conclusion is not necessarily justified; it is an unintended consequence of using a pragmatic approach to value time. In addition, the overall goals and design of the regulation typically dictate whether market or nonmarket time is affected. For example, a regulation that requires that employees receive work-related training is unlikely to allow employers to mandate that workers complete this training during unpaid time.

### 3.0 AVAILABLE NONMARKET VALUATION RESEARCH

The use of compensation measures to value paid work time is well-established, reflecting the assumption that employers determine compensation based on the value of a worker's marginal product. The use of compensation measures to value other types of time use, including unpaid work (e.g., in the household or as a volunteer) as well as leisure, raises more difficult issues. As noted earlier, labor market distortions may limit an individual's ability to equate the value of paid and unpaid time at the margin, and the value they place on unpaid time may differ from the amount of compensation forgone. In this chapter, we explore the use of nonmarket valuation methods to value unpaid time. We focus on two areas where these values have been studied extensively: the environmental economics literature on the demand for recreational opportunities, and the transportation economics literature on the value of travel time savings.

The nonmarket valuation studies applied in these contexts use revealed- or stated-preference methods to estimate WTP or WTA, taking into account the specific attributes of the individuals and activities affected. Revealed-preference studies rely on observed market behavior to estimate the value of related nonmarket goods, while stated-preference studies typically ask respondents about their choices in hypothetical settings.<sup>22</sup> Each approach has advantages and limitations; studies must be carefully designed to provide valid results, as discussed in more detail in the HHS *Guidelines* and other sources (e.g., Freeman et al. 2014).

The nonmarket valuation literature reviewed in this chapter does not directly address the types of administrative activities most likely to be affected by HHS regulations; e.g., filling out forms or undertaking other activities on one's own time to comply with regulations. However, it provides useful information on the extent to which compensation-based measures are likely to approximate the value of such time.<sup>23</sup>

#### 3.1 Valuing Time in Recreation Demand Modeling

Travel and associated uses of leisure time have been studied extensively in the context of outdoor recreational opportunities, such as parks used for activities like fishing or hiking. The fundamental assumption is that the value of a recreational opportunity is at least as great as the value of what one must pay to participate in terms of both money and time expenditures. In other words, time is one of the resources used to engage in the recreational activity. Related studies provide insights into the labor-leisure trade-off, which is the conceptual foundation for valuing nonmarket time (see Section 2.2), including the effects of labor market distortions on these trade-offs.

---

<sup>22</sup> The use of compensation data may be categorized as a revealed preference method, because it involves the direct application of market data. In this chapter, we focus on the indirect use of market data to estimate the value of outcomes for which market measures may be insufficient, as illustrated by some of the recreation models discussed in the following section.

<sup>23</sup> The HHS *Guidelines* discuss the benefit transfer framework, which involves reviewing available valuation studies for quality and applicability to determine whether and how to apply them in HHS regulatory analysis. Because we did not identify studies that address the types of administrative time use that are the focus of this report, we do not discuss the application of that framework in detail.

Revealed preference methods are often used to estimate the value of recreational activities, although stated preference methods may also be used. A simple travel cost model may use market data and survey information to determine the money costs (e.g., fuel, tolls, and access fees) and the time costs (e.g., traveling) to make inferences about individual WTP for a recreational opportunity. More sophisticated models, such as random utility models, consider environmental quality variables as well as travel costs that affect an individual's choice between different recreational sites.<sup>24</sup> In the discussion that follows, we focus on how time is valued in these models, rather than on how these models are used to estimate the value of recreational opportunities more generally.

Many recreational demand studies apply a simple default assumption to value time, often one-third of the wage rate, although the wage rate is not always defined consistently. This approach is fairly arbitrary and appears to have its origins in the early transportation literature (Shaw and Feather 1999, Larson and Lew 2014).<sup>25</sup> Although some researchers continue to use this approach, others have more directly investigated the value of time in particular recreational contexts.<sup>26</sup>

These studies address a specific type of time use – personal travel for leisure activities involving outdoor recreation – that is dissimilar to the types of time use likely to be affected by HHS regulations. Nevertheless, we examine this literature because it provides insights into related issues. We considered the results of several reviews, including Phaneuf and Smith (2005), Robinson (2007), Freeman et al. (2014), Larson and Lew (2014), and English et al. (2015). We summarize selected examples below, focusing on frequently cited U.S. studies. Note that the results of these studies are not necessarily comparable. Few indicate whether the reported income fractions are based on pre- or post-tax income, and income is at times measured at the household rather than the individual level.

An early example is McConnell and Strand (1981), who examine the value of travel time as a proportion of the wage rate in a simple travel cost model. They focus on sportfishing and find that, for the typical angler included in their survey, travel time was valued at approximately 60 percent of hourly income. Variation in these values is explored, for example, by Englin and Shonkwiler (1995) in a study on the value of boating, angling, and swimming trips to freshwater recreation sites. They note that the value that an individual places on travel time is unobservable, and predict this value based on other (observable) factors. They find that time spent traveling was valued at approximately 40 percent of the mean wage rate.

Other researchers examine the effects of work hour flexibility on the value of leisure time, and find that these values vary depending on labor market status. For example, Bockstael, Strand, and Hanemann (1987) examine the effects of fixed work hours in a sportfishing study. They find that, for individuals with flexible work hours, the opportunity cost of time was about equal to the wage rate. In contrast, for

---

<sup>24</sup> For more detailed discussion of recreation demand models, see Phaneuf and Smith (2005) and Freeman et al. (2014); Larson and Lew (2014) explore the conceptual framework and advantages and limitations of alternative approaches for valuing time in such models.

<sup>25</sup> In particular, in his 1976 review, Cesario concluded that the then-available evidence suggested that the value of non-work travel time was between one-fourth and one-half of the wage rate.

<sup>26</sup> The number of such studies is relatively small. For example, English et al. (2015) identified 10 U.S. studies published since 1990 that estimate the value of travel time for recreational opportunities and noted that most have important limitations.

individuals with fixed work schedules, the opportunity cost of time was about 3.5 times the wage rate. A 1999 study of river recreation by Feather and Shaw further examines the impact of inflexible work hours. They find that the shadow wage or opportunity cost of time exceeded the market wage in cases where an individual was working more hours than he or she would prefer, but was less than the market wage in cases where an individual was working fewer hours than desired. Where work hours are flexible, the opportunity cost was again reasonably close to the market wage rate.

A final example is Palmquist, Phaneuf, and Smith (2010), who investigate how the value of time varies depending on the duration and frequency of the activity and its relationship to other activities, using data on recreational opportunities available to homeowners. They consider the effect of the “shadow wage” that respondents would need to be paid to spend additional hours working on the value of travel time, taking into account the length of time spent recreating. The resulting cost of time was 70 percent of the observed wage rate; however, the marginal value increased as trip length increased.

These findings suggest that, when individuals are free to choose how to trade-off paid work and leisure, the wages they receive may provide a reasonable approximation of the marginal value of leisure time in the context of recreational travel. When work hours are less flexible, the marginal value of leisure time may differ significantly from wages received. These studies further suggest that the value of leisure time is not a constant proportion of the value of paid work, but varies depending on income level as well as other personal characteristics and institutional constraints, and on the amount of time affected. Empirical measures also vary depending on the data and modeling approach used as well as the characteristics of the individuals and recreational opportunities studied.

Three limitations of this research are worth noting. First, the tradeoffs that underlie the valuation of travel time are not clear in some cases. The opportunity cost of this travel time may involve additional work time, additional time spent on-site, or additional time spent in other nonmarket work or leisure activities, depending on individual preferences and constraints.<sup>27</sup> Second, although many of these studies report their findings as a fraction of the wage rate, they often do not report how the wage rate is defined, or use inconsistent definitions, as noted earlier. Finally, they rely on samples of the individuals involved in particular recreational activities, rather than national samples of all those potentially affected by major Federal regulations.

### **3.2 Valuing Time in Transportation Modeling**

The value of travel time has been studied more extensively by researchers interested in transportation issues because it plays an important role both in forecasting behavior and in determining the value of different options from a social welfare perspective.<sup>28</sup> The U.S. Department of Transportation (DOT) has developed specific recommendations for valuing travel time savings in its regulatory and other analyses

---

<sup>27</sup> Most of these studies were conducted before the use of smartphones became wide-spread, which may conceivably make travel more pleasurable by allowing one to simultaneously talk on the phone, work, play games or engage in other activities (presumably for those traveling as passengers rather than operators). However, somewhat surprisingly, recent work in the United Kingdom (U.K. Department of Transport 2015a, 2015b) found that the traveler’s ability to do something else while traveling had little or no effect on the value of changes in travel time.

<sup>28</sup> See Small (2012) for review of related theoretical and empirical issues.



(DOT 2016); the HHS *Guidelines* reference the DOT guidance in discussing recommendations for valuing travel time in HHS regulatory analysis. Thus we begin by reviewing that guidance and discuss its application in HHS analyses. We then discuss related nonmarket valuation research that provides additional insights.

As noted in Section 2.1, some theoretical and empirical work suggests that individuals tend to value losses more highly than gains, as illustrated by the disparities between WTA and WTP estimates for identical goods. Applying the estimates described below to HHS regulations that increase travel time (e.g., to attend training related to regulatory implementation) rather than to DOT policies that decrease travel time (e.g., by improving the transportation infrastructure) assumes that gains and losses have equivalent value. However, because travel time is likely to be a small proportion of the costs of most HHS regulations, any differences in the measures appear unlikely to noticeably affect the conclusions of most HHS analyses.

### **3.2.1 U.S. Department of Transportation Guidance**

DOT first published guidance on the value of travel time savings in 1997, then periodically updated the guidance to incorporate more recent research and earnings estimates.<sup>29</sup> This guidance provides percentages that analysts should apply to hourly earnings, which vary depending on the type of travel and transportation mode. The fractions were derived from review of the theoretical and empirical literature, including the types of nonmarket valuation studies that are the focus of this chapter. DOT developed these fractions in 1997 then determined that no revisions were needed in its subsequent reviews. We report these percentages in Exhibit 3 below; the values in parentheses represent the ranges DOT recommends for sensitivity analysis.

---

<sup>29</sup> This DOT guidance focuses specifically on values for use in policy analyses; more disaggregated estimates are needed for prediction in forecasting models that reflect the specific characteristics of the individuals and activities affected.

**Exhibit 3: DOT Recommended Values for Travel Time Savings  
(per person-hour as percent of hourly earnings<sup>a</sup>)**

Travel Type	Surface Modes <sup>b</sup> (except high-speed rail)	Air and High Speed Rail
Local		
Personal	50 percent (35-60 percent)	N/A
Business	100 percent (80-120 percent)	N/A
Intercity		
Personal	70 percent (60-90 percent)	70 percent (60-90 percent)
Business	100 percent <sup>c</sup> (80-120 percent)	100 percent (80-120 percent)

**Source:** DOT (2016), Tables 1 and 2.

**Notes:**

- a. See text for information on how earnings are calculated.
- b. DOT (2016, p. 13) notes that “[s]urface figures apply to all combinations of in-vehicle and other time. Walk access, waiting, and transfer time should be valued at 100% of hourly income when actions affect only those elements of travel time.” DOT (2016, p. 14) recommends that a range of 80-120 percent be used for the latter types of time in sensitivity analysis.
- c. The same fractions apply to vehicle operators including truck drivers, bus drivers, transit rail operators, locomotive engineers, and airline pilots and engineers.

DOT uses different percentages for different types of travel time savings to reflect certain attributes that affect these values. DOT differentiates between business and personal travel, defining business travel as “on-the-clock” time for which the individual is being compensated by his or her employer. DOT assumes that such business travel involves largely unproductive time that would otherwise be spent in market work.<sup>30-31</sup>

DOT uses lower percentages for personal travel, indicating that the available research suggests that savings in personal travel time are valued less than savings in business travel. In addition, because research suggests that the value per unit of time savings increases with the distance traveled, DOT uses lower values for local personal trips, which are likely to be shorter in duration than intercity trips. DOT states that some possible reasons why the value of personal travel is lower than the value of business travel may be that savings in personal travel time cannot be easily converted into additional work time (due to fixed work schedules) and that personal travel may include more pleasurable aspects (such as viewing scenery) than business travel. DOT recommends a value of 100 percent of the applicable wage rate when only wait time or walking or transfer time is affected. DOT does not explain in detail the

<sup>30</sup> As discussed in Wardman et al. (2013), other countries also typically value business travel time savings based on measures of total compensation, although the details of how the approach is implemented vary.

