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Indirect Medical Education and Disproportionate Share Adjustments to Medicare Inpatient Payment Rates

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Abstract

The indirect medical education (IME) and disproportionate share hospital (DSH) adjustments to Medicare's prospective payment rates for inpatient services are generally intended to compensate hospitals for patient care costs related to teaching activities and care of low income populations. These adjustments were originally established based on the statistical relationships between IME and DSH and hospital costs. Due to a variety of policy considerations, the legislated levels of these adjustments may have deviated over time from these "empirically justified levels," or simply, "empirical levels." In this paper, we estimate the empirical levels of IME and DSH using 2006 hospital data and 2009 Medicare final payment rules.

Our analyses suggest that the empirical level for IME would be much smaller than under current law—about one-third to one-half. Our analyses also support the DSH adjustment prescribed by the Affordable Care Act of 2010 (ACA)—about one-quarter of the pre-ACA level. For IME, the estimates imply an increase in costs of 1.88% for each 10% increase in teaching intensity. For DSH, the estimates imply that costs would rise by 0.52% for each 10% increase in the low-income patient share for large urban hospitals.

Keywords: Medicare inpatient prospective payment system, Disproportionate Share Adjustment (DSH), Indirect Medical Education adjustment (IME), Empirically determined level of adjustment, Hospital cost functions, Medicare Payment Policy, Physician training.

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Introduction

The indirect medical education (IME) and disproportionate share (DSH) adjustments are important determinants of payments to hospitals under Medicare's prospective payment system for inpatient services (inpatient prospective payment system or IPPS). Implemented in fiscal years 1984 and 1986 respectively, these adjustments account for approximately $17 billion ($10.8 billion for DSH and $6.3 billion for IME) or over 12% of Medicare payments for inpatient care in 2010 (Congressional Budget Office (CBO), 2011). Both adjustments have been modified several times in the ensuing years. Most recently, the Affordable Care Act (ACA) required significant reductions to the DSH adjustment. For several reasons, it is important at the current time to evaluate the policy and empirical underpinnings of these adjustments.

When enacted, the IME and DSH adjustments were empirically determined, that is, estimated on the basis of statistical analysis of actual costs. Since the IPPS is based on averages of hospital costs, there was initial concern that teaching and disproportionate share hospitals would be unfairly disadvantaged under the new payment system. Indeed, statistical analyses suggested that greater teaching intensity and the larger share of low income patients were significantly associated with higher costs per Medicare discharge (DHHS, 1982 & 1986; Anderson & Lave, 1986; Thorpe, 1988). Over the past 27 years, there have been substantial changes in the hospital industry and in key IPPS payment factors. These changes, such as the implementation of the MS-DRG, may have substantially changed the statistical relationships upon which IME and DSH were originally based.

In addition, prior to ACA, the Congress had modified the DSH formula several times in ways that led many to reinterpret the policy rationale for DSH as providing financial assistance to safety net hospitals—those providing a disproportionate share of uncompensated patient care. The ACA seemingly restored the original empirical basis of the DSH adjustment. On the other hand, the IME adjustment remains higher than the empirical level, thus deviating from its original rationale of recognizing legitimate variations in cost per Medicare discharge to providing funds for certain socially beneficial functions of particular hospitals. In addition, the recent policy emphasis on increasing the supply of primary care physicians has resulted in proposals to use a portion of the IME payments for encouraging medical schools to focus on primary care training.

In this paper, we reevaluate the statistical basis of the IME and DSH adjustments using more recent hospital data. The new estimates may provide policy makers with useful information for validating the DSH adjustment under ACA, as well as examining options for modifying the IME adjustment and using the fund for other purposes, such as funding the training of primary care physicians. The paper presents a brief overview of how Medicare pays hospitals for their operating costs under IPPS, especially how Medicare has established the IME payments for teaching hospitals and DSH payments for hospitals that serve a large share of low income patients. Following a discussion of the new estimates based on the latest data, we then discuss the potential implications for Medicare payment policies based on the analyses.

Background

Medicare Payment

Medicare, administered by the Centers for Medicare & Medicaid Services (CMS) of the U.S. Department of Health and Human Services (HHS), pays acute care hospitals for their inpatient services using a prospectively determined payment for each discharge (hence, IPPS). The payment for each discharge is based on a national rate—a standardized payment amount multiplied by a weight, which reflects the relative resources needed to treat an average patient within each clinical category, called the diagnosis related group (DRG).

