AEA Papers and Proceedings 2020, 110: 274–278
https://doi.org/10.1257/pandp.20201031

PROVIDER DECISION-MAKING AND PRODUCTIVITY IN HEALTH CARE[‡]

Administration above Administrators: The Changing Technology of Health Care Management[†]

By Abe Dunn, Joshua D. Gottlieb, and Adam Hale Shapiro*

Researchers and politicians lament the resources spent on billing and other administrative activities in health care (Cutler and Ly 2011, Berwick and Hackbarth 2012, Obama 2016). Administration may be valuable for deterring or detecting fraud, coordinating care, or encouraging the use of more valuable types of care. But it also consumes resources and increases the costs of providing care. In recent work, we found that physicians' supply of care is highly responsive to challenges in the billing process (Dunn et al. 2019). This is especially salient for Medicaid, which has the highest levels of billing complexity (Gottlieb, Shapiro, and Dunn 2018), which dissuades physicians from treating Medicaid patients.

This paper aims to measure the costs and types of administrative inputs in the health care industry. We use data on labor and non-labor inputs by industry and categorize those based on whether they are productive or administrative. Since firm boundaries can be variable (witness the dramatic consolidation of US health care production in recent years) and changing technology can shift the composition of administrative inputs (e.g., electronic health records, henceforth EHR), any measure of administrative inputs needs to account for outsourcing. Past work documenting administrative costs has focused on labor inputs (e.g. Woolhandler and Himmelstein 1991 and recent critiques by Drum 2019 and Tabarrok 2019). This paper measures both labor and non-labor administrative inputs and documents how they have changed over time for hospital and ambulatory care—two of the largest industries within the health care sector.

We find that non-labor inputs are a critical part of administrative spending, over and above labor inputs. Administrative spending on both hospitals and ambulatory care is much higher when accounting for non-labor inputs than when focusing on labor alone. And trends in non-labor administrative input spending have differed dramatically from that of labor input spending for hospitals over the last 20 years.

This paper describes our data and methods then presents the results and interpretation. We cannot conclude whether the changes in administration we document are efficient. Bloom, Sadun, and Van Reenen (2012) shows that information technology is valuable for management. And the city of Detroit conducted 70 percent of its accounting *manually*—prior to declaring bankruptcy (Gilson, Mugford, and Lobb 2020). But administrative hassle in health care has costs (Dunn et al. 2019), and more work is needed to trade these off against the benefits.

I. Data and Methods

We combine Occupational Employment Statistics (OES) from the Bureau of Labor

[‡]*Discussants:* Robert Gibbons, Massachusetts Institute of Technology; Mark Shepard, Harvard University; David Silver, Princeton University; Alice Chen, University of Southern California.

*Dunn: Bureau of Economic Analysis (email: abe.dunn@bea.gov); Gottlieb: University of Chicago and NBER (email: jgottlieb@uchicago.edu); Shapiro: Federal Reserve Bank of San Francisco (email: adam.shapiro@sf.frb.org). We are grateful to Oscar Chan and Finn McLaughlin for superb research assistance. We would like to thank staff at the Bureau of Economic Analysis for providing details regarding the production of the input-output tables, including Matt Calby, Edward Morgan, Jennifer Lee, and Brian Smith. The views in this article are those of the authors and do not necessarily represent the views of the US Bureau of Economic Analysis or the US Department of Commerce.

[†]Go to https://doi.org/10.1257/pandp.20201031 to visit the article page for additional materials and author disclosure statement(s).

Statistics (BLS) with input/output (I/O) tables from the Bureau of Economic Analysis (BEA) to produce new and more comprehensive measures of administrative spending in health care. The OES decomposes labor costs by occupation, allowing us to determine how much of labor spending accrues to medical billers and their bosses rather than nurses and physicians. Since many of these tasks can be outsourced (Autor 2003, Goldschmidt and Schmieder 2017) and administrative tasks may require capital inputs (such as expensive EHR), the I/O tables are a key complementary source for observing providers' spending on administrative tasks outside of firm boundaries.

In brief, we label certain occupations as administrative and certain input industries as administrative. We then use OES and I/O tables to measure the size of health care administration including, but also above and beyond, the administrators themselves.

The OES is an annual database that presents national aggregate statistics on employment and wages by occupation and industry. It uses detailed four-digit North American Industry Classification System (NAICS) codes, which means that we can distinguish, for example, between offices of physicians (6211), dentists (6212), outpatient care centers (6214), and home health care (6216). For each industry, the data present wages and employment for detailed occupations, at the level that a "medical secretary" (43-6013) is distinct from a nonmedical secretary or administrative assistant (43-6014).

