GEOGRAPHIC ADJUSTMENT IN MEDICARE PAYMENT

Phase I: Improving Accuracy

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

Geographic Adjustment in Medicare Payment Phase I: Improving Accuracy

Second Edition

Committee on Geographic Adjustment Factors in Medicare Payment

Board on Health Care Services

Margaret Edmunds and Frank A. Sloan, *Editors*

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

THE NATIONAL ACADEMIES PRESS 500 Fifth Street, N.W. Washington, DC 20001

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This study was supported by Contract No. HHS P23320042509XI, Task Order No. HHS P23337012T between the National Academy of Sciences and the Centers for Medicare and Medicaid Services. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the organizations or agencies that provided support for this project.

International Standard Book Number 0-309-XXXXX-X (Book)
International Standard Book Number 0-309- XXXXX -X (PDF)
Library of Congress Control Number: 00 XXXXXX

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Suggested citation: IOM (Institute of Medicine). 2011. *Geographic Adjustment in Medicare Payment: Phase I: Improving Accuracy.* Washington, DC: The National Academies Press.

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Willing is not enough; we must do."
—Goethe

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This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by **Harold Sox,** American College of Physicians, and **Charles E. Phelps,** Rochester University. Appointed by the National Research Council and Institute of Medicine, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

ACKNOWLEDGMENTS

The Committee on Geographic Adjustment Factors in Medicare Payment and the Institute of Medicine (IOM) study staff would like to thank the many individuals and organizations who generously contributed their time, knowledge, and expertise to this report.

The following individuals shared their expertise through invited presentations at the two public sessions: James Bentley, Consultant; Dan Black, Professor and Dean of the Harris School of Public Policy, University of Chicago; The Honorable Bruce Braley, U.S. House of Representatives, Iowa; Larry DeGhetaldi, Palo Alto Medical Foundation and Chair of Medicare Committee, California Medical Association; Roland Goertz, President, American Academy of Family Physicians; Karen Heller, Executive Vice President, Greater New York Hospital Association; Michael Kitchell, President of Board of Directors, McFarland Clinic and President, Iowa Medical Society; Mark Miller, Executive Director of MedPAC; Rob Otten, Vice President of Health Policy, American Medical Association; James Potter, Senior VP of Advocacy and Government Relations, American Academy of Physician Assistants; Douglas Reding, Vice President, Marshfield Clinic; Jennie Rhinehart, Administrator and CEO, Community Hospital, Tallassee, Alabama; Elena Rios, President, National Hispanic Medical Association; The Honorable Allyson Schwartz, Pennsylvania; Sherry Smith, Director of Physician Payment Policy at the American Medical Association; Byron Sogie-Thomas, Health Policy Director, National Medical Association; James Spletzer, Senior Research Economist, Bureau of Labor Statistics; Alice Tolbert-Coombs, President, Massachusetts Medical Society; and Jan Towers, Health Policy Director, American Academy of Nurse Practitioners. Additional presentations were made by Dale Baker, Baker Consulting; Tim Bartholow, Wisconsin Medical Society; Edward Bentley, Santa Barbara Gastroenterology Associates; Craig Boyer, North Country Health Services, Bemidji, Minnesota; and Jerome Connolly, American Academy of Family Physicians; Dario DeGhetaldi, Corey, Luzaich, Pliska, DeGhetaldi & Nastari LLP.

Written testimony from the following individuals and organizations is gratefully acknowledged: The Honorable Charles Grassley, United States Senate, Iowa; Atul Grover, Chief Advocacy Officer, Association of American Medical Colleges; Joanna Kim, Senior Associate Director, Policy, American Hospital Association; Ellen Kugler, National Association of Urban Hospitals; Brent Miller, Director of Federal Government Relations, Marshfield Clinic; Anne O'Rourke, California Hospital Association; Eneida Roldan, President and CEO, Jackson Health System, Miami; Steve Speil, Senior Vice President, Health and Finance Policy, Federation of American Hospitals; and David Winslow, Vice President, Maine Hospital Association. A commissioned paper by Dobson DaVanzo LLC on the technical approach to the study was also provided.

Several others provided valuable information and technical assistance. Phil Doyle, Laurie Salmon, and George Stamos of the Bureau of Labor Statistics met with committee members and staff and provided statistical consultations and data for the committee's consideration. Alex Calgano of the Massachusetts Medical Society; Linda Fishman and Don May of the American Hospital Association; Atul Grover of the American Association of Medical Colleges; Elizabeth McNeil of the California Medical Association; Brent Miller of Marshfield Clinic; and Robert Phillips, Director of the Robert Graham Center: Policy Studies in Family Medicine and Primary Care were instrumental in identifying speakers for the public sessions and in providing materials for the committee's consideration.

Several Congressional staff members also provided valuable background information for the study. They include Susan Walden of the Senate Committee on Finance; Jennifer Friedman, Geoff Gerhardt, and Tim Gronniger of the House Committee on Ways and Means, Subcommittee on Health; Stephen Cha and Anne Morris, House Committee on Energy and Commerce; Christa Shively, Office of Congressman Earl Blumenauer; Mike Goodman, Office of Congressman Bruce Braley; Megan Eidman,

Office of Congressman Jay Inslee; Kelly Hall, Office of Congresswoman Allyson Schwartz; Nils T. Tillstrom, Office of Congressman David Wu. The expertise of Jim Jensen, Executive Director of the Office of Congressional and Government Affairs, in facilitating communications with Congressional staff and Members is gratefully acknowledged.

Special thanks go to the staff at RTI International, whose statistical analyses and technical consultations were both integral and invaluable to the study: Kathleen Dalton, RTI Project Director; Greg Pope, Program Director; and team members Walter Adamache, Elizabeth Seeley, Deborah Healy, Nathan West, Brieanne Lyda-McDonald, Justine Allpress, Alton Wright, and Bill Wheaton.

Several members of the IOM staff offered their guidance and support to the study staff and committee, including Roger Herdman, Director of the Board on Health Care Services; John Bailar, Scholar in Residence; Senior Program Officers Jill Eden, Robin Grant, Cheryl Ulmer, and Dianne Wolman and Program Officers Meg McCoy and Rob Saunders. Assistance and project support from Cassandra Cacace is also gratefully acknowledged. Harvey Fineberg, IOM President, and Judith Salerno, the Leonard D. Schaeffer Executive Officer of the IOM, also provided valuable advice at key stages of the study. The guidance of Porter Coggeshall, Executive Director of the Report Review Committee, was especially valuable throughout the report review process.

The Study Director would like to thank Lauren Tobias, Director of Communications, IOM; Abbey Meltzer, Deputy Communications Director, IOM; Greta Gorman, Editorial Projects Manager; Christine Stencel, Senior Media Relations Officer, Office of News and Public Information; Marton Cavani, Web Communications Manager, IOM; and Jordan Wyndelts, Web Content Assistant; and Stephen Mautner, Executive Editor, National Academies Press for their creative approaches to helping the staff plan for report dissemination.

The committee would like to commend the IOM staff for their impressive work on this study: Margo Edmunds, Study Director; Kathleen Haddad, Senior Program Officer; Serina Reckling, Research Associate; Sara Spizzirri, Research Assistant; and Ashley McWilliams, Senior Program Assistant.

Finally, the committee and staff would like to thank The Centers for Medicare and Medicaid Services whose funding made this study possible. We especially thank Jonathan Blum, Deputy CMS Administrator, Marc Hartstein, Acting Director, Hospital and Ambulatory Policy Group, and Judith Richter, Division of Acute Care.

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Acronyms

ACA	Patient Protection and Affordable Care Act
ACS	American Community Survey
AHRQ	Agency for Healthcare Research and Quality
AHW	average hourly wage
AMA	American Medical Association
ASC	ambulatory surgical center
BLS	Bureau of Labor Statistics
CAH	critical access hospital
CBSA	core-based statistical area
CF	conversion factor
CMS	Centers for Medicare and Medicaid Services
CPT®	Current Procedural Terminology
CSA	combined statistical area
CT	computed tomography
CTS	Community Tracking Survey
CY	calendar year
DOD	U.S. Department of Defense
DRG	diagnosis related group
DSH	disproportionate share hospitals
EHR	electronic health record
FY	fiscal year
GAF	geographic adjustment factor
GAO	Government Accountability Office
GIS	geographic information system
GME	graduate medical education
GPCI	geographic practice cost index
GSA	General Services Administration
HCERA	Health Care & Education Reconciliation Act of 2010
HCFA	Health Care Financing Administration
HCPCS	Healthcare Common Procedure Coding System
HHA	home health agency
HHS	U.S. Department of Health and Human Services
HIT	health information technology
HITECH	Health Information Technology for Economic and Clinical Health Act of 2009
HRR	hospital referral region
HSA	hospital service area
HUD	U.S. Department of Housing and Urban Development
HWI	hospital wage index
IDW	inverse distance weighting

IME	indirect medical education
IOM	Institute of Medicine
IPPS	Inpatient Prospective Payment System
IRS	Internal Revenue Service
LPN	licensed practical nurse
MDH	Medicare dependent hospitals
MedPAC	Medicare Payment Advisory Commission
MEI	Medicare Economic Index
MGCRB	Medicare Geographic Classification Review Board
MGMA	Medical Group Management Association
microSA	micropolitan statistical areas
MMA	Medicare Modernization Act of 2003
MP	malpractice
MS-DRG	Medicare severity diagnosis related group
MSA	metropolitan statistical area
NAICS	North American Industry Classification Systems
NCS	National Compensation Survey
NECTA	New England City and Town Areas
OBRA	Omnibus Budget Reconciliation Act of 1989
OES	Occupational Employment Survey
OMA	occupational mix adjustment
PCSA	primary care service area
PE	practice expense
PFS	Physician Fee Schedule
PLI	professional liability insurance
PPIS	Physician Practice Information Survey
PPS	Prospective Payment System
ProPAC	Prospective Payment Advisory Commission
RN	registered nurse
RSE	relative standard error
RRC	rural referral center
RVU	relative value unit
SCH	sole community hospital
SE	standard error
SLMO	state labor markets option
SNF	skilled nursing facility
USPS	U.S. Postal Service

Glossary

Accountable care organization (ACO): A network of various health care providers such as hospitals, primary care physicians, and specialists who work together to improve the cost efficiency and quality of health care services administered to local patients, including Medicare beneficiaries (Denvers and Berenson, 2009).

Ambulatory surgical center (ASC): A center where patients undergo minor outpatient surgeries that do not require an overnight stay; ASCs pay per bundle of services (MedPAC, 2007a).

Area wage index (AWI): See *Hospital wage index*.

Balance of state areas: See *Micropolitan statistical areas*.

Blending: A method recommended by the Medicare Payment Advisory Commission to reduce differences in payments between neighboring hospitals by adjusting the hospital wage index using metropolitan statistical area-level wage data with county-level census wage data.

Budget neutrality: A statutory requirement imposed on the Centers for Medicare and Medicaid Services that states that any changes to hospital and physician Medicare payments cannot affect the budget. When one provider receives an increase in payment, another receives a decrease.

Circularity (or endogeneity): The ability of hospitals (or physicians) to influence the hospital wage index (and geographic practice cost indexes). This is a result of the hospital wage index being computed from hospital-reported wage data, which is especially problematic in areas with few hospitals.

Core-based statistical area (CBSA): A geographic area (defined by the Office of Management and Budget) that the Centers for Medicare and Medicaid Services uses to define the payment areas for the hospital wage index. CBSA is a collective term for metropolitan statistical areas and micropolitan statistical areas. See *metropolitan statistical areas* and *micropolitan statistical areas* (OMB, 2000).

Cost index: A ratio that measures the variation in actual expenditures, such as wages and benefits, across different areas and over time.

Cost share (or weight): The portion of aggregate input costs attributable to a single input. For example, the cost share of registered nurses compared with all hospital labor input costs is about 40 percent. Cost shares vary by geographic area. Along with its price, the proportion of a specific input used in production influences the total cost.

Critical access hospital (CAH): Hospitals with 25 or fewer beds, most of which are located in rural areas, that are reimbursed on the basis of their actual costs rather than through the Inpatient Prospective Payment System. Medicare pays 101 percent of a CAH's allowed costs. Geographic adjustment factors do not affect reimbursement to CAHs (MedPAC, 2007a).

Current Procedural Terminology (CPT)® codes: Standardized procedural codes that medical professionals use to report and bill medical procedures and services to public and private health insurers. The American Medical Association develops the codes and updates them annually (AMA, 2011).

Diagnosis-related group (DRG): A classification system that groups similar clinical conditions (diagnoses) and the procedures furnished by the hospitals during the hospital stay. The Medicare-Severity DRG (MS-DRG) takes into account the severity of illness and resource consumption for Medicare beneficiaries. Medicare pays for inpatient hospital services on a rate-per-discharge basis that varies according to the DRG to which a beneficiary's stay is assigned. DRGs are evaluated and updated annually by the Centers for Medicare and Medicaid Services (CMS, 2010a).

Disproportionate share hospital (DSH): Hospitals identified by the Centers for Medicare and Medicaid Services that serve a large proportion of low-income patients. These hospitals receive a percentage add-on payment that is applied to the diagnosis-related group-adjusted base payment rate (CMS, 2010a).

Exceptions: A process by which a hospital paid under the Inpatient Prospective Payment System can receive additional funds if it meets certain criteria. Exceptions can be regulatory or legislative.

Frontier states: States where 50 percent of counties have a population density of less than 6 people per square mile and for which a 1.0 wage index floor for hospitals and a 1.0 practice expense geographic practice cost index floor are provided for physicians. These states are Montana, Wyoming, North Dakota, Nevada, and South Dakota (CMS, 2010d).

Geographic information system (GIS): A hardware and software product that enables researches to capture, organize, and analyze data through geographically referenced information. It is a potential tool that health care researchers can use to define market areas and program various smoothing techniques (Dartmouth, 2010).

Geographic practice cost index (GPCI): An adjustment to Medicare's practitioner payments to account for geographic differences in the costs of operating a private medical practice that are beyond the providers' control. The GPCI has three components: physician work, practice expense, and malpractice insurance (CMS, 2010d).

Graduate medical education (GME): Additional payments to teaching hospitals for the cost of the Centers for Medicare and Medicaid Services' approved graduate medical education programs. These payments take into account the number of residents working in the hospital, and the number of Medicare patients treated (CMS, 2010c).

Home health agency (HHA): An agency that provides care to patients who require skilled nursing or therapy care at home; the Centers for Medicare and Medicaid Services pays HHAs per 60-day episode of care, and payments are determined on the basis of the patient's condition and treatment (MedPAC, 2008).

Hospital cost report: An annual survey conducted by the Centers for Medicare and Medicaid Services that collects information on wages and wage-related costs from acute care hospitals. The Centers for Medicare and Medicaid Services currently uses cost report data from Worksheet S-3 to compute the hospital wage index (Hartstein, 2010).

Hospital referral region (HRR): The area from which a tertiary care hospital draws patients, developed by the Dartmouth Atlas. HRRs are generally larger than counties and smaller than states, but they can cross state and county lines. Many types of hospitals fall within an HRR, but an HRR must contain at least one hospital that performs major cardiovascular and neurosurgical procedures. The United States currently has 306 HRRs (Dartmouth, 2011).

Hospital wage index (HWI): An adjustment to Medicare payments to hospitals, also known as an area wage index, paid under the Inpatient Prospective Payment System that reflects how the average hourly hospital wages in a specified geographic area (a proxy for the local labor market) compare with average hourly hospital wages nationally. The value of the wage index for any given labor market is the ratio of the average hourly hospital wage in that area to the national average hourly hospital wage (CMS, 2011c).

Imputation: A method for assigning a value when actual data are missing or unavailable.

Index: A statistic that is designed to compare how the price for a defined group of goods and services varies as a whole over time or between geographic areas compared with an average. This is distinct from a cost index, which measures variation in actual expenditures, such as wages and benefits.

Indirect medical education (IME): A per case add-on payment under the Inpatient Prospective Payment System to the Centers for Medicare and Medicaid Services-approved teaching hospitals. The IME adjustment reflects that teaching hospitals have higher indirect patient care costs than nonteaching hospitals (CMS, 2010a).

Inpatient Prospective Payment System (IPPS): The system by which the Centers for Medicare and Medicaid Services pays acute care hospitals for operating costs of caring for Medicare patients. Hospitals are paid a predetermined flat rate per discharge, depending on the Medicare-severity diagnosis-related group to which the discharge is assigned (CMS, 2011a).

Input cost: A producer's expenses for labor and other resources used to produce a product or service. In the case of health care, inputs consist of resources such as nursing labor and space costs. The cost of inputs is determined by their market price and the quantity of each input used by hospitals or physicians.

Input price: The market-determined value of the labor and resources (inputs) used to provide a medical service.

Inputs: All of the resources that hospitals and physician practices use to provide a medical service. Inputs include hospital beds, examining and operating rooms, medical supplies, staff, and patients.

Labor: Services performed by workers for a wage.

Labor market: A type of market in which workers compete for a common set of jobs and employers compete for a common set of workers.

Lugar Counties: Rural counties near urban areas in which hospitals are reimbursed at the same rates as nearby urban hospitals (Hartstein, 2010).

Market: An area in which buyers and sellers interact to exchange resources (Black, 2010).

Medical malpractice geographic practice cost index: An index representing professional liability expenses, which is set at 3.9 percent of the adjustment (CMS, 2010d).

Metropolitan statistical area (MSA): An area that consists of one urban core with a population of at least 50,000. It comprises central counties or counties containing the core and any outlying or nonmetropolitan counties that meet certain commuting requirements (OMB, 2000).

Micropolitan statistical area (microSA): A statistical area based around at least one urban core with a population of 10,000 to 49,999. It is comprised of central counties or counties containing the core and outlying or nonmetropolitan counties that meet certain commuting requirements (OMB, 2000).

Occupational mix: The specific proportions of various categories of labor (clinical and administrative staff) used by a hospital or physician practice to provide health care services.

Occupational mix adjustment (OMA): An adjustment to a payment area's hospital wage index that controls for the effect of the hospital's employment choices. OMA accounts for geographic differences in labor costs rather than differences in types of labor employed by a hospital (CMS, 2010c).

Opportunity cost: The most valuable resource(s) that an individual gives up to invest time or money into something else (Bradley, 2008).

Outmigration adjustment: An upward adjustment to a county's hospital wage index if a large percentage of hospital employees residing in the qualifying county are employed in an area that has a higher wage index (Medicare Prescription Drug, Improvement, and Modernization Act of 2003, P.L. 108-173).

Physician Fee Schedule (PFS): The schedule that the Centers for Medicare and Medicaid Services uses to pay practitioners for services rendered under Part B of Medicare. The PFS is determined using relative value units (assigned to each procedure or service), a conversion factor, and geographic practice cost indexes (CMS, 2010b).

Physician work geographic practice cost index: An index that reflects the time, skill, effort, judgment, and stress associated with providing one service relative to other services. As of 2011, the work geographic practice cost index is set at 52 percent of the geographic adjustment (CMS, 2010d).

Price index: An index that compares differences in price or quantity for a group of goods or services relative to an average derived from a standard or baseline geographic area or time period.

Prospective Payment System (PPS): The system that the Centers for Medicare and Medicaid Services uses to pay hospitals with a predetermined, fixed amount on the basis of the complexity of the service rendered (CMS, 2011e).

Reclassification: A hospital is reclassified by reassigning it to a neighboring payment locality with a higher wage index, if that hospital can demonstrate that it competes for labor with providers in the desired payment locality.

Relative value unit (RVU): A measure of the relative amount of resources typically used to provide a particular service. Section 1848(c) of the Social Security Act requires Medicare to establish national RVUs for physician work, practice expenses, and malpractice (CMS, 2010d).

Rest-of-state (or balance-of-state) areas: The designated payment area for hospitals located in micropolitan statistical areas and areas with populations of less than 10,000 that do not fall into the metropolitan statistical areas within a given state. Each state has one rest-of-state payment area that receives its own hospital wage index (CMS, 2010c).

Rural floor: A term indicating that a wage index applied to a hospital in a metropolitan area cannot be less than a wage index applied to a hospital in a nonmetropolitan area in the same state.

Rural hospitals: Any hospital located in a micropolitan statistical area or in a nonmetropolitan statistical area (CMS, 2010c).

Rural referral center: Medical centers located in a rural area that have a minimum of 275 beds. At least 50 percent of their Medicare patients have been referred by another hospital or physician, and at least 60 percent of those patients live more than 25 miles away (CMS, 2011f).

Rural-urban continuum codes: A U.S. Department of Agriculture (2010) classification scheme that defines metropolitan counties by their population size and nonmetropolitan counties by their degree of urbanization and adjacency to a metropolitan area.

Section 401 of the Balanced Budget Refinement Act: A provision that classifies certain urban hospitals as rural to qualify for special hospital status, such as a sole community hospital, Medicare-dependent hospital, or rural referral center.

Section 508 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003: A provision that allows hospitals that did not meet proximity criteria to be reclassified under a special one-time-only process.

Skilled nursing facility (SNF): A facility that provides patients with skilled nursing care on an inpatient basis, after a hospital stay of at least 3 days. Medicare pays SNFs per day using a Prospective Payment System that covers all costs related to the services provided. The SNF

payment rates are adjusted for patient case mix and geographic variation in wages using the hospital wage index (CMS, 2011d).

Smoothing: A methodology used to reduce large differences in the hospital wage index between neighboring geographic areas by tapering the indexes in counties close to the payment border (MedPAC, 2007b).

Sole community hospitals: The only entities that can make inpatient services "reasonably available" to a given population because of isolation, geographic barriers, weather, or distance (the hospital is at least 35 miles away from the next nearest hospital). Sole community hospitals receive the Inpatient Prospective Payment System federal rate or the updated hospital-specific rate based on fiscal year 1982, 1987, 1996, or 2006 costs per discharge, whichever is highest (CMS, 2010e).

Standard occupational classification (SOC) system: A system that federal statistical agencies use to classify workers and jobs into occupational categories for the purpose of collecting, calculating, analyzing, or disseminating data. The SOC system is designed to reflect the current occupational structure of the United States. Health care workers are classified into two major categories: health care practitioners and technical occupations (29-0000 codes) and health care support occupations (31-0000 codes) (BLS, 2010).

Urban hospitals: Hospitals located in metropolitan statistical areas (CMS, 2010c).

Volatility: Large changes in an area's hospital wage index from year to year. Relative wage rates generally should not change substantially from year to year, other than to reflect unusual circumstances (MedPAC, 2007b).

Wage bill: The total cost of wages paid by a hospital.

Wage cliff: A large difference in wage index values between two neighboring payment areas (MedPAC, 2007b).

Weight: See *Cost share.*

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Summary

Geographic Equity in Medicare Payment

The Medicare system adjusts fee-for-service payments to hospitals and practitioners[1] according to the geographic location in which providers practice, recognizing that certain costs beyond providers' control vary between metropolitan and nonmetropolitan areas and also differ by region. The fundamental rationale for geographic adjustment is to create a payment structure that adjusts payments for input price differences that health care professionals and institutions face, such as the cost of employee compensation.

Medicare provides health care coverage for 47 million Americans, including 39 million individuals who are 65 years of age and older and 8 million nonelderly people with permanent disabilities or end-stage renal disease. The Congressional Budget Office estimates that Medicare payments in 2010 will reach more than $500 billion. Total per capita Medicare spending is not evenly distributed across the country, and the proportion of beneficiaries living in metropolitan and nonmetropolitan areas also varies from state to state.

Because Medicare is a national program, policy makers and researchers working to develop and implement its payment systems have long recognized the need to adjust payment amounts to reflect input price differences across geographic areas of the United States. The geographic adjustments to Medicare fee-for-service payments are the hospital wage index (HWI) and the three geographic practice cost indexes (GPCIs).[2]

Geographic adjustments are intended to improve the accuracy of Medicare payments to providers in various areas of the country, by accounting for the differences in prices for certain expenses (such as clinical and administrative staff salaries and benefits, rent, malpractice insurance, and other defined costs) from region to region. As a result, Medicare's Inpatient Prospective Payment System (IPPS), other institutional prospective payment systems (other PPSs), and the Medicare physician fee schedule (PFS, or fee schedule) all employ geographic adjustment factors (GAFs).

Although there is widespread agreement about the importance of providing accurate payments to providers, there is considerable and long-standing disagreement in the provider community and among policy makers about how best to adjust payments based on geographic location. In 2 public sessions, the committee heard testimony from critics of the existing geographic adjusters who identified a number of questions and concerns and who believe that the current adjusters are not treating

[1] Unless otherwise specified, the term "practitioners" is used to describe both physicians and other eligible clinical providers who are permitted to furnish and bill Medicare under the Physician Fee Schedule (PFS). These include nurse practitioners, clinical nurse specialists, psychologists, social workers, and others.

[2] In broad terms, an index compares differences in price or quantity for a group of services relative to an average value for a standard or baseline geographic area or time period.

them fairly. Among their stated concerns are problems and inconsistencies with the definitions of payment areas and labor markets, concerns about the relevance and accuracy of the source data for determining area wages and other input prices, questions about the occupational mix used to create the hospital wage and physician practice expense adjustments, and criticisms about the lack of transparency of index construction.

These and other concerns regarding the current system for geographic adjustment are conceptually complex, widely disputed, and often contentious. With a goal of improving this system, the U.S. Department of Health and Human Services (HHS) and the U.S. Congress sought advice from the Institute of Medicine (IOM) on how to best address concerns about the accuracy of the data sources and the transparency of the methods used for making the geographic adjustments in payments to providers. The IOM was also asked to assess the impact of geographic adjustment on workforce in metropolitan and nonmetropolitan areas, beneficiaries' access to care, and the ability of providers to provide high-value, high-quality care.

SCOPE OF THIS STUDY

This is the first of two reports to the Secretary of HHS and the U.S. Congress. This report focuses primarily on accuracy of measuring input prices for fee-for-service Medicare Part A and Part B payments. It includes a review of the data sources used to calculate the HWI and the GPCIs and for defining the payment areas used for each index, but does not include a review of the accuracy of payments to facilities other than short term acute care hospitals, such as skilled nursing facilities (SNFs) or home health agencies (HHAs).

In its phase 2 report, scheduled to be released in the spring of 2012, the committee will consider the role of Medicare payments in addressing matters such as the distribution of the health care workforce, population health, and the ability of providers to produce high-value, high-quality health care.

BOX S-1
Statement of Task

An ad hoc committee will conduct a comprehensive empirical study on the accuracy of the geographic adjustment factors established under Sections 1848(e) and 1886(d)(3)(E) of Title XVIII of the Social Security Act and used to ensure that Medicare payment fees and rates reflect differences in input costs across geographic areas.

Specifically, the committee will

- Evaluate the accuracy of the adjustment factors;
- Evaluate the methodology used to determine the adjustment factors; and
- Evaluate the measures used for the adjustment factors for timeliness and frequency of revisions, for sources of data and the degree to which such data are representative of costs, and for operational costs of providers who participate in Medicare.

Within the context of the U.S. health care marketplace, the committee will also evaluate and consider:

- The effect of the adjustment factors on the level and distribution of the health care workforce and resources, including recruitment and retention, taking into account mobility between urban and rural areas; ability of hospitals and other facilities to maintain an adequate and skilled workforce; and patient access to providers and needed medical technologies;
- The effect of adjustment factors on population health and quality of care; and
- The effect of the adjustment factors on the ability of providers to furnish efficient, high value care.

To assist with the quantitative aspects of data accuracy and methodological assessments and to model the impact analysis, the IOM engaged RTI International as consultants to the committee because of its extensive previous work on the HWI and the GPCIs.

RESEARCH FRAMEWORK FOR THE STUDY

After evaluating its charge, the committee developed a framework with a series of research questions to help guide its work and decision-making. Understanding that its recommendations must be objective, well-supported by empirical evidence, and understandable to stakeholders, the committee undertook a systematic review of current and alternative data sources and methods for making geographic adjustments. This included:

- Reviewing the existing data sources and methods used to calculate the HWI and the GPCIs, as well as considering recommendations in other studies that have proposed to alter the sources or methods;
- Examining the conceptual foundation for the geographic areas used in the HWI and GPCI adjustment processes;
- Considering the accuracy of alternate data sources through a series of statistical comparisons of those data with the data currently being used;
- Assessing the nature and extent of geographic variation in the prices for each input;
- Conducting a series of simulations to determine the impact on stakeholders of using different data sources and methods for computing the indexes;
- Evaluating the cost shares for both indexes; and
- Choosing the most appropriate and best available source and method for each input and each index.

PRINCIPLES AND ASSUMPTIONS

Committee members made an early commitment to focus first on the committee's charge to study the accuracy of the geographic adjustment established under Sections 1848(e) and 1886 (d) (3) (E) of Title XVIII of the Social Security Act. To help guide its review and deliberations, the committee developed the following general principles.

1. ***Evidence for adjustment*. The continued use of geographic adjustment factors in Medicare payment is warranted to reflect geographic variations in input prices.**

Public testimony and written comments to this committee, along with extensive public comment to the Centers for Medicare and Medicaid Services (CMS) on the proposed revisions to the PFS Rules in 2010, revealed clear differences of opinion about how the study should be conducted and what the committee should recommend. However, one area of agreement among stakeholders was the need to rebuild the system and to improve the accuracy of the data sources and methods used in making geographic adjustments. The committee begins its deliberations by examining the extent of geographic variation in input prices faced by hospitals and practitioners.

Although the availability of sufficient representative data on practitioner compensation and practice expenses was particularly problematic and the data sources available for determining wages for the HWI had certain shortcomings, the committee agreed that the overall evidence and rationale for geographic adjustment were strong enough to warrant its continuation. To help improve the current system, the committee focused on ways to improve the data sources and methods used.

2. ***Accuracy.*** **Geographic adjustment for input price differences is intended to reflect the input prices faced by providers, not the costs incurred by providers.**

"Accuracy" of data sources can be defined as the degree of closeness of measurements to the true value of whatever is being measured. The committee recognizes that stakeholders have different perspectives about the accuracy of data sources, and it supports moving toward a more systematic process of geographic adjustment that more accurately reflects differences in input prices across labor markets. Although the committee recognizes that every currently available data source has certain deficiencies, the committee agrees that data sources can be improved by holding the data producers to standards of accountability and accuracy in sampling, analysis and reporting, and by making the data and data collection methods more transparent to users.

The committee heard testimony from hospital administrators and clinical practitioners who believe that hospital cost reports or actual practice expense data are both more understandable and more transparent to the provider community and a more accurate reflection of their actual business costs than some of the proxy data sources currently proposed or in use. However, the committee generally concluded that independent data that reflect input prices faced by providers are conceptually more appropriate than data on costs paid by the providers, given that actual costs also reflect local business decisions or requirements that do not necessarily reflect input prices across labor markets.

3. ***Local labor markets.*** **Geographic adjustment, where possible, should reflect area-wide input prices for labor faced by all employers operating in the same local market and should not be drawn exclusively from data on the prices paid by hospitals or health care practitioners.**

To improve accuracy and reflect market prices faced by providers, geographic adjustment should reflect the local labor markets in which providers operate and compete for employees. The committee recognized that such competition may exist between like entities (e.g., hospitals versus hospitals) and across different entities (e.g., hospitals versus ambulatory surgery centers). The committee concluded that broadening the employers whose employees would be included in calculating a wage index would be especially worthwhile in areas with few health care providers (e.g., single-hospital markets).

On balance, the committee agreed that labor market data should not be drawn exclusively from hospital and provider sources, yet it also recognized that some categories of personnel are employed primarily in health care settings (e.g., nurses). In addition, the committee was concerned that certain employees in health care and other

employment settings may not be identical according to their training and scope of service.

In developing recommendations about data sources for the HWI and GPCIs, committee members compared an independent source of wage data for all-industry, health care sector, and hospital-specific wages for several occupational categories and found a very high degree of correlation between health care sector wages and wages from the other two sectors. The committee acknowledges that correlation does not demonstrate per se the "true" wage in the market. However, correlation provides some support for the idea that hospital employees compete for jobs in other labor markets, particularly the health care sector. As a result, the committee found a strong conceptual rationale for using health sector data rather than industry-wide data to help improve accuracy in adjustments and to respond to concerns expressed by stakeholders.

4. ***Consistent criteria.*** **Consistent criteria should be used for determining the payment areas, data sources, and methods that are used in making the geographic adjustment for hospitals and practitioners.**

Currently, Medicare payment to hospitals is based on their location in 1 of 441 labor markets (365 MSAs and 76 non-MSAs). In contrast, physician and other practitioner payments are adjusted across 89 payment areas, with 34 statewide areas having both metropolitan and nonmetropolitan areas and the remainder being centered on large metropolitan areas. The committee understands the history leading to these geographic designations, yet it found little compelling evidence that the actual labor markets for physicians and hospitals are different.

Because hospitals, physicians, and other practitioners in a given geographic area tend to function within the same local labor markets, the committee sees benefits to using the same defined payment areas for both hospitals and practitioners. In view of market and policy trends toward increasing degrees of coordination and integration between hospital and ambulatory care, this appears to be both reasonable and timely.

5. ***Sound rationale.*** **Changes in the current system of geographic adjustment should be based on a clear and logical rationale.**

Throughout its deliberations, the committee sought to make internally consistent decisions that were logically valid, clearly supported by empirical evidence, and understandable to non-technical audiences. The HWI and the GPCIs have been subject to many changes since they were first introduced, yet they have been considered separately both in statute and in implementation. There have been many previous recommendations for improvements to both indexes over several years. The committee noted that a number of improvements could be made to both indexes through a similar strategy or data source.

6. ***Transparency.*** **The geographic adjustment process should provide sufficient information to allow transparency and empirical review of the data and methods used to make the adjustments.**

The committee worked to develop recommendations to improve the accuracy of the current data sources and methodologies and provide a clear explanation of its reasoning for recommending selected data sources and methodologies to improve accuracy. Whenever possible, the committee sought to simplify the methodologies used for geographic adjustment, to use clear language to explain complex technical formulas and concepts, and to promote a reasonable and objective selection of data sources that maximize accuracy.

7. ***Policy adjustments*****. Medicare payment adjustments related to national policy goals should only be made through a separate and distinct adjustment mechanism, and not through geographic adjustment.**

Medicare provider payments should be adjusted on the basis of on the services that they provide and the prices that they face. The committee responded to its charge for this report by focusing first on the accuracy of payments based on the market conditions and input prices that providers face in fee-for-service settings.

The statement of task also asks the committee to consider the impact on stakeholders of any recommendations to change the current system of geographic adjustment. The committee heard testimony from practitioners and policy makers who view geographic adjustments in fee-for-service Medicare payment as a way to help address provider shortages and achieve other policy goals. Throughout their deliberations, committee members also recognized that even the most accurate geographic adjustment factors will not resolve all problems associated with the fee-for-service payment system as they relate to issues such as access to care, provider shortages, and provider mix. The committee recognizes the importance of these issues and will examine policy adjustments and their impact on stakeholders further in its phase 2 report.

ORGANIZATION OF THE REPORT

Chapter 1, Introduction and Overview, includes an overview of the Medicare program, a brief history of the approaches to geographic adjustment, and a description of the committee's approach to the study, including its principles and technical considerations.

Chapter 2, Labor Markets and Payment Areas, describes the conceptual framework for the committee's recommendations on changing the payment areas used for geographic adjustment. It provides a brief overview of labor markets, and then explains the committee's findings on how well existing payment areas perform in differentiating providers when based on prevailing wages. Finally, the chapter lays out

alternative market designations that the committee considered by the committee and explains the committee's recommendation for using MSAs and statewide non-MSAs as the basis for labor markets for both physicians and hospitals.

Chapter 3, Hospital Wage Index, describes what the index is intended to accomplish and explains how it is calculated. The chapter also reviews the different data sources that have been used in the past, and assesses the advantages and disadvantages of using alternate data sources, including their timeliness, accuracy, and transparency to stakeholders. Finally, the chapter includes recommendations about using Bureau of Labor Statistics (BLS) health care industry wage data (instead of hospital cost survey data reported to CMS), expanding the use of BLS data collection to include benefits, and expanding the number of occupations included as inputs in the wage index, each with a fixed national weight.

Chapter 4, Smoothing the Borders of Labor Markets and Payment Areas, compares different approaches to smoothing the differences in the wage indexes when neighboring hospitals competing in the same labor market have different wage indexes. The chapter recommends the use of commuting patterns of health care workers to compute the HWI and the practice expense component of the GPCI applying to employee wages. This approach would replace the current system of reclassification.

Chapter 5, Geographic Practice Cost Indexes, describes the history, intent, and evolution of the GPCIs. It explains the three GPCI components: physician work; practice expense, including employee wages and rent; and professional liability, or malpractice insurance. The chapter also reviews concerns about the accuracy and appropriateness of the methods and sources of data used to calculate the GPCIs that stakeholders have expressed. After reviewing several sources of data for each GPCI component and discussing the ways in which the GPCIs are calculated, the committee made seven recommendations regarding national cost share weights; a full range of occupations in the practice expense component; geographic adjustment for certain non-clinical labor-related expenses; new data sources for office staff wages and office rent; and a new method for setting the work adjustment.

Chapter 6, Transitions, is a summary of the goals of the study, themes of the committee's deliberations, and key features of its technical approach. The chapter then makes some observations about what the committee's recommendations were intended to accomplish overall and its plans for the second phase of the study. The final section looks ahead to some broader trends in the health care industry that are already underway, and that could have an influence on the way in which the committee's recommendations are implemented over the next 3 to 5 years.

RECOMMENDATIONS

Chapter 2: Labor Markets and Payment Areas

Recommendation 2-1: The same labor market definition should be used for both the hospital wage index and the physician geographic adjustment factor. Metropolitan statistical areas and statewide non-metropolitan statistical areas should serve as the basis for defining these labor markets.

The current system of geographic adjustment for hospitals uses 441 labor markets to define payment areas. Hospitals are classified according to their location in 365 metropolitan statistical areas, with the balance of non-metropolitan counties grouped into rest-of-state areas. The geographic adjustment system for physician payment uses 89 payment areas, some of which comprise large metropolitan areas, whereas 34 are statewide with combinations of metropolitan and nonmetropolitan areas. The committee recommends using the same labor market definition for both indexes, to reflect market integration for health care employers and workers in local markets. The committee acknowledges that moving from 89 to 441 physician payment areas could result in some areas with small sample sizes. To address this potential problem, certain areas could be combined, additional data could be collected, or data-smoothing techniques using information from adjoining areas could be used.

Recommendation 2-2: The data used to construct the hospital wage index and the physician geographic adjustment factor should come from all health care employers.

The current payment systems use wage data from different sources: some directly from providers (e.g., hospital cost reports and physician surveys) and others that are more independent, such as census data. After comparison of hospital-only, health care sector, and industry-wide wage data, the committee concluded that the health sector data from the Bureau of Labor Statistics would be the most accurate and conceptually appropriate data source for both of the indexes.

Chapter 3: Hospital Wage Index

Recommendation 3-1: The U.S. Congress should revise the hospital wage index statute (Section 1886(d) (3) (E) of the Social Security Act) to allow the Secretary of the U.S. Department of Health and Human Services to use data from the Bureau of Labor Statistics to compute the wage index.

Currently, hospital cost survey data reported to the Centers for Medicare and Medicaid Services (CMS) are used to calculate the wage index. The committee recommends that Bureau of Labor Statistics (BLS) health care industry wage data be used as an independent source to improve the accuracy of the index, given that BLS

data are collected at the occupational level and every occupation can be incorporated into the index. Because every occupation is measured, the average hourly wage in each area can be weighted by a fixed number of hours for each occupation. The fixed weighting allows the index to reflect the price of labor, not the reported cost of labor, which the committee views as an improvement in accuracy. If the use of BLS data were to change total payments, CMS will need to make a budget neutrality adjustment to re-calibrate the wage index, as required by law.

Recommendation 3-2: The Centers for Medicare and Medicaid Services should establish an ongoing agreement with the Bureau of Labor Statistics to use all necessary wage data from the Occupational Employment Survey to compute the wage index.

Compensation includes wages as well as benefits, and the Centers for Medicare and Medicaid Services (CMS) will need access to the unpublished BLS data to accurately compute the wage index. Several options for arranging CMS access to BLS data are available, including having BLS calculate wage index values for CMS. These are implementation details for CMS to work out.

Recommendation 3-3: The committee recommends use of all occupations as inputs in the hospital wage index, each with a fixed national weight based on the hours of each occupation employed in hospitals nationwide.

Currently, a limited number of occupations are included in the computation of the wage index. The use of all occupations in the health care workforce will more accurately reflect the broad range of health care professions and skills, and will also reflect the increasing integration of care provided in hospitals, outpatient clinics, office-based practices, and other clinical settings.

Recommendation 3-4: The Centers for Medicare and Medicaid Services should apply the proposed hospital wage index to facilities other than short term acute care hospitals, using nationwide occupation-specific weights derived from data for each type of facility.

The hospital wage index is currently applied to non-Inpatient Prospective Payment System facilities, such as skilled nursing facilities, home health agencies, and ambulatory surgical centers, but it does not accurately reflect the wage levels that these providers face because they have a different labor mix. To improve the accuracy of the price indexes, the Centers for Medicare and Medicaid Services should use the respective labor shares and occupation-specific weights from each setting.

Chapter 4: Smoothing the Borders of Labor Markets and Payment Areas

Recommendation 4-1: The committee recommends that wage indexes be adjusted by using formulas based on commuting patterns for health care workers who reside in a county located in one labor market but commute to work in a county located in another labor market.

As described earlier, the current geographic adjustment system uses different labor market definitions and payment areas for hospitals and physicians. To streamline the system and improve accuracy, the committee has proposed using metropolitan statistical areas and nonmetropolitan statistical area definitions for labor markets and payment areas in the future (see Recommendation 2-1). However, if the wage or other geographic practice cost index values are very different on either side of these defined borders, a process will be needed to smooth the boundaries in recognition of the fact that labor markets cannot classify all providers with complete accuracy. The commuting patterns of health care workers should be used as part of the smoothing adjustments, because they are an indication of economic integration of labor markets across their geographically drawn boundaries.

Smoothing adjustments based on commuting patterns can be implemented in several ways, but implementation will require determination of whether a minimum threshold should be applied, whether commuting patterns to lower- or higher-wage areas should be used, and whether the cost differences should be adjusted nationally or locally. The committee favored an outmigration adjustment, in which workers living in the county where a hospital is located are commuting to work in other hospitals located in areas with a higher wage index, because a precedent in using that type of adjustment already exists. However, the full range of options should be reviewed by the U.S. Department of Health and Human Services.

Recommendation 4-2: The committee's recommendation (4-1) is intended to replace the system of geographic reclassification and exceptions that is currently in place.

The committee believes that its recommendation will improve accuracy and that smoothing will decrease the need for reclassifications and exceptions. However, smoothing is not a replacement for index floors, which are policy adjustments rather than adjustments to improve accuracy. These and other policy adjustments will be considered as part of the phase 2 report.

Chapter 5: Geographic Practice Cost Indexes

Recommendation 5-1: The GPCI cost share weights for adjusting fee-for-service payments to practitioners should continue to be national, including the three GPCIs (work, practice expense, and liability insurance) and the categories within the practice expense (office rent and personnel).

Geographic adjustments should be made for the prices of inputs that are purchased and/or produced locally and that vary from the national average. Inputs that are purchased in a national market without systematic variation in prices across geographic areas should not be adjusted geographically. In future PFS updates, CMS should take steps to ensure accuracy in distinguishing between national and local market input prices. The statutory requirement to use the Medicare Economic Index (MEI) cost share weights as the source of GPCI cost share weights is reasonable and should be continued.

Recommendation 5-2: Proxies should continue to be used to measure geographic variation in the physician work adjustment, but CMS should determine whether the seven proxies currently in use should be modified.

Geographic variations in the price of physician time can be measured in two ways: by directly measuring variation in physician income, or by using income data from proxy occupations as indicators of variations in physician income. In keeping with its principles about accuracy and independence of data sources, the committee prefers an independent source of data that reflects geographic variation in compensation levels for comparable professions rather than using physician compensation data that are affected by Medicare's payment adjustments.
Therefore, the continued use of proxy data for rate-setting to avoid the circularity of using physician income data is appropriate. However, in keeping with its principles of accuracy, consistency, and transparency of data sources, the committee recommends that CMS empirically re-evaluate the accuracy of the 7 proxies it currently employs using the most current BLS OES data. The statistical process for this assessment is described in detail in Appendix I.

The committee recognizes that this empirical approach is conceptually challenging because there is no obvious "gold standard" against which the proxy-based estimates can be judged. Although the committee does not favor basing the geographic adjuster on actual physician incomes in each area, it would be useful to assess the extent to which the proxy-based estimates are related to variation in physician compensation among geographic areas on a national basis. This process would validate their status as proxies. If the proxy data were not found to have predictive value for physician compensation, CMS might compare the predictive value of physician salary data from several different sources, such as MGMA and ACS. A proposed methodology

for such a re-evaluation using statistical modeling is discussed in the section on the physician work adjustment and is described in Recommendation 5-3 and Appendix I.

Recommendation 5-3: CMS should consider an alternative method for setting the percentage of the work adjustment based on a systematic empirical process.

The committee recommends that the work adjustment should be based on a systematic empirical process that generates new evidence to predict the extent of differences in compensation across geographic areas. There is clearly a policy precedent for the current one-quarter adjustment, given that the GPCIs have been updated six times since the physician fee schedule was implemented, and the "quarter work" adjustment has been in place by law throughout all of the updates. Many will view that precedent as adequate justification for continuing the same approach.

The committee members did not think there is an adequate conceptual justification for choosing that level of adjustment. However, based on the available empirical evidence, the committee found inadequate grounds to determine a more appropriate level for the adjustment. The committee therefore advises CMS to test various statistical models using multiple regression, a versatile technique that allows testing and modeling of multiple independent or explanatory variables to predict a dependent or outcome variable (see Appendix I for more detail). Once the necessary data are assembled, CMS has reviewed the data to ensure they are credible, and the model is estimated, CMS would determine the empirically-derived percentage for the work adjustment by using the model that provides maximum explanatory power.

Several alternative data sets could be used for the modeling, each with different strengths, weaknesses, and predictive power. At a minimum, the wage index data used in the modeling would have to be adjusted to control for specialty mix, RVUs, and residency training status to ensure that the variability in wages attributable to these non-geographical factors would not affect the geographic adjuster based on the models.

While the committee strongly supports an empirical approach to determining the work adjustment, it also acknowledges that it is impossible to determine in advance how much predictive power the most appropriate statistical model may attain. If the correlations between the proxy occupation wages and the physician wages were found to be low or not statistically significant, for example, that might indicate that the factors determining physician wages are too distinctive to be adequately captured by this methodology. The committee has considered the possibility that geographical variations in the market for physician services or in amenities (including professional amenities) valued by physicians might not parallel the corresponding variations for other professionals. If that were found to be the case, CMS would need to re-evaluate the use of the current proxies, as indicated in Recommendation 5-2. For purposes of modeling (but not rate-setting), CMS might also compare the predictive power of different sources of provider-generated data, such as physician salary data from MGMA surveys and ACS data, when they become available.

Recommendation 5-4: The practice expense GPCI should be constructed with the full range of occupations employed in physicians' offices, each with a fixed national weight based on the hours of each occupation employed in physicians' offices nationwide.

The committee finds that independent, health-care specific data from BLS provide the most conceptually appropriate measure of differences in wages for health professional labor and clinical and administrative office staff. Although acknowledging that there are some regional differences in occupational mix of employees in the limited data available, the committee prefers a consistent set of national weights applied to wage data from the full range of health sector occupations so that hourly wage comparisons can be made. The exceptions are those health professionals who bill independently under Medicare Part B, whose compensation should be captured through the work geographic practice cost index.

The expanded set of occupations will be a better reflection of the current workforce and a broader range of health professions, which will help to improve accuracy of the adjustment. In addition, the expansion will anticipate future changes in the workforce brought by changes in the labor market, including the increasing demand for expertise in the adoption and use of health information technology. Further study of the mix of occupations by specialties will be valuable to determine whether geographic differences in approaches to clinical service integration and care teams should be addressed in future assessments of the geographic adjustment factors.

Recommendation 5-5: The Centers for Medicare and Medicaid Services and the Bureau of Labor Statistics should develop a data use agreement allowing the Bureau of Labor Statistics to analyze confidential BLS data for the Centers for Medicare and Medicaid Services.

The committee recommends that the data source for office staff wages should be all health sector employers' wages and benefits data from the Bureau of Labor Statistics. Comparable to the analyses and recommendations about the HWI, the committee concluded that independent data that reflect market prices faced by providers are more appropriate than provider data on costs paid, because actual costs also reflect business decisions that are not necessarily an accurate reflection of input prices. Further, the committee concluded that independent data on health sector wages would be a closer proxy to physicians' office staff wages than all-industry data from BLS.

The committee recognizes that there is a need to increase coverage in areas where current data are not made available in public data files by BLS because of the need to protect confidentiality. Some areas have a very small number of providers and increased sampling to improve accuracy may not be possible. A data use or other formal agreement between CMS and BLS would allow additional analyses to be conducted in the interest of improving transparency. Using all occupations instead of a

limited number would be new, but BLS could compute an index that includes all data, including those data that are suppressed due to confidentiality.

Recommendation 5-6: A new source of data should be developed to determine the variation in the price of commercial office rent per square foot.

The committee reviewed several available sources of data to determine whether an accurate alternative is available to replace the U.S. Department of Housing and Urban Development residential data that are currently used in the practice expense geographic practice cost index. These included rental data from the American Housing Survey (Census and HUD), the General Services Administration (GSA), The Basic Allowance for Housing (DOD), the United States Postal Service (USPS), the MGMA Physician Cost Survey, and REIS, Inc.

Each of these sources yielded a substantially different index, which indicates that they may not be representative of the market in which physicians rent space. They also collected and reported data differently (e.g., monthly rent v. price per square foot), which made comparisons difficult. Based on the limitations associated with each data source, such as low response rates, small sample sizes, and sample bias, the committee concluded that all of these sources would be imperfect or geographically incomplete proxies for variation in physician office rental costs. Because the committee also concluded that the cost of space is not adequately measured with residential data, the committee recommends the development of a new data source.

Recommendation 5-7: Nonclinical labor-related expenses currently included under PE office expenses should be geographically adjusted as part of the wage component of the PE.

The update for the physician payment rule proposed for comment in July 2011 included setting several labor-related expenses to a national index. These included occupations in the "All Other, Labor-Related" category (e.g., security guard and janitor) and the "Other Professional Expenses" category (e.g. accountants and attorneys). CMS proposed to create a new category for contracted/outsourced services for these labor categories and to create a new purchased services index. Including professional and other labor expenses in labor categories would promote consistency between labor-related hospital and physician payment adjustments, and would also take into account geographic variations in wages for the services reflected in BLS data.

CONCLUSION

The committee recommends a shift to one set of payment areas for both indexes, using one source of wage and benefits data for both indexes, finding a new source of commercial rent data, and including a more inclusive range of occupations in computing both indexes, and geographically adjusting certain additional non-clinical labor-related expenses. The committee also recommends a new method for setting the physician work adjustment based on a systematic empirical process that generates new evidence to confirm differences in compensation across geographic areas.

Taken together, these recommendations will mean a significant change in the way that the indexes are calculated and will require a combination of legislative, rule-making, and administrative actions as well as a period of public comment. If the use of new data sources changes the total payments, CMS will need to re-calibrate the payments to maintain budget neutrality.

Any such transition should be managed strategically by phasing it in over time and communicating clearly with stakeholders at every step along the way. However, the advantages of long-term administrative simplification, reduced administrative burden, and improved consistency within the Medicare program outweigh the short-term disadvantages of moving forward with a change.

1

Introduction and Overview

The Medicare system adjusts fee-for-service payment rates for hospitals and practitioners[1] according to the geographic location in which providers practice, recognizing that certain costs beyond the providers' control vary between metropolitan and nonmetropolitan areas and also differ by region. The fundamental rationale for geographic adjustment is to create a payment structure that adjusts payments for the input price differences, such as employee compensation, that providers face when they provide care.

Although Medicare is a national program, policy makers and researchers working to develop and implement its payment systems have long recognized that health care delivery is local, and that payment amounts must be adjusted to reflect input price differences across geographic areas of the United States. The two geographic adjustments applied to Medicare payments for care provided by hospitals and practitioners are the hospital wage index (HWI) and three geographic practice cost indexes (GPCIs). In broad terms, an index compares differences in price or quantity for a group of goods and services relative to an average value derived from a standard baseline geographic area or time period (see Box 1-1).

BOX 1-1
What Is an Index?

An index compares differences in price or quantity for a group of goods or services relative to an average value derived from a standard or baseline geographic area or time period. The data used to derive the index can come from a variety of sources, such as employer or consumer surveys, hospital reports related to staff salaries and benefits, and many others.

A price index is a statistic that is designed to compare how the price for a defined group of goods and services varies as a whole over time or between geographic areas compared with an average. This is distinct from a cost index, which measures variation in actual expenditures, such as wages and benefits.

[1] Unless otherwise specified, the term "practitioners" is used to describe both physicians and other eligible clinical providers that are permitted to furnish services and bill Medicare under the Physician Fee Schedule (see Box 4-2 in Chapter 4 for a detailed list) (CMS, 2009).

Geographic adjustments are intended to ensure that the Medicare program does not overpay hospitals and practitioners in certain areas and underpay in others as a result of geographic differences in prices for resources such as clinical and administrative staff salaries and benefits, office or hospital space (rent), malpractice insurance (premiums), and other resources that are part of the cost of providing care. As a result, Medicare's inpatient prospective payment system (IPPS), other institutional prospective payment systems (other PPS), and the Medicare Physician Fee Schedule (PFS, or fee schedule) all employ geographic adjustment factors (GAFs).

Although there is widespread agreement about the importance of varying payments to providers to reflect differences in input prices across areas, there is disagreement in the provider community and among policy makers about how to make the geographic adjustments most accurately. Critics of the existing geographic adjusters identify a number of questions and concerns. Among these are problems and inconsistencies with the definitions of payment areas and labor markets and the discreteness of the borders between them, concerns about the appropriateness of the source data for determining wages and other input prices prevailing in an area, questions about how and to what extent variations in the occupational mix used to provide care should be reflected in the hospital wage and physician practice expense adjustments, and the lack of transparency in the construction of indexes and the data used to compute them.

These and other concerns regarding the current system of geographic adjustments are conceptually complex, widely disputed, and often contentious – largely because of the magnitude of the payments distributed by use of the indexes and because of the lack of a definitive measure of accuracy. With a goal of improving this system, the U.S. Department of Health and Human Services (HHS) and the U.S. Congress sought advice from the Institute of Medicine (IOM) on how best to address concerns about the appropriateness of the data sources and the transparency of the methods used for making the geographic adjustments in payments to providers. The IOM was also asked to assess the impact of geographic adjustment on the workforce in metropolitan and nonmetropolitan areas, beneficiaries' access to care, and the ability of providers to provide high-value, high-quality care.

To assist with the analysis of data accuracy and methodological questions and to model the impact analysis, the IOM engaged RTI International to be consultants to the committee because of its extensive previous work on the HWI and the GPCIs.

GOAL OF THIS STUDY

The overall goal of this study is to provide recommendations that increase the likelihood that the geographic adjustments reflect reasonably accurate[2] measures of input price differences and are consistent with national policy goals of creating a payment system that rewards high-value and high-quality health care.

[2] Throughout this report, the term accuracy is used to refer to the degree of closeness of measurement to the true value of whatever is being measured.

This is the first of 2 reports to the Secretary of HHS and the U.S. Congress, which commissioned a 2-year IOM study to assess the accuracy of the adjustment factors and the methodology used to determine them, including an evaluation of the sources of data and the extent to which these sources reflect true price inputs for providers.

This first report focuses primarily on accuracy in measuring input prices for fee-for-service Medicare Part A and Part B payment systems. It includes a technical assessment of the data sources used for the HWI and the GPCIs, and for defining the payment areas used for each index, but does not include a review of the accuracy of payments to facilities other than short- term acute care hospitals, such as skilled nursing facilities (SNFs) or home health agencies (HHAs), due to time and resource constraints.[3] The details of the HWI are discussed in Chapter 3, and the GPCIs are addressed in detail in Chapter 5.

In its phase 2 report, scheduled to be released in the spring of 2012, the committee will evaluate the effects of the adjustment factors on such matters as the distribution of the health care workforce and the ability of providers to produce high-value, high-quality health care. The phase 2 report will consider such issues as policy adjustments that affect the level and distribution of the health care workforce in metropolitan and nonmetropolitan areas, and the effect of the adjustment factors on population health and quality of care, as well as additional considerations to promote geographic equity in Medicare payments and beneficiaries' access to high-quality care.

The statement of task for the study was developed by the IOM and the Centers for Medicare and Medicaid Services (CMS) on behalf of the Secretary of HHS (see Box 1-2). For reasons that are explained later in this chapter, the language in the statement of task is taken directly from Section 1157 of the U.S. House of Representatives health reform bill, The Affordable Health Care for America Act (House Resolution 3962) (see later section on congressional perspectives).

[3] The committee recognizes that the HWI needs further refinement in order to be an accurate adjustment for non-acute care facilities and addresses those refinements in the supporting language for Recommendation 3-4.

BOX 1-2
Statement of Task

An ad hoc committee will conduct a comprehensive empirical study on the accuracy of the geographic adjustment factors established under Sections 1848(e) and 1886(d)(3)(E) of Title XVIII of the Social Security Act and used to ensure that Medicare payment fees and rates reflect differences in input costs across geographic areas.