Medicare allows several adjustments to the national DRG prices based on what are considered legitimate sources of cost variation. These are cost variations beyond each hospital's control and include an index to reflect local wage levels for hospital labor, an index to reflect higher costs of living (COLA) in Alaska and Hawaii, and a payment add-on for being a teaching hospital (indirect medical education or IME), for providing a disproportionate share of care to low income patients (disproportionate share hospital or DSH), or for treating cases with extraordinary costs (outliers). Special provisions exist if a hospital qualifies as a sole community hospital (SCH), Medicare dependent hospital (MDH), or rural referral center (RRC).

Medicare payment for indirect medical education (IME)

Medicare divides the higher costs of teaching hospitals associated with the training of interns and residents into direct and indirect costs. The direct costs of graduate medical education (GME) include salaries paid to interns, residents, and teaching physicians; the costs of teaching materials, classrooms, conferences, and other overhead costs. Medicare reimburses teaching hospitals for the costs of GME on a cost per resident basis. Indirect medical education (IME) costs, on the other hand, are additional patient care costs associated with the training of interns and residents.[1] While Medicare has reimbursed for direct GME costs from its inception, the IME adjustment was established with the IPPS in 1983. Over 1,000 teaching hospitals receive IME payments, estimated at $6.3 billion for 2010 (CBO, 2011). This additional payment, computed as a percentage add-on for each case paid under IPPS, was authorized by Congress in Section 1886(d)(5)(B) of the Social Security Act to reflect the higher patient care costs of teaching hospitals relative to non-teaching hospitals.

While the direct costs of GME are computed from the hospitals' accounting records, the indirect costs of IME are estimated statistically. In December 1982, in the Report to Congress on establishing the IPPS for Medicare hospital payment, the Secretary of Health and Human Services estimated that Medicare inpatient operating cost per case increased approximately 5.79% with each 10% increase in the number of interns and residents per hospital bed (IRB).

Subsequently, CBO estimated that 71% of teaching hospitals would have been adversely affected if the IME adjustment were set at 5.79%. The Administration proposed, and Congress agreed, to double the adjustment to 11.59% for each 10% increase in the IRB.

Over time, the original adjustment of 11.59% was reduced to 8.7% in 1986, and then reduced further to 8.1% to partly finance the disproportionate share (DSH) adjustment established in that year. With enactment of the Omnibus Budget Reconciliation Act of 1987 (P.L. 100-203), the IME adjustment remained at 7.7% from October 1, 1988 until October 1, 1997. The Balanced Budget Act (BBA) of 1997 (P.L. 105-33) reduced the IME percentage add-on from 7.7% in FY 1997 to 7.0% in FY 1998 and 6.5% in FY 1999. The Balanced Budget Refinement Act (BBRA) of 1999 (P.L. 106-113) and Beneficiary Improvement and Protection Act (BIPA) of 2000 (P.L. 106-554) maintained the IME adjustment at 6.5% in FYs 2000, 2001, and 2002 before reducing it to 5.5% in FY 2003 and thereafter. Subsequently, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA or P.L. 108-173) increased the Medicare Indirect Medical Education (IME) adjustment from 5.5% to 6.0% on April 1, 2004; 5.8% in FY 2005; and 5.55% in FY 2006. In FY 2007, IME payments were reduced to 5.35% and set at 5.5% in FY 2008 and beyond.

The additional payment for the operating cost of indirect teaching, the IME adjustment, is calculated as a percentage add-on to the basic DRG payment.[2] This percentage add-on, called the IME adjustment factor, is computed using a hospital's ratio of interns and residents to beds (IRB) denoted by (r), and a multiplier set by Congress (c), in the following equation:

$$\text{IME adjustment factor} = c * [(1 + r)^{0.405} - 1].^{3}$

The exponent, 0.405, represents the estimated impact of teaching intensity on cost per discharge, while, the multiplier, c, reflects a policy "target" to assure that teaching hospitals receive adequate payment under the national prospective rates.[4] The multiplier has either been chosen based on "payment" specifications of these regressions, or based on other policy and budgetary considerations.

Indeed, the IME adjustment has always been set higher than the "empirical level," which is the estimated independent effect of teaching on the hospitals' cost per case. Recently, in its March 2007 Report to Congress, the Medicare Payment Advisory Commission (MedPAC) found that the IME empirical level based on 2004 data is 2.2% for each 10% increase in teaching intensity, less than half the IME adjustment under current law (MedPAC, 2007). We find that the adjustment is even lower using 2006 data.

Medicare payment for disproportionate share hospital (DSH)

Over 2,500 hospitals receive disproportionate share hospital (DSH) payments, estimated at $10.5 billion for FY 2010 (CBO, 2011). Following the passage of the Consolidated Omnibus Reconciliation Act of 1985 (COBRA) (P.L. 99-272), additional payment for hospitals that serve a large share of low-income patients, the so-called DSH adjustment, was established.[5] The creation of the DSH adjustment was budget neutral; its funding was obtained by lowering the basic DRG rate paid to all hospitals, and by decreasing the level of the indirect medical education (IME) adjustment by 0.6 of a percentage point (from 8.7% to 8.1%) in recognition that teaching hospitals would receive a large proportion of DSH payments.

