Authors’ abstracts, when available, are reproduced below. I have summarized some works for which authors have not supplied abstracts.


Abstract: We estimate a semi-parametric model of health production process using a two-stage approach for OECD countries. By regressing data envelopment analysis output efficiency scores on non-discretionary variables, both using Tobit analysis and a single and double bootstrap procedure, we show that inefficiency is strongly related to GDP per head, the education level, and health behaviour such as obesity and smoking habits. The used bootstrapping procedure corrects likely biased DEA output scores taking into account that environmental variables are correlated to output and input variables.


Abstract: This paper presents a data envelopment analysis model that can be implemented by public sector management for assessing the efficiency of a health system within a developing country. To illustrate the practical implementation and interpretation of the model this study compares health systems across 51 developing countries using 1998-99 data. The results of the analysis generated empirical indicators of efficiency, and we demonstrate how these may then be used by management in order to understand the factors associated with good performance of a health system.

Abstract: Purpose Medical-group practices are becoming increasingly commonplace, with more than a third of licensed physicians in the United States currently working in this mode. While previous studies have focused on physician practices, little attention has been focused specifically on the contribution of internal organizational factors to overall physician practice efficiency. This paper develops a model to help determine best practices of efficient physician offices while allowing for choices between inputs. Measuring how efficient practices provide services yields useful information to help improve performance of less efficient practices. Design Data for this study were obtained from the 1999 Medical Group Management Association (MGMA) Cost Report. In this study, 115 primary care physician practices are analyzed. Outputs are defined as gross charges; inputs include square footage and medical, technical, and administrative support personnel. Methodology Data envelopment analysis (DEA) is used in this study to develop a model of practice outputs and inputs to help identify the most efficient medical groups. DEA is a linear programming technique that converts multiple input and output measures to a single comprehensive measure of efficiency. These practices are used as a reference set for comparisons with less efficient ones. Conclusion The overall results indicate that size of physician practice does not increase efficiency. There does not appear to be extensive substitution among inputs. Compared to other practices, efficient practices seem to manage each input well.


Abstract: We summarize results of several data envelopment analysis (DEA) studies to identify countries with the most efficient healthcare systems in terms of translating resources consumed into outputs produced. These analyses identify 27–65 countries on empirical performance frontiers based on six key dimensions of healthcare systems — clinical outcomes, health adjusted life years, access, equity, safety, and resources — using modified DEA methods for rationally constraining weights given to each measure and handling proportional data such as outcome rates. The DEA models also produce targets for each measure that would move an inefficient healthcare system to the current best performance frontier. Results are reported for 180 countries using data obtained primarily from the World Health Organization (WHO), both altogether and separately within each of four WHO economic development categories. Overall, very few countries were found to be efficient, suggesting significant opportunities for improvements through combining best practices.

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Abstract: Ukraine’s recent elections revealed deep divisions between eastern regions, which favored central economic planning, and western regions, which preferred more free market reforms. This study compares polyclinics in Ukraine to see if the inflexibility of Soviet-style planned economies results in lower economic efficiency in eastern regions. Using data from two geopolitical regions, Data Envelopment Analysis (DEA) scores for polyclinic efficiencies are modeled as a function of demographic and economic determinants. Surprisingly, results indicate that polyclinics in western Ukraine are less efficient. Possible explanations, including case mix intensity, responsiveness to local preferences, physician entrepreneurial behavior and a legacy of inequitable funding, are discussed.


Abstract: This study examined the efficiency of health care delivery systems in 24 OECD countries. Practicing physicians, practicing nurses, inpatient beds, and pharmaceuticals were considered as inputs to treat populations of various age groups. Data envelopment analysis (DEA) was utilized to calculate efficiency. We also calculated input efficiency that should be helpful in determining excess number of physicians, nurses, inpatient beds, and pharmaceuticals consumed. Institutional arrangements affect efficiency: public-contract and public-integrated countries are more efficient than public-reimbursement countries. Countries in which physicians are paid in wages and salaries and countries with capitation have higher efficiency than fee-for-service countries. Countries in which a primary care physician acts as a gatekeeper are also more efficient than countries without gatekeepers.


