



The exclusion of indirect costs from efficiency benchmarking

Exclusion of indirect costs

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Abstract

Purpose – This study aims to evaluate the effects produced by a strategy aimed at neutralising one of the “disturbance factors” that may impede the focalisation on “real (in)efficiency” in relative efficiency assessments within the health-care sector: the exclusion of indirect costs from these comparative analyses.

Design/methodology/approach – The empirical analysis is based on the statistical elaboration of data from a sample group of hospital sub-units within Italian health-care trusts. The analysis isolates the effect on efficiency indicator variability (dependent variable) of excluding indirect costs (independent variable).

Findings – The analysis conducted has uncovered the likely manipulation of indirect costs to create the impression of having achieved approximately average levels of efficiency performance. The case analysed in this study shows how a defensive orientation in public organizations may arise even without the application of some form of compulsory benchmarking.

Practical implications – The results observed highlight how the exclusion of indirect costs – potentially allocated to attain cross-subsidization among cost objects – may help to uncover actual cases of (in)efficiency and thus aid in identifying “true” best practices.

Originality/value – Literature has presented a variety of strategies aimed at neutralising some of the “disturbance factors” that impede the focalisation on “real (in)efficiency” in inter-trust efficiency comparisons. However, until now no studies have supplied evidence of the efficacy of the strategies in question in isolating “real (in)efficiency”.

Keywords Benchmarking, Indirect costs, Health services, Italy

Paper type Research paper

1. Introduction

Since the New Public Management process reform, the development of inter-trust comparisons regarding performance measurements has been considered to be an important issue in the public sector domain and, in particular, within the health-care sector. Comparisons among health-care trusts have been implemented for many non-mutually exclusive reasons, such as:

- the allocation of funds;
- the improvement in performances;
- the evaluation of results; and
- the provision of relevant information to the different stakeholders, etc.

In many of these initiatives, the lack of uniformity of data to be compared is one of the most important problems (Wait and Nolte, 2005). In particular, the homogeneity of efficiency data is one of the crucial aspects for implementing reliable efficiency benchmarking initiatives. Regarding this aspect, treatment of indirect costs could be an obstacle to the uniformity of cost data from different organizations.



This study focuses on the strategy, within the health-care sector, of excluding indirect costs from inter-trust efficiency comparisons with a benchmarking purpose. The empirical analysis proposed aims to determine whether this exclusion may eliminate a part of the variability in efficiency indicators unrelated to the actual use of resources; thus revealing “real (in)efficiency”.

This analysis was inspired by the results attained in a number of efficiency benchmarking studies conducted in the UK (Jones, 2002; Northcott and Llewellyn, 2002) and in Italy (Barretta, 2005), which revealed how irrelevant the managers of health-care trusts consider the efficiency data generated for comparison. This is partly due to the variability of the indicators resulting from widely varying cost-allocation practices, especially as regards the allocation of indirect costs. The focus of this paper is moreover justified by the fact that the data examined made it possible to perform a statistical analysis capable of measuring the impact of excluding indirect costs from benchmarking projects on efficiency indicator variability. In fact, it was possible to isolate the effects brought about by this exclusion from all other factors that might influence this statistic[1].

Our empirical analysis is based on the statistical elaboration of data from a sample group of hospital sub-units within Tuscan health-care trusts. The data employed were taken from annual reports presented by the regional agency known as *Osservatorio costi* and cover a six-year period (1998-2003). The empirical analysis presented in this work concentrates essentially on the Tuscan Health-Care Service (THCS) given that:

- the regions of Italy enjoy complete control over the governance of the local health-care service and their legislation has produced a variety of systems with noteworthy characteristics; and
- the region of Tuscany has attained greater experience in developing and consolidating efficiency benchmarking than most Italian regions.

The paper will explore its subject in increasing detail. Section 2 will identify the causes that impact on efficiency, consequently creating variability in the efficiency indicators compared. By concentrating on one such case, differences in cost-allocation practices, a number of justifications are presented for the exclusion of indirect costs from efficiency performance evaluations aimed at benchmarking. To this end, various considerations expressed in existing literature on benchmarking initiatives are presented. Subsequently, in order to contextualize the practices studied in this research, Section 2 will highlight the importance of efficiency measures and cost control within the Tuscan regional health-care system. Section 4 will describe the experience of the *Osservatorio costi* for the region of Tuscany. More specifically, given that the empirical analysis is based on data from this agency, the various indicators listed in the regional report promoting inter-trust comparison will be illustrated. Finally, Section 5 will present the empirical verification aimed at measuring the impact of excluding indirect costs on efficiency indicator variability. The work will then conclude with some general considerations.

2. Influences on efficiency performance measurement and reasons for excluding indirect costs from efficiency benchmarking

In recent years, initiatives aimed at promoting performance comparison among public health-care trusts have become increasingly popular in many countries (Dawson *et al.*, 2001; Welsh and Kokaua, 2005; Wait and Nolte, 2005).

Recently, a considerable amount of literature has focussed on the subject of efficiency comparison among public health-care trusts (Ellwood, 1996; Dawson and Street, 2000; Dawson *et al.*, 2001; Jones, 2002; Northcott and Llewellyn, 2002, 2003, 2005; Llewellyn and Northcott, 2005; Barretta, 2005). A number of these studies (Ellwood, 1996; Jones, 2002; Northcott and Llewellyn, 2002, 2003; Barretta, 2005) have underlined that:

- the users of inter-trust efficiency analyses believe that some factors (such as differences in cost-allocation methods and the presence of external and internal special circumstances) have an impact on data variability and conceal “real (in)efficiency”;
- the presence of these “disturbing factors” is one of the prime contributors to unreliable data; and
- the results obtained are only minimally used by trusts with the aim of benchmarking.

Literature has presented a variety of strategies aimed at neutralising some of the “disturbance factors” that impede the focalisation on “real (in)efficiency” in inter-trust efficiency comparisons, such as:

- defining and periodically updating a uniform costing system for all trusts (Ellwood, 1996; Jones, 2002; Northcott and Llewellyn, 2002, 2003);
- excluding any costs subjectively assigned to the cost object (so-called indirect costs) from the analysis (Northcott and Llewellyn, 2003; Barretta, 2005); and
- creating clusters of trusts (or their sub-units) that present similar peculiarities with respect to their internal or external environments (Dawson *et al.*, 2001; Northcott and Llewellyn, 2003; Barretta, 2005).