We classify these occupations to include those narrowly focused on billing, and also a broader concept of administration. We include many high-skilled occupations involved in hospital administration, from computer technicians to lawyers and executives. Our occupational classification is described in the online Appendix.

Beyond internal firm labor, health care providers may procure administrative support from other types of sources. They can purchase capital inputs, such as EHR and billing systems, that are key to administrative activities. They can also outsource administrative tasks to external firms, even if the ultimate factor inputs for those activities are largely labor.

To capture these inputs, we turn to the BEA's I/O tables. These use data from the Economic Census, the Service Annual Survey, Quarterly Census of Wages and Employment, and a variety of other sources. The Service Annual Survey asks firms in service industries to report input purchases and is customized to each sector. The BEA then assigns these inputs to another industry's output, adjusted using a biproportional balancing (RAS) approach. Our estimates rely on the BEA's mapping, so any decisions or changes in that mapping will flow through to our results.

The resulting I/O tables are computed in somewhat less detail, as they are only available at the three-digit NAICS industry for most years, though more detail is available in the quinquennial years corresponding to the Economic Census. We focus on two key health care production industries available at the three-digit code: ambulatory care (621) and hospitals (622). The input industries we treat as administrative are listed in the online Appendix.

II. Results

Figure 1 shows the evolution of our administrative cost measures over time, for both ambulatory care (first panel) and hospitals (second panel). Each figure shows three lines: aggregate administrative inputs and their decomposition into labor inputs (from OES) and non-labor inputs (from I/O tables). All three are measured as a share of the industry's output.

We find that non-labor inputs are an important part of administrative costs, in both ambulatory settings and hospitals. Total administrative inputs hover around 20 percent of output in ambulatory settings, with a slight decline from 1998 to 2017. Of this 20 percent, about two-thirds is labor and one-third non-labor. Administrative inputs have been remarkably stable for ambulatory care. Labor inputs have declined slightly for hospitals, but this represents a shift in input sources: hospitals have doubled their purchases of administrative inputs on the external market, from 11 percent of revenue to 22 percent.

For hospitals, the comprehensive administrative measure tells a very different story than labor administrative costs alone. Total administrative inputs in hospitals climb from around 20 percent to 30 percent over our period. This growth is driven entirely by non-labor inputs, highlighting the importance of a comprehensive measure.

The ambulatory care results are of the same order of magnitude as estimates from Dunn et al. (2019), where we estimate physician billing

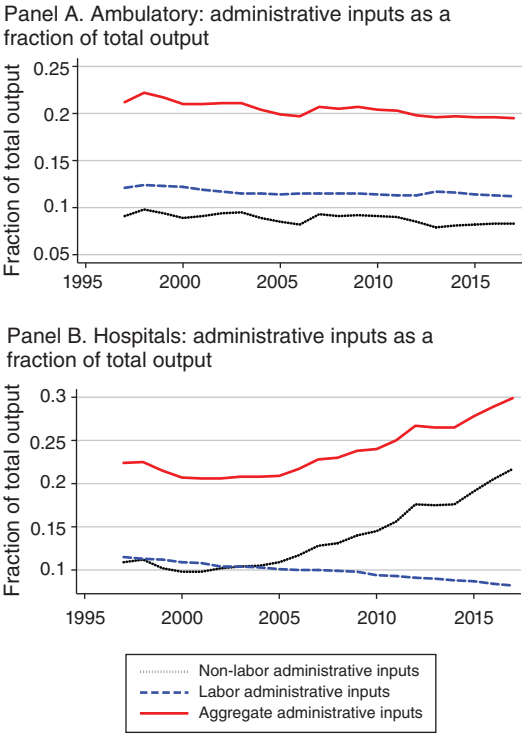

Figure 1. Administrative Inputs in Major Health Care Industries

Notes: This figure shows the share of output in two health care sectors—ambulatory care (panel A) and hospitals (panel B)—devoted to administrative expenses. Each figure shows three lines: total administrative inputs, wages paid to administrative workers, and non-labor inputs measured in input/output tables. The administrative labor figures have been both rescaled and interpolated for the period 1999–2003.