Abstract: This paper describes the efficiency of Dutch hospitals using the method of Data Envelopment Analysis (DEA). In particular the analysis focuses on explaining cost inefficiency measures due to each hospital’s operating environment. In previous works, the resulting DEA score is regressed on environmental factors via a Tobit approach. Previously, these approaches have been used [Simar and Wilson, J Prod Anal 7(1):63-80, 2000] but later these authors [Simar and Wilson 2007] demonstrated that bias is incurred since the efficiency score is a point estimate without a probability distribution around it that is required by the Tobit methodology. In this paper we use the Simar and Wilson bootstrapping techniques in order
to obtain more efficient estimates of the environmental effects. It is shown that differences in estimated effects exist between the non-bootstrapped and bootstrapped models.


Abstract: Current debates in the insurance and public policy literatures over health care financing and cost control measures continue to focus on managed care and HMOs. The lower utilization rates found in HMOs (compared to traditional fee-for-service indemnity plans) have generally been attributed to the organization’s incentive to eliminate all unnecessary medical services. As a consequence HMOs are often considered to be a more efficient arrangement for delivering health care. However, it is important to make a distinction between utilization and efficiency (the ratio of outcomes to resources). Few studies have investigated the effect that HMO arrangements would have on the actual efficiency of health care delivery. Because greater control over provider autonomy appears to be a recurrent theme in the literature on reform, it is important to investigate the effects these restrictions have already had within the HMO market. In this article, the efficiencies of two major classes of HMO arrangements are compared using “game-theoretic” data envelopment analysis (DEA) models. While other studies confirm that absolute costs to insurance firms and sponsoring companies are lowered using HMOs, our empirical findings suggest that, within this framework, efficiency generally becomes worse when provider autonomy is restricted. This should give new fuel to the insurance companies providing fee-for-service (FFS) indemnification plans in their marketplace contentions.


Abstract: Frequently data envelopment analysis is conducted on empirical data that are either proportions, estimated, or both. When proportional rates are estimated either from a sample of data or by expert judgment, point and interval estimates for efficiency scores, projection targets, and reference sets can be developed via Monte Carlo sampling. We explore and apply a simple approach to identify countries with the most efficient healthcare systems, using data from the World Health Organization that includes several estimated rates (e.g., infant and adult mortality, immunization rates, and TB prevalence).

Abstract: Using data from the Annual Survey of Hospitals compiled by the Department of Health in Taiwan for years 1994 through 1997, we employed Data Envelopment Analysis (DEA) to evaluate the impact of a National Health Insurance (NHI) Program on the operating efficiency of district hospitals in Taiwan. We find that, on average, efficiency of district hospitals in Taiwan decreased following the implementation of the NHI Program. Our results are robust to the inclusion of control variables that have been shown to affect hospital operating performance in prior research, and alternative efficiency measurements.


Abstract: This paper uses both the non-parametric method of Data Envelopment Analysis (DEA) and the econometric method of Stochastic Frontier Analysis (SFA) to study the production technology and cost efficiency of the U.S. dental care industry using practice level data. The American Dental Association (ADA) 2006 survey data for a number of general dental practices in Colorado are used for the empirical analyses. The result shows that the average cost efficiency score is 0.79 for DEA and 0.87 for SFA, and the cost inefficiency comes mainly from the allocative inefficiency. The minimum average cost of production is 50.6 cents for each dollar of gross billing generated. The optimal output level for a dental practice to fully exploit the economies of scale is at $1.68 million. Both DEA and SFA provide generally consistent results.


The author surveys DEA methods and examines their applications to hip replacement teams; physical, occupational, and speech therapy; and cardiac surgeons.


Abstract: This paper applies a new methodology to the study of hospital efficiency and quality of care. Using a data set of hospitals from several states, we jointly evaluate desirable hospital patient care output (e.g., patient stays) and the simultaneous undesirable output (e.g., risk-adjusted
patient mortality) that occurs. With a DEA based approach under two different sets of assumptions, we are able to include multiple quality indicators as outputs. The results show that lower technical efficiency is associated with poorer risk-adjusted quality outcomes in the study hospitals. They are consistent with other studies linking poor quality outcomes to higher cost.