Specifically, the committee will

- Evaluate the accuracy of the adjustment factors;
- Evaluate the methodology used to determine the adjustment factors; and
- Evaluate the measures used for the adjustment factors for timeliness and frequency of revisions, for sources of data and the degree to which such data are representative of costs, and for operational costs of providers who participate in Medicare.

Within the context of the U.S. health care marketplace, the committee will also evaluate and consider:

- The effect of the adjustment factors on the level and distribution of the health care workforce and resources, including: recruitment and retention taking into account mobility between metropolitan and nonmetropolitan; ability of hospitals and other facilities to maintain an adequate and skilled workforce; and patient access to providers and needed medical technologies;
- The effect of adjustment factors on population health and quality of care; and
- The effect of the adjustment factors on the ability of providers to furnish efficient, high- value care.

A first report will address the issues surrounding the adjustment factors themselves, and then a second report that evaluates the possible effects of the adjustment factors will follow. The reports, containing findings and recommendations, will be submitted to the Secretary, HHS, and the Congress.

During the first meeting of the committee, CMS provided additional guidance and context to the committee by requesting an impact analysis to better understand the consequences of the committee's recommendations for various providers (see Box 1-3).

BOX 1-3
Public Statement by Jonathan Blum
on Behalf of the Centers for Medicare and Medicaid Services,
U.S. Department of Health and Human Services

CMS has made various proposals to revise the geographic adjusters, but stakeholder feedback indicates that many believe that there are flaws in data methodology, and that the adjuster arrangement is unfair. This committee should bring together an independent consensus report on geographic adjustment factors. CMS is willing to provide the committee with any technical assistance and data that might be useful for the study.

The goal of this study is to help influence and improve the CMS rule-making processes by making actionable recommendations. This goal and the timeline of this report were designed with CMS rule-making in mind. CMS and IOM have agreed on a schedule that would result in IOM producing a report in time for the rulemaking cycle for physician fee schedule rates on January 1, 2012. The IOM study timeline is fixed with the 2012 rule-making cycle.

While the IOM study is aimed to help improve CMS processes, CMS also has legislative limitations. If the IOM committee's recommendations go beyond the authority of CMS, then CMS will be limited in the recommendations that it can adopt. We want the IOM to make independent recommendations, but CMS looks forward to recommendations that can be implemented under its current legislative authorities.

When the committee develops its recommendations, we ask that you consider the long-term objective in the Affordable Care Act of creating a payment system that reflects value and efficiency of services and provides incentives to reward efficiency.

CMS requests that an impact analysis on the recommendations provided will be included to better understand the specific impacts the changes in the geographic adjustment factors will have on various healthcare providers. For CMS to consider rapid implementation of any recommendation, a thorough understanding of the impacts on all communities is necessary.

CMS has the responsibility to ensure that payments are accurate, provide incentives for physicians, and ensure access to care. The long-term goal is to create a payment system that promotes value of care, not volume of care. CMS understands that many have criticisms of the data and proxies we currently use to adjust payments. We seek concrete recommendations on alternative data sources if the IOM panel were to make any recommendations in this area. We need more general consensus on geographic Medicare adjustment factors.

Jonathan Blum, Director, Center for Medicare, CMS, September 16, 2010

GEOGRAPHIC ADJUSTMENTS TO MEDICARE PAYMENT

Medicare is the largest single payer of health care services in the United States, representing 30 percent − nearly one-third of total spending on hospital care and 20 percent of total spending on physician services (CMS, 2010f).[4] Medicare covers 47 million Americans, including 39 million individuals who are 65 years of age and older and 7 million nonelderly people with permanent disabilities or end-stage renal disease. More than one-third of Medicare beneficiaries have three or more chronic medical conditions and about half live at or below 200 percent of the federal poverty line, which in 2006 was an annual income of $19,600 for a single person and an annual income of $26,400 for a couple (CMS, 2006; HHS, 2006).

Medicare payments in 2010 are estimated to reach more than $500 billion (CMS, 2010f; CBO, 2010). Total Medicare spending, however, is not evenly distributed across the country. Although Medicare beneficiaries make up about 15 percent of the total population of the United States, their share of the population varies within each state (CMS, 2010b).

CMS adjusts Medicare fee-for-service payments to practitioners and hospitals according to the geographic location in which the provider practices, recognizing that some costs are beyond the providers' control. Medicare's IPPS, other institutional PPSs, and the Medicare PFS all employ GAFs (CMS, 2010c, 2010d).

Separate and distinct from the geographic adjustments, other payment adjustments are made to serve policy purposes such as helping to offset expenses for caring for uninsured patients, or to encourage practitioners to serve patients in medically underserved areas. Although such policy adjustments are not the primary focus of this report, the committee recognizes the critical importance of these payments and their contribution to the debate over equitable payments for Medicare services among policy makers and providers. These topics will be addressed as part of the committee's phase 2 report.

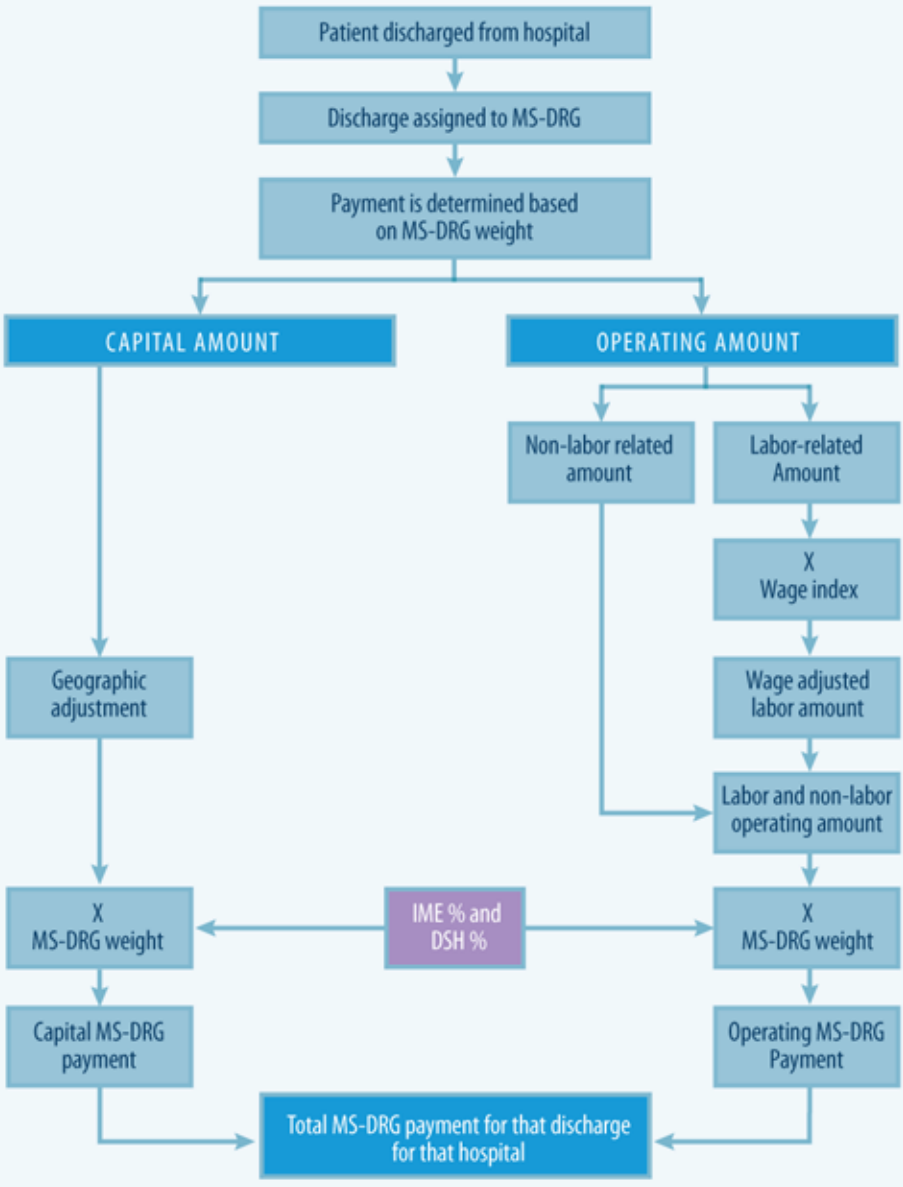
HOSPITAL WAGE INDEX

The IPPS pays hospitals a predetermined, fixed amount for each category of inpatient stay regardless of the actual costs incurred by providing that care. Figure 1-1 presents a diagram of the Medicare payment formula. Although the fixed payment amount is based on national average costs for patients in each Medicare Severity Diagnosis-Related Group (MS-DRG), Medicare's Part A hospital and other institutional payment systems also adjust the payment rates according to the HWI (CMS, 2010c). This index reflects how the average hourly hospital wages in a specified geographic area (a proxy for the local labor market) compare to average hourly hospital wages nationally.

[4] These figures reflect the proportion of national personal health expenditures on hospital and physician services that are paid for by Medicare.

FIGURE 1-1

How the Hospital Acute Inpatient Services Payment System Works



ABBREVIATIONS:

MS-DRG Medicare-severity Diagnosis Related Group
IME Indirect Medical Education
DSH Disproportionate Share Hospital

SOURCE: Adapted from CMS, 2010. Acute care hospital inpatient prospective payment system fact sheet. *Medicare Learning Network;* MedPAC, 2010. Payment basics: Hospital acute inpatient services payment system. Washington, DC: MedPAC; and Dalton et. al, 2001. Fact sheet: PPS inpatient payment and the area wage index. *North Carolina Rural Health Research and Policy Analysis Center.*

The wage index is intended to reflect geographic differences in the price, not the cost, of labor faced by each hospital within its labor market. The price of labor is indicated by the prevailing wage for a given occupation in each labor market, while the cost of labor reflects business decisions regarding employee compensation and occupational mix. The adjustment for differences in price, rather than costs actually incurred, helps to hold hospitals accountable for efficient use of labor.

The numerical value of the wage index for any given labor market is the ratio of the average hourly hospital wage in that area and the national average hourly hospital wage. The hourly wages used to construct the wage index include all salaries and benefits for acute care hospital staff, including contract staff for selected clinical and administrative positions.

To define the labor markets used in these computations, Medicare currently classifies hospitals according to their location in 1 of 365 metropolitan statistical areas (MSAs), with the balance of nonmetropolitan counties grouped into rest-of-state areas (non-MSAs), making a total of approximately 441 hospital labor markets (CMS, 2010d).

In general, hospitals in metropolitan areas tend to face higher wages than those in nonmetropolitan areas, resulting in a higher wage index and higher hospital payments. Conversely, hospitals in nonmetropolitan and rest-of-state areas tend to have lower wages relative to metropolitan areas in their regions, generating a lower wage index adjustment and lower payments. According to the Agency for Healthcare Research and Quality (AHRQ), almost half of nonmetropolitan hospitals' total inpatient stays are paid for by Medicare (Stranges, 2010),[5] yet many nonmetropolitan health providers and some policy experts believe their payments are disproportionately low compared with actual input price (wage) differences (Kitchell, 2010; Reding, 2010).[6]

Average hospital wages vary not only because hospitals pay different wages for similar personnel, but also because they employ different mixes of occupations. Although in some instances this may be a function of discretionary business choices, in others it may be a result of factors beyond the control of hospital employers. For example, a hospital is paid for more expensive labor if their patients require specialized care, due to particularly severe or complex conditions. This is accounted for by the MS-DRG adjustment to payment, as shown in Figure 1-1. There are also state statutes that govern nurse staffing ratios, shortages of various types of ancillary or allied health personnel in some areas, or prevailing community practices.

In general, hospitals in metropolitan areas tend to employ a more highly-trained and more expensive mix of employees than hospitals in nonmetropolitan areas. For example, many facilities located in MSAs report a higher proportion of registered nurses (RNs) relative to nursing aides and licensed practical nurses (LPNs) (see Table 3-5).

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[5] AHRQ used data from the Healthcare Cost Utilization Project 2007 nationwide inpatient sample, which includes more than 5,000 metropolitan and nonmetropolitan hospitals. Medicare paid for 35 percent of the stays in metropolitan hospitals.

[6] More than 1,000 nonmetropolitan hospitals designated Critical Access Hospitals are not paid under the IPPS discussed in this report, so the issues under discussion are not relevant to all hospitals in nonmetropolitan areas.

Because the HWI is intended to reflect differences in the price of labor but not in the labor mix, an "occupational mix adjustment" (OMA) is also made to each hospital's average wages before the index values are computed to factor out the effect of hospitals' own decisions about the mix of occupations (RNs, LPNs, nurse-aide and medical assistants) they hire before computing index values (CMS, 2010c). Other hospital personnel, such as administrative staff, are not included in the OMA (see Chapter 3).

Exceptions and Reclassifications

Under the current methodology, each hospital paid through the IPPS is assigned to a given payment area on the basis of its geographic location (see Chapter 2, Labor Markets and Payment Areas). As a result, there can be substantial differences in the hospital wage indexes among neighboring hospitals located in different payment areas that may compete in the same labor market.

Perceived inequities in the wage index, as well as other policy objectives, have led to a number of *ad hoc* legislative changes. For example, since the late 1980s, the U.S. Congress has created several exceptions to the methodology used to determine the locations of IPPS hospitals for payment purposes. These include provisions in the Balanced Budget Act of 1997 (P.L. 105-33) and the Medicare Modernization Act of 2003 (P. L. 108-173), that serve to minimize the differences in Medicare payments among neighboring hospitals that may compete in the same local market. More recently, in 2010 the U.S. Congress added a provision in the Patient Protection and Affordable Care Act (ACA) (P.L. 111-148) that established a HWI floor for hospitals located in a frontier state.[7]

By statute, a system of exceptions and reclassifications[8] allows hospitals that are paid under the main IPPS rules to request reclassification to a neighboring labor market if they meet certain criteria related to the level of their wages in their initial market and the neighboring market. No similar system for providing exceptions or reclassifications for other facilities paid under prospective payment systems exists, but they still use the HWI to adjust payments on a geographic basis.

Figure 1-2 shows the 2011 HWI for each hospital payment area, including the five frontier states identified in the ACA (P.L. 111-148). The ACA also established a permanent 1.0 floor for the practice expense GPCI for those states.

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[7] A frontier state is any state in which 50 percent of counties have a population per square mile of less than 6. Five states are currently frontier states: Montana, Nevada, North Dakota, South Dakota, and Wyoming.

[8] A hospital may apply to the Medicare Geographic Classification Review Board to request reclassification to another payment area (labor market) if it meets criteria related to proximity, if its hourly wages are above average for its market area, and if its wages are comparable to those in the requested area. (See MedPAC Payment Basics, Hospital Acute Inpatient Services Payment System, Footnote 4. http://www.medpac.gov/documents/MedPAC_Payment_Basics_07_hospital.pdf)

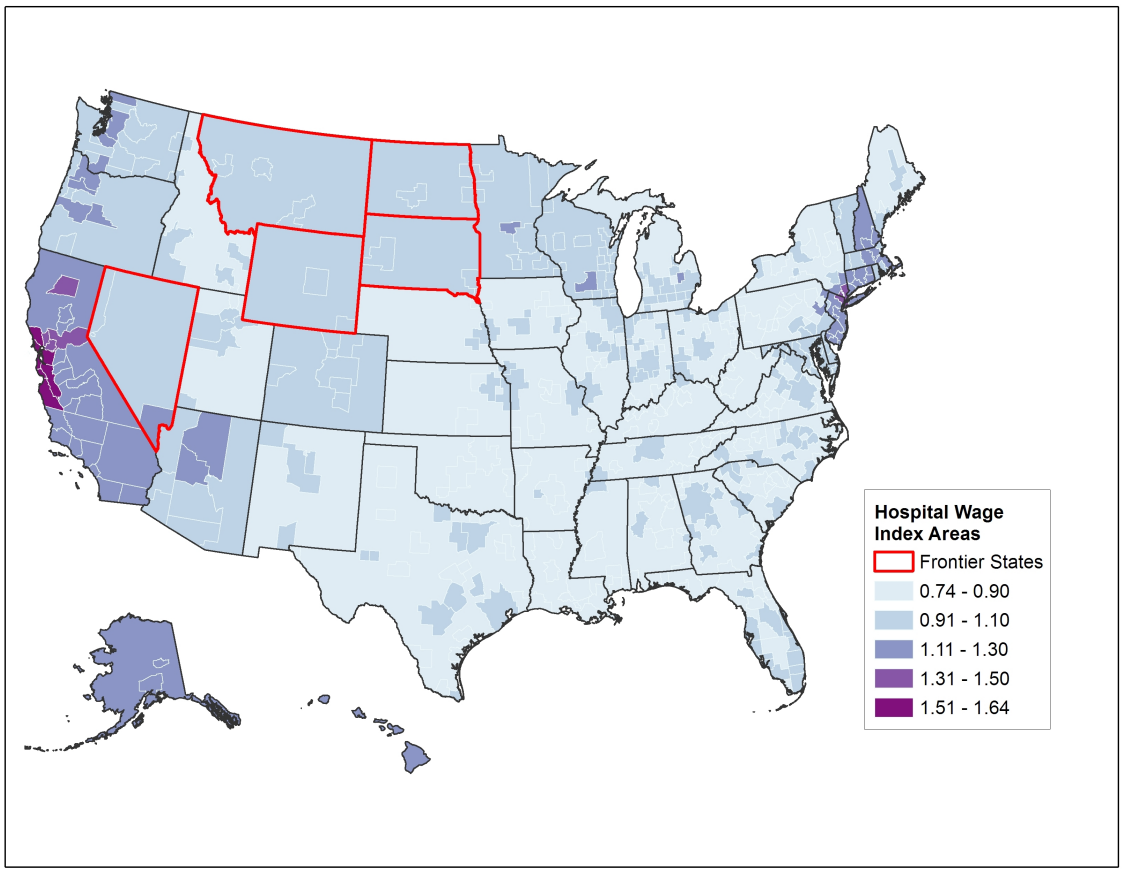


FIGURE 1-2 Hospital Wage Index by Wage Area, FY 2011.
SOURCE: CMS (2010c)

There are other HWI adjustments. In the Medicare Modernization Act of 2003 (MMA), the U.S. Congress created an "outmigration adjustment" to increase the wage index for hospitals located in counties where a significant percentage of hospital employees who reside in those counties commute to neighboring MSAs with higher wage indexes for work.

Because the MSAs serve as proxies for actual labor markets, they may not adequately or consistently define hospital labor markets. According to RTI analyses of CMS data for this study, almost 40 percent of all IPPS hospitals have been reclassified – that is, they are paid according to a wage index other than the one that applies to the geographic area in which they are located (see Figure 1-3). While reclassifications are conscientiously done, they nevertheless demonstrate that MSAs may not consistently or adequately reflect actual hospital labor markets (see Chapter 5, Smoothing).

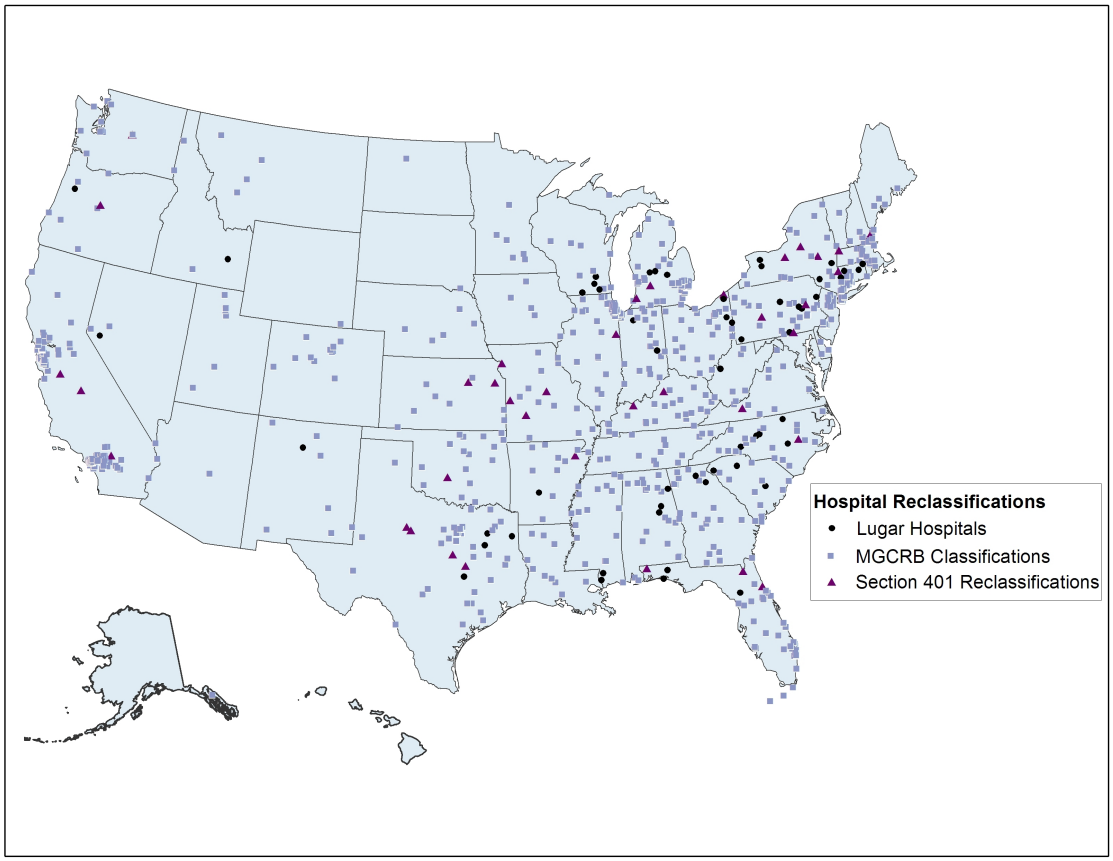


FIGURE 1-3 Reclassified IPPS hospitals, FY 2011
SOURCE: CMS (2010c)

NOTE: The total number of IPPS hospitals is 3,518.[9] Of those IPPS hospitals, 1,313 or 37 percent have qualified for reclassification or for an exception.

Medicare Geographic Classification Review Board (MGCRB) reclassifications apply to hospitals that requested reclassification to another payment area from the MGCRB and have met the board's criteria (773 hospitals, or 22 percent).

Lugar County reclassifications apply to hospitals in nonmetropolitan areas near metropolitan areas that are reimbursed at the same rates as nearby metropolitan hospitals (55 hospitals, or 2 percent).

Section 401 reclassified hospitals are those in metropolitan areas that are classified as nonmetropolitan, in order to qualify for sole community hospital status, Medicare dependent status or rural referral center status (37 hospitals, or 1 percent) (Hartstein, 2010).

An additional 14 percent of hospitals qualify for an exception such as an outmigration adjustment, a rural floor adjustment, or a frontier state adjustment.[10]

[9] This figure comes from the FY 2011 Final Rule Impact File, CMS.

Although the HWI is also used to adjust PPS payments to other health care settings,[11] no mechanism is currently available to allow SNFs or HHAs to request reclassification from the labor market in which they are located (CMS, 2011). The wage index for facilities other than short-term acute care hospitals is discussed briefly in Chapter 3, Hospital Wage Index.

GEOGRAPHIC PRACTICE COST INDEXES

Medicare Practitioner Payments

The concepts and methods of physician payment were enacted in the Omnibus Budget Reconciliation Act (OBRA) of 1989. Since 1992, Medicare has paid for physicians' services and those of other eligible Medicare practitioners/suppliers under Section 1848 of the Social Security Act, which requires that payments be based on national uniform relative value units (RVUs) that are based on the relative resources typically used in providing a service (CMS, 2010d).

The standard process for billing professional services under fee-for-service medicine is based on submission of a claim using one or more procedural codes. CMS uses Healthcare Common Procedure Coding System (HCPCS) codes based on the Current Procedural Terminology (CPT®) codes, whose nomenclature was developed by and whose intellectual property rights are held by the American Medical Association (AMA) (2010). Physician services include office visits, surgical procedures, and a broad range of other services provided in a variety of settings, including offices, hospitals, clinics, and post-acute care settings (MedPAC, 2008).

Medicare payments to physicians and certain other clinical practitioners, including nurse practitioners, physician assistants, and physical therapists are set by the PFS, a CMS payment system used to pay for more than 7,000 distinct services (CMS, 2010d; MedPAC, 2008). For most physician services, Medicare pays the provider 80 percent of the fee schedule amount and the Medicare beneficiary is responsible for the remaining 20 percent (MedPAC, 2008). The beneficiary's share is often paid by supplemental coverage such as a Medigap plan or Medicaid.

Depending on state scope of practice laws and with some restrictions in the Medicare statute and regulations, nurse practitioners, physician assistants, physical and occupational therapists, and certain other licensed clinicians can independently bill Medicare and are reimbursed at 85 percent of the physician rate (MedPAC, 2002). However, when clinical practitioners other than physicians provide a service identified

[10] The percentages do not add up to 37 percent because a hospital may qualify for more than one exception category.

[11] These include hospital outpatient services, ambulatory surgical centers, inpatient rehabilitation facilities, skilled nursing facilities, inpatient psychiatric facilities, long-term acute care hospitals, home health agencies, and hospice facilities (MedPAC, 2010).

as "incident to" or under the direct supervision of a physician (e.g., provide an injection), Medicare pays the fee schedule amount as if the physician had personally provided it, and the non-physician practitioner is not allowed to bill Medicare separately (CMS, 2009, 2010a; MedPAC, 2002).

The Medicare PFS adjusts payments according to geographic differences in the costs of operating a private medical practice. Although the PFS geographic adjustments are known collectively as the GAF, technically there are 3 independent adjusters called geographic practice cost indexes (GPCIs). GPCIs are used to help standardize the differences in resource costs incurred across geographic areas when those costs are compared with the national average costs for the physician work, practice expense, and malpractice insurance components of the fee schedule (CMS, 2010d). Specifically, the 3 adjustments are provided for the following:

- Physician work reflects the time, skill, effort, judgment, and stress associated with providing one service relative to other services according to the HCPCS codes. On average, as of 2011, work accounted for 52.5 percent of the geographic adjustment factor within the fee schedule (CMS, 2010d).
- Practice expense (PE) considers certain prices for maintaining a clinical practice, including salaries and benefits for administrative and clinical employees, rent, equipment, and supplies. Practice expenses associated with supplies and equipment are not adjusted geographically because they are purchased in a national market in which prices are similar across the country. On average, as of 2011, the PE GPCI accounted for 43.7 percent of the geographic adjustment (CMS, 2010d) (see Chapter 4, Geographic Practice Cost Indexes).
- Professional liability insurance (PLI) represents payment for professional liability (malpractice) expenses and on average accounts for 3.9 percent of the geographic adjustment (CMS, 2010d).

CMS will address the cost share weights again in the CY 2012 PFS Proposed Rule (CMS, 2010d).

To provide relative comparisons of the practitioner resources required to provide the service, each HCPCS code has an assigned work RVU with an associated payment amount. For example, an office visit for an upper respiratory infection is considered under the current system to be less resource-intensive than a cataract removal, or a colonoscopy.

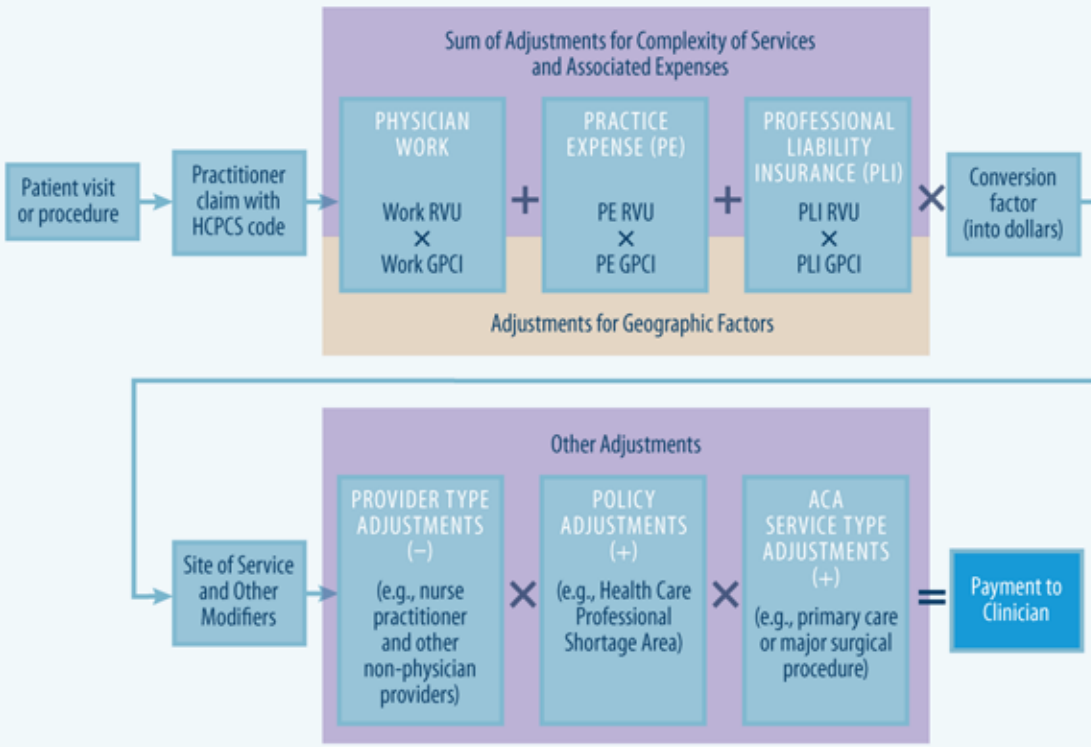
Each CPT® code also has an assigned practice expense RVU that is intended to reflect the relative differences in typical office or other practice-related costs. Some practice expense RVUs vary according to the "site of service" and adjust payments for services delivered in non-office settings, such as an outpatient clinic, hospital, or hospice (CMS, 2010d). A third RVU is assigned for malpractice. This RVU is adjusted according to the risk factors associated with various procedure codes and also for geographic differences in the price of PLI premiums (CMS, 2010d).

To pay for a service after it has been provided, each of the three RVUs for that service is adjusted for geographic differences in resource costs by use of the 3 GPCIs. Then, the sum of the adjusted RVUs for a particular code in a particular geographic area is multiplied by the conversion factor, which produces a Medicare fee for that HCPCS code in that area (see Figure 1-4).

FIGURE 1-4

How the Physician Payment System Works

(Medicare Part B)



ABBREVIATIONS:

ACA Affordable Care Act
GPCI geographic practice cost index
HCPCS healthcare common procedural coding system
PE practice expense
PLI professional liability insurance
RVU relative value unit

SOURCE: Adapted from MedPAC, 2010. Payment basics: Physician services payment system. Washington, DC: MedPAC.

Physician Payment Areas

The GPCIs geographically adjust physician fees across 89 geographic localities (see Figure 1-5). Some comprise large metropolitan areas, whereas 34 are statewide and combine metropolitan and nonmetropolitan areas. Practice costs may vary substantially within the payment areas, particularly for the statewide areas that are both metropolitan and nonmetropolitan. A congressionally requested Government Accountability Office (GAO) (2007) study found that more than half of the payment areas contained at least one county where there was a difference of 5 percent or more between the Medicare adjustment and the actual relative level of physician practice costs. This represented 14 percent of all counties nationwide.

As will be discussed in Chapter 4 (Geographic Practice Cost Indexes), the Medicare approach to geographic adjustment of physician payment has been subject to substantial criticism. Extensive public comments on the proposed revisions to the PFS rules in 2010 (CMS, 2010d) revealed a variety of concerns among stakeholders about approaches to geographic adjustment and perceived shortcomings of the current payment system, including whether physician work should be considered to be operating in a national market or whether there is sufficient evidence that the market value of physician work varies by region or by metropolitan or nonmetropolitan locations. Other public comments on the proposed rule related to whether the occupational mix used for practice expense adjustments is an accurate reflection of clinical or business considerations about how many and what type of clinical and support staff are employed in different geographic areas.

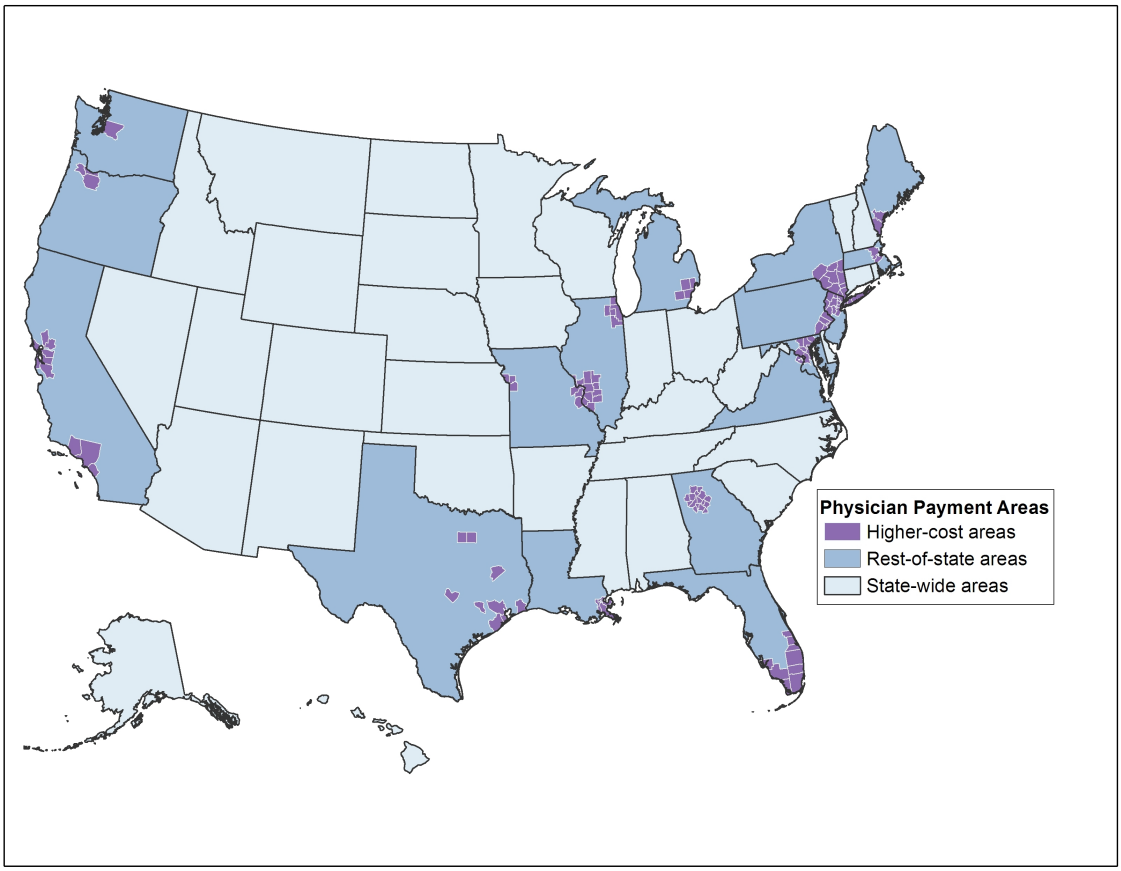


FIGURE 1-5 Physician Payment Areas, CY 2011
SOURCE: CMS CY 2011 Final Rules (November 2010)

The committee heard testimony from stakeholders who believe that only actual cost data from clinical practices should be used for the GPCIs, although a number also expressed concern about the burden on clinicians who develop these individual cost reports, but do not receive reimbursement for the extra administrative work (Kitchell, 2010). The committee also heard testimony from the American Academy for Family Physicians about the inaccuracy of the work adjustment because of flaws in the relative values that historically undervalue primary care services relative to the procedure-based services as part of the system for making these adjustments (Goertz, 2011).

These are only a few examples of the concerns about the accuracy of the geographic adjustments that stakeholders have expressed. Other examples and further discussion are included in Chapter 4, Geographic Practice Cost Indexes.

BUDGET NEUTRALITY AND PROVIDER IMPACT

From a policy perspective, adjustments for geographic variation in input prices can be viewed as an acknowledgment of geographic differences in the prices associated with doing business in various regions. By definition, a geographic index adjusts some values up and some down, but these indexes generally determine only the distribution

of payments across providers in different areas and not the total amount of payments in aggregate. This budget neutrality of geographic adjustments to Medicare payments is imposed by statute, with the exception of the outmigration adjustment to the HWI as stated in Section 505 of the Medicare Modernization Act of 2003.

From the provider perspective, the budget neutrality requirement forces a zero-sum situation in which any upward adjustment (such as one resulting from a reclassification) or any adjustment in payments for one area (such as an index floor) must be paid for by a downward adjustment to other providers or areas. The perception of a competitive advantage to providers in metropolitan versus nonmetropolitan areas or to one provider in a geographic area compared with others in the same area or neighboring areas is a source of considerable debate among providers, members of the U.S. Congress, and other policymakers.

A major source of disagreement between providers in metropolitan and nonmetropolitan areas is reflected in discussions about whether these geographic adjustments should also serve as a policy lever to help address perceived provider shortages, particularly in nonmetropolitan areas. These dynamics further complicate the ability to make changes in a contentious political environment with the distribution of hundreds of billions of dollars in annual Medicare payments at stake.

PAYMENT EQUITY CONCERNS AND RATIONALE FOR THIS STUDY

After months of congressional negotiations about how to transform the delivery of the nation's health care by improving health care access and quality, reforming payment systems, increasing efficiency, and slowing growth in health care expenditures, the U.S. House of Representatives passed a health care reform bill on November 7, 2009. The Affordable Health Care for America Act (House Resolution 3962) included consumer protections for preexisting medical conditions, a national health insurance exchange, a public option for expanding insurance coverage, workforce incentives to promote primary care, and other provisions.

In addition, Section 1157 of the House bill called for an IOM study to make recommendations for improving the accuracy of the adjustments made to physician and hospital payments to account for geographic variation in input prices, such as salaries and benefits for clinical and administrative staff. A wide array of provider groups had criticized the geographic adjustment factors for undervaluing the contributions of providers in low-cost areas, especially nonmetropolitan areas, as well as for not recognizing actual costs in the high-cost metropolitan areas. A different section of the House bill, Section 1159, called for a separate IOM study of geographic variation in health care spending that focused on Medicare spending per beneficiary and differences in utilization patterns across the country.

BOX 1-4
Statement from Representative Allyson Schwartz, D-Pennsylvania

"This study has its origins in a provision of the health care reform legislation that was not included in the final legislation: the public option. When the public option was under consideration in House Bill 3200, its rates were to be based on Medicare payment rates, and this linkage raised concerns from a number of Members, particularly those representing rural areas. The purpose of the geographic adjustment factors is to help ensure that Medicare's payment is accurate and appropriate in all areas. Congress and the administration are seeking your expertise and help in designing a methodology that best reflects this purpose, to raise or lower Medicare rates and fees depending on whether the local costs are above or below the national average."

September 16, 2010

On December 24, 2009, the U.S. Senate passed its version of the health care bill without the public health insurance option, and congressional leadership began amending the Senate bill through the reconciliation process. The Patient Protection and Affordable Care Act (ACA) was signed into law on March 23, 2010 and the compromise bill, the Health Care and Education Reconciliation Act (HCERA) of 2010 (P.L. 111-152) was signed into law on March 30, 2010, a week after the ACA.

Provisions for the two IOM studies (Sections 1157 and 1159) were not included in the final version of the ACA. As a condition of supporting the final bill, 30 House Democrats negotiated with HHS officials and White House staff to restore the IOM studies of geographic variation and address "geographic disparities" in Medicare payment. On March 20, 2010, HHS Secretary Kathleen Sebelius sent a letter to these members, who came to be known as the House Quality Care Coalition, with a commitment to commission the IOM to conduct the two geographic variation studies. The letter also committed HHS to convene a National Summit on Geographic Variation, Cost, Access, and Value in Health Care, which took place in Washington, DC in early October 2010 (Sebelius, 2010).

BOX 1-5
Statement from Representative Bruce Braley, D-Iowa

"One of the things we are trying to do with this study is to give you the incentive to look at the validity of some of the adjustments that are currently being made and determine whether there is better data that can more accurately reflect what is going on. We want you to look at the adjusters that are being used and try to decide whether they are accurate and if they need to be changed to reflect real world data, not just proxies. Unless these accuracy issues are addressed, there will be an impact on delivery and access to patient care in my district, and that is why this is so important to the people that I represent."

September 16, 2010

BOX 1-6
Senator Charles Grassley's (R-Iowa) Written Testimony to the Committee

"The existing inaccurate geographic adjustments by CMS result in unwarranted and unduly low rural reimbursement rates. More current, relevant, and accurate data sources exist and should be used by CMS to make geographic adjustments to Medicare payments, especially in the area of physician practice expense. The current geographic disparities in payment are not based on actual or reliable data, and they put rural Medicare beneficiaries at risk. I urge the committee to recommend that CMS use actual practice cost data rather than the current inaccurate proxies to ensure that Medicare payment reflects true geographic differences in physician practice costs."

January 5, 2011

Separate IOM consensus committees were appointed to conduct the two Medicare geographic variation studies. The work and charge for each committee are related, but the two studies are distinct and should not be confused. The present study, known as the 1157/1158 study on geographic adjustment in Medicare payment, reflects congressional concerns and hopes for remedial recommendations regarding the accuracy, methods, and workforce impacts of the geographic adjustment system for Medicare Part A and Part B payments as defined in the statement of task (see Box 1-2).

The other IOM study, the 1159/1160 study on Medicare geographic variation in health care spending, addresses congressional interest in lessons that might be learned through analyses of factors responsible for geographic variation in Medicare service cost and intensity, such as patient population demographics, patient preferences, insurance status, and physician discretion and practice patterns, among others. The statement of task for that report required recommendations for changes in Medicare Part A and Part B payments on the basis of these analyses and on the basis of an additional assessment of whether Medicare payment systems should provide incentives for high value care. The findings of the Dartmouth Atlas Project (Fisher,2003a, 2003b, 2009) have provided, in large part, the foundation for this congressional interest (Schwartz, 2010) and work to be undertaken as part of this very different and separate study.

PRINCIPLES AND ASSUMPTIONS

The committee began its deliberations by reviewing the statement of task and discussing its responsibilities in detail. Committee members made an early commitment to focus first on the committee's charge to study the accuracy of the geographic adjustment established under Sections 1848(e) and 1886 (d) (3) (E) of Title XVIII of the Social Security Act

To help guide its review and deliberations, the committee developed the following general principles.

1. ***Evidence for adjustment*. The continued use of geographic adjustment factors in Medicare payment is warranted to reflect geographic variations in input prices.**

Public testimony and written comments to this committee, along with extensive public comment to the Centers for Medicare and Medicaid Services on the proposed revisions to the PFS Rules in 2010, revealed clear differences of opinion about how the study should be conducted and what the committee should recommend. However, one area of agreement among stakeholders was the need to rebuild the system and to improve the accuracy of the data sources and methods used in making geographic adjustments. The committee began its deliberations by examining the extent of geographic variation in input prices faced by hospitals and practitioners.

Although the availability of sufficient representative data on practitioner compensation and practice expenses was particularly problematic and the data sources available for determining wages for the HWI had certain shortcomings, the committee agreed that the overall evidence and rationale for geographic adjustment were strong enough to warrant its continuation. To help improve the current system, the committee focused on ways to improve the data sources and methods used.

2. ***Accuracy.* Geographic adjustment for input price differences is intended to reflect the input prices faced by providers, not the costs incurred by providers.**

"Accuracy" of data sources can be defined as the degree of closeness of measurements to the true value of whatever is being measured. The committee recognizes that stakeholders have different perspectives about the accuracy of data sources, and it supports moving toward a more systematic process of geographic adjustment that more accurately reflects differences in input prices across labor markets. Although the committee recognizes that every currently available data source has certain deficiencies, the committee agrees that data sources can be improved by holding the data producers to standards of accountability and accuracy in sampling, analysis and reporting, and by making the data and data collection methods more transparent to users.

The committee heard testimony from hospital administrators and clinical practitioners who believe that hospital cost reports or actual practice expense data are both more understandable and more transparent to the provider community and a more accurate reflection of their actual business costs than the proxy data sources currently proposed or in use. However, the committee generally concluded that independent data that reflect market input prices faced by providers are conceptually more appropriate than data on costs paid by the providers, given that actual costs also

reflect local business decisions or requirements that do not necessarily reflect input prices across labor markets.

3. ***Local labor markets.*** **Geographic adjustment, where possible, should reflect area-wide input prices for labor faced by all employers operating in the same local market and should not be drawn exclusively from data on the prices paid by hospitals or health care practitioners.**

To improve accuracy and reflect market prices faced by providers, geographic adjustment should reflect the local labor markets in which providers operate and compete for employees. The committee recognized that such competition may exist between like entities (e.g., hospitals versus hospitals) and across different entities (e.g., hospitals versus ambulatory surgery centers). The committee concluded that broadening the employers whose employees would be included in calculating a wage index would be especially worthwhile in areas with few health care providers (e.g., single-hospital markets).

On balance, the committee agreed that labor market data should not be drawn exclusively from hospital and provider sources, yet it also recognized that some categories of personnel are employed primarily in health care settings (e.g., nurses). In addition, the committee was concerned that certain employees in health care and other employment settings may not be identical according to their training and scope of service.

In developing recommendations about data sources for the HWI and GPCIs, the committee members compared an independent source of wage data for all-industry, health care sector, and hospital-specific wages for several occupational categories and found a very high degree of correlation between health care sector wages and wages from the other two data sources. As a result, the committee found a strong conceptual rationale for using health sector data rather than industry-wide data to help improve accuracy in adjustments and to respond to concerns expressed by stakeholders.

4. ***Consistent criteria.*** **Consistent criteria should be used for determining the payment areas, data sources, and methods that are used in making the geographic adjustment for hospitals and practitioners.**

Currently, Medicare payment to hospitals is based on their location in 1 of 441 labor markets (365 MSAs and 76 statewide non-MSAs). In contrast, physician and other practitioner payments are adjusted across 89 payment areas, with 34 statewide areas having both metropolitan and nonmetropolitan areas and the remainder being centered on large metropolitan areas. The committee understands the history leading to these geographic designations, yet it found little compelling evidence that the actual labor markets for physicians and hospitals are different.

Because hospitals, physicians, and other practitioners in a given geographic area tend to function within the same local labor markets, the committee sees benefits to

using the same defined payment areas for both hospitals and practitioners. In view of market and policy trends toward increasing degrees of coordination and integration between hospital and ambulatory care, this appears to be both reasonable and timely.

5. ***Sound rationale.*** **Changes in the current system of geographic adjustment should be based on a clear and logical rationale.**

Throughout its deliberations, the committee sought to make internally consistent decisions that were logically valid, clearly supported by empirical evidence, and understandable to non-technical audiences. The HWI and the GPCIs have been subject to many changes since they were first introduced, yet they have traditionally been considered separately both in statute and in implementation. There have been many previous recommendations for improvements to both indexes over several years. The committee noted that a number of improvements could be made to both indexes through a similar strategy or data source.

6. ***Transparency.*** **The geographic adjustment process should provide sufficient information to allow transparency and empirical review of the data and methods used to make the adjustments.**

The committee worked to develop recommendations to improve the accuracy of the current data sources and methodologies and provide a clear explanation of its reasoning for recommending selected data sources and methodologies to improve accuracy. Whenever possible, the committee sought to simplify the methodologies used for geographic adjustment, to use clear language to explain complex technical formulas and concepts, and to promote a reasonable and objective selection of data sources that maximize accuracy.

7. ***Policy adjustments*****. Medicare payment adjustments related to national policy goals should only be made through a separate and distinct adjustment mechanism, and not through geographic adjustment.**

Medicare provider payments should be adjusted on the basis of the services that they provide and the prices that they face. The committee responded to its charge for this report by focusing first on the accuracy of payments based on the market conditions and input prices that providers face in fee-for-service settings.

The statement of task also asks the committee to consider the impact on stakeholders of any recommendations to change the current system of geographic adjustment. The committee heard testimony from practitioners and policy makers who view geographic adjustments in fee-for-service Medicare payment as a way to help address provider shortages and achieve other policy goals. Throughout their deliberations, committee members also recognized that even the most accurate geographic adjustment factors will not resolve all problems associated with the fee-for-

service payment system as they relate to issues such as access to care, provider shortages, and provider mix. The committee recognizes the importance of these issues and will examine policy adjustments and their impact on stakeholders further in its phase 2 report.

RESEARCH FRAMEWORK FOR THE STUDY

After evaluating its charge, the committee developed an empirical framework with a series of research questions to help guide its work and decision-making. Understanding that its recommendations must be objective, well-supported by empirical evidence, and understandable to stakeholders, the committee undertook a systematic review of current and alternative methods of adjusting for geographic price differences, and using alternative data sources to make the adjustments. The process included:

- Reviewing the existing data sources and methods used to calculate the HWI and the GPCIs, as well as considering recommendations in previous studies that have proposed changes in data sources or methods;
- Examining the conceptual foundation for the geographic areas used in the HWI and GPCI adjustment process;
- Considering previous recommendations about the accuracy of alternative data sources through a series of statistical comparisons of those data with the data currently being used;
- Assessing the nature and extent of geographic variation in the prices for each input;
- Conducting a series of simulations to determine the impact on stakeholders of using different data sources and methods for computing the indexes;
- Evaluating the cost shares for both indexes; and
- Choosing the most appropriate and best available data source and method for each input and each index.

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2

Labor Markets and Payment Areas

Physicians and hospitals play a critical role in society, ensuring the health of the population and caring for individuals when they are the most vulnerable. At the same time that physicians and hospitals contribute to social welfare, they are also businesses that must tend to the bottom line. Whether their tax status is for profit or not-for-profit, they operate within markets not only to sell health care services but also to buy the goods and services needed in the production of health care.

The goods and services that physicians and hospitals purchase are known to economists as production inputs or production factors. The prices of some of these inputs vary geographically; the Medicare program recognizes and reflects this variation in differential payment to physicians and hospitals, which is partially adjusted by geography. The first issue in geographic adjustment is how to conceptualize and operationalize the definition of geographic areas to most accurately reflect input price differences. Labor constitutes the primary input for which the Centers for Medicare and Medicaid Services (CMS) adjust payment on the basis of geography. Because of this, the committee considers local labor markets to be the conceptual and empirical foundation of geographic adjustment.

This chapter provides a brief overview of labor markets: what they are and how they work. It then explains the committee's findings on how well existing payment areas perform in differentiating providers on the basis of prevailing wages. Finally, the chapter lays out alternative market designations that the committee considered and explains the committee's recommendation for using metropolitan statistical areas (MSAs) and statewide non-MSAs as the basis for labor markets for both physicians and hospitals.

FACTORS OF PRODUCTION

Labor, land, and capital are the major factors of production (Mankiw, 2008). For health care providers, labor includes nurses, radiologic technicians, secretaries, janitors, and individuals in dozens of other occupations. Land refers to office rents and to the opportunity costs - that is, the value derived from putting the land to other uses - of the acres on which hospitals are built. Capital consists of the vast array of equipment in use at both hospitals and physician practices. Labor is the most important input both in the overall economy and for doctors and hospitals. Labor comprises 68.8 percent of the total cost of inputs that hospitals use to produce health care (CMS, 2010a) and 71.2 percent of the cost of physician inputs (CMS, 2010b).[1]

[1] For hospitals with a wage index less than the national average, the labor-related share of input costs is set at 62 percent. For physicians, 18.7 percent of total input costs are office labor and 52.5percent physician labor.

The costs of some inputs used in the production of health care vary geographically, whereas others do not. The price of the medical equipment that hospitals and physicians use is generally the same across all areas, and CMS does not adjust hospital or physician payment for any geographic differences in equipment costs (CMS, 2010c). For example, it costs a hospital in Des Moines, IA, about the same amount to purchase a computed tomography (CT) scanner as it does for a hospital in San Diego, CA, and it costs a physician in Boise, ID, about the same amount to purchase a blood pressure monitor as it costs a doctor in New York City.

Prices for land and labor do vary from place to place, however. Per square foot, the cost of land in Boston, MA, is greater than the cost of the same type of land in Charlotte, NC. Rent reflects the price of land, as well as the cost of construction. Rent per square foot of commercial space – the type of space that a physician practice might use – costs $28.72 in Boston and $17.60 in Charlotte (REIS unpublished data, 2010). Wages represent the price of labor. Per hour, the wage of a registered nurse (RN) in San Francisco is greater than the wage of an RN in Springfield, MO – $48 in San Francisco, CA, and $25 in Springfield (RTI unpublished analysis of BLS data released in May, 2010). CMS adjusts payments to both hospitals and physicians for geographic differences in the price of labor and it adjusts physician payment for differences in office rent. CMS also adjusts hospital payment for capital expenditures and depreciation, using the hospital wage index (HWI).

Because labor accounts for the majority of input costs for both hospitals and physicians, the committee uses the price of labor to define geographic boundaries for input markets. Moreover, because hospitals and physicians use the same types of labor inputs drawn from all employers in a similar geographic area, the committee proposes the use of one labor market definition for both sets of providers. The physical boundaries of these markets define the extent of geographic variations in input prices so that the same adjustment can be made to the payment made to all hospitals and physicians within the market boundaries (see Box 2-1 for an explanation of how the geographic adjustments work). Thus, payment areas should group together those providers facing comparable labor prices.

BOX 2-1
How Do the Geographic Adjustment Factors Work?

For Hospitals: For each payment area, the Centers for Medicare and Medicaid Services (CMS) collects wage data from the hospitals in the market to develop the hospital wage index (HWI). The index is a ratio centered on the value of 1 that compares average wages in each labor market with average national wages. The index is applied to a national standardized payment rate that is case-mix adjusted for each type of patient. For hospitals located in labor markets with low index values, payments are reduced; for hospitals in labor markets with high index values, payments are increased. See Chapter 3 for a full discussion of how the HWI is constructed and applied to Medicare payments.

For Physicians and Other Practitioners: Three indexes are used to adjust practitioner payments for geographic differences. These indexes are known collectively as the geographic adjustment factor (GAF), a weighted average of the geographic practice cost indexes, or GPCIs. The practice expense GPCI adjusts for price differences in physician office labor and rent; the work GPCI adjusts for geographic differences in the value of physician labor; and the malpractice GPCI adjusts for geographic differences malpractice insurance premiums. Each index works in a similar fashion to the HWI. That is, data are collected from each physician payment area, and a ratio of area costs to national costs is applied to physician payment. See Chapter 4 for more details on the GAF.

SOURCE: CMS (2010a, 2010b)

When geographic adjustments to payment are considered, an important question arises: how should Medicare recognize variations in the dollar value of inputs? Should Medicare adjust provider payments for the input costs that providers actually incur, or for the prevailing market price of inputs? When Medicare began in 1966, hospitals were reimbursed on the basis of their costs after they were incurred (retrospective cost reimbursement). In 1983, the program began a move to prospective payment. Hospitals were paid a set amount for similarly sick patients; no longer was payment tied to actual hospital costs. The goal was to hold down costs by encouraging hospitals to operate more efficiently (Mayes, 2006).

Subsequently, CMS has explained in the rules governing hospital payment (the Inpatient Prospective Payment System [IPPS]) that geographic adjustment is meant to reflect differences in input prices (CMS, 2010a). If CMS or the U.S. Congress meant geographic adjustment to reflect cost variation rather than input price variation, each hospital could be assigned its own wage index reflecting its own costs and there would have been no need to group hospitals geographically by labor market. Given this context, the precedent of prospective payment, competitive forces in the health care market for non-Medicare patients, and pressures on public budgets, the committee has concluded that Medicare payments should adjust for geographic variation in market *prices* of inputs and not for variation in expenditures on inputs by individual hospitals and physicians. Several important implications follow from this conclusion.

The implication for operationalizing payment areas is that providers facing similar labor input prices should be grouped together within labor markets and receive the same adjustment, based on the prevailing wages in those markets. There is also an implication for determining which industries' wage data should be used to calculate the wage index. Currently, the HWI is calculated from wages actually paid by hospitals, as stated on the cost reports that hospitals submit to CMS each year. However, using a *price* index requires that wage data come from all industries in which hospitals and physicians compete for workers.

Finally, there is an implication for the types of occupations and the quantity of each occupation to be included in the indexes. This is known as occupational mix. A labor cost index reflects variation in the wages associated with any occupational mix selected by hospitals or physicians. For example, a hospital that chooses to hire all registered nurses (RNs) and no licensed practical nurses (LPNs) would be paid for the higher wages of RNs. In contrast, a price index for wages typically reflects variation in the wages associated with a fixed quantity of personnel in each occupation, such as the national average quantity. If the average hospital uses 75 percent RNs and 25 percent LPNs, the hospital mentioned above would be reimbursed only for variation in the wage costs associated with a 75 percent/25 percent mix[2] (this issue is discussed in more detail in Chapter 3).

THE MARKET FOR LABOR

In general, a market is a group of buyers and sellers who make transactions for a particular good or service. A market can be global, as in the case of internet transactions, or located in a physical place, as in the case of a shopping mall. A labor market is a type of market in which workers compete for a common set of jobs and employers compete for a common set of workers. Labor markets can be defined across many dimensions, such as occupation, industry, geography, and sector. In the case of hospitals and physician offices, where nurses, doctors, medical technicians, food service workers, janitors, and other types of employees come together in a physical location to provide personal health care services, it makes sense to define the labor market geographically.