<sup>31</sup> Of course, not all time spent at a workplace rather than traveling is productive; distractions such as staring out the window or socializing are not limited to travel. The question is the degree to which the balance between productive and unproductive time while at work (which is reflected in the wage rate) is the same as the balance while traveling. In addition, as recognized by Hensher (1977), for some individuals work travel may occur in part during time that would otherwise be used for leisure, and individuals may accrue some utility or disutility from traveling (in comparison with alternative uses of their time) which is not reflected in the wage rate. See Wardman et al. (2013) for more discussion of the Hensher framework and related issues.

rationale for the specific ranges suggested for sensitivity analysis, except to say that they are plausible based on the available empirical research.

DOT uses different approaches to estimate earnings for each category of traveler. For general business travel (during paid work hours), DOT applies the percentages to estimates of the national median hourly wage, including benefits and payroll taxes. For truck drivers and other commercial operators, it uses wages for the particular occupation rather than national averages. For personal travel (commuting, shopping, recreation, etc.), DOT uses estimates of median household pre-tax income divided by 2080 hours per year.<sup>32</sup> For airline and high speed rail travelers, higher values are used than for other travel modes based on data suggesting that individuals in these categories have incomes that exceed the national median.

As noted earlier, the HHS (2016) *Guidelines* reference the DOT fractions in discussing recommendations for valuing travel time. However, DOT's approaches for estimating hourly earnings currently differ from those recommended for use in HHS regulatory analyses when valuing administrative time (see Chapter 4). For consistency with the derivation of the DOT fractions, we recommend that HHS analysts use DOT's earnings estimates when valuing travel time. Analysts should also check whether DOT has updated or revised its approach before applying these estimates. We expect that HHS regulations will rarely require valuation of travel time and that such time will be a small proportion of the total costs of most regulations; hence the resulting uncertainties are not likely to significantly affect the analytic conclusions.

### 3.2.2 Effects of Attributes on Values

DOT discusses several attributes that affect the value of travel time and provides a bibliography of revealed and stated preference research conducted through 2009. We reviewed selected materials from that bibliography as well as other work to provide more insights into the value placed on attributes of time likely to be affected by HHS regulations.<sup>33</sup> Because this literature is large, we summarize findings on key attributes across studies rather than individual studies. The transportation literature covers several issues that are important in the travel context but relatively unimportant in the context of HHS regulatory analyses, such as the comparative advantages of different transport modes (e.g., plane, car, walking). However, it also covers issues such as the effects of duration which appear relevant to the valuation of administrative time in HHS regulatory analysis.

This literature generally focuses on travel time *savings*, which presumably involve substituting more pleasurable or productive activities for travel. In the context of HHS regulations, we are generally concerned instead about time *costs*; i.e., substituting less pleasant activities (such a filling out forms or

---

<sup>32</sup> DOT currently uses estimates of median household (rather than individual) pre-tax income in calculating these values. However, the Miller (1996) paper that DOT (1997) references as the basis for the local travel fractions calculates these percentages based primarily on the pre-tax wage rate of the travelers studied. DOT staff note that they will be reevaluating this approach in the next major revision of the guidance. (Personal communication from Darren Timothy, U.S. Department of Transportation, March 2017).

<sup>33</sup> While we are primarily interested in U.S. studies, the value of travel time and its attributes has received considerable attention in Europe and elsewhere, as exemplified by Fosgerau et al. (2007), Börjesson and Eliasson (2014), Meunier and Quinet (2015), and U.K. Department for Transport (2015a, 2015b). In general, this work appears to lead to similar conclusions.

waiting in line) for one's normal activities. In the discussion that follows, we continue to refer to savings for consistency with the literature we review. As noted in the earlier discussion of WTP versus WTA measures, some studies have found that the value of time is similar for losses and gains, while others have found more significant differences. However, in general, we expect that a factor that increases the value of travel time savings would lead to a roughly commensurate increase in the value of time costs.

**Duration and Timing:** Many observers have noted that small time savings (e.g., of a few minutes) may be valued differently than larger time savings, in part because small savings may be simply tacked onto adjoining activities while longer time savings can be used to engage in new activities.<sup>34</sup> The value of time savings of different durations also will depend in part on whether the affected individuals can re-arrange their schedules so as to take better advantage of the time available. This suggests that to the extent that HHS regulations require small changes in time use, the opportunity costs of such time may be smaller (on a per unit basis) than the value of larger changes in time.

The value of time savings also depends on when it occurs. The time of day, as well as the season of the year, affects the range of activities available. In their review of the recreational literature, Phaneuf and Smith (2005) note that research completed to-date suggests that this relationship is complex, and that more work is needed to determine the variation in value.

**Predictability and Reliability:** Another attribute that affects individual's valuation of time savings is the associated predictability, variability, or uncertainty. For example, Brownstone and Small (2005) find that the research supports the use of higher values for averting unreliable travel time. The value placed on predictability or variability may vary from day-to-day or from trip-to-trip depending on the context.

**Comfort, Convenience, Stress, and Safety:** Travel time has a number of attributes that determine how pleasant or unpleasant the experience is likely to be. It is very difficult to disentangle the effects of these various characteristics and to assess their individual impact empirically. Few, if any, studies provide separate estimates of the value of factors such as comfort or convenience. However, it seems self-evident that the more unpleasant the experience, the higher the value of saving time is likely to be.

**Ability to Engage in Simultaneous Activities:** The value of time also depends in part on whether the individual can simultaneously pursue other activities while traveling. For example, a business traveler may work when traveling by plane or train, hence the time may not be entirely unproductive. A leisure traveler – as well as a business traveler – may enjoy listening to music or viewing the scenery. These productive or pleasant uses of time may mean that time savings have a lower value than would be the case if the activity had no positive aspects.

**Relationship to Income:** In U.S. regulatory analysis, values are not usually adjusted for income differences across those affected, except to the extent that the analysis focuses on those working in different occupations and industries (as in the valuation of paid work time). However, regulatory analysis may involve projecting costs and benefits over a 10 to 20 year period, in which case real

---

<sup>34</sup> In some cases, these findings may result from the methods used to estimate values. For example, small changes may attract less attention in survey or other research than larger changes, and the effects of changes in time use may be confounded by changes in monetary costs, if both are affected.

changes in income may be taken into account. Although some older research suggests that the value of travel time savings increases more slowly than income, more recent research suggests that it may be reasonable to assume that the increase is proportionate. For example, a U.K. meta-analysis (Wardman and Wheat 2013) found income elasticities of 1.06 for commuting time and 0.9 for other types of personal travel time.

Thus in general, these findings suggest that travel time savings are valued more highly if: (1) the duration is uncertain or unpredictable; (2) the surroundings are uncomfortable or unpleasant; and (3) the affected individuals are unable to pursue other more enjoyable or productive activities simultaneously. In addition, the marginal value per unit of time may increase as the amount of time expended in an activity increases. It is unclear, however, how much these values are likely to vary from the compensation-based measures used as default assumptions in HHS regulatory analyses. Analysts should discuss those attributes that may make the change in time use particularly unpleasant or unproductive, or otherwise significantly affect related values, when presenting their analytic results.

### **3.3 Summary and Conclusions**

Our review of the nonmarket valuation literature indicates that the compensation-based measures currently recommended for use in HHS regulatory analyses continue to be the most defensible and appropriate approach for valuing changes in time use. Although the nonmarket valuation literature suggests that compensation-based measures may only roughly approximate the values that individuals place on changes in their use of nonmarket time, it does not provide estimates that should be used to replace or adjust these measures.

#### **4.0 APPROACH FOR CONSTRUCTING COMPENSATION-BASED ESTIMATES**

As discussed in Chapter 3, compensation-based measures are currently the most defensible approach for valuing changes in time use. In this chapter, we provide recommendations for developing such measures. We begin by summarizing the recommendations in the 2016 *Guidelines*. These assumptions reflect HHS's current approach for developing primary estimates of the value of time changes in its regulatory impact analyses. In the subsequent sections, we describe available data for constructing values, focusing first on values for activities undertaken while working, and then for activities undertaken on individuals' own time.

We found that data related to wages, benefits, and taxes are readily available; however, as described below, information on indirect costs are limited. At this time, data limitations prevent us from providing specific recommendations for improving HHS's default assumptions for estimating indirect costs. Analysts should, however, consider using the information provided in this report for sensitivity or uncertainty analysis. We also make recommendations for additional research.

##### **4.1 Key Assumptions**

Exhibit 4 summarizes the recommended default assumptions for valuing changes in time use in HHS regulatory impact analyses described in the *Guidelines*. We also note sources of national data for each cost element.<sup>35</sup> If available and clearly justified, analysts may instead apply data more directly related to the industries, programs, or activities of interest.

---

<sup>35</sup> For on-the-job activities, the Guidelines identify only the U.S. Bureau of Labor Statistic sources of pre-tax wage information. For completeness, we add the General Schedule for government employees to the table in this report.

**Exhibit 4: Default Assumptions for Valuing Changes in Time Use<sup>a</sup>**

Context	Costs Included in Hourly Value	Data Sources and Key Assumptions
<b>On-the-Job Activities:</b> Employees undertaking administrative tasks while working	<ul style="list-style-type: none"> <li>• Pre-tax wages</li> </ul>	<ul style="list-style-type: none"> <li>• OES or NCS ECEC industry data on wages</li> <li>• General Schedule for government employees published by the U.S. Office of Personnel Management (OPM)</li> </ul>
	<ul style="list-style-type: none"> <li>• Benefits</li> <li>• Indirect costs</li> </ul>	<ul style="list-style-type: none"> <li>• Industry- or program-specific data as available, or assume benefits plus indirect costs equal 100 percent of pre-tax wages (i.e., for a fully-loaded wage rate, multiply pre-tax wages by a factor of “2”, referred to in this chapter as the “wage multiplier”)</li> </ul>
<b>Unpaid Time:</b> Individuals undertaking administrative tasks on their own time	<ul style="list-style-type: none"> <li>• Post-tax wages</li> </ul>	<ul style="list-style-type: none"> <li>• OEC or NCS ECEC data on wages</li> <li>• Adjust wage estimates using data on household income before and after taxes collected in the CPS</li> </ul>

**Acronyms:**

CPS – Current Population Survey (U.S. Census Bureau)  
 ECEC – Employer Costs for Employee Compensation (U.S. Bureau of Labor Statistics)  
 NCS – National Compensation Survey (U.S. Bureau of Labor Statistics)  
 OES – Occupational Employment Statistics (U.S. Bureau of Labor Statistics)

**Note:**

a. When valuing changes in travel time, analyses should review the current DOT guidance (DOT 2016) discussed in Chapter 3 and decide whether those values are appropriate in the context of the particular regulation.

**4.2 On-the-Job Activities**

For paid-work-related activities, the opportunity cost, or value, of a unit of time devoted to regulatory compliance equals the marginal value of the product that would have otherwise been produced in the absence of the regulation. As discussed in Chapter 2, economists typically assume that employers are willing to incur labor costs up to the value of workers’ marginal product under a simple version of the standard economic model. Thus marginal cost of compensation to the employer can be used to value the opportunity cost of productivity losses attributable to a regulation.

Compensation varies depending on the type of work performed. Wages may include base pay, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay (commissions, bonuses), and/or tips.<sup>36</sup> In addition, employers pay additional benefits, which generally include paid time off, health insurance, retirement benefits, other legally required benefits (e.g., worker’s compensation), and payroll taxes. Typically, all of these expenses are included in valuing changes in paid work time, consistent with theory as well as with current practices in the transportation and medical cost literature (DOT 2015; Wardman et al. 2013; Grosse and Krueger 2011; Drummond et al. 2015).

<sup>36</sup> We generally use the term “wages” to refer collectively to all of these categories.