However, until now no studies have supplied evidence of the efficacy of the strategies in question in isolating “real (in)efficiency”.

The following analysis isolates the effect on efficiency indicator variability (the dependent variable) of excluding indirect costs (the independent variable). However, regarding the previously mentioned strategies aimed at neutralising some of the “disturbance factors”, the available data did not allow us to undertake statistical studies to verify the effects that they produced on efficiency indicator variability.

This section draws inspiration from the classification of causes for efficiency indicator variability drawn up by Llewellyn and Northcott (2005) for the English Health Service. Similarly, this work identifies the factors impacting on efficiency performance as measured in the THCS, the context of reference for this empirical study. These factors cannot be generalized for all inter-trust cost comparisons, given that they depend on the specific characteristics of the efficiency measurement model adopted. In Tuscany, the essential characteristics of the efficiency benchmarking project foresee that:

- the sub-units operating within the health-care trusts act as the cost objects; and
- the model for classifying the services offered is based on the system of Diagnosis-Related Groups (DRGs).

After having considered the causes for variability of the efficiency indicators adopted in the THCS, we concentrate on one of these: variations in cost-allocation practices with particular attention to variability in the attribution of indirect costs. In reference to this

cause, considered one of the “disturbance factors” inhibiting the identification of “real (in)efficiency”, opinions expressed by a number of scholars are presented in favour of excluding indirect costs from benchmarking efficiency initiatives.

2.1 Variations in clinical coding practices

The DRG system is used to classify hospital services into approximately 500 groups expected to require similar quantities of hospital resources. DRGs are assigned by a “grouper” program based on the International Classification of Diseases (commonly known by the abbreviation ICD), diagnoses, procedures, age, sex, and the presence of complications or co-morbidities. The DRG system was developed in the USA and is currently used in many nations including Italy. A code may be attributed to every episode of patient care whenever a member of health-care staff fills out a uniform hospital discharge data set. The reliability of the efficiency measures depends partly on the quality of the data regarding the volume of services provided. Clinical coding plays an essential role in measuring these volumes accurately.

2.2 Variations in the version of classification system applied

In 1983, the US Centers for Medicare and Medicaid Services assumed responsibility for the maintenance and modifications of this DRG system. The US Public Health Service bears responsibility for updating the ICD. In Italy, the regions (and in some cases even health-care trusts within the same region) have adopted various versions of both the DRG system and the ICD. This heterogeneity in the systems for classifying hospital services damages the comparability of the data regarding the volume of service provision and consequently also that of the efficiency indicators based on this data. This drawback is to be remedied shortly, as an agreement has recently been reached by all the Italian regions establishing that all of Italy is to adopt the ninth version of the ICD and the 19th version of the DRG.

2.3 Variations in the percentage of hospital services accurately classified with the DRG system

In order to attribute codes to all hospital cases, some codes in the DRG system are reserved for procedures that present coding incongruities or simply defy attribution to a specific DRG. The existence of such DRGs (known in jargon as “trash” DRGs) makes hospital service coding and therefore also the calculation of its volume less accurate. The greater the percentage of hospital services classified with such codes, the less accurate the resulting coding will be.

2.4 Variations in how DRG scores are attributed to specialities

Every DRG corresponds not only to a code and denomination for hospital services, but also to a relative weighting. The weighting assigned to each DRG should reflect the value of the resources consumed to provide that hospital service. In essence, a relatively minor, commonly performed procedure is established as a baseline (and assigned a weighting of 1.000) against which all other procedures are weighted. In nations such as Italy, where the cost accounting systems employed by health-care trusts frequently allow data to be collected by specialty but not by individual health service (Barretta, 2004), the efficiency indicators may be calculated for sub-units, but not for individual procedures. In order to calculate efficiency indicators for sub-units, first a reference time period must be chosen, then the ratio of the value of the resources

consumed by the sub-unit relative to its total DRG score must be calculated. In Italy, the information systems of individual or regional health-care trusts may attribute DRG scores to individual services provided by the sub-unit discharging a patient or apply algorithms of varying complexity to divide the DRG score for hospital services requiring the involvement of multiple sub-units among the various specialities. Variations in attributing DRG scores to hospital sub-units reduce the comparability of the data regarding the volume of services provided and therefore negatively influence the comparability of the efficiency indicators based on this data.

2.5 Variations in data collection capacity among trust information systems

The information systems (accounting or otherwise) of the various health-care trusts may also differ considerably in their level of accuracy. For example, the financial accounting of some trusts may fail to indicate the value of certain multi-year investments, thus undervaluing annual amortisation. Moreover, one trust's cost accounting system might only calculate the average annual pay for each professional position, while another trust might more precisely record the actual pay of each individual staff member. Trusts may also vary in how they record non-accounting data such as types of admissions, diagnostic tests, pharmacy prescriptions, etc.

2.6 Variations in cost-allocation practices

The validity of inter-trust efficiency comparison may also be damaged by heterogeneity in cost-allocation practices. What cost to assign a cost object in a comparative analysis and what criteria to adopt when attributing the object's indirect costs represent just two of the many decisions that must be taken when elaborating data. Any variations in the cost-allocation practices adopted by the health-care trusts whose efficiency performance is under comparison must reflect the organizational and operative peculiarities of the individual trust, otherwise they will reduce data comparability.

2.7 Variations concerning the external cost drivers

When expressing comparative judgement of the efficiency attained by health-care trusts in providing services, allowance should be made for possible peculiarities (within the organization or in its surrounding context) which may affect the costs borne by the organisation in spite of any managerial intervention. Consider, for example, two sub-units with analogous professional positions whose personnel costs may vary as a result of differing levels of seniority.

2.8 Variations in the clinical practices that drive costs

The costs incurred by health-care trusts also depend on decisions taken by their health-care staff. Staff is responsible for assigning pharmacy prescriptions and specialist treatment as well as deciding which patients are in need of treatment and whether they should be admitted to the hospital, treated in the day hospital or be treated at home. Physicians prescribe diagnostic tests, surgery, pharmaceuticals and therapeutical care as well as deciding the length of hospital stays.