Abstract: We use resampling of data to explore the basic statistical properties of super-efficient data envelopment analysis (DEA) when used as a benchmarking tool by the manager of a single decision-making unit. Our focus is the gaps in the outputs (i.e., slacks adjusted for upward bias), as they reveal which outputs can be increased. The numerical experiments show that the estimates of the gaps fail to exhibit asymptotic consistency, a property expected for standard statistical inference. Specifically, increased sample sizes were not always associated with more accurate forecasts of the output gaps. The baseline DEA’s gaps equaled the mode of the jackknife and the mode of resampling with/without replacement from any subset of the population; usually, the baseline DEA’s gaps also equaled the median. The quartile deviations of gaps were close to zero when few decision-making units were excluded from the sample and the study unit happened to have few other units contributing to its benchmark. The results for the quartile deviations can be explained in terms of the effective combinations of decision-making units that contribute to the DEA solution. The jackknife can provide all the combinations contributing to the quartile deviation and only needs to be performed for those units that are part of the benchmark set. These results show that there is a strong rationale for examining DEA results with a sensitivity analysis that excludes one benchmark hospital at a time. This analysis enhances the quality of decision support using DEA estimates for the potential of a decision-making unit to grow one or more of its outputs.


Abstract In this paper we propose a new technique for incorporating environmental effects and statistical noise into a producer performance evaluation based on data envelopment analysis (DEA). The technique involves a three-stage analysis. In the first stage, DEA is applied to outputs and inputs only, to obtain initial measures of producer performance. In the second stage, stochastic frontier analysis (SFA) is used to regress first stage performance measures against a set of environmental variables. This provides, for each input or output (depending on the orientation of the first stage
DEA model), a three-way decomposition of the variation in performance into a part attributable to environmental effects, a part attributable to managerial inefficiency, and a part attributable to statistical noise. In the third stage, either inputs or outputs (again depending on the orientation of the first stage DEA model) are adjusted to account for the impact of the environmental effects and the statistical noise uncovered in the second stage, and DEA is used to re-evaluate producer performance. Throughout the analysis emphasis is placed on slacks, rather than on radial efficiency scores, as appropriate measures of producer performance. An application to nursing homes is provided to illustrate the power of the three-stage methodology.


Abstract: *Objectives* To expand care for chronic haemodialysis (HD) patients throughout England and Wales by studying two aspects of service delivery that are important: to identify relative performance of haemodialysis satellite units (HDSUs), and understand the factors that influence the performance. As a first step toward these aspects, this work reports a study of apparent comparative efficiency in the delivery of HDSUs and demonstrates the potential of data envelopment analysis (DEA). *Methods* DEA was applied to data obtained from a national survey of the organizational structures and processes of delivering care at HDSUs in England and Wales. *Results* DEA was found to be a judicious approach for performance assessment of HDSUs, although valid results depend on appropriate model specification and quality of data available. The available data were not of sufficient comprehensiveness or quality to produce definitive results but suggested that overall efficiency could improve; these data suggested by as much as 10% overall (mean efficiency score 90%) and variably within the sample (46 [65%] that HDSUs were potentially inefficient, the lowest unit scoring 38%). *Conclusions* Addressing questions raised by comparative inefficiency could help plans to improve capacity to deal with the growing demand for HD delivered in HDSUs. The application was an important start and needs to be followed by further research to establish model validity and obtain authoritative results.


Abstract: We use data from the Health Service Indicators database to compare different methods of measuring the performance of English Family Health Services Authorities (FHSAs) in providing primary care. A variety of regression and data envelopment analysis methods are compared as summary efficiency measures of individual FHSAs performance. The correlation
of the rankings of FHSAs across DEA and regression methods, across two years of data and across three different specifications of the technology of primary care are examined. Efficiency scores are highly correlated within variants of the two methods, and across years for a given method. Inter method correlations are smaller and correlations across different specifications of the primary care production process are negligible and sometime negative.


Abstract: The UK government believes that substantial variations in efficiency persist in the National Health Service and has called for improvements in the cost effectiveness of service provision. As part of this general initiative, hospitals have been encouraged to participate in a project designed to compare labour costs in general surgery specialties. This paper analyses these costs, taking into account the scale of operation and mix of output, using econometric techniques and data envelopment analysis. The results produced by these methods are compared as a form of sensitivity analysis. For the majority of general surgery units no evidence is found to support the belief that there are widespread differences in cost efficiency. However, a small number of units appear to perform poorly irrespective of the measurement technique employed. These units merit further scrutiny.