When a regulation changes the work performed, the full opportunity cost comprises both direct costs (pre-tax wages and benefits) and indirect costs. Indirect costs reflect resources devoted to administrative oversight and generally include time spent on administrative personnel issues (e.g., human resources activities such as hiring, performance reviews, personnel transfers, affirmative action programs), writing administrative guidance documents, office expenses (e.g., space rental, utilities, equipment costs), and outreach and general training (e.g., employee development). Because these activities jointly support one or more of an organization's productive activities, allocation of such costs is achieved through the application of an indirect rate to total direct labor costs.

Including indirect costs is appropriate because a share of such costs is effectively used to support compliance activities, rather than other productive work. For example, a staff member may use his or her office space, phone, and computer for record-keeping, documentation, and transmittal of required forms instead of for the activities he or she would undertake in the absence of the regulation. In another example, time spent hiring staff and training them on the use of basic office computing programs provides the skills needed to complete administrative compliance activities.

Precedent for including indirect costs when estimating opportunity costs is provided by the Federal government's practice of including such costs both in fees charged for services performed for other entities and when recovering labor-related costs associated with time spent on certain activities subject to litigation.<sup>37</sup> Similarly, in the private sector, universities include indirect costs in the calculation of labor-related costs in grant proposals (see 2 Code of Federal Regulation (CFR) 220), and consultants include such costs in hourly-billing rates (Grant Thornton 2015).<sup>38</sup>

In the remainder of this section, we discuss the data sources available for estimating labor costs. First, we recommend two sources of hourly wage information. Because these sources do not include the value of benefits, and available data on indirect cost rates generally apply to estimates of hourly wages plus benefits, we also recommend data sources allowing analysts to separately estimate benefits. Next, we discuss sources of indirect rates for Federal, private, and nonprofit entities. We then summarize our conclusions and recommendations.

#### **4.2.1 Wage Data**

Two data sources published by the U.S. Bureau of Labor Statistics (BLS) provide national information on hourly pre-tax wages by industry sector.<sup>39</sup> The Occupational Employment Statistics (OES) are generated

---

<sup>37</sup> For example, the hourly-fee charged by the FDA for re-inspection of imported goods includes related indirect costs (FDA 2015c). In a litigation context, the Federal government publishes indirect rates for recovery of labor costs incurred in response to oil spills and other releases of hazardous materials affecting natural resources (National Oceanic and Atmospheric Administration 2016, DOJ 2015).

<sup>38</sup> Furthermore, as discussed later in this section, the U.S. Department of Labor (DOL) Employee Benefits Security Administration (EBSA) provides guidance on the calculation of labor costs for use in regulatory impact analyses. The guidance specifies the inclusion of wages, benefits, and overhead costs (DOL 2016). Other Federal agencies, including the FDA within HHS, the U.S. Environmental Protection Agency's Office of Solid Waste and Remedial Response (OWSER), and the U.S. Fish and Wildlife Service (USFWS) undertake similar wage adjustments. DOL is the only agency that we are aware of, however, that publishes official guidance on this subject.

<sup>39</sup> We focus on data sources providing hourly wage data, as opposed to weekly, annual, or household estimates, to avoid the need for additional assumptions about the number of hours worked and/or the number of employed workers in a household. If



from a semiannual mail survey that covers a broad set of establishments across the United States.<sup>40</sup> The National Compensation Survey (NCS) is an in-person survey of a subset of establishments and provides information on quarterly changes in employer costs (the Employer Cost Index, or ECI) and cost levels (Employer Costs for Employee Compensation, or ECEC).<sup>41,42</sup>

Both surveys use statistical methods to collect nationally representative samples. The OES survey is larger, covering a greater range of occupations and geographic areas, and provides estimates of median, as well as mean, wages. In contrast, the NCS program samples fewer establishments, but conducts the survey in-person and collects more detailed information on occupations within an establishment. In addition to reporting wage and salary information (pre-tax, mean only), the NCS provides data on other compensation, including benefits (paid leave, insurance, retirement). Generally, OES is the preferred source for national estimates of hourly wages given its broader geographic coverage. The ECEC is useful for identifying compensation rates for specific categories of employees (e.g., managers).

For Federal employee wages, analysts should use the General Schedule published by the U.S. Office of Personnel Management (OPM).<sup>43</sup> This schedule is updated annually and provides hourly wages by grade and step. It also includes adjustments for specific localities.

#### 4.2.2 Benefits Data

The NCS ECEC reports the total cost of benefits incurred by civilian employers, including state and local governments and private industry. Benefits data collected in the survey include paid leave (vacation, holiday, sick, personal), supplemental pay (overtime and premium, shift differentials, nonproduction bonuses), insurance (life, health, short- and long-term disability), retirement and savings (defined benefit, defined contribution), and legally required benefits (Social Security and Medicare, Federal and state unemployment insurance, workers' compensation).<sup>44</sup> Benefits are reported as a percentage of total compensation. In 2015, total benefits accounted for a mean of 31.3 percent of total compensation across all sectors (BLS 2016). Thus, benefits are equivalent to 45.6 percent of wages ( $31.3/(100-31.3)=0.456$ ).

OMB Circular A-76 (2003b) establishes Federal policy for estimating the cost to the government of performing commercial activities.<sup>45</sup> It recommends assuming "fringe" benefits are equivalent to 36.25 percent of wages. It defines fringe benefits as including retirement, insurance and health, Medicare, and miscellaneous (workers' compensation, bonuses, awards, and unemployment programs) (OMB 2003b).

---

data on annual salaries are required, additional sources, such as the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW; <http://www.bls.gov/cew/>), may also be used.

<sup>40</sup> See <http://www.bls.gov/oes/>. OES excludes farm establishments and self-employed persons.

<sup>41</sup> See <http://www.bls.gov/oes/> pages on "OES Frequently Asked Questions" for a comparison of the OES and NCS.

<sup>42</sup> See <http://www.bls.gov/ncs/>. NCS excludes Federal government employees.

<sup>43</sup> See <https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/2015/general-schedule/>.

<sup>44</sup> See <http://www.bls.gov/news.release/ecec.toc.htm>

<sup>45</sup> The purpose is to compare competitive proposals or quotations prepared by the private sector to the Federal government's cost for undertaking the same work to determine if government personnel should perform a commercial activity (OMB 2003b).

Alternatively, a study undertaken by the Congressional Budget Office (CBO) estimates that benefits account for 39 percent of total compensation (wages plus benefits) for Federal employees (Falk 2012).<sup>46</sup> Thus, benefits are equivalent to 64 percent of wages ( $39/(100-39)=0.64$ ). The higher ratio identified in this study, relative to the ratio used in Circular A-76, likely results from the fact that the benefits estimates in Falk (2012) include paid leave, in addition to the benefits described in the prior paragraph. The estimate in this study was specifically designed by the authors to be comparable to the ratios identified for non-Federal employees in the ECEC. Thus, HHS analysts should generally rely on the estimate provided in Falk (2012) to estimate benefits for Federal employees.

#### 4.2.3 Indirect Cost Data

Identifying the appropriate indirect rate to apply to the hourly estimates of wages and benefits described above requires an understanding of how indirect rates are calculated. In this section, we first describe this calculation. Next, we review sources of indirect cost rates for Federal agencies. We conclude with a similar review of data for non-public entities.

##### Estimating an Indirect Rate

Conceptually, the goal of an indirect rate is to allocate a share of the overhead and other indirect costs (e.g., space rental, utilities, training, equipment, administrative support, safety management, etc.) associated with managing an organization to a particular activity or program. To develop an indirect rate, accountants estimate the indirect costs attributable to an office or program and divide it by relevant total direct labor costs, as follows:

$$\frac{\text{Total indirect costs}}{\text{Total direct labor costs}} = \text{Indirect cost rate}$$

In regulatory analyses, the total opportunity cost of a unit of time, including all relevant indirect costs, can be calculated by multiplying direct labor costs by one plus the indirect cost rate.

$$\text{Total direct labor costs} * (1 + \text{Indirect cost rate}) = \text{Total opportunity cost of a unit of time}$$

It is important, however, when applying an indirect cost rate, to be certain that the types of costs included in an estimate of direct labor costs match the types of costs included in the denominator, or total direct labor cost “base,” used to calculate the indirect cost rate. Financial accounting standards delineate the types of costs included in this base, as discussed in detail in the Appendix to this report. Generally, direct labor costs include: pre-tax wages, fringe benefits (i.e., retirement, health insurance, and life insurance); leave and holiday pay; and overtime and premium pay.<sup>47</sup> Thus, when applying an

---

<sup>46</sup> The analysis relies on data from 2005 through 2010. Data on benefits paid to Federal employees was obtained from the Central Personnel Data File (CPDF) collected by OPM (Falk 2012). It also provides more specific data depending on the level of education attained.

<sup>47</sup> The approach to defining the total direct labor cost base described here is typically used by accountants to build an indirect rate for a specific program or office using actual, historical accounting data. Alternatively, if analysts are looking for a general

indirect cost rate in an HHS regulatory analysis, it should be multiplied by the hourly estimate of compensation, including wages and benefits.<sup>48</sup>

The second important thing to keep in mind is that an indirect cost rate may vary significantly within or across organizations, depending on the specific office or program for which the rate is calculated. For example, offices whose employees spend more time in training relative to direct work will have a higher indirect rate than similar offices with lower training costs. In addition, offices in an agency with many organizational layers may have a higher indirect rate due to the need to bear a proportionate cost associated with several layers of management and oversight. Thus, it is difficult to recommend a single, “rule-of-thumb” indirect rate for an entire Agency or industry sector.

Third, if compliance activities displace work that would normally be allocated to the indirect cost pool (i.e., the numerator in the above equation), then indirect cost rates derived as described above may overstate costs. For example, an accountant whose time is assigned to the indirect cost pool will incur indirect costs associated with occupying his office space and immediate supervision. However, it would not be appropriate to burden his time with the labor associated with other accountants in the department providing indirect support to the same program. We are unable to identify data reporting indirect cost rates for individuals whose time is typically allocated to an indirect cost pool.<sup>49</sup>

Finally, the draft *Guidelines* advise analysts to separately estimate the incremental labor costs and the incremental cost of materials, equipment, lab testing, etc. required to comply with a regulation. Analysts should be careful to avoid double-counting when combining these categories to estimate the incremental cost of a regulation. If regulated entities are likely to use existing equipment or facilities (e.g., computers, storage space, etc.) to comply, then related costs may already be included in the indirect rate and should not be estimated separately. However, if the regulation requires significant new purchases of equipment or other items (e.g., new hard drives are necessary to store data; entities must rent additional storage space for long-term document retention), then it is appropriate to separately estimate these incremental costs and add them to estimates of labor costs that include indirect costs. Furthermore, when analysts estimate the hours required to comply with the regulation, they should only count direct hours spent working on regulatory tasks; including non-project specific supervisory or support time may lead to double-counting.

#### Indirect Rate Data for Federal Agencies

---

indirect rate for a typical employee or job category, rather than a rate for a specific program or office, it would be reasonable to assign benefits to the numerator (i.e., the cost “pool”), rather than the denominator. Because the method used to calculate an indirect rate may vary, it is important that analysts understand the derivation of any indirect rates applied in an analysis, including the component costs included in the base.

<sup>48</sup> Accountants also calculate a second type of indirect cost rate, where the base is total direct costs, rather than total direct *labor* costs. In the former case, materials (e.g., equipment purchases, supplies and materials) that can be traced to a specific activity or program are also included in the base (see Appendix for a more detailed discussion). Because we are interested in making adjustments to estimates of compensation, we attempt to identify indirect rates based on labor costs only. If analysts are considering using a published indirect rate for an office or program, they must carefully evaluate the construction of that rate to ensure that it refers to direct labor costs.

<sup>49</sup> As a lower bound value, analysts could assume that for individuals whose time is generally considered to be indirect labor, and who are asked to complete compliance activities, only wages and benefits apply. As an upper bound, analysts could apply the standard indirect cost rate used elsewhere in the analysis.

Although the methodology for calculating an indirect rate is well-established and consistent across agencies and offices, as discussed above, the rate itself may vary significantly depending on the characteristics of the relevant office. To illustrate the potential degree to which indirect rates may vary, we provide the following examples.