The 2 major actors in any labor market are workers, who supply labor, and employers, who demand it. Upon entering a labor market, workers face many decisions, such as how much of their time to spend in activities other than work, what skills to acquire, which occupations to enter, and how much effort to apply to a job (Borjas, 2010). Workers make decisions that maximize their individual well-being; thus, each seeks a job with an optimal combination of wages, workplace amenities (such as health insurance benefits, pension generosity, onsite child care, workplace safety) and locality amenities (such as weather, recreational amenities, and leisure and cultural opportunities). These worker decisions are reflected in the labor supply.

[2] Some states have laws that dictate specific nurse-to-patient ratios and limit the scope of practice of less skilled and lower paid nurses. This may result in hospital costs that are not fully captured by the wage index, even though they are beyond a hospital's control. As a federal program, Medicare's responsibility is to purchase quality services efficiently. A price index should not accommodate state and local decisions such as staffing ratios and scope of practice laws. To do so would give states an incentive to mandate specific input quantities because the costs would be reimbursed by the federal government.

Employers also face choices and make decisions, such as which workers to hire, what wages to offer, what occupations and skill levels to employ, and how to structure a work environment. These decisions by employers reflect labor demand. Employers also seek to maximize well-being, either through the maximization of profits, or, in the case of non-profit employers, through cost minimization and achievement of mission-oriented goals. Workers and firms enter the labor market with conflicting interests. With all else being equal, workers are willing to supply more of their services when wages are high. Firms want to hire more labor when wages are low. Workers and firms effectively bid compensation up and down until a level acceptable to both parties is achieved (Borjas, 2010).

HOW AND WHY DO HEALTH CARE WAGES DIFFER GEOGRAPHICALLY?

Geographic differences in hourly wages for workers in the same occupation can be traced to a number of factors. These include differences in productivity, ability, and experience; unionization; race and gender; the cost of living; and amenities in an area (Borjas, 2010; Ehrenberg and Smith, 1988; Moretti, 2010). Geographic differences in hourly wages, controlling for worker characteristics, have increased over time (Moretti, 2010).

A major factor driving geographic differences in wages is the cost of housing. Expenditures on housing accounted for 41 percent of income in the year 2000. Indeed, across metropolitan areas, although there is a 41 percent difference in the nominal wages of college graduates between the 10th and 90th percentiles of the cross-metropolitan average wage distribution, this difference shrinks to 22 percent when nominal wages are deflated by a local consumer price index that reflects geographic differences in housing costs (Moretti, 2010). More generally, in an econometric analysis of the relationship between nominal wages and the cost of housing, Moretti finds further evidence that housing costs are responsible for a significant portion of geographic wage differentials for all groups of workers.

In addition to housing and the other wage determinants described above, the amenities available in a particular area may influence wages. This concept is derived from the theory of compensating wage differentials (Black, unpublished presentation to IOM Geographic Adjustment Committee, 2010; Rosen, 1986). Area amenities include good schools, sports and recreation opportunities, and theaters and museums. These amenities compensate for the high cost of living in certain areas; without such amenities, wages would need to increase to achieve equilibrium in the local labor market, holding the cost of living constant. For example, wages do not fully compensate a nurse for the cost of living in Boston. He or she is also "paid" by access to the availability of the Boston Red Sox and the Boston Symphony Orchestra. Similar to area amenities, job amenities, such as health insurance, workout rooms, and onsite child care, may compensate for a portion of wages, offsetting differences. The reverse also applies: jobs in remote areas, such as northern Alaska, pay higher wages to compensate for the remoteness and the cold temperatures in winter, and dangerous or dirty jobs pay more to compensate for risk and discomfort.

DEFINING MARKETS

Having demonstrated how and why wages differ geographically, the discussion now turns to defining labor markets that group together those employers competing for the same workers. It is acknowledged that it is impossible to define physical boundaries with complete accuracy, and steps to address this problem are addressed in Chapter 5, Geographic Practice Cost Index. The purpose of the following discussion is to understand the concept of delineating the best practicable approximation of labor market boundaries.

If markets are defined too broadly, boundaries will include hospitals and physician practices that do not compete against each other for labor and, therefore, pay different wages for the same types of workers. When boundaries are defined too broadly, hospitals and physician practices are assigned to the same labor market for the purposes of making wage adjustments, although in reality they face different wage rates for the same types of labor. A large, overly broad labor market definition will fail to identify differences in the prevailing wages faced by hospitals and physician practices, and it will contain providers with true wage indexes that vary widely.

In contrast, markets that are drawn too narrowly will separate providers that do compete for the same workers and pay the same wages for a given occupation. In this case, providers in different labor markets may actually face the same market wages. Variation of geographic index values across markets will be indistinguishable from variation of indexes within markets. Many pairs of hospitals are located near each other but are separated by a labor market boundary defined by CMS. These hospitals sometimes have significantly different wage indexes because they are classified in separate labor markets. These differentials have become known colloquially in the health care financing literature as “wage cliffs”. Recent reports on these differentials have labeled differences of 5 to 10 percent to be small and differences of 10 percent or more to be large (Dalton, 2007; MaCurdy, 2010; MedPAC, 2007).

An example of a wage cliff is found in upstate New York. Northern Dutchess Hospital in Rhinebeck, NY, and Kingston Hospital, in Kingston, NY, are four miles apart, and although their close geographic proximity should mean that they compete against each other for labor, they have different wage indexes because they are classified as operating in different labor markets. The index for Northern Dutchess Hospital is 1.14, whereas the index for Kingston Hospital is 0.91.[3]

Of course, any set of administrative market boundaries, especially boundaries set according to a national formula, will be imperfect. To the extent that they are observable and definable, true labor market boundaries are both irregular and fluid. As compensation levels change, so will theoretical market boundaries. Moreover, at some wage levels, workers can be enticed to commute across market 'boundaries' to work at hospitals in other labor markets. Such decisions will change as personal preferences change, for example, the desire to spend more time with children, and as the cost of commuting changes because of technology and infrastructure development. For these reasons, the committee views drawing labor market boundaries as an exercise in approximation.

[3] These wage indexes are computed on the basis of FY 2011 HWI data (downloaded from the CMS web site) before reclassification and other adjustments and are normalized to account for the index data and construction.

A related dimension of market definition has to do with the industries from which wage data are drawn to construct geographic adjustment indexes. In principle, to accurately reflect the prevailing wages faced by hospitals and physicians in a given area, the wage data used to create the adjusters should come from all employers that compete for the types of labor used in hospitals and physician practices. Given that hospitals and physicians employ a broad spectrum of workers – from food service workers to accountants – all industries contribute information to the prevailing wages faced by hospitals and physicians.

EXISTING PAYMENT AREAS

Hospital Payment Areas

The labor markets[4] used for the current HWI come from the set of statistical areas designed by the president's Office of Management and Budget (OMB) for the purpose of collecting federal statistics. Other agencies and organizations commonly use these statistical areas for economic purposes because they reflect the economic integration of a set of geographic areas. OMB statistical areas include MSAs and micropolitan statistical areas (MicroSAs) (see Figure 2-1). Each is a collection of one or more central metropolitan areas connected to outlying counties based on commuting for employment between the central area and outer counties.

[4] Throughout the chapter, the terms 'labor market' and 'payment area' may be used interchangeably.

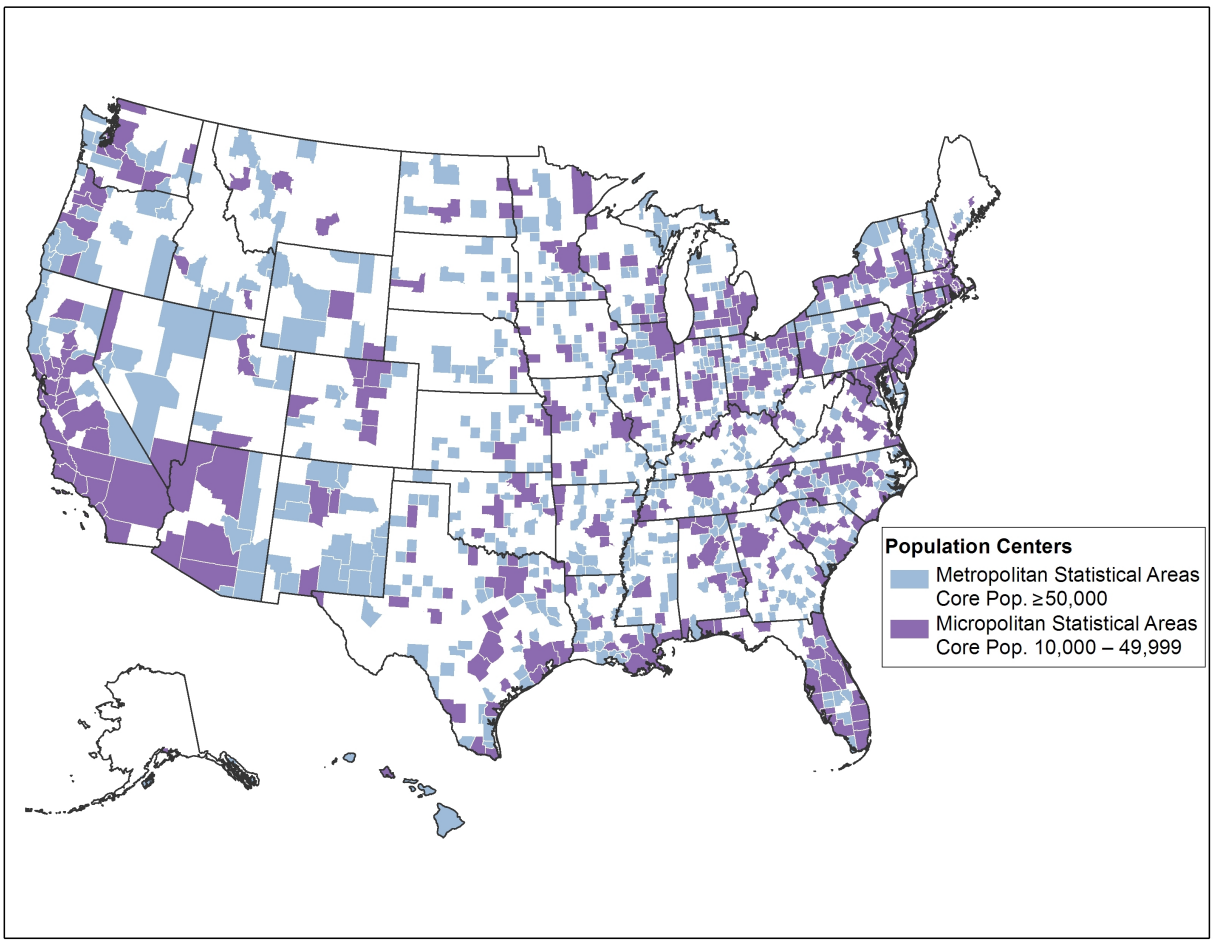

FIGURE 2-1 Metropolitan and Micropolitan Statistical Areas. Metropolitan Statistical Areas (indicated by dark yellow) and non-metropolitan statewide areas (indicated by light yellow and white, within state boundaries) comprise the 441 HWI payment areas.
SOURCE: RTI Analysis of county data provided by the US Census Bureau and available at www.census.gov/population/www/metroareas/files/

To construct payment areas for hospitals, CMS divides the country geographically into MSAs and statewide non-MSAs.[5] CMS includes microSAs as part of statewide non-MSA payment areas. Each of the payment areas is assigned a wage index value. There are currently 441 wage index payment areas −392 MSAs (or metropolitan divisions) and 49 statewide non-MSAs[6] (see Box 2-2).

[5] This report refers to an area within a state that is not encompassed within an MSA as a residual statewide area, a non-MSA, a 'rest-of-state' area, or a 'balance-of-state' area.

[6] CMS produces a county-to-MSA crosswalk file each year as part of its wage index documentation. The current version of this file identifies 392 MSAs, including Puerto Rico but no other territories (Wage Index and Capital Geographic Adjustment Factor (GAF) for Acute Care Hospitals in Urban Areas by CBSA and by State - FY 2011). In some analyses and tables in this report, the number of MSA payment areas differs from 441 if the analysis excludes payment areas without IPPS hospitals.

BOX 2-2
Metropolitan and Micropolitan Statistical Areas

Statistical areas are geographic delineations of population centers designed by the federal government for the purpose of collecting federal statistics. They were created 60 years ago by the Bureau of the Budget to standardize the metropolitan areas for which various federal agencies collect statistics. Metropolitan statistical areas (MSAs) and micropolitan statistical areas (MicroSAs) are two types of statistical areas. Because MSAs and MicroSAs reflect economic integration, they have been adopted for purposes other than the collection of statistics, such as funding federal programs.

Since Medicare moved from cost-based to prospective payment in 1983, the Centers for Medicare and Medicaid Services (CMS) have used MSAs and statewide non-MSAs to delineate areas whereby Medicare payment to hospitals should be adjusted for geographic differences in wages. CMS classifies MicroSAs with statewide non-MSA payment areas. Statewide non-MSAs include all areas within a given state that are not categorized as MSAs.

Conceptually, an MSA is an area containing a large population nucleus and adjacent counties that have a high degree of integration with the nucleus. A MicroSA is similar to an MSA but has a smaller nucleus. The nucleus of an MSA has a population of at least 50,000. The nucleus of a MicroSA has a population of 10,000 to 49,999. The collective term to describe MSAs and MicroSAs is 'core based statistical area' (CBSA).

CBSAs are composed of counties. The central county or counties are defined by the nucleus. An outlying county qualifies as part of a CBSA by meeting one of two criteria: 1) at least 25 percent of the outlying county's working residents commute to the central county, or 2) at least 25 percent of the outlying county's workforce commutes in from the central county.

Other types of statistical areas are defined by OMB:

- In New England, CBSAs are called New England City and Town Areas (NECTAs) because they are built around towns and cities, rather than counties. In this chapter, the term MSA includes NECTAs.
- Eleven MSAs are so large that they are divided into metropolitan divisions, and CMS uses the divisions as wage index payment areas.
- Adjacent CBSAs can be grouped into combined statistical areas (CSAs) on the basis of commuting between the CBSAs.

Standards for defining statistical areas are revised every 10 years, and OMB announces delineations of areas on the basis of the new standards several years later. OMB last revised the definitional standards for statistical areas in 2010 and plans to announce new delineations of statistical areas in 2013. Although definitional standards change only once a decade, the delineation of counties into statistical areas can change annually with changes in population and employment patterns.

SOURCE: CMS (2010a) and OMB (2010)

Physician Payment Localities

Currently, the geographic adjustment factor (GAF) applied to physician payments is based on a completely different set of geographic definitions called “physician payment areas”. There are 89 areas, including 34 statewide areas (see Figure 1-5, in Chapter 1). The current set of payment areas is a consolidation of the 240 areas designed by Medicare carriers (health

plans that contracted with Medicare to process claims) at the inception of Medicare in 1966. These areas came out of the carriers' knowledge of local medical practice and charge-based billing patterns (GAO, 2007) but were created using different geographic delineations, including zip codes, MSAs, cities, towns, and states (CMS, 1993). The original 240 physician payment areas included 16 statewide areas. The number of payment areas was reduced to 210 in the early 1990s, when CMS allowed state medical associations to merge multiple payment areas into single statewide areas, if they demonstrated overwhelming statewide physician support. This increased the number of statewide areas to 22. In 1997, CMS reduced the total number of payment areas to the current 89, increasing the number of statewide areas to the current 34 (see Figure 1-5, in Chapter 1).

At the inception of Medicare, CMS did not attempt to design these areas as representations of labor markets or even wholly on the basis of provider cost variation. Rather, the agency allowed carriers to use their existing payment areas. When CMS set about to redesign areas in the 1990s, it cited inconsistencies in the carrier-based methodology (CMS, 1996) but proceeded to use 3 different methodologies to consolidate areas: consolidation within statewide areas, consolidation of existing areas, and abolishment and creation of new areas (GAO, 2007).

Consolidation Within Statewide Areas

CMS consolidated payment areas within a state into one statewide area if state medical associations could demonstrate overwhelming support among physicians. Payment areas in six states were consolidated this way (GAO, 2007). Statewide areas generally increase the GAF for physicians in non-MSAs and decrease it for physicians in MSAs. To consider a request for consolidation of multiple payment areas in a state, CMS required the following: a formal request for change from the state medical society, including a recently adopted resolution requesting the change; the number of licensed physicians in the state who were members of the association, and the total number of licensed physicians in the state; the number of state medical association members in each county medical society; and letters from the local medical societies where consolidation decreased payment indicating the level of support for the change. CMS also said it would not set specific numerical levels of support because each state area structure was unique, and discretion was needed (CMS, 1994).

Consolidation of Existing Areas

CMS consolidated areas in 25 states with multiple areas by using an iterative ranking methodology. In each of these states, the carrier areas were ranked on the basis of their GAFs. The GAF of the highest-cost area was compared with the weighted average GAF of the remaining areas, and if the difference was greater than 5 percent, the highest-cost area remained a separate payment area. The process was repeated for the second costliest area, and so on, until the difference fell below 5 percent. At this point, the areas that had not been pulled out were grouped into a rest-of-state payment area. Areas in 12 states were made into statewide payment areas because no areas exceeded the 5 percent threshold.

Abolishment and Creation of New Areas

CMS created new, county-based areas in three states with multiple- areas, stating that the consolidation methodology created inaccurate results. These states were Massachusetts, Missouri, and Pennsylvania. Generally, to create the new payment areas, central counties within an MSA were grouped into separate areas and the remaining counties were assigned to a rest-of-state area (GAO, 2007).

In addition to the use of inconsistent methodologies, the Government Accountability Office (GAO) criticized CMS for failures of evaluation. GAO (2007) faulted the agency for not evaluating the accuracy of payment areas in states with multiple areas before rolling them into consolidated counties, and for using inconsistent criteria for assessing the accuracy of the newly created areas against consolidated areas. To assess accuracy, CMS examined the absolute difference between the average GAF of each county and the average GAF of the county's payment area. By using the consolidation methodology, the average payment differences in the 3 states in which new areas were created would have ranged from 3.16 to 3.90. However, 2 states in which areas were consolidated, Kansas and Virginia, had average payment inaccuracies within the same range. GAO (2007) also noted the absence of a policy to regularly update the payment areas, meaning some had not been changed for 40 years.

COMMITTEE ASSESSMENT OF EXISTING PAYMENT AREAS

Hospital Payment Areas

The MSA geographic classification system is a reasonable method for determining hospital labor markets because MSAs are defined according to where people work. The definition has inherent logic for the challenging task of drawing geographic labor market boundaries. However, the methodology may perform better for hospitals in MSAs than hospitals in non-MSAs.

The general concept of an MSA is that of a core area of counties containing a substantial population nucleus, together with adjacent counties having a high degree of economic and social integration with that core (OMB, 2010). Specifically, an outlying county qualifies as part of an MSA if 25 percent of the outlying county’s working residents commute to the core of the MSA, or if 25 percent of the outlying county’s workers commute from the core (OMB, 2010). Commuting into the core is a reflection of employers in the core of a metropolitan area drawing labor at least partially from outlying counties. Likewise, commuting from the core reflects the fact that employers in the outer counties draw workers from the metropolitan core. Thus, an MSA represents a group of employers and employees transacting employment relationships and is a reasonable proxy for a labor market.

In addition to the inherent logic of using the MSA as a labor market proxy, many federal agencies and other entities have used MSAs for many years for a wide range of economic purposes. For example, the Office of Management and Budget (OMB) uses MSAs to define pay areas for federal employees, and the U.S. Department of Housing and Urban Development (HUD) uses MSAs, in part, to determine the eligibility of city and county governments to receive Community Development Block Grant funding (GAO, 2004). Because MSAs are already in

widespread use for statistical summaries and economic purposes, using MSAs, rather than a designation unique to CMS, provides a basis for comparison with other uses.

The committee used a number of measures to assess how well MSA-based and other systems perform in grouping together hospitals that face similar prevailing wages. One of these measures is the number of markets created by a classification system. A larger number of smaller markets can distinguish wage differences better than a smaller number of larger areas. However, a larger number of markets also means more borders and therefore, the potential for boundary problems. The MSA/statewide non-MSA system includes 441 markets, intermediate in number among labor market alternatives, as seen in Table 2-1.

Another way to assess the overall ability of a classification system to group hospitals that operate in the same labor market is to assess the relative ability of classification systems to differentiate hospitals on the basis of their existing wage indexes. It is important to note that this is only an approximate way of assessing the classification system because existing wage indexes for hospitals are based on costs actually incurred rather than prevailing market wages.

Table 2-1 shows that of the total variation in hospital wages in the current HWI, 83 percent is explained by variation across MSAs. The remaining 17 percent of variation is explained by factors within labor market boundaries.

TABLE 2-1 Percent of Variation in Hospital Wages Explained by Alternative Wage Area

Labor Market Area	Number of Hospitals	Number of Areas	Number of Hospitals Per Area	% of Variation Explained (R^2)
State	3,413	53	64.4	0.581
MSA/statewide non-MSA	3,413	438	7.8	0.829
CBSA/statewide non-CBSA Area	3,413	922	3.7	0.843
County	3,413	1,596	2.1	0.873
2-digit zip code	3,413	99	34.5	0.751
3-digit zip code	3,413	825	4.1	0.862
4-digit zip code	3,413	2,341	1.5	0.942
5-digit zip code	3,413	3,100	1.1	0.984
Hospital referral region	3,363	306	11.0	0.787
Hospital service area	3,363	2148	1.6	0.908

SOURCE: RTI analysis of CMS Hospital Wage Index Files
NOTE: MSA = Metropolitan Statistical Area. Statewide/non-MSA includes Micropolitan Statistical Areas (MicroSAs). CBSA = Core Based Statistical Area, an umbrella term that includes MSAs and MicroSAs.

A third way to assess the accuracy of the MSA-based classification system is to examine the resulting wage index differentials, or wage cliffs. Hospitals on both sides of an MSA border that creates wage cliffs are likely to compete for the same workers but receive very different wage indexes. Wage cliffs can occur at the borders of MSAs and statewide non-MSAs and at borders where two MSAs meet. The latter is the case for the upstate New York hospitals cited in the example above. Northern Dutchess Hospital is located in Rhinebeck, NY, and is part of the Poughkeepsie MSA, and Kingston Hospital lies in the adjacent Kingston MSA.

Table 2-2 shows the number of hospitals that experience all types of wage cliffs. More than 1,709 hospital pairs are located within 25 miles of each other but have wage index differences of at least 0.10, which is considered a large difference. More than 2,500 hospital pairs have wage index differences of at least 0.05, including both small and large differences.[7]

[7] These wage indexes are on the basis of FY 2011 HWI data (downloaded from the CMS web-site) before reclassification and other adjustments and are normalized to account for the index data and construction.

TABLE 2-2 Number of Hospital Pairs with Small and Large Wage Differences

Distance Between Hospitals (Miles)	Small Wage Differences (0.05-0.10)	Large Wage Differences (>0.10)	Total
1	0	0	0
5	7	23	30
10	93	152	245
25	1,761	1,709	2,570

SOURCE: Committee analysis of CMS FY 2011 Hospital Wage Index Files
NOTE: Wage indexes are constructed without reclassification and other adjustments and normalized to account for the index data and construction.

The converse to the problem of wage cliffs is the problem of wage gradients within a single payment area. This situation occurs when the wage index assigned to a payment area does not adequately reflect the fact that multiple true labor markets lie within the payment area. Single statewide labor markets are likely to contain wage gradients, particularly in large western states where hospitals within the same statewide area can be separated by hundreds of miles yet receive the same wage index. Within an MSA, hospitals in core metropolitan areas may compete for different workers than suburban hospitals, yet all hospitals in the MSA have the same wage index.

These labor market definitional problems are not new. Throughout the 1980s and early 1990s, the Prospective Payment Assessment Commission (ProPAC, since integrated into the Medicare Payment Advisory Commission) issued numerous reports criticizing the labor markets for reasons similar to those described above (Dalton, 2007; ProPAC, 1985, 1986, 1987, 1993; Wellever et al, 1994; Williams, 1990). A number of changes were proposed, but none was ever adopted (see Box 2-3).

Box 2-3
Past Attempts by CMS to Redefine Wage Index Labor Markets

In 1987, the Prospective Payment Assessment Commission (ProPAC) proposed creating additional market areas in both MSAs and statewide non-MSA statewide areas. Within MSAs, metropolitan areas would be separated from outlying counties; in non-MSA rest-of-state areas, urbanized counties (those with a city or town having a population of at least 25,000) would be separated from nonmetropolitan counties. This proposal was based on a report by ProPAC stating that hospitals in MSA core areas paid 16 percent more in wages than hospitals in MSA suburban areas and that hospitals in urbanized non-MSA counties paid 8.5 percent more in wages than hospitals in other non-MSA counties (Schmitz, 1987). In a report for the Centers for Medicare and Medicaid Services (CMS), Cromwell and colleagues (1986) showed that hospitals in non-MSA counties adjacent to MSAs paid, on average, 2.4 percent more wages than hospitals in other non-MSA counties. About 20 percent of the variation in wages was explained by housing costs and another 20 percent was explained by hospital characteristics for which other index or payment formula adjustments now account (e.g., differences in occupational mix, part-time versus full-time employment, case mix, and teaching status). The remaining 60 percent of wage variation was unexplained (Wellever et al, 1994).

In 1990, Wright and Marlor proposed testing the product markets and labor markets developed by the U.S. Department of Agriculture for IPPS use (Wright, 1990). In 1993, ProPAC recommended assigning to each hospital a specific wage index, based on the wages of surrounding hospitals. This was known as the "nearest-neighbor" approach. The surrounding hospitals could be chosen on the basis of a predetermined number of hospitals, those hospitals within a fixed radius on the basis of air miles, or a hybrid approach (ProPAC, 1993).

In response to the above and other proposals, CMS concluded that alternative market definitions performed no better than MSAs and statewide non-MSAs in segregating hospitals with comparable wages (MaCurdy, 2010). In response to the nearest-neighbor proposal, CMS said in its IPPS proposed rule for 1994 that legislation was required for implementation and that although the proposal held promise, "careful analysis of its impact on hospitals is necessary before proposing to adopt such a significant change" (CMS, 1993). The rule asked for comments on aspects of the nearest neighbor proposal and related proposals, and CMS published an analysis of nine alternative market proposals in the next year's rule (CMS, 1994). These included several approaches devised by CMS: two hybrid approaches that combine the nearest-neighbor approach with MSAs and a state labor markets option (SLMO), in which hospitals within a state could design their own markets. The SLMO was based on a belief that "hospitals within a state may have better information regarding market conditions than HCFA" (Wellever et al., 1994). (HCFA is now CMS.) The agency reviewed the proposals on the basis of the degree of wage conformity within markets and across market boundaries and on the basis of redistributional impact and concluded that none of the alternatives was an improvement over the current MSA/statewide non-MSA system. CMS also said that it could not redefine market areas without congressional authority (Wellever et al, 1994).

Some of these labor market definitional problems have been attenuated since the U.S. Congress allowed hospitals to appeal their labor market classifications beginning in 1988, when hospitals in non-MSAs were allowed to reclassify. Two-thirds of these hospitals appealed their classifications immediately. CMS allowed all hospitals to appeal for reclassification beginning in

1992, with the creation of the Medicare Geographic Classification Review Board (MGCRB). Any hospital that demonstrates that it meets a predetermined set of criteria is granted reclassification. The criteria require geographic proximity to the payment area to which reclassification is sought and comparability of wages with the hospital wages in the new payment area.

Subsequent to providing for reclassification, Congress instituted other ways in which hospitals could change the wage indexes that they received as a result of their labor market classification. Because the total amount of Medicare expenditures must remain constant by law, the costs of these reclassifications and exceptions are effectively paid for by other hospitals. Box 2-3 lists the specific criteria for reclassification and other exceptions.

BOX 2-4
Reclassifications and Exceptions

Methods of computing the current wage index may lead to large differences (known as "wage cliffs") in Medicare payments among neighboring hospitals that compete in the same labor market. Several reclassifications and exceptions attempt to minimize wage cliffs by increasing payments to hospitals that meet specific criteria:

Medicare Geographic Classification Review Board (MGCRB): MGCRB evaluates applications from hospitals that seek reclassification. Hospitals must meet proximity and wage comparability criteria established by the Omnibus Budget Reconciliation Act of 1989 (P.L. 101-239).

Section 508 of the Medicare Modernization Act of 2003 (MMA): Section 508 of the MMA allows MGCRB to grant a one-time reclassification on the basis of criteria defined by the Secretary of the U.S. Department of Health and Human Services (P.L. 108-173).

Section 505 of MMA: Section 505 of the MMA authorizes an upward wage index adjustment for nonreclassified hospitals located in counties where at least 10 percent of hospital workers commute into higher wage index areas to work (P.L. 108-173).

Lugar County: This provision allows an upward adjustment to a hospital's HWI if it is near more than one MSA and more than 25 percent of its residents commute to and work in those MSAs (P.L. 100-203).

Rural Floor: The Balanced Budget Act of 1997 declares that the wage index for urban hospitals in a state cannot be less than that state's rural wage index (P.L. 105-33).

Urban to Rural Reclassification: An urban hospital can be considered rural if it is located in a rural census tract and/or qualifies as a "special hospital" (P.L. 106-113).

1109 Qualifying Hospitals: 1109 qualifying hospitals will have received $400 million in fiscal years 2011 and 2012 if they are located in counties that spend the least amount of money on benefits (under Medicare Parts A and B), taking into account the age, sex, and race demographics of each county (House Resolution 3590).

Floor for Frontier States: The wage index cannot be lower than 1.0 for all frontier states, which include North Dakota, Montana, South Dakota, Utah, and Wyoming (CMS, 2010a).

Wage Data

So far, discussion of labor market definitions has focused on the geographic component. The selection of industries from which wage data are used to construct each area's wage index is also critical to the definition of a labor market and its performance.[8] To properly reflect the prevailing wages faced by hospitals in an area, the wage data used to create the HWI should come from all employers that compete for hospital workers. As stated above, the current HWI is constructed using wage data only from hospitals, yet hospitals recruit employees—both skilled health care professionals and nonskilled workers—from beyond their own walls. An RN might work for a school or a manufacturing firm, for example, as well as a physician practice or a hospital. An orderly or a janitor can work in nearly any industry. Thus, the wages paid by hospitals in each area are determined by the wages paid by all industries in the area.

In addition to respecting the fundamental definition of a labor market, use of data from non-hospital workers helps to solve the practical problems of volatility and circularity in the HWI. "Volatility" is the term used to describe sharp year-to-year fluctuations in the wage index after, for example, a sudden change in the local supply of certain occupations or hospital adoption of a new union contract that raises wages significantly. "Circularity" is defined as the ability of hospitals to have undue influence over their own wage indexes. When wage source data are restricted to hospitals, volatility and circularity are particularly problematic in markets having only 1 or 2 hospitals.

Physician Payment Areas

The system of physician payment areas currently used by CMS has fundamental conceptual problems that reach back to the beginning of Medicare. First, the areas are based on a system that reflects physician charges rather than geographic differences in the prices of inputs faced by physicians. Second, the statewide areas bear little, if any, resemblance to input price markets. States are geopolitical units where, in many cases, geographically defined differences in input prices clearly exist across areas within states and where, in other cases, geographic input price markets cross state lines. Third, the payment areas are constructed on the basis of inconsistent methodologies.

As with hospitals, physician payment areas should group physician practices that face similar input prices. Analyses to examine how well a geographic classification system performs are complicated by two factors: (1) physicians do not report their costs to CMS as hospitals do, and (2) there are many more physician practices than hospitals. One method that has been used to measure accuracy is to compute a geographic adjustment factor (GAF) for each county and compare the county GAF to the payment area GAF to which this county is assigned.

GAO performed this analysis and found significant intra-area variation in practice costs (GAO, 2007). In more than half of the payment areas, costs in at least one constituent county differed from the payment area average by more than 5 percent (which GAO labeled a "large payment difference"). Overall, 447 counties, representing 14 percent of all counties, had large

[8] In addition to the choice of industries from which to draw data, an index requires weights with which to assign relative importance to occupations. This is discussed in Chapter 3.

payment differences.[9] Counties with large differences were located across the United States, but 60 percent were located in five states: California, Georgia, Minnesota, Ohio, and Virginia.

GAO (2007) attributed these large differences in the GAFs between counties and the payment areas to which they belong to the mixed methods used by CMS in developing physician payment areas and the agency's preference for statewide areas, as described above. The differences occur because many physician payment areas combine counties with very different input costs (GAO, 2007).

On the basis of the evidence presented above, the committee concludes that GPCI payment areas are conceptually and empirically problematic. The payment areas began as a mixture of geographic areas more closely related to product than to labor markets and were further consolidated on the basis of several different rationales that did not emphasize accuracy in payment. This has resulted in the inaccuracies cited above, and led this committee to propose a set of areas that are consistent with hospital markets, increasing the number of physician payment areas from the current 89 to 441 (the number of hospital payment areas).

ALTERNATIVE LABOR MARKET OPTIONS CONSIDERED BY THE COMMITTEE

Options for the Hospital Wage Index

The committee examined previously developed hospital labor market definitions, keeping in mind how these definitions would also work for physician practices. In general, the array of potential hospital market definitions can be classified as either (1) geopolitical units or variants thereof or (2) markets specific to individual hospitals. The first category includes single geopolitical units (e.g., counties), geopolitical units aggregated on the basis of economic measures (e.g., MSAs), and geopolitical units aggregated on the basis of the consumption of health care products (e.g., hospital service areas [HSAs]). The second category refers to a system in which a health care market is defined for each individual hospital on the basis of the hospital's characteristics. These definitions have been used for a number of purposes: government agencies use them to distribute payments, courts use them to decide antitrust issues in hospital merger cases, and economists use them to test economic theory (MaCurdy, 2010).

Because single geopolitical units, such as counties and states, have no intrinsic relationship to labor markets, the committee eliminated them from consideration as viable payment areas. The committee discussed the use of aggregated geopolitical units defined by input markets or by consumer consumption of health care and ways of defining labor markets using hospital-specific factors. The alternatives were assessed on the basis of various criteria: the number of payment areas created (a greater number of payment areas may increase not only accuracy but also the number of boundaries and the opportunity for wage cliffs), the number of hospitals within each area, and the percentage of variation in wages reported by hospitals that is explained by each alternative classification system.

[9] The finding is based on a computation of relative GAFs using 2000 data from the Bureau of the Census, FY 2006 U.S. Department of Housing and Urban Development data, and 2005 CMS data to calculate county-specific GAFs using the same methodology that CMS used in its 2005 update to the GPCIs.

Beginning with the hospital-specific category, the committee discussed the concept of assigning a specific wage index to each hospital. This approach is similar to the "nearest-neighbor" approach discussed above but is based on spatial correlations between hospitals computed using geographic information systems (GIS) technology. This method essentially improves the accuracy and flexibility of the nearest neighbor method. The committee decided against this approach because it would not be widely understood. Creating as many payment areas as hospitals would result in thousands of payment areas, which would be a burdensome and impractical system. The spatial adjustment approach would mean reliance on a mathematical system rather than actual market data, creating many opportunities for challenges. The spatial adjustment approach would be particularly impractical for defining physician practice labor markets.

The committee also examined the use of two product markets: HSAs and hospital referral regions (HRRs). HSAs, developed by the Dartmouth Atlas Project, are a collection of zip codes based on consumption of hospital care. HRRs are aggregates of HSAs based on consumption of cardiac and neurosurgical services (Dartmouth, 2011). As illustrated in Table 2-1, HSAs account for 91 percent of the total variation in reported hospital costs, but there are more than 2,000 HSAs and only 1.6 hospitals in each, on average. HRRs are fewer in total number (n = 306) each with an average of 11 hospitals (Dartmouth, 2011). HRRs explain 78 percent of the variation in hospital costs, which is less than the percentages for other viable alternatives. Also, HSAs and HRRs define product markets, which may not correspond well with actual labor markets. Another product market developed by Dartmouth is the Primary Care Service Area (PCSA), which the committee did not evaluate. There are 6,542 PCSAs, which are collections of zip codes that reflect where Medicare patients receive primary care (Dartmouth, 2007).

The committee also discussed the use of geopolitical units based on economic measures, specifically MSAs. The committee favored their use as labor market proxies because they are easy to understand, widely used, and based on labor market activity, as embodied in commuting patterns (OMB, 2010). The committee concluded that the number of MSA-based labor markets (n = 441) is manageable and that they contain enough hospitals on average (7.8), to largely address problems of volatility and circularity, especially in combination with extending the source of wage data to other health care providers. In addition, the MSA/statewide non-MSA classification system explains a reasonable amount of variation in hospital wages (83 percent) compared with other systems.

The committee acknowledges problems with using the rest-of-state areas as labor market proxies, particularly in areas adjacent to MSAs; county-based smoothing methods based on cross-MSA commuting of hospital workers, as discussed in Chapter 4, are designed to resolve many of these issues. County-based smoothing would raise the wage index for hospitals in rest-of-state counties which compete for workers living in adjacent counties located within an MSA. The committee also discussed the use of labor market areas (LMAs) as a solution. LMAs are the geographic divisions used by the Bureau of Labor Statistics (BLS) for collecting employment statistics in statewide non-MSAs. The advantage of LMAs is that they cross the same state boundaries that commercial centers do, similar to MSAs. However, LMA design methodology varies from state to state (meeting with BLS, February 11, 2011). In the time

allotted to prepare this report, the committee was not able to compare the strengths and weaknesses of LMAs relative to statewide non-MSAs, but such a comparison would be useful.

The committee discussed the issue of wage gradients within MSAs and the related incentive for hospitals to move from urban to suburban areas where they might pay lower wages but retain the same level of payment. The committee considered smoothing of wage index values (discussed in Chapter 4) as a potential solution. (Investigation of hospital relocation was not specifically part of the committee's scope of task or feasible within the report's timeframe.)

If smoothing were applied so that both positive and negative index adjustments were made based on commuting patterns, wage indexes in suburban counties would decline in some suburban MSA counties where hospital workers commute into non-MSA counties. This would address within-MSA wage variation – namely, hospitals in core metropolitan areas that face higher wages than suburban hospitals located in different counties but within the same MSA – by resulting in a wage index that is higher in the core metropolitan county and lower in the suburban county. The committee acknowledges that intra-county wage variation could remain a problem in MSA counties where there are significant differences between core metropolitan and suburban wage levels.

Options for Physician Payment Areas

The committee considered several criteria in evaluating input markets for physician payment areas, including: consistency across the hospital and physician markets, the administrative burden posed by the classification system, and the economic integration represented by the system.

Given the requirements for functional labor markets described above—to identify the areas in which hospitals and physicians compete for workers—the committee could find little justification for defining physician labor markets differently from hospital labor markets since hospitals and physicians draw labor from essentially the same pool of workers.

The occupations used by hospitals and physician offices have substantial overlap, as shown in Table 2-3. The top 10 occupations used by physician offices are also used by hospitals, with RNs and LPNs comprising a significant share of each workforce.

TABLE 2-3 Overlap in Occupations Used in Physician Practices and Hospitals

Top 10 Occupations in Physician Practices	Share of Physician Office Labor (%)	Share of Hospital Labor (%)
Medical assistants	16.5	1.2
Registered nurses	12.0	30.1
Receptionists and information clerks	9.7	0.8
Medical secretaries	9.5	2.3
Billing and posting clerks and machine operators	4.8	0.9
Licensed practical and vocational nurses	4.8	3.2
First line supervisors/managers of office and admin. support workers	4.0	0.8
Office clerks, general	3.9	2.0
Secretaries, except legal, medical and executive	2.9	1.3
Radiologic technologists and technicians	2.4	2.6

SOURCE: RTI analysis of BLS Occupational Employment Series data released in 2010
NOTE: Occupation titles come from the Standard Occupational Classification System used by the Bureau of Labor Statistics.

Moreover, wages across hospitals and physician offices are similar, particularly for RNs. Table 2-4 shows that, on average nationally, RNs make $32.57 in hospitals and $32.35 in physician offices. In occupations where slight differences exist, shorter commutes, lower work intensity, and other job characteristics likely explain the wage differentials. Although some workers might prefer working for one provider versus another at a given wage, the facts above suggest that hospitals, physicians, and their employees transact employment relationships in the same geographic labor markets. Indeed, the labor market for hospital and physician practice employees extends beyond hospitals and physicians. As seen in Table 2-4, wages for health sector employees and all employees are nearly identical.

TABLE 2-4 National Average Hourly Wage (dollars) by Health Sector

Occupations	All Employer Mean Hourly Wage	Health Sector Mean Hourly Wage	Hospitals	Physician Offices	Ambulatory Care (all settings)	Nursing Facilities	Home Health
Registered nurses	31.99	32.02	32.57	32.35	31.63	28.52	30.43
Licensed vocational nurses	19.66	19.58	19.25	17.68	18.88	20.34	20.33
Nursing aides, orderlies	12.01	11.89	12.74	12.36	11.69	11.58	11.09
Radiologic technologists and technicians	26.05	25.99	26.36	24.45	25.33	23.11	23.05
Medical record and health information specialists	16.29	15.77	17.24	13.69	14.05	15.92	15.40
Medical secretaries	15.12	15.11	15.19	14.64	15.10	14.52	14.31
Bill and account collectors	15.65	15.89	15.50	15.87	15.99	18.22	16.65

SOURCE: RTI analysis of BLS tabulations of Occupational Employment Series data released in 2010

One way to assess the ability of MSAs to group physicians facing similar wages is to compare the difference in the current adjustment factor between each county and the MSA/non-MSA labor market in which the county is located, similar to what was done in the GAO analysis described above. RTI performed this analysis for the committee with data published by CMS to be used for the calculation of the 2010 GAF. As shown in Table 2-5, the difference between the GAF computed at the county level and the GAF computed at the MSA/non-MSA level is greater than 5 percent for only 108 counties, whereas the number is 475 counties under the existing payment area system.[10] When GAFs are computed for current payment areas that account for congressionally mandated restrictions on GAF variation,[11] the number of counties at or above the 5 percent threshold difference is 1,809 under the current payment area system (RTI analysis for the IOM, 2010).

TABLE 2-5 Differences between County Level GAFs and Payment Area GAFs

Payment Area GAF	Amount of Difference >5%	>10%
MSA GAF[a] (*without* congressional mandates)	108	14
Current area GAF[b] *(without* congressional mandates)	475	6
Current area GAF[c] *(with* congressional mandates)	1,809	106

SOURCE: RTI analysis of CMS and Acumen data

NOTE: The county level, the locality level, and MSA actual GAFs were derived from county level 2012 fully transitioned GPCIs that were calculated by CMS and Acumen. The 2010 GAF contains a 1.0 work GPCI floor, reflects one-half the rent and employee compensation components of the practice expense GPCI, and reflects a 1.5 work GPCI floor in Alaska.

[a] Created from actual county-level GPCIs and GAFs

[b] Created from actual county-level GPCIs and GAFs

[c] From July 2010 *Federal Register* GAFs

[10] Computed without congressionally mandated floors of work and practice expense GPCIs. County-level, locality-level, and MSA actual GAFs were derived by RTI from county-level GAFs that were calculated by CMS and Acumen.

[11] Computed with congressionally mandated work and practice expense floors. Data obtained from Addendum D (pages 40643-5) of the Proposed Rule (Federal Register Vol. 75, No. 133, July 13, 2010).

The use of MSAs instead of the current areas increases the number of physician payment areas from the current 89 to 441: 392 MSAs and 49 rest-of-state areas (see Table 2-6). The increase in the number of payment areas is due to the recognition of all MSAs as labor markets and to the decomposition of current statewide areas into MSA and statewide non-MSA payment areas. For example, the San Diego, CA MSA becomes its own labor market instead of being grouped with the California rest-of-state area, and North Carolina, now a statewide area, is divided into 15 MSAs and one residual state area.

TABLE 2-6 Effect of Using MSAs on the Number of Physician Payment Areas

Basis of Payment Areas	Number of Payment Areas
Current Areas	
Total	89
Statewide non-MSA	36
Defined	37
Rest of State	16
MSA	
Total	442
MSA	392
Statewide non-MSA	49
Statewide	1
Ranked iterative MSA (3% threshold)	
Total	180
MSA	130
Statewide non-MSA	41
Rest of State	9

SOURCE: RTI analysis of CMS and Acumen data

NOTE: The county level, the locality level, and MSA actual GAFs were derived from county level 2012 fully transitioned GPCIs that were calculated by CMS and Acumen. Under the current system of physician payment areas, Puerto Rico and the Virgin Islands are classified as statewide, and the District of Columbia area includes counties in Maryland, Virginia, and West Virginia, as well as the District of Columbia itself. In MSA-based methods, the Virgin Islands MSA is statewide, Puerto Rico has several MSAs, and the DC MSA includes counties in other states. The MSA total in this table differs from the total of 441 cited in the text. The total in the table includes the Virgin Islands as a statewide MSA payment area, while the total cited in the text does not.

The committee was concerned about the potential for increased administrative burden posed by a larger number of physician localities. It is difficult to determine if a larger number of areas would create an additional burden. A larger number of areas increases the number of boundaries, which increases the potential for complaints about boundary differences that CMS might have to address. However, any potential increase in administrative burden might be mitigated by having consistency across hospital and physician payment areas.

For comparative purposes, the committee examined an adapted MSA-based approach in which high-cost MSAs are pulled out of existing states and made separate. This adapted approach used an iterative method, similar to the method used by CMS used in the mid-1990s to consolidate the number of physician payment areas. The iterative approach (using a 3 percent threshold) creates 180 physician payment areas: 130 MSAs, 41 statewide non-MSAs, and 9 statewide areas. In terms of the number of payment areas and metropolitan-nonmetropolitan redistribution, these iterative methods are a compromise between the current areas —rooted in the historical emphasis on larger, fewer markets and protecting nonmetropolitan areas—and MSAs/statewide non-MSAs. Similar methods were investigated by the health policy research firm Acumen in its 2008 report to CMS and by GAO in its 2007 report to the U.S. Congress.

Because the current physician payment areas were partly designed to attract providers in nonmetropolitan areas through payment (GAO, 2007), any refinement of the current payment areas on the basis of labor market principles will redistribute Medicare payment away from nonmetropolitan areas. Changing the 89 existing payment areas to a system of 441 MSAs and statewide non-MSAs would increase payments in large metropolitan areas by about 1 percent, decrease payments in small metropolitan areas by slightly more than 1 percent, and decrease payments in non-metropolitan areas by about 3 percent (see Table 2-7). Adopting the 3 percent iterated MSA option would increase payments in large metropolitan areas by less than 1 percent, decrease payments in small metropolitan areas by slightly more than 1 percent, and decrease payments in non-metropolitan areas by about 2 percent.[12]

[12] The analysis was performed using data published by CMS for the 2012 GPCIs. The effects of the congressionally-mandated floors for Alaska's work GPCI and the Frontier states' practice expense GPCIs were removed to isolate the effects of the payment area change from the effects of the floors.

TABLE 2-7 Mean County GAFs Under the Current and Two Alternative Physician Payment Areas

Urbanicity Category[a]	Number of Counties	Locality GAFs[b]	MSA GAFs	MSA Ranked Iterated 3% GAFs
Metropolitan counties				
>1 Million population	414	1.039	1.049	1.046
250,000–1,000,000 Population	325	0.972	0.973	0.970
< 250,000 population	351	0.951	0.938	0.939
Nonmetropolitan counties				
Adjacent to a metropolitan county	1,062	0.950	0.918	0.932
Not adjacent to a metropolitan county	990	0.933	0.903	0.913

SOURCE: RTI Analysis of CMS and Acumen data

NOTE: The county level, the locality level, and MSA actual GAFs were derived from county level 2012 fully transitioned GPCIs that were calculated by CMS and Acumen.

[a] Urbanicity categories are based on 2003 Rural/Urban Continuum Codes. Does not include Yellowstone, MT, the Virgin Islands, and 78 Puerto Rican counties.

[b] Locality GAFs were calculated from the county-level GPCIs that would have been used in the absence of congressionally mandated floors for Alaska's work GPCI and the Frontier states' practice expense GPCIs.

Considering the information presented above, both the MSA/statewide non-MSA system and the iterated MSA-based approach create more accurate payment areas than the current system. Because hospitals and physician practices essentially compete for labor in the same markets and industries, the committee favors using the same system for both sets of providers. The committee acknowledges the redistributional impact on physicians in nonmetropolitan areas of dividing 89 large payment areas into 441 labor markets. To some degree, this is a reversal of an historical income redistribution that resulted from the consolidation of payment areas in deference to the policy goal of recruiting physicians to nonmetropolitan areas. The committee's phase two report will address the impact of geographic adjustment on patients' access to physicians in nonmetropolitan and metropolitan areas.

COMMITTEE RECOMMENDATIONS

Recommendation 2-1: The same labor market definition should be used for both the hospital wage index and the physician geographic adjustment factor. Metropolitan statistical areas and statewide non-metropolitan statistical areas should serve as the basis for defining these labor markets.

Since hospitals and physicians draw labor from essentially the same pool, the same labor markets should be used for both the hospital wage index and the geographic adjustment factor. There is little economic justification for using the 89 current physician payment areas. In fact, the current areas are inaccurate compared with the 441 metropolitan statistical areas (MSAs). They fail to differentiate geographic areas within payment areas where physicians face significant variation in their wages. Moreover, consistency across both hospitals and physician practices makes administrative sense and may reduce the administrative burden for the Centers for Medicare and Medicaid Services. In addition, MSAs, by definition, are economically integrated, as reflected by commuters in all occupations and industries going both directions across county borders to work.

The committee acknowledges that moving from 89 to 441 physician payment areas could result in some areas with small sample sizes, affecting the reliability of payment calculations. If small sample sizes affect the accuracy of calculations, additional data could be collected, areas or years of data could be combined, or methods that borrow strength from surrounding regions could be used.

Use of the same labor market definition for hospitals and physician practices is in line with increasing integration of hospital and physician care settings and the movement toward more accountable and coordinated health care across both settings. Although the extent and permanence of integration is not clear, hospitals and physicians often provide related services in locations that are in close proximity and within similar commuting distances to population centers. Whether they are providing substitute, complementary, or even non-related services, both hospitals and physicians compete for similar types of labor at similar wage rates within similar areas.

The intent of the provisions for accountable care organizations in the 2010 Accountable Care Act (P.L. 111-148) is for physicians, hospitals, and other providers to be jointly responsible for care delivery, care transitions across settings, and outcomes for their patients, with success reflected in joint savings. On the basis of current trends, the future may bring physicians and hospitals closer together in both the delivery and payment of health care. Given the potential for increased interdependence in payment, it makes sense to use the same labor markets for hospitals and physicians for geographic adjustment of payment.

There is an advantage to using already established definitions that are in widespread use. Although the metropolitan statistical area is not a perfect definition of a labor market, with smoothing improvements (described in Chapter 5), it can serve as an effective and equitable approximation. Grounded in information on where people live and work, it reflects the very decisions made by employers and employees that define geographic labor markets. The metropolitan statistical area also does a reasonable job of grouping together hospitals facing similar wage rates.

In addition, metropolitan statistical area definitions and the county-based delineation of metropolitan statistical areas are regularly updated by the Office of Management and Budget and modified as employment patterns change. This ensures that labor markets are updated and relieves the Centers for Medicare and Medicaid Services of the administrative burden of redefining labor markets in response to claims that they are outdated.

Recommendation 2-2: The data used to construct the hospital wage index and the physician geographic adjustment factor should come from all health care employers.

A corollary to the first recommendation is that the labor market for employees of hospitals and physician practices extends beyond their existing employers to the health care sector and beyond. This has implications for the source of wage data used to construct the geographic adjustment indexes.

A central principle of geographic adjustment is that it should reflect payment for the prices of labor faced by employers rather than the costs of labor paid by employers. To accurately reflect the prevailing wages faced by hospitals and physicians in a given area, the wage data used to create geographic adjusters should come from all employers that compete for employees in hospitals and physician practices. These employees come from occupations both in and out of the health care professions, ranging from nurses to cafeteria workers. Empirically, these occupations are employed in all industries, not just health care industries. Moreover, the Centers for Medicare and Medicaid Services already uses wage data from all industries for the office labor portion of the physician geographic adjustment factor. Although a case can be made for using wage data from all employers, the committee recommends that wage data come from all health care employers and not simply hospitals and physician practices. This recommendation is an acknowledgement that health care employers may differ from the universe of all employers in terms of the percentage of compensation paid in benefits, in the likelihood of unionization, and in other ways that might affect compensation rates for some types of employees.

Using data from the industries in which employers compete for workers and workers compete for jobs is fundamental to the definition of labor markets for the geographic adjustment of Medicare payment. Wage data are discussed in more detail in Chapter 3.

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3

Hospital Wage Index

This chapter describes the hospital wage index (HWI) and addresses key areas of disagreement in how it is constructed. Two important principles guide the ensuing discussion. First, the HWI is meant to reflect geographic differences in the price and not the cost of labor that each hospital faces within its labor market. The price of labor is indicated by the prevailing wage in each labor market for a given occupation. The cost of labor reflects each hospital's decisions regarding its occupational mix of employees and compensation packages. By adjusting for differences in the price of labor, rather than cost actually incurred by hospitals, they are held accountable for using labor efficiently. This principle supports the goal of the prospective payment system to pay hospitals in each area an amount that reflects the cost of efficiently providing inpatient care to Medicare beneficiaries.

Second, to reflect the price rather than the cost of labor in each market area, the HWI should capture only those geographic differences in labor expenses that are beyond the control of the individual hospital. The index — and therefore Medicare payment —should not reflect the impact of a hospital's own business decisions on its wage-related costs.

DETAILS OF THE HOSPITAL WAGE INDEX

The HWI was first implemented in 1983 as part of the Inpatient Prospective Payment System (IPPS), when Medicare moved away from cost-based payment and began to pay hospitals a set amount for each group of patients who are clinically similar. The intent was to encourage hospitals to operate more efficiently—and to think of care in terms of the hospital stay rather than each day of care, procedure, or service provided. The goal of the wage index is to adjust prospective payment rates to account for local differences in the wages that hospitals face in their respective labor markets. Wages account for about two-thirds of total costs, so the HWI is applied to a similar portion of the payment rate for hospitals in each geographic area.

The wage index is part of the overall formula used to pay short-term general hospitals under IPPS for the care that they provide to patients insured by Medicare. The formula is illustrated in Figure 1-1. In summary, the payment for each patient is determined by making adjustments to a national standard payment rate to account for patient and hospital characteristics, including hospital location, that are thought to affect the cost of efficiently provided inpatient care. Patient characteristics are accounted for by the case mix adjustment. Each patient is assigned to one of 747 Medicare severity diagnosis-related groups (MS-DRGs). Each MS-DRG carries a specific weight, which reflects the relative costliness of patients in that category compared with the average Medicare patient. Hospital location is accounted for by the wage index adjustment. Each hospital is assigned to a labor market: a metropolitan statistical area (MSA) or a statewide non-MSA. Each labor market is assigned a specific index value, which is intended to reflect the variation in prevailing wage levels across labor markets.

In addition to these adjustments to the standard payment rate, separate amounts are added to fulfill certain public policy goals. These policy adjustments include a percent add-on to Medicare payments for teaching hospitals and for hospitals that serve a disproportionate number of low-income patients. Extra payments are also made to reimburse hospitals for the cost of using certain expensive new technologies and to protect against the risk of large financial losses associated with treating atypically high-cost patients. A reduction is made if the hospital transfers a patient earlier than usual to another hospital or a post-acute care setting (such as a skilled nursing facility). Table 3-1 illustrates the calculation of the wage index and shows the effects of each adjustment, including the wage index, on payments to hospitals in four different geographic areas.

TABLE 3-1 Effect of FY 2011 Wage Index on Payments to Hospitals in Four Geographic Areas

	Santa Clara, CA Stanford Hospital[a] 416 IPPS beds Case Mix Index = 2.09	Atlanta, GA Emory University Hospital 506 IPPS beds Case Mix Index = 2.40	Columbia, MO University of Missouri Hospital 307 IPPS beds Case Mix Index = 2.04	Enterprise, AL Medical Center Enterprise 117 IPPS beds Case Mix Index = 1.07
National Standardized Amount[b]	$5,164.11	$5,164.11	$5,164.11	$5,164.11
× Labor-related percent	68.8%	62.0%	62.0%	62.0%
= Labor-related portion	$3,552.91	$3,201.75	$3,201.75	$3,201.75
× Wage index	1.6379	0.9522	0.8227	0.7436
= Labor-adjusted portion	$5,819.31	$3,048.70	$2,634.08	$2,380.82
+ Non-labor related portion	$1,611.20	$1,962.36	$1,962.36	$1,962.36
= Labor-adjusted standardized amount	$7,430.51	$5,011.07	$4,596.44	$4,343.18
IME & DSH Add-ons[c]	$3,454.15	$1,528.22	$2,343.49	$255.34
Operating Payment Amount, MS-DRG wt = 1.000	$10,884.66	$6,539.29	$6,939.94	$4,598.52
Example: Stroke with Complication or Comorbidity (CC)				
MS-DRG 065 (intracranial hemorrhage or cerebral infarction with CC weight=1.1667)	$12,699.13	$7,629.39	$8,096.82	$5,365.09
Example: CABG with Major Complication or Comorbidity (MCC)				

MS-DRG 233 (Bypass with Cardiac Catheterization with MCC, weight=7.2081)	$78,457.69	$47,135.87	$50,023.75	Not available

[a] Most hospitals in this market, including Stanford, are reclassified to the Santa Cruz/Watsonville area. The Stanford index reflects the reclassified value.
[b] Amounts are for the operating portion of payment. The capital portion of payment is not reflected.
[c] Indirect medical education (IME) adjustments provide an increase in Medicare payment to teaching hospitals. Disproportionate share hospital (DSH) adjustments provide an increase in Medicare payment to hospitals that serve a disproportionate share of low-income patients.
SOURCE: RTI Analysis of IPPS impact file and MS-DRG weight file, FY 2011

Other payment supports apply to hospitals in nonmetropolitan areas. Rural referral centers[1] (RRCs) receive payments for inpatient care equal to what hospitals in metropolitan areas would receive for furnishing the same services (42 CFR 412.96). Sole community hospitals[2] (SCHs) receive the IPPS federal rate, or the updated hospital-specific rate based on fiscal years 1982, 1987, 1996, or 2006 per discharge – whichever is highest (CMS Factsheet, 2010). Finally, critical access hospitals[3] (CAHs) are small rural facilities that are not paid under the IPPS system; rather, Medicare pays 101 percent of their costs on a per-patient basis (Payment Basics).