Abstract: This paper reviews 188 published papers on frontier efficiency measurement. The techniques used are mainly based on non-parametric data envelopment analysis, but there is increasing use of parametric techniques, such as stochastic frontier analysis. Applications both to hospitals and wider health care areas are reviewed and summarised, and some meta-type analysis undertaken. Results appear to confirm earlier findings that public provision demonstrates less variability than private. The paper is meant as a resource in itself, but also points to the future in terms of possible directions for research in efficiency measurement in health care and health.


Abstract: The measurement of efficiency and productivity of health service delivery has become a small industry. This is a review of 317 published papers on frontier efficiency measurement. The techniques used are mainly based on non-parametric data envelopment analysis, but there is increasing use of parametric techniques, such as stochastic frontier analysis. Applications to hospitals and other health care organizations and areas are reviewed
and summarised, and some meta-type analysis undertaken. Cautious conclusions are that public provision may be potentially more efficient than private, in certain settings. The paper also considers conceptualizations of efficiency, and points to dangers and opportunities in generating such information. Finally, some criteria for assessing the use and usefulness of efficiency studies are established, with a view to helping both researchers and those assessing whether or not to act upon published results.


Abstract: Offers a balanced critique of the current state of the art of efficiency analysis as applied to health care. Provides a general introduction to the context and principles underlying the development of efficiency analysis. Explores stochastic frontier analysis and data envelopment analysis. Assesses their major weaknesses from a policy perspective. Presents some tentative proposals for complementary analytic approaches. Summarizes the current state of the art in effective regulation of health care.


Abstract: The research presented in this paper provides an analysis of the delivery of a few health care services by the public sector in Gauteng, South Africa. The data for the study was especially difficult to collect, suggesting the need for hospital level data information systems, as well as staff who are trained to analyze the information collected. The empirical results from the analysis suggest that services provided by small-scale medical facilities waste fewer resources, while medical centres offering more technical services, such as surgeries, also appear to deliver medical services more efficiently.


Abstract: Renewed debate over competition in healthcare suggests that greater specialization is good for the health economy. In essence, greater specialization is hypothesized to lead to lower average costs, due to learning curve effects, scale, or other operating efficiencies. This hypothesis was tested in oncology care, since this disease group is one of the few with existing specialized cancer centers already in place. Data envelopment analysis (DEA), and specifically a longitudinal Malmquist index over a 5-year period was applied to the major, specialized inpatient cancer centers to determine if these specialized centers achieve higher productivity over time, and if scale leads to higher operating efficiency. Results suggest policy and
payer implications since these DRG-exempt hospitals may not be improving their technical efficiency over time. Despite advancements in technology and greater scale, the average efficiency of cancer care has marginally declined. Similarly, when compared to other hospitals with greater numbers of other service offerings, oncology care has not benefited from increasing returns to scale.


Abstract: In this article, we use data on five social inclusion indicators (poverty, inequality, unemployment, education, and health) to assess and compare the performance of 15 European welfare states (EU15) over a 12-year period from 1995 to 2006. Aggregate measures of performance are obtained using index number methods similar to those employed in the construction of the widely used Human Development Index. These are compared with alternative measures derived from data envelopment analysis methods. The influence of methodology choice and the assumptions made in scaling indicators upon the results obtained is illustrated and discussed. We then analyse the evolution of performance over time, finding evidence of some convergence in performance and no sign of social dumping.


Abstract: In this paper we use non-parametric mathematical programming models to compute and decompose Malmquist indices of productivity and quality change, which are used to evaluate the reforms in the UK National Health Service in the early nineties. We focus on acute hospitals and we study them over the first five years of the reforms. The findings of the study indicate that there was a productivity slowdown in the first year after the reforms but productivity progress in the subsequent years and thus, overall there was a net gain in productivity over the entire period considered. Productivity trends were dominated by technical change rather than hospital relative efficiency changes, as hospitals were already largely relatively efficient at the time of the introduction of the reforms. In fact, over the last four years in the period studied there was small relative efficiency regress and this does not bear out the argument that the reforms would increase hospital efficiency. The productivity changes are similar when service quality is incorporated in the analysis but the magnitude of these changes diminishes. Quality of service followed different trends to productivity change and this may have been the price for the productivity gains achieved.