- The **National Oceanic and Atmospheric Administration (NOAA)** has authority under various laws to assess, remediate, and restore natural resources damaged by releases of oil and other hazardous materials.<sup>50</sup> The agency is authorized to recover the reasonable costs of damage assessment and restoration planning activities, including both the direct and indirect costs of the program (NOAA 2016a). Annually, it publishes in the *Federal Register* its indirect cost rate for the three offices within NOAA that conduct these activities. Each office has a separate rate, and each rate is calculated by the same private accounting firm and is subject to peer review. Thus, a uniform methodology and general set of assumptions are applied in the estimation of all three rates. In fiscal year 2015, the indirect cost rates applicable to a direct labor cost base were 151.18 percent (Office of Response and Restoration), 60.91 percent (Restoration Center), and 32.75 percent (General Counsel for Natural Resources Section) (NOAA 2016b).<sup>51</sup>
- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, or Superfund) establishes the Hazardous Substance Superfund Trust Fund to finance cleanup efforts, under certain circumstances, and to pay the U.S. Environmental Protection Agency (EPA) for enforcement, research, and development. The **U.S. Department of Justice (DOJ)**, Environment and Natural Resources Division (ENRD) is responsible for all Superfund litigation. ENRD developed and updates an indirect cost rate for purposes of obtaining reimbursement from EPA for its litigation costs, and this rate was recently audited by the Inspector General (DOJ 2015). The indirect rates for 2013 and 2014 were 190.2 percent and 197.9 percent, respectively. Importantly, these rates define a direct labor cost base including only wages; benefits are included in the indirect pool. Thus, these rates are not directly comparable to the NOAA rates presented in the prior bullet.

In principle, analysts could calculate the appropriate indirect rate for an agency office affected by a regulation as part of the development of the regulatory analysis. Alternatively, analysts could apply a published, approved indirect rate for the relevant program or office.<sup>52</sup> However, estimating indirect cost rates as part of the regulatory analysis is likely to be infeasible because of the resources needed to

---

<sup>50</sup> These laws include the Oil Pollution Act (OPA), the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA), and the National Marine Sanctuaries Act (NMSA).

<sup>51</sup> The types of activities accounted for in these indirect rates include: employee recruitment and training; general budget formulation, monitoring, analysis, and reporting; non-case-specific management and staff meetings on administrative matters; general cost accounting, computer support, and secretarial support; general records management and database support; general program policy and development; and techniques and methods development (Cotton & Company LLC 2016a, 2016b, and 2016c).

<sup>52</sup> One potential source of data is notices published in the *Federal Register* for rates charged to the public for agency services.

collect the necessary data, and published indirect rates are unlikely to be available for most offices or programs. When conclusions are sensitive to this factor, analysts should conduct sensitivity analysis.<sup>53</sup>

Note that in the absence of published rates for most offices or programs, Circular A-76 (OMB 2003b) provides a source of a government-wide estimate. Circular A-76 is used by Federal agencies to develop estimates of the internal costs of undertaking tasks that might also be achieved using external contractors, for purposes of comparing internal and external costs to the government. It directs Federal agencies to use an overhead factor of 12 percent. OMB applies this rate to all Federal labor costs, including prorated shares of labor for supervision and management and other indirect labor. Thus, because some types of labor more typically found in the indirect pool are included in the direct labor base, this estimate may be understated relative to typical indirect rates for Federal agency programs. Comparing it to the limited available examples of Federal indirect rates (e.g., NOAA 2016) also suggests that it is a low estimate. Analysts may choose to apply this rate in sensitivity analysis.

#### Indirect Rate Data for Non-Federal Entities

Indirect rates of affected firms and other non-Federal entities are likely to vary substantially, both across and within industries. This information is proprietary and closely-held. There are no publicly available resources that provide company-specific indirect rates by industry sector. We profile some potentially useful, albeit limited data sources for indirect rates below:

- **Industry surveys from Grant Thornton.** Each year, Grant Thornton publishes current, survey-based estimates of industry indirect rates. However, the sample is limited to government contractors.<sup>54</sup> For example, Grant Thornton (2015) reports a median labor overhead rate of 36 percent if fringe benefits are included in the allocation base (the denominator).<sup>55-56</sup> In the 2009 through 2013 surveys, this rate ranged from 38 percent to 51 percent.

In an older report, Grant Thornton (2001) reports mean overhead rates by company size (measured in revenues) and the types of services provided. That year, mean direct labor overhead, where fringe benefits are included in the base, ranges from approximately 35 percent to 82 percent depending on company size.<sup>57</sup> Similarly, the mean overhead rate was approximately 70 percent for firms providing engineering services, 48 percent for information services firms, 50 percent for management

---

<sup>53</sup> The 2016 HHS *Guidelines* include a more detailed discussion of the use of screening analysis to determine how to most appropriately target analytic resources.

<sup>54</sup> For example, see <https://www.grantthornton.com/~media/content-page-files/public-sector/pdfs/surveys/2015/Gov-Contractor-Survey.ashx>. Some editions of the Government Contractor Survey from Grant Thornton provide industry-by-industry breakdowns of indirect rates.

<sup>55</sup> The labor overhead rate does not include the general and administrative (G&A) pool (calculated separately), which typically includes the cost of headquarters functions such as executive management, accounting, legal, contract administration, human resources, and sales and marketing. In addition, it does not include profit.

<sup>56</sup> Grant Thornton (2015) defines fringe benefits as including paid time off, in addition to payroll taxes, health insurance, retirement plans, and other employee benefits.

<sup>57</sup> The mean overhead rate was lowest for mid-sized firms (\$20 million to \$50 million in annual revenues). The mean rates were higher for larger firms (more than \$50 million in annual revenues) and slightly smaller firms (\$10 million to \$20 million in annual revenues). The smallest firms (\$0 to \$10 million in annual revenues) had the highest mean overhead rate.

consulting firms, 105 percent for firms providing biomedical research, and 30 percent for telecommunications firms. These data are more than 15 years old (data collected in the survey reflect fiscal year 1999) and may be outdated.

- **Financial Statement Studies.** Estimates of indirect rates may be calculable from information provided on companies' financial statements as aggregated by third-party data processors/vendors. However, to the extent that the provided data do not sufficiently distinguish costs between direct and indirect categories, their utility may be limited in deriving appropriate indirect rates.<sup>58</sup>
- **Indirect cost rates applied in Federal grant proposals.** Educational institutions; state, local, and Indian tribal governments; and non-profit organizations applying for Federal grants may negotiate an indirect cost rate.<sup>59</sup> Entities that have not received a negotiated indirect cost rate may elect to charge a *de minimis* rate of 10 percent of modified total direct costs (MTDC) (OMB 2013).<sup>60</sup>

A 2013 review of the 50 universities receiving the highest reimbursements for indirect costs from the National Institutes of Health (NIH) revealed that indirect cost rates ranged from 46.5 percent to 69.5 percent; the mean was 56.2 percent (GAO 2013).<sup>61</sup> Importantly, this indirect rate is calculated using a total cost base (denominator) that includes both labor costs as well as other items, as noted earlier. Additionally, certain components of the rate (e.g., general administration) are capped by OMB Circular A-21 (GAO 2013). Thus, applying this rate to a direct labor cost estimate may understate indirect costs.<sup>62</sup>

Similarly aggregated data on indirect rates for State, local, and Tribal governments and nonprofit entities are not readily available. A study by the U.S. Government Accountability Office (GAO, 2010) concluded that inconsistencies in terminology, as well as the diverse characteristics and accounting practices of these entities, lead to inconsistent classification of costs. Thus, identifying a range of typical indirect rates for these entities is challenging.<sup>63</sup>

---

<sup>58</sup> For example, see eStatement Studies from the Risk Management Association (RMA) at <http://www.rmahq.org/estatement-studies/>. Sagemworks (<https://www.sageworks.com>) also provides financial statement analysis for private companies.

<sup>59</sup> The methodology for calculating this rate is described in OMB (2013) (also known as the "Supercircular" or the "Omniscircular") and codified at 2 CFR 200 *et al.* Note that for hospitals, 45 CFR 74 Appendix E, "Principles for Determining Cost Applicable to Research and Development Under Grants and Contracts with Hospitals" remains in effect.

<sup>60</sup> MTDC includes "all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel, and subawards and subcontracts up to the first \$25,000 of each subaward or subcontract (regardless of the period of the subawards or subcontracts under the award). MTDC excludes equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each subaward and subcontract in excess of \$25,000..." (OMB 2013).

<sup>61</sup> These universities are responsible for approximately two-thirds of all NIH research conducted at universities (GAO 2013). The mean is based on 45 universities because data are unavailable for five.

<sup>62</sup> Because these rates are developed pursuant to 2 CFR 200 *et al.* and negotiated with the Federal government, they may diverge from estimates of actual indirect costs. The extent of this potential divergence is unknown.

<sup>63</sup> A cursory search suggests some hospitals may publish federally-negotiated indirect rates for grant funding. Additional detailed research could be undertaken to identify these rates; however, the rates would likely focus on the research activities undertaken by these organizations, rather than all aspects of hospital operations.

- **U.S. Department of Labor (DOL) Guidance.** Most recently, in 2016, the U.S. Department of Labor (DOL) Employee Benefits Security Administration (EBSA), Office of Policy and Research (OPR) developed guidance for calculating labor cost inputs for use in regulatory benefit-cost analyses. It directs analysts to estimate hourly labor costs by adding together wages obtained from the OES, nonwage benefits derived from the ECEC, and overhead costs (DOL 2016). DOL estimates overhead costs per hour worked for 16 different occupations defined by Standard Occupational Classification Code (e.g., financial managers (11-3031); Family and General Practitioners (29-1062); Computer Programmers (15-1131); etc.) using industry-wide data on costs obtained from the U.S. Census Bureau’s Annual Survey of Manufacturers (ASM) and the Service Annual Survey (SAS).

Rather than calculating a rate, DOL provides overhead as an hourly cost. For comparison purposes, we calculate an approximate indirect cost rate for each labor category, assuming the base is comprised of the wages and benefits presented in DOL’s guidance. On this basis, the approximate indirect cost rate ranges from 15 percent (Family and General Practitioners) to 195 percent (Mail Clerks and Mail Machine Operators, Except Postal Service). The mean across the 16 different occupations, weighted by relative employment in each occupation, is 82 percent. We note two limitations of this approach. First, the ASM and SAS data are not sufficiently detailed to allow for separate estimation of labor costs typically associated with direct work and labor associated with supporting activities (e.g., human resources). Thus, these supporting activities are implicitly allocated to the base, rather than the indirect pool, which decreases the indirect rate. Second, indirect costs from a variety of disparate industries (e.g., mining, construction, real estate, medical services) are aggregated to estimate indirect costs per occupation (e.g., secretaries). The potential direction of bias associated with this approach is unknown; however, overhead associated with some industries (e.g., costs in the construction industry to repair and maintain equipment) are less likely to be relevant to administrative compliance activities.

#### Summary of Available Indirect Rates

Exhibit 5 summarizes the readily-available information on indirect rates discussed in this section. To facilitate comparison, for each source identified above, we list the costs included in the rate base and the indirect pool. We also highlight key limitations of each source. For Federal agencies, the agency-wide default rate provided by OMB is likely a low-end estimate; example rates for specific programs suggest actual rates are higher. Applicable rates exist for government contractors. No data are available for state, local, and Tribal governments, and nonprofit organizations; the data available for universities and private industry have limitations.

