



Revising the Medicare Wage Index to Account for Commuting Patterns

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1 Introduction

The Medicare statute requires that per-discharge payments to inpatient prospective payment system (IPPS) hospitals reflect geographic differences in the cost of labor. The purpose of the Medicare wage index is to allocate payments that are consistent with the relative cost of labor across IPPS hospitals in different areas, while maintaining budget neutrality. Under the current system, Medicare calculates an average hourly wage for each metropolitan statistical area (MSA) and residual, or “rest of state,” area to construct the hospital wage index. However, labor markets defined by fixed geographic boundaries often do not accurately reflect hospital labor markets. To improve the wage index, Acumen proposes an alternative formulation known as the Commuting-Based Wage Index (CBWI), which uses commuting data to create more flexible hospital-specific labor markets. The following discussion presents an overview of the CBWI approach.

In theory, the extent of a hospital’s labor market is limited by the level of compensation offered its workers, the compensation offered by neighboring hospitals, and the wage that workers require to provide their services. Given its location, a hospital’s level of compensation will attract workers who live up to some distance away. The labor market boundary can be defined by the location of workers who are indifferent, at a given wage (or compensation) level, between commuting to a hospital in a particular wage area or to a hospital in a neighboring wage area. With this boundary as the outer edge of the labor market, one can trace the physical area that includes the hospital to define the hospital’s wage area or labor market.

Using an MSA-based labor market definition can define hospital labor markets either too broadly or too narrowly. If a hospital’s labor market is defined too broadly, hospitals facing different prices for labor within the same market would receive the same index value. One example of a broadly-defined labor market is the MSA made up of Riverside-San Bernardino-Ontario, CA. This MSA covers over 20,000 square miles and includes more than two million people. Within this MSA are both the city of San Bernardino and the town of Needles. San Bernardino has a population of about 200,000 and is only about 60 miles from Los Angeles. Fewer than 5,000 individuals live in the town of Needles, located in the heart of the Mojave Desert. Under the current wage index that relies on an MSA-based labor market definition, hospitals in both San Bernardino and Needles receive the same index values even though their actual labor markets are quite different.

MSAs also may define labor markets too narrowly, and hospitals facing similar prices of labor may receive very different index values. For example, a hospital in New York City likely will draw workers who live in New York City, as well as workers in the suburbs. It may also hire workers from Poughkeepsie, NY, but not nearly as many as from New York City. However,

the hospital has little to no chance of hiring workers who live in San Francisco, CA. In this case, it is clear that New York City and the surrounding suburbs should be included in the hospital's labor market, but San Francisco should not. Poughkeepsie presents a problem under the MSA-based framework. Keeping Poughkeepsie separate from the New York City labor market would ignore the fact that the New York City hospitals hire some workers from Poughkeepsie, and the labor market would be defined too narrowly. However, combining the Poughkeepsie-Newburgh-Middletown, NY and New York-Northern New Jersey-Long Island, NY-NJ-PA MSAs would not account for the fact that only a small share of Poughkeepsie workers make the 80-mile commute to New York City.

2 Fundamentals of the Commuting-based Wage Index (CBWI)

The innovation of CBWI involves its use of commuting data to define a hospital's labor market in terms of the geographic areas from which it hires its workers. Each hospital's CBWI is the weighted sum of the wages for its workers' commuting areas, where the weights are the proportions of workers commuting from each area. In principle, each hospital's labor market and CBWI value is unique. More generally, CBWI values will be similar (or different) to the extent that hospitals hire workers in similar (or different) proportions from the same (or different) commuting areas. Two hospitals would have identical CBWI values if they hired workers in the same proportions from exactly the same areas.

CBWI's greater precision in defining labor markets results from the use of data on the number of workers commuting from home to work between relatively small areas such as ZIP Codes or census tracts. Since the CBWI does not use MSAs or counties to establish wage areas, CBWI values can vary for hospitals within the same MSA or county. In contrast to wage indices based on MSAs and counties, CBWI values are not subject to sharp differences solely because nearby hospitals are located in different adjacent MSAs or counties.

There are two ways in which CBWI can better account for wage variation than does the current Medicare wage index or any other index based on MSAs or counties. First, ZIP codes or census tracts are smaller areas than the MSAs and non-metropolitan ("rest of state") areas that are used in the current wage index. As a result, CBWI can more precisely reflect wage differences within and across MSA boundaries. Second, CBWI accounts for differences in the degree to which workers commute into and out of the hospital's area. In contrast, except for the outmigration adjustment, the current Medicare wage index implicitly assumes that all hospitals in the MSA hire their workers from the same areas and in identical proportions.