Source: BLS (OES), BEA (I/O tables), and authors' calculations

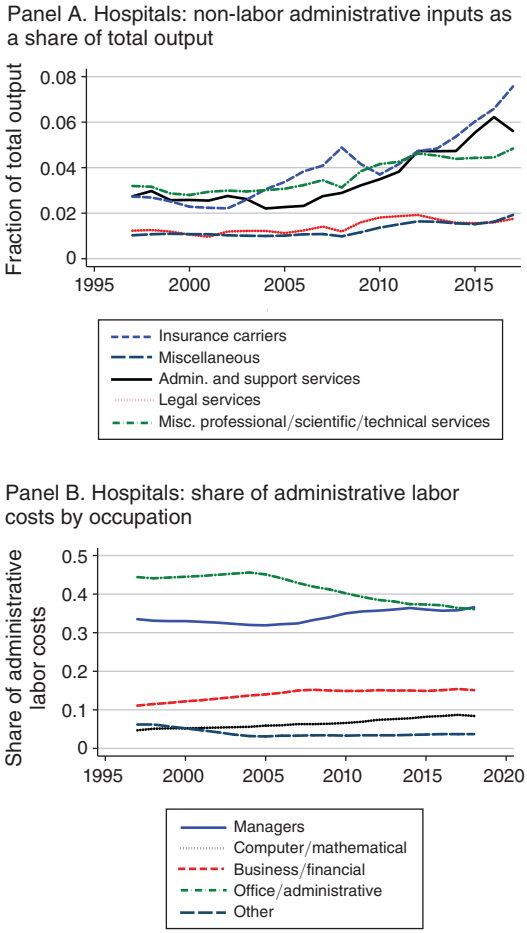

Figure 2. Categories of Administrative Inputs in Hospitals

Notes: This figure shows the changing importance of major categories of administrative inputs in hospitals. The first panel shows different categories of non-labor inputs, and the second panel shows the categories of workers classified as administrative. The miscellaneous input category in the first panel includes Computer Systems; Data Processing and Printing Services. The employment series in the second panel have been interpolated for the period 1999–2003.

Source: BLS (OES), BEA (I/O tables), and authors' calculations

costs based on their decisions of which payers to accept and whether to resubmit claims. We find billing costs of around 20 percent of revenue for Medicaid patients but lower for other insurers, suggesting that average billing costs across all insurers are below 20 percent. But billing costs are a subset of total administration.

To better understand these changes, Figure 2 distinguishes between specific categories of labor and non-labor administrative inputs, focusing on hospitals—the industry that experienced more change in administrative inputs. The first panel breaks down non-labor administrative inputs from the I/O tables. The second panel decomposes types of administrative workers. In both cases, we continue to show time series measures as a share of industry output.

The first panel shows major growth in all categories of non-labor inputs. "Administrative and support services," "miscellaneous professional/

scientific/technical services," and "insurance carriers" all start at around 3 percent of output and approximately double, with each ending up in the range of 5–7 percent. Both "legal services" and "miscellaneous" start the period at around 1 percent and end at around 2 percent. So the administrative growth does not appear concentrated in any one category but instead is quite broad.

The second panel shows the share of labor compensation that accrues to different categories of administrative employees. The changes within administrative workers are not particularly dramatic, but we do see a decline in the "office/administrative" share from 45 percent to 35 percent of these labor costs. This is compensated by slight increases in the share accruing to managers, "business/financial" workers, and "computer/mathematical" workers. Together, the reduction of office workers and increase in purchased administrative inputs are suggestive of a switch from in-house to outsourced administrative services. The growth in managers and more technical workers, who are likely able to work with new technology and externally purchased inputs, is consistent with this view. Ultimately, the growth in outsourced services exceeds the decline in administrative workers, leading to an increase in administrative inputs over and above a shift in where those inputs are purchased.

III. Interpretation

The dramatic change we observe for hospitals is surprising in light of the recent changes in the industrial organization of US health care. In recent decades, hospital systems have merged and also acquired other types of health care providers. This growth in scale and scope makes the hospital results surprising for two reasons. First, one might expect larger organizations to have economies of scale that reduce administrative spending of all sorts. Second, one would expect larger organizations to use more internal production, but instead we see a shift toward outsourcing.

In light of these trends, our results could reflect at least three different forces. If the hospitals begin providing administrative services for other firms that they have acquired, it would be natural to see administrative costs increase at the parent firm.

Alternatively, the organizations might be growing inefficiently large. This could be the case if they are merging for reasons other than achieving efficient scale—for example, to increase bargaining leverage and hence prices (Cooper et al. 2018).