Abstract: In this study Malmquist productivity indexes are used to evaluate the performance of acute hospitals in the UK over the period after the introduction of the internal market in the National Health Service in 1991. The indexes are computed using nonparametric programming, known as Data Envelopment Analysis, and they are decomposed into multiple component measures to give insights into the trends in hospital performance. Overall it is found that productivity regressed in the year after the reforms but progressed thereafter so that overall there was a net progress both as far as the inputs and costs are concerned. Productivity progress is mainly due to overall efficiency progress, which in turn is mostly attributed to allocative efficiency improvements. Technical change resulted in a small reduction in the amount of inputs used but also at higher production costs, because of a worsening in the match between input mixes and relative input prices. However, it is suggested that the gains in productivity are not high enough to argue that the internal market has had a significant impact on productivity. Finally, it is argued that the methodologies employed here can be a valuable evaluative and managerial tool in the context of the new NHS reforms about to be introduced.


Abstract: Background Zambia has recently articulated an ambitious national health program designed to meeting health-related MDGs. Public expectations are high and Zambia continues to receive significant resources from global and bilateral donors to support its health agenda. Although the lack of adequate resources presents the most important constraint, the efficiency with which available resources are being utilised is another challenge that cannot be overlooked. Inefficiency in producing health care undermines the service coverage potential of the health system. This paper estimates the technical efficiency of a sample of hospitals in Zambia. Methods Efficiency is measured using a DEA model. Vectors of hospital inputs and outputs, representing hospital expended resources and output profiles respectively, were specified and measured. The data were gathered from a sample of 30 hospitals throughout Zambia. The model estimates an efficiency score for each hospital. A decomposition of technical efficiency into scale and congestion is also provided. Results Results show that overall Zambian hospitals are operating at 67% level of efficiency, implying that significant resources are being wasted. Only 40% of hospitals were efficient in relative terms. The study further reveals that the size of hospitals is a major source of inefficiency. Input congestion is also found to be a source of hospital inefficiency. Conclusion This study has demonstrated that inefficiency of resource use in hospitals is significant. Policy attention is drawn to unsuitable hospital scale of operation and low productivity of some inputs as factors that reinforce each other to make Zambian hospitals technically
inefficient at producing and delivering services. It is argued that such evidence of substantial inefficiency would undermine Zambia’s prospects of achieving its health goals.


Abstract: The significant impact of health foodservice operations on the total operational cost of the hospital sector has increased the need to improve the efficiency of these operations. Although important studies on the performance of foodservice operations have been published in various academic journals and industrial reports, the findings and implications remain simple and limited in scope and methodology. This paper investigates two popular methodologies in the efficiency literature: Bayesian “stochastic frontier analysis” (SFA) and “data envelopment analysis” (DEA). The paper discusses the statistical advantages of the Bayesian SFA and compares it with an extended DEA model. The results from a sample of 101 hospital foodservice operations show the existence of inefficiency in the sample, and indicate significant differences between the average efficiency generated by the Bayesian SFA and DEA models. The ranking of efficiency is, however, statistically independent of the methodologies.


Abstract: This paper compares the relative productive efficiencies of four models of primary care service delivery using the data envelopment analysis method on 130 primary care practices in Ontario, Canada. A quality-controlled measure of output and two input scenarios are employed: one with full-time-equivalent labour inputs and the other with total expenditures. Regression analysis controls for the mix of patients in the practice population. Overall, we find that community health centres fare the worst when it comes to relative efficiency scores.


Abstract: Health care costs are a financial burden for developing and transition economies which have experienced a faster growing demand on their health care systems while aiming to improve efficiency. As costs become more complex, attention has shifted to the efficiency of an entire system. Through system-wide assessments, countries with higher health care efficiency can be identified. These systems can be replicated to allow provision
of good care at lower costs. Data Envelopment Analysis is used to measure health care efficiencies and to discuss policy implications.


The author cautions that “much of estimated inefficiency may represent measurement error from inappropriately aggregating either inputs or outputs” (p. 321).