**Exhibit 5: Summary of Example Indirect Rates**

Source	Rate	Rate Base	Indirect Cost Pool	Limitation
<b>Federal Government Agencies</b>				
<i>Circular A-76</i> (OMB, 2003b)	12%	<ul style="list-style-type: none"> <li>• Direct labor costs (including retirement, insurance and health benefits, Medicare, and miscellaneous fringe benefits)</li> </ul>	<ul style="list-style-type: none"> <li>• Not available.</li> </ul>	<ul style="list-style-type: none"> <li>• Likely represents a low-end estimate because the direct labor cost base includes items, like labor for supervision, management, and contract support, which might also be categorized as indirect costs.</li> </ul>
“Indirect Cost Rates for the Damage Assessment, Remediation, and Restoration Program for Fiscal Year 2015” (NOAA 2016b)	32.75% – 151.18%	<ul style="list-style-type: none"> <li>• Direct labor costs (including leave, benefits, and relevant proportion of GSA rent)</li> </ul>	<ul style="list-style-type: none"> <li>• Indirect labor costs (including leave, benefits, relevant proportion of GSA rent) associated with recruiting and training, budgeting, general management, accounting and computer support, records management, policy development, and methods development</li> </ul>	<ul style="list-style-type: none"> <li>• Applies to specific offices within NOAA.</li> </ul>
<i>Audit of Superfund Activities in the Environment and Natural Resources Division for Fiscal Years 2013 and 2014</i> (DOJ 2015)	190.2% - 197.9%  (77% - 82% if benefits are included in the rate base*)	<ul style="list-style-type: none"> <li>• Direct wages</li> </ul>	<ul style="list-style-type: none"> <li>• Indirect wages</li> <li>• Benefits</li> <li>• Travel</li> <li>• Freight</li> <li>• Rent</li> <li>• Communication</li> <li>• Utilities</li> <li>• Supplies</li> <li>• Equipment</li> </ul>	<ul style="list-style-type: none"> <li>• The higher rate is likely due, at least in part, to the fact that benefits are included in the indirect cost pool, rather than the direct labor base.</li> </ul>



Source	Rate	Rate Base	Indirect Cost Pool	Limitation
<b>State, Local and Tribal Governments</b>				
<i>Nonprofit Sector: Treatment and Reimbursement of Indirect Costs Vary Among Grants, and Depend Significantly on Federal, State, and Local Government Practices</i> (GAO 2010)	Not available	<ul style="list-style-type: none"> <li>• Not available</li> </ul>	<ul style="list-style-type: none"> <li>• Not available</li> </ul>	<ul style="list-style-type: none"> <li>• Inconsistencies in terminology, as well as the diverse characteristics and accounting practices of these entities, lead to inconsistent classification of costs. Thus, GAO concludes identifying a range of typical indirect rates for these entities is challenging.</li> </ul>
<b>Government Contractors</b>				
<i>Grant Thornton's 2015 Government Contractor Survey</i> (Grant Thornton 2015)	36% (median)	<ul style="list-style-type: none"> <li>• Direct labor costs (including payroll taxes, paid time off, health insurance, retirement plans, other employee benefits)</li> </ul>	<ul style="list-style-type: none"> <li>• Management and support time</li> <li>• Other indirect expenses</li> </ul>	<ul style="list-style-type: none"> <li>• Represents the most current median rate across all types of government contractors. Older data suggest this rate fluctuates over time and varies significantly depending on company size and type of consulting services provided.</li> </ul>
<b>Universities</b>				
"Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards; Final Rule" (OMB 2013)	10% ( <i>de minimis</i> rate)	<ul style="list-style-type: none"> <li>• Direct salaries and wages</li> <li>• Fringe benefits</li> <li>• Materials and supplies</li> <li>• Services</li> <li>• Travel</li> <li>• Subawards and subcontracts up to the first \$25,000 of each subaward or subcontract</li> </ul>	<ul style="list-style-type: none"> <li>• Facilities <ul style="list-style-type: none"> <li>○ Buildings</li> <li>○ Equipment</li> <li>○ Capital improvements</li> <li>○ Interest on debts</li> <li>○ O&amp;M expenses</li> </ul> </li> <li>• General administration and general expenses (e.g., director's office, accounting)</li> </ul>	<ul style="list-style-type: none"> <li>• Default rate may not reflect actual indirect costs.</li> </ul>

Source	Rate	Rate Base	Indirect Cost Pool	Limitation
<i>Biomedical Research: NIH Should Assess the Impact of Growth in Indirect Costs on Its Mission</i> (GAO 2013)	56.2% (mean)	<ul style="list-style-type: none"> <li>• Direct salaries and wages</li> <li>• Fringe benefits</li> <li>• Materials and supplies</li> <li>• Services</li> <li>• Travel</li> <li>• Subawards and subcontracts up to the first \$25,000 of each subaward or subcontract</li> </ul>	<ul style="list-style-type: none"> <li>• Facilities <ul style="list-style-type: none"> <li>○ Buildings</li> <li>○ Equipment</li> <li>○ Capital improvements</li> <li>○ Interest on debts</li> <li>○ O&amp;M expenses</li> </ul> </li> <li>• General administration and general expenses (e.g., director’s office, accounting)</li> </ul>	<ul style="list-style-type: none"> <li>• The mean is calculated based on rates reported by approximately 50 universities receiving the highest reimbursements for indirect costs from NIH.</li> <li>• Certain indirect cost components (e.g., general administrative) are capped by the regulation.</li> <li>• Because the rate base includes both labor costs and other items, applying it solely to an estimate of labor costs may understate indirect costs.</li> <li>• Certain indirect costs (e.g., laboratory facilities and equipment) may not be relevant to administrative compliance activities.</li> </ul>
<b>Nonprofit Organizations</b>				
“Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards; Final Rule” (OMB 2013)	10% ( <i>de minimis</i> rate)	<ul style="list-style-type: none"> <li>• Direct salaries and wages</li> <li>• Fringe benefits</li> <li>• Materials and supplies</li> <li>• Services</li> <li>• Travel</li> <li>• Subawards and subcontracts up to the first \$25,000 of each subaward or subcontract</li> </ul>	<ul style="list-style-type: none"> <li>• Facilities <ul style="list-style-type: none"> <li>○ Buildings</li> <li>○ Equipment</li> <li>○ Capital improvements</li> <li>○ Interest on debts</li> <li>○ O&amp;M expenses</li> </ul> </li> <li>• General administration and general expenses (e.g., director’s office, accounting)</li> </ul>	<ul style="list-style-type: none"> <li>• Default rate may not reflect actual indirect costs.</li> </ul>
<i>Nonprofit Sector: Treatment and Reimbursement of Indirect Costs Vary Among Grants, and Depend Significantly on Federal, State, and Local Government Practices</i> (GAO 2010)	Not available	<ul style="list-style-type: none"> <li>• Not available</li> </ul>	<ul style="list-style-type: none"> <li>• Not available</li> </ul>	<ul style="list-style-type: none"> <li>• Inconsistencies in terminology, as well as the diverse characteristics and accounting practices of these entities, lead to inconsistent classification of costs. Thus, GAO concludes identifying a range of typical indirect rates for these entities is challenging.</li> </ul>

Source	Rate	Rate Base	Indirect Cost Pool	Limitation
<b>Private Industry</b>				
“Labor Cost Inputs Used in the Employee Benefits Security Administration, Office of Policy and Research’s Regulatory Impact Analyses and Paperwork Reduction Act Burden Calculations (DOL 2016)	15% - 195%	<ul style="list-style-type: none"> <li>• Wages</li> <li>• Nonwage benefits (paid leave, supplementary pay, retirements, insurance, and legally required benefits).</li> </ul>	<ul style="list-style-type: none"> <li>• Fuel</li> <li>• Electricity</li> <li>• Contract work</li> <li>• Facility</li> <li>• Equipment</li> <li>• Advertising</li> <li>• Purchased professional and technical services</li> <li>• Taxes and leases</li> </ul>	<ul style="list-style-type: none"> <li>• Data limitations prevent separate identification of direct and indirect labor (e.g., human resources support). Thus, thus, the implied rate may understate total indirect costs.</li> <li>• Costs across disparate industries (e.g., mining, construction, real estate, medical services, etc.) are aggregated to calculate total indirect costs per occupation (e.g., secretary). Thus, these rates may include indirect costs that are not relevant to administrative compliance tasks.</li> </ul>

**Note:**

\* For comparability with the NOAA rates, we calculate an indirect rate assuming a rate base that includes direct labor costs, including benefits. We assume benefits are 64 percent of wages (Falk 2012).

As discussed in the introduction to Chapter 4, HHS currently assumes that benefits plus indirect costs equal approximately 100 percent of wages. In other words, multiplying wages by a factor of 2 provides an estimate of the fully loaded wage rate. In Exhibit 6, we provide illustrative examples of the wage multipliers implied by the data sources provided in the previous three sections. Specifically, the fully-loaded wage rate is calculated as follows (depending on the data source and data availability):

$$(\text{Pre-tax Wage Rate} * (1+ \text{Benefit Rate}) * (1+\text{Indirect Rate})) = \text{Fully loaded wage rate}$$

The wage multiplier is calculated as follows:

$$\text{Fully loaded wage rate/pre-tax wage rate} = \text{Wage multiplier}$$

Exhibit 6 provides the implied wage multiplier associated with each source of indirect cost rates, along with the key advantages and limitations of each estimate. For example, combining a benefits rate of 64 percent for Federal employees with OMB's indirect rate of 12 percent yields a wage multiplier of 1.8. As discussed above, this multiplier is likely to provide a low-end estimate of Federal time costs because supervisory and management time are not included in the indirect cost pool. Applying the same benefits rate to NOAA's Damage Assessment, Remediation, and Restoration Program yields wage multipliers ranging from 2.2 to 4.1, depending on the program. Similarly, wage multipliers for DOJ's Environmental and Natural Resources Division range from 2.9 to 3.0, depending on the year.

In government consulting, assuming benefits equal to 40 percent of wages, the mean multiplier is 1.9. We also provide illustrative calculations for universities receiving NSF grant funding. For the universities, the wage multiplier ranges from 1.47 to 1.70; however, this multiplier is not directly comparable to the other estimates because it applies to a broader, total cost base, and certain indirect costs are capped by executive order. Finally, DOL's guidance document suggests private sector wage multipliers ranging from 1.67 to 4.36. Advantages of DOL's information are that it is intended for use valuing time in regulatory impact analyses, includes many industries, and is occupation-specific. However, DOL's estimates rely on aggregate national data that do not allow analysts to separate identify direct and indirect (e.g., supervisory) labor costs. Furthermore, some of the indirect costs experienced by industries like construction or mining may not be relevant for the types of administrative activities that are of interest in this report.

**Exhibit 6: Example Wage Multipliers**

Source	Entity	Multiplier	Key Advantages	Key Limitations
<i>Circular A-76</i> (OMB, 2003b)	Federal Government	1.8 <sup>a</sup>	<ul style="list-style-type: none"> <li>Provides a government-wide estimate.</li> </ul>	<ul style="list-style-type: none"> <li>Likely a lower-bound because management and supervision time is not included in the indirect pool.</li> </ul>
“Indirect Cost Rates for the Damage Assessment, Remediation, and Restoration Program for Fiscal Year 2015” (NOAA 2016b)	Specific NOAA offices	2.2 – 4.1 <sup>a</sup>	<ul style="list-style-type: none"> <li>Peer-reviewed estimate prepared by a private accounting firm.</li> </ul>	<ul style="list-style-type: none"> <li>Applies to a specific government program.</li> </ul>
<i>Audit of Superfund Activities in the Environment and Natural Resources Division for Fiscal Years 2013 and 2014</i> (DOJ 2015)	Specific DOJ division	2.9 – 3.0 <sup>a</sup>	<ul style="list-style-type: none"> <li>Estimate prepared by a private consulting firm and audited by the Office of the Inspector General.</li> </ul>	<ul style="list-style-type: none"> <li>Applies to a specific government program.</li> </ul>
<i>Grant Thornton’s 2015 Government Contractor Survey</i> (Grant Thornton 2015)	Government contractors	1.9 <sup>b</sup>	<ul style="list-style-type: none"> <li>Based on a survey of a firms ranging in size and specialty.</li> <li>Indirect rates are estimated for purposes of government contracting and are therefore subject to potential audits.</li> </ul>	<ul style="list-style-type: none"> <li>Applies to the government consulting industry.</li> </ul>
<i>Biomedical Research: NIH Should Assess the Impact of Growth in Indirect Costs on Its Mission</i> (GAO 2013)	45 universities	1.47 – 1.70 <sup>c</sup>	<ul style="list-style-type: none"> <li>Provides data for a large number of research universities.</li> <li>Indirect rates are estimated for the purposes of government grants and are therefore subject to potential audit.</li> </ul>	<ul style="list-style-type: none"> <li>Rate base is not comparable to other categories because it includes total direct costs, rather than just direct labor costs (resulting in lower rates).</li> <li>Certain categories of indirect costs are capped; rates are negotiated with the Federal government.</li> <li>Cost pools may include cost centers (e.g., costs of operating research laboratories) that are not directly relevant to the types of administrative compliance activities of interest in this report.</li> </ul>

Source	Entity	Multiplier	Key Advantages	Key Limitations
"Labor Cost Inputs Used in the Employee Benefits Security Administration, Office of Policy and Research's Regulatory Impact Analyses and Paperwork Reduction Act Burden Calculations (DOL 2016)	16 different private industry occupational categories	1.67 – 4.36 <sup>d</sup>	<ul style="list-style-type: none"> <li>• Intended for application to all private industry sectors.</li> <li>• Developed specifically for use in valuing time in regulatory impact analyses.</li> </ul>	<ul style="list-style-type: none"> <li>• All labor costs are allocated to the base, rather than the indirect cost pool (decreases the rate).</li> <li>• Indirect costs associated with some industries (e.g., construction, mining) may not be relevant to the types of administrative compliance activities of interest in this report.</li> </ul>

**Notes:**

- a. We assume Federal benefits equal 64 percent of wages (Falk 2012) (see section 4.2.2).
- b. We assume benefits equal 40 percent of wages for private industry workers engaged in professional and business services (BLS 2016).
- c. As reported in GAO (2013).
- d. Calculated using DOL's estimates of mean hourly wages, benefits, and overhead for each labor category.

