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Education

Ph.D., 2009 (Economics)	University of California, San Diego
B.S., 2002 (Business & Public Policy)	University of Pennsylvania (Wharton)
B.A., 2002 (Spanish)	University of Pennsylvania (School of Arts & Sciences)

Professional Experience

2013 – present	Economist	Precision Health Economics
2009 - 2013	Policy Researcher	Acumen, LLC
2008	Instructor	UCSD, Dept. of Economics
2004 - 2009	Teaching Assistant	UCSD, Dept. of Economics
2002 - 2004	Financial Analyst	General Electric
2001	Financial Analyst	Benefits Plus Consulting Group

Selected Honors, Scholarships and Fellowships

2008-2009	Institute for Humane Studies Fellowship
2002	Government Scholars Fellowship, New York City Housing Authority

Selected Research Experience

Malpractice Relative Value Units (MP RVUs) and Geographic Practice Cost Indices (GPCIs)

Centers for Medicare & Medicaid Services (CMS), 2012-2013

Acumen currently works with CMS to calculate two key components of the Medicare physician fee schedule (FFS): (i) malpractice Relative Value Units (RVUs) and (ii) updating the Geographic Practice Cost Indexes (GPCIs). To update the malpractice RVUs, Acumen is collecting information from a variety of sources (e.g., State Departments of Insurance, the NAIC) to measure regional variation in malpractice premiums. Second, Acumen currently calculates the GPCIs, which adjust physician payments for geographic differences in the costs of inputs for physician services, and as part of this project will update these calculations using more recent data and improved methodologies. Currently, Acumen is evaluating the use of alternative data sources (e.g., using commercial rent data rather than residential rent data to compute office rent), methodologies (e.g., alternative set of proxy occupations for the physician work GPCI), and payment localities (e.g., Metropolitan Statistical Areas rather

than the 89 Medicare payment localities). In a previous contract, Acumen also proposed the creation of a purchased services index within the practice expense GPCI to capture physician costs for workers who are contracted rather than directly employed by the office. To assess the effect of updating the data or methodology used to calculate the MP RVUs and GPCIs, Acumen will conduct detailed impact analyses investigating the differences in GPCI component values.

- Project Manager
- Writing and Dissemination Lead

Hospital Value-Based Purchasing Payment Standardization

Centers for Medicare & Medicaid Services (CMS), 2011-2013

Under a contract with the Centers for Medicare and Medicaid Services (CMS), Acumen computes Medicare spending per beneficiary (MSPB) measure scores and value-based incentive payment adjustments for hospitals annually. Recently added to the Hospital Value-Based Purchasing (HVBP) program measures set, the MSPB measure evaluates hospitals' efficiency by assessing the cost of services performed by doctors and other healthcare providers during an MSPB episode. Because expenditures for the same set of services can vary geographically due to differences in case mix and input prices, Acumen developed risk adjustment and price standardization methodologies to remove these sources of variation that a hospital cannot directly control. Acumen also provided technical assistance to post this measure on hospital Compare and responded to providers questions. Acumen also will calculate hospitals' value-based incentive payment adjustments for FY 2015. As part of an extension to this project, Acumen is also calculating standardized payments to be used for the physician Quality and Resource Use Reports (QRUR).

- Project Manager; designed risk adjustment specification and MSPB implementation; designed reports and data files to be distributed to hospitals through QualityNet; led ad hoc and impact analyses for MSPB and HVBP Total Performance Scores (TPS)

Geographic Adjustment Factors in Medicare Payment

Centers for Medicare & Medicaid Services (CMS), 2011-2013

To support future rulemaking, Acumen is assisting CMS in evaluating the Institute of Medicine's (IOM) findings and recommendations regarding potential revisions to the geographic adjustment factors in Medicare. On September 28, 2011, IOM released its first report titled *Geographic Adjustment in Medicare Payment, Phase I: Improving Accuracy*, which evaluates the accuracy of the Hospital Wage Index (HWI) and Geographic Practice Cost Index (GPCI) adjustment factors, as well as the methodology and data used to calculate them. Acumen evaluates IOM's findings and recommendations and provides CMS with reports to be used to support the proposed and final rules for payment systems impacted by the HWI and GPCIs, including the Inpatient Prospective Payment System (IPPS), Outpatient Prospective Payment Systems (OPPS), and Medicare Physician Fee Schedule (PFS).