The original rationale for the DSH adjustment was to compensate hospitals for the higher operating costs they incur in treating a large share of low-income patients. Over time, the rationale for the DSH adjustment has been broadened to become “preserving access to care for Medicare and low-income populations by financially assisting the hospitals that serve them”, thus, allowing continuous increases in DSH payments, despite newer evidence suggesting a weakening statistical relationship between treating low-income patients and a hospital’s cost per case (MedPAC, 2007).

The empirical effect of DSH on cost per case has evolved over time. Initial studies conducted by CMS (formerly the Health Care Financing Administration, HCFA) and by the Congressional Budget Office in the mid-1980s and early 1990s, tended to show that serving the poor is associated with higher costs only in urban hospitals, especially in those with more than 100 beds. Congress decided to extend the DSH adjustment estimated for large urban hospitals to all other hospitals as well. From 1987 to 2004, DSH payments grew from 1.9% to 9.9% of DRG payments (MedPAC, 2007). DSH payments rose further to 10.5% of DRG payments in 2006 according to our analyses.[6]

The DSH adjustment is calculated as a percentage add-on to the basic DRG payment. Specifically, computing the DSH payment (with all percentages expressed in decimals), involves two steps: determining the DSH patient percentage, then computing the payment adjustment based on the DSH patient percentage:

1. The DSH patient percentage (DPP) is the sum of the percentage of Medicare Supplemental Security Income (SSI) days divided by Medicare days, and Medicaid days divided by total patient days:
   DSH patient percentage = (Medicare SSI days/Total Medicare days) + (Medicaid, non-Medicare days/Total patient days).
2. The DSH adjustment (add-on payment as percent of DRG payment and expressed in decimals) is computed as in the following example:
   - If DSH patient percentage is between 0.15 and 0.202, then:
     DSH adjustment = 0.025 + (0.65)*(DSH patient percentage – 0.15);
   - If DSH patient percentage is equal to or greater than 0.202, then:
     DSH adjustment = 0.0588 + (0.825)*(DSH patient percentage – 0.202).

All hospitals receiving DSH payments are subject to the 12% cap (DSH adjustment cannot exceed 0.12), except for urban hospitals with more than 100 acute care beds, rural hospitals with more than 500 acute care beds, rural referral centers and, effective for discharges occurring on or after October 1, 2006, Medicare-dependent hospitals. A handful of hospitals—for which 30% of net patient revenues (excluding Medicare and Medicaid) come from state and local government subsidies—are paid a DSH adjustment of 0.35.

MedPAC in 2007 found that a 10% increment in DSH patient percentage would increase Medicare cost per case by about 0.4% based on 2004 data (MedPAC, 2007). This finding was the basis for the DSH adjustment prescribed in ACA.

MedPAC's empirical level was about one-fourth to one-fifth the current payment level. In fact, the current DSH adjustment increases payment by 1.8% for a 10% increase in the DSH patient percentage. The case-weighted average DSH patient percentage is 0.25; therefore, a hospital with 0.25 DSH patient percentage will receive an add-on payment of 0.0588 + (0.825)*(0.25 – 0.202) = 0.098 = 10%, or $1.10 in total payment (base rate + DSH) for every $1 in the base rate. A 10% increase in the DSH patient percentage (1.1*0.25 = 0.275) would yield a DSH adjustment of 0.0588 + (0.825)*(0.275 – 0.202) = 0.119 = 12%, or $1.12 in total payment (base rate + DSH) for every $1 in the base rate. Therefore, the 10% increase in the DSH patient percentage raises payment by (1.12-1.1)/1.1 = 1.8% under current law until 2014.

With the 2006 data, we find the DSH impact to be comparable to MedPAC's findings for all hospitals.

Methodology and Data

Hospital Cost Functions

In this paper, we continue the accepted practice of applying multivariate analysis to estimate the impact of IME and DSH on the Medicare inpatient operating cost per discharge. Specifically, we estimate the so-called behavioral model, a commonly adopted approach to examining hospital costs (Evans, 1971; Lave, 1985; Sloan, Feldman, & Steinwald, 1983; Thorpe, 1988). In the literature, a distinction is often made between "technical" and "behavioral" hospital cost functions. Unlike "technical" cost functions that require strict assumptions concerning profit maximization or cost minimization, behavioral cost functions assumes that hospitals pursue multiple objectives other than profit maximization—for example, providing a variety of services and functions to the communities they serve (Lave & Lave, 1984; Dalton, Norton, & Kilpatrick, 2001).