Figure 3-1 shows how different wage indexes affect payment for the same type of patient at hospitals in four different areas.

[1] A facility qualifies as an RRC if it is located in a rural area and has a minimum of 275 beds. At least 50% of RRC Medicare patients are referred by another hospital or physician, and at least 60% of those patients live more than 25 miles away.
[2] A facility qualifies as an SCH if it is the only entity that can make inpatient services "reasonably available" to a given population due to isolation, geographic barriers, weather, or distance (the hospital is at least 35 miles away from the next nearest hospital).
[3] A facility qualifies as a CAH if it has a maximum of 25 beds dedicated to acute care patients, up to 10 beds for psychiatric care, and 10 beds for rehabilitation. A CAH is at least 15 miles by secondary road, or 35 miles by main road from the nearest hospital, or it is deemed a "necessary provider."

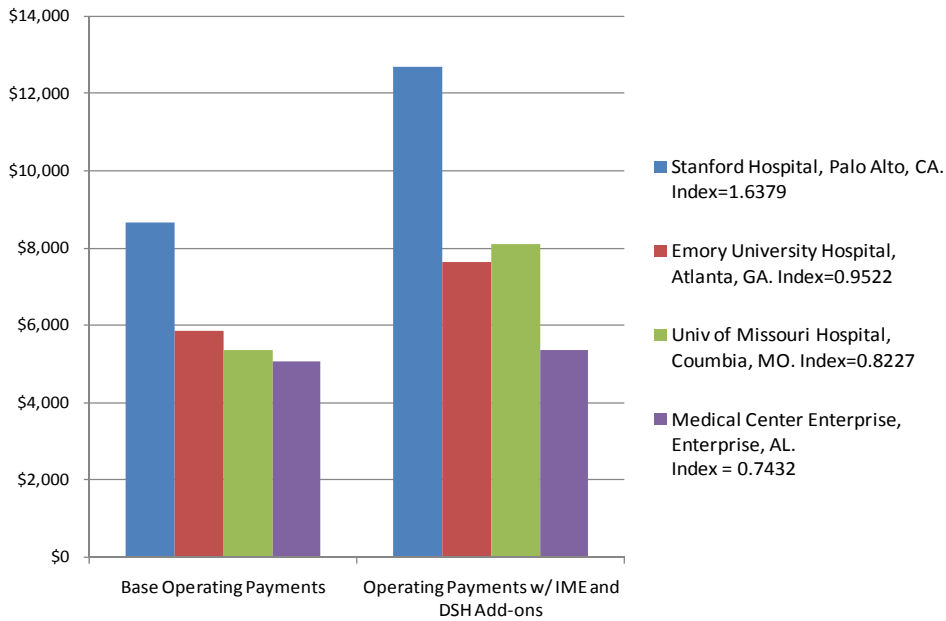

FIGURE 3-1 Payments for Stroke Admission by Hospital
NOTE: Stanford hospital receives higher payments because its wage index is greater than 1. When an index is equal to or greater than 1, it is adjusted 69.7 percent for area wages. An index that is less than 1 is adjusted 62 percent for area wages. IME = indirect medical education; DSH = disproportionate share hospital.
SOURCE: RTI analysis of CMS FY 2011 IPPS Final Rules

The wage index adjustment is currently computed as the average hourly wage (AHW) paid by all IPPS hospitals in each labor market area divided by the AHW for all IPPS hospitals nationwide. The data come from Worksheet S-3 (see Appendix H) of the cost reports that hospitals are required to submit annually to the Centers for Medicare and Medicaid Services (CMS). The index is updated each year on the basis of the latest available complete set of data, after review and verification or correction of any questionable data. Constructing the HWI requires 3 basic steps:

1. Identify the data source from which to derive a measure of the prices for each input. To a large extent, the data determine the options available in the next two steps;
2. Define the inputs that will be included in the index; and
3. Establish a set of weights to assign relative importance to each input to the index.

Although the steps may seem straightforward, the data, inputs, and weights used for the HWI have been a source of continuing disagreement among stakeholders and policy makers. Small changes in any of the components of the index can have major effects on how payments are distributed.

The inputs to the HWI consist of the dollar-valued wages and benefits of full-time, part-time, and contract workers.[4] The AHW is computed as if all hospitals use a fixed mix of hours for each of the major occupations in the hospital industry. The mix of hours assigned to each occupation comprises the weight for each occupation. The weights are used to make the occupational mix adjustment (OMA) to the wage index. It is useful to remember that the OMA is an adjustment to the wage index and that the wage index is an adjustment to the Medicare payment. This is explained further in Box 3-1. As discussed in more detail below, the OMA is needed to even out hospital decisions about how many workers in each occupation to use. The fixed mix of hours used as the standard for each occupation is determined by averaging the number of hours of the occupation that are used by all hospitals in the country.

BOX 3-1
Mechanics of the Hospital Wage Index With the Occupational Mix Adjustment

Computing the hospital wage index involves a series of steps that use simple multiplication, addition, and division. For ease of explanation, the steps below present the calculation of the wage index from the point of view of a single hypothetical hospital named Clark General Hospital.

Step 1: Determine the proportion of nurses by subcategory (registered nurses; licensed practical nurses [LPNs]; nursing aides, orderlies and attendants; and medical assistants) who are employed by Clark General Hospital.

Start with the LPN subcategory. Divide the LPN hours by the total nursing category hours. Repeat for the other three subcategories of nurses employed by Clark General Hospital.

Every other Inpatient Prospective Payment System (IPPS) hospital does the same calculation.

Step 2: Calculate the national average hourly wage (AHW) for each nursing subcategory in all hospitals included in the occupational mix survey database.

Start with the LPN subcategory. Divide the total LPN salaries for all hospitals by the LPN total hours for all hospitals. Repeat this calculation for the other three subcategories of nurses.

Step 3: Calculate Clark General Hospital's AHW for nursing, weighted by the percentage of hours attributable to each nursing subcategory in all hospitals included in the occupational mix survey database.

Start with the LPN subcategory at Clark General Hospital. Multiply the hours for all LPNs at Clark by the national AHW for LPNs. Do this for the other three subcategories of nurses at Clark. Then sum the weighted AHW for each subcategory to get a weighted AHW for all of nursing at Clark.

Every other IPPS hospital does the same calculation.

[4] Contract workers include nurses, executive management, and other employees working under contract between an agency and a hospital.

Step 4: Calculate the national AHW for nursing, weighted by the percentage of hours attributable to each nursing subcategory in all hospitals included in the occupational mix survey database.

Again, start with the LPN subcategory, but this time the calculation is for all the hospitals in the United States. Multiply the hours for all LPNs in the country by the national AHW for all LPNs in the country. Do the same for the other three subcategories of nursing. Then sum the weighted AHW for each subcategory to get a weighted AHW for all of nursing in the country.

Step 5: Calculate Clark General Hospital's occupational mix adjustment factor.

Divide the national weighted AHW (from Step 4) by Clark's AHW (Step 3). If Clark General Hospital's weighted AHW is less than the weighted national AHW, that means that Clark uses a less expensive mix of nursing employees. Its occupational mix adjustment factor will be greater than 1. If Clark General Hospital's weighted AHW is greater than the weighted national AHW, that means that Clark uses a more expensive mix of nursing employees. Its occupational mix adjustment factor will be less than 1.

Do this for every other IPPS hospital in the country.

Step 6: Calculate Clark General Hospital's occupational mix -- adjusted salaries and wage-related costs for the total nursing category.

Divide Clark General Hospital's total nursing category salaries by the total salaries for "nursing and all other" employee categories to determine the percentage of hospital staff attributable to the nursing category. Multiply Clark Generals Hospital's total salaries and wage-related costs by the percentage of the hospital's total number of workers attributable to the total nursing category and by the total nursing category's occupational mix adjustment factor (from Step 5).

Subtract the hospital's nursing category percentage from 100 percent to determine the portion of Clark General Hospital's total salaries and wage-related costs for other employees that are not adjusted for occupational mix.

Step 7: Calculate the total occupational mix-adjusted salaries and wage-related costs for Clark General Hospital.

Sum the occupational-mix adjusted salaries and wage-related costs for the total nursing category (from Step 6) and the hospital's wage related costs for all other employees.

To compute the hospital's occupational mix-adjusted AHW, divide the hospital's total occupational mix-adjusted salaries and wage-related costs by the hospital's total hours.

SOURCE: CMS (2010b)

Currently, CMS uses four occupations to construct the OMA: registered nurses (RNs); licensed practical nurses (LPNs); medical technologists; and nursing aides, orderlies and attendants. These occupations make up 42.5 percent of hospital workers nationally (CMS, 2010b). No OMA is made to the hours of the remaining 57.5 percent of hospital workers. The data on hours worked by each occupation that are needed for the OMA are not included in the annual cost reports that hospitals submit to CMS. Therefore, CMS must conduct a survey of hospitals — known as the occupational mix survey — to acquire the data necessary to compute the OMA. CMS is required by law, the Tax Relief and Healthcare Act of 2006 (P.L. 109-432), to conduct the survey not less than every 3 years and to update the OMA accordingly.

The intent of the OMA is to more accurately reflect the wages that hospitals face in each area, by factoring out the effect of the hospitals' own decisions about the mix of occupations that they hire. This is important because some hospitals, for one reason or another, choose to employ higher-paid occupations instead of lower-paid occupations. Differences in a hospital's occupational mix due to the clinical characteristics of the hospital's patient population are already accounted for by the Medicare Severity Diagnosis Related Group (MS-DRG) relative weights that are used to adjust the payment for each case. As described in Chapter 1, MS-DRGs increase payment for sicker patients who require more staff resources relative to patients who are less sick. This adjustment is separate from the adjustment made for geographic differences in hospital wages. (Some states require a specific mix of nurses in hospitals, which could affect index values in a way that is beyond the control of the hospitals in those areas. This issue is discussed below.) Without standardization for occupational mix, the HWI would reflect the costs of hospital decisions to use a broader mix of occupations, raising payments for those hospitals. The application of an OMA to the wage index at least partially controls for the impact of those decisions, so that hospitals in different areas that pay the same wages for nurses have the same wage index, even if they choose to hire different mixes of nursing staff.

IPPS hospitals are free to use whatever mix of occupations they need to treat their patients; the goal of the OMA is to avoid rewarding or penalizing hospitals per se for using a richer occupational mix. The FY 2011 IPPS Final Rule states:

> The purpose of the OMA is to control for the effect of hospitals' employment choices on the wage index. For example, hospitals may choose to employ different combinations of registered nurses, licensed practical nurses, nursing aides, and medical assistants for the purpose of providing nursing care to patients. The varying labor costs associated with these choices reflect hospital management decisions rather than geographic differences in the costs of labor (CMS, 2010a).

The OMA was first applied in FY 2005, after 2 decades of debate, several congressional mandates, and a lawsuit (see Box 3-2: Hospital Wage Index Timeline of Events). In particular, hospitals in nonmetropolitan areas argued that hospitals in large metropolitan areas used a richer mix of occupations and that the unadjusted wage index rewarded those hospitals with higher payments (Pope et al, 1989; ProPAC, 1990, 1991; Size, 1992).

BOX 3-2
Hospital Wage Index Timeline of Events

1965: The U.S. Congress creates the Medicare and Medicaid Programs in Titles XVIII and XIX of the Social Security Act of 1965.

1975: John D. Thompson of Yale University leads the development of the Diagnoses Related Groups (DRG) system (Mistichelli, 1984).

1977: HCFA (Health Care Financing Administration) is authorized by the U.S. Congress to collect and review hospital cost data (Medicaid Anti-fraud and Abuse Amendments, P.L. 95-142, October 25, 1977).

1982: The U.S. Congress requires HCFA to develop a prospective payment system (Tax Equity and Fiscal Responsibility Act. P.L. 97-248, September 3, 1932).

1983: Medicare establishes the hospital wage index (HWI) using Bureau of Labor Statistics (BLS) data to control costs (Social Security Amendments of 1983. P.L. 98-21, April 20, 1983).

1984: HCFA develops and conducts the first Wage Index Survey of hospitals (Deficit Reduction Act of 1984. P.L. 98-369, July 18, 1984).

1987: The U.S. Congress authorizes the Secretary of the U.S. Department of Health and Human Services (HHS) to reclassify some nonmetropolitan counties as metropolitan counties to reduce variation in wages among neighboring hospitals. These exceptions are known as “Lugar Counties” (Omnibus Budget Reconciliation Act of 1987. P.L. 100-203, December 22, 1987).

1988: The U.S. Congress requires that wage indexes for Lugar Counties must be calculated separately from all other hospitals to prevent a decline in the indexes of neighboring areas (Technical and Miscellaneous Revenue Act of 1988. P.L. 100-647, November 10, 1988).

1989: The U.S. Congress requires an annual update of the HWI to ensure accuracy (Omnibus Budget Reconciliation Act of 1989. P.L. 101-239, December 19, 1989).

1989: The U.S. Congress grants the Medicare Geographic Classification Review Board authority to reclassify hospitals to different payment regions (Omnibus Budget Reconciliation Act of 1989. P.L. 101-239, December 19, 1989).

1990: Annual hospital surveys are included in the cost reports (Dalton et al, 2002).

1993: The Prospective Payment Assessment Commission (ProPAC) recommends redefining hospital labor market areas on the basis of the nearest-neighbor principle rather than geo-political boundaries, such as counties and states (Dalton et al, 2002).

1996: ProPAC reports that hospitals in nonmetropolitan areas receive significantly less in Medicare payments than hospitals in metropolitan areas (Dalton et al, 2002).

1997: The U.S. Congress applies the HWI to hospital outpatient services, home health agencies, skilled nursing facilities, impatient psychiatric facilities, inpatient rehabilitation facilities, and long-term acute care hospitals (The Balanced Budget Act of 1997. P.L. 105-33, August 5, 1997).

1997: The U.S. Congress establishes rural floors, so that urban hospitals must be paid *at least* as much as rural hospitals (The Balanced Budget Act of 1997. P.L. 105-33, August 5, 1997).

1999: The U.S. Congress reclassifies some metropolitan hospitals as nonmetropolitan hospitals, if they meet criteria defined by the Secretary of HHS (Balanced Budget Refinement Act of 1999. P.L. 106-113, November 26, 1999).

2000: The U.S. Congress requires the Centers for Medicare and Medicaid Services (CMS) to account for a hospital's occupational mix when adjusting the wage index, and gather data at least every 3 years (Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000. P.L. 106-554, October 30, 2000).[5]

2003: CMS grants reclassifications for 3 years, instead of 1 year (Medicare Prescription Drug, Improvement and Modernization Act. P.L. 108-17, December 8, 2003).

2003: Outmigration adjustments increase the wage index for hospitals that employ a significant percentage of individuals who reside in neighboring metropolitan statistical areas with higher wage indexes (Medicare Prescription Drug, Improvement, and Modernization Act of 2003. P.L. 108-173, December 8, 2003).

2003: The U.S. Congress establishes a 1.0 floor on the work geographic practice cost index (Medicare Prescription Drug, Improvement, and Modernization Act of 2003. P.L. 108-173, December 8, 2003).

2006: The U.S. Court of Appeals rules that CMS must immediately apply the occupational mix adjustment to 100 percent of the wage index instead of implementing the adjustment gradually (*Bellevue Hospital v. Leavitt*, 2006).

2006: The U.S. Congress mandates that MedPAC write a report to CMS containing recommendations for improving the wage index (Tax Relief and Health Care Act of 2006. P.L. 109-432, December 20, 2006).

2007: MedPAC's June report suggests that CMS account for benefits, use industry-specific data for occupational mix measurements, employ smoothing techniques to reduce disparity between borders, and phase in major changes gradually (MedPAC, 2007).

2010: On behalf of HHS Secretary Kathleen Sebelius, CMS commissions the Institute of Medicine to evaluate the accuracy of the geographic adjustment factors (July 2010).

[5] CMS surveys the hospitals every 3 years to gather information about paid hours by occupation. It receives national wage rates from the Bureau of Labor Statistics.

COMMITTEE ASSESSMENT OF WAGE INDEX ALTERNATIVES

The committee examined potential improvements to each component of the HWI: its data source, inputs, and weighting. Because the wage data used to construct the index drive the choice of inputs and methods of weighting the inputs, the ensuing discussion is organized around the alternative sources of wage data available for construction of the index. These are (1) the current hospital cost report data, combined with the occupational mix survey data, and (2) data from the Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES).

The wage data should meet certain fundamental criteria. Most importantly, the data should be sufficiently accurate for use in a price index. That is, the data should reflect the prevailing wages in each market. To meet this criterion, the data should include wages from all employers with which a hospital competes for labor and should not be limited to hospital wage data. This derives from the principle described above, that the wage index should reimburse for the price of labor in a given market and not the cost of labor actually incurred by hospitals. Numerous dimensions of the data affect the accuracy of the index. These include the granularity of data elements, the industries covered, the number of facilities in each market submitting data, and the inclusion of relevant information on benefits and contract labor. Accuracy is also affected by technical characteristics, such as volatility and missing data. In addition to meeting standards in these categories, to the extent possible, the data should also be transparent and timely, and minimize administrative burden.

On the basis of these characteristics, the committee evaluated the current data source — hospital cost reports combined with the occupational mix survey — against data from the BLS OES, as prescribed by the scope of task for this report.

Current Wage Index Data

Accuracy

As described above, the current wage index is computed from hospital employee wage data that are reported to CMS in annual hospital cost reports, and from a special occupational mix survey of hospitals conducted by CMS approximately every 3 years. For a number of reasons, these data do not produce an index that reflects the prevailing wages that hospitals face in their respective markets.

The data that hospitals currently report lack occupation-level wages for all occupations. As described above, occupation-specific data is available for nursing occupations only. Occupation-level data are needed in each market to standardize the measurement of the AHW to a single fixed quantity of hours for each occupation. The current data contain enough wage information to standardize nursing occupations only, leaving more than half of hospital employment unstandardized. This gap results in a wage index that reflects wages paid (actual labor costs) for the unstandardized portion of each hospital's workforce rather than wages faced (the market price of labor). In a report for CMS, MaCurdy and colleagues found that the adjustment for nursing occupation mix results in a wage index change of at least 2 percent for

almost 24 percent of wage areas (MaCurdy, 2009). To include all workers in the OMA, the occupational mix survey would have to be expanded to cover all hospital occupations.

The cost report data currently used in the HWI are limited to the hospital industry; they do not include wages from the broader health care sector or non-health care industries. Although cost report wage data come from a census of all hospitals, rather than a survey, the target population is not hospitals but is the broader labor market of all employers who compete for hospital workers. The cost report data can therefore be viewed as a biased sample of the target population of all employers, negating the advantage of the census collection method.

A broad representation of occupation-specific wages is required to determine the prevailing wage in a labor market, on the basis of the definition of a labor market (Borjas, 2010). Most hospital workers—whether they are highly trained health care professionals such as nurses or occupations with little or no training —can work in health care settings other than hospitals or in other industries altogether. For example, a nurse can work in a physician practice, a school, a government agency, or a manufacturing plant. (For a fuller discussion of this issue, see the section,"Defining Markets," in Chapter 2.) When hospitals compete for workers, they place their compensation packages against those of other employers in the market, and not just other hospitals. Wage data from these other employers help to determine the prevailing area wage for a given occupation. Because the wage index produced by hospital-only data does not reflect the wages from these other occupations, the index does not reflect the prevailing wage in each labor market.

A related problem with hospital-only data is endogeneity, or circularity, defined as the ability of hospitals to influence their own wage index values. This is especially likely to occur in areas containing only a few hospitals, or in areas with one or a few dominant hospitals. Table 3-2 shows the number of hospitals in each labor market by metropolitan and non-metropolitan areas.

TABLE 3-2 Number of IPPS Hospitals by Labor Market

Number of Providers per Market Area	Large Urban Areas[a]	Other Urban Areas[b]	State Rural Areas[c]
1	0	58	1
2	0	96	2
3	0	55	1
4	0	38	2
5	0	30	5
6-10	7	41	8
11-20	31	4	9
>20	24	0	20

[a] Large urban indicates metropolitan statistical area (MSA) with population greater than or equal to 1 million

[b] Other urban indicates MSA with population less than 1 million

[c] State rural areas are aggregates of all non-MSA counties within a state.

SOURCE: RTI Analysis of CMS wage survey data for fiscal years 2009 to 2011

Fifty-nine markets have only one hospital, and 98 markets have only two hospitals. Nearly all of these markets are small to medium metropolitan markets. Thus, the cost report data that hospitals in these areas submit in a given year directly influence each hospital's index value 4 years later. In these markets in particular, the index can reflect hospitals' own decisions about what wages to pay rather than the prevailing wage in the area.

Hospital cost report data contain information on both wages and benefits, such as health insurance and pensions, reported in dollar values. This is important because the portion of compensation paid in benefits varies geographically, thereby affecting the value of the wage index. Table 3-3 shows that high-wage areas generally pay a higher portion of total compensation in benefits relative to low-wage areas.

TABLE 3-3 Benefits as an Add-on to Base Wages

Percentile Distribution	Low-wage Hospital Labor Markets (Wage Index ≤ 0.90)	High-wage Hospital Labor Markets (Wage Index > 1.10)
10th	1.22	1.24
25th	1.23	1.26
50th	1.25	1.28
75th	1.28	1.31
90th	1.30	1.34

SOURCE: RTI Analysis of CMS wage survey data for payment fiscal years 2009 to 2011

Excluding benefits from the index would produce inaccurate index values. Specifically, the index would be understated in areas where benefits account for a greater portion of compensation and overstated in areas where benefits account for a lower portion of compensation.

In addition to benefits, the cost report data— and the HWI —include the wages of contract workers, such as nurses, supplied by outside firms. Contract labor generally costs more per hour than directly employed labor (Broome, 2010); therefore, including wages for contract workers produces higher index values in payment areas that rely more on contractors relative to payment areas that rely less on contractors. Opinions vary regarding the appropriateness of including contract wages in the wage index, and an argument can be made that wages for contract labor should be excluded from the calculation of the index. Contract wages were included in the wage index until 1988, when data problems caused CMS to exclude them (CMS, 1992). CMS reincorporated contract labor wages in 1994 after revising the rules for reporting them (CMS, 1993). The following year, CMS incorporated wages for high-level administrators hired under management contracts (CMS, 1994). At the time, hospitals in nonmetropolitan areas were thought to use more contract labor than hospitals in metropolitan areas, to deal with nursing and other shortages of skilled workers (Size, 1992).

Other aspects of accuracy are more technical in nature. Missing data can decrease the accuracy of the AHW (as it represents the population of hospital workers) calculated from a data source. To the degree that all hospitals complete and submit their cost reports, the AHW accurately captures hospital worker wages. The completion rate of Worksheet S-3 is greater than 90 percent (CMS, 2010b). The occupational mix survey is a sample of 3,197 hospitals and has a response rate of 91.1 percent (CMS, 2010b).

The accuracy of each payment area's AHW—again, in reference to the population of hospital workers only— also depends on whether the data that hospitals supply on Worksheet S-3 and in the occupational mix survey are correct. Both data sources are subject to review and edits for aberrant data. However, a review of cost reports from 21 hospitals conducted by the Department of Health and Human Services Office of Inspector General found that 17 hospitals overstated wages and 4 understated wages (HHS, 2007). Overstatements ranged from 0.23 percent to 21 percent, while the four understatements ranged from 0.62 percent to 28 percent. The OIG stated that "the fiscal intermediaries' cost report reviews did not detect the errors because their review procedures were generally limited in scope."

The stability of cost report data from year to year is reasonable in most areas. However, in areas with only a few hospitals, the data can be volatile from year to year (MaCurdy, 2009), particularly if a sudden change in occupational availability occurs or a union contract changes wages significantly.

Transparency

The current cost report data used for the HWI are highly transparent. Because the cost reports are publicly available, a hospital can compute its own wage index, compare it with the indexes of other nearby hospitals, and plan for appeal through reclassification or other means.

Timeliness

Stakeholders have stated that hospital cost report data are dated. A given year's index is based on data that are 4 years old, because of the time required for CMS to receive and audit the data and respond to appeals of agency auditing decisions. It is not clear to the committee if or how the time lag affects the relative values of the wage index.

Administrative Burden

Worksheet S-3 and the occupational mix survey draw administrative resources from both hospitals and CMS. Hospitals must record and report data at the level of detail required by CMS. CMS and its contractors must review and manage the data. Moreover, the occupational mix survey involves a reporting and review effort separate from that for Worksheet S-3. Partly for this reason, the OMA is limited to the nursing occupations.

Inputs and Weighting

The inputs available from cost report data are total wages and total hours reported at the hospital level. From these inputs, CMS computes an AHW for each hospital. Then, for each labor market, CMS computes an AHW for all the hospitals in the area. The AHW for each labor market is divided by the national AHW to produce a wage index for each market. At this stage, the wage index is called a "raw" index because it is unadjusted for occupational mix.

To compute the OMA to the wage index, national occupation-specific weights are needed. These weights—expressed as the percentage of hours worked in each occupation—assign a level of importance to specific occupations and improve index accuracy. Because the weights available from the occupational mix survey cover nurses' hours only and nurses make up 42.5 percent of the hospital workforce, the OMA is incomplete; to include all workers in the OMA, the occupational mix survey would have to be expanded to cover all hospital occupations.

Potential Improvements to Hospital Data

The committee discussed ways of improving existing hospital data so that they could meet the requirements necessary to reflect the price, rather than the cost, of labor. First, additional occupation-level data could be collected and reported in either the annual cost reports or the triennial occupational mix survey. Either approach would increase the administrative burden on both hospitals and CMS. Second, the index could be made more reflective of the wages prevailing in a geographic area by incorporating data submitted to CMS from additional types of facilities. Cost report data are collected for long-term specialty hospitals, skilled nursing facilities (SNFs), home health agencies (HHAs), and hospices. However, CMS does not review these data as carefully as hospital cost report data. If they are used for the calculation of the wage index, the data would require more intensive review than is

currently done. The timeliness of the data could be improved if CMS could expedite the processes for review and correction of questionable data. This would likely require hiring or contracting with additional staff.

Even with the improvements discussed above, the data collected by CMS still reflect the actual costs incurred for labor rather than prevailing wages. Another approach is to collect BLS-type data from all facilities (including IPPS hospitals and facilities other than short term acute care hospitals such as skilled nursing facilities, home health agencies, and hospices) outside of the cost report process. Facilities would electronically submit to CMS the same type of payroll data that BLS collects for a sample of hospitals shortly after the close of the calendar year. This may or may not improve timeliness because it would require a CMS review process to replace the extensive reviews that BLS currently performs, as described below.

An Index Constructed with Data from the Bureau of Labor Statistics

Data

BLS sponsors the OES, which provides estimates of wages and employment rates for 800 occupations in 450 industries in the United States (BLS, 2011). The survey covers all salaried non-farm workers, excluding self-employed individuals. The data are collected through a voluntary mail survey distributed to about 200,000 establishments nationally every 6 months (BLS, 2011). Wages and employment rates are published on the basis of a rolling 3-year average; the total national sample size starts with 6 panels of 200,000 each, although some data is removed if it is deemed out of scope (BLS, 2011). Occupation-level wage data for specific industries are available at the level of MSA and statewide non-MSA regions within a state.[6]

Accuracy

The BLS data consist of occupation-specific hourly wages for all the occupations used by hospitals. At the labor market level, data can be segmented by industry, including the health care industry and, more specifically, the hospital industry. Because BLS data are collected at the occupation level, national weights can be computed for every occupation and incorporated into the index. Thus, the index is calculated as if all hospitals use the same amount of each occupation, for every occupation. In contrast, the hospital data provide this information for only four nursing occupations. The improved measurement of AHWs by occupation enabled by the BLS data produces an index that reflects the price of labor more accurately than an index generated with hospital data with a limited OMA. As reported above, several studies have shown that BLS data produce an index that better reflects prevailing wages in each area than cost report or OMA survey data (MaCurdy, 2009).

Because the BLS data are collected from all industries, an index using the data could include wages from multiple industries, in addition to hospitals. As explained above, multi-

[6] Occupations are defined by the Standard Occupational Classification system. Industries are defined by the North American Industry Classification System. The Office of Management and Budget coordinated the development of both systems on the basis of the work of interagency and intergovernmental committees of statistical experts.

industry data is important to a price index because all employers' wages determine the prevailing market wage. The committee considered an index based on (1) all-industry data or (2) health care sector data. In addition to hospitals, the health care sector includes physician practices, skilled nursing facilities, ambulatory surgical centers, home health agencies, and hospices, for example.

To gauge the relative accuracy of the options, the committee examined the correlations of the options with an index using data from all industries, based on the assumption that an all-industry index is more accurate than a health care sector index. As shown in Table 3-4, the correlation of the health care sector index with the all-industry index is very high—0.994 for metropolitan areas and 0.990 for non-metropolitan areas. The correlation is still high but not as strong between the hospital index and the all-industry index: 0.976 for metropolitan markets and 0.951 for nonmetropolitan markets.

TABLE 3-4 Correlations of Hospital Indexes Computed from Wages from Different Industry Sectors

Metropolitan Markets	All Employers	Health Sector	All Hospitals	General Hospitals*
All employer	1.000			
Health sector	0.994	1.000		
Hospitals	0.976	0.981	1.000	
General hospitals	0.974	0.979	0.999	1.000
BLS Rest-of-State Areas				
All employer	1.000			
Health sector	0.990	1.000		
Hospitals	0.951	0.950	1.000	
General hospitals	0.951	0.950	0.999	1.000

SOURCE: RTI analysis of BLS tabulations of Occupation Employment Series (OES) data released May 2010
NOTE: * Category includes only general medical and surgical hospitals.

In Chapter 2, the committee recommends an index based on health care sector data, acknowledging that health care employers may differ from the universe of all employers in terms of the percentage of compensation paid in benefits, the likelihood of unionization, and other ways that might affect compensation rates for some types of employees. Extending the index to account for additional employers increases the number of facilities contributing data, thereby addressing the problem of index circularity (in addition, data become more stable from year to year because the sample size increases) .

Unlike hospital cost report data, BLS data do not include benefits, an important component of the wage index because the portion of total compensation attributable to benefits varies systematically. As seen in Table 3-3, the median value of benefits as a percentage of base wages is 25 percent in low-wage areas and 28 percent in high wage areas. Benefits information is available in another BLS survey, the National Compensation Survey (NCS). However, occupation-level all-industry benefits data are available for only 15 MSAs, and expanding this survey would be costly, which is unlikely in the current fiscal climate.

The committee discussed several alternatives for incorporating benefits data into an index constructed with BLS wage data. CMS could continue to require submission of the benefits portion of Worksheet S-3 and compute an adjustment to the wage index reflecting the value of benefits. This adjustment would be incorporated as a second step, after the wage index is calculated, similar to how the OMA is applied to the wage index. This approach has two disadvantages: (1) use of data from two different sources can create inaccuracies and inconsistencies in wage index values, and (2) maintenance of Worksheet S-3 defeats an advantage of using BLS data, which is to eliminate the need for hospitals to complete the form.

A plausible alternative is to use the NCS to construct a regression from which a coefficient for benefits could be used to adjust wages.

Another difference between hospital and BLS wage data is that BLS data do not capture the wages of contract labor. Contract services are used for professions in short supply, for services where the patient volume is insufficient to hire a staff employee, or to fill vacancies created by turnovers (Broome, 2010). Nationally, in 2002, contract workers accounted for about 8 percent of all hospital personnel expenses (Shoemaker, 2005). A more recent study in North Carolina attributed about 5 percent of that state's hospital labor costs to contract labor (Broome, 2010). Hospitals vary in their reliance on contractors, and the trend differs by profession. In North Carolina, for example, rural hospitals use more contract therapists and certified nurse anesthetists than urban hospitals do, while urban hospitals use more contract pharmacy and surgical technicians and more contract clinical lab scientists.

The use of contract labor is generally inefficient. A contract worker is more expensive per hour than the same worker employed directly by a hospital (Shoemaker, 2004), partly because a fee is paid to the firm supplying the worker, in addition to compensation to the worker. While the use of contract labor may be necessary because of scarcity in the type of labor that a hospital needs, it may also reflect management decisions unaffected by other pressures. An argument can be made that contract wages do not belong in the wage index and that the lack of contract wages in BLS data is not necessarily a drawback. The committee will address this issue in more detail in the phase 2 report, considering whether or not contract labor should be included, and if so, how to incorporate contract labor into an index using BLS data.

BLS and CMS data are also different when they are compared according to their year-to-year volatility, with BLS data appearing to be more stable. One reason is that the BLS index is a rolling average of 3 years of data, and rolling averages are inherently more stable than static averages (Zaslavsky, 2002). Indexes constructed from CMS data experience small to medium changes over 1 year more frequently than indexes constructed from BLS OES data. The 2002 to 2004 BLS wage index experienced a -0.05 percent mean 1-year change, while the FY 2005-FY 2008 Medicare wage index experienced a -0.17 percent mean 1-year change (MaCurdy et al, 2009).

All individual hospitals and all areas experience some degree of variation, regardless of which index is applied (MaCurdy et al, 2009). An RTI analysis found that from 2002 to 2004, 1.3 percent of payment areas experienced changes in the CMS index of 10 percent or more, while 0.9 percent of the payment areas experienced changes in the BLS index of 10 percent or more (Dalton, 2007). Use of health care or all-industry data, as opposed to hospital-only data, can improve stability for two reasons: (1) the sample size increases and (2) events that can lead to sudden wage changes, such as a diminished supply of individuals in certain occupations, are less likely to occur simultaneously in multiple industries (MaCurdy et al, 2009).

The BLS data come from a survey (based on a probability sample), not a census, as do hospital cost report data. Wage and employment data are estimated by use of scientifically accepted statistical procedures sanctioned by the Office of Management and Budget (OMB). The response rate for the survey is about 80 percent. Wages and employment (counts of workers) are imputed for non-respondent employers by a method known as "nearest

neighbor." This is accomplished by replacing the missing cell value with the value of the most similar cell for which data are available, based on characteristics including occupation, location, and employer size.[7]

BLS publishes all-industry data for occupational categories by area for which (1) the relative standard errors (RSEs)[8] are less than 30 percent for wages and 50 percent for employment and (2) there are at least 3 sample units with at least two responses. The first requirement is to ensure the precision of the data and the second is to protect the confidentiality of employer respondents. Under its current policies, BLS does not publish wage and employment data for the health care sector by state or area, but they do allow state partners to publish that information.

To assess the accuracy of the BLS wage data for the committee, RTI examined the RSEs for the employment share-weighted average wages of three occupations that comprise 50 percent of total hospital employment: RNs; nursing aides, orderlies, and attendants; and office and administrative support staff. This simulates a combination of all occupation-adjusted wages used to construct an index from BLS all-industry data. The analysis, performed with published all-industry data, shows that BLS data are reliable in most areas, including nonmetropolitan areas. The committee could not evaluate unpublished health sector data in the time allotted for the study because the standard errors for these data were not available from BLS in that time period.

For the committee's analyses, BLS calculated wage index values on the basis of unpublished data for the health care sector. RTI analyzed the correlation between the wage indexes calculated using BLS published all-industry data and wage index values calculated for IOM by BLS using unpublished health sector data. As Table 3-4 shows, the correlation is 0.994, and the number of markets in which the index values of published versus unpublished data differ substantially is small.

The BLS data are reviewed for accuracy at 3 levels: the state agents who collect the data (these are sworn agents of BLS), BLS staff at the regional federal level, and BLS staff at the national level.

Transparency

Because BLS data are collected as part of a confidential survey process, data at the firm level are not publicly available; wage data are available at the area level. In comparison, CMS cost report data are available at the hospital level. The methods that BLS uses are completely transparent. Moreover, BLS makes its restricted data available on-site to researchers by application, and research to validate wage indexes may fall into the category of acceptable use.

[7] Technical details on BLS data are available at http://www.bls.gov/oes/current/oes_tec.htm.

[8] RSE is a measure of the precision of the estimate. More specifically, it is the standard error of the estimate divided by the estimate itself (the mean of the sample). For example, an hourly wage estimate of $30 with a 10% RSE means that the actual wage is likely to be between $27 and $33. The actual wage is more likely to be closer to $30 than to $27 or $33.

The committee values transparency as a core principle. However, transparency does not require that hospitals have access to cost data from other hospitals, because neither costs nor hospitals are relevant constructs in the context of a price index.

Timeliness

The timeliness of BLS data is comparable to that of the data currently used for the wage index. The data that BLS uses for a given year's index range from being 2 to 5 years old, which is the result of using a rolling average to compute wage rates.

Administrative Burden

If BLS data were used to construct the HWI, the triennial occupational mix survey could be eliminated, along with all or part of Worksheet S-3. If BLS data were used in conjunction with a regression-computed benefits adjustment based on NCS data, CMS could eliminate the entire Worksheet S-3, a 2-page line-itemed document similar to an Internal Revenue Service tax form. Acquisition of benefits information from Worksheet S-3 would require maintaining that portion of the worksheet.

Inputs and Weighting

With occupation-level data, it is possible to construct an index by using fixed national weights, holding all hospitals accountable to a single national standard for the amount of each occupation used. As explained above, this is a fundamental principle of a price index versus a cost index: that the index should not capture variation due to hospital management decisions.

Some hospitals argue that they are reliant on a different and presumably more costly mix of occupations then other hospitals. In some states, laws require a specific nurse-to-patient ratio or limit the scope of practice of some types of nurses. In California, for example, the law requires one RN for every five medical/surgical patients and one RN for every two intensive care patients. In addition, California law limits the scope of practice for LPNs, with the effect being that RNs provide the majority of inpatient care (Kasprak, 2004). The question then arises as to whether the weights (or the OMA, in the current index) should account for these local differences.

The committee examined metropolitan and nonmetropolitan differences in occupational mix for each of the four United States census regions. Table 3-5 compares hospital use of the 10 most common hospital occupations across these areas. Generally, the shares of occupations used are similar across census regions. A report for CMS compared differences in BLS wage index values using national weights and state weights. For 93 percent of payment areas, the difference between state-weighted and national-weighted indexes was less than 1 percent (MaCurdy, 2009).

Although the labor shares in individual states can vary for reasons beyond the control of individual hospitals, a price index that accommodates state and local decisions such as staffing ratios and scope-of-practice laws can be administratively burdensome and give states an

inappropriate incentive to mandate specific input quantities because the costs would be reimbursed by the federal government. As a federal program, Medicare's responsibility is to purchase quality services in a way that provides incentives for efficient provision of high-quality care to Medicare beneficiaries across the country.

TABLE 3-5 Employment Shares (%) for Ten Most Common Hospital Occupations, by Census Region and Metropolitan and Non-Metropolitan Areas

	Employment Shares (%)								
	National	Northeast		Midwest		South		West	
Occupation Title		MSA	Statewide Non-MSA	MSA	Statewide Non-MSA	MSA	Statewide Non-MSA	MSA	Statewide Non-MSA
Registered nurses	29.69	29	26	30	25	31	25	31	25
Nursing aides, orderlies	7.89	8	8	7	8	8	9	8	9
Licensed practical and vocational nurses	3.15	2	4	2	5	3	7	3	4
Radiologic technologists and technicians	2.54	2	3	3	3	3	3	2	3
Maids and housekeeping	2.34	2	3	2	3	2	3	2	3
Medical secretaries	2.31	2	2	2	2	2	2	3	2
Medical and health services managers	2.04	3	2	2	2	2	2	2	2
Medical and clinical laboratory technologists	1.97	2	2	2	2	2	2	2	2
Office clerks, general	1.97	2	2	2	2	2	2	2	1
Interviewers, except eligibility and loan	1.79	2	2	1	2	2	3	2	2

SOURCE: RTI analysis of BLS tabulations of Occupational Employment Statistics (OES) data released May 2010, for the general medical and surgical hospitals (industry code 622100)

A related issue concerns which occupations to include in the wage index computation. The choice of occupations and the weights that they supply will affect index values if there are systematic geographic differences in the mix of occupations used by hospitals, if wages for those occupations differ, and if the number of workers in these occupations is substantial.

If BLS hospital-only data are used, not all occupations can be included because the sample sizes for less commonly used occupations in smaller labor markets would be insufficient. A Medicare Payment Advisory Commission (MedPAC) report that recommended using BLS data for production of the wage index suggested using 30 occupations (MedPAC, 2007), and an Acumen report to CMS to evaluate MedPAC's proposal suggested that 62 occupations be included as weights in an index based on BLS data (O'Brien-Strain, 2008). The Acumen analysis shows that the choice of occupations has a moderate impact on index values: about 14 percent of wage index areas experienced a difference in their index values of more than 2 percent when computed on the basis of the 62 most prevalent occupations and MedPAC's 30 occupations. [9]

The committee examined the effects on wage index values of using MedPAC's 30 recommended occupations versus all of the occupations contained in the BLS OES data. Figure 3-2 shows a scatter plot correlating the HWI values computed on the basis of each set of occupations. Although the correlation between the 2 sets is extremely strong, the graph shows that lower-wage markets have a slightly higher wage index when the full set of occupations is used, whereas higher-wage markets have a slightly higher index when the reduced set of occupations is used. Since all occupations are available in most labor markets in BLS health care sector data, it makes sense to use all occupations in the index construction and weighting, based on wage data from the health care sector.

[9] See Appendix E for a comparison of the MedPAC and IOM proposals for alternative hospital wage indexes.

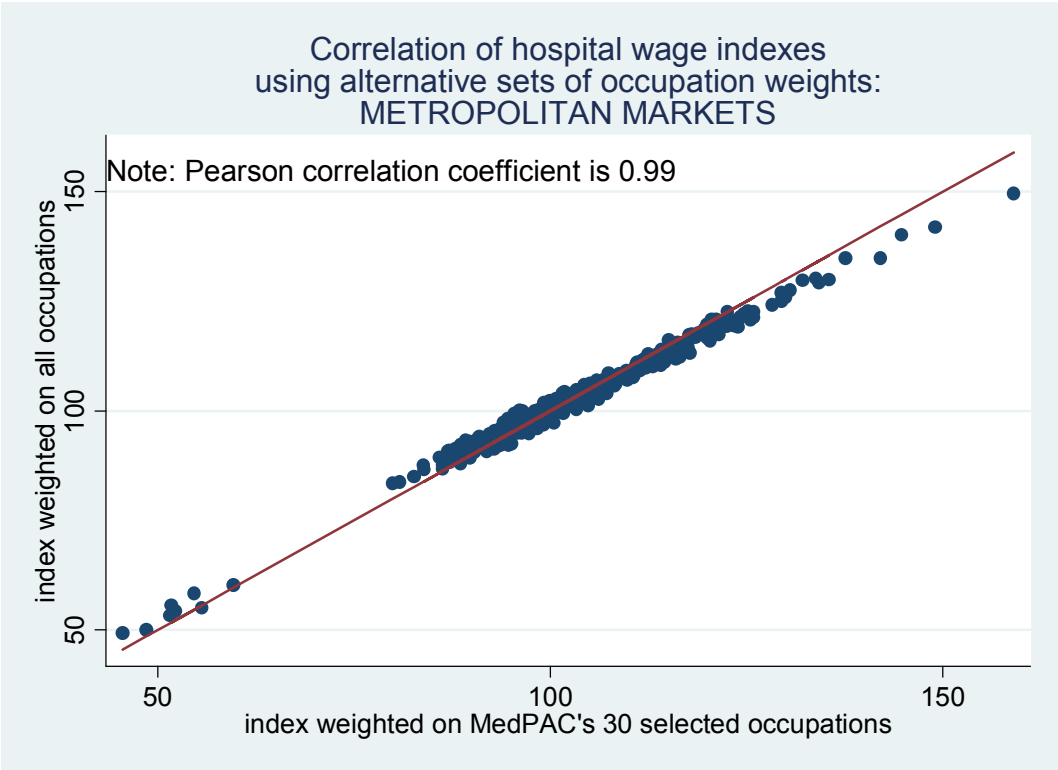

FIGURE 3-2 Correlation of Hospital Wage Indexes Using Alternative Sets of Occupation Weights. Wage data from Puerto Rico are included.
SOURCE: RTI analysis of BLS indexes computed from published and unpublished data

THE HOSPITAL WAGE INDEX AND OTHER FACILITIES

Recommendations for improving the HWI for IPPS hospitals will also affect facilities other than short term acute care hospitals. Since 1997, CMS has applied a pre-floor, pre-reclassification wage index (without accounting for occupation mix or outmigration) to inpatient rehabilitation facilities, inpatient psychiatric facilities, long-term care hospitals (LTCHs), SNFs, hospital outpatient services (HOPDs), ambulatory surgical centers (ASCs), HHAs, and hospice facilities (Dalton, 2007). [10]

The HWI may be inaccurate as a geographic adjuster for these providers for several reasons. First, facilities other than short term acute care hospitals have a different labor share and mix than IPPS hospitals (MedPAC, 2007) because many of them provide services that are different from those provided by IPPS hospitals. Second, the HWI is not geographically representative of other types of facilities such as HHAs, SNFs, etc.; that is, facilities other than short-term acute care hospitals may be located in areas where there are no short-term acute care hospitals (Dalton, 2007). Third, the HWI includes data pertaining to IPPS hospitals. Although labor markets in metropolitan areas are defined primarily by larger IPPS facilities,

[10] The pre-reclassified, pre-floor wage index is the value of the index before changes are made on the basis of hospital requests to CMS to be classified in different labor markets and before incorporation of the effects of congressional mandates to limit how low a wage index value can be. See Chapter 2 for more information.

labor markets in nonmetropolitan areas are typically governed by smaller establishments. Therefore, use of only IPPS hospital wages to calculate a wage index for nonmetropolitan areas in which most employees work at smaller establishments does not accurately reflect the type of labor that facilities other than short term acute care hospitals provide or the wages that they pay (Dalton, 2007).

To improve payment accuracy to facilities other than acute care hospitals, the committee recommends that CMS use BLS OES data, rather than the hospital data used in the current HWI. Because the BLS data include wage information from all employers, CMS can adjust the weights for each type of facility to create an index that reflects the national labor share and mix of each facility type. It is important to note that smoothing methods (discussed in Chapter 4) are applicable to any type of provider, and facilities other than short term acute care hospitals should benefit from smoothing to prevent large differences in wage index values between nearby providers. The committee also encourages CMS to continue a more thorough study of payment methodologies as they are applied to facilities other than short term acute care hospitals. Because of the time constraints of this study, the committee was unable to investigate providers other than IPPS hospitals.

OTHER ISSUES

Apart from wage variation, other variation is currently not captured in the input price index used for hospital services, including variation in prices for utilities such as energy and telecommunication services. Another shortcoming in the adjustment of hospital input prices lies in the source of data used to adjust for capital. Currently, the value of hospital capital is adjusted using the wage index, because of a lack of data on capital price variation. If CMS used data on the price of capital rather than the price of labor, the accuracy of the capital adjustment might be improved.

The committee recognizes that gaps exist in the geographic adjustment of the inputs used to produce hospital services. Although the committee did not have the time or resources to explore these areas in more depth, CMS may want to do so. New sources of information on clinician office rent (recommended in Chapter 5) might prove useful in refining the geographic adjustments for hospital input prices.

COMMITTEE RECOMMENDATIONS

Recommendation 3-1: The U.S. Congress should revise the hospital wage index (HWI) statute (Section 1886(d) (3) (E) of the Social Security Act) to allow the Secretary of the U.S. Department of Health and Human Services to use data from the Bureau of Labor Statistics (BLS) to compute the wage index.

An index constructed by the use of the Bureau of Labor Statistics (BLS) wage data from all health care employers will reflect the prevailing wage in each labor market more accurately than the use of the Centers for Medicare and Medicaid Services (CMS) hospital-only data, reduce the potential for hospitals to affect their own index values, and reward hospitals for efficient use of labor. The wages paid by all health care sector employers in the geographic area is a better measure of prevailing market wages than the wages paid only by acute care hospitals. Because BLS data are collected at the occupation level, national weights can be computed for every occupation and incorporated into the index. The improved measurement of average hourly wages by occupation enabled by the BLS data will produce an index that reflects the price of labor, rather than the cost of labor. In contrast, the index constructed with hospital data has only a partial OMA, and the data used to compute it come from hospital employers only. As required by law, if the use of BLS data changes the total level of compensation, CMS will have to re-calibrate the wage index to make the change budget neutral.

The committee compared the BLS and hospital data on other characteristics. The major disadvantage of the BLS data is that it does not contain information on the value of benefits. However, this limitation can be addressed by using data from the National Compensation Survey to compute an adjustment to average hourly wages for use in the wage index. An alternative would be for CMS to continue collecting benefits data from hospitals. The BLS is also missing data pertaining to the use of contract labor in hospitals. The committee will revisit this issue in the phase two report, and consider whether or not a hospital wage index (HWI) should include the price of contract labor. If appropriate, the committee will identify and recommend potential sources of contract labor data. Another disadvantage is that the BLS data are less accessible than the hospital data. Because BLS data are carefully managed under federal statistical requirements for accuracy and confidentiality, hospitals and their agents cannot work directly with the BLS firm-level data. However, BLS allows researchers to apply to work with such data on site for credible research purposes.

Constructing the HWI using the BLS data would reduce the administrative burden on both hospitals and CMS. The occupational mix survey of hospitals could be eliminated, and the Worksheet S-3 that hospitals submit annually to CMS could be eliminated or shortened significantly.

Recommendation 3-2: The Centers for Medicare and Medicaid Services (CMS) should establish an ongoing agreement with the Bureau of Labor Statistics (BLS) to use all necessary wage data from the Occupational Employment Statistics (OES) to compute the wage index.

The Centers for Medicare and Medicaid Services (CMS) will need access to unpublished data from the Bureau of Labor Statistics (BLS) to compute the wage index. The BLS publishes all-industry data at the occupation level for most labor markets. The BLS also maintains a broader set of unpublished data, including all-industry data for the remaining markets and health care sector data at the occupation level for all markets. Although all-industry data best reflect market wages for a given hospital occupation, the committee acknowledged in an earlier recommendation reasons for restricting industry wage data to the health care sector. If small sample sizes affect the accuracy of calculations, additional data could be collected, areas or years of data could be combined, or methods that borrow strength from surrounding regions could be used.

Several options for arranging CMS' access to the BLS data exist. The agencies could arrange for the BLS to calculate wage index values for CMS. The two agencies could also pursue a legal arrangement under which the BLS provides data directly to CMS, or CMS could work with the BLS to publish health care sector data. Although neither CMS nor BLS would be able to release unpublished data, the methods used to compute the index could be made public and researchers could apply to BLS to use unpublished data on-site at the agency to do validation research, which could include evaluating the accuracy of the wage indexes based on the BLS data.

Recommendation 3-3: The committee recommends use of all occupations as inputs in the hospital wage index (HWI), each with a fixed national weight based on the hours of each occupation employed in hospitals nationwide.

The choice of occupations and the weights that they supply will affect index values if there are systematic geographic differences in the mix of occupations used by hospitals, if wages for those occupations differ, and if the number of workers in these occupations is substantial. Use of all occupational categories eliminates the element of arbitrariness that by nature pertains to the use of any subset of occupations.

The committee examined the effects on wage index values of the use of a limited number of occupations versus all of the Bureau of Labor Statistics (BLS) occupations. Lower-wage markets have a slightly higher wage index when the full set of occupations is used, whereas higher-wage markets have a slightly higher index when the reduced set of occupations is used. Since all occupations are available in most labor markets in the BLS health care sector data, it makes sense to use all occupations in the index construction and weighting, based on wage data from the health care sector.

The inclusion of all occupations in constructing the wage index strengthens the case for using health care industry rather than hospital industry-only data to construct the index. The use of hospital industry-only data would require that some occupations be excluded because, although sufficient data are available at the nationwide level to construct hospital industry-

specific occupational weights, the sample size for less commonly used occupations in smaller labor markets would be insufficient to construct indexes that include all occupations in each area.

Recommendation 3-4: The Centers for Medicare and Medicaid Services (CMS) should apply the proposed hospital wage index (HWI) to facilities other than short term acute care hospitals, using nationwide occupation-specific weights derived from data for each type of facility.

The hospital wage index (HWI) is currently applied to non-inpatient prospective payment system facilities, such as skilled nursing facilities, home health agencies, and ambulatory surgical centers. The current wage index does not accurately reflect the wage levels that these providers face because it is computed only from hospital wages, based on hospital labor shares. The committee recognizes that its recommended adjustments to the wage index will affect these non-inpatient prospective payment system facilities. These types of facilities typically have a different mix of employees than inpatient prospective payment system hospitals, and their labor shares are unique to the nature of the clients that they serve, the resources that they require, and the services that they offer. To improve the accuracy of the price index recommended by the committee for geographic adjustment of payment to these non- inpatient prospective payment system facilities, the Centers for Medicare and Medicaid Services (CMS) should use the labor shares derived from each setting as occupation-specific weights in its respective index computations.

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4

Smoothing the Borders of Labor Markets and Payment Areas

Medicare adjusts payments to hospitals according to their geographic location in designated labor markets. As discussed in Chapter 2, a labor market is a market in which employers compete for a common group of workers, such as nurses, and workers compete for a common set of jobs, such as those in the health care industry.

For reasons explained in Chapter 2, it is difficult to definitively establish the boundaries of labor markets. Metropolitan statistical areas (MSAs), a core-based statistical area (CBSA) designed under the auspices of the Office of Management and Budget (OMB), have generally been accepted as reasonable approximations of local labor markets because they are defined on the basis of core population centers surrounded by counties that have high levels of economic integration with that core (see Chapter 2 for additional discussion of MSAs).

Regardless of what method is used to define labor markets, boundary issues will arise. Some neighboring providers who know that they compete for the same labor will find themselves classified into different wage areas and subject to different geographic adjustment factors. If the wage index values are very different on either side of labor market borders (what are sometimes called "wage cliffs"), this leads to a perception that the index is inaccurate or unfair. Smoothing the labor market boundaries is a way of addressing these border issues by reducing the index differences between nearby areas. Incorporating a smoothing adjustment into a geographic price adjuster is a way of acknowledging that fixed market boundaries cannot always accurately represent economic activity.

In Chapter 2, the committee recommended that the same labor market definitions should be used for both the hospital wage index (HWI) and the physician geographic practice cost indexes (GPCIs). In the committee's view, both the HWI and the GPCIs should reflect geographic variation in input prices rather than variation in cost, because costs are determined by both price and production decisions such as choice of types of labor. For this reason the committee has recommended the use of a fixed weight index – that is, one that captures geographic variation for a fixed set of occupations in fixed amounts. The committee also recommended in Chapter 2 that MSAs and statewide non-MSAs be used to define input markets for both hospitals and physicians.

This chapter builds on the description of labor markets in Chapter 2 and the discussion of the HWI in Chapter 3. It begins by providing background on the current wage index, the extent of the "wage cliff" problem, and how wage differentials between nearby areas are addressed under the current geographic adjustment system through the system of reclassifications and exceptions described in Chapters 1 and 3. The chapter goes on to describe other approaches for refining markets using formula-based

smoothing techniques, and then examines modeling results for three specific smoothing methods that were evaluated by the committee. Finally, the chapter offers the committee's recommendations for a smoothing approach based on commuting patterns of health care workers.

ADJUSTMENT APPROACHES UNDER THE CURRENT HOSPITAL WAGE INDEX

The original current HWI is computed from IPPS hospital data, after adjusting the hourly wages for occupational mix differences but before making any labor market reassignments or other adjustments. The values of the 2011 original (or "pre-reclassification") index range from 0.671 to 1.638, excluding values in the territories. Reclassification and other adjustments narrow the range – the lowest index value after reclassification is 0.743. Reclassification also reduces the number of wage cliffs. Under the original index, there are 1,709 pairs of hospitals located within 25 miles of each other that have an index value difference of 0.10 points or more. Under the final post-reclassification index, there are only 614 pairs of hospitals with a difference of 0.10 points or more.

Adjustments and exceptions to labor markets under the current inpatient prospective payment system (IPPS) can be grouped into three types: those with a rationale based on commuting patterns, those with a rationale based on individual hospital wages, and those that serve a policy or political objective but are not based on technical improvements to the index (see Table 4-1).

"Lugar counties" were the first wage index exceptions, enacted as part of the Omnibus Reconciliation Act of 1987. Lugar counties are nonmetropolitan counties located at the edges of non-MSA rest-of-state labor markets, where there is documentation that a substantial part of the population commutes into the neighboring MSA.[1] Hospitals located in a Lugar county are "deemed urban" and automatically re-reclassified into the neighboring MSA.[2]

[1] Code of Federal Regulations, Section 412.63.

[2] The Omnibus Reconciliation Act of 1987 (P.L. 100-203) simply "deemed" them to be part of the neighboring MSA; a later amendment in the Omnibus Reconciliation Act of 1989 (P.L. 1-1-239) revised this and established Lugar counties as a type of reclassification, in order to avoid penalizing the rural markets in which Lugar hospitals were physically located.