- Project Manager; led conceptual and empirical evaluation of IOM proposals to modify HWI and GPCI; lead writer for two reports evaluating HWI and GPCI recommendations

Geographic Variation in Health Care Spending and Quality of Care

Institute of Medicine (IOM), 2011-2013

In partnership with the Institute of Medicine of the National Academies (IOM), Acumen evaluates geographic variation in levels of medical spending, utilization, and care quality for Medicare and Medicaid beneficiaries. The goal of this study is to guide policymakers to contain healthcare spending while promoting high-quality care. Working with partners at Harvard University, and the Lewin Group—who are conducting a parallel analysis for commercially insured beneficiaries—Acumen identifies whether areas that have low costs and high quality for Medicare and Medicaid beneficiaries also are able to provide superior care for commercial beneficiaries. In addition to an aggregate analysis, Acumen examines regional variation in spending, quality, and utilization for fifteen beneficiary disease cohorts (e.g., diabetes, acute myocardial infarction, breast cancer). Finally, Acumen examines multiple years of data to determine if the poor performance is persistent over time.

- Project Manager; led coordination across contractors; collaborated with IOM Committee to design econometric specifications; lead writer for Acumen Final Report

Episode Grouper Software Evaluation / Application of Episode Groupers to Medicare / Medicare Grouper Evaluation and Physician Profiling Issues/ Calculating Episode Based Costs from the Medicare Episode Grouper for Physician Feedback

Centers for Medicare & Medicaid Services (CMS), 2009-2013

In a series of contracts with CMS, Acumen is exploring approaches to evaluating Medicare providers' cost efficiency based on episodes of care. In the first contract, Acumen tested the functionality of episode grouper software. In the second contract, Acumen created resource efficiency reports for providers with the output from the grouper software evaluation and assessed the usefulness and sensitivity of the reports in rating provider performance. In the third contract, Acumen evaluated the use of episode grouper output for developing measures of physician cost-efficiency, including evaluating different methods for risk-adjusting episode costs, using various criteria developed in conjunction with CMS. Under the current contract, Acumen is calculating episode-based costs from the Medicare Episode Grouper to evaluate physicians in supplemental Quality and Resource Use Reports (QRURs). Drawing on our group's broad and in-depth knowledge of CMS-led quality measurement programs, Acumen will also identify quality measures that are associated with the episode cost measures and analyze how the relationships between cost and quality of care at various levels may impact CMS payment programs and policies.

- Writer; led writing for a series of four reports evaluating commercial grouping algorithms and two reports evaluating new grouper prototypes tailored to Medicare beneficiaries

Revision of the Medicare Wage Index

Centers for Medicare & Medicaid Services (CMS), 2009-2013

To assist CMS in assessing options for revising the hospital wage index, Acumen evaluated the Medicare Payment Advisory Commission (MedPAC) revision to the hospital wage index and has also proposed our own alternative wage index formulation. As part of its Inpatient Prospective Payment System (IPPS), CMS adjusts the labor share of its base rate to adjust for geographical differences in labor costs. Acumen completed a detailed impact analysis that compared MedPAC's recommendations for revising the wage index with the current Medicare hospital wage index. Based on the findings of these reports, the Acumen team decided further improvements were needed and began designing an alternative wage index framework. Acumen conducted an empirical proof of concept report which applied the

framework to hospitals in five metropolitan statistical areas (MSAs), and completed an impact analysis comparing our alternative Commuting-Based Wage Index (CBWI) formulation with the Medicare hospital wage index. This alternate formulation uses commuting data to create more flexible hospital-specific labor markets. Acumen also provided technical assistance for the Wage Index Reform Report to Congress.

- Project Manager; alternative framework design and implementation; evaluation of alternative data sources for CBWI; technical support for a Report to Congress.