Fully specified Models vs. Payment Models

Anderson & Lave (1986) and Sheingold (1990) described two approaches for establishing prospective payment rates or rate adjustments using hospital cost functions. The first would be a fully specified model in which all measurable factors consistent with the underlying theoretical structure are included in the estimating equation. The second method is to estimate a "payment model," which only includes those factors that are used in setting the prospective rates. Using this approach, the effects on costs of factors not recognized in rate setting are allowed to "load" on to the estimated impact of the payment variables of interest. [7]

Accordingly, we categorize the set of explanatory variables in two groups: (a) the Medicare payment variables; and (b) all other explanatory variables. The payment variables include the types and complexity of patient care measured by the MS-DRG case mix, the prices the hospital must pay for its factors of production (measured by the hospital wage index and COLAs), the level of its teaching intensity (IRB), the share of patients that are of low income status (DSH patient percentage), and the payment for extraordinary costly cases (known as outlier payments). The other explanatory variables include the scale of the hospital's operation, the quality of services, regional binary variables, and the market structure and extent of competition in the area in which the hospital operates.

A fully specified behavioral cost regression equation is the Medicare Operating Cost (MOC) = function of (payment variables, other explanatory variables); while a payment model would simply be the MOC = function of (payment variables); where MOC is the Medicare operating cost per discharge net of the direct costs attributable to teaching, research, and pass-through such as organ acquisition costs.

The explained variable and most payment variables are in natural log form; therefore, the coefficient estimates are interpreted as elasticities. The log functional form is chosen to reflect the fact that the relationship of the Medicare payment variables to the standardized amount is multiplicative and that the explained variable, MOC, is better described by a log-normal distribution. Binary variables (such as indicators of whether the hospital is a rural referral center, Medicare dependent, sole community, etc.) are also represented on the right-hand-side of the regression.[8]

The two key payment variables of this study are the IME represented by the interns-and-residents-to-beds ratio (IRB), an indicator of the size of the medical education program, and DSH represented by the DSH patient percentage, an indicator of the load of indigent care. The change in MOC attributable to a change in IME (dMOC/dIME) described by the coefficient estimate of IME is the indirect cost of graduate medical education. Similarly, the coefficient estimate of DSH (dMOC/dDSH) represents the impact of DSH on Medicare cost.

All analyses are weighted by each hospital's discharges so that the estimated impacts would reflect better the impacts on Medicare costs as they relate to payment differences because, since 1988, the standardized amounts were calculated as discharge-weighted averages of hospital costs. Thus, weighted regressions would be more appropriate to estimate variations in standardized costs (Sheingold, 1990).

Restricted vs. Unrestricted Models

Another issue when estimating IME and DSH effects is whether the coefficients for some of the payment variables should be restricted to their payment values; specifically, for the case mix effect to be held at 1 and for the wage effect to be restricted to approximately 0.6. In an unrestricted regression, the coefficients for these variables are left to be estimated by the regression and, therefore, may differ from their payment values and affect the estimated IME and DSH coefficients in a manner that differs from the intent of using a payment model. In a restricted regression, the coefficients for these variables are held at their IPPS payment values, usually by standardizing the dependent variable (operating cost per case), by the case mix and wage index, in the same way the standardized cost per case is calculated to determine the system's payment rates. The latter method has the advantage of both restricting the effects of case mix and wage index to 1 and 0.6 respectively, and representing the dependent variable in a way that's more consistent with the IPPS's base prices—the standardized amounts.[9]

The choices described above can result in significant variation in the estimated IME and DSH impacts as displayed in Table 1. The Table presents past estimates using the different specifications starting with the original estimation by HCFA in 1982. Models 1-4 represent the unrestricted payment model, model 5 the restricted payment model, model 6 a fully specified restricted model, and model 7 the restricted payment model with more recent data. Model 1, the original HCFA regression, estimates the coefficient of IME to be 0.579. This means that a 10% increase in (1+IRB) is associated with a cost increase of 5.79%. Models 2 and 3 exclude bed size as an explanatory variable (since Medicare does not pay differently for larger capacity) and estimate the IME at about 0.8. The larger estimate reflects the fact that the impact of the excluded bed size variable is loaded on the IME coefficient as teaching hospitals tend to be larger than non-teaching hospitals. Models 4 and 5 added the DSH variables as controls; consequently, the coefficient of IME is lower (suggesting certain correlations between the DSH and IME variables that were picked up by the IME variable when the DSH variables were not controlled for). Adding even more controlling factors in the fully specified model, 6 reduces further the estimated impact of IME. MedPAC's recently published work in 7, based on 2004 data, implies that the IME estimate is trending downward over time.