Keywords: health economics, data envelopment analysis, hospitals


Abstract: The study uses Data Envelopment Analysis (DEA) to analyze physician practice behavior and develops measures of physician practice efficiency as a basis for improving productivity and reducing costs in otitis media treatment. Other objectives include determining geographic variations in practice patterns for otitis media, and the impact of inefficient practice patterns on the cost of treatment of otitis media. Only 46 (28.8%) of the 160 physicians were classified as efficient. Average total cost of an episode by efficient providers was $357.03 and $492.06 for inefficient providers. By restricting particular inputs and outputs, and directing all physicians to treat otitis media through a balanced primary care model, physicians would be able to provide the same quality care at an average savings of 23.7% per efficient and 4.4% per inefficient provider. Descriptors: Analysis of Health Care Markets


Abstract: Applies the analytical framework of data envelopment analysis (DEA) methodology to provide health care administrators with specific benchmarking tools for performance evaluation. Discusses evaluation of performance in health care; performance measurement using DEA; returns to scale models; multiplier models; nonoriented and measure specific models; longitudinal (panel) evaluations using DEA; effectiveness and other models of DEA; hospital applications; physician practice and disease-specific applications; nursing home applications; health maintenance organization applications; home health agency applications; applications for other health care organizations; and other DEA applications at hospital settings. Includes a CD-ROM that contains DEA Frontier software.

Abstract: This paper contributes to the estimation of the best practice frontier in health production in the OECD countries at the aggregate level, in the tradition of the concept of health production function originally developed by Grossman. Estimates of technical efficiency for the OECD countries, decomposed into their components of pure technical efficiency and scale efficiency, using a nonparametric method (Data Envelopment Analysis) are presented. In a two-stage approach, differences in efficiency scores are attributed to environmental factors using a stochastic censored regression model.


Abstract: In this paper we show how both the choice of specific constraints on output weights (in accordance with health care policy-makers’ preferences) and the consideration of exogenous variables outside the control of hospital management (and linked to past policy-makers’ decisions) can affect the measurement of hospital technical efficiency using the data envelopment analysis (DEA). Considering these issues, the DEA method is applied to measure the efficiency of 85 (public and private) hospitals in Veneto, a Northern region of Italy. The empirical analysis allows us to verify the role of weight restrictions and of demand in measuring the efficiency of hospitals operating within a National Health Service (NHS). We find that the imposition of a lower bound on the virtual weight of acute care discharges weighted by case-mix (in order to consider policy-maker objectives) reduces average hospital efficiency. Moreover, we show that, in many cases, low efficiency scores are attributable to external factors, which are not fully controlled by the hospital management. Finally, we show that accredited private hospitals exhibit a higher level of total inefficiency than public ones: for-profit hospitals are mostly characterised by scale inefficiency, while non-profit hospitals are affected by different sources of inefficiency. Most of the hospitals in Veneto are too small in relation to their output levels (i.e., are characterised by IRS) and this problem of scale inefficiency characterises mainly the accredited private hospitals. This result indicates that private hospitals are considered important within regional health care planning as providers of supplementary services integrating public supply, even though they operate at a sub-optimal scale.

Abstract: Background The Data Envelopment Analysis (DEA) method has been fruitfully used in many countries in Asia, Europe and North America to shed light on the efficiency of health facilities and programmes. There is, however, a dearth of such studies in countries in sub-Saharan Africa. Since hospitals and health centres are important instruments in the efforts to scale up pro-poor cost-effective interventions aimed at achieving the United Nations Millennium Development Goals, decision-makers need to ensure that these health facilities provide efficient services. The objective of this study was to measure the technical efficiency (TE) and scale efficiency (SE) of a sample of public peripheral health units (PHUs) in Sierra Leone. Methods This study applied the Data Envelopment Analysis approach to investigate the TE and SE among a sample of 37 PHUs in Sierra Leone. Results Twenty-two (59%) of the 37 health units analysed were found to be technically inefficient, with an average score of 63% (standard deviation = 18%). On the other hand, 24 (65%) health units were found to be scale inefficient, with an average scale efficiency score of 72% (standard deviation = 17%). Conclusion It is concluded that with the existing high levels of pure technical and scale inefficiency, scaling up of interventions to achieve both global and regional targets such as the MDG and Abuja health targets becomes far-fetched. In a country with per capita expenditure on health of about USD 7, and with only 30% of its population having access to health services, it is demonstrated that efficiency savings can significantly augment the government’s initiatives to cater for the unmet health care needs of the population. Therefore, we strongly recommend that Sierra Leone and all other countries in the Region should institutionalize health facility efficiency monitoring at the Ministry of Health headquarter (MoH/HQ) and at each health district headquarter.

