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Organizing professionals and their impact on performance: the case of public health doctors in the Italian SSN

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ABSTRACT

Hybrid professional managers have been associated with improvements in the performance of public sector organizations. However, less attention has been given to differences within this category. Drawing on board human capital theory, we focus on an emerging group of ‘organizing professionals’ with earlier and deeper exposure to management training and education: generalist clinical hybrids drawn from public health in the Italian healthcare system. Specifically, we investigate the impact that these hybrid hospital CEOs have on organizational performance in comparison with other backgrounds. The results indicate that this form of generalist hybrid professionalism has distinct, if not dramatic, consequences for performance.

KEYWORDS Hybrid professional managers; performance; healthcare; Italy

Introduction

In many countries, the reform of public services has focused on increasing the involvement of professionals, such as doctors, nurses and teachers in management (Dent et al. 2016). This has led to the creation of new part time or ‘hybrid’ professional manager roles such as clinical directors and, at more strategic levels, membership of governing boards as well as investments in leadership and management training and education for professionals (O’Reilly and Reed 2010). In healthcare, for example, there has been a sustained focus on developing clinical leadership, which has moved from ‘the dark side to centre stage’ (Ham, Clark, and Spurgeon 2011). Policy makers assume that these changes will ultimately raise the performance of public sector organizations, with professionals (such as doctors) enhancing decision making through their sector specific knowledge and greater credibility. As Falcone and Satiani (2008, 88) suggest, ‘in a healthcare system that is complex, troubled, and challenging, the doctor CEOs and board directors brings a unique set of skills to the business of medicine’.

A growing number of studies have explored these claims by focusing on the performance implications of hybrid professional managers, especially at strategic levels (membership of boards) (Goodall and Bäker 2015). In healthcare, the results

of this research have been mixed, with some studies finding strong associations with quality outcomes (such as mortality rates and patient experience) and others noting how clinical involvement may have negative consequences for efficiency (see Sarto and Veronesi 2016 for a review). However, to date less attention has been given to differences between *types* of hybrid professional managers. The available research notes significant variations in how professionals respond to management roles, in terms of emergent identities and practices (Spyridonidis and Currie 2016; Schott, Van Kleef, and Noordegraaf 2016). This literature also highlights variations in the level of prior training, development and socialization experienced by these hybrid professional managers (Noordegraaf et al. 2016). As we noted above, in areas such as healthcare, significant investments have been made to develop clinical leadership capabilities (Noordegraaf 2011). In some countries, including the US, Australia, Israel and Italy, this has also gone closely together with moves to introduce more specialized career tracks in areas such as education or medical management (Busari, Berkenbosch, and Brouns 2011). But what difference do these investments make to the impact that hybrid professional managers have on decision making? Are those professionals who have undergone specific management training and education more effective than those who have not, perhaps because they are better able to balance demands associated with service quality *and* efficiency?

Our goal is to address these questions about the relative impact of hybrid professional managers with different levels of prior management development and socialization. Drawing on ideas from board human capital theory (Kor and Sundaramurthy 2009; Datta and Iskandar-Datta 2014), we make a distinction between hybrids with specialist and more generalist expertise. While the former tend to enter these roles in late career with limited (if any) training in management, the latter are similar to what Noordegraaf (2015) has termed '*organizing professionals*', with deeper and earlier exposure to management development and socialization.

In the main part of the paper we explore these concerns empirically, focusing on the case of public hospital CEOs in the Italian Servizio Sanitario Nazionale (SSN). Italy is theoretically interesting because—unlike many other health systems—it witnessed the early development of a sub-specialization of medical (hybrid professional) managers drawn from the public health (PH) specialty. Since the 1950s, PH doctors (also called hygienists—*igienisti*) have engaged in an explicit occupational mobility project aimed at capturing the jurisdiction of public hospital management (Sartirana, Prenestini, and Lega 2014). As such, the Italian case illustrates the development of a cadre of generalist organizing professionals who are playing an increasingly significant role in the management and governance of hospitals. Using routine administrative data sources, we investigate three main hypotheses by testing the impact that hospital CEOs with different professional backgrounds have on (quality and financial) performance goals. The results of the analysis confirm existing assumptions about the impact of clinical hybrids overall, but also reveal the distinctive impact that generalist clinical hybrid CEOs (or organizing professionals) are having on organizational performance.