Table 1. Historical Estimated Impact of IME & DSH on Medicare Operating Costs Per Case

	Payment Model Unrestricted[1]				Restricted[2]	Full Model Restricted[4]	Payment Model Restricted
Explanatory variables[1]	HCFA, 1982 [1]	Anderson Lave 1986 [2]	Sheingold 1990 [3]	Sheingold 1990 [4]	Sheingol d 1990 [5]	Sheingold 1990 [6]	Medpac 2006 [7]
IME: log (intern-resident to bed ratio+1)	0.579 *	0.810	0.829 *	0.719 *	0.550 *	0.310 *	0.022 *[6]
DSH (Medicaid & SSI) patient percentage				0.149 *	[3]		0.040 *
log case mix: MS-DRG & Cost-based	1.011 *	1.510	1.520 *	1.239 *			
log wage index	1.022 *	1.160	1.180 *	0.949 *			
log bed size	0.119 *						
Location variables	[5]	[5]	[5] *	[5] *			
Adjusted R-square	67%	75%	65%	66%		19%	

[1] The dependent variable is the natural log of Medicare operating cost per discharge

[2] The dependent variable in the restricted model is cost per discharge standardized for case mix, wages, and outlier payment. This regression is weighted by discharges.

[3] The coefficients of the low income patient share variables are restricted to duplicate the payment value for each hospital.

[4] The restricted regression is weighted by discharges; the independent variables do not include DSH but have population characteristics, etc.

[5] Location variables include small, medium, large cities in HCFA, urban in Anderson and Lave, urban in Sheingold.

[6] Empirical level of teaching drops from 2.2 to 1.7 percent when accounting for low-income patient share effect in urban hospitals over 100 beds

* Significant at 1%

Source: Assistant Secretary for Planning and Evaluation's (ASPE) analysis of The Medicare Hospital Cost Reports 2006, the Payment Impact File for Final Rules FY 2009, and other DHHS data.

Data and Variables

The data for the study come from various sources. The main source of data for hospital costs, discharges, and other hospital characteristics is the Medicare Cost Reports for 2006. Although Medicare pays hospitals both for their operating and capital costs, the analysis focuses on only operating costs since Medicare payment for operating costs accounts for over 90% of Medicare inpatient payment.[10]

All payment related variables come from the impact file reflecting the final rules for FY 2009. The impact file provides data on the hospital location (region, state, county, urban, rural, geographic labor market area), wage index and wage adjustment, cost of living adjustments for hospitals in Hawaii and Alaska, the ratio of interns and residents to beds, the disproportionate share patient percentage, and the outlier payment percentage of operating IPPS payment for 3,619 hospitals in the 2009 final rule. For the analysis, we use the case mix index computed with the grouper version 25 on the Medicare Provider Analysis and Review (MEDPAR) File 2006.[11] CMS computes this case mix index using the new MS-DRG and costs (instead of charges) for the DRG weights. We supplemented our data on hospital characteristics with the 2006 Provider Specific and Provider of Services Files.[12]

From these primary data, we compute certain variables for the analysis. The level of hospital market concentration is measured by the Herfindahl-Hirschman index (HHI) based on bed size in the hospital referral region. An HHI value of 0 indicates a perfectly competitive market and a value of 1 indicates a monopoly.

Our measure of teaching intensity is the continuous variable IRB ratio, a widely adopted measure in the literature. Because IRB can be zero, adding one is common practice to transform the variable when used in a log linear function and, for administrative simplicity, the estimated coefficient is interpreted as an elasticity or as the percentage increase in costs for each 10% or 0.1 increase in the IRB (Pettengill & Vertrees 1982). Much debate has arisen about this interpretation of the estimated coefficient (Anderson & Lave, 1986; Thorpe, 1988). We believe that, while the estimated coefficient of (IRB+1), which is dln(MOC)/dln(IRB+1), is an elasticity, the correct interpretation should be the percentage increase in costs for each 10% increase in the (IRB+1), rather than just IRB. As an example, a change in IRB from 0.10 to 0.21 is equivalent to a 110% increase in IRB, but only 10% in (IRB+1).

The DSH patient percentage (entered in natural units rather than in natural logarithms) measures the extent of care provided to low income patients. Since the DSH patient percentage is already in percent form, the estimated coefficient, dln(MOC)/dDSH, can be interpreted as the increase in costs for each 10 point increase in the DSH patient percentage.

Results

The regression results for both payment and fully specified models are displayed in Table 2. Each set of payment and fully specified models is estimated separately in unrestricted (log of the operating cost per case is the dependent variable) and restricted (dependent variable is the log of the standardized cost per case net of outlier payments) form, and for large (100 or more beds) urban hospitals as well as for all hospitals.