TABLE 4-1 Types of Administrative Adjustments Under the Current System

Adjustment	Based on Commuting Patterns	Based on Hospital Wages	Based on Other Characteristics
Lugar Counties (n = 55)	X		
MGCRB Reclassifications* (n = 810)			
Whole County	X	X (group)	
Individual Hospital		X (individual)	
Section 505 "Outmigration" Adjustments (n = 215)	X		
"Rural Floor" (n = 184)			X
"Frontier State Floor" (n = 49)			X

*MGCRB =Medicare Geographic Classification Review Board. Section 401 providers are included in the MGCRB reclassifications category.

SOURCE: RTI analysis of IPPS Impact File as published August 2010 and Final Wage Index Tables for FY 2011

The most common type of labor market adjustment is reclassification granted through the Medicare Geographic Classification Review Board (MGCRB). Most of these are individual hospital reclassifications, and they can be granted for hospitals wanting to reclassify from a nonmetropolitan market to a nearby MSA, or from one MSA to another MSA. As described in Chapter 3, criteria for individual hospital reclassifications are based on geographic proximity to higher-wage markets as well as hospital-specific wage costs. Hospitals must meet what are known as "wage comparability criteria," which require that the hospitals' own average hourly wage is both comparable to the average wage of the labor market to which they are requesting reclassification, and higher than the market wage where they are geographically located.

MGCRB can also grant requests to re-designate whole nonmetropolitan counties as metropolitan, which will qualify all hospitals in the county for reclassification into a neighboring MSA. County re-designations are based on a combination of criteria that include both wage comparability and commuting patterns. Specifically, recent commuting data must demonstrate levels of economic integration similar to those that the OMB (2000) uses to identify outlying counties in the core-based statistical area (CBSA) metropolitan area definitions.[3]

Section 505 of the Medicare Modernization Act of 2003 introduced a new type of wage index adjustment that is based primarily on commuting patterns and is available to hospitals that are not reclassified by the MGCRB (CMS, 2004).[4] Known as the "outmigration adjustment", it provides for wage index changes for qualifying hospitals located in qualifying counties where at least 10 percent of resident hospital workers are commuting to hospitals located in other MSAs with a higher wage index. The adjusted index is a weighted average of the wage index for the home (or resident) county and the indexes for the work area counties.

[3] *The Medicare Geographic Classification Review Board*, Section 412.63

[4] Section 505 of Public Law 108-173.

The underlying assumption behind the Section 505 adjustments is that if workers in a given county are able to commute to a neighboring labor market with higher wages, then the prevailing wages faced by the given county's hospitals will be higher than prevailing wages faced by other hospitals in their labor market. Many hospitals facing this situation will pay higher wages and will meet the wage comparability criteria for wage index reclassification. Eligibility for Section 505 adjustments, however, is limited to hospitals that are not reclassified. They must be located in counties that meet the 10 percent outmigration threshold, and they must have an average county hospital wage that is higher than the average hospital wage of their assigned labor market.

The last two adjustments on Table 4-1 are those for "rural floors" and "frontier floors". These adjustments have the effect of reducing variation in payments across areas, but they are unrelated to border issues or market misclassification.

What is called the "rural floor" adjustment was enacted by the Balanced Budget Act of 1997. It is actually an index floor for urban hospitals, because it establishes that MSA index values within each state cannot be any lower than the state's non-metropolitan index value.[5] Hospitals in MSAs that are subject to a rural floor are not reclassified – they are simply paid using the higher index of the nonmetropolitan area, rather than their own markets' computed index. No proximity or wage comparability requirements are associated with the rural floors. RTI identified 46 MSAs across 20 states that were subject to rural floors in FY 2011, resulting in a higher wage index for 215 IPPS hospitals.

Frontier state wage floors are the most recent type of wage index policy adjustment, having been enacted as part of the Patient Protection and Affordable Care Act of 2010. These set a lower limit of 1.00 on index values for any labor markets located within five states that have very low population densities (referred to as "frontier states"), regardless of the actual level of relative wages. The five states are Montana, North Dakota, South Dakota, Utah, and Wyoming. Nonmetropolitan markets in all five states and metropolitan markets in 10 of their metropolitan areas benefit from this floor. The frontier state floors result in a higher wage index for a total of 49 hospitals.

ADJUSTMENT APPROACHES CONSIDERED BY THE COMMITTEE

The committee sought to recommend a method of addressing labor market border problems that will reduce the need for reclassifications and exceptions. The committee believes that application of a consistent and data-driven smoothing process applied to MSA-based markets can help to reduce the number and magnitude of wage cliffs, while remaining faithful to the basic wage index principles described in Chapter 1.

[5] Section 4410 of the Balanced Budget Act of 1997 (P.L. 105–33). In addition, a related category of "imputed rural floors" was created through a special temporary regulatory measure (CMS, 2004) that provided related relief for states with no hospitals located in rural counties. Rules enabling imputed rural floors are set to expire in FY 2012.

The committee studied the problem of wage cliffs under MSA-based labor markets, and reviewed three formula-based smoothing techniques in more detail: the first is contiguous-county smoothing, similar to what was proposed in 2007 by MedPAC; the second is commuting pattern-based smoothing similar to what is currently used for the outmigration adjustment; and the third is geospatial smoothing as implemented through geographic information systems software. These approaches were each evaluated as possible alternatives to the current set of administrative adjustments now used to address wage index boundary problems.

The committee believes that any proposed approach to smoothing should:

- be plausibly linked to the notion of improved accuracy in labor market definitions;
- use computations that are transparent and reproducible by the provider community;
- rely on data that are publicly available, reliably produced, and periodically updated;
- be systematic and formula-based, to minimize the need for individual reviews or exceptions processes;
- be made budget-neutral in implementation;
- focus on markets rather than individual facilities; and
- avoid use of hospital-specific criteria or costs.

The last 2 objectives are grounded in both conceptual and practical concerns. Provisions to adjust the wage index should focus on areas where there is evidence that a local market is misrepresented by MSA and statewide non-MSA definitions, rather than evidence that a given facility is disadvantaged. A given facility's labor costs are a reflection of both the prevailing wages in its area and the decisions that the facility makes about the types of labor to hire. In keeping with the principles identified in Chapter 1, the underlying goal of a price index should be to adjust only for the first of these.

From a purely practical perspective, it is also important to recognize that a change from CMS wage data to wage data from the Bureau of Labor Statistics (BLS) as a source for the index will mean that the computation of average hourly wages from the Medicare cost report Worksheet S-3 will no longer be needed. The source for "comparable wage data," which is used to defend arguments for hospital-specific adjustments, may therefore no longer be available. This provides another reason to develop an adjustment that avoids reliance on individual hospital labor costs.

Contiguous County Smoothing

Background

In June of 2007, the Medicare Payment Advisory Commission (MedPAC) recommended using BLS/OES hourly wage data in the HWI (MedPAC, 2007). At that time, the Commission also suggested a contiguous-county smoothing algorithm that could be applied to the BLS index values to reduce large border differences, as an alternative to hospital-level geographic reclassification. The rationale underlying contiguous county smoothing is that large differences in index values between communities located on either side of an MSA boundary may be the result of distortion due to MSA-level averaging rather than true local variation in the price of labor.

To implement this method, MedPAC analysts first set a maximum tolerable difference in wage index values across any given border. Although the choice of a specific threshold may be arbitrary, the threshold can be modified easily in modeling to allow policy makers and regulators a chance to see how sensitive the smoothed index is to the choice. MedPAC chose a threshold of a 10 percent positive difference in the wage indexes of two contiguous counties, such that the smoothing algorithm would be applied only where the wage index applicable to a particular county was less than or equal to 90 percent of the wage index of a contiguous county. All pairs of counties along any side of all MSA and non-MSA borders were evaluated to see if the difference in their wage indexes exceeded the tolerance level. If the threshold difference was exceeded, then the wage index applicable to the county with the lower index was adjusted up to the 90 percent threshold.

Smoothing can be designed so that adjustments are made only for the county with the lower index value (i.e., positive values only), or so that adjustments are made for both counties (i.e., positive and negative values). By allowing smoothing only in counties where the wage index was 90 percent or less of the wage index in a contiguous county, MedPAC chose to model smoothing so that it would produce only positive adjustments. A positive-only adjustment algorithm will raise the national aggregate wage index. Therefore, MedPAC also applied a budget neutrality adjustment to the wage index values of all providers, to offset the payment effect of the positive contiguous county adjustments (see Box 4-3 for discussion of budget neutrality adjustments).

Simulations

As part of its deliberations, the Committee modeled the impact of contiguous-county smoothing, using a simplified version of MedPAC's approach.[6] The RTI

[6] The MedPAC algorithm had 2 stages, the first referred to as blending and the second as smoothing. The blending stage recognized within-state variation, using available county-level data from the 2000 census for four key health care occupations. For each county the index value before smoothing was the MSA-level BLS index value, adjusted to incorporate one half of computed within-MSA county variation as

simulations used the CMS pre-reclassified index for FY 2011 as a base rather than an alternative BLS index, in order to compare the impact of smoothing to the impact of the current adjustments (see Box 4-1).

Table 4-2 identifies the number of counties and hospitals affected. Using an 85 percent threshold (the index of the lower wage county is no greater than 85 percent of the higher-wage county), 9 percent of counties and 7 percent of hospitals qualify for an adjustment. The offsetting reduction in all index values needed to fund the positive-only smoothing adjustments is -0.3 percent. Using a 95 percent threshold, two-thirds of counties and 58 percent of hospitals qualify for a smoothing adjustment. The results suggest that a 90 percent threshold could be reasonable from a policy perspective.

BOX 4-1
How Contiguous County Smoothing Was Implemented

RTI's contiguous county smoothing model used data for 3,413 IPPS hospitals located across 1,595 counties. Three versions were run based on threshold differences where the target county index had to be 85%, 90% or 95% of the adjacent county index. All IPPS hospitals within an MSA or rest-of-state market were assigned the hospital wage index value from the pre-reclassified MCS wage index for that area. For each target county with an index value that was less than the threshold percent below that of a contiguous county, the index for all hospitals in the target county was raised to the value where the threshold was met. If there were more than one contiguous county meeting the threshold, the index value of the target county hospitals was raised to the value where the threshold was met for the contiguous county with the highest index. Following MedPAC's model, only positive adjustments were made. This created a need for offsetting index neutrality adjustments ranging from -0.3% when an 85% standard was used, to -3.6% when a 95% standard was used (see Box 4-3 for further description of budget neutrality adjustments).

It is possible for one round of adjustments to create new index differences above the tolerance level in a new set of contiguous counties. We used an iterative approach where counties are reassessed after each computed adjustment to identify possible new wage cliffs, and the computation is repeated until there are no more cliffs. The 85% model needed only 2 iterations, the 90% model needed 4, and the 95% model needed 9.

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documented from the 2000 census data. The blended portion of the adjustment could have a negative or positive effect on a county index level, but the smoothing portion of the adjustment was implemented only for positive changes.

Because RTI modeled contiguous-county smoothing using the CMS wage index, the analogous computation for the first stage of the MedPAC algorithm would have been to compute the county average wage from the CMS wage index files and use this for the blending step. This was not done here, in part because the Committee's objective is to explore ways to address border issues that do not rely on individual hospital data.

TABLE 4-2 Results from Contiguous-County Smoothing Modeled on FY 2011 Hospital Wage Index

Threshold for a County to Qualify for an Adjustment[a]	Percent of Counties Affected[b]	Percent of IPPS* Hospitals Affected	Index-neutrality Adjustment Needed to Offset Effect of Positive Adjustment[c]
85%	9.28	6.91	–0.30
90%	23.20	22.00	–1.20
95%	66.83	58.42	–3.80

[a] Data represent a percentage of the neighbor county index.
[b] Computed as percentage of counties that have at least one IPPS hospital.
[c] Computed as the percent reduction in wage index values for all hospitals that is needed to bring the national aggregate index value back to 1.00.
SOURCE: RTI Analysis of CMS FY 2011 wage index data

Table 4-3 shows the distribution of wage index adjustments created by contiguous county smoothing using a 90 percent threshold. Only 6 percent would see moderate increases (5 -10 percent) as compared to the pre-reclassified index, and only 4 percent would see increases greater than 10 percent.

A similar proportion would see increases greater than 5 percent as compared to the final (post-reclassification) index. These are most likely hospitals that receive no special adjustments under the current system. In RTI's simulations the wage index values for 62 percent of hospitals would be slightly higher under a contiguous county smoothing algorithm than under the current system. However, this is not because they are being given upward adjustments under the smoothing algorithm. Rather, it is because the offsetting budget neutrality factor is smaller under the smoothing algorithm than it is under the current reclassification system.

A contiguous-county smoothed index would be lower than the current final index for roughly 30 percent of IPPS hospitals. Some of these hospitals, however, are currently benefitting under the rural or frontier floors. Ideally, results from smoothing should be compared to results from reclassifications and other adjustments *exclusive* of the rural and frontier floors, because these are designed to accomplish something other than improve the technical accuracy of the wage index. Unfortunately it is difficult to separate the effects of floors from other adjustments, because some hospitals currently benefitting from the rural floor would likely apply for and receive geographic reclassification if not for those floors.

TABLE 4-3 Distribution of Impact from Contiguous County Smoothing Algorithm on CMS Data, Using a 90 Percent Threshold for Tolerable Wage Index Differences

Impact on Index Value	Comparison of Smoothed Index With:			
	Original FY 2011 Hospital Wage Index (Pre-reclassified)		Final Wage Index (Post-reclassification and All Other Adjustments)	
	IPPS facilities		IPPS Facilities	
	Number	Percent	Number	Percent
Decrease of more than 10%	0	0	94	2.8
Decrease of 10% to 5%	0	0	370	10.8
Decrease of 5% to 0%[a]	2,797	81.9	562	16.5
Increase of 0% to 5%	283	8.3	2,102	61.6
Increase of 5% to 10%	206	6.0	197	5.8
Increase of more than 10%	127	3.7	88	2.6
Total	3,413	100.0	3,413	100.0

[a] Decreases as compared to the original pre-reclassified wage index are limited to those from budget-neutrality adjustment of negative 1.2%.
Source: RTI analysis of FY 2011 wage index data

Review

Contiguous county smoothing is a fairly transparent approach to market smoothing. It is reasonably intuitive and it can be easily reproduced by the provider community. A drawback to the approach is that it is based on a proxy measure rather than a direct measure of economic activity. It builds on the premise that geographic proximity is sufficiently correlated with economic integration that adjacent areas can be assumed to face similar prevailing wages.

Labor markets are also influenced by factors such as topography, transportation, demographics, and location of commercial centers. An analysis of the contiguous-county smoothed index values against the actual hospital hourly wages revealed that slightly *more* hospitals would meet the current wage comparability criteria for reclassification using smoothed index values than meet them using unsmoothed values. If hospitals' actual average hourly wages are considered indicative of a market, then these results would not provide strong support for the notion that contiguity necessarily implies shared labor markets.

Commuting Pattern-Based Smoothing

General Background

The committee turned to commuting patterns as a possible basis for refining the MSA-based payment areas because commuting is a more direct measure of economic integration. While proximity is a strong determinant of economic activity, commuting patterns will reflect the combined influence of proximity, topography, transportation, demographics and commercial activity.

An example of a single highly integrated area where employers should be facing the same prevailing wages would be two contiguous counties with large proportions of residents commuting to or from both counties. The degree of commuting in and out of defined communities is a useful measure to capture this set of circumstances.

Commuting patterns are already incorporated into the designation of CBSAs. Metropolitan and micropolitan areas are defined by identifying a core population nucleus, and linking the core with adjacent communities having a high degree of "economic and social integration" with that core. "Economic and social integration" measured exclusively using commuting data from census surveys.[7] Outlying CBSA counties are assigned to a central CBSA core county if (a) at least 25 percent of the workers in that outlying county commute to work in one of the core counties, or (b) at least 25 percent of the jobs in the outlying county are filled by residents of one of the core counties (OMB, 2000). Assignment is based entirely on commuting patterns and not by population size or population density. Thus, a relatively non-urbanized county with low population density can still be considered part of a metropolitan labor market area, if a sizeable portion of its population is employed in the core. Both the designation as a Lugar county and eligibility for whole-county re-designation by MGCRB are based on evidence that the 25 percent criteria have been met.

County commuting patterns also serve as the basis for the Section 505 outmigration adjustment, as discussed earlier in this chapter and in Chapter 1. Where CBSAs are based on commuting patterns of all workers, the outmigration adjustment is based on the specific commuting patterns of hospital workers. This is an important distinction, because hospitals are not located in every county; consequently, hospital commuting patterns for smaller communities can look very different from commuting patterns of other workers. The data are from a special tabulation of Census 2000 journey-to-work data, compiled from responses to the decennial census "long-form" survey. As discussed in the final IPPS payment rules for FY 2005, the data were collected from the one-in-six households that received the long form, and the tabulations used by CMS were restricted to responses from individuals coded as working in the industry code 622000 that includes all hospitals (CMS, 2004). CMS described several limitations of the data in its proposed and then final rules for that year, including small cell sizes and uncertainty about future availability, but received no public comments strongly

[7] CBSAs are further discussed in Chapter 2, Box 2-2.

opposing the data and no recommendations for alternative sources. CMS did not rule out the possibility of collecting commuting data directly from hospitals at some time in the future.

Although the long form sample was not repeated for the 2010 census, journey-to-work data are now collected by the census as part of the American Community Survey (ACS), which uses smaller samples but fields the surveys over multiple years.[8] The 5-year ACS journey-to-work data (surveys from 2006 -2010) is expected to be released in 2012, with special tabulations by respondent characteristics available for request by 2013.[9]

Commuting pattern-based smoothing can be implemented on the basis of the patterns of workers residing elsewhere but commuting to the county where a provider is located (in-commuting), or on patterns of residents leaving a county to work in another county where a provider is located (out-commuting). Both measures capture economic integration to some degree, and most counties where a hospital is located have workers going in both directions.

The balance of commuting, however, is from lower-wage areas to higher-wage areas. This is because workers tend to seek higher wages and because larger hospitals are located in larger, higher-wage metropolitan areas. Smoothing based on out-commuting will tend to raise the wage index in areas where a hospital is competing for workers with facilities located in higher-wage markets. Conversely, smoothing based on in-commuting patterns will tend to lower the wage index in areas where hospitals are drawing large pools of workers from lower-wage markets. Out-commuting adjustments would therefore raise the aggregate national wage index, while in-commuting adjustments would lower it. In either implementation, a budget neutrality adjustment is needed that offsets the aggregate effect (see Box 4-3 for further explanation).

The committee first examined cross-county and cross-MSA commuting patterns from the special census tabulation used by CMS, and then created simulations for a number of commuting pattern-based smoothing adjustments that resemble expanded forms of the current out-migration adjustment.

Commuting Patterns

The 2000 census data set identified 1,596 counties as having a hospital and 2,730 counties as having any hospital workers. Roughly 40 percent of those 2,730 counties therefore "exported" all of their hospital workers to other counties. Figure 4-1 illustrates the distribution of in- and out-commuting across counties. In counties with at least one hospital, the median percentage of workers coming from another county was 21 percent.

[8]See http://www.census.gov/acs/www/. The ACS replaced the US Census long form survey in 2010. Conducted by the Bureau of the Census, the ACS is a nationwide continuous survey that collects additional demographic, housing, and economic data in the years between decennial census. ACS as a source for wage data is also discussed in Chapter 5.

[9] Personal communication from Journey-to-work section chief, U.S. Census Bureau (May 18, 2011).

Commuting across different MSAs or state-wide nonmetropolitan areas is less common than commuting across counties within MSAs. One third of the counties with hospital workers had no cross-MSA commuting. Among those counties with any, the median percent of workers commuting out-of-MSA was 19 percent.

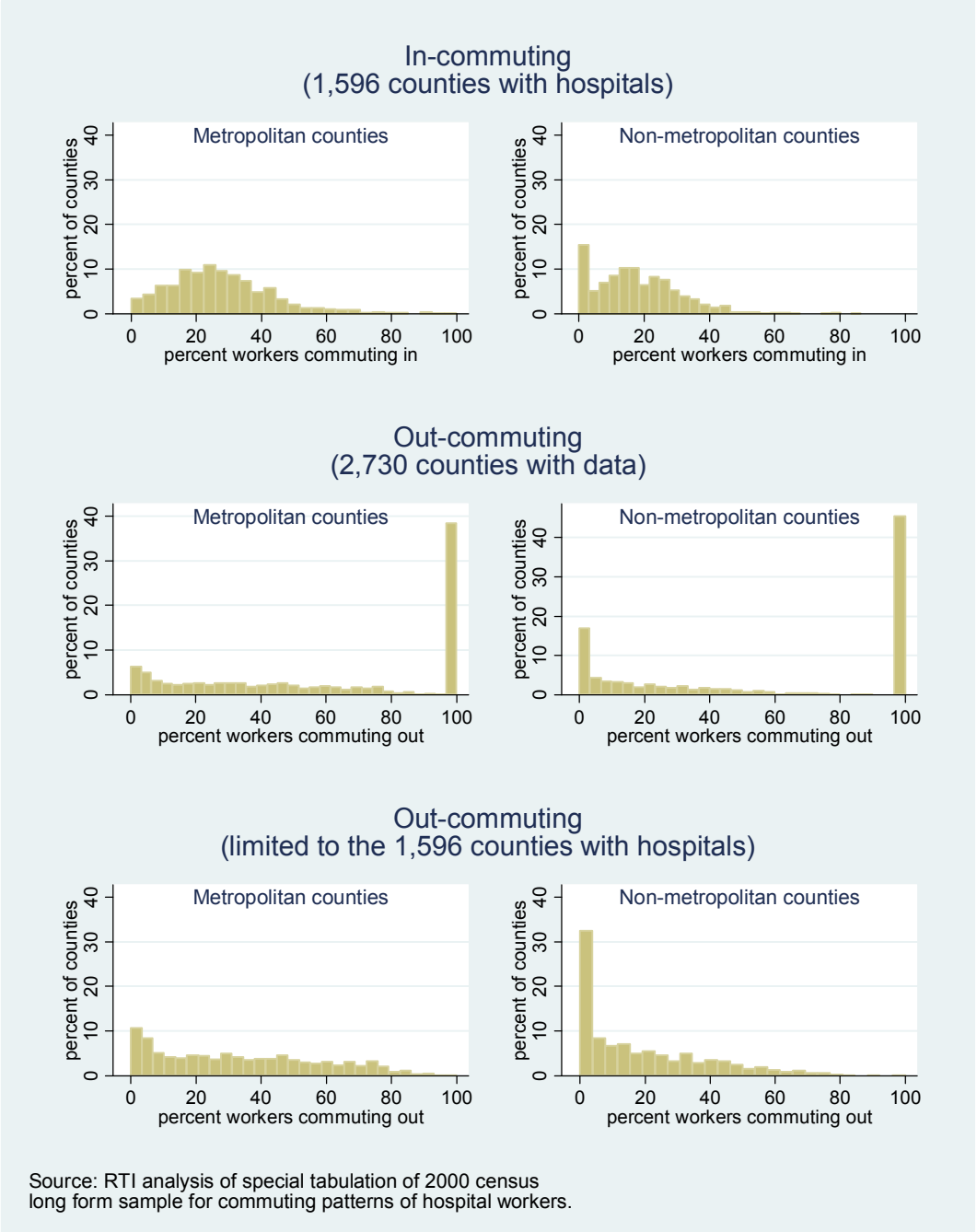

FIGURE 4-1 County-level Commuting Patterns of Hospital Workers from the 2000 Census Data. Percentages on the *x*-axis are cumulative and add to 100.

Simulations

It is possible to simulate the impact of commuting pattern-based smoothing using any given index and tabulations of all combinations of counties by worker residence and worker employment. Box 4-2 provides a description of the computations needed to implement commuting pattern-based smoothing.

Sample computations and illustrative maps are also presented in Table 4-4 and Figure 4-2. These illustrate commuter-based smoothing for two hypothetical counties that are located in a moderately well integrated area that crosses several MSA boundaries. In this example, workers are commuting in both directions between County A and County D even though County D has more hospital workers and a higher wage index (1.100 compared to 0.950).

If adjustments are made based on patterns of workers that commute *out* of their resident county (out-commuting), and if both positive and negative adjustments are made, the resulting adjustments for this area would be an increase in County A's index from 0.950 to 0.998 and a drop in County B's index from 1.10 to 1.066. In this example, smoothing succeeds in reducing the wage cliff from a difference of 0.15 points to a difference of 0.07 points.

BOX 4-2
How Commuting-based County Smoothing is Implemented

To model commuting-based county smoothing RTI used the same special census tabulation file that is used by CMS for outmigration adjustments. The file contains data for each combination of county of worker residence ("home county") and county of hospital employment ("work county"), identifying the number of hospital workers qualifying for both.

Each county where a hospital is located is a potential target for commuting pattern-based adjustment. For each target county, we computed the number of resident workers who commuted out of the county for a job in a hospital, and identified the wage index applicable to each of the counties to which resident workers were commuting. An adjusted wage index for the target county is computed as the worker-weighted average of the wage index values for each county where its resident hospital workers are employed. However, if workers commute to counties located within the same labor market as the county in which they reside ("within-MSA commuting"), then their "home counties" and "work counties" have the same wage index and commuting patterns have no effect on the wage index of the target county.

To limit smoothing to counties with substantial out-commuting, the adjusted index can be computed only for counties where a minimum threshold of workers commute out of the county or out of the MSA. Alternatively, the weighted average computation can be modified such that the wage index and commuting levels of any one destination work county is used in the formula *only* if the commuting to that one county exceeds a specific threshold.

Similarly, to limit smoothing to positive adjustments only, the adjusted index can be implemented only for counties where the wage index is increased. Alternatively, the weighted average computation can be modified such that the wage index of any one destination work

county is used in the formula only if it is higher than the wage index applied to the target county.

TABLE 4-4 Sample Computations for Smoothing Based on Out-Commuting, in Two Adjacent Areas

No. of County Resident Hospital Workers	Work in County:	County Located in MSA:	Percentage of Total Resident Workers	Original Index	Computation of Smoothed Index as Weighted Average	
Out of County A						
700	A	1	54	0.9500	0.54 × 0.9500 =	0.5115
50	B	1	4	0.9500	0.04 × 0.9500 =	0.0365
100	C	2	8	0.9000	0.08 × 0.9000 =	0.0692
450	D	3	35	1.1000	0.35 × 1.1000 =	0.3808
1300			100		Weighted mean:	0.9981
					Original index:	0.9500
					Adjustment:	5.1%
Out of Adjacent County D						
1,200	D	1	71	1.1000	0.71 ×1.1000 =	0.7765
100	A	1	6	0.9500	0.06 × 0.9500 =	0.0559
150	C	3	9	0.9000	0.09 × 0.9000 =	0.0794
250	E	2	15	1.0500	0.15 × 1.0500 =	0.1544
1700			100		Weighted mean:	1.0662
					Original index:	1.1000
					Adjustment:	–3.1%

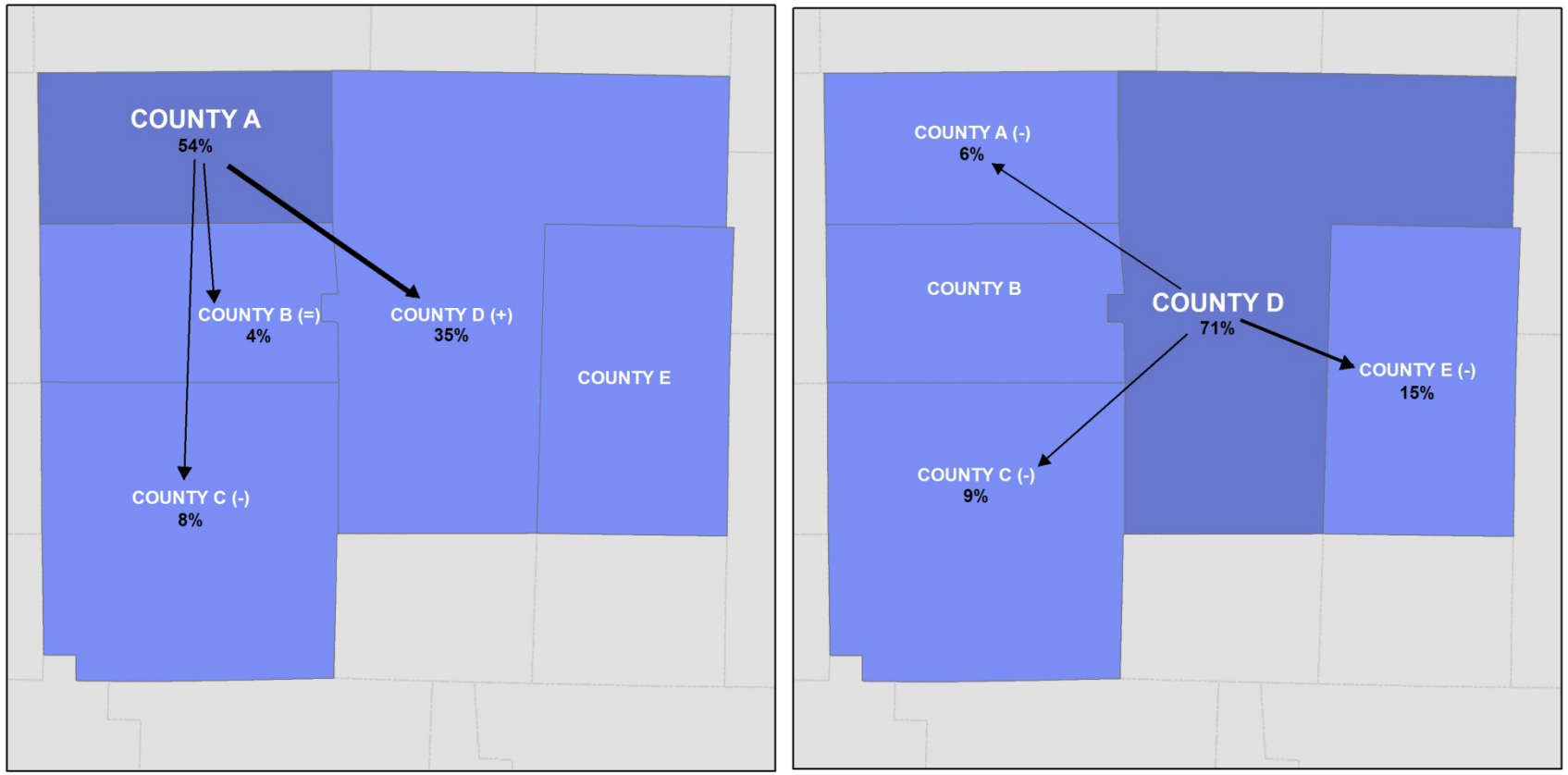

FIGURE 4-2 Sample Map of Local Area Commuting Pattern**.**
SOURCE: RTI Analysis
NOTE: Left figure: The percentages indicate the portion of hospital workers residing in County A who work in each county. Right figure: The percentages indicate the portion of hospital workers residing in County D who work in each county. Arithmetic signs in parentheses after the county identifiers indicate whether the wage index in the destination county is higher, lower, or the same as the index in the county from which the workers are commuting.

Simulation Options

The committee reviewed simulations that estimated the impact of commuting pattern-based smoothing on both the CMS wage index and a new index constructed from the May 2010 release of BLS Occupational Employment Statistics (OES) data.[10] Models were run using the out-commuting percentages, consistent with the approach used by CMS for its Section 505 outmigration adjustment. The models used out-commuting patterns for 1,585 counties matched to the location of 3,468 hospitals identified in the FY 2011 IPPS Impact File.[11]

Several design issues need to be decided to implement this approach to smoothing. Many of them are similar to the issues addressed by CMS when the Section 505 outmigration adjustments were introduced.

- CMS chose to implement out-migration adjustments with a 10 percent commuting threshold. The advantages of a threshold are that it minimizes disruption and administrative costs from having many small adjustments within a market. A threshold would also focus the wage index adjustments on areas where there is clear evidence of cross-MSA integration. The downside of a threshold, however, is that it creates another administrative "cliff." A weighted average computation without thresholds would result in adjustments that are directly proportional to the level of commuting.
- CMS chose to implement the outmigration adjustment without regard to the size of the index differences. An index difference threshold would focus the smoothing adjustments on areas with true "wage cliffs". As with the commuting threshold, the disadvantage of setting an index difference threshold is that it creates another administrative barrier with a potential to be perceived as arbitrary. In addition, the current wage index is often recomputed during the year in response to data errors or new legislation, and linking eligibility for a smoothing adjustment to current index levels could add instability to the process. Using the BLS index, this would be less of a concern.
- By statute, the current outmigration adjustment is limited to positive adjustments. This issue is related to the question of whether budget neutrality should be imposed locally or nationally (see Box 4-3 for a discussion of budget neutrality). If both positive and negative smoothing adjustments are made, then the resulting payment redistributions are localized and most of the index increases will be offset by index decreases within the same set of areas. If adjustments are only made to areas where out-commuting is to a higher-wage

[10] All models using BLS data are based on hospital wage indexes constructed for the committee by BLS staff in order to incorporate published and non-published data. The wages used were from surveys of all health care sector employers, and fixed weights for the index were drawn from the BLS employment estimates for short-term hospitals using the 31 standard occupation codes that were recommended by MedPAC (2007b).

[11] One county within the Los Angeles area had no commuting data from 2000, although there are 5 hospitals located in this county in 2011.

area (thus raising the index value for the county from which the workers are commuting), then the aggregate effect of all of the increases must be offset by a national index or budget neutrality adjustment that spreads the cost of the smoothing-based increases across all areas and all providers. If the adjustment is intended only for IPPS providers (as is the case with the outmigration adjustment) then hospital commuting data is the appropriate measure. If journey-to-work survey sample size were not an issue, the adjustments could be tailored to fit the commuting patterns of hospitals for a hospital index, skilled nursing facilities for a SNF index, or ambulatory care workers for physician offices, because all of these industry codes are available from the survey data. In practice, sample size limitations may dictate that commuting patterns for all health care workers be used. This would make the method generalizable to other provider settings.

The committee discussed each of these implementation options for commuter pattern-based smoothing. Multiple simulations were run to test the sensitivity of resulting adjustments to these design parameters.

BOX 4-3
What Are Budget Neutrality Adjustments, and How Are They Computed in the Committee's Smoothing Models?

Both the original wage index and the GPCIs are designed to affect the geographic distribution of Medicare payments while having no net impact on the total amount being distributed. This is because they are *cross-sectional* indexes, measuring variation across geographic units at a single point in time, and centered on a value of 1.00 that represents the national average value of the item being indexed. An individual market is either below the national average (index<1.00), equal to the national average (index=1), or above the national average (index>1.00). By construction, a weighted (or aggregate) average of all the individual market index values should always be 1.00.Whenever an administrative change is made to any of the original individual index values, however, the weighted average of the altered index will change, becoming greater than or less than 1.00 according to the net effect of the adjustments. Administrative changes are nearly always made for purposes of increasing index values. Consequently, the weighted average altered index is always pushed above 1.00. Using an altered index to adjust payments will therefore alter not only the distribution of the payments but also the total amount being distributed.

Most of the exceptions and adjustments that are made to the wage index are required by statute to be "budget neutral" – meaning they cannot alter the total amount of payment being distributed. The only way to accomplish this is to impose an additional computation, made after the various exceptions and adjustments are completed, that brings the aggregate average of the altered index values back to 1.00. This final computation is implemented as an across-the-board adjustment imposed on all providers. Thus, the net positive effect of any set of special exceptions can be thought of as a corresponding reduction imposed across all providers.

CMS is asked to make many changes and adjustments to many components of the prospective payment system in each year's rule-making, and almost all of these must be made budget-neutral. Some budget neutrality adjustments are made by adjusting the base payment rates applicable to all providers, but wage index neutrality can be enforced by across-the-board offsets to the wage index applicable to all providers. Wage index neutrality adjustments have recently been in the range of 1.0 to 1.5 percent, and these are made primarily to accommodate the effects of reclassification and rural floors. (Congress did not require the implementation of Frontier state floors and outmigration adjustment to be budget neutral.)

The various smoothing simulations performed for the committee also included estimations of budget neutrality factors specific to each simulation. The neutrality factors for the commuter based smoothing algorithms, for example, were estimated by calculating the worker-weighted average of the post-smoothed index; if this number was greater than one, then the net impact of the smoothing was to raise the aggregate wage index, and if it was less than one, then the net impact of the smoothing was to lower the aggregate wage index. In either instance, to bring the values back to levels with an aggregate average of one, each market's index value was divided by the worker-weighted average of the post-smoothed index.

Simulation Results

Results from 3 outmigration models are presented here.

- The first model adjusts index values for all counties where hospital workers living in that county commute to another labor market with a different wage index – whether the index is higher or lower.
- The second model limits adjustments to counties where at least 10 percent of hospital workers commute to labor markets with a different wage index.
- The third model limits the adjustments to counties where at least 10 percent of hospital workers commute to labor markets where the wage index is *higher than* the index of the home county. This ensures that only positive smoothing adjustments are made (at least until the imposition of the budget neutrality factor). This third specification is similar to what CMS now uses for the outmigration adjustments.

Each of the 3 models was run once using the FY 2011 CMS pre-reclassified wage index, and once using an index computed for the committee by staff at the BLS, using OES data from their May 2010 release of data collected between 2007 and 2009 (see footnote 12). Adjustments were computed using the same special tabulation of 2000 census hospital worker commuting data that CMS has been using, because it is the best publicly available source for health care commuting patterns at this time.

In the simulations run with CMS index values, 64 percent of the counties with IPPS hospitals had at least some resident hospital workers commuting to another MSA or non-MSA rest-of-state market and, therefore, could be affected by smoothing based on out-commuting (see Table 4-5). Applying a 10 percent minimum commuting threshold for eligibility reduces this number to 36 percent. Further restricting the model to positive-only index adjustments reduces it to 27 percent. Simulations run on the BLS index data produce very similar results.

TABLE 4-5 Number of Counties and Hospitals Affected Under Three Design Options for Smoothing Based on Out-commuting

Smoothing Design Parameters	Percent Affected			
	Smoothed CMS Index (Pre-reclassification Values)		Smoothed BLS index	
	Counties[a]	IPPS Hospitals	Counties[a]	IPPS Hospitals
All counties eligible, no minimum commuting thresholds, both positive and negative changes implemented	64.4	63.9	62.1	61.1
Counties eligible only if ≥ 10 percent of workers commute to another labor market	35.8	32.1	35.2	31.6
Counties eligible only if ≥10 percent of workers commute to another labor market that has a higher wage index	26.8	22.0	25.7	23.0

SOURCE: RTI Analysis of FY 2011 wage index data, 2000 census hospital worker commuting data, and BLS-constructed hospital fixed-weight index using 30 occupation codes and all-employer hourly wages from May 2010

NOTE: Values are the numbers affected before applying budget neutrality adjustments, which apply to all counties.

[a] Computed as a percentage of counties that have at least one IPPS hospital.

Tables 4-6 and 4-7 provide additional detail on results from the CMS and BLS index models, respectively. In the CMS data model with no restrictions on county eligibility, 27 percent of metropolitan counties and 54 percent of non-metropolitan counties qualify for an increase in their indexes. In comparison, 40 percent of metropolitan counties and 9 percent of non-metropolitan counties experience a decrease. The size of the adjustments ranges from a reduction of 4.6 percent to an increase of 19.3 percent, but these are outlier values. Most changes are very small in absolute terms.

Imposing the 10 percent outmigration threshold reduces the proportion of counties with a negative adjustment to 12 percent in metropolitan areas and 6 percent in the non-MSA rest-of-state areas. These negative adjustments would not be implemented in the model with the positive-only adjustments, but the other adjustments would remain the same. Estimates of budget neutrality factors to fund adjustments under the different specifications are similar, ranging from a nationally applied reduction of 0.27 percent to a nationally applied reduction of 0.38 percent

The effects of commuter pattern-based smoothing on the BLS wage index are similar but smaller than the effects on the CMS wage index. Budget neutrality adjustments range from a decrease of 4.2 percent to an increase of 16.4 percent, and the differences by metropolitan and non-metropolitan counties follow the same pattern.

Figure 4-2 shows how the simulated adjustments are distributed across hospitals. The figure shows the average percent change in index values for groups of hospitals categorized according to the type of wage index adjustment they have in FY 2011. Bars show the results for each of the three models, for each hospital group. The upper frame of Figure 4-2 shows results from the CMS index models and the lower frame shows results from the BLS models.

This presentation approach highlights several findings:

- First, design parameter choices such as threshold versus no threshold, or positive and negative adjustments versus positive only, have relatively little effect on the overall impact of smoothing across the hospital groups.
- Second, the impact of smoothing on BLS index values is smaller than the impact on CMS index values, but the relative effect across hospital groups are almost identical (see also Table 4-8). This reflects the strong correlation between the two indexes (the Pearson coefficient is 0.90). It also suggests that BLS data are able to capture hospital market differences as well as hospital-only data.
- Third, as might be expected, the types of hospitals that would benefit most from commuting pattern-based smoothing are those that are already receiving adjustments based on commuting patterns (specifically, the Lugar and outmigration adjustments). Commuting pattern-based adjustments applicable to hospitals currently receiving reclassification, however, are much smaller than their reclassification adjustments.

Figure 4-3 presents only the unweighted average effect across hospitals in each group. Table 4-8 provides additional detail on the distribution of the commuting-based adjustments by comparing the change in CMS and BLS index values when out-migration smoothing is used.

TABLE 4-6 County-level Impact of Out-commuting Smoothing on the CMS Wage Index

	Optional Smoothing Parameters					
	No Minimum Commuting Threshold		10% Minimum Commuting Threshold		10% Minimum, Positive Adjustments Only	
Counties affected[a]	N	%	N	%	N	%
Metropolitan areas						
Increase	208	27%	133	17%	133	17%
Decrease	307	40%	95	12%		
No change	260	34%	547	71%	642	83%
	775	100%	775	100%	775	100%
Rest-of-state areas						
Increase	435	54%	292	36%	292	36%
Decrease	70	9%	47	6%		
No change	305	38%	471	58%	518	64%
	810	100%	810	100%	810	100%
Percent change in index value (excluding effect of budget neutrality factor)						
Minimum	–4.6		–4.6		0.0	
10th pct	–0.4		0.0		0.0	
25th pct	0.0		0.0		0.0	
50th pct	0.0		0.0		0.0	
75th pct	0.8		0.3		0.3	
90th pct	3.1		3.1		3.1	
Maximum	19.3		19.3		19.3	
Estimated budget neutrality factors	1/1.002515 (or –0.25%)		1/1.002742 (or –0.27%)		1/1.003775 (or –0.38%)	

[a] Includes only counties that have at least one IPPS hospital.

SOURCE: RTI Analysis of FY 2011 wage index data, 2000 census hospital worker commuting data, and BLS-constructed hospital fixed weight index using 30 occupation codes and all-employer hourly wage from May 2010

TABLE 4-7 County-level Effects from Out-migration County Smoothing on BLS Wage Index Values

	Optional Smoothing Parameters					
	No minimum commuting threshold		10% minimum commuting threshold		10% minimum, positive adjustments only	
Counties affected[a]	N	%	N	%	N	%
Metropolitan areas						
Increase	213	27%	128	17%	128	17%
Decrease	279	36%	95	12%		
No change	283	37%	552	71%	647	83%
	775	100%	775	100%	775	100%
Rest-of-state areas						
Increase	409	50%	279	34%	279	34%
Decrease	84	10%	476	59%		
No change	317	39%	55	7%	531	66%
	810	100%	810	100%	810	100%
Percent change in index value (excluding effect of budget neutrality factor)						
Minimum	-4.2		-4.2		0.0	
10th percentile	-0.3		0.0		0.0	
25th percentile	0.0		0.0		0.0	
50th percentile	0.0		0.0		0.0	
75th percentile	0.4		0.1		0.1	
90th percentile	2.0		2.0		2.0	
Maximum	16.4		16.4		16.4	
Estimated budget neutrality factors	1/1.002516 (or -0.25%)		1/1.00236 (or -0.24%)		1/1.00313 (or -0.32%)	

[a] Includes only counties that have at least one IPPS hospital.

Source: RTI Analysis of 2000 Census hospital worker commuting data and BLS-constructed hospital fixed-weight index using 30 occupation codes and all-employer hourly wage from May 2010

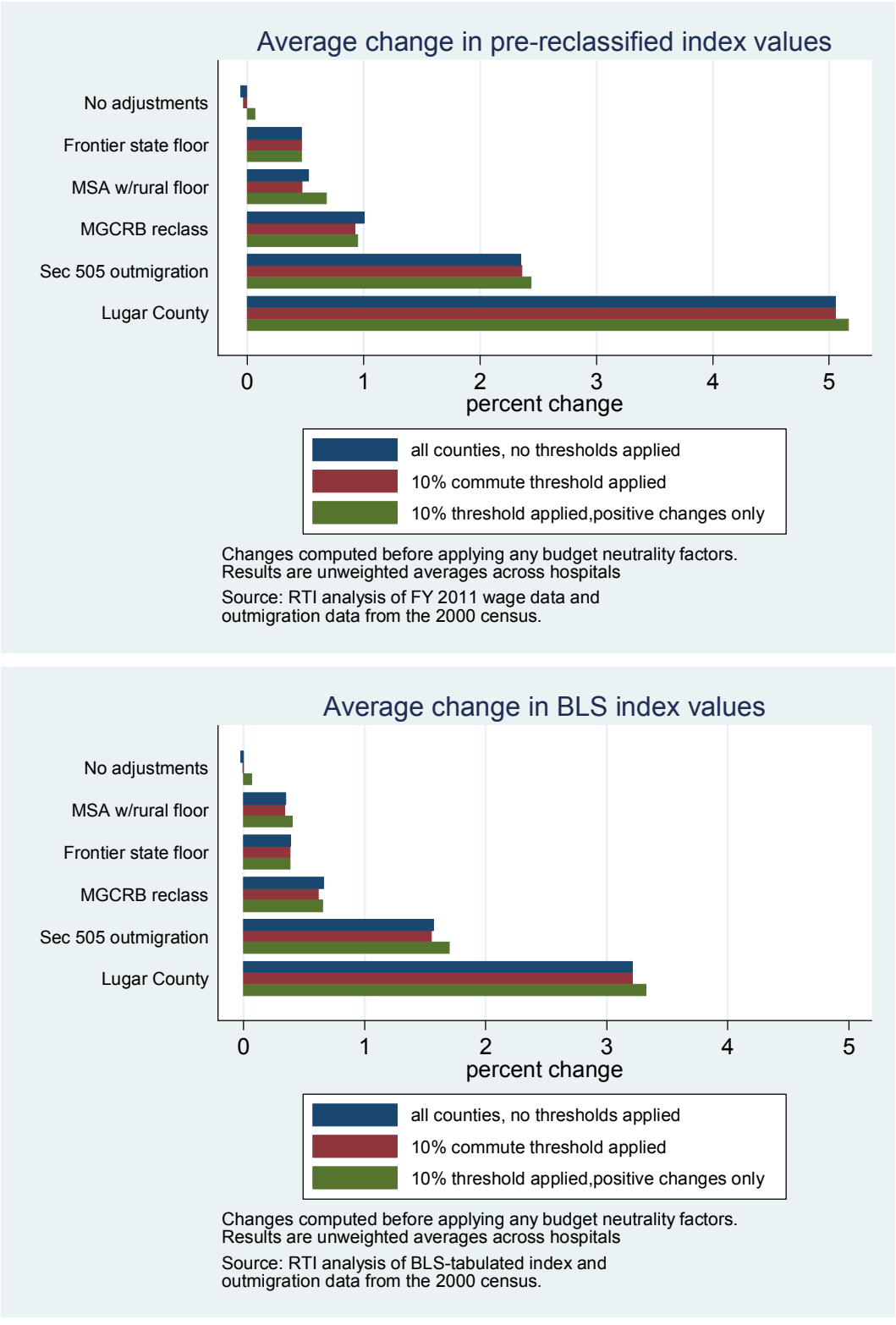

FIGURE 4-3 Impact of Out-commuting Smoothing Under Three Design Options, Computed Across Hospitals Grouped by Current Wage Index Exception Status

TABLE 4-8 Hospital-Level Impact of Outmigration Smoothing on CMS and BLS Indexes from Distribution of Percent Change in Index Values

	Number of Hospitals [a]	Smoothed Versus Unsmoothed CMS Index					Smoothed Versus Unsmoothed BLS Index				
		Min	25th pct	50th pct	75th pct	Max	Min	25th pct	50th pct	75th pct	Max
By Location											
Large urban area[b]	1,384	–12.79	–0.87	0.22	0.90	17.45	–9.48	3.13	6.47	10.48	23.41
Other urban area[b]	1,120	–26.68	–2.97	–1.05	0.48	26.30	–15.89	1.55	5.70	10.68	25.13
Rural (Non-metropolitan)[b]	959	–31.87	–7.41	–2.33	–0.83	22.00	–17.44	2.88	8.73	13.98	20.99
All	3,463	–31.87	–2.49	–0.74	0.59	26.30	–17.44	2.69	6.78	11.60	25.13
By Current Wage Index Status [c]											
No adjustments	2150	–7.62	–1.13	–0.10	0.77	22.00	–15.89	3.40	8.45	12.58	22.43
Lugar Hospitals	55	–17.94	–9.60	–5.45	–3.29	10.30	–9.40	–0.96	4.70	8.91	19.61
MGCRB Reclassifications	748	–24.66	–9.31	–4.81	–0.96	26.30	–17.44	–1.07	3.32	6.84	23.46
Section_505 (outmigration)	246	–14.06	–1.72	–0.64	0.12	3.59	–15.00	7.41	11.31	14.46	21.02
Frontier state floor	49	–31.87	–15.01	–13.52	–5.04	5.14	–13.70	–10.40	–6.60	–5.60	13.40
MSA w/ rural floor	215	–23.78	–7.68	–2.92	–1.51	5.45	–10.44	0.00	3.29	8.44	25.13
Total	3,463	–31.87	–2.49	–0.74	0.59	26.30	–17.44	2.69	6.78	11.60	25.13

NOTE: Smoothing includes effect of budget neutrality adjustment. Smoothing was implemented with no thresholds or positive and negative adjustments. MIN = minimum; pct = percentile; MAX = maximum.

[a] Number of IPPS hospitals identified in the FY 2011 IPPS Impact File, excluding five that were located in counties without hospital worker commuting data.

[b] Large urban area is CMS' designation for an MSA with population >= 1 million. Other urban area is an MSA with less than 1 million population. Rural Area refers to all non-MSA counties.

[c] Wage index status derived from FY 2011 Impact File. Hospitals counted in wage index floor areas are only those whose wage index is affected by the floor.

SOURCE: RTI analysis of FY 2011 wage index data, 2000 census hospital worker commuting data, and BLS-constructed hospital fixed weight index using 30 occupation codes and all-employer hourly wage from May 2010

Other Geospatial Approaches

The committee also discussed several techniques for defining or refining markets that are based on distances between hospitals. The geospatial approaches described in this section can be used to construct completely new markets from local wage data, or they can be adapted to adjust the boundaries of previously defined markets if wage data have already been aggregated (as is the case with BLS data).

One geospatial approach is similar to the "nearest neighbor" concept that was developed by the Prospective Payment Advisory Commission (predecessor to MedPAC) and recommended to HCFA in 1987. Each hospital is designated as a central point around which a circle is drawn based on distance or time (for example, a 60 mile radius, or a 1-hour commuting radius). Each hospital defines its own market, such that the approach produces multiple overlapping markets rather than a set of mutually exclusive markets with fixed borders. Within each hospital-specific market, a weighted average wage can be constructed from the hourly wage data for hospitals within that radius. The approach could also be implemented using average wages computed for very small geo-political units (such as census tracts or zip codes) within the radius, if the data were available. An adaptation of this approach might simply average the previously computed MSA-based wage index values that fall within the radius.

The nearest neighbor approach can also be adapted to use commuter data rather than physical geography, by substituting the notion of "commuter sheds" for fixed distances. Instead of drawing a fixed radius around the target hospital, the commuter shed approach would define the relevant local markets based on the counties that contribute workers to a hospital, or a hospital county. The local weighted average wage can be constructed for each hospital or county based on the average wages of the counties contributing to that county's workforce.

More complex approaches to smoothing that use individual hospital location and distance functions are available by applying methods developed through geographic information systems (GIS). A commonly used algorithm for grouping data by location is based on an inverse distance weighting (IDW) function. IDW is a method of interpolation that adjusts a data point for a given location by averaging the sample data points in the neighborhood of the target value. The closer a point is to the center of the data point to be adjusted, the more influence (or weight) it has in the averaging process.

IDW smoothing applied to the wage index would identify a central geographic point within a market – such as the city center of an MSA or a population "centroid" – and adjust the wage index values of surrounding hospitals based on how closely they are located to that central point. Hospitals that are located at the edge of their labor market and relatively far away from its central point could have their index values affected only marginally by that central point. Hospitals located at the edge of their labor market, but close to the centroid of a neighboring market, could have their wage index affected primarily by the neighboring centroid. IDW approaches for a wage index can be implemented using the actual average wage at the central points and allowing index values to be adjusted up or down based on the "pull" of the central point as

measured by distance. It is also possible to implement this technique using only the area wage index values for the central point and all individual hospital adjusted points; the second implementation would capture varying levels of influence across labor markets based on location within markets, but would not capture the influence of the central point within the market.

The committee reviewed simulation results from the second IDW implementation just described, using the existing FY 2011 pre-reclassified wage index as its base. Straight-line distances were computed from geo-coded hospital street addresses. Results were generated using a standard application of ARC-GIS software where the weighting function was the inverse of the squared distance.

As expected, the model sharply reduced the number of nearby hospitals with wage index differences of 0.10 or more, compared with the number as computed from the original pre-reclassified index and also compared with the number as computed from the post-reclassification index (Table 4-9).

TABLE 4-9 Index Wage Cliffs: Nearby Hospital Pairs with Large Difference in Wage Index Values, Before and After Inverse-distance Weighted Smoothing

	Number of IPPS Hospital Pairs With Wage Index Differences of 0.10 Points or More		
Distance Between Hospitals (miles)	Under Pre-reclassification Wage Index	Under Final Post-reclassification Wage Index	Under Pre-reclassification Wage Index with IDW Smoothing
1	0	1	0
5	23	17	0
10	152	60	0
25	1,709	614	316

NOTE: Hospitals can be counted more than once. Geospatial smoothing implemented with ARC-GIS, version 10.0, software, with the default weights set proportional to the inverse of the square of the distance between hospital pairs within a fixed maximum search radius of 25 miles.
SOURCE: RTI analysis of FY 2011 wage index data from CMS

Table 4-10 shows the distribution of wage index adjustments created by this application. For reference, the first column shows the impact of administrative reclassifications and other adjustments on the final wage index compared to the pre-reclassification index. The second column shows the impact of IDW smoothing compared to pre-reclassified wage index values, and the third shows the impact of IDW smoothing compared to the hospitals' final wage index values.

Under IDW smoothing, wage index values are increased by 1 percent or more for about one-third of hospitals in the model, and are decreased by 1 percent or more for 29 percent of hospitals in the model. Under the current system of reclassifications and adjustments, the wage index is increased by 1 percent of more for about 29 percent of hospitals, while very few hospitals have decreased index values beyond the effect of the budget neutrality adjustment.[12]

Because the IDW approach computes both positive and negative adjustments it is largely self-weighting, and should not require an offsetting national index neutrality adjustment. Put another way, IDW smoothing is "locally neutral."

TABLE 4-10 Distribution of Impact of Inverse Distance-Weighted (IDW) Smoothing on FY 2011 CMS Wage Index for IPPS Facilities[a]

	CMS Final Index[b]		IDW-Smoothed Index Compared with Pre-reclassified Index		IDW-Smoothed Index Compared to Final (Post-reclassified) Index[b]	
Impact on Index Value	Number	Percent	Number	Percent	Number	Percent
Decrease of more than 10%	4	0.1%	31	0.9%	113	3.3%
Decrease of 10% to 5%	12	0.4%	220	6.5%	449	13.2%
Decrease of 5% to 1%	13	0.4%	735	21.7%	983	29.0%
Change from -1 to +1 %	2,353	69.4%	1,273	37.5%	1,124	33.1%
Increase of 1% to 5%	431	12.7%	448	13.2%	349	10.3%
Increase of 5% to 10%	279	8.2%	440	13.0%	259	7.6%
Increase of more than 10%	299	8.8%	244	7.2%	114	3.4%
Total	3,391	100.0%	3,391	100.0%	3,391	100.0%

NOTE: Geospatial smoothing implemented using ARC-GIS 10.0 software with default weights set proportional to the inverse of the square of the distance between hospital pairs, within a fixed maximum search radius of 25 miles.

[12] A small number of hospitals in the FY 2011 Impact File show reclassified wage index values that are lower than pre-reclassified values, and a small number of hospitals located in Texas appear to be mis-classified as rural. No values in the Impact File were altered for this study, but there are some unexpected results (such as those showing a small number of facilities with large decreases in the wage index following reclassification).

[a] Number of IPPS hospitals identified in the FY 2011 IPPS Impact File and included in all three indexes. IDW simulations were conducted with data for facilities in the 48 contiguous states only.
[b] This is the post-reclassified index compared with the pre-reclassified index, including effects of reclassifications, "deemed" metropolitan counties, outmigration adjustments, rural floors, and frontier floors.
SOURCE: RTI Analysis of FY 2011 wage index data

Review

IDW smoothing based on the existing wage index values is successful in reducing wage cliffs, and should therefore also reduce perceptions of boundary issues among providers. After reviewing the results from the simulation of geospatial methods, however, the committee feels that the approach also has several drawbacks.