Only variations in the clinical practices driving costs comprise causes of variability in efficiency indicators that a project to improve resource use should be able to identify. Projects aimed at revealing the effects (economic and otherwise) of variations in clinical practices would appear to be highly useful, as it is possible that both across and within

hospitals, the clinical services provided vary considerably and frequently in ways that are not closely related to patient needs (Llewellyn and Northcott, 2005). The other seven variations may simply be considered “distractors” that ought to be neutralised in order to reveal “real (in)efficiency”.

As previously indicated, we will now focus on a single cause of efficiency indicator variability: variations in cost-allocation practices with particular attention to heterogeneity in the attribution of indirect costs. An effort will then be made to summarize the reasons why indirect costs should be excluded from efficiency benchmarking initiatives.

The need for comparable cost data (measurements calculated using uniform cost accounting methods) in efficiency benchmarking initiatives is justified by the need to prevent efficiency indicator variability from reflecting different costing practices rather than varying levels of cost efficiency (Jones, 2002; Northcott and Llewellyn, 2003). Should the cost data used to elaborate efficiency indicators fail to be comparable, the use of efficiency performance for benchmarking purposes will result at best in scepticism, at worst in misleading information (Northcott and Llewellyn, 2003; Barretta, 2005). An empirical analysis conducted by Jones (2002) revealed that the cost category perceived by trust managers as most critical in guaranteeing data comparability is that of indirect costs. Although the study cited did not reveal the motivations underlying this perception, it may likely depend on:

- difficulty in identifying uniform, generally applicable cost apportionment for indirect costs due to the impossibility of using a cost-allocation process reflecting causality relations between productive factors and cost objects; and
- the high percentage of costs classified as indirect in health-care trusts (Llewellyn and Northcott, 2005).

The fact that trust managers perceive indirect costs as the most critical aspect of cost data comparability probably also explains why they view the allocation of such costs as a possible escape route when the comparative analysis highlights trust performance as above average (Jones, 2002; Barretta, 2005).

A number of surveys has moreover shown that allocating indirect costs represents a problem not only in comparisons among trusts but also within organizations when evaluating the “true efficiency” of sub-units (Catturi, 2000; Modell and Lee, 2001; Modell, 2002). As Modell (2002, p. 665) has noted:

Powerful organizational sub-units may occasionally be in a position to successfully bargain for bearing a proportionately lesser share of indirect costs than their actual resource utilization would seem to warrant and thus avoid closer scrutiny and accountability by preserving some ambiguity in cost allocation practices.

For the reasons listed, research (Northcott and Llewellyn, 2003; Barretta, 2005) has suggested that only direct costs be included in efficiency benchmarking projects, as they are the only costs that can be monitored and modified over the short term, and because in this way one of the principal causes of data variability can be removed so as to reveal “real (in)efficiency”.

3. The relevance of efficiency performance in the Tuscan health-care sector

The framework of the Italian National Health Service was set forth in national law n. 502 issued in 1992 and subsequently revised and modified by laws n. 517 (1993)

and n. 229 (1999). These reforms introduced the following fundamental innovations (Anselmi, 1996; Marcon and Panozzo, 1998; Barretta, 2004):

- (1) The corporatisation of health-service providers through the creation of two distinct types of health-care trusts: local health-care trusts (LHTs) and hospital trusts (HTs). LHTs bear full responsibility for satisfying the health-care needs of the residents in their jurisdiction. These needs may be met through services provided by the LHT itself, or purchased from other health-care organisations (HTs, other LHTs or private providers). Subsequently, LHTs may act as both providers and purchasers of health-care services. This dual role refers essentially to secondary care; in contrast, LHTs are the main providers of primary care. Instead, HTs solely provide (frequently highly specialized) hospital services and operate only as providers.
- (2) The implementation of a financing mechanism according to which:
 - The regions distribute financial resources among the LHTs on the basis of a weighted capitation system (CS) which estimates the average amount of resources necessary to satisfy the health-care needs of each inhabitant over a given time period.
 - HTs are financed by means of a prospective payment system (PPS), according to which they are reimbursed for the services they provide on the basis of full-cost prices set by the regional administration. Given that in fact funding is allotted to LHTs according to the number of inhabitants residing within each of their geographical jurisdictions and taking into consideration certain aspects of the population (age, sex, geographical area of residence, etc.), the hospital services provided by the LHTs to the residents in their catchment area are not financed by means of the PPS, but rather by means of the CS. Consequently, the PPS applies to:
 - all hospital services furnished by HTs;
 - all hospital services supplied by private providers; and
 - hospital services provided by LHTs for the inhabitants of other geographical jurisdictions (so-called patient mobility).
- (3) The elimination of the accounting system previously used by the public providers of health-care services, which was based on central government principles and with a focus on revenue and expenditure in favour of an accrual-type accounting system.
- (4) The creation of a general manager position to which ultimate responsibility for health-care trust performance is assigned. Law n. 502 (1992) prescribes that LHTs and HTs must “monitor their operations in terms of effectiveness and efficiency and must respect their budget limitations by balancing their costs and revenue”. In line with these provisions, this law specifies that the general manager, who is appointed by the regional government and holds a fixed-term contract, may be dismissed from his/her duties if the budget limitations are not respected.

Owing to the considerable autonomy granted by the Italian Constitution to the regions concerning matters of health-care policy, in the previous nationwide framework each regional administration participated by issuing regional laws. This body of regional

legislation ultimately produced a network of dissimilar Italian regional health-care systems varying in terms of:

- the standard level of assistance to which all citizens are entitled, in part set by the central government;
- the criteria to be adopted in applying the CS;
- the full-cost price list to be adopted at the regional level for the payment of hospital services;
- the health-quality goals to be achieved by health-care trusts at the regional level; and
- the organisational structure adopted within the health-care trusts themselves.