Hybrid professional managers and their impact on performance

In recent years, the notion of hybridity has been used widely in the public management literature to describe change at multiple levels of analysis: individual, organizational and institutional (Denis, Ferlie, and Van Gestel 2015). The term is imported from biology to

refer to a 'state of being composed through a mixture of disparate parts' (Battilana and Lee 2014, 400), relatively stable over time. In this regard, hybrid professional manager roles are essentially about the blurring of logics and modes of working at individual levels, within organizational contexts such as public hospitals, universities and professional service firms (Empson et al. 2013). Considerable research has been conducted on these roles, exploring variations in how professionals respond to them and consequences for practice. For instance, an influential strand of work focuses on identity struggles and distinctions in how professionals in different settings engage with management priorities and seek either to buffer or control the work of junior colleagues (Croft, Currie, and Lockett 2015; Mcgovern et al. 2015).

As noted earlier, there are strong reasons to assume that the presence of hybrid professional managers (doctors and other clinicians), especially at the board level of hospitals, including CEO roles, will have positive consequences for the core goals of healthcare including clinical and process quality. Here, an important source of reference are ideas from board human capital theory (Kor and Sundaramurthy 2009). A central tenet of this approach is that unique managerial capabilities of executives will influence decision making and subsequent performance. Frequently, distinctions are made between human capital that is either 'generic' or 'industry/sector specific' (Sundaramurthy, Pukthuanthong, and Kor 2014). In the context of public services, this might capture differences between managers drawn from the commercial sector (with generic expertise) and professionals (including hybrids) who have advanced their careers exclusively within public organizations (Kirkpatrick, Vallasca, and Veronesi 2017). These differences might also have implications for 'increased understanding and credibility and better communication' (Dorgan et al. 2010, 14). Greater understanding arises from the knowledge and training of clinicians, giving them significant informational advantages over non-clinical (or general) managers in decisions regarding patient care and service development (Ford-Eickhoff, Plowman, and McDaniel 2011). In addition, CEOs or board members with clinical backgrounds may benefit from enhanced credibility, making it easier for them to communicate policies to rank and file professionals while ensuring greater engagement and implementation (Spurgeon and Clark 2017).

These assumptions about the contribution of hybrid clinical managers at board level are supported by some emerging research (Goodall and Bäker 2015). Hence, Jiang et al. (2009) show how greater doctor participation on hospital committees improves performance in terms of the care process (measured as quality of care of heart attack, heart failure, pneumonia and surgical infection prevention) and mortality rates. Focusing on the top 100 US hospitals, Goodall (2011) also finds that having a CEO with a medical background generates quality improvements and results in higher hospital rankings. More recently, similar results have been reported in the English NHS, where it appears that having a greater proportion of doctors on the governing boards of English hospital trusts can generate improved quality ratings and enhanced patient experience (Veronesi, Kirkpatrick, and Vallasca 2013). Therefore, it seems reasonable to predict that:

Hypothesis 1. Clinical hybrids on the governing board of hospitals will have a positive impact on core service quality outcomes.

Notwithstanding this hypothesis, it is less clear whether the presence of clinical hybrids on boards will have positive implications for other performance goals,

notably those of financial efficiency. On the one hand, it might be argued that the greater credibility of clinical hybrids (Falcone and Satiani 2008) will make it easier for them to ‘enter discussions with the medical staff about the hospital’s efforts to contain costs without raising concerns that proposed changes will adversely affect hospital quality’ (Succi and Alexander 1999, 35). Against this assumption is the limited training of most clinical hybrids in financial management (Kippist and Fitzgerald 2009) and, in some cases, a reluctance to engage with these concerns. The latter may arise from a ‘wariness of managerial work’ that ‘is deeply rooted in the culture of medicine and medical education’ (Blumenthal et al. 2012; 515—quoted in Noordegraaf et al. 2016). Others note moral hazards and risks associated with clinical hybrids, especially when they behave as advocates or ambassadors of their own specialisms at the expense of the wider organizational priorities (Addicott 2008). These concerns are reflected in the available empirical research. While some studies have found that medical involvement on hospital boards is associated with marginal improvements in efficiency (Sarto and Veronesi 2016), others report a significant negative impact (Succi and Alexander 1999). As such we can further predict that:

Hypothesis 2. Clinical hybrids on the governing board of hospitals are unlikely to have a positive impact on financial efficiency outcomes.