The results in Table 2 point to an IME effect substantially smaller than the adjustment in current law. Our estimated IME effect ranges from 0.81% to 1.88% for each 10% increase in (IRB+1).[13] As in the past, there has been a policy preference for using restricted payment model estimates (model 3) for the empirical level of IME. Incidentally, the IME effect of 1.88% is also the largest, hence most conservative, estimate among the various models.

On the other hand, the estimated DSH effect is small, even negative, or statistically insignificant. The unrestricted models (1 and 2) imply an effect of approximately a 0.5 percent increase in costs for each ten percentage point increase in the DSH variable. The payment models (3 and 5) show small and insignificant DSH effect when estimating with all hospitals, but large and significant effect for large urban hospitals (a 0.52 percent increase in costs for each ten percentage point increase in the DSH variable).

Aside from the IME and DSH results, there are other interesting outcomes from the fully specified regressions on all hospitals presented in Table 2 (models 2 and 4):

(1) For-profit hospitals tend to have lower costs than non-profit hospitals, and both have lower costs than public hospitals (controlling for everything else).

(2) Hospitals in less concentrated markets (i.e., more competition) do not necessarily have lower costs (in fact, the data suggest the opposite, that is, less competition or higher concentration is associated with lower costs, although this relationship is not always significant).

Table 2. Impact of Teaching and Indigent Care on Cost and Standardized Cost, 2006 Comparing Payment Model to Fully Specified Model

	All Hospitals								Large Urban Hospitals[1]			
	Operating Cost Per Case				Standardized Cost Per Case[2]				Standardized Cost Per Case[2]			
Explanatory variables	Payment [1]		Full Model [2]		Payment [3]		Full Model [4]		Payment [5]		Full Model [6]	
IME: log (intern-resident to bed ratio+1)	0.081	*	0.092	*	0.188	*	0.114	*	0.160	*	0.137	*
DSH (Medicaid&SSI) patient percentage	0.046	*	0.050	*	0.006		-0.011		0.052	*	0.009	
log case mix: MS-DRG & Cost-based	0.685	*	0.763	*								
log wage index	0.603	*	0.604	*								
log cola, operating cola for AK & HI	0.541	*	0.335	**								
log operating Outlier payment per case	0.117	*	0.117	*								
For-profit status			-0.035	*			-0.058	*			-0.051	*
Non-profit status			-0.011	**			-0.023	*			-0.026	*
Rural Referral Center			-0.011	***					0.000		-0.008	
Medicare Dependent Hospital			0.055	*			-0.012				-0.005	
Sole Community Hospital			0.043	*			0.016				0.082	**
log bed size			-0.028	*			0.023	*			0.016	*
Herfindahl of total beds in a hospital referral region			-0.026				-0.058	*			-0.049	***
Regional fixed effects (Pacific is the omitted region)												
Adjusted R-square	87.9%		90.3%		3.8%		12.7%		4.6%		11.9%	

[1] Urban Hospitals with 100+ beds

[2] Medicare operating cost per case is standardized for case mix, wage, cost-of-living, and outlier payment.

* $p \leq 0.001$ ** $p \leq 0.05$ *** $p \leq 0.1$

Source: ASPE's analysis of The Hospital Cost Reports 2006, the FY2009 Final Rules Payment Impact File and other DHHS data.