#### 4.2.4 Conclusions and Recommendations

At this time, we do not make a specific recommendation regarding a wage multiplier, or range of multipliers, for use in valuing on-the-job activities. Developing a “rule of thumb” is difficult for many reasons, including: 1) rates vary depending on the characteristics of the affected entity; 2) published data on indirect costs are generally scarce; 3) published rates may not be comparable in all cases due to differences in analytic approach, data, and other limitations; and 4) available rates represent average, rather than marginal costs.

In the future, we recommend HHS undertake additional research to improve its default assumption. For example, it could attempt to develop indirect rates for specific industries using data collected by aggregators. Additionally, it could survey financial accounting offices within key government agencies to collect information about indirect rates used in other programs that recover or account for the costs of government-employees’ time. Finally, in the absence of better data, HHS should demonstrate the sensitivity of its results to alternative assumptions about the appropriate multiplier.

#### 4.3 Unpaid Activities

HHS regulations may also impose administrative burdens on individuals (e.g., filling out additional paperwork for health care reimbursements) that they undertake on their own time, without compensation. The rationale for selecting a rate for valuing time spent performing such activities is less straightforward than for market labor. As discussed earlier, economists often assume that the marginal value of an hour of uncompensated activity is equal to marginal compensation received. In other words, the opportunity costs of not working equal the value of the compensation the individual would have received if he or she chose to work (see section 2.2 for more discussion). This value is generally estimated based on the post-tax wage an individual would have received for market work. This interpretation applies both to people employed in the labor force, who (in principle) could adjust their working hours and compensation, as well as to those out of the labor force, who (in principle) have chosen not to work because they value their time more highly than the rate at which they would be compensated.

To estimate the hourly value of administrative tasks in this case, analysts should apply the population median or mean post-tax wage rate for U.S. workers.<sup>64</sup> This rate can be obtained by adjusting the pre-tax wage rates reported in the OES or NCS to remove taxes, which vary as a percentage of wages over time and across locations.

---

<sup>64</sup> This approach assumes that individuals who are not active in the labor market make this choice based on post-tax wages. The validity of this assumption is particularly uncertain in such cases, given that the decision to not engage in paid work also involves forgoing employer-paid benefits, and may reflect numerous other factors, such as mandatory retirement requirements or poor health. Where a regulation primarily affects individuals who are not workforce participants, such as those above retirement age, analysts may wish to consider conducting sensitivity analysis using alternative assumptions.

To estimate the tax rate, including both Federal and state taxes, analysts should use data on household income before and after taxes collected in the CPS, a joint effort by the U.S. Census Bureau (Census) and BLS. The CPS collects data from a nationally-representative sample of 60,000 households on a monthly basis.<sup>65-66</sup> The Census maintains a tool called the “CPS Table Creator,” which allows analysts to create customized data tables.<sup>67</sup> It provides both mean and median income; as with wage rates, which central tendency estimate analysts should use will depend on the specific characteristics of the rule.<sup>68</sup> For example, in 2016, median pre-tax household income (\$56,000) minus post-tax income (\$46,706) and divided by median pre-tax income results in an estimated tax rate of 17 percent. Similarly, using mean, rather than median data, results in an estimated tax rate of 26 percent  $((\$77,282 - \$57,032)/77,282 = 0.26)$ . Using these values, the post-tax wage rate can be calculated as follows:

$$\text{Pre-tax wage rate} * (1 - \text{tax rate}) = \text{Post-tax wage rate}$$

For both paid and unpaid work time, the representativeness of the wage and tax rate estimates is likely to be uncertain. Where plausible alternative estimates exist, analysts should test the sensitivity of their results to these assumptions, particularly if the alternative estimates significantly affect the analytic conclusions.

#### 4.4 Summary and Conclusions

Our review of the available data sources suggests that information on pre- and post-tax wages and benefits is readily accessible, given the numerous relevant databases maintained by the U.S. government. Data on indirect rates are less accessible and are likely to vary substantially depending on

---

<sup>65</sup> Household tax rates are appropriate because ideally individuals should make decisions based on the tax rates they actually pay.

<sup>66</sup> Taxes include Federal income taxes after refundable credits (except Earned Income Credit (EIC)), state income taxes after all refundable credits, and payroll taxes (the employee’s contribution to Social Security and Medicare and other mandatory deductions).

<sup>67</sup> To estimate mean or median household income before taxes, under “Data Options” select the relevant calendar year and get a count of “Persons-All.” Next, “Define Your Table” by selecting “Household Income – Alternative” as a row variable. Under the “Statistics” section, in the subsection called “Additional numeric variable statistics” choose “Household Income-Alternative” and “Mean” or “Median.” In the “Income Definition” section, select “Customize your own income definition” and then select “1. Earnings (wages, salaries, and self-employment income)” and “19. Federal Earned Income Credit.” For household income after taxes, follow the same steps and add the following additional selections in the customized income definition: “20. Federal Income Taxes after refundable credits except EIC,” “21. State income taxes after all refundable credits,” and “22. Payroll taxes (FICA and other mandatory deductions).” (To access the CPS Table Creator, see <http://www.census.gov/cps/data/cpstablecreator.html>).

<sup>68</sup> As with wage rates, ideally analysts would use estimates of the marginal tax rate (i.e., the tax rate applied to the last dollar of income earned) to make this adjustment, rather than the mean tax rate paid for all income. While data on the distribution of marginal tax rates paid by the U.S. tax filers are available from the IRS, they only include Federal taxes; excluding State or other taxes. Thus, analysts should use the CPS data, even though it provides average rather than marginal rates, because it includes both Federal and State taxes.



the characteristics of the entity of interest and the activities it undertakes. For example, programs or offices requiring more equipment or training in order to operate are likely to have higher overhead costs relative to offices with relatively simple equipment or training needs. Similarly, entities with multiple management layers may have higher overhead costs in comparison with relatively streamlined organizations.

Currently, for on-the-job activities undertaken by employees, HHS *Guidelines* recommend using estimates of pre-tax wages for the particular industry and affected occupation, to the extent possible, and adding estimates of benefits and indirect costs. The *Guidelines* direct analysts to assume benefits plus indirect costs equal to 100 percent of pre-tax wages; i.e., they multiply pre-tax wages by a factor of 2. Data limitations prevent us from providing updated estimates at this time. However, if the multiplier is a major determinant of the analytic conclusions (e.g., of whether the regulation results in net benefits), then analysts should explore the sensitivity of the results to reasonable, alternative multipliers.

For activities undertaken during unpaid time, generally the activities that are being displaced (i.e., that would be undertaken in the absence of the regulation) are unknown. Therefore, we recommend that analysts apply an estimate of national post-tax wages. This estimate should be derived from data on pre-tax wages, then adjusted to remove taxes. For example, in 2014, the median household paid 16 percent of its household income in Federal and state taxes. Similarly, the mean household paid 25 percent. Multiplying pre-tax wages by one minus the tax rate provides an approximate estimate of post-tax wages.<sup>69</sup>

As discussed in detail in the HHS *Guidelines*, analysts should use screening analysis to explore the likely importance of these estimates to the analytic conclusions and to determine how to best allocate resources across investigating the value of changes in time use and other analytic tasks. In some cases, it may be desirable to research the specific values applicable to the particular context. In other cases, use of the default assumptions discussed in this chapter may suffice.

---

<sup>69</sup> We note that if factors are not independent (wages and tax rates), then the average post-tax wage rate is not equal to the average wage times (1 – the average tax rate). Our proposed approach relies on easily accessible data, which requires certain simplifying assumptions.

## REFERENCES

- Anderson, D., S. Dumont, P. Jacobs, and L. Azzaria. 2007. "The Personal Costs of Caring for a Child with a Disability: A Review of the Literature." *Public Health Reports*. 122: 3-16.
- Bartik, T.J. 2012. "Including Jobs in Benefit-Cost Analysis." *Annual Review of Resource Economics*. 4: 55-73.
- Becker, G.S. 1965. "A Theory of the Allocation of Time." *The Economic Journal*. 75(299): 493-517.
- Boardman, A.E., D.H. Greenberg, A.R. Vining, and D.L. Weimer. 2011. *Cost-Benefit Analysis: Concepts and Practice, Fourth Edition*. Upper Saddle River, NJ: Prentice Hall.
- Bockstael, N.E., I.E. Strand, and W.M. Hanemann. 1987. "Time and the Recreational Demand Model," *American Journal of Agricultural Economics*. 69: 293-202.
- Börjesson, M. and J. Eliasson. 2014. "Experiences from the Swedish Value of Time Study." *Transportation Research Part A: Policy and Practice*. 59: 144-158.
- Brownstone, D. and Small, K.A. 2005. "Valuing Time and Reliability: Assessing the Evidence from Road Pricing Demonstrations." *Transportation Research Part A, Policy and Practice*. 39(4): 279-293.
- Cesario, F.J. 1976. "Value of Time in Recreation Benefit Studies." *Land Economics*. 52(1): 32-41.
- Centers for Medicare and Medicaid Services, U.S. Department of Health and Human Services. 2015a. "Medicaid and Children's Health Insurance Program (CHIP) Programs: Medicaid Managed Care, CHIP Delivered in Managed Care, Medicaid and CHIP Comprehensive Quality Strategies, and Revisions related to Third Party Liability." *Federal Register*. 80(104): 31098-31297. <http://www.regulations.gov/#!documentDetail;D=CMS-2015-0068-0001>
- Centers for Medicare and Medicaid Services. U.S. Department of Health and Human Services. 2015b. "Medicare and Medicaid Programs: Reform of Requirements for Long-Term Care Facilities." *Federal Register*. 80(136): 42168-42269. <http://www.regulations.gov/#!documentDetail;D=CMS-2015-0083-0001>
- Clinton, W.J. 1993. "Executive Order 12866: Regulatory Planning and Review." *Federal Register*. 58(190): 51735-51744. [http://www.whitehouse.gov/omb/inforeg\\_regmatters](http://www.whitehouse.gov/omb/inforeg_regmatters)

Cooper, B.S. and D.P. Rice, 1976. "The Economic Cost of Illness Revisited." *Social Security Bulletin*. 39(2): 21-36.