Returning to the themes raised in the introduction, much of the literature identifies different forms that hybrid roles can take and in the background and expertise of hybrids. Focusing on independent treatment centres in the UK, Waring and Bishop (2013) distinguish between professionals with expertise that is commercially valuable (so called ‘corporate elites’) and other practicing professionals. This dimension also captures the extent to which professionals in hybrid roles have experienced prior formal training and on the job socialization in management. While such differences are especially pronounced between professions—see for example, Currie and Spyridonidis (2016) comparing nurses and doctors in management—they are increasingly present *within* professions as well (Noordegraaf et al. 2016).

These variations between hybrids are explained in part by growing investments in leadership and management training and education for professionals (O’Reilly and Reed 2010). Also relevant is the emergence of new types of sub-specialisms (Busari, Berkenbosch, and Brouns 2011) in which professional and management competencies (and identities) are merged from the outset. For instance, in Australia and New Zealand, the specialty of medical administration is a postgraduate specialist branch of medicine promoted by the Royal Australasian College of Medical Administrators in order to prepare doctors for careers in healthcare management (MacCarrick 2014). In the US, attempts to build medical management sub-specialisms through joint degrees such as MD/MBA are also long standing (Larson, Chandler, and Forman 2003).

Once again, ideas from board human capital theory might be useful for making sense of these differences in the backgrounds of hybrids (Kor and Sundaramurthy 2009). While noting differences between ‘generic’ or ‘industry/sector specific’ human capital (see above), this approach also makes further distinctions between ‘specialists’ and ‘generalists’ (Datta and Iskandar-Datta 2014). In the context of private sector boards, specialists are those directors with ‘deep expertise’ in a given ‘functional area’ (such as accounting). By contrast, generalists are defined as ‘those who earned [for example] an MBA degree’ which ‘imparts a broader, strategic knowledge-base’ (p. 1854). This latter distinction is

particularly relevant to the emergence of hybrid professional manager roles. Crudely speaking, specialists are those hybrids whose expertise is primarily professional (such as medicine or teaching) and have taken on these roles in late career. By contrast, generalists are hybrids who have undergone significant management training, similar to what Noordegraaf (2015) terms ‘organizing professions’. The latter, he argues, represent a form of ‘re-configured’ professionalism in which the techniques and objectives of organizations (i.e. management) are more closely integrated. In professions such as medicine, this means that ‘organizational skills’ are not viewed as ‘separate from medical work’, but rather, ‘part of medical work’ (Noordegraaf et al. 2016, 1113).

But what difference (if any) will these distinctions have for understanding the impact of hybrid clinical managers? A key rationale of investments in training and development—to develop organizing professionals—is that it may lead to enhanced performance. In part this is explained by the reasons explored above in relation to Hypothesis 1. As clinicians themselves, organizing professionals should be able to leverage specific knowledge and credibility in ways which improve board level decisions about clinical and process quality. In addition, it is possible that clinical hybrids with a more generalist training will be able to contribute towards other goals, including efficiency. This assumption is also central to the board human capital literature. According to Datta and Iskandar-Datta (2014, 1856): ‘CEOs with a general management experience tend to have expertise of greater strategic relevance than those with specific functional expertise’.

The specific literature on hybrids also suggests that the ‘development of organizing capacities and skills’ will lead to a wider awareness and engagement with financial priorities (Schott, Van Kleef, and Noordegraaf 2016, 604). This could ensure that generalist hybrids are more adept at dealing with ‘cost-quality trade-offs’ (Weiner, Shortell, and Alexander 1997, 496). In addition, the orientation and motivation of generalist hybrids who have self-selected into careers that involve management and leadership are potentially critical. Following Mcgovern et al. (2015), these professionals are more likely to be ‘willing hybrids’, with a stronger commitment to organizational interests over and above those of a particular speciality or profession. Hence, our final hypothesis states that:

Hypothesis 3. Generalist clinical hybrids on the governing board of hospitals will contribute positively to both service quality and financial efficiency outcomes.

Research setting: hybrid clinical managers in Italy

Like other European healthcare systems, in Italy there has been an emphasis on strengthening clinical leadership and involvement in management. A key piece of legislation in 1992 allowed some public hospitals the opportunity to convert to semi-independent enterprises with private sector-style boards and actively promoted clinical directorates, which later became mandatory in 1999 (Lega 2008). As in other countries, these reforms were associated with a growing number of hospital CEO positions being filled by clinical professionals, especially doctors (see below).