3 Calculation of CBWI

Calculating the value of CBWI for each hospital relies on commuting data between the area where the hospital is located and the areas where its workers live (commuting areas). The

commuting data can be represented as a matrix, with hospitals as rows and workers’ commuting areas as columns. Within each row, the columns indicate the distribution of each hospital’s workers by commuting area. One of the cells in each row corresponds to the same area where the hospital is located. The number of workers in this cell represents the hospital’s workers who live in the same area as the hospital’s location. Other cells in the row reflect in-migration of workers from other areas. Within each column, the rows indicate the distribution of each commuting area’s workers by hospital of employment. In the column for the area in which a given hospital is located, rows for other areas than the hospital’s location indicate out-migration of workers to other hospitals. When a matrix element is zero, it means that no workers in an area commute to the hospital located in that row of the matrix.

The table below illustrates a hypothetical commuting matrix for workers in three hospitals (1, 2, and 3), all of whom commute from one of six ZIP codes (A, B, C, D, E, or F). The information in the table summarizes commuting patterns viewed from either a residential area or hospital perspective. The size of worker populations commuting from ZIP codes range from 40 coming from A to 135 workers coming from ZIP code C (see bottom row). Of the 40 workers commuting from ZIP code A, 20 commute to Hospital 1, 20 commute to Hospital 2, and zero commute to Hospital 3. The number of individuals employed at hospitals range from 75 working at Hospital 1 to 310 working at Hospital 2 (see second column). Of the 75 workers at Hospital 1, 20 commute from ZIP code A, 45 commute from ZIP Code B (where the hospital is located), eight commute from ZIP code C, two commute from ZIP code D, and none commute from ZIP codes E and F.

Table 1: Hypothetical Commuting Matrix: Distribution of Workers by Hospital and Zip Code

Hospital	Workers by Hospital	Workers by Zip Code					
		A	B	C	D	E	F
1 (located in B)	75	20	45	8	2	0	0
2 (located in C)	310	20	80	120	50	30	10
3 (located in F)	150	0	3	7	20	40	80
Total Workers	535	40	128	135	72	70	90

Using wage data from hospitals and data on commuting patterns, calculating CBWI involves the following approach:

1. Calculate average wages in workers’ commuting areas;
2. Estimate the wage level for each hospital (the numerator of CBWI); and
3. Compute the national wage (the denominator of CBWI).

The wages of workers in this table typically differ across hospitals and across areas. The CBWI links the wages of workers in hospitals to the wages of workers in areas. Because Step 3 exactly replicates the current Medicare wage index, the following discussion focuses on Steps 1 and 2.

Step 1: Calculate average wages in workers' commuting areas: Just as each hospital's wage level can be expressed as the average of the wage levels in the commuting areas weighted by the proportions of workers who commute to the hospital from each area, wage levels in commuting areas can be expressed as an average of hospital wage levels weighted by the proportions of area residents who work at each hospital. Understanding these two proportions (i.e., the proportion of workers living in an area and the proportion of area residents working in a hospital) is critical to understanding the construction of CBWI. Both proportions are derived directly from the basic commuting matrix described in the above table. The proportion of hospital workers living in an area corresponds to the row proportions, and the proportion of area residents working in a hospital corresponds to the column proportions. Using wage data for hospitals and information on column proportions of the commuting matrix, Step 1 consists of calculating an average wage level for each commuting area.

For simplicity, this description presumes a standard number of hours per worker, but the analysis could readily be adapted to account for variation in hours per worker across hospitals. Data on hours could be estimated using the Medicare wage survey data.

Step 2: Estimate the wage level for each hospital: Once the commuting area wage levels are computed, the row proportions of the commuting matrix are used to calculate each hospital's estimated wage. The estimated hospital wage indicates the expected level of each hospital's wage based on average wage levels for each residential area and actual hiring proportions. The use of actual hiring proportions automatically accounts for all factors that may affect commuting patterns, such as differences in commuting costs due to distance and geographical barriers (mountains and rivers), as well as differences in the size of the employee population among residential areas. We expect that the larger the working population in an area, the greater will be the hiring proportion from that area. Hiring proportions are expected to fall as distance and other commuting costs increase relative to the hospital's location. Implicitly, CBWI assumes that the average residential area wage level is the wage that must be offered to workers in the area to induce them to work in the given hospital. Another implicit assumption, which could be relaxed if commuting data were available by occupation type, is that all hospitals hiring from the same residential area hire workers with the same mix of occupations.

4 Potential Impacts of the CBWI on Hospital Wage Indices

Since CBWI is tailored to the circumstances of each hospital's labor market more precisely than the current indices, the effects for specific hospitals may differ depending on the

specific geographic situation of a hospital. How each hospital's CBWI compares to the Medicare pre-reclassification wage index depends on the comparison of wages between (i) the CBWI labor market area derived from commuting patterns, and (ii) the Medicare MSA or "rest of state" rural area.