Cotton & Company LLP. 2016a. "General Counsel for Natural Resources Section Fiscal Year 2015 Indirect Cost Rate." Prepared for the National Oceanic and Atmospheric Administration, Damage Assessment, Remediation, and Restoration Program. <https://darrp.noaa.gov/sites/default/files/node-attachments/FY%202015%20GCNRS%20DARRP%20Rate%20Report.pdf>

Cotton & Company LLP. 2016b. "Office of Response and Restoration Fiscal Year 2015 Indirect Cost Rate." Prepared for the National Oceanic and Atmospheric Administration, Damage Assessment, Remediation, and Restoration Program. <https://darrp.noaa.gov/sites/default/files/node-attachments/FY%202015%20ORR%20Rate%20Report.pdf>

Cotton & Company LLP. 2016c. "Restoration Center Fiscal Year 2015 Indirect Cost Rate." Prepared for the National Oceanic and Atmospheric Administration, Damage Assessment, Remediation, and Restoration Program. <https://darrp.noaa.gov/sites/default/files/node-attachments/FY%202015%20RC%20Rate%20Report.pdf>

De Borger, B. and M. Fosgerau. 2008. The Trade-Off between Money and Travel Time: A Test of the Theory of Reference-Dependent Preferences. *Journal of Urban Economics*. 64(1), 101-115.

de Meijer, C., W. Brouwer, M. Koopmanschap, B. van den Berg, and J. van Exel. 2010. The Value of Informal Care – A Further Investigation of the Feasibility of Contingent Valuation in Informal Caregivers." *Health Economics*. 19(7): 755-771.

DeSerpa, A. C. 1971. "A Theory of the Economics of Time." *The Economic Journal*. 81(324): 828-846.

Drummond, M.F., M.J. Sculpher, K. Claxton, G.L. Stoddart, G.W. Torrance. 2015. *Methods for the Economic Evaluation of Health Care Programmes, Fourth Edition*. Oxford University Press: Oxford, United Kingdom.

Englin, J. and J.S. Shonkwiler. 1995. "Modeling Recreation Demand in the Presence of Unobservable Travel Costs: Toward a Travel Price Model." *Journal of Environmental Economics and Management*. 29: 368-377.

English, E., C. Leggett, and K. McConnell. 2015. "Value of Travel Time and Income Imputation." Prepared for Craig O'Connor, National Oceanic and Atmospheric Administration. <https://pub-dwhdatadiver.orr.noaa.gov/dwh-ar-documents/940/DWH-AR0056732.pdf>

Falk, J. 2012. "Comparing Benefits and Total Compensation in the Federal Government and the Private Sector." Congressional Budget Office Working Paper Series. <https://www.cbo.gov/publication/42923>

Feather, P. and W.D. Shaw. 1999. "Estimating the Cost of Leisure Time for Recreation Demand Models." *Journal of Environmental Economics and Management*. 38: 49-65.

Federal Accounting Standards Advisory Board. 2015. *Handbook of Federal Accounting Standards and Other Pronouncements, as Amended, as of June 30, 2015*.

Food and Drug Administration, U.S. Department of Health and Human Services. 2015a. *Administrative Destruction of Certain Drugs Refused Admission to the United States; Final Rule*.  
<http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/EconomicAnalyses/ucm462321.htm>

Food and Drug Administration, U.S. Department of Health and Human Services. 2015b. *FSMA Final Rulemaking for Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Human Food*.  
<http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/EconomicAnalyses/ucm469324.htm>

Food and Drug Administration, U.S. Department of Health and Human Services. 2015c. "Food Safety Modernization Act Domestic and Foreign Facility Reinspection, Recall, and Importer Reinspection Fee Rates for Fiscal Year 2016." *Federal Register*. 80(148):46020-46023.

Food and Drug Administration, U.S. Department of Health and Human Services. 2015d. *Permanent Discontinuance or Interruption in Manufacturing of Certain Drug or Biological Products; Final Rule*.  
<http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/EconomicAnalyses/ucm454724.htm>

Food and Drug Administration, U.S. Department of Health and Human Services. 2015e. *Standards for the Growing, Harvesting, Packing and Holding of Produce for Human Consumption*.  
<http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/EconomicAnalyses/ucm472310.htm>

Fosgerau, M., K. Hjorth, and S.V. Lyk-Jensen. 2007. *The Danish Value of Time Study*.  
[http://www.transport.dtu.dk/~media/Institutter/Transport/forskning/publikationer/publikationer%20dtf/2007/the\\_danish\\_value\\_of\\_time\\_study\\_250208.ashx?la=da](http://www.transport.dtu.dk/~media/Institutter/Transport/forskning/publikationer/publikationer%20dtf/2007/the_danish_value_of_time_study_250208.ashx?la=da)

Freeman, A.M.III, J.A. Herriges, and C.L. Kling. 2014. *The Measurement of Environmental and Resource Values: Theory and Methods*. New York: RFF Press.

Gold, M.R., J.E. Siegel, L.B. Russell, and M.C. Weinstein (eds). 1996. *Cost-Effectiveness in Health and Medicine*. New York: Oxford University Press.

Grant Thornton. 2015. *Grant Thornton's 2015 Government Contractor Survey*.  
<https://www.grantthornton.com/~media/content-page-files/public-sector/pdfs/surveys/2015/Gov-Contractor-Survey.ashx>

Grant Thornton. 2001. *Government Contractor Industry Survey: The Pulse of a Vital Industry*.  
<https://www.grantthornton.com/staticfiles/GTCom/files/Industries/TIP/Government%20contractor%20i ndustry%20survey/7th%20Govt%20Contractor%20Survey%5B1%5D.pdf>

Grosse, S.D., K.V. Krueger, and M. Mvundura. 2009. "Economic Productivity by Age and Sex: 2007 Estimates for the United States." *Medical Care*. 47(7): S94-S103.

Grosse, S.D. and K.V. Krueger. 2011. "The Income-Based Human Capital Valuation Methods in Public Health Economics Used by Forensic Economics." *Journal of Forensic Economics*. 22(1): 43-57.

Hanemann, W.M. 1991. "Willingness to Pay and Willingness to Accept: How Much Can They Differ?" *American Economic Review*. 81(3): 635-647.

Hammit, J.K. 2015. "Implications of the WTP-WTA Disparity for Benefit-Cost Analysis." *Journal of Benefit-Cost Analysis*. 6(1): 207-216.

Hensher, D.A. 1977. *The Value of Business Travel Time*. Oxford: Pergamon Press.

Hess, S., J.M. Rose, and D.A. Hensher. 2008. "Asymmetric Preference Formation in Willingness to Pay Estimates in Discrete Choice Models." *Transportation Research Part E*. 44: 847-863.

Knetsch, J.L. 2015. "The Curiously Continuing Saga of Choosing the Measure of Welfare Changes." *Journal of Benefit-Cost Analysis*. 6(1): 217-225.

Koopmanschap, M.A., F.F. Rutten, B.M. van Ineveld, and L. van Roijen. 1995. "The Friction Cost Method for Measuring Indirect Costs of Disease." *Journal of Health Economics*. 14(2):171-189.

Larson, D. and D. Lew. 2014. "The Opportunity Cost of Travel Time as a Noisy Wage Fraction." *American Journal of Agricultural Economics*. 96(2):420-437.

Levine, C., G.G. Hunt, D. Halper, A.Y. Hart, J. Lautz, and D.A. Gould. 2005. "Young Adult Caregivers: A First Look at an Unstudied Population." *American Journal of Public Health*. 95(11): 2071-2075.

McConnell, K.E. and I. Strand. 1981. "Measuring the Cost of Time in Recreation Demand Analysis: An Application to Sportfishing." *American Journal of Agricultural Economics*. 63: 153-156.

Meunier, D. and E. Quinet. 2015. "Value of Time Estimations in Cost Benefit Analysis: The French Experience." *Transportation Research Procedia*. 8: 62-71.

Miller, T.R. 1996. *The Value of Time and the Benefit of Time Saving*. Prepared for the U.S. Department of Transportation.

Miller, W., L.A. Robinson, and R.S. Lawrence (eds.). 2006. *Valuing Health for Regulatory Cost-Effectiveness Analysis*. Washington, D.C.: The National Academies Press.

Morgenstern, R. 2013. "Analyzing the Employment Impacts of Regulation." In *Does Regulation Kill Jobs?* (C. Coglianese, A. Finkel, and C. Carrigan, eds.). Philadelphia, PA: University of Pennsylvania Press.

National Oceanic and Atmospheric Administration. U.S. Department of Commerce. 2016a. *Damage Assessment, Remediation, and Restoration Program: Indirect Rates*. <https://darrp.noaa.gov/history-program/indirect-rates>

National Oceanic and Atmospheric Administration. U.S. Department of Commerce. 2016b. "Indirect Cost Rates for the Damage Assessment, Remediation, and Restoration Program for Fiscal Year 2015." *Federal Register*. 81(162): 56580-56582.

Obama, B. 2011. "Executive Order 13563: Improving Regulation and Regulatory Review." *Federal Register*. 76(14): 3821-3823. <http://www.whitehouse.gov/omb/info/regmatters>

Palmquist, R., D. Phaneuf, and V.K. Smith. 2010. "Short Run Constraints and the Increasing Marginal Value of Time in Recreation." *Environmental and Resource Economics*. 46: 19-30.

Phaneuf, D.J. and K.V. Smith. 2005. "Recreational Demand Models." *Handbook of Environmental Economics, Vol. 2* (K.-G. Maler and J.R. Vincent, eds.). The Netherlands: Elsevier.

Robinson, L.A. 2007. *Valuing Travelers' Time for Border Crossings and Related Activities*. Prepared under subcontract to Industrial Economics, Incorporated for U.S. Customs and Border Protection, Department of Homeland Security.

Robinson, L.A. and J.K. Hammitt. 2011. "Behavioral Economics and Regulatory Analysis." *Risk Analysis*. 31(9): 1408-1422.

Russell, L.B. 2009. "Completing Costs: Patients' Time." *Medical Care*. 47(7): S89-S93.

Sanders, G.D. et al. 2016. "Recommendations for Conduct, Methodological Practices, and Reporting of Cost-effectiveness Analyses, Second Panel on Cost-Effectiveness in Health and Medicine." *JAMA*. 316(10): 1093-1103.

Shaw, W.D. and P. Feather. 1999. "Possibilities for Including the Opportunity Cost of Time in Recreation Demand Systems." *Land Economics*. 75(4): 592-602.

Small, K.A. 2012. "Valuation of Travel Time." *Economics of Transportation* 1(1): 2-14.

Tilford, J.M., S.D. Grosse, A.C. Goodman, and K. Li. 2009. "Labor Market Productivity Costs for Caregivers of Children with Spina Bifida: A Population-Based Analysis." *Medical Decision Making*. 29: 23–32.

Tranmer, J.E., D.N. Guerriere, W.J. Ungar, and P.C. Coyte. 2005. "Valuing Patient and Caregiver Time." *Pharmacoeconomics*. 23(5): 449-459.

Trump, D.J. 2017. "Executive Order 13771: Reducing Regulation and Controlling Regulatory Costs." *Federal Register*. 82(22): 9339-9341. <https://www.federalregister.gov/documents/2017/02/03/2017-02451/reducing-regulation-and-controlling-regulatory-costs>

Tunçel, T. and J.K. Hammitt. 2014. "A New Meta-Analysis on the WTP/WTA Disparity." *Journal of Environmental Economics and Management*. 68: 175-187.

U.S. Bureau of Labor Statistics. 2016. "New Release: Employer Costs for Employee Compensation – March 2016." USDL-16-1150. <http://www.bls.gov/news.release/pdf/ecec.pdf>

U.S. Department of Labor. 2016 (August). *Labor Cost Inputs Used in the Employee Benefits Security Administration, Office of Policy and Research's Regulatory Impact Analyses and Paperwork Reduction Act Burden Calculations*. <https://www.dol.gov/sites/default/files/ebsa/laws-and-regulations/rules-and-regulations/technical-appendices/labor-cost-inputs-used-in-ebsa-opr-ria-and-pra-burden-calculations-august-2016.pdf>

U.K. Department for Transport. 2015a. *Provision of Market Research for Value of Travel Time Savings and Reliability: Phase 2 Report*. Prepared by Ove Arup and Partners, Ltd.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/252088/meta-analysis-vtts-dft-011.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/252088/meta-analysis-vtts-dft-011.pdf)

U.K. Department for Transport. 2015b. *Provision of Market Research for Value of Travel Time Savings and Reliability: Non-Technical Summary Report*. Prepared by Ove Arup and Partners, Ltd.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/470229/vtts-phase-2-report-non-technical-summary-issue-august-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/470229/vtts-phase-2-report-non-technical-summary-issue-august-2015.pdf)

U.S. Department of Health and Human Services. 2016. *Guidelines for Regulatory Impact Analysis*. Prepared by L.A. Robinson, J.K. Hammitt, and J.R. Baxter under subcontract to Industrial Economics, Incorporated and Mathematica Policy Research.