Abstract: Using a national data set, this paper looks at the efficiency of physician practices, focusing on scopes of service by comparing single specialty groups and multispecialty groups. An analysis of efficiency using DEA indicates that there are scope inefficiencies from combining different types of providers into a single practice. Most of the inefficiency is due to technical rather than allocative reasons. In addition, we find that larger practices are able to capture efficiencies of scope, but incur inefficiencies of scale.

Abstract: Policy makers are increasingly interested in developing performance indicators that measure hospital efficiency. These indicators may give the purchasers of health services an additional regulatory tool to contain health expenditure. Using panel data, this study compares different
parametric (econometric) and non-parametric (linear programming) techniques for the measurement of a hospital’s technical efficiency. This comparison was made using a sample of 17 Italian hospitals in the years 1996–9. Highest correlations are found in the efficiency scores between the non-parametric data envelopment analysis under the constant returns to scale assumption (DEA-CRS) and several parametric models. Correlation reduces markedly when using more flexible non-parametric specifications such as data envelopment analysis under the variable returns to scale assumption (DEA-VRS) and the free disposal hull (FDH) model. Correlation also generally reduces when moving from one output to two-output specifications. This analysis suggests that there is scope for developing performance indicators at hospital level using panel data, but it is important that extensive sensitivity analysis is carried out if purchasers wish to make use of these indicators in practice.


Abstract: It is widely recognized that general practitioners (GPs) play a key role in determining the use of resources for ambulatory care. In addition to the GPs’ working hours, these resources consist of the work of specialists and that of hospital physicians treating the GPs’ referrals and the cost of medication and other measures induced by the GP. Different systems of remuneration differ in their power to lead to efficient service provision. This contribution provides empirical evidence on the efficiency of service provision by Austrian GPs. The analysis is based on data for some 600 GPs. The data comprise sufficient information to assess the GPs’ efficiency with regard to the way they manage their cases. Data Envelopment Analysis, a nonparametric technique, is used to estimate the production frontier. The results suggest that almost one-half of the GPs in the sample have a relative efficiency of 0.8 or less. A Malmquist decomposition of the productivity change reveals a decline in productivity. This is due to a pronounced negative shift of the frontier whereas individual efficiency rises against the weaker benchmark of the new frontier.


Abstract: Various attempts to assess the performance of German hospitals have generated a wide range of estimates regarding their efficiency. These attempts were based on different, often rather small data sets consisting of heterogeneous hospitals; the techniques applied range from simple benchmarking approaches to studies which employ Data Envelopment Analysis (DEA). Some studies report ‘dramatic differences in efficiency’ and propose savings potentials of 50%; others find an average efficiency in excess of 95% and characterize almost 75% of their observations as fully efficient. This study presents results for two datasets representative of two segments of
the German hospital system. These segments comprise all hospitals that have one internal medicine and one surgery department; the hospitals are located in the old federal states of Germany. None of the hospitals provides tertiary care. DEA can be applied because all hospitals offer a comparable quality and range of services. The results were estimated with a DEA-bootstrapping procedure and suggest an average bias-corrected efficiency of around 80%.


Abstract: Data on some 600 general practitioners located in the same region of Austria for the years 2001–2003 are analyzed using data envelopment analysis. The available information comprises patient numbers by age category, case mix, and resource use; outliers are removed with a procedure based on the order-m estimator. The results do not vary much over different samples and specifications and imply an average inefficiency of around 15%. Throughout the observation period, only slight changes in total factor productivity are observed.


Abstract: This paper uses a non-parametric frontier model and adaptations of the concepts of cross-efficiency and peer-appraisal to develop a formal methodology for benchmarking provider performance in the treatment of Acute Myocardial Infarction (AMI). Parameters used in the benchmarking process are the rates of proper recognition of indications of six standard treatment processes for AMI; the decision making units (DMUs) to be compared are the Medicare eligible hospitals of a particular state; the analysis produces an ordinal ranking of individual hospital performance scores. The cross-efficiency/peer-appraisal calculation process is constructed to accommodate DMUs that experience no patients in some of the treatment categories. While continuing to rate highly the performances of DMUs which are efficient in the Pareto-optimal sense, our model produces individual DMU performance scores that correlate significantly with good overall performance, as determined by a comparison of the sums of the individual DMU recognition rates for the six standard treatment processes. The methodology is applied to data collected from 107 state Medicare hospitals.