The region of Tuscany recognised the 1992 law n. 502 by implementing regional law n. 1 in January 1995. Since the enactment of this regional legislation which introduced the innovations cited above into the THCS, health-care services have been provided by 16 public health-care trusts, 12 of which are LHTs and four of which are HTs. In Tuscany, beginning with the application of this reform, the effort to make rational use of resources and monitor efficiency performance has come to the forefront for a number of reasons:

- (1) In Tuscany, 80 per cent of the revenue generated by HTs is governed by the application of the PPS, while approximately 90 per cent of LHT revenue is governed by the CS. Consequently, while attracting patients is a necessary goal for HTs in order to balance their costs and revenue, at the same time cost control remains the main instrument that LHTs, having fixed revenue, must take full advantage of in order to reach this economic goal.
- (2) The contract for general managers drawn up by the Tuscan region clearly states that: “the general manager is bound to respect the budget set every year together with the regional administration. This requirement is considered an absolute priority for the regional health-care service and its lack of attainment is so serious as to warrant the suspension of the general manager’s contract”. Therefore, trusts must increase their efficiency in order to attain budget objectives and assure that the general manager retains his/her position.
- (3) As also takes place in the other Italian regions, in Tuscany the value of the resources assigned by the central government to the region to finance health-care services increases by a lower rate than does the actual cost of providing these services (Barretta, 2004). Therefore, in order to balance income and expenses within the regional health-care sector (a balance which the regions must attain in order to avoid sanctions from the central government) without reducing the volume or quality of the services provided, it is imperative for the region to:
 - find new sources of health-care funding, such as from local taxes; and/or
 - increase efficiency in the provision of public health-care services.

For these reasons in numerous planning documents, the region of Tuscany has called for the refinement of management control and particularly cost accounting within its health-care trusts. Moreover, the trusts themselves have followed these indications by setting up administrative sub-units aimed at monitoring the efficiency performance of their various cost centres. The experience of the *Osservatorio costi* which we are about to

examine is just one of the initiatives undertaken by the Tuscan region to reinforce a culture of greater efficiency within health-care trusts and provide instruments to attain this goal.

4. The experience of Tuscany's *osservatorio costi*

As is clearly explained in the manual illustrating uniform cost accounting as it should be applied to the THCS, the fundamental aim of this comparative analysis is to promote the benchmarking of efficiency in order to (Regione Toscana, 1999):

[...] a) select region-wide reference indexes through the comparison of homogeneous entities and b) direct research at the regional level through the signalling of deviations and an analysis of the causes of the more remarkable deviations. It is precisely this last aspect which will be subjected to decisive intervention by health-care trust management intent on identifying strong and weak points within the trust and setting goals for improvement in terms of efficiency.

Although the comparative analysis in question is conducted by Tuscany's regional administration which is in charge of programming and monitoring for the THCS, this practice was observed to essentially take the form of voluntary benchmarking, that is, a comparison by public administration managers as an approach to improving performance *per se* (Bowerman *et al.*, 2002). During the time period considered in this study, the initial aim of the comparative analysis endured, and its objective remained unchanged.

The regional agency that compiles efficiency indicators for public health trusts and processes the comparative analysis is called *Osservatorio costi*, and was founded in 1999. The first comparative analysis on public health trusts was published in 1999 on the basis of data for 1998. Since then, six more comparative reports have been published, with the latest – issued in 2006 – presenting cost data for 2004 [2].

The *Osservatorio costi* carries out the following duties:

- it undertakes regular audits of uniform cost accounting in collaboration with a representative from each of the 16 public health-care trusts;
- it manages a database in order to collect and elaborate cost and activity data received from the trusts;
- it publishes a final report that makes it possible to undertake a comparative analysis of the relative efficiency of cost centres in different trusts; and
- it then sends a printed copy of this report to the general managers within the trusts and to the 16 trust representatives of the *Osservatorio costi*.

During the period considered, the *Osservatorio costi* prepared three separate manuals outlining the uniform costing practices to be adopted by Tuscany's health-care trusts when compiling cost data for the regional administration. It should be noted that these three uniform costing manuals are the work of a group made up of regional personnel and a representative for each trust responsible for the elaboration requested by the *Osservatorio costi*.

The comparative analysis ignores the prices set for health-care services in favour of the expenses incurred by the cost centres of single health-care trusts. This decision was taken as a result of two peculiarities of the THCS:

- (1) trust cost-accounting systems are incapable of systematically determining the cost of individual procedures; and

- (2) the organizational layout and attribution of responsibility within the health-care trusts – prescribed in regional law – focus on the sub-units and make no reference to processes or the relative procedures.

Regarding this last point, it should be emphasised that case managers are rarities within the THCS and that the method for assigning responsibility for centres has remained unvaried for over a decade. Therefore, managers bearing responsibility for centres are under great pressure from general managers to reach the trust economic targets.

Table I presents a simplified summary of the data sent by each trust to the regional *Osservatorio costi* to account for the actual costs of each cost centre, with a general itemization by category.

This is basically a matrix in which the resources consumed (arranged in columns) are related to their relative cost centres (arranged in rows). The costs numbered 1-4 typically represent direct costs for the cost centre, while the costs numbered 5 and 6 typically represent allocated costs for these sub-units.

The complete list of the cost centres of interest is published in a document drawn up at the regional level. It is conceived in such a way as to comprise all the sub-units of the trusts that treat patients directly or provide finished services. Therefore, the first column does not list support cost centres, whose costs are attributed to operative cost centres.

Once the data are compiled, the efficiency indicators are calculated by relating the cost data to the activity data representing the volume of services provided by the sub-units.

Therefore, all costs attributed to operative cost centres are related to the volume of services provided during the period of reference. The general efficiency indicator (GEI) for a given year is a ratio of all the costs borne by the centre to the sum total of services provided, quantified by means of the DRG system. The DRG score is equivalent to the summation of all hospital services, multiplied by their relative weight, provided by a given cost centre. In this way, the total unit costs incurred by each cost centre may be calculated, as seen in the following formula:

$$GEI_{yt} = \frac{Costs_{yt}}{DRG_{yt}}$$

GEI_{yt} – general efficiency indicator of the cost centre y for the year t ; $Costs_{yt}$ – costs incurred by the cost centre y for the year t ; DRG_{yt} – DRG score in the cost centre y for the year t .

It should be noted that the regional methodology provides for other indicators in addition to the GEI.