U.S. Department of Justice. Office of the Inspector General. 2015. *Audit of Superfund Activities in the Environment and Natural Resources Division for Fiscal Years 2013 and 2014*. Audit Division 15-32.

<https://oig.justice.gov/reports/2015/a1532.pdf>

U.S. Department of Transportation. 1997. "Departmental Guidance for the Valuation of Travel Time in Economic Analysis." Memorandum to Secretarial Officers and Modal Administrators from F.R. Kruesi, Assistant Secretary for Transportation Policy; prepared by P. Belenky.

U.S. Department of Transportation. 2016. "Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis." Memorandum to Secretarial Officers and Modal Administrators from V. White, Acting Assistant Secretary for Transportation Policy.

<https://www.transportation.gov/regulations/economic-values-used-in-analysis>

U.S. Environmental Protection Agency. 2014. *Guidelines for Preparing Economic Analysis*. EPA 240-R-10-001. <http://yosemite.epa.gov/ee/epa/eed.nsf/pages/guidelines.html>

U.S. Government Accountability Office. 2010. *Nonprofit Sector: Treatment and Reimbursement of Indirect Costs Vary Among Grants, and Depend Significantly on Federal, State, and Local Government Practices*. GAO-10-477. <http://www.gao.gov/new.items/d10477.pdf>

U.S. Government Accountability Office. 2013. *Biomedical Research: NIH Should Assess the Impact of Growth in Indirect Costs on Its Mission*. GAO-13-760. <http://www.gao.gov/assets/660/658087.pdf>



U.S. Office of Management and Budget. 1995. "Managerial Cost Accounting Costs and Standards for the Federal Government." Statement of Federal Financial Accounting Standards, Number 4.

U.S. Office of Management and Budget. 2003a. *Circular A-4: Regulatory Analysis*.  
[http://www.whitehouse.gov/omb/inforeg\\_regpol\\_agency\\_review/](http://www.whitehouse.gov/omb/inforeg_regpol_agency_review/)

U.S. Office of Management and Budget. 2003b. Circular A-76 (Revised).  
[https://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a076/a76\\_incl\\_tech\\_correction.pdf](https://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a076/a76_incl_tech_correction.pdf)

U.S. Office of Management and Budget. 2015. *2015 Draft Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act*.  
[https://www.whitehouse.gov/sites/default/files/omb/inforeg/2015\\_cb/draft\\_2015\\_cost\\_benefit\\_report.pdf](https://www.whitehouse.gov/sites/default/files/omb/inforeg/2015_cb/draft_2015_cost_benefit_report.pdf)

U.S. Office of Management and Budget. 2017. "Guidance Implementing Executive Order 13771, Titled, "Reducing Regulation and Controlling Regulatory Costs." Memorandum to Regulatory Policy Officers at Executive Departments and Agencies and Managing and Executive Directors of Certain Agencies and Commissions from Dominic J. Mancini, Acting Administrator, Office of Information and Regulatory Affairs. <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2017/M-17-21-OMB.pdf>

U.S. Office of Management and Budget. 2013. "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards; Final Rule." *Federal Register*. 78(248): 78590-78691.

van den Berg, B., H. Bleichrodt, and L. Eeckhoudt. 2005. "The Economic Value of Informal Care: A Study of Informal Caregivers' and Patients' Willingness to Pay and Willingness to Accept for Informal Care." *Health Economics*. 14(4): 363-376.

von Wartburg, M. and Waters, W.G. II. 2004. *Congestion Externalities and the Value of Travel Time Savings: Towards Estimating the Social and Environmental Costs of Transportation in Canada*. (A. Zhang, Project Director.) Prepared for Transport Canada.

Viscusi, W.K. 2015. "Reference-Dependence Effects in Benefit Assessment: Beyond the WTA-WTP Dichotomy and WTA-WTP Ratios." *Journal of Benefit-Cost Analysis*. 6(1): 187-206.

Wardman, M. R. Batley, J. Laird, P. Mackie, T. Fowkes, G. Lyons, J. Bates, and J. Eliasson. 2013. *Valuation of Travel Time Savings for Business Travellers*. Prepared for the U.K. Department for Transport by the

University of Leeds Institute for Transport Studies.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/251997/vtts\\_for\\_business\\_main\\_report-dft-005.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/251997/vtts_for_business_main_report-dft-005.pdf)

Wardman, M. and P. Wheat. 2013. *Meta-Analysis of Post-1994 Values of Non-Work Travel Time Savings*. Prepared for the U.K. Department of Transport.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/252088/meta-analysis-vtts-dft-011.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/252088/meta-analysis-vtts-dft-011.pdf)

Willig, R.D. 1976. "Consumer's Surplus without Apology." *American Economic Review*. 66(4): 589–597.

Zhang, W., N. Bansback, and A.H. Anis. 2011. "Measuring and Valuing Productivity Loss due to Poor Health: A Critical Review." *Social Science and Medicine*. 72(2):185-192.

## APPENDIX: METHODS USED BY ACCOUNTANTS TO CALCULATE INDIRECT COST RATES

The main body of this report focuses on identifying the incremental impacts of a regulation (changes in time use) relative to a baseline, and measuring those impacts in terms of opportunity costs. In contrast, this Appendix provides a detailed discussion of the methods used by accountants to calculate indirect cost rates. From an accounting perspective, entities incur operating costs that are necessary for conducting business, but that may not be easily linked to specific projects or tasks. The development of an indirect rate facilitates the allocation of such overhead costs directly to labor costs. As discussed in Chapter 1, the proportionate share of indirect costs used to support regulatory compliance, rather than other productive work, represents an opportunity cost that must be included in a regulatory analysis.

It is important for analysts to understand the derivation of these rates because the method used may dictate whether and how a rate should be applied to wage and benefit estimates. In particular, it is important to understand whether the indirect rate applies to a base (denominator) that is comprised only of labor costs (i.e., a “total direct labor cost” base) or labor costs plus miscellaneous supplies and materials, such as equipment rentals, project-specific travel, etc. (i.e., a “total direct cost” base). Because the recommendations included in the main text of this report focus on wage adjustments, ideally analysts would choose indirect rates derived against a “total direct labor cost” base.

In managerial cost accounting, agencies determine the full costs of goods and services, and use appropriate costing methods to accumulate and assign costs to outputs (i.e., programs or activities).<sup>70</sup> The full cost of a program or activity includes “direct” and “indirect” costs. Financial accounting standards exist to delineate the conditions under which a particular cost constitutes a direct or indirect cost; separately delineated accounting standards exist for governmental entities (Federal Accounting Standards Advisory Board, FASB) and for private companies (Financial Accounting Standards Board, FASB).

To assess the full cost of a particular program (e.g., a specific program within an agency, a specific research center within a hospital or university) or an activity (e.g., FDA re-inspection of non-compliant importer facilities, consulting services provided to government or private-sector clients), accountants first assess the total amount of resources used to conduct a program or complete an activity. Full cost includes all costs (direct and indirect) that contribute to the program or activity. Next, accountants differentiate direct and indirect costs into a “base” (the denominator) and “pool” (the numerator) using the following general rule. Indirect costs generally materialize whether or not the program exists; direct

---

<sup>70</sup> OMB (1995) and Federal Accounting Standards Advisory Board (FASAB 2015); [http://www.fasab.gov/pdf/files/2015\\_fasab\\_handbook.pdf](http://www.fasab.gov/pdf/files/2015_fasab_handbook.pdf). Specifically, see “Statement of Federal Financial Accounting Standards 4: Managerial Cost Accounting Standards and Concepts,” on page 396 of FASAB (2015). Pronouncements and guidance specific to state and local governmental agencies can be found via the Governmental Accounting Standards Board at <http://www.gasb.org/>.

costs exist only if the program exists. If by eliminating the program, a particular cost also is eliminated, then the cost is labeled “direct” and not “indirect.” This delineation between direct and indirect costs exists irrespective of whether the entity is a regulatory body or regulated entity.<sup>71</sup>

Below, we provide a detailed discussion of the differences between direct and indirect costs within this accounting framework. The types of direct and indirect costs delineated below exist for regulatory bodies (e.g., the Federal government) and for regulated entities (e.g., firms in the affected industries), irrespective of industry.

- **Direct Costs** include all funds spent on labor and materials that can be traced directly to a particular activity or program. Direct costs tend to be easily quantified by accountants, consisting primarily of costs related to labor associated with managing a particular program or activity, including:
  - Cost of direct labor;
  - Fringe benefits (i.e., retirement, health insurance, and life insurance);
  - Leave and holidays;
  - Overtime and premium pay;
  - Other personnel costs;
  - Equipment purchases; and
  - Miscellaneous items, such as supplies and materials, equipment rentals, travel, purchased services such as printing, and contractual services.
- **Indirect Costs** reflect the funds spent on administrative oversight. Depending on the nature of a particular activity or program, a share of overhead costs associated with managing the organization within which the program resides may flow down to the program through an indirect rate. For example, to the degree a program resides within a larger office, the program may be charged a proportionate share of the overhead expense associated with the larger office. Again, this distinction is applicable to both regulatory bodies and regulated entities.

Often, allocation of this proportionate share of overhead is achieved through the application of an indirect rate. Generally, indirect rates are calculated by dividing the total pool of indirect costs by total direct costs. The intricacy is in determining which costs constitute the pool, and which costs constitute

---

<sup>71</sup> Note that the accounting methodology used to standardize the assignment of costs to direct base or an indirect cost pool should not be confused the framework for identifying incremental and baseline costs in in RIA. In an RIA, analysts assign costs that will occur in the absence of the regulation to the baseline; they are not counted in the analysis. In the discussion above, indirect costs are identified as costs that will be incurred, even in the absence of the program or activity. We include these costs as an incremental effect of the regulation because they are a necessary contribution to the incremental direct labor needed to comply with the subject regulation; without these indirect costs, this direct labor would not be possible.

the base. Once determined to a degree of reasonableness, the resulting rate then is applied to a base of costs. As introduced at the beginning of this Appendix, the base could be comprised of either “total direct labor costs” or “total direct costs.”

$$\frac{\text{Total indirect costs}}{\text{Total direct labor costs}} = \text{Indirect cost rate}$$

*Or*

$$\frac{\text{Total indirect costs}}{\text{Total direct costs}} = \text{Indirect cost rate}$$

Specifically, indirect costs tend to include the time spent on administrative personnel issues, writing administrative guidance documents, outreach and training for program managers, or other activities which are not directly related to the program’s operations. In general, indirect costs consist of costs related to the following items that arise irrespective of the nature of the program or activity under review:

- Space rental;
- Utilities, including telephone expenses;
- Postage;
- Unemployment compensation benefit costs;
- Data processing, management, and control;
- Equipment rentals;
- Miscellaneous supplies and materials;
- Equipment costs;
- Training, employee development, and personnel transfers, including costs of travel and time in-transit;
- Budget development and program planning, coordination, and direction;

- Research and development activities;
- Administrative support related to a bureau's or office's overall mission, including such costs as procurement, contracting, office services, property management, vehicle management, supply, finance, payroll, voucher processing, personnel services, records management, and document control;
- Reports, including all costs of preparation, review, and distribution of required recurring reports such as accounting or property reports;
- Public information and inquiries;
- Safety management, including inspection, training, and promotion; and
- Equal Employment Opportunity Office and other affirmative action programs, including employee counseling and review of grievance and appeals.

Although the accounting methodology for calculating an indirect rate is well-established and consistent across agencies and offices, the discussion above demonstrates that the rate itself will vary depending on the characteristics of the relevant office. For example, offices whose employees spend more time in training relative to direct work will have a higher indirect rate than similar offices with lower training costs. In addition, offices in an agency with many organizational layers may have a higher indirect rate due to the need to bear a proportionate cost associated with several layers of management and oversight. Calculating an indirect rate necessitates understanding and delineating the appropriate pool and base of costs aligned by cost category and by activity. It also requires access to detailed data regarding the costs incurred and activities undertaken by a particular office. Analysts need to pay particular attention to whether the rate is derived from a direct labor cost base, as opposed to a total direct cost base, assuming the rate will be applied to an estimate of hourly wages plus benefits.