Abstract: A nonparametric data envelopment analysis (DEA) is performed on hospitals in the federal state of Saxony (Germany) and in Switzerland.
This study is of interest from three points of view. First, contrary to most existing work, patient days are not treated as an output but as an input. Second, the usual DEA assumption of a homogeneous sample is tested and rejected for a large part of the observations. The proposed solution is to restrict DEA to comparable observations in the two countries. The finding continues to be that hospitals of Saxony have higher efficiency scores than their Swiss counterparts. The finding proves robust with regard to modifications of DEA that are motivated by differences in hospital planning in Germany and Switzerland.


Abstract: The efficiency of hospitals is of interest to health insurers, government authorities and hospital management itself. However, econometric methods for determining (in)efficiency have severe drawbacks since hospitals are multiproduct firms and because the duality between production and cost functions cannot be assumed. In this work, non-parametric, deterministic data envelopment analysis (DEA) is used to measure the relative inefficiency of 89 Swiss hospitals covering the years 1993–96 (310 observations). Special attention is given to the role of patient days in the production of health. The findings depend on whether patient days are viewed as an input of patient time or as an output, as in previous studies. While the probability of a unit being inefficient cannot be explained using the available data, the degree of overall inefficiency is shown to significantly depend on the financial incentives faced by management, in particular due to subsidization. Private hospitals do not seem to be less inefficient than public ones; however, this may be caused by their “overusing” inputs that in fact are valued as amenities by patients. This consideration points to an important limitation in applying the purely quantitative criteria of DEA to hospitals.


Abstract: This paper uses hearth status outputs with Data Envelopment Analysis to assess the relative efficiency of the use of physician labor inputs. The trends in physician population growth are examined to see if there is a link between physician population ratios and the health status of the communities they serve. Input efficiency scores are analyzed for Michigan counties with comparable population densities over a 10-year period. Overall, approximately 47 percent of Michigan counties operated with relative input efficiency during the decade. In addition to assigning an efficiency rating, Data Envelopment Analysis also identifies the efficiency reference set. The efficiency reference set can be used to develop a composite unit that produces the same output level as the inefficient unit, employing the most efficient combination of inputs.

Abstract: This paper measured the variations in performance of small municipalities in the State of Sao Paulo, Brazil, regarding the technical efficiency in the use of public funds in public primary health care actions concerning the funding profile, in a scenario of fiscal federalism. Technical efficiency is one of the parameters of evaluation of public sector performance and was measured by means of data envelopment analysis (DEA). The correlation analysis of DEA score was used to verify possible associations between technical efficiency and the funding profile of expenses with health care. The results showed that 6.41% of the municipalities were considered efficient. They also showed that the level of municipality dependence to inter-governmental general purpose grants and the national health funding specific purpose grants have negative correlation with efficiency scores.


Abstract: This paper analyses the evolution of productivity in Spanish public hospitals during the period characterised by the use of program-contracts. The results demonstrate that a significant improvement has occurred. The decomposition of the Malmquist productivity index shows that efficiency change has been the main contributor to productivity improvement. We also analyse the dynamic implications of program-contract bargaining. In particular, the data support the hypothesis that the bargaining process has been subject to a ratchet effect, i.e., the more a hospital does today, the more the hospital is asked to do in the future. This result threatens the credibility of the program-contract as an incentive system.


Abstract: Insurers, health plans, and individual physicians in the United States are facing increasing pressures to reduce costs while maintaining quality. In this study, motivated by our work with a large managed care organization, we use readily available data from its claims database with data envelopment analysis (DEA) to examine physician practices within this organization. Currently the organization evaluates primary care physicians using a profile of 16 disparate ratios involving cost, utilization, and quality. We employed these same factors along with indicators of severity to develop a single, comprehensive measure of physician efficiency through DEA. DEA enabled us to identify a reference set of “best practice” physicians tailored to each inefficient physician. This paper presents a discussion of the selection of model inputs and outputs, the development of the DEA
model using a “stepwise” approach, and a sensitivity analysis using super-efficiency scores. The stepwise and superefficiency analyses required little extra computation and yielded useful insights into the reasons as to why certain physicians were found to be efficient. This paper demonstrates that DEA has advantages for physician profiling and usefully augments the current ratio-based reports.