Choice of Estimates for Payment Policy

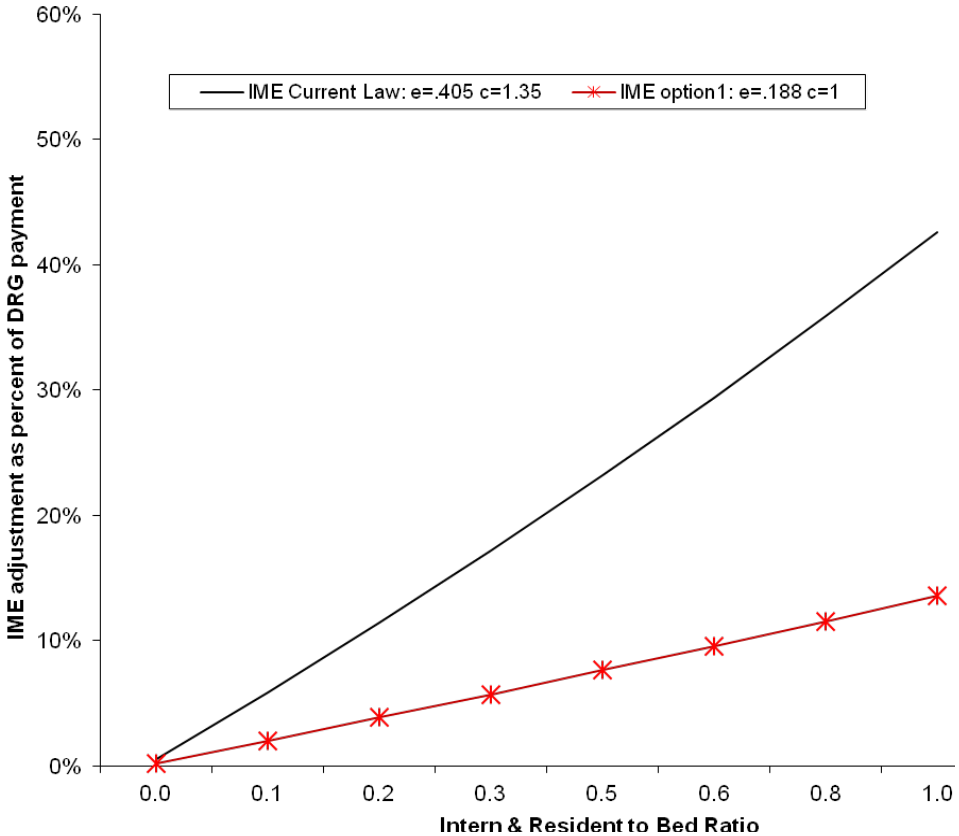
A primary consideration is whether Medicare would pay "true" marginal costs for IME and DSH by adopting a fully specified model, or whether Medicare would also use IME and DSH as policy tools to partly pay for the effects of the omitted variables (those that affect costs but are not directly recognized by the payment system) that could be loaded on to IME and DSH by adopting a payment model. The choice between using the results of the unrestricted or the restricted model depends on whether there is policy intent to compensate some hospitals for differences between the actual estimated impact of payment factors, such as case mix and the wage index on costs, and the actual payment effects of these factors. The restricted regressions estimate the impact of IME and DSH on costs adjusted for the actual payment values of case mix, wage index, COLA and outlier payments on costs.

In all cases, our analysis suggests that the empirical effect of teaching on costs is substantially lower in the new data than in earlier literature. Even though all of our estimated IME effects are statistically significant (implying that teaching hospitals incur higher costs than non-teaching hospitals even after controlling for case mix, input prices, and other factors), the magnitude of our largest teaching effect is considerably less than half the level under current law.

In the past, there has been a policy preference for using restricted payment model estimates (i.e., payment model on standardized costs in model 3). We call the IME coefficient of 0.188, estimated based on the restricted payment model (3), the empirical level for IME. Using a formula structure similar to current law described earlier, the adjustment based on the empirical level for IME would be (1+IRB)**0.188. The difference between the empirical adjustment and the current law IME is displayed on Figure 1.

Our analysis shows that the empirical effect of DSH on Medicare hospital operating costs is not consistent with regard to sign or statistical significance (Table 2, models 1-4 for all hospitals and 5-6 for urban hospitals with 100 or more beds). For all hospitals, the estimated DSH effect ranges from -0.11% and insignificant (model 4) to 0.50% and significant (model 2) for each 10% increase in the DSH patient percentage. A comparison of models 1 and 3 suggests that the actual payment values of the other IPPS adjustments adequately compensate hospitals for DSH related costs. For large urban hospitals, the DSH effect remains positive and significant in the restricted payment model (5)—implying a DSH impact of 0.52% for each 10% increase in the DSH percentage. This level is about 25% the pre-ACA reimbursement level of 2%. Together, these estimates generally support the reduced DSH adjustment that will be required under ACA, but suggest that even the new formula will over-compensate hospitals other than large urban hospitals.

Figure 1: IME Operating Adjustment: Current Law & Empirical Level ASPE Analysis of 2006 Data and 2009 Payment Rules for All Hospitals



Concluding Thoughts

In this paper, we have provided estimates of the IME and DSH effects using 2006 hospital cost data. The estimates suggest that the impact of these factors on Medicare costs is considerably smaller than those estimated when these adjustments were implemented.

The ACA revised the DSH adjustment to reflect its empirical level for large urban hospitals as health reform efforts are expected to insure all, or nearly all, Americans; thereby, reducing the need for subsidizing uncompensated care. Starting in FY2014 under ACA, the Secretary will make DSH payments equal to 25% of what otherwise would be made, a payment that represents the empirically justified amount as determined by MedPAC in its March 2007 Report to Congress. In addition to this amount, starting in FY2014, the Secretary will pay to such acute care hospitals an additional amount using a formula that is the product of three factors:

- the difference in the hospital's DSH payments, because of this legislation;
- for FY2014, the difference in the percentage change in the uninsured under-65 population from 2013 (as calculated from current estimates from CBO data

before the vote to enroll the Act in the House) and those who are uninsured in the most recent period for which data is available minus 0.1 percentage points; in FY2015 through FY2019, there will be a 0.2 percentage point subtraction; in FY2018 and subsequently, the calculation will use data from the Census Bureau or other appropriate sources as certified by the Chief Actuary of CMS; and

- the percentage of uncompensated care provided by the hospital (relative to all acute care hospitals) for a selected period based on appropriate data.