However, as noted earlier, Italy also represents a critical case of the development of an organizing profession (with more generalist human capital) in the healthcare sector. Unlike most other countries, from the early twentieth century doctors

specialized in PH became prominent as medical directors in hospitals and, in the post war era, actively sought to extend their jurisdiction into management, through new forms of training and specialization (see [Table 1](#) for a summary). Importantly, the government was supportive of this strategy, as this meant capitalizing on the willingness of a specific professional category to occupy the emerging hospital managerial positions. Indeed, in the first half of the twentieth century, although primarily focused on the prevention of infectious diseases, PH doctors began to take on administrative roles in healthcare organizations (Sartirana, Prenestini, and Lega 2014).

This process was given a boost in 1938 when the Petragrani Law (*Legge Petragrani*, R.D. 1631/1938) restructured the hospital sector and established the new role of hospital medical director (i.e. *Direttore Sanitario*). Importantly, and possibly unique to Italy, this law insisted that, in order to compete for these positions, doctors should have had specific qualifications in the field of hygiene, technology and hospital care (Sartirana, Prenestini, and Lega 2014). Thus, the government intentionally selected PH doctors and not other types of clinical disciplines as having the expertise most relevant to the demands of hospital administration. This placed PH doctors in an advantageous position, allowing them to colonize the new roles of medical director (Nante et al. 2013).

In the 1990s, the advent of New Public Management (NPM) reforms in Italy (Lega 2008) further re-affirmed the prominent role of PH doctors in occupying top management positions. This was especially the case after the creation in 1992 of semi-independent organizations—*Aziende Sanitarie Locali* (local health organizations) and *Aziende Ospedaliere* (hospital trusts) —with corporate style governing boards (Sartirana, Prenestini, and Lega 2014). At that point, it was again made clear that the specialization in PH was a preferred qualification for the access of clinical professionals to senior board roles: general director (*Direttore Generale*) and medical director (D.lgs. 502/1992, D.lgs. 517/1999 and D.P.R. 10/12/1997 n. 484). To support this reform, in 1995 a uniformed, standardized curriculum for PH doctors was agreed, with particular emphasis on

Table 1. The development of PH doctors.

PERIOD	MILESTONES
19 th century	Hygiene emerges as independent discipline that combines prevention and organizing of health provision due to Peter Franck's treatise on health.
First half of 20 th century	Doctors with expertise in hygiene start to assume relevant roles within hospitals in public servant positions.
1938	The Petragrani Law introduces the role of hospital medical director and requires the mandatory expertise in Hygiene and PH to access this position.
1968	The Mariotti Law expands the management duties of medical directors by incorporating activities such as control over personnel and financial oversight.
1960s–1970s	A post-graduate specialist training in hygiene and PH is established in Italian medical schools.
1978	The establishment of the SSN sparkles a growing demand for managerial expertise.
1990s	NPM reforms make compulsory specialization in PH for CEO and hospital medical director roles.
1995	The curriculum of doctors specializing in PH is standardized at the national level with more emphasis on organizational competences and managerial skills.
2005	The reform of universities leads to the mandatory introduction of a teaching module in health economics, management and organization in medical curricula as well as an extra-curricular internship in senior management roles.
2006	PH doctors found the Italian Society of Medical Managers.

organizational competence and managerial skills (e.g. human resource management, management of processes, planning and evaluation) (Romano et al. 2014).

By 2014, the number of university courses awarding the PH specialization had reached 38 (Romano et al. 2014). Crucially, a significant proportion of these students had the aspiration to move into senior management positions rather than pursuing a clinical career. As a consequence, PH doctors make up over 50 per cent of general director (or CEOs) roles with a medical background (Sartirana, Prenestini, and Lega 2014). The interest in management has also been reinforced by the establishment of a dedicated professional association—*Società Italiana Medici-Manager* (Italian Society of Medical Managers) —open to all hybrid professional managers but specifically founded by and for PH doctors. Hence, this brief history reveals the emergence of a specialized pathway of medical management in the Italian healthcare context, linked to the PH profession. However, while this model of organizing profession is often viewed by policy makers as advantageous for improving the effectiveness of management decision making in hospitals, we know little about its impact in practice.