A third possibility is that technological innovations may have changed the efficient level of administrative spending. If EHR improve patient care (Lee, McCullough, and Town 2013; McCullough, Parente, and Town 2013), it may be efficient to increase overhead spending on this technology. But if EHR are primarily a coding technology (Gowrisankaran, Joiner, and Lin 2019), significant spending may be privately optimal for the hospital but socially wasteful.

Finally, there are likely large fixed costs when adopting new capital aimed to deal with administrative burden. It is possible that the recent increase in non-labor administrative costs has been due to a wave of technological adoptions. Accordingly, this may be followed by a decline in administrative variable costs as the returns from this capital investment take hold.

IV. Conclusion

To understand the production function of US health care, researchers need to consider the significant share of resources spent on administration. Research has not yet determined the benefits and costs of this activity, which are important parameters for evaluating the performance of the medical system. As we document here, even measuring administration is subtle: as in other parts of the economy, the technology of administration has changed. Administration comprises more than administrators.

REFERENCES

Autor, David H. 2003. "Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing." *Journal of Labor Economics* 21 (1): 1–42.

Berwick, Donald M., and Andrew D. Hackbarth. 2012. "Eliminating Waste in US Health Care." *JAMA* 307 (14): 1513–16.

Bloom, Nicholas, Raffaella Sadun, and John Van Reenen. 2012. "Americans Do IT Better: US Multinationals and the Productivity Miracle." *American Economic Review* 102 (1): 167–201.

Cooper, Zack, Stuart V. Craig, Martin Gaynor, and John Van Reenen. 2018. "The Price Ain't Right? Hospital Prices and Health Spending on the Privately Insured." *Quarterly Journal of Economics* 134 (1): 51–107.

Cutler, David M., and Dan P. Ly. 2011. "The (Paper)Work of Medicine: Understanding International Medical Costs." *Journal of Economic Perspectives* 25 (2): 3–25.

Drum, Kevin. 2019. "Join Me on a Dive down the Rabbit Hole of Health Care Admin Costs." *Mother Jones*, June 15. http://bit.ly/Adm1nMJ.

Dunn, Abe, Joshua D. Gottlieb, Adam Hale Shapiro, and Pietro Tebaldi. 2019. "The Costs of Payment Uncertainty in Healthcare." Unpublished.

Gilson, Stuart, Kristin Mugford, and Annelena Lobb. 2020. "Bankruptcy in the City of Detroit." Harvard Business School Case 9-215-070.

Goldschmidt, Deborah, and Johannes F. Schmieder. 2017. "The Rise of Domestic Outsourcing and the Evolution of the German Wage Structure." *Quarterly Journal of Economics* 132 (3): 1165–1217.

Gottlieb, Joshua D., Adam Hale Shapiro, and Abe Dunn. 2018. "The Complexity of Billing and Paying for Physician Care." *Health Affairs* 37 (4): 619–26.

Gowrisankaran, Gautam, Keith A. Joiner, and Jianjing Lin. 2019. "How Do Hospitals Respond to Payment Incentives?" NBER Working Paper 26455.

Lee, Jinhyung, Jeffrey S. McCullough, and Robert J. Town. 2013. "The Impact of Health Information Technology on Hospital Productivity." *RAND Journal of Economics* 44 (3): 545–68.

McCullough, Jeffrey S., Stephen Parente, and Robert Town. 2013. "Health Information Technology and Patient Outcomes: The Role of Organizational and Informational Complementarities." NBER Working Paper 18684.

Obama, Barack. 2016. "United States Health Care Reform: Progress to Date and Next Steps." *JAMA* 316 (5): 525–32.

Tabarrok, Alex. 2019. "Are Health Administrators to Blame?" *Marginal Revolution*, August 17. http://bit.ly/Adm1nMR.

Woolhandler, Steffie, and David U. Himmelstein. 1991. "The Deteriorating Administrative Efficiency of the U.S. Health Care System." *New England Journal of Medicine* 324 (18): 1253–58.

This article has been cited by:

1. Lynn Unruh, Aishwarya Joshi. 2024. Growth in Pennsylvania Hospital Administrators 1991-2020. *Medical Care Research and Review* **11**. . [Crossref]
2. Maggie Shi. 2024. Monitoring for Waste: Evidence from Medicare Audits. *The Quarterly Journal of Economics* **139**:2, 993-1049. [Crossref]