First, IDW models are highly technical and require specialized software. Because the computations are iterative and complex, the methods could be difficult for the provider community to replicate, which is contrary to the committee's objectives of promoting transparency. Second, the approach smoothes the boundary differences by reducing large wage cliffs and offsetting them with many new smaller differences among local area providers. The approach can only be implemented as a "locally budget neutral" method where an increase in one provider's index is offset by other relatively local decreases.

Finally, and most importantly, IDW is driven solely by considerations of distance from a chosen point, on the premise that proximity is a good proxy for economic integration. The committee recognizes that labor markets are highly influenced by location, but topography, transportation, and demographics also play a significant role in defining market behavior. If commuting patterns are available, then commuting data can provide a direct measure rather than a proxy.

TABLE 4-11 Summary Evaluation of Alternative Approaches for Refining Labor Market Boundaries

	Current Administrative Approaches				Alternative Approaches		
Committee's Stated Evaluation Objectives	Hospital Reclassification	County Re-designation	Out-migration Adjustment	Index Floors	GIS: Inverse Distance Weighting	Contiguous County Smoothing	Commuting Pattern-Based Smoothing
Is plausibly linked to the notion of improved accuracy in labor market definitions	Yes	Yes	Yes	No	Possibly	Possibly	Yes
Uses computations that are transparent and reproducible by the provider community	Yes	Yes	Yes	Yes	No	Yes	Yes
Relies on data that are publicly available, reliably produced, and periodically updated	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is systematic and formula based, to minimize the need for individual reviews or exceptions processes	No	Lugar counties only	Yes	Yes	Yes	Yes	Yes
Is made budget neutral in implementation	Yes	Yes	No	Yes(for rural floors); no (for frontier floors)	Yes	Yes	Yes
Focuses on markets rather than individual facilities	No	Yes	Yes	No	No	Somewhat	Yes
Avoids use of hospital-specific criteria or costs	No	Lugar counties only	Not completely	Yes	No	Yes	Yes

Review and Implications

The committee reviewed several options for refining the definitions of labor markets by smoothing their borders. Each option, including the current set of administrative changes, has advantages and disadvantages. Table 4-11 is presented as an aide to review CMS' current approaches as well as the alternatives just presented, to assess them systematically in the context of the objectives set out at the beginning of this chapter.

Commuting pattern-based smoothing meets all of the objectives identified for smoothing at the start of this chapter. It offers several advantages over the other approaches:

- It is solidly linked to notions of markets and what defines a market;
- It is based on data that can capture changes in labor markets;
- It is flexible in implementation design;
- It is reasonably transparent in computation; and
- It has a precedent in the current prospective payment system.

After reviewing the findings using different design parameters for commuting pattern-based smoothing, the committee concluded that several of the decisions on design parameters would be more appropriately made by CMS, given the level of complexity of the administrative details involved in implementation. This includes decisions on appropriate thresholds and on whether smoothing should be implemented as positive and negative adjustments, or as positive adjustments only to be offset with a larger national budget neutrality factor.

Although the committee only had time to conduct smoothing simulations on the wage index as applied to IPPS hospitals, any of the methods analyzed in this chapter could be applied to other Part A providers. Commuter pattern-based adjustments could also be implemented for smoothing GPCI values. The key to implementation across different types of providers is the availability of commuter data for the right industry subsector – for example, for nursing homes, for ambulatory care, or for all health care workers.

COMMITTEE RECOMMENDATIONS

Recommendation 4-1: The committee recommends that wage indexes be adjusted using formulas based on commuting patterns for health care workers who reside in a county located in one labor market but commute to work in a county located in another labor market.

The committee examined four approaches to adjusting the boundaries of labor markets: the current reclassification and exceptions systems, two county-based smoothing methods -- one based on contiguous counties and the other based on commuting patterns, and a hospital-specific geospatial method.

The current system of reclassifications and exceptions is administratively burdensome, and also relies on individual hospital cost data. Exceptions based on individual provider data are not consistent with the committee's fundamental principle that geographic indexes should adjust for market-level variation in the price of inputs facing providers, rather than the cost of inputs that providers actually incur.

Contiguous county smoothing has some advantages over the hospital-specific adjustments but it also has significant problems. The method is based on county adjacency using a pre-set tolerance for adjacent differences, and smoothing results are very sensitive to that tolerance level. The committee noted that the contiguity smoothing method does not rest on direct evidence that the adjacent counties actually operate in an economically integrated area. To be more specific, there is no assurance that smoothed adjacent counties compete for labor in the same market.

The committee recommends commuting pattern-based smoothing because it is anchored in a solid conceptual framework linking commuting with economic integration and therefore with labor markets. It is also consistent with the way MSAs are defined. Commuting patterns of health care workers are an indication of overlap and economic integration of labor markets across their geographically drawn boundaries. Implementing the adjustments based on commuting patterns of all health care workers, as opposed to hospital workers only, would incorporate the contribution of labor employed by physician offices and other health providers, and acknowledge a growing degree of integration in the workforce across clinical practice settings.

The committee is in favor of targeting smoothing adjustments to areas with significant wage cliffs and strong evidence of economic integration. Therefore, the committee is generally in favor of establishing thresholds to identify counties that should be eligible for smoothing adjustments. Rules for specific thresholds, however, are more appropriately developed by CMS.

The committee is not making a recommendation on whether to apply smoothing in both directions or apply smoothing for positive adjustments only. An advantage to applying smoothing in both directions is that the adjustments tend to cancel each other out within a region, and there is less need to underwrite the cost of the adjustments with a national budget neutrality factor applied to all providers. An advantage to limiting smoothing to positive

adjustments only is that it will be less disruptive to the current payment system and perhaps require less of a phase-in.

The committee is in favor of adjustments based on out-migration rather than in-migration patterns to address the issue of hospitals competing for workers in surrounding higher-wage areas and because there is precedent in using an out-migration adjustment. However, the full range of options should be reviewed by the Department of Health and Human Services and CMS, given the level of complexity of the administrative details involved in implementation.

Recommendation 4-2: The committee's recommendation (4-1) is intended to replace the system of geographic reclassification and exceptions that is currently in place.

The committee believes that this recommendation (4-1), if adopted, should improve the accuracy of the wage index and reduce the need for reclassifications and exceptions based on individual provider costs.

The committee regards Frontier state index floors as policy adjustments rather than as adjustments intended to improve index or market accuracy. While the committee is charged with reviewing the geographic payment adjusters for accuracy, the committee also recognizes that some parts of the current administrative system of reclassifications and exceptions may serve other policy goals. Thus, while formula-based smoothing is recommended as a replacement for all types of reclassification, Lugar counties, the current set of Section 505 outmigration adjustments, and the rural floors, smoothing is not a replacement for Frontier state floors, nor will it accomplish some of the policy objectives embedded in the special considerations that are now given to sole community providers and rural referral centers to help them qualify for reclassification. In keeping with its objective to separate technical price adjustments from policy interventions, the committee will consider the policy goals addressed by Frontier state floors and the policy goals embedded in special rural hospital considerations as part of its phase two report.

The committee's recommendations for revising the wage index and the GPCIs, adopting more accurate labor markets, and smoothing labor market boundaries based on commuting patterns should reduce the need for special exceptions. Special circumstances may still arise related to market-level inaccuracies that could create a need for administrative exceptions. The committee believes that such exceptions should be restricted to addressing market-level issues, however, and not for individual provider adjustments based on individual provider circumstances. The need for any additional adjustments should be assessed in the context of the underlying principles as described in Chapter 1 of this report, including consistency of criteria, market-based rationale to make adjustments, and transparency to stakeholders.

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5

Geographic Practice Cost Indexes

Fee-for-service Medicare payments to physicians and certain other licensed clinical practitioners (including nurse practitioners, physician assistants, clinical nurse specialists, and occupational and physical therapists) are adjusted for geographic differences in market conditions and business costs. These geographic adjustments are intended to ensure that payment to providers reflects the local costs of providing care, so that the Medicare program does not overpay in certain areas and underpay in others.

Each of the three components of the Medicare Physician Fee Schedule (PFS) – physician work, practice expense (PE), and malpractice (MP) insurance – is adjusted for differences across geographic areas in the input prices related to each component. When they are combined, these three components are known as the geographic adjustment factor (GAF).[1]

This chapter describes the history, intent, and evolution of the GPCIs to provide background and context for the committee's findings and recommendations about improving the accuracy of payment. The committee sought to develop a uniform and consistent approach to the GPCIs and the hospital wage index (HWI) (see Chapter 3) by employing comparable data sources and methods.

Throughout its deliberations about the GPCIs, the committee has made a distinction between geographic adjustments that are designed to adjust payments for input price differences that providers face, and those that might be made to help address perceived workforce shortages and achieve other policy goals. While the committee acknowledged that both cost and access are part of its charge, the committee took the position that preserving access to care in nonmetropolitan areas should be done explicitly, rather than using the GPCIs to address both cost differences and access issues (Zuckerman and Maxwell, 2004). The committee viewed the combination of the two sets of issues as conceptually problematic by making it difficult to distinguish the level of resources being allocated to each objective, which affected the determination of the accuracy of payment.

Accordingly, the committee's conceptual distinction is reflected in the structure of the committee's reports. The committee's phase 1 report addresses geographic differences in input prices, focusing on improving accuracy by relying on the best possible input price measures from an independent source. Phase 2 of the committee's

[1] Unless otherwise specified, the term "practitioners" is used to describe both physicians and other eligible clinical practitioners who are permitted to furnish services and bill Medicare under the Physician Fee Schedule (CMS, 2009b). Physician assistants must be supervised by a physician, but nurse practitioners and certain other practitioners may practice independently if their state laws allow it and may therefore bill Medicare directly. Their payment is a set percentage of the physician fee schedule.

work will address broader policy issues including workforce supply and access to care in the context of geographic adjustment. For example, physician practices have an increasingly diverse mix of employment arrangements, and advanced practitioners such as nurse practitioners contribute to the work component as well as the practice component of physician work. Accordingly, the phase 2 report will also consider the impact of the committee's phase 1 report recommendations on geographic adjustment to fee-for-service payment in the context of current market trends toward delivery system integration.

GEOGRAPHIC ADJUSTMENTS TO FEE-FOR-SERVICE PAYMENTS

Fee-for-service Medicare payments to practitioners are based on the PFS. The PFS is based on a list of more than 7,000 distinct services defined according to the nomenclature of the Current Procedural Terminology (CPT ®) codes developed by the American Medical Association (AMA) (2011a). CMS uses the CPT® codes to create an expanded coding system called the Healthcare Common Procedure Coding System (HCPCS) and assigns HCPCS codes to the 7,000+ procedures that Medicare recognizes in its fee-for-service payment system.

Medicare payment for physicians and other licensed health practitioners for each service is based on submission of a claim using one or more HCPCS codes (CMS, 2011a). Each HCPCS code has an assigned number of Relative Value Units (RVUs) that represents the cost of resources required to provide a particular procedure or service relative to the resources associated with other procedures or services. For example, a follow-up office visit and a cataract removal require different amounts of resources than those needed to perform a colonoscopy, so all are assigned different RVUs (MedPAC, 2008). The total RVUs for a procedure are subdivided into the three components of the PFS: physician work, PE, and MP insurance:

- **Physician work RVUs** reflect the time, skill, effort, judgment, and stress associated with providing one service relative to other services.
- **Practice expense RVUs** address the direct costs of providing a service and the indirect costs of maintaining a clinical practice, including administrative and clinical staff compensation (salary and benefits), rent, and supplies and equipment (CMS, 2010a). For most services, there are different PE RVUs for services provided in facility settings and in office settings. Practice expenses associated with supplies and equipment are not adjusted geographically because they are typically purchased in a national market with practically uniform prices across areas.
- **Malpractice premium RVUs** represent payment for professional liability insurance (PLI), also known as malpractice (MP) insurance (CMS, 2010a). The mean MP premium for each payment area is weighted for state- and

insurer-specific specialty mix and adjusted for each insurer's market share (O'Brien and Strain, 2010a).

Before Medicare pays for a service, the RVUs for that service are adjusted for geographic differences in input prices and for provider type (e.g., physician, nurse practitioner, podiatrist, and others who can bill Medicare independently). Policy adjustments are also made, such as for services furnished in a provider shortage area. Then, the sum of the three geographically adjusted total RVUs is multiplied by a conversion factor (CF) that determines Medicare payment in dollars (see Appendix B).

Physician services include office visits, surgical procedures, and a broad range of other services provided in offices, hospitals, clinics, post-acute care settings, and other clinical settings (MedPAC, 2007). For most physician services in most settings, Medicare pays the provider 80 percent of the fee schedule amount and the Medicare beneficiary is responsible for the remaining 20 percent[2] (MedPAC,2010) after meeting the $162 deductible (HHS, 2011). Medicare pays nurse practitioners, physician assistants, and clinical nurse specialists, at 85 percent of the physicians' fees, after the deductible is met (MedPAC, 2010). However, their services can be paid at 100 percent of the physicians' fees if they are "incident to" services, or services that are rendered by a nurse, and billed by the supervising physician (MedPAC,2010).

Payment Methodology

Medicare pays for physicians' services under Section 1848 of the Social Security Act, which requires that payments be based on national uniform RVUs (CMS, 2010b; Hsiao et al., 1988). The basic concepts and methodology of the current Medicare physician payment approach, known as the Resource-Based Relative Value Scale (RBRVS) were enacted in the Omnibus Budget Reconciliation Act (OBRA) of 1989 and implemented by CMS in 1992. The change was intended to make Medicare payments more equitable by basing them on relative input use rather than on historical prices, and to reflect local variation in input prices. Additional statutory changes that affect geographic adjustment have been made over the years (see Box 5-1).

The Centers for Medicare and Medicaid Services (CMS) is required by law to update the GPCIs that adjust these RVU-based fees every 3 years. The CY 2011 final PFS rule implemented the following changes to the adjustment factors in response to new statutory requirements in the Patient Protection and Affordable Care Act:

[2] Participating providers receive the Medicare Part B allowed amount as payment in full for services and bill the beneficiary only for any coinsurance or deductible that may apply. Payment for nonparticipating physicians (those who have not signed a Participating Payment Agreement with the Part B enrollment department at CMS) is 5 percent below the Medicare Physician Fee Schedule amount (CMS, Medicare Physician Guide), but these physicians are permitted to bill patients up to 15 percent in excess of the fee schedule amount (https://www.cms.gov/mlnproducts/downloads/physicianguide.pdf).

- Extended the GPCI work floor of 1.0 through FY 2011, in accordance with a provision in the Medicaid and Medicare Extension Act of 2010;
- Kept the permanent 1.5 GPCI work floor for Alaska in effect; and
- Established a permanent, non-budget neutral floor of 1.0 for practice expense for "frontier" states (Utah, North Dakota, Montana, South Dakota, and Wyoming).

BOX 5-1
Geographic Practice Cost Index Timeline of Events

1989: The U.S. Congress requires that the U.S. Department of Health and Human Services (HHS) account for physician work, practice expenses, and malpractice expenses when calculating the GPCIs (Omnibus Budget Reconciliation Act of 1989 P.L. 101-239 December 19 1989).

1992: Section 1848 of the Social Security Act establishes a fee schedule for physicians' services.

1996: The Health Care Financing Administration reduces the number of payment areas from 210 to 89 (CMS, 1996).

1997: The U.S. Congress requires the Centers for Medicare and Medicaid Services (CMS) to implement resource-based malpractice relative value units (RVUs) for all services provided, effective in the year 2000 (The Balanced Budget Act of 1997 P.L. 105-33(August 5 1997).

2003: The U.S. Congress mandates review of the practice expense GPCI (Medicare Prescription Drug, Improvement, and Modernization Act of 2003 P.L. 108-173 December 8 2003).

2005: The Government Accountability Office (GAO) reports that the GPCIs are sound conceptually but that data and data collection methods could be improved, such as by collecting more data on physician assistant wages and using commercial rent data rather than residential rent rates (GAO, 2005).

2007: GAO recommends that CMS design a uniform approach to defining payment areas, so that there is consistency from state to state, and that CMS base its locality structure on the most recent data (GAO, 2007a).

2007: The Medicare Payment Advisory Commission recommends that CMS exclude expenses that do not vary geographically (including supplies and medical equipment) from the GPCI formulas to improve their accuracy (MedPAC, 2007).

2008: Acumen report for CMS evaluates four smoothing techniques, and concludes that each method would significantly reduce large disparities between payment areas (O'Brien-Strain et al., 2008).

2010: On behalf of HHS Secretary Kathleen Sebelius, CMS commissions the Institute of Medicine to evaluate the accuracy of the geographic adjustment factors in a 2-year study.

2010: The U.S. Congress passes the Patient Protection and Affordable Care Act of 2010, which establishes a wage index floor of 1.0 for frontier states, sets a practice expense GPCI floor for frontier states, and extends the work GPCI floor through December 31, 2010 (P.L. 111-148).

2010: In November 2010, CMS posts the final Physician Fee Schedule rule with comment period for the 2011 GPCI. The Final Rule describes updates to GPCI weights and includes new regulations in response to provisions in the Patient Protection and Affordable Care Act (CMS, 2010b).

2011: On July 8, 2011, CMS issues the CY 2012 Physician Fee Schedule Proposed Rule, which proposes to change the GPCI cost share weights by decreasing the weight for work and increasing the PE weight; add a new category for contract labor as a component of the PE; and use ACS residential rent data for the office rent component of the GPCI.

By statute, any changes to the GPCIs that do not explicitly receive additional funding must be budget neutral. In practice, budget neutrality requires that the total amount of payment be unaffected by new adjustments, so that any adjustment upward for one payment area must be paid for by a downward adjustment for other areas. This requirement creates significant tensions among providers in high- versus low-cost areas.[3]

Another major source of disagreement is whether the geographic adjusters should be used as policy levers to help influence provider supply, particularly in nonmetropolitan areas. Some rural health policy experts and practitioners argue that because earning potential influences physicians' decisions on where to practice, and because many private payers use Medicare prices as a basis for setting their own rates, the geographic adjustments should be used as policy tools to encourage physicians to practice in nonmetropolitan areas (Iowa Medical Society, 2010; MacKinney et al, 2003). Using the geographic price adjusters to raise payments in provider shortage areas has been called into question by others on the grounds that it is inconsistent with the underlying purpose of input price adjustments and reduces payment accuracy (Schwartz, 2010).

Another source of longstanding dissatisfaction over the geographic adjustment factors has been the use of proxy data from sources other than physician practices to measure geographic variation in the price of some inputs. Among practitioners, the complexity of the index construction and the lack of direct public access to some of the sources of data used for the index calculations have also been grounds for criticism.

The committee's principles value transparency to stakeholders, but also assign a high priority to the task of improving accuracy by relying on the best possible input price measures from an independent source. In the view of the committee members, proxy data for physician earnings are more accurate than data on costs paid by providers

[3] See, for example, statements to the IOM Committee on Geographic Adjustment Factors in Medicare Payment from Senator Grassley (2011), Eneida Roldan (2011), and Alice Tolbert Coombs (2010).

because the proxy data are independent of local business decisions or other requirements, such as state laws on staffing ratios, which do not necessarily reflect input prices across labor markets. The committee also made a distinction between geographic payments that are intended to adjust payments for input prices and those adjustments that might be made to help reach policy goals, such as addressing shortages of clinical practitioners to maintain or improve access to care. Such policy adjustments will be addressed in the phase 2 report.

Payment Areas

The GPCI payment adjustments are made for 89 different geographic areas in the United States, also known as payment areas (or localities). Some are defined according to metropolitan areas, but there are 34 statewide payment areas that include both metropolitan and nonmetropolitan areas (see Figure 1-5 in Chapter 1). Practice input prices may vary substantially within payment areas, particularly in the statewide areas. For example, although Texas has 8 areas (Brazoria, Dallas, Galveston, Houston, Beaumont, Fort Worth, Austin, and the rest of Texas), San Antonio - the 25th largest metropolitan area in the country and the 3rd largest metropolitan area in Texas - is included within the "rest of Texas" payment area, despite the fact that practitioners there are unlikely to face prices equivalent to those in the nonmetropolitan areas of Texas.

Historically, CMS has relied on the advice of state medical associations when deciding whether to make changes to statewide payment areas. However, as the Texas example shows, statewide payment areas do not necessarily represent economically integrated areas with similar relative wages and rents, and they may not be the most accurate basis for adjustment. In recent rules, CMS (2010a) noted that changes in demographics and local economic conditions have occurred since 1997, when the current payment area structure was developed and implemented. These changes may have led to inconsistencies between payment differences and input price differences that warrant reconsideration of the current configuration of payment areas.

The committee's discussion and recommendations about revising payment area configurations are the subjects of Chapter 2. Because hospitals and physicians essentially draw from the same labor market, the committee recommends that the same set of payment areas be used for the HWI and the GPCIs, and that MSAs and statewide non-MSAs should serve as the basis for defining these labor markets. While the payment areas would stay the same for the HWI, implementing this recommendation would mean that the GPCI payment areas would expand from 89 to 441 areas, which would be a significant change. The impact of the change in payment areas will be assessed in the phase 2 report.

GEOGRAPHIC ADJUSTMENT FACTOR COMPONENTS

As described above, the GAF is a combination of three independent GPCIs, each used to adjust the fee schedule for geographic variation in input prices for a different component of the cost of physician care.

The relative contribution of these three components varies by type of service and the setting where it is provided. For example, the composition of the total RVU for the office visit code 99201 is roughly 40 percent work RVU, 57 percent PE RVU, and 3 percent malpractice RVU, while the composition for the emergency room visit code 99283 is roughly 74 percent work, 21 percent PE, and 5 percent malpractice. Because each CPT code is composed of a different mix of the three RVUs, and therefore the three GPCIs are combined in different proportions, each code has a different average GAF.

When it was introduced, the RBRVS was seen as a significant improvement over the previous system, which was based on the customary, prevailing, and reasonable (CPR) physician fees in each payment area. Payments based on the CPR method varied widely across areas but were only partially explained by differences in practice costs (Physician Payment Review Commission, 1991).

CMS updates the RBRVS to adjust values for new services and reflect services that may be overvalued or undervalued after considering the recommendations of the AMA/Specialty Society Relative Value Scale Update Committee (RUC). The accuracy of the RUC's valuation of services has been another source of discussion and debate for some time. According to the Medicare Payment Advisory Commission (MedPAC), the RUC process does not accurately identify services that are overvalued and tends to recommend higher values for specialty care (MedPAC, 2006).

In its discussions about accuracy and the work adjustment, the committee acknowledged the importance of the RVUs in the broader fee-for-service healthcare system, since most private insurers use the RVUs as the basis for negotiating fees with physicians in their networks. While the committee believes that further study of the accuracy of the RVUs is warranted in the near future, that effort is beyond the scope of this committee's charge.

GPCI Cost Share Weights

To set the relative importance of each input category, CMS bases the GPCI cost share weights on those used in the Medicare Economic Index (MEI), which measures price differences (inflation) from year to year (rather than across geographic areas) in the cost of providing services under the PFS (MaCurdy et al, 2011). The weight assigned to the GPCI for each component of the Medicare PFS is based on the sum of the MEI cost shares of the inputs that comprise that component. The MEI cost shares are updated annually to meet a statutory requirement, as follows:

> The Medicare Economic Index was originally required by Section 1842 (b)(3) of the Social Security Act, which states that any prevailing charge levels beginning after June 30, 1973 may not exceed the level from the previous year except to the extent that the

Secretary finds, on the basis of an appropriate economic index data, that a higher level is justified by year-to-year economic changes (CMS, 2010).

In CY 2011, the GPCI cost share weights were based on the 2000 base-year MEI weights, reflecting physician expenses in 2000. In the PFS proposed rule for CY 2012, CMS announced plans to update the GPCI cost share weights with the 2006 base-year MEI cost share weights, which use more current practice expense data primarily from the 2006 AMA Physician Practice Information Survey (PPIS) (CMS, 2011). This update would decrease the overall weight assigned to physician work, increase the overall weight assigned to practice expense, and disaggregate certain practice expense categories (see Table 5-1).

TABLE 5-1 Comparison of CY 2011 and Proposed CY 2012 GPCI Cost Share Weights

Expense Category	Cost Share Weights (%)		Geographically Adjusted Cost Share Weights (%)	
	Current Rule CY 2011	Proposed Rule CY 2012	Current Rule CY 2011	Proposed Rule CY 2012
Physician Work	52.47	48.27	13.12[a]	12.00[a]
Practice Expense	43.67	47.44	30.86	34.39
Employee Compensation	18.65	19.15	18.65	19.15
Office Rent	12.21	10.22	12.21	10.22
Purchased Services	n/a	8.10	n/a	5.01[b]
Equipment, Supplies, Other	12.81	9.97	0.0	0.0
Malpractice Insurance	3.87	4.30	3.87	4.30
Total	100.00	100.0	47.85	50.75

NOTE: [a] Work cost share weight with the one quarter work adjustment.
[b] Only 62 percent of the purchased services index is adjusted for geographic variation in contracted services.
SOURCE: MaCurdy, et al (2011)

Within the practice expense component, the proposed rule for CY 2012 adds a new PE cost category for purchased services. The purchased services index reflects regional variation in input costs for contracted labor that would typically be outsourced, such as accounting, legal, and building maintenance services. These industries are included in the "all other services" category within the MEI office expense and the standalone "other professional expenses" category of the MEI (CMS, 2011).

No geographic adjustment is applied to the portion of payment that corresponds to inputs, such as equipment and supplies, that are generally purchased in national markets at prices that do not vary systematically by geographic area (CMS, 2010). Because the physician work GPCI is adjusted for only one quarter of the geographic variation in the proxies used in the adjustment, and no adjustment is applied to the equipment and supplies component of PE, only 48 percent of the GPCI cost share weights were adjusted for geographic input price variation in 2011. The changes in the

proposed CY 2012 GAF would increase this percentage from 48 to 51 percent in CY 2012 (see Table 5-1) (MaCurdy et al, 2011).

WORK GPCI

The physician work GPCI is designed to reflect geographic differences in the cost of physician labor across areas in comparison to the national average (CMS, 2010). The committee discussed two key issues: 1) whether physician work should be adjusted for geographic differences in the price of physician labor and if so, to what extent, and 2) what data should be used in computing the work adjustment.

The physician work GPCI has some unique characteristics compared to the practice expense GPCI. Practice costs such as office rent and wages of non-physician personnel are determined in local real estate and labor markets, where geographic variation in input prices is well understood and reasonably well documented. Physician work costs are different, in that there is no broader market for this input beyond medical practices, making the physician labor market distinctive.

Moreover, many physicians are self-employed and have an ownership interest in their practice, and it is not uncommon for physicians in private practice to have a partial salary for administrative or clinical responsibilities. Earnings of self-employed physicians, including those in physician-owned groups, are therefore a combination of payment for their own labor and an entrepreneurial return on investment in their business (Gillis et al, 1993). There are so many variations in staffing arrangements in physician practices that physician income may not be accurately described by a measure that is based solely on the payments that physicians receive for providing services.

How Should Physician Work Be Geographically Adjusted?

The goal of geographic adjustment is to pay physicians at a level that is equivalent across geographic areas, given cost of living differences and differences in amenities across geographic areas. Since the implementation of the PFS and the RBRVS in 1992, there have been differences of opinion about whether and how to make geographic adjustments to physician work payments and how much the adjustments should be. Committee members reflected the range of opinions when the deliberations began, and there was support for full, partial, and no work adjustment.

A full work adjustment would mean that variations in earnings would reflect the full extent of differences in cost of living, as attenuated by area amenities. The rationale for a full work adjustment is that compensation rates in the private sector, including the healthcare industry, vary across labor markets. Public sector wage rates for a variety of occupations ranging from census workers to highly skilled professionals and managers also vary geographically. Geographic variation in wages for non-physician health care workers is recognized and reflected in the geographic adjustment of hospital and physician office labor expenses. Furthermore, a substantial and growing share of

physicians (nearly 50 percent of new physicians, according to the MGMA (2010), are employees who are paid at locally prevailing salary scales.

A partial physician work adjustment of 25 percent has been in place since the work adjuster was developed because there was such a wide variation in the earnings data used to calculate the adjustment and policy makers would not support a full adjustment (Zuckerman, 2004). Committee members supporting a partial adjustment took the position that an adjustment was needed, but the data used to calculate the adjustment might not adequately reflect the variation in compensation in different areas. Thus, the appropriate amount for the adjustment might be might overstated or understated, especially if the market for physician services were found to differ significantly from the market for other professional services.

There was also some support on the committee for no work adjustment. The argument against any physician work adjustment is based on the view that physicians providing an equivalent service for a federal program should receive the same reimbursement regardless of where they are located; "work is work." According to this view, Medicare's work RVU already takes into account physician work effort, and it takes no more or less effort to provide the same medical service in different geographic areas (AAFP Testimony, 2010).

Given the variety of opinions, the committee turned first to a consideration of economic theory and discussed the applicability of the labor economics theory of compensating wage differentials, which addresses the relationship between wage rates and various attributes of a particular job. The economic argument for adjusting Medicare physician payment across areas is that, in general, compensation varies inversely with the affordability and desirability of an area as a place to live and work. Thus, wages will tend to be lower if there is a lower cost of living and greater availability of amenities. (See Appendix I; and the discussion of the theory of compensating wage differentials in Chapter 2.)

According to this theory, compensation for physician labor, like compensation for other labor, should reflect the cost of living in an area, along with amenities that might affect wage compensation, such as the quality of schools and housing, access to recreational facilities, and professional opportunities. The theory implies that workers will accept lower monetary compensation in return for amenities they value and will require higher compensation in return for giving up amenities they value (Borjas, 2010; Ehrenberg and Smith, 2009). The theory further holds that these differences not only reflect the requirements of the local labor market, but are also fair in that workers – especially relatively mobile professionals such as physicians – can move between areas if they perceive their salaries are misaligned with amenities and costs of living. The committee recognized that there may be substantial differences in preferences for amenities among individuals in the labor market. The committee also recognized that preferences for amenities may differ among persons in professional occupations from those in other occupations and also may differ between health professionals and those in other professions. The extent to which such differences exist and are related to

differences in compensation by occupation in general and by profession in particular, however, has not yet been adequately measured.

Another perspective on geographic differences in the cost of providing services was provided in testimony from clinical practitioners about geographic differences in the requirements for support services that are not adequately accounted for in the national average relative value units by CPT code. For example, in rural areas, physicians can be isolated in solo or small practices with few available professional resources to assist with discharge planning or family counseling. In these circumstances, primary care providers take on many different roles that may not be reimbursed (Iowa Medical Society, 2011). Providers in medically underserved urban areas may also lack necessary supports - translators, for example (Flores, 2005), which increases the time required to communicate with patients. While the committee acknowledges the potential for such resource and payment gaps, its position is that payment for these support services is more appropriately provided through a different targeted mechanism rather than through a geographic adjuster focused on variation in input prices. These other issues will be examined further in the committee's phase 2 report.

The committee next sought to reconcile its differences by pursuing an evidence-based approach to determining the level of desired adjustment, and whether it should be no adjustment, partial, or full adjustment. A study by the Center for Studying Health System Change (HSC) found that mean physician incomes in metropolitan and nonmetropolitan areas were not statistically significantly different (Reschovsky and Staiti, 2005).[4] However, a finding of no difference on average does not necessarily mean that there are no important differences among individual metropolitan and nonmetropolitan areas that should be reflected in Medicare payments to providers. Another study found that primary care physicians (general practitioners, family physicians, internists, and pediatricians) in nonmetropolitan areas earned about 5 percent less than their urban counterparts, after making similar adjustments to those made in the HSC study (Weeks and Wallace, 2008). Neither study assessed possible differences among individual metropolitan and nonmetropolitan areas. Data for both studies were more than 10 years old and do not reflect the most recent trends in provider payment. The committee therefore concluded that new empirical evidence will be needed to confirm the full extent of differences in compensation across geographic areas.

After extensive discussion, the committee came to agreement that geographic areas vary in terms of prices of goods and services and desirability in terms of places to live and work, even if there are individual and professional differences in the ways that desirability is perceived by health professionals. The committee was also in agreement about addressing differences in resource use and the ways that services are provided in medically underserved areas in its Phase 2 report.

[4] The study used self-reported data on net income from the 2000-01 HSC Community Tracking Study Physician Survey, adjusting for hours worked, specialty, practice ownership, and payer mix, factors which also affect physician income.

Given the inconclusive empirical evidence on geographic variation in compensation, the committee concluded that new empirical evidence will be needed to confirm the full extent of differences in fee-for-service compensation of physicians and other clinicians across geographic areas. The committee therefore recommended that the work adjustment should be based on a set of principles involving accuracy, consistency, and transparency, as described in Chapter 1, and a systematic empirical process to generate new empirical evidence about geographic variation in compensation.

To generate this new empirical evidence, the committee recommended a multiple regression model using the incomes of proxy or reference occupations to predict physician incomes region by region. The approach is based on the logic of compensating wage differentials, which suggests that anything less than a full cost of living adjustment should be offset by the region's desirable amenities. The proposed approach assumes that the preferences for amenities among the individuals in the proxy occupations, and thus the offsets from a full cost of living adjustment are similar to those of physicians. If that were found not to be the case using proxy data, the statistical model could systematically compare physician salary data from different sources to improve the model's explanatory power. The committee's recommended approach to testing various statistical models for predicting physician compensation is discussed in more detail in the following section and in Appendix I.

How Much of the Variation in Physician Work Should Be Adjusted?

When the geographic adjuster for physician work was originally developed, it was based on non-physician professional earnings that ranged from 28 percent above the national average, in Manhattan, NY, to 16 percent below the national average, in rural Missouri (Zuckerman, 2004). Policy makers concluded that the range appeared too large, and Congress required that the physician work GPCI reflect only one-quarter of the variation observed in professional earnings. This reduced the range to 9 percent above average for Manhattan and 5 percent below average for rural Missouri (Zuckerman, 2004).

Over time, Congress further limited the extent of geographic adjustments to physician work. In addition to the one-quarter work adjustment, two additional statutory provisions limited downward adjustments to the work component of physician fees. First, section 1848 (e)(1)(G) of the Social Security Act requires that the state of Alaska receive a permanent 1.5 work GPCI floor for services furnished beginning January, 2009, meaning that physician payment will remain above the national average of 1.0. Second, a provision in the Medicaid and Medicare Extension Act of 2010 extended the 1.0 temporary work GPCI floor, enacted in the Medicare Modernization Act through December 31, 2011. These provisions raised Medicare fees to physicians in low-cost areas and narrowed urban-rural fee differences (GAO, 2005).

The Congressional decision to adjust for one-quarter of the variation in physician work was the result of political compromise rather than empirical evidence. One

subsequent study in the early 1990s found that the one-quarter work adjustment was a better fit than the full adjustment or no adjustment in a statistical model relating the work GPCI and physician net hourly earnings as measured by the AMA's Socioeconomic Monitoring System survey in 1990 and 1991 (Gillis et al, 1993). After adjustment with the one quarter work GPCI, physician earnings still varied, though less so than for the other levels of work adjustment. However, this study did not attempt to estimate the optimal fraction for the adjustment or assess the proxy occupations selected, and the committee was reluctant to draw firm conclusions from one study with data that are now more than 20 years old.

The committee therefore concluded that the one-quarter work adjustment lacks empirical foundation and sought to develop an alternative using statistical modeling based on multiple regression, a standard statistical technique that allows testing and modeling of independent or explanatory variables to predict a dependent or outcome variable. The inputs to the analysis would be indexes representing the ratio of median compensation for an occupation in each payment area to the national mean of these median compensation levels, both for physicians and for the proxy occupations. Preferably, if appropriate data can be found, these income indexes should be calculated based on employed professionals. The statistical analysis would then be a linear regression[5] to determine which occupations' earnings best track physician earnings, then creating an adjustment index based on geographic variation in earnings in the other occupations. (The analysis is summarized in this section and described in detail in Appendix I.)

After fitting this linear statistical model, there are at least two ways to use the fitted regression model to calculate the work adjustment. One approach is to calculate an index to represent the predicted value for physician compensation from the regression model. This resembles the committee's approach for non-physician labor expense in the PE GPCI, but with an important difference. For non-physician labor expense, the geographic adjustment is based on the weighted average hourly wage of health care workers in each geographic area relative to the weighted average national wage for those same health care workers, where the weights used for the averaging are national employment for all occupations in all physician offices.

The committee also discussed a second approach to the work adjustment, in which the relative weights for each of the 7 reference (proxy) occupations would be derived from the regression equation. Under the current method of GPCI calculations, none of the reference (proxy) occupations are parts of the physician workforce and in fact, only 2 – nurses and pharmacists – are part of the healthcare workforce. By using the proposed regression equation to determine relative weights of the proxy occupations, occupations with a higher regression coefficient would receive a higher weight in the predicted value used to compute physician work.

[5] A linear regression model is used to explain the relationship between two or more variables by using a straight line to plot the strength of the relationship. For example, linear regression can be used to fit a predictive model to an observed data set of independent and dependent variables.

For example, if monetary compensation in Occupation A tracks physician pay more closely than does Occupation B, Occupation A compensation would receive a higher weight in determining values of physician work. If the wages of the alternate occupations used as predictor variables were found to be highly correlated with each other, the choice of occupations would need to be re-evaluated, perhaps by testing alternative choices of reference occupations, and replacing the less predictive occupations (those with smaller coefficients) with more predictive ones (with larger coefficients). Furthermore, the total weight given to all occupations would also be determined empirically through the magnitude of the coefficients; thus, the choice of a one-quarter work GPCI or something larger or smaller would be determined through an objective empirical procedure.

There are many possible variations to developing a statistical model to set the level of the work adjustment, in terms of the data sources, specific variable definitions, and the possible of influence of high or low outlier values. The committee did not perform a full evaluation of each of the alternatives in the limited time available, but the committee recommended that CMS consider statistical modeling as a general approach. The committee concluded that an empirical alternative using statistical modeling would be an important improvement over the way the work adjustment is currently calculated. Appendix I presents a detailed discussion of some possible ways in which the modeling might be accomplished.

Which Data Should Be Used for Adjusting Physician Work?

Current Sources

In CY 2011, CMS computed the work GPCI using the relative median hourly earnings from 2006-2009 BLS OES data of seven non-physician occupation categories:

- architecture and engineering;
- computer, mathematical, life and physical sciences;
- social science, community and social service, and legal;
- education, training and library;
- registered nurse;
- pharmacists; and
- art, design, entertainment, sports and media (CMS, 2010).

The use of the relative median earnings of these 7 non-physician (proxy) occupations to compute the work GPCI has been a source of disagreement among stakeholders since the GPCIs were introduced. Some believe that only actual physician wage data should be used in the work GPCI calculations. They question how accurately the relative median earnings of the 7 non-physician occupations reflect actual relative differences in physician compensation (e.g., Reding, 2010), and the committee addressed this concern in its recommendations.

When the geographic adjuster for physician work was originally developed in the early 1990s, it was based on the median hourly earnings of workers in professional occupations with 5 or more years of college education. This group of highly educated workers was assumed to be similar to physicians in the types of goods and services they purchase and in their preferences for area amenities (Zuckerman, 2004). Physician wages were available from the U.S. Census Bureau, but the GPCI developers considered those data inappropriate for several reasons. Primary among them was the concern that the data captured existing patterns of the very fee-based reimbursement system which the PFS would replace. This would result in endogeneity, or circularity: that is, existing fees could influence the value of the adjuster that would be applied to the new fee schedule.

Alternate Data Sources for the Work Adjustment

There is strong support in the provider community for continuing to use provider-generated data, such as that from surveys of physicians by the AMA and MGMA, for the work adjustment (e.g., Reding, 2010). The committee's position was that the best approach to the work adjustment is to use variations in compensation for other professions as proxies, but the committee also decided that it was important to determine whether any existing data sources generated by providers might be adequate. The committee therefore considered several alternative data sources that might provide information on geographic variation in physician earnings for purposes of comparison with the physician proxy data that are used for the work adjustment. These sources included two non-physician surveys: the BLS OES and the US Census American Community Survey (ACS), and two surveys of physicians: the PPIS conducted by the AMA and the Medical Group Management Association (MGMA) Physician Compensation and Production Survey (see Table 5-2).

The committee's evaluation of the appropriateness of these four data sources was based on the following key characteristics:

- **Sample size.** The data source should have an adequate sample size to ensure that the variables described above are available at the level of MSAs and state-wide non-MSAs, which define the labor markets recommended by the committee (see Chapter 2 for a discussion of labor markets). Labor markets are the payment areas by which physician payment rates vary. A large sample size is necessary so that each labor market contains sufficient data for reliable computation of the work GPCI.
- **Response rate.** The data source should have an adequate response rate to ensure that the intended population is represented by the sample. A low response rate increases the likelihood of a sample that is unrepresentative of the entire population of physicians.

- **Representativeness.** The sample should reflect a broad geographic distribution, and the survey respondents should represent the range of physician practice characteristics, including single and multi-specialty practices, self-employed and salaried physicians, and solo and group practices. There should be a representative balance of these types of physicians to avoid the potential for biases. Additionally, residents should be excluded, since their wages substantially underestimate physician earnings and would introduce geographic distortions.
- **Timeliness of data.** The wage data should be current and collected regularly.

TABLE 5-2 Comparison of Four Alternative Physician Wage Data Sources

	The BLS Occupational Employment Survey (Department of Labor)	2009 American Community Survey (Bureau of Census, DOC)	MGMA Physician Compensation and Production Survey	2006 AMA Physician Practice Information Survey
Survey Characteristics				
Sample size	1.2 million establishments	2.9 million households	57,791 clinicians	5,825 physicians
Sampling unit	Employers	Households	Physicians and non-physicians that bill independently	Physicians only (MD/OD)
Can be aggregated to level of MSA/statewide non-MSA	Yes	Yes	Yes	No
Response rate	78.20%	98.00%	18.72%[a]	11.70%
Representativeness of data	Random sample and high response rate; excludes self-employed physicians; resident salaries skew mean wage downward.	Random sample and high response rate.	Convenience sample and poor response rate.	Random sample but poor response rate.
Geographic representativeness	Broad representation (all US physicians are represented at any level at which wage data are published)	Broad representation (all US physicians are represented at any level at which data are published)	Regional composition of respondents: East-24%, Midwest-32%, South-21%, West-23%	Regional composition of respondents: East- 22.2%, Midwest- 22.5%, South-35.1%, west-20.2%
Frequency of data collection	Semi-annually (200,000 establishments in each panel)	Continuously	Annually	One-time survey

Frequency of data reporting	Annually, based on a 3-year rolling average	Annually, based on 1, 3, and 5 years of data; first 5-*year report expected in 2012	Annually	n/a
Requirements for reporting data in each cell	A minimum of 2 responses from at least 3 establishments	A minimum of 2 responses from at least 3 establishments	A minimum of 10 respondents from 3 practices	Varies by question type
Available Measures				
Physician compensation	Yes	Yes	Yes	Yes
Physician benefits	No	No	Retirement Benefits Only	Yes
Physician specialty	Anesthesiologists, family/general practitioners, internists, obstetricians/gynecologists, pediatricians; psychiatrists; surgeons	Yes, but varies: wages are reported only by specialties with sufficient sample size		Yes
Physician hours worked	Yes	Yes	No	Yes
Staff wages by SOC code	Yes	Yes, but varies: wages are reported only by occupations with sufficient sample size	No	No
Characteristics of Surveyed Physicians				
Salaried v. self-employed	Salaried only	Both	Both; entrepreneurial return may be included in reported wages	Both
Solo v. group practice	Group only (plus hospitals and other health care employers)	Both	Both	Both
Single- v. multi-specialty practice	Both	Both	Both; 73% multi-specialty, 27% single-specialty	Both

NOTE: SOC = Standard Occupation Classification. RSE = Relative standard error.

SOURCES: BLS (2008), US Census Bureau (2008), AMA PPIS (2010) and MGMA Physician Compensation and Production Survey: 2010 Report Based on 2009 Data

Bureau of Labor Statistics Occupational Employment Survey (BLS OES)

The BLS OES data provide estimates of wages and employment rates for 800 occupations in 450 industries in the United States (BLS, 2011b), excluding self-employed individuals. The data are collected through a voluntary mail survey distributed to about 200,000 establishments nationally every 6 months (BLS, 2011b). Wages and employment rates are published twice yearly on the basis of a rolling 3-year average, based on a sample size of 1.2 million.

The BLS OES data include data on wages and hours, by several specialties, at the labor market level.[6] Included specialties are anesthesiologists; family and general practitioners; internists; obstetricians and gynecologists; pediatricians; psychiatrists; and surgeons. The BLS OES has a large sample size (1.2 million establishments) and a relatively high survey response rate, 78.2 percent.

The limitations of the BLS data are the following:

- The survey does not include data on benefits;
- Precise salary information is not available at the higher levels because wages above $187,200 are collected in a single category of "$187,200 or higher;" and OES then assigns a mean wage to workers in that interval that is above $187,200;
- The data include wages for medical residents, which may result in underestimates of median hourly wages for physicians in areas with teaching programs; and
- Data at the MSA/statewide non-MSA level are available only for a limited number of specialties.

American Community Survey (ACS)

The American Community Survey, launched in 2005 by the U.S. Census Bureau, is a nationwide continuous survey of households that collects demographic, housing, social, and economic data, including wages and hours worked by occupation (U.S. Census Bureau, 2008). The ACS replaced what would have been the decennial census long form in 2010 and most of the questions are identical or nearly identical to the decennial census long form. CMS used long form Census data for the physician work GPCI until CY 2011. The ACS surveys approximately 2.9 million households annually, with a response rate of 98 percent.

[6] Occupations are defined by the Standard Occupational Classification system. Industries are defined by the North American Industry Classification System. The Office of Management and Budget coordinated the development of both systems on the basis of the work of interagency and intergovernmental committees of statistical experts.

The ACS currently publishes 1-, 3-, and 5-year rolling estimates. One-year estimates of economic characteristics, such as wages, are provided for geographic areas that have a population of least 65,000 (U.S. Census Bureau, 2008). The ACS publishes period estimates[7] of wages that represent data collected over 3 and 5 years for less-populated geographic areas such as micropolitan statistical areas and statewide non-MSAs. The US Census released the ACS 5-year public use data in December 2010. The 5-year data include wage estimates for the less populated areas, for which 1- or 3-year wage estimates were not published.

The limitations of the ACS data are similar to, but not the same as, those of the BLS data. Resident wages are also included. Unlike BLS data, which represent employed physicians only, ACS data include both employed physicians and self-employed physicians, whose reported wages may also reflect profitability from practice ownership or the degree to which a physician may draw a partial salary for clinical or administrative work (e.g., medical director of a clinical service area) related to a local medical group or hospital In addition, the availability of annual specialty wage data in the ACS varies depending on the sample size of the specialties of the physician reporting wage data.

AMA Physician Practice Information Survey (PPIS)

The Physician Practice Information Survey is a national survey sponsored by the AMA for the purpose of updating the practice cost data used to develop the PE RVUs and to set the cost share weights for the MEI (Kane, 2009). The survey collected physician wage data in 2006-07 by specialty, including employed and self-employed physicians, and excluding residents.

In its review of the survey data, the committee was concerned about the survey's small sample size (5,825 physicians) and low response rate (11.7 percent) (see Table 5-2). The PPIS threshold for presenting data is 20 observations, indicating possible small sample sizes in some of the cost data metropolitan categories. In addition, the AMA has indicated that it does not plan to conduct the PPIS again so these data would not be available for future adjustments.

Medical Group Management Association (MGMA) Physician Compensation and Production Survey

The 2009 Physician Compensation and Production Survey is a national survey conducted annually by MGMA. This survey collects physician wage data, including time worked, by specialty. Employed and self-employed physicians are included and residents are excluded. In comparison to the AMA PPIS, the MGMA Physician Compensation and Production Survey has a larger sample size (57,791 clinicians) and higher response rate (18.72 percent).

[7] Period estimates are defined by the US Census (2008) as estimates "based on information collected over a period of time."

While the MGMA survey is not a reliable data source for computing the work GPCI, the committee considered whether it might be useful as a source of physician data for a statistical model to ascertain how physician wage variation compares to the wages of other professional wages. An advantage of the MGMA data for this purpose is that the data include information on the number of RVUs performed by each physician respondent, which would provide a way to control statistically for service mix, incorporating time, intensity, and skill per unit of physician work. However, as mentioned elsewhere in the report, the committee finds independent sources of data to be more accurate for calculating geographic adjustments to payment. The ACS data, when they become available, might be appropriate for such a model.

PRACTICE EXPENSE (PE GPCI)

The practice expense GPCI adjusts for geographic variation in the direct costs of providing services and the indirect costs of maintaining a clinical practice, including administrative and clinical staff compensation (salary and benefits), rent, and supplies and equipment (CMS, 2010a). Practice expenses associated with supplies and equipment are not adjusted geographically because they are assumed to be purchased in a national market in which prices are similar across the country. As of 2011, the PE GPCI accounted for 43.7 percent of the geographic adjustment, on average.

Employee Compensation

Geographic adjustments to wages for clinical and administrative office staff are based on median wage data from the BLS OES for four occupations: RNs, LPNs, health technicians, and administrative staff (CMS, 2010a; O'Brien-Strain et al, 2010).[8] This selection of occupations dates back to the first iteration of the GPCIs and is based on a 1983 survey of physician expenditure data. At that time, those four occupations were the top earnings categories for employees in physician practices, although it was noted that the employee occupational mix varied by specialty. For example, radiologists were more likely to employ technicians, whereas psychiatrists tended to have only administrative staff support (Zuckerman et al, 1987).

Since 1983, the healthcare system and its workforce has evolved, and the current 4 occupations used for the employee compensation component of the PE GPCI may not accurately reflect the current practice costs of office staff. Physician practices have an increasingly diverse mix of employment arrangements and staffing configurations, many of which vary by specialty and subspecialty, as well as by local workforce supply and other factors that physicians do not control. Therefore, the committee considered the use of a PE employee compensation index using a broader

[8] In the CY 2012 PFS, CMS proposed to expand the 4 occupations used to compute the employee compensation index to 33 health sector occupations, which account for 90 percent of the total wage share in physician offices (CMS, 2011).

range of occupations, which would better reflect the current workforce, thus improving the accuracy of the adjustment.

BLS collects wage data at three different levels: all-industry, health care sector only, and physician offices. Having decided to broaden the number of occupations included in the adjustment, the committee discussed which of these levels of BLS wage data should be used to compute the PE employee compensation index. All industry wage data have the largest sample size, but the committee is concerned that the large sample does not represent physician offices. Physician office industry level wage data are most representative of physician offices, but the sample size is smaller and the data do not address the problem of endogeneity. Health care industry level data have a sufficient sample size that is more representative of physician offices than the all industry level data and addresses the endogeneity problem. Therefore, the committee concluded that BLS health sector level wage data are a more acceptable data source for computing the employee compensation PE GPCI. The committee found no compelling reason to restrict the number of occupations in the PE adjustment, as long as the weights used in the adjustments are specific to employment in physicians' offices.

Because employment data are not available by practice type and are thought to be highly variable for reasons other than geographic variation, the committee will consider other ways to address occupation mix in the second phase of the study. Their considerations will be subject to the availability of data.

The committee also explored the degree of geographic differences in the mix of employees in clinical practices. On reviewing the data presented in Table 5-3, the committee considered whether the adjusters should reflect those geographic differences, or should be held instead to a national standard occupational mix. Variability in staffing patterns in MSAs and rest-of-state areas will be considered further in the second year of the study, subject to the availability of data.

TABLE 5-3 Ten Most Common Occupations in Physician Offices, Compared by Census Regions and Metropolitan and Nonmetropolitan Areas (in percentages)

Occupations	National Employment Shares	Northeast		Midwest		South		West	
		MSA	Statewide Non MSA	MSA	Statewide Non MSA	MSA	Statewide Non MSA	MSA	Statewide Non MSA
Medical Assistants	16	15	12	15	11	15	13	23	16
Registered Nurses	11	11	15	14	15	12	11	10	13
Receptionists and Information Clerks	9	13	10	8	10	10	12	6	11
Medical Secretaries	9	9	9	10	9	7	6	14	11
Billing and Posting Clerks	4	6	4	5	5	4	6	5	4
Licensed Practical and Vocational Nurses	4	4	7	5	11	5	10	2	5
Supervisors and Admin. Managers	4	5	4	2	3	4	5	4	3
Office Clerks, General	3	3	4	4	4	5	6	3	3
Secretaries	2	6	6	1	1	3	3	1	2
Radiologic Technologists and Technicians	2	3	2	2	2	2	2	2	2

SOURCE: RTI Analysis of BLS tabulations of Occupation Employment Series Data released May 2010

NOTE: Decimals are rounded to the nearest whole number

Alternate Employee Compensation Data Sources

An alternative to using the BLS data that CMS is using might be to use wage data from the ACS, as proposed in 2005 by the Government Accountability Office (GAO). Because ACS reports wage data annually, the GAO (2005) report suggests that the use of ACS wage data would make the PE GPCI more current and will allow the PE GPCI to be updated annually. For the Sixth PFS update, CMS chose not to use wage data from the ACS because the 3-year public- use microsample reflected only 3 percent of households, which resulted in small sample sizes in certain geographic areas. For example, the pharmacist occupational category had fewer than 10 observations in the Manhattan, Kansas, Beaumont, Texas, and southern Maine areas.

However, in late 2010, additional ACS data became publicly available, offering certain advantages over BLS data, including a higher response rate, larger sample size (including wage data at the zip code level), and more frequent data collection (see Table 5-2). CMS (2010a) indicated that it will review the ACS data, and has proposed to use them in the construction of the practice expense adjustment factor in the future. In the proposed revisions to the Sixth update released in July 2011, CMS proposed to use ACS data to estimate regional variation in the cost of office space (MaCurdy, 2011).

Office Rent

Geographic differences in office rents are calculated on the basis of the median rent for a two-bedroom apartment, using data from the U.S. Department of Housing and Urban Development (HUD) (Pope et al, 1989). Even though physicians' offices are located in commercial as well as residential areas, HUD price information is the only source publicly available for all metropolitan and nonmetropolitan areas. The appropriateness of using these data rests on the assumption that residential rents and commercial office rents are influenced by similar factors, for example, land scarcity and population density, although the lack of publicly available commercial data makes it difficult to fully test this assumption.

Data on median rents for a 2-bedroom apartment are used to minimize the effect of outliers, which is reasonable for estimation of relative rental costs. The rent adjuster is based on the "fair market rent" under HUD's Section 8 Housing Program, which has been criticized as not reflecting commercial space or actual cost differences in metropolitan and nonmetropolitan areas (Grassley, 2011).

Alternate Sources of Office Rent Data

To assess the accuracy of HUD data and respond to stakeholders' concerns, the committee identified alternative public and commercially available sources of commercial rent data and compared the data available, the frequency and methods of data collection, sample sizes, and demographic information with the characteristics of HUD data currently being used. Table 5-4 presents these comparisons.

Table 5-4 Comparison of Office Rent Data Sources

	HUD	American Housing Survey (census and HUD)	General Services Administration (GSA)	Basic Allowance for Housing (US Department of Defense)	USPS	MGMA Physician Cost Survey for Single Specialty Practice	REIS, Inc.
Data available	Residential rental rates for 0–5+ bedroom apartments at 40th or 50th percentile of a distribution of standard – quality housing units	Average price of residential properties by region, according to type of house (focus on structure, utilities, and amenities, rather than geography)	Commercial rent for federal government properties only	Residential rent rates for 1–4 bedroom apartments/detached houses, utilities, and renters' insurance rates	Commercial properties leased or owned by USPS	Data on building and occupancy, reported as percentage of total revenue	Commercial rent rates for properties larger than 10,000 sq. ft, at zip code, county, and MSA levels
Collection methods	2000 census long-form survey, updated with ACS 1-year survey, BLS Consumer Price Index and trending/random digit	Census employees call or visit to conduct personal interviews	GSA subscribes to various commercial data sources and hires independent appraisers to estimate the values of their properties; in particularly small	A contractor collects data from multiple sources, including newspapers, real estate listings, and apartment management companies; utilities data are from the ACS		Distribute cost survey questionnaires to both medical group practices and others involved in physician practice management	Reis, Inc. conducts its own surveys

	dialing data on market trends		markets, GSA uses a return of investment process to establish rent rates			(participants included MGMA members and nonmembers)	
frequency	Every 10 years, and updated annually	Biannually (odd years)	Appraisals every 1–5 years	Annually		Annually	Quarterly
Demographics	Only collects data on 2-bedroom residential units; excludes new units (<2 years old), units below the public housing rent threshold, and units with renters who have occupied the unit longer than 15 months		Federal government buildings only; does not reflect traditional market behavior or all geographic regions	Excludes "undesirable" neighborhoods	All USPS properties (leased and owned)	Non-metropolitan (<50,000): 21.15% Metropolitan (50,000-250,000): 29.29% Metropolitan (250,000-1,000,000): 32.67% Metropolitan (>1,000,000): 16.88%	Metropolitan areas

Sample size	530 metropolitan areas and 2,045 non-metropolitan county areas	National: 55,000 housing units; Metropolitan: 4,100 units	All federal government buildings	400 military housing areas (in the United States), defined by zip code	25,300+ leased properties, 8,500+ owned properties	1,871 practices	169 MSAs total; Reis, Inc. samples 40% of each region each quarter
Available to public	Yes, free of charge	Yes, free of charge	Limited data are available	Yes, free of charge	Yes, free of charge	Yes, for a fee: rent as a percentage of physician operational expense	

SOURCES: HUD (2011a), U.S. Census Bureau (2008), GSA (2010), U.S. Department of Defense (2009), USPS (2011), MGMA Cost Survey for Single-Specialty Practices: 2010 Report on 2009 Data

Each of the sources reviewed has strengths and weaknesses. For example, both the American Housing Survey and the Basic Housing Allowance collect only residential rental data. The General Services Administration (GSA) collects data on commercial rent for federal office space only and has limited geographic coverage. The United States Postal Service (USPS) collects rental data for commercial properties it leases or owns, but the reported lease costs may reflect a number of factors including the date that the lease was signed and the type of building. REIS, Inc. collects commercial rental rates for properties larger than 10,000 square feet in metropolitan areas, but has limited information for nonmetropolitan areas.