Data and methodology

Sample and data

To investigate the concerns raised so far, we focus on clinical hybrids occupying the position of *Direttore Generale* (hereafter, the CEO) within Italian public hospitals. The study concentrates on autonomous public hospitals, therefore excluding those managed by local health organizations (Sarto et al. 2016). The latter are less autonomous organizations with CEOs having far less room for independent decision making in hospital management (Nutti, Ruggieri, and Podetti 2016; Longo, Salvatore, and Tasselli 2011; Ferré et al. 2014). The more autonomous public hospitals comprise general (*Aziende Ospedaliere*), teaching (*Aziende Ospedaliero-Universitarie*) and research (*Istituti di Ricovero e Cura a Carattere Speciale*) hospitals.

To address our main hypotheses, the study unfolded in two main stages. First, we explored the impact of all CEOs with clinical backgrounds on quality and efficiency outcomes. Second, we looked specifically at the performance implications of CEOs with a PH background (our proxy for generalist hybrids). Due to the lack of a central repository of information on the Italian SSN hospital governance, we constructed a unique dataset by manually working through the official documentation published by the Ministry of Health, the Regions and any other relevant information accessible on each hospital website. The personal information on hospital CEOs and their area of expertise was retrieved from their curriculum vitae, their appointment decrees and the Italian official register of doctors. In terms of outcomes, data on service quality was taken from the ‘Hospital Discharge Cards’ (*Schede di Dimissione Ospedaliera*) database published by the Ministry of Health on its website. Lastly, information relating to hospital financial performance (efficiency) was gathered from the publicly available hospital annual reports and accounts.

The total population of public hospitals in the Ministry of Health database amounted to 105 organizations censused in 2011. This was the last available information at the time of the research. Some organizations had to be excluded as mergers, de-mergers and changes in ownership status occurred during the period under investigation. The remaining missing hospitals were not included in the study due

to the absence of reliable information on their top executive position. As a result, the final sample comprised of 90 hospitals in 2008, 92 hospitals in 2009 and 96 hospitals in 2010. All PH doctors included in our sample had qualified after the 1995 reform, which meant they had undertaken the more standardized form of management education described earlier.

Dependent variables

As noted, our main dependent variable (hospital performance) was measured in relation to both the quality of services provided and financial efficiency. The rationale for this dual measure is linked to the assumptions discussed earlier about the possible contribution of clinical hybrids in general and organizing professionals (generalists) in particular both to the core business of health services (service quality) and to goals which are more central to management (financial efficiency).

Service quality

To measure service quality, we employed process indicators relating to the delivery of care. These indicators have been sourced from the performance evaluation system elaborated by the 'Scuola Superiore Sant'Anna' of Pisa (Nuti et al. 2012) and have been used in prior research focused on the Italian SSN (Vainieri et al. 2017; Nuti, Ruggieri, and Podetti 2016). Specifically, we focused on two dimensions—the length of care and its appropriateness—both widely accepted indicators of service quality.

Our first process quality measure, the *length of care* (LOC), was captured using two indicators: the 'pre-surgery length of stay', and the 'overall length of stay'. The pre-surgery length of stay includes the average number of days between the patient admission date and the date when the surgery is performed. The length of stay represents the average number of days between admission date and final discharge of the patient. Essentially, both indicators measure the hospital ability to effectively organize its activities for the patient benefit. Using principal component factor analysis (PCFA), we identified the factor comprising the two indicators and then dichotomised the variable at its median value (DeCoster, Iselin, and Gallucci 2009). As the value of the (pre-surgery and ordinary) length of stay factor was inversely proportional to the efficiency of care dimension (i.e. a higher composite value equals lower efficiency), the dummy variable assumes value 1 (better performance) if the factor value is lower than the median, meaning that the composite length of stay for each hospital is lower than the one of the hospital population in our sample.

Second, the *appropriateness of care* (APPROP) measures the hospital ability to perform clinically appropriate interventions for (medical and surgical) patients (Nuti et al. 2012; Nuti, Ruggieri, and Podetti 2016). Medical appropriateness was measured using two ratios: (i) the ratio between the number of short (0–2 days) hospital medical hospitalizations and the total number of medical hospitalizations; and (ii) the ratio between the number of hospital medical hospitalizations with diagnostic aim and the total number of medical hospitalizations. These two ratios capture the organization compliance with the National Healthcare Agreement of 2010 in avoiding unnecessary short ordinary hospitalization for patients who could be diagnosed or treated in other care settings (e.g. outpatient clinics). In both cases, a lower raw value indicates more appropriate care. Surgical appropriateness, on the other hand, was measured using the ratio between the number of hospitalizations with medical

diagnostic related groups discharged from surgical departments and the total number of patients discharged from surgical department. As such, this indicator also captures outcomes quality, where a lower raw value is associated with more accurate diagnoses of patients.