Medicare Physician Fee Schedule Malpractice Relative Value Units (MP RVUs) and Geographic Practice Cost Indices (GPCIs)

Centers for Medicare & Medicaid Services (CMS), 2011-2013

Acumen produces regular updates of the Geographic Practice Cost Index (GPCI). The GPCI, as part of the Resource-Based Relative Value Scale (RBRVS) method of paying physicians, accounts for geographic variation in physician costs for providing services. For the most recent update, Acumen examined alternative data sources and methods to construct the GPCI. Because CMS has not previously included regional variation in the cost of purchased services (e.g., accounting, legal, advertising, consulting, landscaping) within the employee wage index, Acumen evaluated the impact of implementing a new purchased services index that accounts for regional variation in physician expenses for contracted services. To address stakeholder feedback indicating that the previous methodology for creating the employee wage index omits key occupational categories, Acumen also evaluated the impact of expanding the occupations included in the non-physician employee wage index. Acumen wrote two reports that analyzed and suggested revisions to the Sixth Update of the GPCI, and also provided technical support helping CMS respond to public comments. The associated analyses helped inform CMS's proposed and final rules on the physician fee schedule.

- Project Manager; methodology design leader; improvements include the development of a purchased services index; provided technical assistance to CMS in response to public comments.

Physician Compare Web Site Implementation Support

Centers for Medicare & Medicaid Services (CMS), 2011-2013

Acumen (in partnership with Westat and Rose Communications) is working with CMS to transform Physician Compare from a directory of basic provider information to a comprehensive source of performance quality data by January 1, 2013, as required by Section 10331 of Health Care Reform H.R. 3950. Physician Compare will provide useful information for consumers to make an informed decision about the choice of provider and create explicit incentives for physicians to maximize performance. Acumen's core activities involve working closely with CMS to achieve a number of objectives, such as developing a comprehensive public reporting timeline for Physician Compare, leading the development of methods to select measures suitable for public reporting on Physician Compare, identifying and leading empirical analyses of measures and patient populations, assisting CMS by responding to public comments concerning measures development, and developing a Physician Compare Quality Assurance (QA) plan to ensure the validity of data used to construct quality measures presented through Physician Compare.

- Measure Selection Lead; empirical analysis of variability in the measures across physicians, and reliability of attribution to physicians and physician groups

Medicare Research Information Center (MedRIC)

National Institute on Aging (NIA), Small Business Innovation Research, 2010-2013

MedRIC facilitates the acquisition and linking of CMS data for participants of surveys and registries sponsored by NIA and other related federal agencies, and to advance the use of these data for research and public policy. The overriding goal is to vastly reduce the costs and burdens that survey and registry projects, along with individual researchers and policy analysts, must bear to obtain and use administrative data from the Medicare and Medicaid programs in their study of health care and status of program beneficiaries. Acumen established infrastructure for (i) obtaining Medicare and Medicaid claims and enrollment data for beneficiaries appearing as respondents in surveys and registries; (ii) matching data at the person level to create supplementary research files describing the health status and utilization of medical services of individual sample members; (iii) creating a rich array of research extracts developed to meet the specific requirements of individual projects; and (iv) assisting projects in the establishment of processes for data access by individual investigators consistent with CMS policy.

- Writer/Data File Design Consultant; overall project management, creation of logic for each summary variable

Development of the Post Acute Care Supplement (PACS) Research Files

Agency for Healthcare Research and Quality (AHRQ), 2010-2012

The SPHERE Institute, in collaboration with Acumen, LLC, is developing post-acute care supplemental research files (PACS) to evaluate trends in the population of chronically-ill Medicare beneficiaries. This beneficiary group is at high risk of repeated hospitalization, often receives a combination of nursing home or home health services, and is responsible for a large share of rising total Medicare expenditures. Prevalence of comorbid conditions among this population is a major factor driving its high healthcare costs. This project will create user-friendly longitudinal research files using episodic Outcomes and Assessment Information Set (OASIS) and Minimum Data Set (MDS) data. By translating the current assessment files into a more research-friendly longitudinal format—with one observation each year for each beneficiary—researchers will be able to access information on Medicare's most vulnerable population more easily.