In fact, the final report published by the *Osservatorio* provides the following analytical indicators:

- the personnel efficiency indicator: the ratio of the centre's total personnel costs (see n. 1 in Table I) to its DRG score;
- the efficiency indicator for other direct costs: the ratio of all other direct costs (see n. 2-4 in Table I) incurred by the centre to its DRG score;
- the efficiency indicator for total direct costs (EITDC): the total cost of personnel and other direct costs divided by the DRG score;

Cost and sub-cost centres	Payroll (1)			Intermediate services and products (5)			Overhead costs (6)		
	Medical staff	Nursing staff	Administrative staff	Materials costs (2)	Depreciation (3)	Other direct costs (4)		Medical imaging	Laboratories
<i>General surgery</i>									
Surgery									
Outpatient services									
Inpatient care									
<i>Orthopaedics</i>									
Surgery									
Outpatient services									
Inpatient care									
.....									
.....									

Exclusion of indirect costs

Table I.
Data itemization

- the efficiency indicator for intermediate products and services (EIIPS): the ratio of the all costs incurred to provide intermediate products and services (see n. 5 in Table I) in a centre to its DRG score;
 - the efficiency indicator for production costs (EIPC): the total of all costs (excluding other indirect costs) divided by the DRG score; and
 - the efficiency indicator for other indirect costs (EIOIC): the ratio of all other indirect costs (see n. 6 in Table I) incurred by a centre to its DRG score.
- The report obviously also presents the following GEI:
- the GEI: the ratio of the total costs incurred by the centre to its DRG score.

This final indicator is used to verify an eventual deviation from the regional average, measured as the difference in percentage between the centre's individual global efficiency indicator and regional average. In order to provide supplementary data that might better represent the activity of the cost centre, the case mix is also indicated as the ratio of the total yearly DRG score for the centre to the number of patient discharges during the same time period.

5. The empirical analysis

The empirical analysis is based on statistical elaboration carried out on data from a sample of hospital sub-units within Tuscan health-care trusts. Table II illustrates some figures that give a good idea of the global dimensions of all the hospital sub-units considered in the comparative project.

A total of 181 sub-units was examined (Table III). These sub-units serve as a sample to represent all the sub-units shown in Table II. These 181 sub-units were chosen because:

- they are the only ones that existed throughout the entire period surveyed[3]; and
- they all offer clinical specialties practiced in at least five sub-units[4].

The empirical analysis that follows has sought to verify the impact on the variability of efficiency indicators of excluding indirect costs allocated both from non-administrative

	1998	1999	2000	2001	2002	2003
No. of participating trusts	15	16	16	16	15	15
No. of hospital sub-units	469	557	565	485	438	444
No. of clinical specialties	44	45	45	43	43	42
Total direct costs for the hospital sub-units (in millions of Euros)	696	650	730	780	820	940
Total indirect costs for the hospital sub-units (in millions of Euros) and percentage as regard to total costs	338 (33)	396 (38)	413 (36)	453 (37)	465 (36)	503 (35)
DRG score attained	592,896	725,558	728,450	600,811	538,972	530,978
Total days of inpatient care	3,335,256	4,447,668	4,367,671	3,719,489	3,214,289	3,062,114
Total surgical procedures	390,770	478,774	513,698	461,945	419,598	395,262

Table II.
The dimensions of hospital sub-units included in the efficiency benchmarking project

	1998	1999	2000	2001	2002	2003	Exclusion of indirect costs
No. of trusts represented by the 181 sub-units	10	10	10	10	10	10	
No. of specialties represented by the 181 sub-units	12	12	12	12	12	12	
Total direct costs (in millions of Euros)	294	303	339	360	371	417	
Total indirect costs for the hospital sub-units (in millions of Euros) and percentage as regard to total costs	168 (36)	198 (40)	210 (38)	221 (38)	214 (37)	202 (33)	
DRG score attained	267,735	277,692	277,803	260,579	240,574	231,239	
Total days of inpatient care	1,572,359	1,709,110	1,694,160	1,610,993	1,553,917	1,428,627	
Total surgical procedures	188,788	197,547	209,218	211,201	215,148	195,305	

Table III.
Values for the sample group of hospital sub-units

support centres (see the cost items indicated as n. 5 in Table I) and from administrative support centres (see the cost items indicated as n. 6 in Table I). As previously indicated in Section 2, literature suggests considering only direct costs in inter-trust comparisons undertaken for benchmarking purposes. Given that in the practice of the THCS even the costs allocated by support centres to operative centres are included when calculating efficiency indicators, it is essential to measure the effects of their inclusion on data variability. In other words, our aim is to both understand what variation (decrease/increase) could be created in the variability of efficiency data by the exclusion of indirect costs and to identify a possible explanation for the change in this statistical measurement. In carrying out this test, we intended to verify the real effectiveness of the strategy analyzed in rendering data more comparable.

Table IV illustrates the value of the coefficient of variation calculated by the value of the GEI (see index n. 7 in Section 4), the EITDC (see index n. 3 in Section 4) and the EIPC (see index n. 5 in Section 4) in the 181 hospital sub-units included in our sample group, without distinguishing their clinical specialty.

In order to attain a synthetic measure of efficiency indicator variability, the GEI coefficient of variation was calculated for all hospital sub-units without distinguishing their clinical specialties.

The coefficient of variation was calculated by considering the values attained in all the sub-units for each year during the period 1998-2003, with the following global efficiency indicator:

Years	EITDC coefficient of variation	EIPC coefficient of variation	GEI coefficient of variation
1998	0.407	0.355	0.339
1999	0.344	0.294	0.271
2000	0.343	0.296	0.278
2001	0.317	0.280	0.267
2002	0.329	0.300	0.281
2003	0.376	0.338	0.331

Table IV.
Variability of the EITDC, EIPC and GEI

$$GEI = \frac{\text{total costs of sub-unit}}{\text{DRG score of sub-unit}}$$

As explained in Section 4, the GEI quantifies total unit costs per DRG point.