The ACA, however, left the current IME adjustment intact. The estimates in this paper suggest that a much smaller IME (1.88% vs. 5.5%) would adequately compensate hospitals for the indirect medical education costs as well as for other nonpayment factors. Given the magnitude of this difference, Congress would have a variety of options to address health care policy objectives, such as supporting efforts to increase the primary care workforce. For example, one policy approach that has been discussed involves creating a new body tasked with transforming GME in order to train doctors who would be better exposed to "new perspectives and skills for evidence-based practice, effective use of information technology, quality measurement and improvement, cost awareness, care coordination, leadership of interdisciplinary teams, and shared decision-making" (Hackbarth, Boccuti, 2011). The new body would be given three years to develop new standards for physician training and ways to link them to new payment incentives, which would be funded with the payment difference between the current and empirical levels of the IME.

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ENDNOTES

[1] We estimate that hospitals received an average of about $30,000 in GME and $62,000 in IME per FTE intern and resident in 2006.

[2] The additional capital payment adjustment for indirect teaching is: $\{e^{(0.2822 * \text{residents/average daily census})} - 1\}$, where the factor 0.2822 in the exponent is the estimated coefficient of the teaching variable (residents/average daily census)

on hospitals' total costs (operating and capital costs). The capital adjustment is scheduled to end by the end of FY 2010 (Phillips, 1992, p. 61).

[3] The IME adjustment factor formula is traditionally described in terms of a certain percentage increase in payment for every 10% increase in the resident-to-bed ratio. For discharges occurring during FY 2008 and thereafter, the IME formula (with the 1.35 multiplier and 0.405 exponent) represents a 5.5% increase in payment for every 10% increase in the resident-to-bed ratio.

[4] In the formula for the IME adjustment payment, the exponent, 0.405, is the estimated teaching coefficient obtained by CBO in 1985 using 1981 data, and c is the multiplier set by Congress (originally, c was set at 2 when Congress decided to double the IME adjustment rate from 0.579 to 1.159). Under current law, c is 1.35 for discharges occurring during FY 2008 and thereafter. While the multiplier has been changed by Congress over the years, the exponent has been held at 0.405 ever since, despite newer estimates of the teaching coefficient.

[5] DSH adjustment was incorporated into the IPPS in May 1986 and was set to expire on October 1, 1988. It was then extended, and legislation passed in 1990 (P.L. 101-508) repealed the sunset provision for the adjustment, making it a permanent part of the IPPS.

[6] We compute the percent using case-weighted hospital averages in the 2006 Cost Report as: DSH adjustment / (PPS operating payment – DSH adjustment – IME adjustment) = 4.89M / (55.56M – 4.89M – 4.16M) = 0.105 or 10.5%.

[7] For example, since Medicare does not pay more for larger bed size, and since teaching hospitals tend to be larger than other hospitals, if we pay teaching hospitals the "true" marginal impact of teaching (obtained in the fully specified model after controlling for bed size), we might risk underpaying teaching hospitals. On the other hand, paying teaching hospitals the likely "biased" impact of teaching obtained from the payment model (without controlling for bed size), we allow the effects of the excluded bed size variable to be "loaded on" to the teaching variable.

[8] The correct interpretation of a binary variable in a semilog model is: percent change relative to the control group = {exponent(coefficient estimate of the binary) -1}*100%.

[9] The labor share for FY 2009 averages about 0.62. Specifically, it is 0.62 for all hospitals with a wage index less than or equal to 1, and for hospitals with a wage index greater than 1, the labor share is 0.697 or 0.587 if the hospital is in Puerto Rico.

[10] Based on ASPE's calculation from the Medicare Hospital Cost Reports for 2006.

[11] We use this case mix index computed based on MEDPAR 2006 (instead of the case mix index in the impact file for final rule FY 2009, which is mainly based on MEDPAR 2007) to be internally consistent with the 2006 Hospital Cost Report data.

[12] Characteristics of the counties in which hospitals operate come from the Area Resource File (ARF) for 2007 and data on the hospital referral regions (HRR) from the Dartmouth Atlas.

[13]It takes a 10% increase in (1+IRB), that is equivalent to a 110% increase in IRB to increase per case cost by 1.88%. In fact, from an IRB of 0.10, the IRB increases by ((0.21-0.10)/0.10) = 110% while the (IRB+1) only increases by ((1.21-1.1)/1.1) = 10%.

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