- Project Manager; overall project management; creation of file design for OASIS Annual Summary File (OASF) and Long-Term Care Annual Summary File (LTCASF)

Outcomes and Assessment Information Set (OASIS) Measure Development & Maintenance

Centers for Medicare & Medicaid Services (CMS), 2010-2012

Acumen is currently developing and testing quality measures suitable for value-based purchasing (VBP) for home health care. Our group's new measure development has focused on using Medicare claims data to assess rates of emergency department use and acute care hospitalization across the universe of home health agencies. These claims-based measures have been NQF-approved and may replace some of the OASIS-C assessment measures currently used to evaluate and publicly report information about home health agencies to consumers. Additionally, Acumen developed a risk adjustment model that will permit

meaningful comparisons of these hospitalizations and emergency room visits across all home health agencies. Acumen is working with CMS to continue developing additional new claims-based measures that will be publicly reported. Acumen also maintains previously developed process, outcome, and potentially avoidable event measures based on OASIS assessment data. Finally, Acumen developed an implementation plan for value-based purchasing (VBP) in the home health setting to include in the FY2011 Report to Congress. Based on an evaluation of elements of previous and existing VBP systems and CMS feedback, Acumen developed an implementation plan for a VBP program for home health. This implementation plan was submitted to CMS in July 2011 and formed the basis of a Report to Congress.

- Writer and Payment Policy Consultant; developed framework for translating home health quality scores into summary value of overall performance; designed approach through which CMS could use the composite scores to affect payments to home health agencies

Constructing One or More Price Indexes for Part D Drugs/Constructing a 2008 Price Index for Part D Drugs/Constructing a 2009 Price Index

Medicare Payment Advisory Commission (MedPAC), 2009-2012

Under a contract with MedPAC, Acumen has developed a set of price indices for Part D drugs. These indices not only evaluate overall price trends, but also allow for more detailed analysis of price growth in specific Part D populations (e.g., low-income subsidy beneficiaries, institutionalized beneficiaries). Acumen also analyzed price trends for specific drug categories such as protected classes and biologics. These findings were used in conjunction with measures of drug utilization and enrollment to isolate the source of changes in Part D expenditure levels over time, both nationally and regionally.

- Writer; contributed to writing for draft and final reports

Time Series Modeling and Related Economic Forecasting Methods in Long-Run Health Expenditure Projections

Centers for Medicare & Medicaid Services (CMS), 2009-2011

This project aims to improve the methodology for projecting national health expenditure (NHE). First, Acumen compared two prominent projection methods: one developed by CMS's Office of the Actuary (OACT) and another created by the Congressional Budget Office (CBO). Second, our group outlined various alternative statistical projection methods and evaluated their relative merits and drawbacks for this purpose of long-term NHE projections. For example, Acumen evaluated whether the use of time-series modeling can improve accuracy for 75-year current law projections.

- Task Lead for projection method econometric evaluation of long-term prediction models

Publications

1. *Geographic Variation in Spending, Utilization and Quality: Medicare and Medicaid Beneficiaries*, (with Thomas MaCurdy, Jay Bhattacharya, Daniella Perloth, Anita Au-Yeung, Hani Bashour, Camille Chicklis, Kennan Cronen, Brandy Lipton, Shahin Saneinejad, Elen Shrestha, and Sajid Zaidi) Report prepared for the Institute of Medicine. Burlingame, CA, 2013.
2. *IOM Study of Geographic Variation: Growth Analysis*, (with Thomas MaCurdy, Jay Bhattacharya, Camille Chicklis, Kennan Cronen, Jesselyn Friley, Brandy Lipton, Daniel Rogers, Sajid Zaidi.) Report prepared for the Institute of Medicine. Burlingame, CA, 2012.
3. *Geographic Adjustment of Medicare Payments to Physicians: Evaluation of IOM Recommendations*, (with T. MaCurdy, T. DeLeire, J. DeVaro, M. Bounds, D. Pham, and A. Chia), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2012.
4. Wage Index Reform Report to Congress: Technical Appendix. “Revising the Medicare Wage Index to Account for Commuting Patterns” (with T. MaCurdy, K. López de Nava, A. Shah, T. DeLeire). Acumen, LLC Report prepared for the Center for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2012.
5. *Home Health Value-Based Purchasing Optional Design Approaches*, (with T. MaCurdy, K. Cook, K. Piccinini, M. O’Brien-Strain, A. Shah, G. DeForest, L. Hyungi Noh, C. Sharma, and D. Deitz), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
6. *Report to Congress: Plan to Implement a Medicare Home Health Value-Based Purchasing Program*, (with T. MaCurdy, K. Cook, K. Piccinini, G. Marrufo, A. Dixit, and A. Shah), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
7. *Long-Term Forecasts Using Time Series Models*, (with T. MaCurdy, and P. Hansen), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, 2011.
8. *Revising the Medicare Wage Index to Account for Commuting Patterns*, (with T. MaCurdy, K. López de Nava, A. Shah, and T. DeLeire), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
9. *Proposed Revisions to the Sixth Update of the Geographic Practice Cost Index*, (with T. MaCurdy, and M. Bounds), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
10. *Revisions to the Sixth Update of the Geographic Practice Cost Index: Final Report*, (with T. MaCurdy, M. Bounds, and D. Pham), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
11. *Optimal Pay-for-Performance Scores: How to Incentivize Physicians to Behave Efficiently Using Episode-Based Measures*, (with T. MaCurdy, E. Hartmann, M. Ho, L. Talbot, K. Ueda, and Z. Zhang), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.