We might recall that the EITDC serves as the efficiency indicator of direct costs for the sub-units. It quantifies the direct unit costs per DRG point and may be calculated by means of the following formula:

$$EITDC = \frac{\text{direct costs of sub-unit}}{\text{DRG score of sub-unit}}$$

We might also recall that the EIPC serves as the efficiency indicator of production costs for the sub-units. These costs are a total of the direct costs for the sub-unit and the costs allocated from non-administrative support centres (laboratories, imaging, canteens. . .). This indicator quantifies the unit production costs per DRG point and may be calculated by means of the following formula:

$$EIPC = \frac{\text{production costs of sub-unit}}{\text{DRG score of sub-unit}}$$

From Table IV, it is clear that the variability of the EITDC is greater than that of the GEI and the EIPC for all the years considered. In other words, in the case under analysis, including the costs allocated both from non-administrative support centres and from administrative cost centres in the comparative analysis limited the variability of the GEI with respect to that of the EITDC.

How might the results obtained be reasonably explained? Two hypotheses might be proposed:

- H1. Uniform costing introduced binding rules to standardise the process of allocating costs from administrative and non-administrative support centres to operative cost centres or/and the compliance with these rules increased. This standardisation/compliance decreased the variability of indirect unit costs per DRG point and consequently brought about lower variability for the GEI than for the EITDC.
- H2. The indirect costs may have been “artfully” reported so as to not appear worst of all and to present efficiency indicators in line with the regional average. Should this be the case, each trust would have attributed greater costs allocated to operative sub-units with EITDC scores below the regional average and vice versa, would have attributed lower allocated costs to the operative sub-units with EITDC scores above the regional average.

If the former hypothesis proved true, the variability of the indirect unit costs per DRG point would be lower than the variability of the GEI. Instead, if the latter proved true, the variability of the indirect unit costs per DRG point would be greater than the variability of the GEI.

Therefore, in order to ascertain which of the two hypotheses is more plausible, the variability of the indirect unit costs per DRG point must be measured and compared with the variability of the GEI. Table V reports the coefficient of variation calculated for the EIIPS (see index n. 4 in Section 4) and EIOIC (see index n. 6 in Section 4) scores

for the 181 sub-units in the sample group. These indexes were calculated according to the following formulas:

$$EIIPS = \frac{\text{non - administrative indirect costs of sub-unit}}{\text{DRG score of sub-unit}},$$

$$EIOIC = \frac{\text{administrative indirect costs of sub-unit}}{\text{DRG score of sub-unit}}.$$

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Given that both the EIIPS and EIOIC scores display a greater variability than the GEI, the hypothesis that the indirect costs may have been “artfully” reported so as to not appear worst of all would seem more plausible than the eventuality that uniform costing (and/or the increased compliance with its rules) might have lowered the variability of the indirect unit costs per DRG point.

In the case under study, the indication of so-called outliers by the *Osservatorio costi* prior to the publication of the final report might unwittingly support such cost shifting. These are cases in which an efficiency indicator is above or below the regional average after compensating for the standard deviation. The status of outliers is made known in special reports to their relative trusts so that the latter may check whether mistakes are present in the data and subsequently confirm or correct the results.

In order to verify the validity of these suppositions, a further analysis was carried out to discover to what extent trusts had attributed greater costs allocated to operative sub-units with EITDC scores below the regional average and had instead attributed lower allocated costs to the operative sub-units with EITDC scores above the regional average. An effort was made to:

- identify the four specialties with the highest number of sub-units within the sample group (which added together, make up over 50 per cent of the sub-units in the sample group);
- measure for the 2001-2003 period and these four specialties, the percentage weight of both those sub-units with a higher EITDC and lower sum of EIIPS and EIOIC than the speciality average, and those sub-units with a lower EITDC and higher sum of EIIPS and EIOIC than the speciality average, and ultimately; and
- verify whether for a single specialty there might exist sub-units of the same trust belonging to two distinct subgroups: one with a higher EITDC and lower sum of EIIPS and EIOIC than the specialty average, and another with a lower EITDC and higher sum of EIIPS and EIOIC than the specialty average.

	EIIPS coefficient of variation	EIOIC coefficient of variation	GEI coefficient of variation
1998	0.741	0.467	0.339
1999	0.643	0.290	0.271
2000	0.662	0.335	0.278
2001	0.646	0.362	0.267
2002	0.687	0.334	0.281
2003	0.718	0.409	0.331

Table V.
Variability of the EIIPS,
EIOIC and GEI

The analysis presented below was carried out for the specialities, given that they are also used by the *Osservatorio costi* when calculating regional averages and deviations from these averages. Therefore, any manipulation of cost data undertaken to create the appearance of average performance may involve cost shifts among sub-units belonging to the same specialty.

The data reported in Table VI would seem to confirm our previous considerations concerning the analysis of efficiency indicator variability in that:

- with respect to the total of sub-units with a higher EITDC than average EITDC for a specialty, there emerges a significant percentage of sub-units also with a lower sum of EIIPS and EIOIC than the analogous average sum for a specialty;
- with respect to the total sub-units with a lower EITDC than average EITDC for a specialty, there emerges a significant percentage of sub-units also with a higher sum of EIIPS and EIOIC than the analogous average sum for a specialty; and
- within a single specialty there coexist sub-units of the same trust with a higher EITDC and lower sum of EIIPS and EIOIC than the specialty average and others with a lower EITDC and higher sum of EIIPS and EIOIC within the speciality average (as to this last point, take note of the repeated appearance of codes 05 and 21 in the final two columns of Table VI).

Although the analyses above cannot provide conclusive evidence that the allocation of indirect costs to the sub-units is actually manipulated in order to present efficiency indicators in line with the regional average, all the tests performed in our research revealed signs of accounting practices aimed at covering the inefficiency of certain sub-units through the attribution of costs allocated from support centres.

This outcome would lead us to conclude that in efficiency benchmarking projects it would be wise to opt for the exclusion of indirect costs not only because such costs cannot be controlled by the sub-unit manager, but also because they might also be purposefully allocated so as to display an average efficiency score. In the case of cost data manipulation, the exclusion of indirect costs from inter-trust cost comparisons would seem a useful strategy in focussing on “real (in)efficiency” in the relative efficiency assessment. In our case, the use of this strategy caused an increase in efficiency indicator variability, ranging from a maximum of 7.3 per cent (note in Table IV the difference between the EITDC and GEI for 1999) to a minimum of 4.5 per cent (note this same difference for 2003). The breadth of this variation depends on a variety of factors, most significantly the widespread use of cost data manipulation and the percentage weight of the indirect costs to be attributed to identified cost objects. Concerning this second aspect, we may observe that in our sample group the percentage of indirect costs in the sub-units ranged from a minimum of 33 per cent to a maximum of 40 per cent for the time period examined (Table III). Selecting highly specific cost objects such as individual procedures for the sub-units in comparative analyses would seem to increase the percentage of costs allocated indirectly and consequently create even greater scope for cost data manipulation.

