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Location of health professionals: The supply side

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ABSTRACT

Urban/regional economic analyses help explain several features of health service providers including output determination. Spatial agglomerations increase factor productivity, and therefore rents paid and wages earned. Larger agglomerations imply higher rents and wages, justifying the clustering of health professionals in large cities and medical centers.

We show for 372 US Metropolitan Statistical Areas (2013) that health professionals' wages increase significantly with increased total employment, but fall as the proportion of the total labor force comprised by the sectors within the regional economy increases. Rents respond similarly, although with smaller elasticities.

The wage-rental ratio (W/R) decreases with total regional employment, but increases with jobs per thousand in the health sector. Exogenous factors like heating and cooling degree days are consistent with slight positive increases in the W/R. Inclusion of W/R in a model that accounts for the covariance of wages and rents yields supply elasticities from + 3.47 to + 7.20 for all medical providers, and from + 0.22 to + 0.43 for registered nurses. These interregional elasticities (particularly for nurses) are consistent with estimates in other contexts.

1. . Introduction

Urban/regional analysis has provided many key insights into the allocation of resources both within and among cities. The "open city" model allows analysts to look at the simultaneous determination of wages and rents across a system of cities explaining how:

1. The increased productivity of large cities (or metropolitan areas) is capitalized into higher land rents and higher labor wages, which leads to a system of cities in which long-run equilibrium rents, wages, and their ratios will vary in cross-section;
2. Econometric analysis can examine predicted rents and wages, as well as their residuals, to provide quality of life measures;
3. Given the set of equilibrium wages and rents, cities' sizes and densities will vary in predictable ways both within and among cities.

Even a casual look at equilibrium wages and rents in locations like New York and San Francisco indicates how the desirable features of these locations have been capitalized into high wages and very high rents, particularly in the most desirable city neighborhoods.[1]

A largely unrelated "spatial" health economics literature has focused on:

1. Distribution of skilled health professionals, with clustering in large metropolitan areas – and corresponding "shortages" in small cities and rural areas.
2. Significant and persistent wage differentials for health professionals among geographic areas.
3. The need for the Medicare System, the largest health care services payer in the United States, to adjust fee-for-service payments to Medicare providers for geographic differences, largely related to factor prices, in the costs of providing care (IOM, 2012).

Specific features of the health economy extend this analysis beyond applying the "system of cities" model to yet another industry. First, the health care sector is heavily regulated. In many states, health facility (including hospital) construction is heavily constrained by "certificate of need" (CON) legislation, stemming from a debatable policy framework aimed at limiting big ticket construction and hence costs. CON requires costly and time-consuming planning, application, and sometimes litigation.

Aside from CON, new hospital construction costs can exceed one billion dollars, with renovations in the tens of millions of dollars, leading to an industry with "lumpy" and very long-lived capital. The health services labor force also faces substantive regulation. Physicians,

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[1] Subsequent discussions use "cities" and "metropolitan areas" interchangeably. While health-related agglomerations can occur in smaller areas such as the Mayo complex at Rochester, MN, they are much more concentrated in large metropolitan areas. We use the metropolitan statistical area (MSA) level.

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as well as registered (RN) and licensed practical (LPN) nurses undergo costly and time-consuming training and licensure. These features slow marginal adjustments to long-run equilibrium.

To address the issues discussed above, the health literature has most often addressed economies of scale or scope at the office, clinic, or hospital level. As a result, health economists have failed to recognize that the agglomeration of such activities, most often at the metropolitan level, may have impacts on overall sectoral wages and/or rents. Additionally, health economists have measured persistent wage differentials across various cities, states and/or regions. However, time-consuming and costly health provider training and licensure, coupled with costly migration can create drag on responses to differential wages, and long term wage levels fail to converge. Finally, large government programs such as Medicare direct hundreds of billions of geographically-indexed dollars to care for the (largely) over-65 US population. Health expenditures account for close to one in five dollars of US GDP, and Medicare pays for about one-fifth of that, so it is important to understand how these payments are linked to factor costs. This paper concentrates on these supply-related issues.