Data from MGMA's Cost Survey for Single-Specialty Practices do reflect physicians' actual rental costs. However, the MGMA (2010) cost survey has a low response rate (19.06 percent) and the 2009 data are limited in sample size (n = 1,871) and representativeness. Specifically, sample sizes by state appear to be uneven, with 10 states having fewer than 10 observations each. In addition, as discussed elsewhere in the phase 1 report, the committee preferred an independent source of data that would accurately reflect input prices faced by providers, not the costs incurred by providers.

In addition to reviewing the limitations of the individual data sources, the committee also compared HUD's data with the REIS, Inc. and USPS data for a select number of metropolitan areas. The REIS, Inc. and USPS data on commercial rents were expressed in price per square foot, while HUD's data were expressed as price per entire residential unit. In order to compare the data, the committee standardized the different units by converting the data into index values (see Table 5-5). The analysis shows substantial variation across the three sources, with HUD data providing higher index values in metropolitan markets in California, but lower values in other locations, such as Chicago and Raleigh-Durham.

In the CY 2012 PFS proposed rule, CMS proposed replacing HUD data with ACS residential rent data on the grounds that ACS data provide more detailed geographic information, rely on more current survey data, and will serve as a more standardized data source in the event that ACS wage data are adapted to compute the employee wage index and work GPCI (CMS, 2011). It was estimated that 26 percent of localities would experience a change in their office rent index that would be greater than 5 percent if ACS data were used (MaCurdy et al, 2011). The proposal was in response to an Affordable Care Act mandate for CMS to explore using ACS data for portions of the PE GPCI (CMS, 2011).

On the basis of its analyses for this study, the committee concluded that all of these sources had significant limitations. Most of them are not geographically complete, as they do not reflect market prices in both metropolitan and nonmetropolitan areas. Each source of data also yields a substantially different wage index, which indicates that they may not be representative of the market in which physicians rent space. Small sample sizes, low response rates, and sample biases also led the committee to conclude that these surveys do not accurately represent the physician population.

A variety of possible alternative sources of data were discussed. The committee favored adding a question on commercial rent prices to an existing federal survey, but

no current survey was found that would be appropriate. The committee also considered the CMS proposal to mount a physician cost survey, but found data on costs incurred by providers to be less accurate than an independent source of data on prices faced by providers in the commercial market. Another problem with using practice data as a basis for market rent is that many physician practices pay rent to properties in which they have a partial ownership interest, and additional income produced through these arrangements may not have been excluded from self-reported data.

The committee also discussed whether the use of residential or commercial rent data would be more accurate conceptually, given that empirical comparisons of the available sources would be problematic for a variety of reasons. The committee concluded that the cost of space is not adequately addressed with residential data only. Therefore, the committee recommends that a new source of commercial rent data be developed for the PE GPCI.

TABLE 5- 5 Comparison of Rent Data for Selected Markets Using Different Data Sources

Metro Area, Using Reis Description	"Best match" CBSA code	REIS, Inc "Effective rent"/ sq ft, commercial	Un-weighted index	USPS median lease cost / sq ft	Un-weighted index	HUD median residential 2-bdr rent	Un-weighted index
Atlanta	12060	$ 16.67	0.860	$7.69	1.487	$1,502.00	1.024
Austin	12420	$20.46	1.056	$8.16	1.578	$1,395.00	0.951
Baltimore	12580	$18.46	0.953	$2.72	0.526	$1,622.00	1.106
Birmingham	13820	$15.54	0.802	$0.94	0.182	$1,060.00	0.723
Boston	14484	$28.82	1.488	$5.05	0.977	$1,826.00	1.245
Chicago	16974	$20.84	1.076	$5.59	1.081	$1,242.00	0.847
Indianapolis	26900	$13.97	0.721	$4.79	0.926	$1,062.00	0.724
Kansas City	28140	$14.47	0.747	$3.29	0.636	$1,139.00	0.777
Lexington (KY)	30460	$13.22	0.682	$3.88	0.750	$1,023.00	0.698
Little Rock	30780	$12.90	0.666	$1.02	0.197	$1,043.00	0.711
Miami	33124	$4.03	1.240	$3.84	0.743	$1,639.00	1.118
Milwaukee	33340	$13.82	0.713	$2.56	0.495	$1,091.00	0.744
Minneapolis	33460	$16.47	0.850	$5.17	1.000	$1,279.00	0.872
Nashville	34980	$15.50	0.800	$6.26	1.211	$1,123.00	0.766
New Orleans	35380	$14.97	0.773	$8.85	1.711	$1,394.00	0.951
New York	35644	$43.68	2.255	$2.69	0.520	$1,907.00	1.300
Oakland-East Bay	36084	$20.06	1.035	$5.42	1.048	$2,064.00	1.407
Omaha	36540	$13.35	0.689	$4.62	0.893	$1,078.00	0.735
Portland (OR)	38900	$16.85	0.870	$5.03	0.973	$1,385.00	0.944
Raleigh-Durham	39580	$15.73	0.812	$6.87	1.329	$1,165.00	0.794
St. Louis	41180	$15.40	0.795	$5.13	0.992	$1,086.00	0.741
Salt Lake City	41620	$14.18	0.732	$6.06	1.172	$1,264.00	0.862

San Antonio	41700	$15.47	0.799	$10.52	2.034	$1,193.00	0.814
San Diego	41740	$22.63	1.168	$4.63	0.895	$2,213.00	1.509
San Francisco	41884	$29.41	1.518	$4.69	0.907	$2,715.00	1.851
San Jose	41940	$22.30	1.151	$4.95	0.957	$2,638.00	1.799
Seattle	42644	$23.12	1.193	$6.78	1.311	$1,800.00	1.227
Tampa-St. Petersburg	45300	$16.94	0.874	$4.57	0.884	$1,278.00	0.871
District of Columbia	47894	$41.13	2.123	$3.65	0.706	$1,885.00	1.285
Wichita	48620	$10.80	0.557	$9.71	1.878	$883.00	0.602
Unweighted average		$19.37	1.000	$5.17	1.000	$1,466.00	1.000
Minimum		$10.80	0.557	$0.94	0.182	$ 883.00	0.602
25th percentile		$14.60	0.753	$3.85	0.745	$1,099.00	0.749
Median		$16.57	0.855	$4.99	0.965	$1,278.50	0.872
75th percentile		$21.94	1.132	$6.21	1.201	$1,759.75	1.200
Maximum		$43.68	2.255	$10.52	2.034	$2,715.00	1.851

SOURCE: RTI Analysis unpublished commercial rental data from REIS, Inc, USPS (2011), and fair market rent data from HUD (2011b)

PROFESSIONAL LIABILITY INSURANCE

Physicians purchase professional liability or MP insurance to protect themselves from possible financial losses due to MP lawsuits. The majority of physicians' MP insurance policies provide coverage for $1 million per incident and $3 million per year (GAO, 2003). This is the standard for comparing costs from place to place.

The MP premiums that physicians pay are likely to vary depending both on their specialties and on the location of their medical practices (Jena et al., 2011). For example, specialists who conduct medical interventions that are more likely to result in medical malpractice claims, such as obstetricians, neurosurgeons, and orthopedic surgeons, pay higher premiums than primary care physicians, who do more clinical evaluation and management and fewer claim-prone procedures. MP premiums vary greatly from region to region. In 2010, on average, a general surgeon practicing in Miami–Dade County, Florida might have faced an annual premium of $192,982 for liability insurance, whereas a general surgeon practicing in Nebraska paid $10,928 for the same liability coverage (Lowes, 2010).

The level of physicians' concerns about the risk of malpractice litigation has been found to be high across a range of specialties, practice settings, and geographic areas at the state level, with wide state-to-state variation in the liability environments (Carrier, Reschovsky, Mello, and Katz, 2010). One reason for the geographic differences in MP premiums is that states have different tort laws governing medical malpractice and medical malpractice insurance. Medical liability and medical malpractice insurance are subject to state laws and regulations. Ultimately, the degree to which states monitor MP insurance carriers, control premium prices, and interpret liability, can substantially affect MP premiums (Sloan and Chepke, 2008). The concentration of specialists and claims experience in a given location could also affect premiums. If an area has a high concentration of specialists with high liability risk, then the insurance carrier may charge them higher premiums to cover higher anticipated losses.

As described earlier in this chapter, OBRA (1989) required CMS to establish a Medicare PFS that used GPCIs to measure cost differences in physician work, practice expenses, and MP insurance and to adjust Medicare fees accordingly. If geographic differences in MP premiums were not taken into account, physicians working in areas with higher MP premiums would be subject to an additional practice cost not within their control (GAO, 2005). The current MP insurance portion of the Medicare payment formula consists of MP RVUs and the MP GPCIs, as discussed in the next section.

Malpractice GPCI Methodology and Data Collection

As of CY 2011, the MP cost share weight is 3.9 percent, which means that on average across all procedures, MP costs represent 3.9 percent of the total RVUs. The MP GPCI is based on MP premium data for 25 physician specialties collected from state insurance commissioners and private insurers that are averaged for each payment area. When CMS calculates the mean MP premium for each physician payment area, it is

weighted for state- and insurer-specific specialty mix, and adjusted for each insurer's market share (O'Brien-Strain et al., 2010a).

In 2003, the U.S. Congress directed GAO to evaluate the Medicare GPCIs, including the MP GPCI. The mandated review included an evaluation of the methods used to determine MP costs, review of the increases in MP insurance premiums and the variation of premium costs across states and physician specialty, and an evaluation of the MP GPCI and its relative weights.[9]

GAO recommended that CMS collect MP premium data more frequently from all states, and from insurers that account for at least 50 percent of the MP insurance business in a state (GAO, 2005). In addition, GAO advised that CMS should collect data on each insurer's market share by physician specialty, so that it could adjust average premiums for differences in specialty mix (GAO, 2005). GAO also recommended that CMS standardize the procedures used to collect data from insurers to improve the comparability of premiums within and between payment areas (GAO, 2005).

In response, CMS increased the number of states from which it was able to collect premium data from 33 in 2004 to 49 in the 2012[10] GPCI update (O'Brien-Strain et al, 2010). Premium data were also collected from insurance carriers that represented 50 percent of the market share, or from at least 2 operating MP insurers per state. In addition, CMS increased the depth of the MP premium data from 20 specialties in 2009 to 25 specialties in 2012.

The primary sources used to collect market share data were the state departments of insurance; an alternative source was the National Association of Insurance Commissioners' market share data. The primary source used to collect premium data was state rate filings, and the alternative source for filling in any gaps was the 2005 to 2008 Medical Liability Monitor survey.

Conclusion

The MP component of the Medicare PFS has received little specific criticism lately. This may reflect the small percentage of total RVU cost attributed to MP prices, or the perception that the adjuster is accurately based on real data on insurance prices that physicians actually face. Given the very short time frame of this study and the number of other issues under consideration, the committee determined that it would make no recommendations about potential improvements to the accuracy of the MP GPCI.

[9] P. L. 108-173, § 403(c), 117 Stat. 2055, 2277-78.

[10] Premium data from Mississippi and Puerto Rico were not collected.

COMMITTEE RECOMMENDATIONS

The committee's charge is to evaluate the sources of data and methods used to calculate the GPCIs and to make recommendations about how to improve the accuracy of the geographic adjusters. In order to validate the use of geographic adjustment for the work and practice expense GPCIs, the committee in its analyses first sought to confirm the degree of metropolitan-nonmetropolitan and regional differences in physician compensation and in clinical and administrative staff compensation.

The committee then considered the accuracy of a variety of data sources that had been used or proposed for use in the GPCIs. The shortcomings of the available data on physician compensation, staffing patterns, contract labor, and occupational mix for different types of physician practices made it difficult to conduct thorough quantitative assessments.

The recommendations presented in this chapter relied on many of the same data sources that were used for analyses presented in other chapters. As indicated in the discussion of the committee's principles in Chapter 1, these recommendations are intended to improve the accuracy of the GPCIs and also reflect the committee's preferences for consistency in data sources whenever possible. If the use of new data sources were to change the total payments, CMS would need to make a budget neutrality adjustment to re-calibrate payment levels, as required by law.

In Phase 2 of the study, the committee will consider the role of advanced practitioners in different employment arrangements in physician practices. These analyses will be subject to the availability of data and may include simulations and modeling with different types of practitioners and practice settings. The committee will also consider recruitment and retention issues across areas and review available data on how specialty and geographic location decisions are made by the workforce, including contract labor. In addition, the committee will review the impact of previous policy adjustments to address workforce shortages and other strategies to address access to needed care in medically underserved areas.

Recommendation 5-1: The GPCI cost share weights for adjusting fee-for-service payments to practitioners should continue to be national, including the three GPCIs (work, practice expense, and liability insurance) and the categories within the practice expense (office rent and personnel).

Geographic adjustments should be made for the prices of inputs that are purchased and/or produced locally and that vary from the national average. Inputs that are purchased in a national market without systematic variation in prices across geographic areas should not be adjusted geographically. In future PFS updates, CMS should take steps to ensure accuracy in distinguishing between national and local market input prices. The statutory requirement to use the MEI cost share weights as the source of GPCI cost share weights is reasonable and should be continued.

Recommendation 5-2: Proxies should continue to be used to measure geographic variation in the physician work adjustment, but CMS should determine whether the seven proxies currently in use should be modified.

Geographic variations in the price of physician time can be measured in two ways: by directly measuring variation in physician income, or by using income data from proxy occupations as indicators of variations in physician income. In keeping with its principles about accuracy and independence of data sources, the committee prefers an independent source of data that reflects geographic variation in compensation levels for comparable professions rather than using physician compensation data that are affected by Medicare's payment adjustments.

Therefore, the continued use of proxy data for rate-setting to avoid the circularity of using physician income data is appropriate. However, in keeping with its principles of accuracy, consistency, and transparency of data sources, the committee recommends that CMS empirically re-evaluate the accuracy of the 7 proxies it currently employs using the most current BLS OES data. The statistical process for this assessment is described in detail in Appendix I.

The committee recognizes that this empirical approach is conceptually challenging because there is no obvious "gold standard" against which the proxy-based estimates can be judged. Although the committee does not favor basing the geographic adjuster on actual physician incomes in each area, it would be useful to assess the extent to which the proxy-based estimates are related to variation in physician compensation among geographic areas on a national basis. This process would validate their status as proxies. If the proxy data were not found to have predictive value for physician compensation, CMS might compare the predictive value of physician salary data from several different sources, such as MGMA and ACS. A proposed methodology for such a re-evaluation using statistical modeling is discussed in the section on the physician work adjustment and is described in Recommendation 5-3 and Appendix I.

Recommendation 5-3: CMS should consider an alternative method for setting the percentage of the work adjustment based on a systematic empirical process.

The committee recommends that the work adjustment should be based on a systematic empirical process that generates new evidence to confirm the extent of differences in compensation across geographic areas. There is clearly a policy precedent for the current one-quarter adjustment, given that the GPCIs have been updated six times since the physician fee schedule was implemented, and the "quarter work" adjustment has been in place by law throughout all of the updates. Many will view that precedent as adequate justification for continuing the same approach.

The committee members did not think there is an adequate conceptual justification for choosing that level of adjustment. However, based on the available empirical evidence, the committee was unable to determine a more appropriate level for the adjustment.

The committee therefore advises CMS to test various statistical models using multiple regression, a versatile technique that allows testing and modeling of multiple independent or explanatory variables to predict a dependent or outcome variable (see Appendix I for more detail). Once the necessary data are assembled, CMS has reviewed the data to ensure they are credible, and the model is estimated, CMS would determine the empirically-derived percentage for the work adjustment by using the model that provides maximum explanatory power.

Several alternative data sets could be used for the modeling, each with different strengths, weaknesses, and predictive power. At a minimum, the wage index data used in the modeling would have to be adjusted to control for specialty mix, RVUs, and residency training status to ensure that the variability in wages attributable to these non-geographical factors would not affect the geographic adjuster based on the models.

While the committee strongly supports an empirical approach to determining the work adjustment, it also acknowledges that it is impossible to determine in advance how much predictive power the most appropriate statistical model may attain. If the correlations between the proxy occupation wages and the physician wages were found to be low or not statistically significant, for example, that might indicate that the factors determining physician wages are too distinctive to be adequately captured by this methodology. The committee has considered the possibility that geographical variations in the market for physician services or in amenities (including professional amenities) valued by physicians might not parallel the corresponding variations for other professionals. If that were found to be the case, CMS would need to re-evaluate the use of the current proxies, as indicated in Recommendation 5-2. For purposes of modeling (but not rate-setting), CMS might also compare the predictive power of different sources of provider-generated data, such as MGMA survey data and ACS data, when they become available.

Recommendation 5-4: The practice expense GPCI should be constructed with the full range of occupations employed in physicians' offices, each with a fixed national weight based on the hours of each occupation employed in physicians' offices nationwide.

The committee finds that independent, health-care specific data from BLS provide the most conceptually appropriate measure of differences in wages for health professional labor and clinical and administrative office staff. Although acknowledging that there are some regional differences in occupational mix of employees in the limited data available, the committee prefers a consistent set of national weights applied to wage data from the full range of health sector occupations so that hourly wage comparisons can be made. The exceptions are those health professionals who bill independently under Medicare Part B, whose compensation should be captured through the work geographic practice cost index.

The expansion of occupations will be a better reflection of the current workforce and a broader range of health professions, which will help to improve accuracy of the

adjustment. In addition, the expansion will anticipate future changes in the workforce brought by changes in the labor market, including the increasing demand for expertise in the adoption and use of health information technology. Further study of the mix of occupations by specialties will be valuable to determine whether geographic differences in approaches to clinical service integration and care teams should be addressed in future assessments of the geographic adjustment factors.

Recommendation 5-5: The Centers for Medicare and Medicaid Services and the Bureau of Labor Statistics should develop a data use agreement allowing the Bureau of Labor Statistics to analyze confidential BLS data for the Centers for Medicare and Medicaid Services.

The committee recommends that the data source for office staff wages should be all health sector employers' wages and benefits data from the Bureau of Labor Statistics. Comparable to the analyses and recommendations about the HWI, the committee concluded that independent data that reflect market prices faced by providers are more appropriate than provider data on costs paid, because actual costs also reflect business decisions that are not necessarily an accurate reflection of input prices. Further, the committee concluded that independent data on health sector wages would be a closer proxy to physicians' office staff wages than all-industry data from BLS.

The committee recognizes that there is a need to increase coverage in areas where current data are not made available in public data files by BLS because of the need to protect confidentiality. Some areas have a very small number of providers and increased sampling to improve accuracy may not be possible. A data use or other formal agreement between CMS and BLS would allow additional analyses to be conducted in the interest of improving transparency. Using all occupations instead of a limited number would be new, but BLS could compute an index that includes all data, including those data that are suppressed due to confidentiality.

Recommendation 5-6: A new source of data should be developed to determine the variation in the price of commercial office rent per square foot.

The committee reviewed several available sources of data to determine whether an accurate alternative is available to replace the U.S. Department of Housing and Urban Development residential data that are currently used in the practice expense geographic practice cost index. These included rental data from the American Housing Survey (Census and HUD), the General Services Administration (GSA), The Basic Allowance for Housing (DOD), the United States Postal Service (USPS), the MGMA Physician Cost Survey, and REIS, Inc.

Each of these sources yielded a substantially different index, which indicates that they may not be representative of the market in which physicians rent space. They also collected and reported data differently (e.g., monthly rent v. price per square foot),

which made comparisons difficult. Based on the limitations associated with each data source, such as low response rates, small sample sizes, and sample bias, the committee concluded that all of these sources would be imperfect or geographically incomplete proxies for variation in physician office rental costs. Because the committee also concluded that the cost of space is not adequately measured with residential data, the committee recommends the development of a new data source.

Recommendation 5-7: Nonclinical labor-related expenses currently included under PE office expenses should be geographically adjusted as part of the wage component of the PE.

The update for the physician payment rule proposed for comment in July 2011 included setting several labor-related expenses to a national index. These included occupations in the "All Other, Labor-Related" category (e.g., security guard and janitor) and the "Other Professional Expenses" category (e.g. accountants and attorneys). CMS proposed to create a new category for contracted/outsourced services for these labor categories and to create a new purchased services index. Including professional and other labor expenses in labor categories would promote consistency between labor-related hospital and physician payment adjustments, and would also take into account geographic variations in wages for the services reflected in BLS data.

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6

Transitions

This chapter begins by summarizing the goals of the study, themes of the committee's deliberations, and key features of its technical approach to this 2-year study on improving the accuracy of geographic adjustment for Medicare payment to providers. Next, the chapter reviews what the committee's recommendations are intended to accomplish overall, and what the committee will examine in phase 2 as it responds to the statement of task, including the sponsor's request for an impact analysis. The final section of this chapter looks ahead to some broader trends in health care that could affect the implementation of the committee's recommendations over the next 3 to 5 years.

The committee titled this chapter "transitions" for several reasons. Most apparently, the committee is completing phase 1 of its analysis and reporting, and moving on to phase 2. By changing its frame of reference from accuracy of payment adjustments to the policy implications of such adjustments, the committee will also experience a transition in the nature of its analyses and the focus of its deliberations. Assessing the accuracy of data sources and methods is a very different task than evaluating the impact of a policy decision such as incentive payments to providers in underserved areas. Moreover, most sources of data on the healthcare workforce are quite different from the national survey data from BLS and the CMS cost reports that were used for many of the quantitative analyses and deliberations in the first year of the study.

At the same time, if the committee's recommendations are implemented, the providers of services under Part A and Part B of Medicare will also experience a transition from one system of adjustments to another system with substantially different underpinnings and consequences. This transition would occur during a period when the health care delivery system is undergoing its own transition into one that attempts to reward value rather than volume in its payment methods. The committee will be challenged to recognize and complement this trend in crafting its phase 2 report and recommendations.

WHAT THIS STUDY SOUGHT TO DO

The statement of task directed the committee to make recommendations to improve the accuracy of fee-for-service Medicare payments by assessing the data sources and methods used in making geographic adjustments. It also directed the committee to consider the impact on stakeholders of any recommendations that would change the current system.

The committee's membership includes individuals with a broad range of experience, including those with expertise regarding the Medicare program, including the hospital wage index (HWI) and the geographic practice cost indexes (GPCIs), health care financing and management, hospital administration, health care systems in metropolitan and nonmetropolitan areas (MSAs and non-MSAs), and the health care workforce. By discipline, the perspectives of the committee members include economics, epidemiology, health services research, medicine, nursing, political science, and statistics. In developing principles about accuracy, consistency, fairness, and transparency, they drew from an even broader range of fields of experience, including business administration, management science, mathematics, psychology, regulatory theory, and others.

At its first meeting in September 2010, the committee held a public session and heard testimony from members of the U.S. Congress, the Centers for Medicare and Medicaid Services (CMS) (the government sponsor), the health care industry, and other stakeholders. The public session made it clear that people had a variety of strong opinions about how the study should be conducted and what the committee should recommend. Notwithstanding their differences, one area of agreement among stakeholders was the need to rebuild the system and to improve the accuracy of the data sources and methods used in making geographic adjustments to Medicare provider payments.

The committee worked to ensure that its recommendations in its phase 1 report were based on the best available data and evidence. Although improving consistency in the data sources and methods was a unifying principle, the committee also recognized the critical need to examine the impact on stakeholders of redistributing funds if it recommended changes in these areas. Throughout their deliberations, committee members also recognized that even the most accurate adjustment factors will not address problems associated with the current fee-for-service payment system such as access to care, excess utilization, and appropriateness of the provider mix.

Within this broader context, the committee began its work by focusing on the technical accuracy of the adjusters, with accuracy defined as the degree of closeness of measurement to the true value of whatever is being measured. The approach that the committee used first involved an assessment of the accuracy of the data sources and methods that are currently used by CMS. Next, the committee compared the data sources and methods that are currently used with other sources and methods that have been suggested by experts and researchers, including members of the committee. Finally, the committee reviewed a series of simulations to assess the potential effects of several alternatives.

In keeping with the committee's charge, the phase 2 report will consider separate policy adjustments and their impact on the health care workforce, including occupational mix, provider shortages, and the ability to provide high-value, high-quality care in all geographic areas.

CHALLENGES AND LIMITATIONS OF THE STUDY

Within its conceptual framework, the committee adhered to the unifying principle of improving the accuracy of payments to hospitals and other providers on the basis of the input prices (e.g., prevailing employee wages) that providers face. The committee recognized, however, that it was not always possible to identify which costs reflect business decisions within a provider's control (e.g., discretionary decisions regarding the numbers and types of personnel employed) versus those that were beyond such control (e.g., employment decisions necessary to comply with state statutes governing hospital nurse staffing ratios).

In keeping with its aim to improve consistency where possible, the committee also encountered a number of challenges as it began to identify common conceptual areas between the HWI and the GPCIs. Because the two indexes had been developed separately and independently, the committee needed to examine differences in common concepts such as labor markets and payment areas (see Chapter 2, Labor Markets and Payment Areas), as well as to agree on technical approaches that adhere to the principles regarding evidence, accuracy, consistency, and transparency.

One result of the deliberations about accuracy is reflected in the committee's decision to recommend using independent data on health care industry wages collected by the Bureau of Labor Statistics (BLS) rather than either the hospital cost reports favored by the hospital industry or all-industry BLS wage data. Statistical analyses prepared at the committee's request demonstrated that different data sources were highly correlated. In choosing to base payment adjustments on health care data over the broader all-industry data, the committee recognized that the health care data were conceptually appropriate and would potentially be better understood and accepted by stakeholders.

AREAS OF FOCUS FOR THE COMMITTEE'S PHASE TWO REPORT

In the second phase of the study, the committee plans to review and consider evidence regarding the impact of geographic adjustment on workforce distribution and access to care, and to model the potential impact of payment changes on provider shortages. Subject to the availability of data, analyses will consider staffing pattern variations by specialty and geographic area, including MSA and non-MSA areas. The committee will consider the full range of clinical practitioners in its deliberations and analyses about the health care workforce, including physicians, physician assistants, nurse practitioners, and other Part B providers who can bill Medicare independently, including contract labor.

An additional priority for the committee's phase 2 report is a consideration of policy adjustments to address workforce distribution and access to care. The committee heard testimony from practitioners and policy makers who view geographic adjustments in fee-for-service Medicare payment as a way to help address provider shortages and achieve other policy goals. In addition, the committee will review evidence about the use of telemedicine and mobile technologies as a way to address provider shortages.

Given the limited time available for deliberations, the committee decided that certain issues were beyond the scope of this study. One issue is how capital payments are adjusted in the HWI, which is not a workforce-related issue. Another example is the impact of the committee's recommendations on the billing and payment infrastructure, which is beyond the scope and resources available for this study.

CONSIDERATIONS FOR THE FUTURE

In finalizing recommendations, the committee members realized that each individual recommendation has its own specific impact and that the combined impact of implementing all of the recommendations together could result in a very different picture than the current one.

For example, the recommendations could have effects on other Medicare payment systems, a dynamic that will need to be considered more fully. Within this context, and because the committee has recommended an integrated approach in which the payment system for hospitals and practitioners is based on common data sources and similar payment areas, the committee urges a systematic and phased-in process of moving forward to ensure that providers, regulatory agencies, and others take a coordinated and transparent approach toward implementation.

As the committee looks to the future, it is important to note that the current fee-for-service system that has been dominant in American health care for decades is now changing. New payment incentives introduced by CMS are intended to reward value over volume, meaning that providers will be rewarded for providing higher-quality, more efficient care and penalized for preventable errors such as hospital-acquired infections. The practice choices of new physicians are also changing, with an increasing number now accepting salaried positions with hospitals and health systems after completion of their residency training. More established physicians are also selling their practices and accepting salaried positions (Harris, 2010). According to a 2010 survey of physician starting salary, nearly half of the nation's new physicians are salaried (MGMA, 2010).

The health care workforce is undergoing other significant changes. The introduction of electronic health records and health information technology (HIT) is requiring a different kind of training and workflow in clinical practice. Another major development in the workforce is related to scope of practice for advanced practice nurses, physician assistants, and other licensed health professionals. For example, a recent Institute of Medicine (IOM) report endorsed the effort of nurses to expand their scope of practice and recommended that nurses be licensed to practice up to the full skill level of their training (IOM, 2010).

In addition to marking these larger trends in medical and nursing education and care delivery, the phase 2 report also marks a transition for this committee from focusing on methods and data sources to improve accuracy of payment to achieving policy objectives related to the statement of task. The committee members look forward to the opportunity to address the policy goals of helping to create an equitable payment system that rewards high-value and high-quality health care.

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Appendix A

Committee and Staff Biographies

Frank Sloan, Ph.D., is the J. Alexander McMahon Professor of Health Policy and Management and Professor of Economics at Duke University since 1993. He is also the Director of the Center for Health Policy, Law, and Management at Duke that originated in 1998. Professor Sloan did his undergraduate work at Oberlin College and received his Ph.D. in Economics from Harvard University. Before joining the faculty at Duke in July 1993, he was a research economist at the RAND Corporation and on the faculties of the University of Florida and Vanderbilt University. He was chair of the Department of Economics at Vanderbilt from 1986-89. His current research interests include alcohol use prevention, long-term care, medical malpractice, and cost-effectiveness analyses of medical technologies. Professor Sloan also has a long-standing interest in hospitals, health care financing, and health manpower. He has served on several national advisory public and private groups. He is a member of the Institute of Medicine of the National Academy of Sciences and was recently a member of the Physician Payment Review Commission.

John Christianson, Ph.D., is Professor and James A. Hamilton Chair in Health Policy and Management in the Division of Health Policy & Management at the University of Minnesota School of Public Health. His research interests include competition and competitive health care markets, health insurance, financial incentives in health care, public reporting, employer strategies for purchasing health care, implementation of evidence-based treatment processes in health care organizations, and tracking change in health care markets. He is a member of the Synthesis Project Advisory Group at the Robert Wood Johnson Foundation; holds current editorial appointments at *Medical Care Research and Review*, *Journal of Health Administration Education*, and the *American Journal of Managed Care*; and was recently appointed to the Consumer Operated and Oriented Plan (CO-OP) Advisory Board (DHHS, OCIIO). Previously, he was chair of the 2007 Academy Health Annual Research Meeting, Co-Chairperson, Seventh Biennial Research Conference on the Economics of Mental Health, and a member of the IOM Subcommittee on Maximizing the Value of Health Investments, Committee on Quality of Health Care in America. Dr. Christianson received his Ph.D. in Economics from the University of Wisconsin-Madison.

Stuart Guterman, M.A., is Vice President for the Commonwealth Fund's program on Payment and System Reform, based in Washington, D.C. He is responsible for the Fund's research agenda on the use of payment incentives to elicit changes in health care delivery that can achieve high performance; the development, management, and review of grants to be funded under the program; and analyses related to the current performance and future improvements in the payment system and the health system overall. Mr. Guterman was director of the Office of Research, Development, and Information at the Centers for Medicare and Medicaid Services

from 2002 to 2005. Prior to that, he was a senior analyst at the Congressional Budget Office, a principal research associate in the health policy center at the Urban Institute, and deputy director of the Medicare Payment Advisory Commission (and its predecessor, the Prospective Payment Assessment Commission) from 1988 through 1999. Previously, Mr. Guterman was chief of institutional studies in the Health Care Financing Administration's Office of Research, where he directed the evaluation of the Medicare Prospective Payment System for inpatient hospital services and other intramural and extramural research on hospital payment. He holds an A.B. in Economics from Rutgers College and an M.A. in Economics from Brown University, and did further work toward the Ph.D. in Economics at the State University of New York at Stony Brook.

Judith K. Hellerstein, Ph.D., received her Ph.D. from Harvard University in 1994 and joined the Maryland faculty in 1996. She is also a faculty associate of the Maryland Population Research Center and a research associate of the National Bureau of Economic Research. The focus of much of her research is labor market outcomes across gender, race, and ethnicity. Publications include such works as: "Workplace Segregation in the United States: Race, Ethnicity, and Skill," *Review of Economics and Statistics*, 2008; "Spatial Mismatch or Racial Mismatch?" *Journal of Urban Economics*, 2008; "New Evidence on Sex Segregation and Sex Differences in Wages from Matched Employee-Employer Data," *Journal of Labor Economics*, 2003; "Market Forces and Sex Discrimination," *Journal of Human Resources*, 2002. She serves as a reviewer for numerous journals and has received multiple awards for excellence in teaching. Previously, she was a member of the IOM Committee on Developing Biomarker-Based Tools for Cancer Screening, Diagnosis, and Treatment.

Carlos Roberto Jaén, M.D., Ph.D., FAAFP has special interests that include improving preventive care for individuals of all ages, preventing complications from chronic diseases like diabetes, high blood pressure, and heart disease. He is passionate about building and studying high performance primary care offices. He is co-director of the Center for Research in Family Medicine and Primary Care, and holds an endowed professorship at the University of Texas Health Science Center at San Antonio. Over the last 18 years, the Center has studied almost 500 mostly independent, community-based primary care practices and recently completed the evaluation of the American Academy of Family Physicians' national demonstration project of the patient-centered medical home in 36 practices. He served on the panels that published smoking cessation guidelines in 1996 & 2000 and was co-chair of the panel that published an update in May 2008. In 2005, he was appointed to a three-year term on the National Advisory Council to the Agency for Healthcare Research and Quality (AHRQ). He received a Generalist Physician Faculty Scholar Award from the Robert Wood Johnson Foundation and a Cancer Control Career Development Award for Primary Care Physicians from the American Cancer Society. He is a practicing family physician and has been selected to the Best Doctors in America yearly since 2002. His interests include building a healthier San Antonio through efforts in community wellness. He obtained a B.S. and M.S. from Niagara University in Lewiston, NY and an M.D. /Ph.D. in Epidemiology and Community Health from the State University of New York in Buffalo. He completed a Family Medicine Residency and a Primary Care Research Fellowship at

Case Western Reserve University in Cleveland, Ohio. Previously, he has served as medical director at the Niagara Family Health Center and has been in private practice in Ohio.

Jack Kalbfleisch, Ph.D., is a Professor of Biostatistics and Statistics, and he serves as director of the Kidney Epidemiology and Cost Center at the University of Michigan. He served as chair of the Department of Biostatistics from 2002 to 2007. He received his Ph.D. in Statistics in 1969 from the University of Waterloo. He was an assistant professor of statistics at the State University of New York at Buffalo (1970-73) and on faculty at the University of Waterloo (1973-2002). At Waterloo, he served as chair of the Department of Statistics and Actuarial Science (1984-1990) and as dean of the faculty of Mathematics (1990-1998). He has held visiting appointments as Professor at the University of Washington, the University of California at San Francisco, the University of Auckland, Fred Hutchinson Cancer Research Center, and the National University of Singapore. He has interests in and has published in various areas of statistics and biostatistics including life history and survival analysis, likelihood methods of inference, bootstrapping, and estimating equations, mixture and mixed effects models, and medical applications. Dr. Kalbfleisch is a Fellow of the American Statistical Association and the Institute of Mathematical Statistics. He is also an elected member of the International Statistical Institute, a Fellow of the Royal Society of Canada, and a Gold Medalist of the Statistical Society of Canada.

Meridean Maas, Ph.D., R.N., FAAN, is Professor Emerita and Co-Director of the John A. Hartford Center of Geriatric Nursing Excellence at the College of Nursing of the University of Iowa. Dr. Maas is currently conducting research with electronic clinical data, including standardized nursing data, to assess the cost effectiveness of nursing interventions on outcomes for older persons hospitalized with congestive heart failure and pneumonia. She has been co-principal Investigator of the Iowa Geriatric Education Center grant funded by HRSA, co-director of the Gerontological Nursing Interventions Research Center (GNIRC) and director of its Regional Research Training Core. Her funded programs of research include: testing the effects of Family Involvement in Care interventions on family members of institutionalized Alzheimer's patients, staff caregivers, and persons with AD, and Nursing Outcomes Classification research to develop, classify and validate patient outcomes that are sensitive to nursing interventions. Dr. Maas received the Gerontological Society of America Doris Schwartz Gerontological Nursing Research Award in 2006. She currently serves on four editorial boards and is a reviewer for five journals, has numerous peer reviewed journal articles and book chapters in print, and has authored or edited several books. Dr. Maas has taught in undergraduate and graduate programs and has advised several pre-doctoral and post-doctoral students and fellows in Nursing Administration and in Aging and received the Regents Award for Faculty Excellence at the University of Iowa in 1996/1997. She earned her doctorate in Sociology of Organizations from Iowa State University in 1979 and joined the University of Iowa faculty in 1983. Prior to joining the faculty, she held a number of positions in hospitals and long-term care, including administrative and clinical practice roles. Dr. Maas currently consults with schools of nursing in gerontological nursing education, in the development of faculty programs of research, and with others regarding innovative and best nursing practices for care of older persons.

Marilyn Moon, Ph.D., is a nationally known expert on Medicare, having served as a senior fellow at the Urban Institute and as a public trustee for the Social Security and Medicare trust funds. She is also an expert on health care financing and benefits, and has increasingly worked in the area of patient information and engagement. As vice president and director of the Health Program at AIR, Dr. Moon is responsible for ensuring client satisfaction with all aspects of the Health Program's research and development activities and products. In addition, she provides overall direction of the Health Program, supervising 120 staff members. She also leads strategic planning efforts and supervises senior-level researchers, unit directors, research assistants, and support staff. Dr. Moon is responsible for overseeing the allocation of resources for 50 currently active projects, with a total annual value of more than $30 million. Other duties include serving as corporate monitor on two Centers for Medicare & Medicaid Services (CMS) IDIQ contracts, and as project director on one Agency for Healthcare Research and Quality (AHRQ) IDIQ contract, while continuing to conduct research on a range of health policy issues. In addition to a long list of awards and honorary positions, Dr. Moon has a large number of peer-reviewed journal articles, books and book chapters, other publications, testimonies, and professional presentations to her credit.

Cathryn Nation, M.D., is the Associate Vice President for Health Sciences in the University of California's Office of the President. She completed her undergraduate studies at UC Davis, earning honors in Political Science/Public Policy and Spanish. She earned her medical degree from UC San Francisco in 1989. Her University duties include: leadership and coordination of health sciences academic affairs; liaison with deans and faculty involving educational policy and program planning; development of enrollment plans for UC's sixteen health sciences schools; monitoring of health workforce needs; and representation of UC health sciences programs internally and externally. She oversees the University's anatomical materials programs; and directs the system-wide Academic Geriatric Resource Program–a state-funded, multi-campus program in geriatrics. Dr. Nation has extensive knowledge of undergraduate and graduate medical education; medical school admissions; health professions workforce issues; and matters related to health sciences instruction and institutional accreditation. In 2008, she was appointed as a commissioner on the California Healthcare Workforce Policy Commission – a statewide body established by statute to promote primary care training and workforce diversity. Within the UC, she has primary responsibility for coordinating new initiatives in telemedicine supported by $200M in voter-approved bond funding. Dr. Nation has authored numerous reports and studies addressing medical and health sciences education and was invited by the Institute of Medicine to serve as a lead author of a national review of health professions admissions practices. This study identifies best practices in admissions and was published in 2004 by the National Academies in a book entitled, "*In the Nation's Compelling Interest: Ensuring the Diversity in the Health-Care Workforce."* Dr. Nation continues to lead efforts with UC medical schools to develop new PRograms in Medical Education (PRIME), which provide specialized training to prepare future graduates to meet the needs of the underserved. Five programs are offered, each involving a unique area of focus; program-specific standards for admission; specialized coursework; structured clinical experiences; independent study; and faculty mentoring. Areas of focus
include: rural health and telemedicine (Davis); Latino health (Irvine); diverse and disadvantaged

communities (Los Angeles); promotion of health equity (San Diego); and the urban underserved (San Francisco).

Joanne Pohl, PhD, ANP-BC, FAAN, FAANP, Brings more than thirty years of experience as a nurse practitioner to all of her pursuits; Dr. Pohl's scholarship focuses on health outcomes, cost of care in nurse managed health centers, and health informatics in safety net practices. At the University of Michigan, she directed the Adult Nurse Practitioner Program and served as Associate Dean for Community Partnerships for eight years. She is a recent past president of NONPF and is actively involved in policy related to primary care and nurse practitioners. She has been involved in the Quality and Safety Education for Nurses (QSEN) and currently serves on the Advisory Board for the Nursing Alliance for Quality Care. She continues to teach, have an active program of research, and be involved in policy and practices in one of the School of Nursing's nurse managed health centers.

Thomas C. Ricketts, III, Ph.D., M.P.H., is Professor of Health Policy and Management and Social Medicine at the University of North Carolina Gillings School of Global Public Health and the UNC School of Medicine. In 2008, he was named Gillings Visiting Professor at the École des Hautes Études en Santé Publique in Paris and Rennes, France. He is also co-director of the American College of Surgeons (ACS) Institute for Health Policy Research. His work with the ACS focuses on the future supply of surgeons and access to surgical care. Dr. Ricketts works actively in health workforce policymaking and research and has developed national and state policies to influence the distribution of health care practitioners including the development of a new approach to designating primary care and dental health professional shortage and medically underserved areas. From 2001-2010, he chaired the Scientific Advisory Committee for the United Health Foundation's America's Health Rankings™. In 2008 he was appointed to the Secretary of Veterans' Affairs Rural Advisory Committee. He previously served on the Secretary's National Advisory Committee on Rural Health and Human Services (US HHS). In 1997, Dr. Ricketts received the Distinguished Rural Health Researcher award from the National Rural Health Association, and in 1998, the Cecil G. Sheps Distinguished Investigator award from the University of North Carolina at Chapel Hill. He is a member of the North Carolina Institute of Medicine and serves as an advisor to national and state health policy organizations. Dr. Ricketts is editor of the *North Carolina Medical Journal* having previously served as editor of the *Journal of Rural Health* from 1990 until 1996. Dr. Ricketts has authored many scientific articles, book chapters, and monographs and edited texts on rural health and geographic methods in health services research.

Jane E. Sisk, Ph.D., M.A., is the Director of the Division of Health Care Statistics for the National Center for Health Statistics at the Centers for Disease Control and Prevention. This Division collects data from health-care providers in different settings, including physicians, hospitals, and long-term care facilities. Dr. Sisk has been a professor in the Department of Health Policy, Mount Sinai School of Medicine, New York City, and before that at the Mailman School of Public Health, Columbia University, New York City. While a senior associate at the Congressional Office of Technology Assessment, she directed studies on Medicare payment for physician services and measures of the quality of hospital and physician care. Her research has focused

on interventions to improve the quality of care, especially to reduce disparities among population subgroups; evaluation of Medicaid managed care; and the cost-effectiveness of health-care interventions, including pneumococcal and influenza vaccination for elderly people. At Mount Sinai, she led randomized controlled trials in Harlem on the effectiveness and cost-effectiveness of nurse-management interventions for heart failure and hypertension. Dr. Sisk holds a Ph.D. in Economics from McGill University, an M.A. in Economics from George Washington University, and a B.A. with a major in International Relations from Brown University. She serves on editorial boards for *Health Services Research, Medical Decision Making,* and the *International Journal of Technology Assessment in Health Care.* Dr. Sisk has been elected a fellow of AcademyHealth; a fellow of the New York Academy of Medicine; and a member of the Institute of Medicine of the National Academies.

Bruce Steinwald, M.B.A., is an independent consultant in Washington, D.C. who focuses on health policy, health economics and financing, and Medicare payment issues. Prior to this, he was director of Health Care at the U.S. Government Accountability Office. There, he testified before the Congress on Medicare payment systems and other health care financing issues, supervised the preparation of health policy analyses, testimony and reports to the Congress, and met routinely with congressional staff to advise, inform, and instruct on health policy, financing, and payment issues. Prior to joining GAO, he served with the National Health Policy Forum of George Washington University, Covance Health Economics and Outcomes Services, Inc., and as deputy director of ProPAC. He has served as an expert panelist/presenter at policy institutes and other organizations. He has a B.A. in Business from Johns Hopkins University and an M.B.A. in Hospital Administration from the University of Chicago.

David Vlahov, Ph.D., R.N., is Dean and Professor, University of California, San Francisco School of Nursing. Previously, he was Senior Vice President for Research and Director of the Center for Urban Epidemiologic Studies at The New York Academy of Medicine. He has been Professor of Clinical Epidemiology at the Mailman School of Public Health at Columbia University, and Adjunct Professor in Epidemiology at the Johns Hopkins Bloomberg School of Public Health. Dr. Vlahov has conducted studies of urban populations in Baltimore for over 20 years, including several longitudinal cohort studies for which he received the NIH MERIT Award. He brings expertise in epidemiology, infectious diseases, substance abuse, and mental health and he has served on the National Advisory Council on Drug Abuse. More recently, Dr. Vlahov led epidemiologic studies in Harlem and the Bronx, which have served as a platform for subsequent individual- and community-level intervention studies and community-based participatory research (involving partnerships with residents, community- based organizations, and academic and public health departments) to address social determinants of health. This work has contributed information on racial/ethnic disparities in health, and approaches to address such disparities. Dr. Vlahov led population- based studies after September 11, 2001 on mental health and substance abuse in New York City residents following the attacks on the World Trade Center. Uniting all of these interests, Dr. Vlahov initiated the International Society for Urban Health (The website is www.isuh.org), serving as its first president. The Society brings together an interdisciplinary and international group of scientists to examine the health effects of urbanicity (in developed countries) and urbanization (in both developed and developing

countries). He is a visiting professor at the Medical School in Belo Horizonte, Brazil to develop their programs in urban health, and is working with the World Health Organization's Urban Health Center in Kobe, Japan. Dr. Vlahov is the editor-in-chief of the *Journal of Urban Health*, and serves as an editor for the *American Journal of Epidemiology* and *Epidemiology*. He has edited three books on urban health; he has published over 600 scholarly papers. Dr. Vlahov received a baccalaureate and masters in Nursing from the University of Maryland and his doctorate in Epidemiology at the Johns Hopkins School of Hygiene and Public Health.

M. Roy Wilson, M.D., M.S., served as Chancellor of the University of Colorado Denver (UC Denver) from July 2006 until June 30, 2010, and is now Chancellor Emeritus. UC Denver consists of a general academic campus with eight schools and colleges and a health sciences campus with five schools and colleges and serves approximately 28,000 students. He is an elected member of the Institute of Medicine of the National Academies, the American Ophthalmological Society, and the Glaucoma Research Society. In addition to the board of the University of Colorado Hospital, for which he has been the chairman, Dr. Wilson has served on the governing boards of the Denver Children's Hospital, Auraria Higher Education Center, Fitzsimons Redevelopment Authority, Institute of International Education, Colorado Bioscience Association, Association of Academic Health Centers, and the Association of Public and Land Grant Universities. Dr. Wilson was an initial advisory council member of the National Center on Minority Health and Health Disparities of the National Institutes of Health (NIH) and served four years as chair of its Strategic Plan subcommittee. Dr. Wilson received his medical degree from Harvard Medical School and his Master of Science in Epidemiology at the UCLA School of Public Health. He performed both his ophthalmology residency and glaucoma fellowship at the Massachusetts Eye and Ear Infirmary, Harvard Medical School. Dr. Wilson was named president of the Texas Tech University Health Sciences Center in 2003. In 1998, he was appointed dean of the School of Medicine at Creighton University, and then served as both dean and vice president for Health Sciences from 1999-2003. Prior to that time, he was dean of the School of Medicine at Charles R. Drew University of Medicine & Science. Dr. Wilson's major scientific contributions have been in bridging the fields of epidemiology and ophthalmology. He has delivered more than 200 invited lectures, many of these internationally, and has published more than 300 articles, book chapters, and abstracts. Dr. Wilson was selected in "Best Doctors in America" for consecutive years from 1996 to 2008. Among his many awards are the Distinguished Physician Award from the Minority Health Institute, the Honored Alumnas Award from the Mass Eye and Ear Infirmary, the Senior Achievement Award from the American Academy of Ophthalmology, the Gold Citation from Allegheny College, and the Association of American Medical College's Herbert W. Nickens Award.

Barbara Wynn, M.A., is a Senior Policy Analyst at RAND Corporation where she has been principal investigator on a variety of studies involving Medicare issues, such as studies examining differences in Medicare patient characteristics, cost and quality of procedures performed in multiple ambulatory settings, and an evaluation of severity-adjusted patient classification systems and relative weight methodologies. She also conducts research related to financing of graduate medical education and federal support for safety net hospitals. She has led cost and quality studies for the California workers' compensation system, TRICARE, the

Veterans Administration, and the State of Qatar. Prior to coming to RAND in 1999, Ms. Wynn spent 24 years with the Health Care Financing Administration (the predecessor agency to the Centers for Medicare and Medicaid Services). As deputy director of the Bureau of Policy Development and later director of the Plan and Provider Purchasing Policy Group) she was responsible for the full range of Medicare payment and coverage issues. Ms. Wynn led major Medicare regulatory initiatives, including the Medicare hospital inpatient capital prospective payment system, the hospital outpatient prospective payment system, the resource-based practice expense for physician services, and implementation of the Medicare+Choice program. For a number of years, she directed HCFA's Division of Hospital Payment Policy and was responsible for the policies and annual updates to the Medicare prospective payment system for inpatient hospital services.

Alan Zaslavsky, Ph.D., is a Professor of Health Care Policy (statistics) in the Department of Health Care Policy at Harvard Medical School. His methodological research interests include surveys, census methodology, microsimulation models, missing data, hierarchical modeling, small-area estimation, and applied Bayesian methodology. His health services research focuses primarily on developing methodology for quality measurement of health plans and providers and understanding the implications of these quality measurements. An important part of his work concerns the development, implementation, and analysis of the Consumer Assessments of Healthcare Providers and Systems (CAHPS) survey, a comprehensive program involving a survey instrument for eliciting enrollee reports and ratings of their health plans and the care they receive through them, a standard analysis package, and methods for reporting results to potential enrollees and purchasers. As a statistical leader in the implementation of the CAHPS survey for the Medicare population, he has studied individual characteristics affecting responses to the survey, the main dimensions of quality measured by the survey, the contributions of the health plan and geographical location to CAHPS-measured quality, comparisons of traditional Medicare to Medicare Advantage, and risk selection among health plans. In collaboration with Dr. Ronald Kessler, he leads analyses of the National Comorbidity Survey-Adolescent (NCS-A), a large study of mental health in US adolescents aimed at validation and improvement of the CIDI-A instrument and estimation of mental disorder for small geographic areas and schools. He also collaborates with Dr. Kessler on analyses for the World Mental Health Surveys and for the STARRS study of suicides in the armed forces. Another of Dr. Zaslavsky's areas is methodology for measuring racial and ethnic disparities in care and determining their causes. Finally, Dr. Zaslavsky is part of the Statistical Coordinating Center of the CanCORS (Cancer Care Outcomes Research and Surveillance) consortium, a major study sponsored by the National Cancer Institute to study process-outcomes relationships and sources of disparities in cancer care. He is developing methods of integrating cancer registry data with surveys and medical record reviews to better detect such relationships. Dr. Zaslavsky earned his A.B. from Harvard College, his M.S. in Statistics and Computer Science from Northeastern University, and his Ph.D. in Applied Mathematics, with a specialty in Statistics, from the Massachusetts Institute of Technology. He is a fellow of the American Statistical Association, an elected member of the International Statistical Institute, and a National Associate of the National Academy of Sciences. He has served on numerous panels on decennial census methodology, small-area estimation, and measurement of race for health and health

services research, and health care quality reporting for the Institute of Medicine and the Committee on National Statistics (CNSTAT) of the National Academy of Sciences, of which he is a member.

Stephen Zuckerman, Ph.D., is a Senior Fellow in the Health Policy Center of the Urban Institute. He received his doctorate in Economics from Columbia University in 1983. During his twenty-five years as a health economist, he has studied issues related to physician payment, insurance coverage and market reforms, and the health care safety net. His current research is focused on Medicare physician payment, the development of "medical homes," Medicare benefit design, the tax treatment of employer-sponsored health insurance premiums, and health care among undocumented immigrants. He recently co-authored a study examining the determinants of geographic differences in Medicare spending across individuals. Dr. Zuckerman's research on Medicare physician payment, includes several studies that developed the geographic practice cost indices used in the Fee Schedule for physician services, estimated the extent of the volume offset in the market for physician services, analyzed the growth in the volume and intensity of physician services, and outlined an approach to Medicare assignment that could avoid mandatory assignment of all claims yet protect low-income beneficiaries. He has also studied hospital rate setting, Medicaid managed care, state coverage expansions for adults, the Indian Health Service, the effects of the State Children's Health Insurance Program on private insurance coverage, state budget problems and their impact on health policies, and medical malpractice. He directed the health care component of the National Survey of America's Families (NSAF) -- the Assessing the New Federalism's household survey. Dr. Zuckerman used the NSAF to study the effects of modifying health insurance survey questions like those used in the Current Population Survey by including a question confirming that those who did not report coverage were actually uninsured. Results from this study were cited as part of the justification for including a confirmation question at the end of the Current Population Survey insurance coverage sequence. Prior to joining the Institute, he worked at the American Medical Association's Center for Health Policy Research.

INSTITUTE OF MEDICINE STAFF

Margaret Edmunds, Ph.D., Director of the Institute of Medicine (IOM) Study of Geographic Adjustment Factors in Medicare Payment, is a health policy analyst with a clinical background in disease management. She has designed, implemented, and evaluated initiatives on healthcare coverage and access, health information technology adoption, health information exchange, and consumer health communications for federal and state government, foundations, and associations. Previously, she was a Vice President of The Lewin Group, Adjunct Associate Professor of Health Policy and Management at the Johns Hopkins Bloomberg School of Public Health, and a Senior Associate on the Health IT team at Booz Allen Hamilton, where she co-authored white papers on meaningful use of electronic health records and public health informatics. She also served as Study Director for previous IOM studies on the State Children's Health Insurance Program and quality assurance for managed behavioral health care. Dr. Edmunds serves on the Public Policy Committee of the American Medical Informatics Association, chaired the Health IT Interest Group for AcademyHealth from 2007 to 2010, and is a Fellow and former member of the Board of Directors of the Society of Behavioral Medicine. Her published work also includes two books for the National Academies Press, book chapters, journal articles, white papers, technical reports, media backgrounders, and online commentary. She began her healthcare career as a Research and Clinical Fellow at the Johns Hopkins School of Medicine and as a member of the affiliate staff at the Johns Hopkins Hospital. Dr. Edmunds completed her doctoral degree in human development at The Pennsylvania State University and completed post-doctoral fellowships at the Johns Hopkins School of Medicine and School of Hygiene and Public Health.

Kathleen Haddad, Ph.D., Senior Program Officer for the Institute of Medicine (IOM) Study of Geographic Adjustment Factors in Medicare Payment, is a health services researcher with extensive background in Medicare claims data analysis, Medicare payment systems, Medicare quality, chronic disease management, health insurance policy, and geriatric mental health. In addition, Dr. Haddad has a background in journalism and communications. She came to the IOM from the Centers for Medicare and Medicaid Office of Policy, where she designed a standardized and risk-adjusted database of all Medicare claims and a set of composite quality measures based on four consensus-based measure sets for use in small area variation studies. She directed a Robert Wood Johnson-funded research group on chronic care at Johns Hopkins Bloomberg School of Public Health, where she received her Ph.D. in health services research. Dr. Haddad served as Director of Health Policy at Families USA, Senior Associate for Policy at the American College of Physicians, and Director of Communications in the Office of the New York State Assembly Majority Leader. She began her career in Albany, New York, as health writer for the Albany Times Union, reporting on and writing about public health and health care financing issues emerging from the state Department of Health and state Legislature. Her published work also includes journal articles and numerous reports on Medicare, Medicaid, and private health insurance policy. She is a reviewer for the American Public Health Association Dissertation Awards Committee and a former member of the Board of the New York State Mental Health Association. In addition to completing her Ph.D., Dr. Haddad also completed an M.S. degree at the Columbia University Graduate School of Journalism.

Ashley McWilliams, B.S., joined the IOM in September 2008, as a senior program assistant for the Board on Health Care Services and the National Cancer Policy Forum. Besides assisting on the Geographic Adjustment Factors project, she is working on the Breast Cancer and the Environment: The Scientific Methodology, Research Findings, and Future Directions study funded by the Susan G. Komen for the Cure®, Defining and Revising an Essential Health Benefits Package for Qualified Health Plans, and the Expert Panel on Access to Medicare Part D Routine Vaccines project. She has also worked with the IOM's Roundtable on Evidence-based Medicine and the Office of Reports and Communication. Prior to joining the IOM, Ashley graduated magna cum laude and Phi Beta Kappa, from Howard University with a degree in biology in 2008. During college, Ashley was co-president of the Health Professions Society, an inductee into *Who's Who among Students at American Colleges and Universities*, and a member of several honor societies. Ashley has also participated in summer research programs at the University of California, San Francisco, Massachusetts Institute of Technology, and Virginia Polytechnic and State University; she also participated in a summer health careers program at Case Western Reserve University.