6. Concluding discussion

Former studies regarding inter-trust cost comparison have contributed to the identification of several strategies aimed at “neutralising” the “disturbance factors” that impede focalisation on “real (in)efficiency” in inter-trust cost comparisons,

Year	Speciality (number of sub-units)	Average EITDC for speciality (range \pm 5 per cent) ^a	Average of sum of EIIPS and EIOIC for speciality (range \pm 5 per cent) ^a	Number of sub-units with higher EITDC and lower sum of EIIPS and EIOIC than 5 per cent average (percentage as regard to sub-units with higher EITDC than 5 per cent average) trust code of sub-unit ^b	Number of sub-units with lower EITDC and higher sum of EIIPS and EIOIC than 5 per cent average (percentage as regard to sub-units with lower EITDC than 5 per cent average) trust code of sub-unit ^b
2001	General medicine (29)	€1,122 (€1,178-1,066)	€853 (€896-810)	5 (5/11 = 45.4 per cent) 05, 05, 07, 11, 21	4 (4/12 = 33.3 per cent) 05, 05, 17, 21
	General surgery (27)	€1,395 (€1,465-1,326)	€1,096 (€1,151-1,041)	2 (2/5 = 40 per cent) 05, 05	4 (4/9 = 44.4 per cent) 05, 05, 17, 21
	Orthopaedics and traumatology (20)	€1,302 (€1,367-1,236)	€925 (€972-879)	2 (2/5 = 40 per cent) 00, 05	4 (4/9 = 44.4 per cent) 00, 03, 05, 09
	Obstetrics and gynecology (19)	€1,406 (€1,476-1,336)	€911 (€956-865)	2 (2/4 = 50 per cent) 05, 21	2 (2/9 = 22.2 per cent) 05, 21
2002	General medicine (29)	€1,152 (€1,209-1,094)	€829 (€871-788)	3 (3/8 = 37.5 per cent) 00, 05, 21	4 (4/12 = 33.3 per cent) 00, 05, 09, 21
	General surgery (27)	€1,618 (€1,699-1,537)	€1,240 (€1,302-1,178)	4 (4/10 = 40 per cent) 05, 07, 09, 11	5 (5/14 = 35.7 per cent) 00, 05, 07, 09, 17

(continued)

Exclusion of indirect costs

Table VI.

Table VI.

Year	Specialty (number of sub-units)	Average EITDC for speciality (range \pm 5 per cent) ^a	Average of sum of EIIPS and EIOIC for speciality (range \pm 5 per cent) ^a	Number of sub-units with higher EITDC and lower sum of EIIPS and EIOIC than 5 per cent average (percentage as regard to sub-units with higher EITDC than 5 per cent average) trust code of sub-unit ^b	Number of sub-units with lower EITDC and higher sum of EIIPS and EIOIC than 5 per cent average (percentage as regard to sub-units with lower EITDC than 5 per cent average) trust code of sub-unit ^b
2003	Orthopaedics and traumatology (20)	€1,529 (€1,606-1,453)	€1021 (€1,072-970)	2 (2/6 = 33.3 per cent) 00, 05	5 (5/11 = 45.4 per cent) 00, 03, 05, 09, 17
	Obstetrics and gynecology (19)	€2,050 (€2,153-1,948)	€1,170 (€1,229-1,112)	2 (2/6 = 33.3 per cent) 11, 21	2 (2/10 = 20 per cent) 09, 21
2003	General medicine (29)	€1,360 (€1,428-1,292)	€697 (€732-662)	2 (2/7 = 28.6 per cent) 05, 21	3 (3/16 = 18,7 per cent) 05, 05, 21
	General surgery (27)	€1,775 (€1,864-1,686)	€1,360 (€1,428-1,292)	3 (3/9 = 33.3 per cent) 05, 07, 11	3 (3/14 = 21.4 per cent) 05, 07, 11
2003	Orthopaedics and traumatology (20)	€1,612 (€1,693-1,531)	€1,117 (€1,173-1,061)	3 (3/8 = 37.5 per cent) 00, 05, 05	4 (4/8 = 50 per cent) 00, 03, 05, 17
	Obstetrics and gynecology (19)	€2,366 (€2,485-2,248)	€1,017 (€1,068-966)	2 (2/5 = 40 per cent) 05, 21	2 (2/7 = 28.6 per cent) 05, 21

Notes: ^aIn calculating the frequencies relative to the final two columns of the table, a deviation of \pm 5 per cent from the average was considered in order to exclude any cases bordering average performance. ^bAs part of a trust, each sub-unit may be identified with a two-digit trust code. The repetition of the same trust code twice in the same cell means that an organization has two sub-units with efficiency indicators relative to the cases listed in the last two columns. Note that the trust codes used here are not the same as those used by the *Osservatorio costi*. Please note that the trust codes indicated here have been changed from those used by the *Osservatorio costi* for reasons of privacy

however, up until now there have been no studies which have measured their efficacy. The identified strategies included defining and periodically updating a uniform costing system to be used by all the trusts, excluding subjectively-attributed costs from the analysis and creating clusters to comprise trusts (or their sub-units) with inherent peculiarities that reflect their common internal or external conditions. This study has sought to measure the result brought about by one of these strategies, that is, the exclusion of indirect costs from efficiency benchmarking initiatives. The analysis conducted has uncovered the likely manipulation of indirect costs to create the impression of having achieved approximately average levels of efficiency performance. Therefore, another cause of altered cost allocations may be added to those already cited in literature, such as the attainment of behaviour in line with trust goals (Wagenhofer, 1996; Jeacle, 2003) and the subsidizing of commercial products (whose prices are competitively determined) by well-funded public procurements (Demski and Magee, 1992; Jacob and Tung, 1992; Rogerson, 1992). The result of this empirical analysis further confirm the findings of previous studies indicating that the allocation of indirect costs is not always determined by rational behaviour warranted by decision-making and/or motivational purposes, but may instead be explained by irrationality associated with organisational legitimisation (Modell, 2002).