Similar to the LOC measure, we used PCFA to identify a factor that comprised the two appropriateness indicators. Given the presence of outliers and non-linearity of relationship between input and outcome variables, we dichotomised the appropriateness variable at the median value (DeCoster, Iselin, and Gallucci 2009). As the value of the appropriateness factor was inversely proportional to the performance dimension (i.e. a higher composite value equals lower appropriateness of care), the dummy variable assumes value 1 if the factor value is lower than the median. Therefore, a dummy equal to 1 measures better performance in terms of surgical and medical appropriateness.

Financial efficiency

To measure hospital financial performance, we used two accounting indicators: the net operating margin ratio (OP_MARG_RAT), which is a measure of the ability to generate profit by the organization in relation to its operating revenues (Eldenburg and Krishnan 2003); and the ratio of total expenses on hospital beds (OP_EFF), which represents a size adjusted measure of hospital financial efficiency (Succi and Alexander 1999). The OP_MARG_RAT indicator is positively related to the profit dimension and so its increase indicates an improvement in terms of the profit generated. On the other hand, the raw value of OP_EFF is inversely related to the costs structure of the hospital operations, meaning that when the relative (to the number of beds) costs are higher the hospital is less efficient. Thus, to make it more immediately understandable for the reader, we use the negative value of the size adjusted total expenses (and similarly for all the other variables included in the regression model).

Explanatory variables

To estimate the impact of different types of hybrid professional managers on hospital performance, we looked at the educational background of the CEO. First, to address Hypotheses 1 and 2 we distinguished between CEOs with clinical educational background (essentially, all individuals with a degree in medicine) and those ones with a non-clinical background (CLIN_CEO). Second, to address Hypothesis 3, among clinical CEOs we distinguished doctors with a clinical specialization in PH (PH_CEO), our proxy for organizing professionals, from doctors with any other medical specialization. As a further test, to fully assess the relative contribution of clinical hybrids on performance, we focused on the impact of CEOs with non-clinical backgrounds. Here, we differentiated between those non-clinical CEOs with a degree in administrative sciences (Law/Political Science) (ADM_CEO)—traditionally influential in the Italian SSN (Sarto et al. 2016)—and those without.

A number of control variables were included in the model. First, we looked at whether acting CEOs had previous professional experiences in the same role within healthcare organizations (BACK_CEO) (Fattore, Longo, and Sartirana 2013), assuming that this would have provided individuals with greater knowledge and ability to deal with the requirements of the role. Additionally, we considered the length of

tenure of the CEO within the same organization (TENURE), on the basis that longer tenure would yield a better understanding of the organizational resources and greater familiarity with other managers. In terms of organizational characteristics, we distinguished hospitals in terms of their size with regard to the total number of beds available (SIZE) and case mix, as a proxy for the complexity of care provided (CASEMIX). The case mix captures the characteristics of patients, their associated conditions and diagnoses received, and the related treatments delivered by a hospital such that higher values of the variable indicate greater complexity. Following a similar line of reasoning, hospitals were differentiated according to the population age, determined by the mean age of the population served (POP_AGE). Older patients can potentially require more complex treatments and are more prone to multi-morbidity issues. Finally, hospitals were differentiated according to their status, by distinguishing general hospitals from teaching (TEACH_HOSP) and research (RES_HOSP) hospitals (Veronesi, Kirkpatrick, and Vallasca 2013).

Analysis

We separately estimated three empirical models for each performance indicator. The models employing the financial performance measures as dependent variables were estimated using data for a 3-year period (2008–2010). By contrast, the quality performance analyses were carried out for 2-year periods (2008–2009 for APPROP and 2009–2010 for LOC). As the quality performance indicators were dichotomous variables, here we employed a pooled logistic regression estimation technique. Conversely, because of the continuous nature of the financial performance proxies, we used pooled OLS regressions. In both cases we included year dummy variables in the models. We estimated analogous specifications of the relevant regression model for each explanatory variable—CLIN_CEO, PH_CEO and ADM_CEO.

Findings

Table 2 reports the descriptive statistics related to the variables employed in our analyses. Firstly, it can be seen that CEOs with clinical expertise were more likely to lead Italian public hospitals (59.4%) than those with non-clinical expertise (40.6%). Interestingly, PH doctors entailed about 29.9% of the CEOs' sample and roughly 50% of the hybrid professional CEOs. As far as previous experience in the role is concerned, 38.8% of CEOs had already occupied this position in the past. Finally, CEO's average tenure was around 3 years.