Serina S. Reckling, M.P.H., joined the Institute of Medicine in August 2010 as a Research Associate for the Board of Health Care Services study on Geographic Adjustment Factors in Medicare Payment. Her previous experience includes work in community health in Santa Cruz, and Watsonville, California and Monte Christi, Dominican Republic. Prior to joining the IOM, Serina interned at Insure the Uninsured Project in Los Angeles, where she assisted staff in collecting health care reform literature and analyzing the impact of health insurance exchanges on California. She also interned for Grantmakers In Health in
Washington DC, where she conducted research on program and policy initiatives among grantees. She developed a passion in health policy after working with uninsured patients in a small community hospital in a rural area of California and serving as a community health promoter in the Peace Corps. Serina is a member of the Delta Omega Honorary Society in Public Health and an associate member of the National Academy of Social Insurance. She earned a Masters in Public Health in Health Services Policy from the University of California, Los Angeles School of Public Health and received a BA in Sociology from University of California, Santa Cruz. She is fluent in Spanish and a native speaker of German.

Sara Spizzirri, M.P.A., joined the Institute of Medicine in August 2010 as a Research Assistant on the Board on Health Care Services. She provides research and administrative support to her team members working on the study of Geographic Adjustment Factors in Medicare Payment for the Centers for Medicare and Medicaid Services (CMS) of the Department of Health and Human Services. Previously, Sara supported a variety of programmatic and administrative activities at the Proceedings of the National Academy of Sciences. She also completed internships with the British Parliament and a general practice law firm in upstate New York. Sara graduated from Ithaca College in 2008 with a B.A. in politics and a minor in biology. She earned her M.P.A with a double concentration in non-profit management and science policy from American University in May 2010.

Roger C. Herdman, M.D., born in Boston, MA, Phillips Exeter Academy, 1951; Yale University, Magna Cum Laude, Phi Beta Kappa, BS, 1955; Yale University School of Medicine, MD, 1958. Interned at the University of Minnesota. Medical Officer, US Navy, 1959-61. Thereafter, completed a residency in pediatrics and continued with a medical fellowship in immunology/nephrology at Minnesota. Held positions of Assistant Professor and Professor of Pediatrics at the University of Minnesota and the Albany Medical College between 1966-1979. In 1969, appointed Director of the New York State Kidney Disease Institute in Albany. During 1969-1977 served as Deputy Commissioner of the New York State Department of Health responsible for research, departmental health care facilities and the Medicaid program at various times. In 1977, named New York State's Director of Public Health. From 1979 until joining the US Congress's Office of Technology Assessment (OTA) was a Vice President of the Memorial Sloan-Kettering Cancer Center in New York City. In 1983, named Assistant Director of OTA and then Acting Director and Director from January 1993-February 1996. After the closure of OTA, joined the National Academy of Sciences' Institute of Medicine as a Senior Scholar, and subsequently served as Director of the National Cancer Policy Board and the National Cancer Policy Forum. He is now the Director of the Board on Health Care Services.

John C. Bailar III, M.D., Ph.D. is a professor emeritus at the University of Chicago and founding chair of the Department of Health Studies there. A retired commissioned officer of the U.S. Public Health Service, Dr. Bailar worked at the National Cancer Institute in Bethesda for 22 years, and since then he has held academic appointments at Harvard and McGill Universities. Dr. Bailar's research interests focus on the interpretation of statistical evidence in medicine, with special emphasis on cancer. For 6 years Dr. Bailar was editor-in-chief of the *Journal of the National Cancer Institute*. For 11 years he was the statistical consultant for the *New England Journal of Medicine*, and more recently he has been a member of the editorial board of that journal. Dr. Bailar is a member of the Institute of Medicine and earned his M.D. from Yale in 1955 and his Ph.D. in statistics from American University in 1973.

RTI INTERNATIONAL CONSULTANTS

Walter Adamache, Ph.D., received his Ph.D. in Economics from Vanderbilt University in 1982. His 25+ year career in health economics includes both behavioral and policy-related research. His hospital research includes studies on hospital costs, hospital labor markets, capital costs, investment, closures, and mergers. He examined geographic variation of prices paid by hospitals and physicians for labor and non-labor input prices and suggested to HCFA (now CMS) a methodology to smooth out intertemporal changes in IPPS area wage index values. During the 1990s, he submitted recommendations to HCFA regarding updating the physician malpractice insurance component of the Medicare Geographic Practice Cost Index. Recent work includes examining alternative methods for configuring payment localities for the Medicare Physician Fee Schedule and an examination of the relative merits of BLS versus hospital-specific wage data for the IPPS area wage index. He is currently evaluating the impact of the alignment of hospital and physician incentives on hospital costs.

Kathleen Dalton, Ph.D., has experience in health care finance that spans the roles of management, industry consultant, trustee, and researcher. Following a 20-year career in health care finance, she earned her doctorate in Health Policy from the School of Public Health at the University of North Carolina. After completing a CMS-funded dissertation on payments to teaching hospitals under the Medicare prospective payment system, she remained at U.N.C. for five years as a research faculty member and also a fellow at the Cecil G. Sheps Center for Health Services Research. Her work focused on hospital reimbursement, financial performance and Medicare payment policy, including two studies of geographic wage variation in hospitals and in skilled nursing facilities. Since joining RTI in 2005, she has continued to focus Medicare payment policy, financial performance of hospitals and post-acute care providers, and the effects of reimbursement incentives on care delivery. She is a quantitative analyst specializing in secondary data modeling, is a recognized expert in prospective payment systems, and has extensive experience in analysis of Medicare claims data and cost reports.

Deborah Healy, Ph.D. is a Senior Economist in RTI's Health Care Financing and Payment Program. Dr. Healy's experience in health care spans roles in government, consulting, and research. Dr. Healy began her career at Compass Lexecon working on hospital antitrust cases, after which she earned her doctorate in economics from the University of Chicago. After completing her dissertation on competition in managed care plans, Dr. Health worked as an economist in the Antitrust Division at the US Department of Justice where she focused on competition in healthcare markets. Since joining RTI, Dr. Healy has shifted her focus to competitive bidding, Part D, and Medicare payment policies and their impacts.

Brieanne Lyda-McDonald, M.S.P.H. joined RTI in June 2008 as a Public Health Analyst. She has a strong background in health science and public health, with a concentration in health policy. Ms. Lyda-McDonald has health research experience assisting with the preparation and training of healthcare providers for a congressionally-mandated post-acute care functional assessment, developing and implementing an assessment for outpatient therapy providers in an effort to develop payment alternatives, and surveying Title X family planning grantees on their data reporting burden, among other topics. She earned a Master of Science in Public Health from the University of North Carolina at Chapel Hill.

Gregory C. Pope, M.S. directs RTI's Health Care Financing and Payment Program based in Waltham, Massachusetts. Mr. Pope has over 25 years of experience in health economics and health policy research, after completing his graduate education in economics at the Massachusetts Institute of Technology. Much of Mr. Pope's work has focused on design and evaluation of provider payment methods for the Medicare program. Mr. Pope is a co-developer of the Geographic Practice Cost Index used in Medicare physician payment and has conducted analyses of Medicare's hospital wage index for CMS and MedPAC. He has led the development and refinement of the Centers for Medicare & Medicaid Services' Hierarchical Condition Categories (CMS-HCC) system for risk adjustment of managed care capitation payment. A current focus of Mr. Pope's work is developing shared savings payment methods for Medicare accountable care organizations.

Elizabeth Seeley, Ph.D., M.P.H. is a health policy researcher at RTI International. She has more than a decade of research and practical work experience in both domestic health policy and international health policy issues. While at the London School of Economics, her research focused on pharmaceutical purchasing efficiency, through which she constructed sophisticated pharmaceutical price indices in order to conduct international pharmaceutical price comparisons. As a manager of policy analysis at the Massachusetts Hospital Association, Liz worked directly on Medicare hospital wage index issues as well as on other issues relevant to hospital pricing, including helping hospital managers develop fair pricing guidelines for low-income populations. At the Center for Studying Health System Change and as an independent consultant, Liz has led site visits to multiple states, where she has gained insight on geographic differences in health system delivery. Liz has a doctorate in Social Policy from the London School of Economics, a Master's degree in Health Policy and Management from the Harvard School of Public Health, and a Bachelor's degree in economics from Boston College.

Nathan West, M.P.A. is a health research analyst for RTI International. Mr. West has nearly 15 years experience in health services and health policy research after completing his undergraduate education in public policy from the University of North Carolina at Chapel Hill and graduate education in public administration from NC State University. Much of Mr. West's work has focused on the evaluation of Medicare demonstration programs related to quality measurement, quality improvement, and payment reform. He assisted with the analyses of Medicare's hospital wage index for MedPAC in 2006-07.

Alton Wright, B.S., joined RTI in 2009 as a public health analyst in RTI's Health Care Financing and Payment Program. Before joining RTI, Alton attended the University of North Carolina at Chapel Hill, where he completed his degree in Health Policy and Administration. While completing his degree, he worked for the North Carolina Office of Emergency Medical Services as a research assistant for a cost study of the State Medical Response System. Since joining RTI, Mr. Wright has served as project coordinator for various projects. In this role he has assisted project managers by monitoring achievement milestones, drafting meeting notes and progress reports, and coordinating the logistics of team meetings and interviews with stakeholders and experts.

Appendix B

Public Committee Meeting Agendas

Committee Meeting 1 Agenda

SEPTEMBER 16-17, 2010
20 F STREET, NW, CONFERENCE ROOM B,
WASHINGTON, DC 20001

DAY 1: Thursday, September 16, 2010

OPEN SESSION ONE

10:30 – 10:45 Welcome and Introductory Remarks
Frank Sloan, Ph.D., Chair and Moderator

Policy and Legislative Context for the Study

10:45 – 11:15 Remarks from Study Sponsor (CMS)
Jonathan Blum, M.A., Director, Center for Medicare Management, Centers for Medicare and Medicaid Services (CMS), U.S. Department of Health and Human Services

11:15 – 12:00 Legislative Perspectives
The Honorable Bruce Braley, U.S. House of Representatives (D-Iowa)
The Honorable Allyson Schwartz, U.S. House of Representatives (D-Pennsylvania)
Joint Q and A

12:00 **Adjourn Open Session**

OPEN SESSION TWO
Payment Adjustment Factors

1:00 – 2:00 Current Geographic Adjustment Factors Under Medicare: The Hospital Wage Index and Physician Fee Schedule
Marc Hartstein, Deputy Director, Hospital and Ambulatory Policy Group, CMS

2:00 – 2:40 MedPAC's Approach to the Hospital Wage Index and Geographic Practice Cost Indexes (GPCIs)
Mark Miller, Ph.D., Executive Director, MedPAC

2:40 – 3:30 Physician and Hospital Perspectives on the Geographic Adjustment Factors

Sherry Smith, M.S., C.P.A., Director, Physician Payment Policy and Systems, American Medical Association
James Bentley, Ph.D., Former Senior Vice President, American Hospital Association
Joint Q and A

3:30 **Adjourn**

DAY 2: Friday, September 17, 2010

OPEN SESSION THREE
Labor Markets

8:00 Welcome

8:05 - 8:50 Theoretical Approaches to Labor Market Variations
Dan A. Black, Ph.D., Professor and Dean, Harris School of Public Policy, University of Chicago

SESSION THREE, PART 2: Practitioners' Recommendations for Change

8:50 – 10:00 Recommended Changes in Physician and Hospital Geographic Adjustment Factors

Michael Kitchell, M.D., Neurologist and President of Board of Directors, McFarland Clinic, Ames, Iowa , and President, Iowa Medical Society

Jennie Rhinehart, Administrator and CEO, Community Hospital, Tallassee, Alabama, American Hospital Association Task Force on Variations in Health Care Spending.

Larry deGhetaldi, M.D., Family Medicine, Palo Alto Medical Foundation, and Chair of Medicare Committee, California Medical Association

Douglas Reding, M.D., F.A.C.P., M.P.H., Vice President, Marshfield Clinic, Marshfield, Wisconsin

Karen Heller, M.B.A., Executive Vice President, Greater New York Hospital Association, New York, New York

Alice Tolbert Coombs, M.D., Anesthesiologist and President, Massachusetts Medical Society

10:00 – 10:15 Break

10:15 – 11:00 Q and A

11:00 **Adjourn Open Session**

DAY 2: FRIDAY, SEPTEMBER 17, 2010

OPEN SESSION FOUR
Public Comments

1:00 – 2:00 Additional Public Statements on Hospital and Physician Adjustment Factor Components and Calculations (by request through IOM web site)

1. **Dario de Ghetaldi**, Corey, Luzaich, Pliska, de Ghetaldi & Nastari LLP, Millbrae, California
2. **Dale Baker**, Baker Healthcare Consulting, Inc., Indianapolis, Indiana
3. **Edward Bentley, M.D.,** California Medical Association, Santa Barbara, California
4. **Jerome Connolly**, American Academy of Family Physicians, Washington D.C.
5. **Craig Boyer**, North Country Health Services, Bemidji, Minnesota
6. **Tim Bartholow**, Wisconsin Medical Society, Madison, Wisconsin
7. **Steve Speil**, Federation of American Hospitals

2:00 **Adjourn**

Committee Meeting 3 Agenda

JANUARY 20, 2011
500 FIFTH STREET, NW, ROOM 101
WASHINGTON, DC 20001

3:15– 3:30 **Speaker arrivals and room set-up**

3:30 – 4:45 **Panel One: Provider Perspectives on Medicare Payment**

10-minute individual presentations followed by Q and A with committee and audience

Roland Goertz, M.D., President, American Academy of Family Physicians
Jan Towers, Ph.D., F.A.A.N.P., F.A.A.N., Health Policy Director, American Academy of Nurse Practitioners
James G. Potter, Senior VP of Advocacy and Government Relations, American Academy of Physician Assistants
Elena Rios, M.D., President, National Hispanic Medical Association
Byron Sogie-Thomas, M.S., Director, Office of Health Policy and Government Relations

4:45 – 6:00 **Panel Two: Open Forum for Stakeholders**

5-minute individual presentations followed by Q and A with committee and audience

Dale Baker, President, Baker Healthcare Consulting, Inc.

6:00 **Adjourn**

Appendix C

List of Contributors and Participants

The following individuals and organizations provided testimony and/or attended public meetings of the IOM Committee on Geographic Adjustment Factors in Medicare Payment:

National Organizations and Associations	Location	Contact Person
American Academy of Family Physicians[1]	Washington, DC	Jerome Connolly, PT, CAE Senior Government Relations Representative
American Academy of Family[1] Physicians	Waco, TX	Roland Goertz, MD President
American Academy of Nurse Practitioners[1]	Washington, DC	Jan Towers, PhD, FAANP, FAAN Health Policy Director
American Academy of Physician Assistants[1]	Alexandria, VA	James Potter, MPP Senior VP of Advocacy and Government Relations
American Hospital Association[2]	Washington, DC	Joanna Kim Senior Associate Director, Policy
American Medical Association[1]	Chicago, IL	Sherry Smith, MS, CPA Director of Physician Payment Policy & Systems
Association of American Medical Colleges[2]	Washington, DC	Atul Grover, MD, PhD Chief Advocacy Officer
Baker Healthcare Consulting, Inc.[1,2]	Indianapolis, IN	Dale Baker President
California Hospital Association[2]	Sacramento, CA	Anne O'Rourke Senior Vice President of Federal Relations

California Medical Association[1]	Sacramento, CA	Edward Bentley, MD
Corey, Luzaich, Pliska, de Ghetaldi & Nastari, LLP[1]	Millbrae, CA	Dario de Ghetaldi, Esq.
Federation of American Hospitals[2]	Washington, DC	Steve Speil, Esq., MPH Senior Vice President, Health and Finance Policy
Greater New York Hospital Association[1]	New York, NY	Karen Heller, MBA Executive Vice President, Health Economics & Finance
Hospital & Ambulatory Policy Center, Centers for Medicaid and Medicare Services[1]	Baltimore, MD	Marc Hartstein Deputy Director
Independent Consultant[1,2]	Maryland	James Bentley, PhD Former Senior Vice President, American Hospital Association
Iowa Medical Society[1,2]	West Des Moines, IA	Michael Kitchell, MD
Jackson Health System[2]	Maimi, FL	Eneida Roldan, MD, MPH, MBA President and CEO
Maine Hospital Association[2]	Augusta, ME	David Winslow, MBA Vice President, Finance
Marshfield Clinic[1,2]	Marshfield, WI	Douglas Reding, MD, FACP, MPH Vice President
Massachusetts Medical Society[1,2]	Waltham, MA	Alice Tolbert Coombs, MD President
Medicare Payment Advisory Commission[1]	Washington, DC	Mark Miller, PhD Executive Director
National Association of Urban Hospitals[2]	Sterling, VA	Ellen Kugler, Esq.
National Hispanic Medical Association[1]	Washington, DC	Elena Rios, MD President
National Medical Association[1,2]	Silver Spring, MD	Byron Sogie-Thomas, MS Director, Office of Health Policy &

		Government Relations
North Country Health Services[1]	Bemidji, Minnesota	Craig Boyer Vice President, Finance
Northern Indiana Region, Franciscan Alliance [1]	Michigan City, IN	Scott Mundell
Palo Alto Medical Foundation[1]	Santa Cruz, CA	Larry de Ghetaldi, MD President
Santa Barbara Gastroenterology Consultants[1]	Santa Barbara, CA	Edward Bentley, MD
Tallassee Community Hospital[1,2]	Tallassee, AL	Jennifer Rhinehart President and CEO
United States Congress, House of Representatives[1]	Congressional District 1, IA	The Honorable Bruce Braley
United States Congress, House of Representatives[1,2]	Congressional District 13, PA	The Honorable Allyson Schwartz
United States Congress, Senate[2]	Butler County, IA	The Honorable Chuck Grassley
University of Chicago[1]	Chicago, IL	Dan Black, PhD
Wisconsin Medical Society[2]	Milwaukee, WI	Tim Bartholow, MD Senior Vice President

[1] Provided formal presentations to the committee.
[2] Submitted written testimony

The following individuals attended the public committee meetings on September 16 -17th, 2010 and/or January 2, 2011:

Name	**Affiliation**
Bartholow, Tim	Wisconsin Medical Society
Bee Chong, Sharon	Strategic Health Care
Bentley, Edward	California Medical Association
Bohnet, Sarah	The Minnesota Hospital Association
Boyer, Craig	North Country Health Services
Calcagno, Alexandra	Massachusetts Medical Society
Cannon, Jim	Washington State Hospital Association
Connolly, Jerome	American Association of Family Physicians
Corry, Martin	Buchannan Ingersoll and Rooney
Curran, Kathy	Catholic Health Association of the United States
Davanzo, Joan	Dobson Davanzo and Associates, LLC
DeBrunner, Benjamin	DeBrunner and Associates National Association of Urban Hospitals
Delestienne, Emilie	West Penn Allegheny Health System
Dixit, Rachana	----
Dobson, Al	Dobson Davanzo and Associates, LLC
Ferguson, Karen	American Medical Group Association
Fernandez, Danny	National Rural Health Association
Fisher, Karen	Association of American Medical Colleges
Foster, Griffin	Office of Congresswoman Judy Biggert, US House of Representatives
Fonticiella, Albert	Avalere Health, LLC

Freeman, Jeanine	Iowa Medical Society
Gillis, Kurt	American Medical Association
Giovanis, Theodore	----------
Goodman, Michelle	Office of Rural Health Policy, Health Resources and Services Administration, Department of Health and Human Services
Gronniger, Tim	Committee on Energy and Commerce, US House of Representatives
Harris, Katie	MaineHealth
Hartstein, Marc	Centers for Medicare and Medicaid Services, Department of Health and Human Services
Harvey-McPherson, Lisa	EMHS
Harwell, Stephen	Healthcare Association of New York State
Hayes, Kevin	Medicare Payment Advisory Commission
Keefe, Alyssa	California Hospital Association
Kim, Joanna	American Hospital Association
Kitchell, Michael	McFarland Clinic
Kugler, Ellen	National Association of Urban Hospitals
Kupferman, Gloria	Healthcare Association of New York State
Leeson, Kate	Holland and Knight
Madhani, Sheila	American Society for Radiation Oncology
Marks, Sandy	American Medical Association
May, Don	American Hospital Association
McIlrath, Sharon	American Medical Association
Miller, Brent	Marshfield Clinic

Miller, Lisa	American Academy of Dermatology
Mir, Arielle	Medicare Payment Advisory Commission
Mosbaek, Craig	Committee on Ways and Means, Health Subcommittee, US House of Representatives
Muiroy, Kyle	Washington Strategic Consulting
Munevar, Dianne	Avalere Health, LLC
Nickelson, Dan	Cleveland Clinic
O'Rourke, Anne	California Hospital Association
Pahner, Katie	Health Policy Source
Reep, Kathy	Florida Hospital Association
Richter, Judith	Centers for Medicare and Medicaid Services, Department of Health and Human Services
Rigg, John	Centers for Medicare and Medicaid Services, Department of Health and Human Services
Roth, Jessica	McDermott Will & Emery
Shively, Christa	Office of Congressman Earl Blumenauer, US House of Representatives
Speil, Steven	Federation of American Hospitals
Steinbert, Caroline	American Hospital Association
Stensland, Jeff	Medicare Payment Advisory Committee
Stephansky, Joe	Michigan Health and Hospital Association
Stork, Abigail	Iowa Hospital Association
Swygert, Tiffany	Centers for Medicare and Medicaid Services, Department of Health and Human Services
Vaz, Christopher	American Hospital Association

VonReuden, Cathy	SMDC Health System
Waldon, Sue	Committee on Finance, US Senate
Walradt, Jessica	Jennifer Bell and Partners
Walton, Jessica	----
Warde Zaccarelli, Aisling	Greater New York Hospital Association
Weixel, Nathaniel	Bureau of National Affairs
Young, Joanna	Avalere Health, LLC

Appendix D

Statistical Reliability of the BLS Wage Data

Under the direction of the committee, RTI investigated the statistical reliability of the Bureau of Labor Statistics (BLS) wage data. Given the time and data constraints faced by the project, it was not possible to study the full spectrum of BLS wage data for all occupations. Instead, a simulation was performed with all-industry mean hourly wages and relative standard errors (RSEs) publicly available from the BLS web site for three common hospital occupations. These three occupations would comprise a substantial portion of a BLS hospital wage index including all occupations.

Occupations Used in the Analysis

The occupations used in the simulation were

- Registered nurses;
- Nursing aides, orderlies, and attendants; and
- Office and administrative support occupations.

Together, these three occupations account for half (49.9 percent) of total hospital employment nationally, according to the May 2009 Occupational Employment Statistics national employment estimates for hospitals from the BLS web site. The occupations' shares in employment in the three occupations combined are:

- Registered nurses: 56 percent;
- Nursing aides, orderlies, and attendants: 15 percent; and
- Office and administrative support occupations: 29 percent.

The reliability of the estimated weighted average wage of these three occupations was investigated, that is, the reliability of average wage = [0.56 · (registered nurse wage)] + [0.15 · (nursing aide wage) + 0.29 · (administrative support wage)].

Geographic Areas Used in the Analysis

The analysis was done separately for metropolitan and nonmetropolitan areas. BLS reported at least some data for 400 metropolitan statistical areas (MSAs), but data on wages or RSEs for at least one of the three selected occupations were missing for 21 areas, leaving data for 379 MSAs in the analysis. BLS reported data for 172 non-metropolitan areas, but data on wages or RSEs for at least one of the selected occupations were missing for 4 areas, leaving for 168 non-metropolitan areas in the analysis. Each non-metropolitan area was contained within a single state, but many states contained more than one non-metropolitan area (for example,

northeast Alabama non-metropolitan area, northwest Alabama non-metropolitan area, southeast Alabama non-metropolitan area, and southwest Alabama non-metropolitan area). RTI analyzed data for these non-metropolitan areas individually, and did not aggregate them into a single statewide non-metropolitan area. RTI's analysis likely overstates the RSEs of single statewide non-metropolitan areas.

Calculation of RSE for each Area

The RSE for each area was calculated according to the following derivation.

NOTATION:
Let a_1, a_2, and a_3 be the weights of the components in the index, where component 1 is registered nurses; component 2 is nursing aides, and component 3 is administrative support occupations.

The weights are as follows:
$a_1 = 0.56$, $a_2 = 0.15$, and $a_3 = 0.29$.

Let y_1, y_2, y_3 = estimated mean wages for the components (in a certain area).

The index value (Y; weighted average wage) is defined as $Y = (a_1 \cdot y_1 + a_2 \cdot y_2 + a_3 \cdot y_3)$.

Let s_1, s_2, s_3 = standard errors (SEs) for y_1, y_2, and y_3 respectively. The SEs (s) were calculated from the BLS-reported RSEs as $s_1 = (RSE_1 \cdot y_1)$, $s_2 = (RSE_2 \cdot y_2)$, and $s_3 = (RSE_3 \cdot y_3)$.

Let c be the sampling correlation between pairs of y variables, which is unknown. For this simulation, it was assumed that c is equal to 0.5 (extremes values are 0 and 1).

Now, the squared SE of Y, denoted V, can be calculated for each area, using the national employment weights a_1, a_2, and a_3; the assumed sampling correlation c; and the BLS-reported SEs s_1, s_2, and s_3.

$$V = (a_1^2 \cdot s_1^2 + a_2^2 \cdot s_2^2 + a_3^2 \cdot s_3^2) + 2 \cdot c \cdot [(a_1 \cdot a_2 \cdot s_1 \cdot s_2) + (a_1 \cdot a_3 \cdot s_1 \cdot s_3) + (a_2 \cdot a_3 \cdot s_2 \cdot s_3)]$$

Then, the RSE for each area is calculated as $\sqrt{V}/Y$.

Calculation of Reliabilities for Each Area

To calculate reliabilities, an estimate of the between-area population (model) variance *T* was first obtained as follows:

(1) Areas with very large values of *V* were discarded (RTI removed areas with *V >2* for nonmetropolitan areas [5 areas] and *V >3* for metropolitan areas [five areas]) to improve the efficiency of the estimator.

(2) $T = SD(Y)^2$ - mean(V), where SD(*Y*) is the standard deviation of the remaining *Y* values and mean(*V*) is the mean of the remaining V values, was estimated.

Then, the reliability for each area was calculated as $T/(V+T)$, where *V* is the area-specific quantity derived above.

Results

Table D-1 shows the distribution of metropolitan and non-metropolitan areas by ranges of simulated RSEs in the weighted-average wage of the three common hospital occupations that together account for about half of total hospital employment. About three-quarters of both metropolitan and non-metropolitan areas have RSEs of 1 to 3 percent. Less than 10 percent of metropolitan areas and less than 5 percent of non-metropolitan areas have RSEs greater than 5 percent or have missing data. Fully 95 percent of non-missing metropolitan employment, and 90 percent of non-missing non-metropolitan employment, for these occupations was located in areas with RSEs of 3 percent or less. Less than 1 percent of non-missing metropolitan employment, and less than 3 percent of non-missing non-metropolitan employment, for these occupations was located in areas with RSEs greater than 5 percent.

TABLE D-1 Distribution of Areas by Simulated Relative Standard Error of National-Employment-Weighted Average BLS Wage of Three Common Hospital Occupations

Relative Standard Error (%)	Metropolitan Areas			Non-metropolitan Areas		
	Number	% of areas	% of employment	Number	% of areas	% of employment
Total	400	100	100	172	100	100
> 10	2	0.5	0.1	0	0	0
>5 to 10	12	3	0.8	4	2.3	2.2
>4 to 5	12	3	0.8	6	3.5	2.7
>3 to 4	41	10.3	3.1	13	7.6	5
>2 to 3	117	29.3	15.7	50	29.1	24.8
>1 to 2	177	44.3	58.3	91	52.9	62.8
0%to 1	18	4.5	21.2	4	2.3	2.6
Missing data	21	5.3	NA	4	2.3	NA

SOURCE: RTI computations with May 2010 Occupational Employment Statistics data reported on the Bureau of Labor Statistics website (www.bls.gov).

NOTES: Metropolitan areas are MSAs or other similar areas defined by OMB. Non-metropolitan areas are BLS-defined sub-state non-MSA areas.

Relative standard errors are standard errors divided by the estimated average wage.

National employment weights are for the hospital industry.

Area wages are for all industries.

The three occupations comprising the average wage are registered nurses, nurse aides, and administrative support occupations, which together account for about half of hospital employment.

Percent of employment is derived from all industry employment estimates for the three occupations, using BLS OES May 2010 data.

The analysis assumes a sampling correlation between occupational wages of 0.5.

NA is not available.

Table D-2 shows the distribution of metropolitan and non-metropolitan areas by ranges of simulated reliabilities in the weighted-average wage of the three common hospital occupations. A reliability of 90 percent means that 90 percent of the measured wage variation among areas is due to real wage differences among areas rather than sampling variation. If a reliability greater than 90 percent is considered ”very good”, then the average wage estimates for about 90 percent of both metropolitan and non-metropolitan areas have very good reliability. Fully 99 percent of non-missing metropolitan employment, and 94 percent of non-missing non-metropolitan employment, for the three occupations is in these areas with “very good” reliability of wage estimates. Another 3 percent of metropolitan areas and 5 percent of non-metropolitan areas have reliabilities between 80 and 90 percent, which could be considered “acceptable”. Only 7 percent of metropolitan areas and 6 percent of nonmetropolitan areas have reliabilities of 80 percent or less or missing data, and these areas comprise only 0.4 percent of non-missing metropolitan employment and 3.8 percent of non-

missing non-metropolitan employment. (Areas with missing data are likely to have the lowest reliability.)

TABLE D-2 Distribution of Areas by Simulated Reliability of National-Employment-Weighted-Average BLS Wage of Three Common Hospital Occupations

Reliability (%)	Metropolitan Areas			Non-Metropolitan Areas		
	Number	% of areas	% of employment	Number	% of areas	% of employment
Total	400	100	100	172	100	100
>90 to 100	362	90.5	98.9	153	89	94
>80 to 90	11	2.8	0.7	9	5.2	2.1
>70 to 80	4	1	0.3	3	1.7	1.7
>50 to 70	0	0	0	3	1.7	2.1
0 to 50	2	0.5	0.1	0	0	0
Missing data	21	5.3	NA	4	2.3	NA

NOTES: See notes to table C-1 SOURCE: RTI computations with May 2010 Occupational Employment Statistics data reported on the Bureau of Labor Statistics website (www.bls.gov).

Conclusion

The statistical reliability of the BLS wage data is adequate for most metropolitan and non-metropolitan areas (at least 90 percent of areas). For a small proportion of areas, the BLS data are not as reliable. For areas with less reliable data, steps that could be taken to improve the reliability of estimated wages include consolidating them with adjacent areas, increasing the proportion of sampled employers who respond to the BLS Occupational Employment Statistics survey, increasing the number of employers surveyed by BLS; and adding more years of data. For example, where non-metropolitan wage data are less reliable, multiple sub-state non-metropolitan areas could be consolidated into a single statewide non-metropolitan area.

Appendix E

TABLE E-1 Comparison of the MedPAC and IOM Proposals for Alternative HWIs

IOM Recommendations	MedPAC Recommendations (June 2007 Report)
Recommendation 2-1: The same labor market definition should be used for both the hospital wage index and the physician geographic adjustment factor. Metropolitan statistical areas (MSAs) and statewide non-MSAs should serve as the basis for defining these labor markets.	MedPAC assumes continued use of the existing hospital payment localities – MSAs/non-MSAs. Physician payment localities are not addressed.
Recommendation 3-2: CMS should establish an ongoing agreement with the Bureau of Labor Statistics to use all necessary wage data from the Occupational Employment Survey to compute the wage index.	MedPAC creates a compensation index which incorporates wage data from BLS and the Census Bureau and data on benefits (such as health insurance and pensions) and mandatory payroll taxes from hospital, SNF, and home health provider cost reports submitted to CMS.
Recommendation 3-3: The Committee recommends using all occupations as inputs in the hospital wage index, each with a fixed national weight based on the hours of each occupation employed in hospitals nationwide.	**Recommendation 6B:** The secretary should establish a hospital compensation index that uses wage data from all employers and industry-specific occupational weights
Recommendation 3-4: The Centers for Medicare & Medicaid Services (CMS) should apply the proposed hospital wage index to non-Inpatient Prospective Payment System facilities (non-IPPS facilities), using nationwide occupation-specific weights derived from data for each type of facility.	**Recommendation 6C:** The secretary should use the hospital compensation index described in recommendation 6B for the home health and skilled nursing facility prospective payment systems and evaluate its use in the other Medicare fee-for-service prospective payment systems
Recommendation 5-1: The committee recommends that wage indexes be adjusted using formulas based on commuting patterns for health care workers who reside in a county located in one labor market but commute to work in a county located in another labor market.	**Recommendation 6B:** The secretary should establish a hospital compensation index that is adjusted at the county level and smooths large differences between counties
Recommendation 5-2: The committee's recommendations are intended to replace the system of geographic reclassification and exceptions that is currently in place for health care providers.	**Recommendation 6A:** The Congress should repeal the existing hospital wage index statute, including reclassifications and exceptions, and give the secretary authority to establish new wage index systems.

Appendix F

TABLE F-1 Description of Three Optional Sources for Facility Wage Index Data

	(1) CMS current- IPPS hospital average wage survey (S-3)	(2) CMS option – electronically submitted payroll data, dollars and hours by SOC		(3) BLS option – OES wage surveys	
		(2A) All-Part A providers	(2B) Hospital providers only	(3A) All-employer average wages	(3B) Hospital average wages
Description and sources	"CMS Hospital Wage Index," computed from annual aggregate average hospital wages, adjusted to remove wages from non-IPPS subproviders and to add benefits and contract labor; further adjusted every 3 years to account for variation in nursing occupation mix. Average wage data are obtained from the annual Medicare cost reports; occupation mix adjustments are computed from a separate tri-annual hospital nursing survey	"CMS Part A Wage Index," computed for each type of provider, or for hospitals only. Annually submitted data would include total wages and total hours paid, aggregated at the SOC level, and will be submitted directly from annual payroll files. Average wages could be computed across all health care providers, or separately by type of reporting provider (e.g. hospitals, SNFs, HHAs)		"BLS Part A Wage Index," using BLS reported average wages for a set of health care occupation codes. Data can be captured by occupation code across all industries, across health care industries only, or by health care sector (e.g. hospitals, SNFs, HHAs)	
Calculation	Relative wages are computed from facility-level data aggregated by MSA and state non-MSA	Relative wages would be computed from facility-level data aggregated by MSA and state non-MSA, or could be aggregated to hospital-specific areas (e.g. nearest neighbor)		Data are available by MSA and multiple "balance-of state" non-MSA areas; facility-specific data are not available	
Occupation weights	Added as adjustment to hospital-level average wage	Fixed weight (Laspeyres type) based on submitted data by facility type		Fixed weight (Laspeyres type) based on national employment shares by industry sector	

Suggested "Scoring" on Specific Desirable Characteristics

Characteristics to consider and compare	(1) CMS current: IPPS hospital average wage survey (S-3)	(2) CMS option – electronically submitted payroll data, dollars and hours by SOC		(3) BLS option – OES wage surveys	
		(2A) All-Part A providers	(2B) Hospital providers only	(3A) All-employer average wages	(3B) Hospital average wages
Timeliness	4- year lag from reported wage data to applied index	Potentially as little as a 1-year lag if facilities submit payroll data at the end of the calendar year		Data are from 3 to 5 years old when applied to index (due rolling sample method)	
Volatility	Data are unstable year to year due to large numbers of 1- and 2- hospital markets	Likely to be improved over S-3 survey data, because more providers are contributing data to any given market	Some improvement over S-3 if data are collected from all hospitals rather than IPPS only, but still suffers from small numbers within many markets	Found to be less volatile in testing; likely due to rolling sample method and all-employer data	The sample sizes for hospital- only respondents are likely to be too small for stability
Reporting burden (to providers)	Annual S-3 and tri-annual occupation mix surveys have many exceptions, and often require manual input	One-time burden on providers to load OES occupation categories; after that reporting is a once/year electronic file with individual employee hours and pay or summed by OES group		No added burden to hospitals	
Data completeness, hourly wages	All IPPS providers submit data, and nearly all submit the occupation mix survey	Assuming all providers would be required to submit data for complete payroll		Depends on the level of detail for the chosen occupation codes; many areas show missing data in many SOC codes that will require imputation a hospital-specific version would have more missing data than all-industry	
Data accuracy, hourly wages	CMS reviews and sends out data for extra provider review, and allows all providers to see other provider submissions.	Data would be tied to a payroll system which is already heavily reviewed and audited.		Accurate for large "cells" but subject to sampling error, with some large standard errors in smaller markets and/or less common occupations; hospital-specific estimates have larger standard errors than all-	

				industry estimates. There is some concern over the inability to account for part-time versus full-time employment	
Data completeness, other compensation	Survey has lines for adding benefits including payroll taxes, health benefits, and pension costs, but there is no requirement to use them; survey does not capture variations in paid time off	Payroll tax-related benefits can be added as percentages and/or taxable benefits reported to the IRS could be added, but complete benefit data would still have to be provided through a residual S-3 survey, or coded as an add-on to the annual file		Payroll tax-related benefits can be added as percentages and/or taxable benefits reported to the IRS could be added, but complete benefit data would still have to be provided through other BLS regional data or on a residual S-3 survey	
Data accuracy, other compensation	Survey has instructions for adding other forms of compensation; probably some difficulties in measuring pension costs; benefits may not be as accurate as hourly wages	Depends on alternative source		Depends on alternative source	
Data provider specificity	Data represent IPPS hospitals only but are used for other hospitals, SNFs, and HHAs (Note: surveys exist for other providers but are not used)	Data would come from the specific industry, and be weighted by labor shares for that industry	Data still would not reflect prices for other Part A providers	Data would come from all-industry wages, but could be weighted by labor shares for each specific industry	Data still would not reflect prices for other Part A providers
Representative of the entire labor market	Most health care occupations Some non-health care occupations	Most health care occupations Some non-health care occupations		Most all occupations	Most health care occupations Some non-health care occupations
Contract labor costs included?	Yes	No, unless on additional survey		No	

Adjustment for occupation mix differences	Separate study required, and the survey covers only nursing mix differences	Fixed occupation weights can be derived from submitted data		Fixed occupation weights are available from NAICS-specific national data	
Minimizing circularity and sensitivity to individual reporting anomalies	A large number of labor markets have only 1 or 2 contributing providers	Most areas have multiple providers of some level	A large number of labor markets will still have only a few contributing hospitals	All-industry sampling should eliminate the problem, except in very small labor markets	Smaller labor markets will still have few contributing hospitals
Auditability	Subject to annual review by MACs and audit if requested by CMS	Payroll data subject to review by multiple public agencies, and can be reviewed or audited by MAC if requested by CMS		Only by BLS staff (not available to stakeholders)	
Transparency	Average wage data by provider is made available to all providers	Provider-level wages by SOC code probably not considered public data, but average occupation-adjusted wage by provider could still be released for provider review		Sampling is reviewed by BLS staff, but data cannot be audited by providers or by CMS; missing data issues are also likely to create confusion each year	
Administrative burden to CMS	Current surveys are time consuming; reviews, audits and appeals are numerous	After a one-time investment in coding for fixed-weight indices, the collection and review of data should be manageable; depends in part on the remaining exception processes and/or smoothing techniques		No data collection or auditing burden, and a moderate amount of analysis depending on the remaining exception and/or smoothing techniques	
Flexibility in defining and/or smoothing wage markets	Yes; access to firm-level data	Yes; access to firm-level data		Data only available at MSA/ balance-of-state levels, which provide limited opportunity for boundary smoothing	

Appendix G

RTI Analysis Data Sources

To assist with the analysis of data accuracy and methodological questions of the current geographic adjusters and to model the impact analysis, the IOM engaged RTI International as consultants to the committee. The RTI analyses presented in the report's tables and figures are primarily computed with CMS and BLS OES data. The CMS data is publically available through the CMS websites.

Please note that many of RTI's computations used data from multiple CMS public access files. BLS data for most areas is publically available on the BLS website. However, to produce wage index values for all areas, BLS computed wage index values from non-publically available data. Researchers may apply to work on site at BLS to validate computations using unpublished data.

HOSPITAL WAGE INDEX DATA SOURCES

The CMS wage index data files encompass files for market and provider-level hourly wages, occupation mix adjustments, reclassifications and other adjustment files, outmigration data, and actual wage index data. The term "CMS FY 2011 IPPS files," used in table source notes, encompass these wage index files, plus the Impact File, DRG files, case mix index files, and standardizing file, among other files. The CMS files used in the report analyses can be found at:

Centers for Medicare and Medicaid Services. FY 2011 Final Rule Data Files. http://www.cms.gov/AcuteInpatientPPS/IPPS2011/itemdetail.asp?filterType=none&filterByDID=-99&sortByDID=1&sortOrder=ascending&itemID=CMS1237932&intNumPerPage=10

The occupational mix data on hospitals was obtained from the BLS OES.

Bureau of Labor Statistics. Occupational employment statistics: May 2009 national industry-specific occupational employment and wage estimates, NAICS 622000 - Hospitals. http://www.bls.gov/oes/current/naics3_622000.htm

Data on national hourly wage by health sector was obtained from BLS OES.

Bureau of Labor Statistics. Occupational employment statistics: May 2009 national industry-specific occupational employment and wage estimates, Sector 62 -Health care and Social Assistance. http://www.bls.gov/oes/current/naics2_62.htm#29-0000

GEOGRAPHIC PRACTICE COST INDEX DATA SOURCES

The 2010 current locality GAFs incorporating congressionally mandated floors for the work and practice expense GPCIs were obtained from Addendum D (pages 40643-5) of the Proposed Rule.

> Centers for Medicare and Medicaid Services. Addendum D: Proposed FY 2011 Geographic Adjustment Factors (GAFs). Federal Register 75 (133): 40643-40645. http://frwebgate1.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=uidDw6/0/2/0&WAISaction=retrieve

The 2012 current locality GAFs incorporating congressionally mandated floors for the Frontier States were obtained from CMS.

> Centers for Medicare and Medicaid Services. Addendum E: Final CY 2011 Geographic Practice Cost Indices (GPCIs) by State and Medicare Locality. Federal Register 75 (228): 73817-73819. http://frwebgate1.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=PmHLJ6/5/2/0&WAISaction=retrieve

The county-level, locality-level, and MSA actual GAFs were derived from county-level 2012 fully-transitioned GPCIs that were calculated by CMS and Acumen.

> Centers for Medicare and Medicaid Services. Physician Fee Schedule: Federal Regulation Notices, 6th GPCI Update County Data File. http://www.cms.gov/PhysicianFeeSched/PFSFRN/itemdetail.asp?itemID=CMS1240932

> O'Brien-Strain, Margaret, West Addison, Nick Theobald. Preliminary Report on the Sixth Update of the Geographic Practice Cost Index for the Medicare Physician Fee Schedule. June 2010. http://www.cms.gov/PhysicianFeeSched/downloads/GPCI_Report.pdf

The occupational mix data on physician offices was obtained from the BLS OES.

> Bureau of Labor Statistics. Occupational employment statistics: May 2009 national industry-specific occupational employment and wage estimates, NAICS 621100 - Offices of Physicians. http://www.bls.gov/oes/current/naics4_621100.htm

Appendix H

S-3 Worksheet

04-05 FORM CMS-2552-96 3690 (Cont.)

HOSPITAL AND HOSPITAL HEALTH CARE COMPLEX STATISTICAL DATA | PROVIDER NO.: _____ | PERIOD FROM _____ TO _____ | WORKSHEET S-3, PART I

	Component	No. of Beds	Bed Days Available	I/P Days / O/P Visits / Trips								Interns & Residents FTEs			Full Time Equivalent		Discharges				
						Title XIX															
				Title V	Title XVIII	Total Title XIX	Obs. Beds Admitted	Obs. Beds Not Adm	Total All Patients	Obs. Beds Admitted	Obs. Beds Not Adm	Total	Less I & R Replacing Non-Phys. Anesthetists	Net	Employees On Payroll	Nonpaid Workers	Title V	Title XVIII	Title XIX	Total All Patients	
		1	2	3	4	5	5.01	5.02	6	6.01	602	7	8	9	10	11	12	13	14	15	
1	Hospital Adults & Peds. (columns 3, 4, 5 and 6, exclude Swing Bed, Observation Bed and Hospice days)																				1
2	HMO																				2
3	Hospital Adults & Peds. Swing Bed SNF																				3
4	Hospital Adults & Peds. Swing Bed NF																				4
5	Total Adults and Peds. (exclude observation beds) (see instructions)																				5
6	Intensive Care Unit																				6
7	Coronary Care Unit																				7
8	Burn Intensive Care Unit																				8
9	Surgical Intensive Care Unit																				9
10	Other Special Care																				10
11	Nursery																				11
12	Total (see instructions)																				12
13	RPCH\CAH visits																				13
14	Subprovider																				14
15	Skilled Nursing Facility																				15
16	Nursing Facility																				16
17	Other Long Term Care																				17
18	Home Health Agency																				18
20	ASC (Distinct Part)																				20
21	Hospice (Distinct Part)																				21
23	Outpatient Rehab. Provider (specify)																				23
24	RHC/FQHC (specify)																				24
25	Total (sum of lines 12-24)																				25
26	Observation Bed Days																				26
27	Ambulance Trips																				27
28	Employee discount days (see instru.)																				28

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3690 (Cont.) FORM CMS-2552-96 04-05

HOSPITAL WAGE INDEX INFORMATION	PROVIDER NO.: _____	PERIOD: FROM _____ TO _____	WORKSHEET S-3, PART II

PART II - WAGE DATA

		Amount Reported	Reclass. of Salaries (from Wkst. A-6)	Adjusted Salaries (col. 1 ± col. 2)	Paid Hours Related to Salaries in col. 3	Average Hourly Wage (col. 3 ÷ col. 4)	Data Source	
		1	2	3	4	5	6	
	SALARIES							
1	Total salaries (see instructions)							1
2	Non-physician anesthetist Part A							2
3	Non-physician anesthetist Part B							3
4	Physician-Part A							4
4.01	Teaching physician salaries (see instructions)							4.01
5	Physician-Part B							5
5.01	Non-physician-Part B							5.01
6	Interns & residents (in an approved program)							6
6.01	Contract services, I&R (see instructions)							6.01
7	Home office personnel							7
8	SNF							8
8.01	Excluded area salaries (see instructions)							8.01
	OTHER WAGES & RELATED COSTS							
9	Contract labor (see instructions)							9
9.01	Pharmacy services under contract							9.01
9.02	Laboratory services under contract							9.02
9.03	Management and administrative services							9.03
10	Contract labor: physician-Part A							10
10.01	Teaching physician under contract (see instru.)							10.01
11	Home office salaries & wage-related costs							11
12	Home office: physician Part A							12
12.01	Teaching physician salaries (see instructions)							12.01
	WAGE-RELATED COSTS							
13	Wage-related costs (core)						CMS 339	13
14	Wage-related costs (other)						CMS 339	14
15	Excluded areas						CMS 339	15
16	Non-physician anesthetist Part A						CMS 339	16
17	Non-physician anesthetist Part B						CMS 339	17
18	Physician Part A						CMS 339	18
18.01	Part A teaching physicians (see instructions)						CMS 339	18.01
19	Physician Part B						CMS 339	19
19.01	Wage-related costs (RHC/FQHC)						CMS 339	19.01
20	Interns & residents (in an approved program)						CMS 339	20

FORM CMS-2552-96 (5/2004) (INSTRUCTIONS FOR THIS WORKSHEET ARE PUBLISHED IN CMS PUB. 15-II, SECTION 3605.2)

36-506.2 Rev. 14
06-03 FORM CMS-2552-96 3690 (Cont.)

HOSPITAL WAGE INDEX INFORMATION	PROVIDER NO.: _____	PERIOD: FROM _____ TO _____	WORKSHEET S-3, PART III

PART II - WAGE DATA

		Amount Reported	Reclass. of Salaries (from Wkst. A-6)	Adjusted Salaries (col. 1 ± col. 2)	Paid Hours Related to Salaries in col. 3	Average Hourly Wage (col. 3 ÷ col. 4)	Data Source	
		1	2	3	4	5	6	
	OVERHEAD COSTS - DIRECT SALARIES							
21	Employee Benefits							21
22	Administrative & General							22
22.01	Administrative & General under contract (see inst.)							22.01
23	Maintenance & Repairs							23
24	Operation of Plant							24
25	Laundry & Linen Service							25
26	Housekeeping							26
26.01	Housekeeping under contract (see instructions)							26.01
27	Dietary							27
27.01	Dietary under contract (see instructions)							27.01
28	Cafeteria							28
29	Maintenance of Personnel							29
30	Nursing Administration							30
31	Central Services and Supply							31
32	Pharmacy							32
33	Medical Records & Medical Records Library							33
34	Social Service							34
35	Other General Service							35

PART III - HOSPITAL WAGE INDEX SUMMARY

1	Net salaries (see instructions)							1
2	Excluded area salaries (see instructions)							2
3	Subtotal salaries (line 1 minus line 2)							3
4	Subtotal other wages & related costs (see inst.)							4
5	Subtotal wage-related costs (see inst.)							5
6	Total (sum of lines 3 thru 5)							6
7	Net salaries (see instructions)							7
8	Excluded area salaries							8
9	Subtotal salaries (line 7 minus line 8)							9
10	Subtotal other wages & related costs (see inst.)							10
11	Subtotal wage-related costs (see inst.)							11
12	Total (sum of lines 9 thru 11)							12
13	Total overhead costs (see inst.)							13

Appendix I

Physician Work Adjustment

The current GPCI incorporates a geographic adjustment for the price of physician work. CMS computes the work GPCI using the relative median hourly earnings in 7 non-physician occupations collected as part of the Bureau of Labor Statistics Occupational Employment Series data.

The adjustment is set to 25% of the relative wage differences for each area compared to the national average. Thus, for example, if wages in an area are 8% above the national average, the adjustment factor would be 1 + (25%) (8%) = 1.02. Although the partial adjustment with an inclusion factor of 25% is in law, the committee did not find an explicit scientific or policy basis for the choice of 25% as opposed to any other percentage value. This led the committee to consider normative principles and empirical analyses that might form the basis for the choice of an inclusion factor of 0%, 100%, or some other value. The committee also considered alternatives for the reference group on which the base index of wage differentials should be based.

The argument against any physician work adjustment is based on the view that physicians providing an equivalent service for a federal program should receive the same reimbursement regardless of where they are located: "work is work." According to this view, Medicare's work RVU already takes into account physician work effort, and it takes no more or less effort to provide the same medical service in different areas (AAFP Testimony, 2010). Furthermore, self-employed physicians are more like suppliers than employees and should be paid equivalently for the commodity (health care) that they supply.

A counterargument to this position is that wage rates in the private sector, including the healthcare industry, vary across labor markets. Federal wage rates for a variety of occupations ranging from census workers to highly skilled professionals and managers also vary geographically. Indeed, geographic variation in wages for non-physician health care workers is reflected in the geographic adjustment of hospital and physician office labor expenses. Furthermore, a substantial and growing share of physicians (nearly 50% of new physicians in 2010, according to the MGMA (2010) are employees who must be paid at locally prevalent salary scales, and self-employed physicians should be paid at a rate that allows them to compensate themselves in line with salaries of their local employed colleagues.

Since the objective at this point is to assess the relative costs of equivalent physician labor to practices in different areas, an obvious solution would be to use current mean or median earnings of a group of physicians (or a standardized mix of specialties) to determine the ratios, thus making physicians their own reference group (corresponding to an inclusion factor of 100%). The committee rejected this solution, however, because of the same concerns about circularity that motivated the search for wider reference groups than hospital employees (in

the hospital wage index) and physician office employees (in the practice expense GPCI). Because almost all physicians work in the health care industry, expanding the data source for physician earnings beyond the health care industry would not solve the circularity problem inherent in using physician wages for the work GPCI. Such an approach would incorporate local wage distortions into the wage rate, potentially making it possible for a large practice or group of practices to affect or even manipulate their physician work reimbursement rates within a market.

The committee therefore turned to economic theory for a rationale for a more indirect approach. The economic argument for varying physician compensation across areas is that, in general, compensation varies inversely with the affordability and desirability of an area as a place to live and work; thus, both a lower cost of living and greater availability of amenities (cultural attractions, low crime, and access to outdoor activities, for example) will tend to depress wages. (See the discussion of the theory of compensating wage differentials in Chapters 2 and 5.) Under this theory, wages will adjust so that the marginal physician choosing among locations will be indifferent among high-wage but less desirable options and lower-wage but more desirable options, while those with various preferences off the margin will sort into the locations in the quantities required to satisfy demand.

There is no way to directly assess the relative desirability of areas to physicians. For the reasons given above, the committee prefers not to rely on physicians as the reference group. However, it seems reasonable to assume that other reference groups with similar levels of education and income to physicians and similar degrees of professionalization might have similar location preferences, particularly with regard to the tradeoff between income and amenities. A wage index calculated from such groups might then be used to estimate appropriate payment to physicians. The current GPCI adjustment starts with such an index, calculated from seven professional groups: architecture and engineering; computer, mathematical, life and physical sciences; social science, community and social service, and legal; education, training and library; registered nurse; pharmacists; and art, design, entertainment, sports and media (CMS, 2010).

A limitation of this approach is that different factors might affect wages for physicians and other professional occupations. For example, a physician's skills are geographically nonspecific and highly portable –oncologists or pediatricians who practice in Nashville have much the same skills as their respective counterparts who practice in New York City. But lawyers who practice in New York City include a much higher proportion of employees of large corporations and investment banks, and differences between median incomes of lawyers in these cities reflect this difference in professional mix within the occupation as well as the amenities and cost of living differences between cities. Similarly, teachers' wages are affected by factors such as local school funding policies and unionization which are not relevant to physicians.

On the other hand, amenities that might be attractive to some physicians, such as the opportunity to do research or teach in an academic medical center, are not relevant to other occupations. Such considerations suggest a partial adjustment since the reference index would be partially but not perfectly indicative of appropriate wages for physicians; the current 25% adjustment might thus be justified in general principle, although there is little empirical basis for the choice of this specific number over any other value between 0% and 100%.

Empirically, we might expect that if the amenities and cost of living common to physicians and other professional occupations played a predominant role in determining compensation, the incomes of physicians and the reference occupations would be highly correlated across areas; this finding would support heavily weighting the reference-group incomes in determining a physician work adjustment. Conversely, a low correlation would suggest that the reference groups are poor proxies for factors affecting physicians and relatively little weight should be given to their wage index.

This theoretical approach can be implemented through regression modeling. (The method described herein extends that of Gillis (1993) by estimating both the inclusion factor and the combination of occupational indices.) The data required for this model would be median physician wages (per RVU, to remove the effects of different work hours and specialty mixes) and median wages for the various reference occupations, each by MSA or statewide non-MSA. (Data for *employees* in each group would be preferable, to exclude the entrepreneurial return obtained by the self-employed in their role as owners of a business.)

First, the MSA medians would be normalized for each occupation to obtain an index value by dividing each by the corresponding national mean of medians (weighted by physician population in the MSA). Then the raw physician index would be regressed on all of the reference occupation indices in a multivariate linear regression; the predictions under this model would become the new physician work adjustment factors. (By construction, this index would be 1 in an MSA in which all of the reference indexes are also 1, that is, an area with average wages for all occupations, and its weighted mean would also be 1.) This procedure would simultaneously form the combination of reference occupations that best predicts physician compensation (while excluding effects unique to physicians), and determine the weight to be given to this combination in determining the physician adjustment. Alternatively, the budget neutrality adjustment could be viewed as external to the model, in which case the statistical model would not be constrained to 1. This approach might improve the accuracy of the indexes; in this case, the budget neutrality adjustments would be performed afterwards.

The amount of variation in the predicted work adjustment in this model would implicitly take into account the observed amount of variation in physician compensation across payment areas (which might be different from that for the reference occupations) and also how well the reference population compensation predicts physician compensation, summarized by the correlation coefficient between the predictions and the raw physician index. Even with the best available choice of reference occupations, a low correlation such as .25, which is the same level as the adjustment currently used, would be an indication that the factors determining physician wages are too distinctive to be adequately captured by this methodology; in that case, a direct comparison of physician salary data from a variety of sources, such as MGMA or ACS, might be the best available option. Another possibility might be to use an F-statistic ($p < .05$) to test the null hypothesis that the correlation between the geographic salary differentials for physicians and other occupations is zero, then using the model if the null hypothesis were rejected.

The relationship between the regression coefficients and the inclusion factor (now 25%) can be clarified by a simple reparametrization of the regression equation. The present procedure is represented by formula of the form $W = 1 + C(P - 1)$, where *W* is the final physician work index, *C* is the inclusion factor, and *P* is the reference (proxy) compensation

index. Suppose the regression prediction is $\hat{y} = \beta_0 + \sum_{k=1}^{K} \beta_k x_k$, where x_k is the wage index for reference profession *k*. This can be rewritten as $\hat{y} = \alpha_0 + \alpha^* \sum_{k=1}^{K} \alpha_k x_k$, where $\alpha^* = \sum_{k=1}^{K} \beta_k$ and $\alpha_k = \beta_k / \alpha^*$, so $\sum_{k=1}^{K} \alpha_k x_k$ is a weighted average of the proxy indices, corresponding to *P* in the current method. Then α^* is the multiplier *C* corresponding to the current 25%.