The likely existence of cost data manipulation in benchmarking initiatives seems to confirm that the exclusion of indirect costs for chosen cost objects proves advantageous in preventing such costs from being purposefully allocated to conceal inefficient performance. It should be emphasized that this strategy seems inapplicable wherever inter-trust cost comparisons of hospital services are used not only for efficiency benchmarking but also as a method of price regulation. In the method in question, known as “yardstick competition” (Schleifer, 1985), a regulator sets a price on costs observed in multiple organizations within the same economic sector, not just on the individual firm’s costs. In order to allow efficient organizations to reach a necessary balance between costs and earnings, the data compared by the regulator must regard full costs so as to afford the recovery of the economic value of all the factors of production consumed during the course of service provision. The practical obstacles this competitive model may encounter in the health-care sector have been clearly illustrated by Ellwood (1996). Given that yardstick competition foresees the possibility of practices resulting in cost shifts (Ellwood, 1996) and collusive manipulation (Schleifer, 1985), and that the strategy of excluding indirect costs may not be resorted to, we suggest that:

- indirect costs be indicated separately from direct costs; and
- the regulator endeavour to verify the truthfulness and exactness of the cost measures elaborated by the organizations receiving funding.

Studies focussing on the UK health-care sector have shown that benchmarking projects tend to promote an average level of efficiency performance (Jones, 2002; Northcott and Llewellyn, 2003; Llewellyn and Northcott, 2005). This is also the case in the Tuscan benchmarking initiative that we analysed. The differences between the two experiences lies in the fact that literature addressing the UK health-care sector, while recognising that the allocation of indirect costs is one of several factors that may obfuscate the measurement of “real (in)efficiency”, has suggested that the convergence of trust efficiency indicators toward average levels is most likely due to the standardization of

clinical practices (Llewellyn and Northcott, 2005). Therefore, while in our case the tendency toward an average level of efficiency would seem to depend on manipulation aimed at creating a false impression of similar efficiency performance (a condition that we define as “simulated efficiency isomorphism”), this same trend in British hospitals would seem more indicative of increasingly homogeneous clinical practices (a condition that, according to DiMaggio and Powell (1983) might be defined as “normative isomorphism” regarding efficiency performance). Future research may be helpful in uncovering the cause of these different reactions to relative efficiency performance evaluations. For example, it would be interesting to reveal what role incentives might play in promoting a real trend toward average efficiency levels. On this matter, it should be noted that while in the UK, there is an incentive to refer to average performance because the government has recently announced that the NHS trusts might be financed on the basis of average costs (Llewellyn and Northcott, 2005), in Tuscany no such incentive exists because the financing mechanism for hospital services is based on a PPS only for a limited number of hospital services (Section 3) and there is no link between this financing system and the Tuscan comparative analysis that considers efficiency for cost centres but not for specific procedures (Section 4).

The case analysed in this study shows how a defensive orientation in public organizations may arise even without the application of some form of compulsory benchmarking aimed at emphasizing the quantitative aspects of performance and producing benchmarking metrics in order to satisfy an external agent (Bowerman *et al.*, 2002). This outcome is of interest, as some empirical studies have revealed that as the relative performance of the public sector becomes increasingly visible through the extension of compulsory benchmarking, attention is placed on the benchmarks rather than on ways to reduce possible performance gaps (Leeuw, 1996; Bowerman *et al.*, 2002; Madg and Curry, 2003). Our analysis of the THCS would seem to suggest that, in order for benchmarking to actually produce improvement in the performance of organizations, it is not enough to make use of voluntary benchmarking models to obtain an orientation toward improvement. Most likely, creating a cultural inclination toward comparison among like organizations is a necessary strategy if the defensive attitude is to be replaced with willingness to learn from successful episodes. As concerns this aspect, training is widely believed to play an essential role in assuring that the principles of efficiency benchmarking may be usefully applied in the health-care sector (Leonard *et al.*, 1998; Jones, 2002; Matykiewicz and Ashton, 2005; Tyler, 2005).

The fact that on more than one occasion our analysis indicated the existence of data manipulation in inter-trust cost comparisons might result in a more complete list of recognised causes for efficiency indicator variability and consequently aid in understanding what strategies are needed to neutralize the factors concealing “real (in)efficiency”. The classification proposed by Llewellyn and Northcott (2005), as well as ours illustrated in Section 2 explain the variations in cost-allocation practices as a result of homo or heterogeneity in handling cost data but fail to consider the eventuality that cost data manipulation might take place to attain “simulated efficiency isomorphism”. This clarification would seem important, given that while on one hand the use of strict uniform costing should theoretically lend greater homogeneity to cost elaboration, on the other some scholars have shown that this strategy is incapable of limiting cost data manipulation (Demski and Magee, 1992; Jacob and Tung, 1992; Rogerson, 1992). As previously indicated, the way to overcome this impediment is by:

- seeking to create a benchmarking culture so as to highlight its potential; and
- as regards yardstick competition, in which compulsory and voluntary benchmarking may coexist, providing for verification of the truthfulness and exactness of cost measures.

To conclude, we might note that although this study suggests excluding indirect costs from efficiency benchmarking initiatives intended for cost centre administrators, as these costs are subject to decisions taken at a higher level and potentially modified over the medium/long term, further research is required to identify useful techniques and models for rationalizing them.

Notes

1. For an analysis of the various factors that may influence efficiency indicator variability, see Section 2.
2. The statistical analysis proposed in Section 5 is based on efficiency indicators for the six years from 1998 to 2003. The efficiency data for 2004, just published in the last report by the *Osservatorio costi*, were not taken into consideration as they became known only following the conclusion of our empirical study.
3. During the six years observed, the quantity and makeup of the units varied as a result of: (1) the closure of existing units; (2) the opening of new units; (3) the incorporation of units; and (4) the division of units. The variability study would have lost relevance if the same units had not been considered throughout the period.
4. The decision was taken to exclude all clinical specialties practiced in less than five trust units out of concern that the variability analysis would have been negatively influenced by the presence of sub-groups with a small number of elements.

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