Urban economic analysts (Glaeser and Resseger, 2010) have recognized that more populous areas (generally cities) tend to be more productive than smaller ones, leading to higher wages and land rents. Agglomeration gains come from economies of scale and network effects. When related activities cluster, production costs may decline significantly as multiple suppliers and concentrations of skilled labor gather. The differential impacts stemming from agglomeration imply higher factor payments (wages and rents) that explain varying patterns of land, capital, and labor usage across all sectors, including the health sector.

This article continues by connecting the health and urban literatures. It then reiterates the joint determination of land rents and labor wages in a system of open cities. Next, it lays out a model that shows how both wages and rents are predictably higher (and positively correlated) in larger areas, and go hand in hand with increased concentrations of health care professionals. It concludes by using urban economic theory to examine variations in health labor supply.

2. Geographic differences

Wages for health professionals vary widely across U.S. MSAs. Table 1 shows that the Medicare Wage Index for large MSAs ranges from 0.8862 (Louisville KY-IN) to 1.7396 (San Jose CA). Among all MSAs (excluding Puerto Rico), the range is from 0.6768 (Morristown TN) to 1.8062 (Santa Cruz CA), a factor of 2.67. While some of these differences relate to cost-of-living variations, they also reflect differences in capital endowments and factor productivity.

Health care professionals are also distributed unevenly across geographic areas. Maps of the United States show vast areas with personnel shortages. Although it is unsurprising that areas with low residential densities have low medical personnel densities, with the exception of family physicians, most primary care physicians are more centralized than the population. Fig. 1 shows that while 80% of U.S.

Table 1
Medicare Wage Indices – 2013.

	Metropolitan statistical area	Index
	San Jose-Sunnyvale-Santa Clara, CA	1.7396
	San Francisco-San Mateo-Redwood City, C	1.6327
	Sacramento-Arden-Arcade-Roseville, CA	1.4752
	New York-White Plains-Wayne, NY-NJ	1.2914
	Boston-Quincy, MA	1.2378
	Los Angeles-Long Beach-Glendale, CA	1.2293
	Las Vegas-Paradise, NV	1.2076
	San Diego-Carlsbad-San Marcos, CA	1.1922
	Seattle-Bellevue-Everett, WA	1.1771
	Portland-Vancouver-Hillsboro, OR-WA	1.1673
	Minneapolis-St. Paul-Bloomington, MN-WI	1.1336
	Philadelphia, PA	1.0806
	Washington-Arlington-Alexandria, DC-VA	1.0659
	Chicago-Joliet-Naperville, IL	1.0600
	Phoenix-Mesa-Glendale, AZ	1.0477
	Denver-Aurora-Broomfield, CO	1.0469
	Baltimore-Towson, MD	1.0147
	Miami-Miami Beach-Kendall, FL	1.0130
	Houston-Sugar Land-Baytown, TX	0.9933
	Milwaukee-Waukesha-West Allis, WI	0.9931
	Indianapolis-Carmel, IN	0.9870
	Dallas-Plano-Irving, TX	0.9835
	Columbus, OH	0.9763
	Kansas City, MO-KS	0.9614
	Atlanta-Sandy Springs-Marietta, GA	0.9517
	St. Louis, MO-IL	0.9420
	Detroit-Livonia-Dearborn, MI	0.9361
	Cleveland-Elyria-Mentor, OH	0.9082
	Tampa-St. Petersburg-Clearwater, FL	0.9032
	San Antonio-New Braunfels, TX	0.8936
	New Orleans-Metairie-Kenner, LA	0.8932
	Jacksonville, FL	0.8883
	Louisville-Jefferson County, KY-IN	0.8862
Min	Louisville-Jefferson County, KY-IN	0.8862
Max	San Jose-Sunnyvale-Santa Clara, CA	1.7396
Mean	[Philadelphia, PA - 1.0806]	1.0882
Median	Baltimore-Towson, MD	1.0147

Table 1 shows that the Medicare Wage Index for Urban Areas based on discharges occurring between October 1, 2012 and September 30, 2013. For large MSAs ranges from 0.8862 (Louisville KY-IN) to 1.7396 (San Jose CA). Among all MSAs (excluding Puerto Rico), the range is from 0.6768 (Morristown TN) to 1.8062 (Santa Cruz CA).