Table 3 reports the Pearson bivariate correlations of the variables employed, which allows checking for possible multicollinearity. As a rule of thumb, a problem of multicollinearity subsists if the pair-wise correlation coefficients between two regressors are high, normally in excess of 0.8 (Gujarati 2004). As shown in Table 3, the coefficients for each of the explanatory variables in the regression models ranged from -0.708 to 0.552 , hence below the threshold. We also tested for multicollinearity through Variance Inflation Factor (VIF) analysis. All VIF values were within acceptable limits for the variables employed (<10) and, therefore, we did not exclude any variable.

Tables 4 and 5 respectively show the results of the pooled logistic and the OLS regression analyses testing the effect of CEO human capital on the quality of services

Table 2. Variable explanations and descriptive statistics.

VARIABLES	DEFINITION	N	MEAN	S.D.	MIN	MAX
LOC	Dummy transformation of length of care factor (equal to 1 if lower than the median of the factor)	179	0.497	0.501		
APPROP	Dummy transformation of Appropriateness factor (equal to 1 if lower than the median of the factor)	177	0.503	0.501		
OP_MARG_RAT	Continuous. EBITDA per Operating Revenues ratio	262	1.075	0.136	0.911	1.673
OP_EFF	Continuous. Operating Expenses per Total Beds ratio	271	339.951	97.995	179.497	930.675
CLIN_CEO	Dummy equal to 1 if the CEO is a clinician	278	0.594	0.492		
PH_CEO	Dummy equal to 1(0) if the CEO has PH (non-clinical/other clinical) background	284	0.299	0.459		
ADM_CEO	Dummy equal to 1(0) if the CEO has administrative (other clinical and non-clinical) background	285	0.211	0.408		
BACK_CEO	Dummy equal to 1 if the CEO has experiences in top executive positions	263	0.388	0.488		
TENURE	Continuous. N° of years of staying in hospital CEO's position	278	3.057	1.967	0.416	11.258
SIZE	Continuous. Natural Log of hospital Beds	271	6.429	0.680	4.331	7.537
CASEMIX	Continuous. Hospital case mix	272	1.079	0.173	0.66	1.57
POP_AGE	Continuous. Average age of population within hospital municipality	285	44.096	2.066	40.098	47.806
TEACH_HOSP	Dummy equal to 1 for Teaching Hospitals	285	0.270	0.445		
RES_HOSP	Dummy equal to 1 for Research Hospitals	285	0.123	0.329		

provided and financial performance dimensions. Specifically, models (1) and (4) tested the effect of CEO clinical expertise on hospital performance (Hypotheses 1 and 2), while models (2) and (5) investigated the effect of PH specialization (Hypothesis 3). Finally, as an additional test, models (3) and (6) assessed the effect on performance of CEOs with administrative backgrounds. Within these models, each performance indicator is individually regressed on the different explanatory variables. As a robustness test, we also ran the regression models considering the continuous values of length and appropriateness of care, yielding comparable results (Appendix A).

Starting with the impact of hybrid professional CEOs as opposed to non-clinical CEOs, the results were fairly unambiguous. As reported in Table 4, specifications (1) and (4) of the regression models highlighted a positive and highly significant influence of clinical CEOs both on the length of care (LOC) ($\beta = 1.590$, $p < 0.01$) and on the surgical and medical appropriateness (APPROP) ($\beta = 0.888$, $p < 0.05$). This provides substantial support for Hypothesis 1, consistent with other studies of hospital boards (see, e.g., Goodall 2011; Veronesi, Kirkpatrick, and Vallasca 2013). However, with regard to the financial performance dimension (see Table 5), clinical expertise seemed to have the opposite effect on the profitability and efficiency of the hospital. In particular, models (1) and (4) respectively suggested a negative and significant effect of a clinical CEO on the operating margin ($\beta = -0.035$, $p < 0.1$) and on the financial efficiency ($\beta = -17.163$, $p < 0.1$) factors. Therefore, our findings also offer strong support for Hypothesis 2, with hospitals run by clinical hybrid CEOs under-performing in terms of financial goals.

Table 3. Pearson bivariate correlations.