12. *Issues in the Construction of Medicare Episodes*, (with T. MaCurdy, E. Hartmann, M. Ho, L. Talbot, J. Wong, S. Zaidi, and Z. Zhang), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
13. *Evaluations of Four Episode Groupers*, (with T. MaCurdy, S. Zaidi, C. Sharma, M. Wernecke, C. Chicklis, J. Choi, and M. Chou), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
14. *Medicare Grouper Evaluation: Risk Adjustment*, (with T. MaCurdy, S. Zaidi, C. Sharma, M. Wernecke, C. Chicklis, J. Choi, and M. Chou), Acumen, LLC Report prepared for the Centers for Medicare and Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
15. *Analysis of Current-Law Health Expenditure Projections*, (with T. MaCurdy, and D. Zheng), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2011.
16. *Expenditure Patterns for Part D Prescription Drugs, 2006-2008*, (with T. MaCurdy, M. Bounds, E. Hartmann, J. Son, and K. Ueda), Acumen, LLC Report prepared for the Medicare Payment Advisory Commission. Burlingame, CA: Acumen, LLC, 2010.
17. *Price Indices for Part D Prescription Drugs: 2006-2008*, (with T. MaCurdy, M. Bounds, K. Ueda, J. Son, S. Jhatakia, and E. Hartmann), Acumen, LLC Report prepared for the Medicare Payment Advisory Commission. Burlingame, CA: Acumen, LLC, 2010.
18. *Revision of Medicare Wage Index: Final Report, Part II*, (with T. MaCurdy, T. DeLeire, K. Lopez de Nava, P. Kamenecka, and Y. Tan), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2010.
19. *Overview of Acumen's Alternative Formulation of the Hospital Wage Index*, (with T. MaCurdy, T. DeLeire, K. López de Nava, and A. Shah), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2010.
20. *Consumption Patterns of Prescription Drugs in the Part D Program, 2006-2008*, (with T. MaCurdy, E. Hartmann, M. Bounds, K. Piccinini, J. Son, and K. Ueda), Acumen, LLC Report prepared for the Medicare Payment Advisory Commission. Burlingame, CA: Acumen, LLC, 2010.
21. *Challenges in the Risk Adjustment of Episode Costs*, (with T. MaCurdy, E. Hartmann, M. Ho, L. Talbot, K. Ueda, and Z. Zhang), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2010.
22. *Evaluating the Stability of Physician Efficiency Scores*, (with T. MaCurdy, E. Hartmann, M. Ho, L. Talbot, K. Ueda, and Z. Zhang), Acumen, LLC Report prepared for the Centers for Medicare & Medicaid Services. Burlingame, CA: Acumen, LLC, 2010.
23. *National Health Expenditure Forecasting: A Handbook for Comparing OACT and CBO Methods*, (with T. MaCurdy, and T. Caldis), forthcoming as Centers for Medicare & Medicaid Services: Research Reports, Draft 2010.
24. "Operating on commission: How physician financial incentives affect surgery rates," *Health Economics*, v19(5):562-580, May 2010.
25. "Delivering Vaccines: A Case Study of the Distribution System of Vaccines for Children," (with J. Fontanesi), *American Journal of Managed Care*, v15(10):751-754, October 2009.

26. "Comparison of Pharmacists and Primary Care Providers as Immunizers," (with J. Fontanesi, J.D. Hirsch, S.M. Lorentz, D.A. Bowers), *American Journal of Pharmacy Benefits*, v1(3):150-157, Fall 2009.