Examples where CBWI will likely be higher than Medicare pre-reclassification wage index

The CBWI will be above the Medicare pre-reclassification wage index when the average wage for the CBWI commuting area is greater than the MSA or state-rural area wage. The CBWI commuting area may be larger or smaller than the MSA or state-rural area used to compute the current Medicare wage index, and it may or may not be contained within the MSA/state-rural area. Consider, for example, a situation where workers in an urban core within an MSA are more expensive than their counterparts living outside the core. In this example, a hospital located near or at the center of the urban core will receive a higher wage index value assuming it hires more workers from the urban core than its peers located further away on the MSA's periphery. Moreover, a hospital located in a rural area that is adjacent to an MSA would receive a higher CBWI value compared to the Medicare pre-reclassification value when it draws a significant fraction of its workers from the more expensive urban core in the adjacent MSA. Correspondingly, a large rural hospital that draws workers from an urban MSA typically will be assigned a higher CBWI value than a smaller rural hospital which does not.

Examples where CBWI will likely be less than Medicare pre-reclassification wage index

In the example where the urban core within an MSA has the most expensive labor, hospitals located in the MSA but far away from the urban core will receive a lower CBWI value than the current wage index. This assumes that they draw a large share of their workers from the less expensive suburbs or nearby rural areas. Hospitals in rural areas would receive lower wage index values under CBWI if they attracted fewer workers from expensive MSAs than their peers in the rural areas. Similarly, small hospitals in rural areas would receive lower wage index values under CBWI than large rural hospitals if their hiring predominately occurred in the relatively lower wage rural areas.

Comparing CBWI values to Medicare post-reclassification wage index values

Whether CBWI is higher or lower than the Medicare post-reclassification wage index will depend primarily on the extent and magnitude of the gains from the current reclassification system. CBWI will tend to be higher than the Medicare post-reclassification index in areas that do not benefit much from reclassification. CBWI will tend to be lower than the Medicare post-reclassification index in areas where reclassification and other wage index adjustments have been influenced substantially by very large and relatively high-wage metropolitan areas, such as Boston and New York.

5 Data Requirements for Potential Implementation of CBWI

The key data requirement for potential implementation of CBWI is the availability of commuting data. As noted earlier, CBWI can be constructed with existing wage and hours data currently used for the Medicare hospital wage index. If a new hospital was not yet included in the wage survey, some provision would need to be made to account for its absence. The main additional data requirement for CBWI is commuting data.

The only data currently available are Census Transportation Planning Package (CTPP) data from the 2000 Census on all workers commuting between pairs of census tracts. These data raise several questions: How different are commuting patterns of workers in all sectors of the economy from commuting patterns of hospital workers? Are Census data from 2000 too old to be usable? How rapidly do commuting patterns change over time? How frequently would commuting data need to be updated to be accurate? We do not have any evidence comparing commuting patterns of all workers and hospital workers. Since the decennial Census long form has been replaced by the annual American Community Survey (ACS), it is not currently possible to update the 2000 CTPP data. Potentially, multiple years of ACS information could be pooled to provide more timely commuting data. However, it is not clear that commuting data would ever be available for census tracts or ZIP codes.

Alternatively, a direct collection of data from hospitals on the distribution of their employees' residence by ZIP code would be sufficient to calculate CBWI and would address issues about the specific commuting patterns of hospital workers and the timeliness of commuting patterns. Only aggregate residential data by ZIP code would be required, which could protect employee confidentiality. As a further privacy safeguard, geographical areas with very small numbers of employees could be combined prior to reporting, with minimal impact to the accuracy of CBWI. The collection of commuting data directly from hospitals would involve a larger administrative burden than would the use of publicly-available data. However, the required hospital data could be taken directly from employee payroll records and could potentially be collected less frequently than annually. Presumably, it would be easier for hospitals to provide the proportion of employees by ZIP code than by census tract. We have no evidence about the relative accuracy of CBWI using ZIP codes versus census tracts.

6 Conclusion

The proposed alternative wage index framework improves on Medicare's existing wage index method by using commuting data to characterize hospital labor markets more accurately. By leveraging commuting information at a detailed geographic level, CBWI allows for more flexible labor market definitions, which better reflect the areas from which hospitals draw their employees. Rather than constraining a hospital's labor market to the size of an MSA, CBWI labor markets reflect hospitals' specific commuting patterns.

CBWI's more flexible labor market definitions confer two key benefits. First, CBWI allows wage index values to vary within an MSA, unlike the current Medicare wage index method. Because area wages are determined at the ZIP code or census tract level, CBWI can reflect intra-MSA variation in the price of labor. Second, CBWI does not produce large differences—or “cliffs”—between wage index values for nearby hospitals in different MSAs. As nearby hospitals will likely hire workers from areas in similar—but not identical—proportions, the wage index values of these nearby hospitals will also be similar. While certain implementation issues will need to be considered, these advantages indicate CBWI offers a promising alternative to the current Medicare hospital wage index.