VARIABLES	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 LOC	1													
2 APPROP	0.350***	1												
3 OP_MARG_RAT	-0.244***	0.149**	1											
4 OP_EFF	0.111	-0.381***	-0.277***	1										
5 CLIN_CEO	0.244***	0.111	-0.067	-0.121**	1									
6 PH_CEO	0.148**	-0.074	-0.037	-0.029	0.552***	1								
7 ADM_CEO	-0.180**	0.025	0.239	0.089	-0.634	-0.338	1							
8 BACK_CEO	-0.032	0.091	0.134*	-0.082	-0.085	0.026	0.047	1						
9 TENURE	-0.117	0.210***	0.059	-0.017	-0.007	0.014	0.167***	-0.007	1					
10 SIZE	-0.117	-0.303***	-0.098	0.439***	-0.028	0.158***	0.057	0.302***	0.165***	1				
11 CASEMIX	-0.262***	0.250***	0.147**	-0.518***	0.068	0.086	-0.041	0.262***	0.002	-0.030	1			
12 POP_AGE	0.146*	-0.082	-0.221	-0.088	0.089	0.169***	-0.103*	0.182***	-0.059	0.219***	0.249***	1		
13 TEACH_HOSP	-0.084	0.124	0.085	-0.007	0.061	0.091	0.054	0.156**	0.019	0.244***	0.221***	0.082	1	
14 RES_HOSP	0.097	0.262***	0.149**	-0.389***	0.161***	-0.058	-0.036	-0.081	-0.081	-0.708***	0.184***	0.002	-0.228***	1

Significance level indicated by p-value: * < 0.1; ** < 0.05; *** < 0.01.

Table 4. Logistic regression of service quality.

VARIABLES	LOC			APPROP		
	(1)	(2)	(3)	(4)	(5)	(6)
CLIN_CEO	1.590*** 0.432			0.888** 0.418		
PH_CEO		1.066** 0.420			0.039 0.446	
ADM_CEO			-1.249*** 0.480			-0.893 0.545
BACK_CEO	0.832* 0.445	0.501 0.410	0.528 0.414	0.542 0.484	0.509 0.470	0.506 0.475
TENURE	0.183* 0.104	0.168* 0.101	0.206** 0.103	0.391*** 0.114	0.357*** 0.110	0.432*** 0.124
SIZE	-1.373*** 0.496	-1.090** 0.456	-0.954 0.445	-1.747*** 0.547	-1.665*** 0.524	-1.617*** 0.526
CASEMIX	-7.267*** 1.616	-6.499*** 1.515	-6.806*** 1.528	4.700*** 1.413	4.480*** 1.366	4.762*** 1.392
POP_AGE	0.390*** 0.111	0.329*** 0.105	0.349*** 0.107	-0.162 0.116	-0.174 0.114	-0.197* 0.117
TEACH_HOSP	-0.071 0.441	0.001 0.427	0.256 0.426	0.616 0.462	0.659 0.464	0.819* 0.458
RES_HOSP	0.306 0.975	1.145 0.934	1.247 0.934			
OBSERVATIONS	164	164	164	140	139	140
Wald chi2	49.88***	41.38***	41.78***	42.95***	38.55***	41.03***
Pseudo R2	0.220	0.182	0.184	0.222	0.201	0.212
YEAR DUMMIES	YES	YES	YES	YES	YES	YES

Significance level indicated by p -value: * <0.1 ; ** <0.05 ; *** <0.01 .

The significance of these findings is further revealed by tests looking at the impact of CEOs with administrative backgrounds. As one might expect, specification (3) of the regression model in Table 5 shows a positive and significant effect of these CEOs on the operating margin ratio (although this was not the same for the operating efficiency proxy, whose coefficient was insignificant). However, with regard to quality, specification (3) of the model (see Table 4) highlights a statistically significant negative effect on the length of care (LOC) ($\beta = -1.249$, $p < 0.01$) and a negative (but not significant at the customary levels) effect on the appropriateness of care (APPROP) (specification 6). Such findings highlight the relative benefits of appointing clinical hybrids to hospital CEO roles, as opposed to individuals without clinical expertise, especially with regard to quality.

Regarding the impact of PH specialization (our proxy for generalist clinical hybrids), the results were mixed. As can be seen from Table 4, we found that the coefficient of the variable PH_CEO was significantly and positively related only to one quality outcome: length of care (LOC) ($\beta = 1.066$, $p < 0.01$). Conversely, PH specialization did not seem to generate the same effect on the appropriateness of care (the coefficient was still positive but not statistically significant at the customary levels). With regard to the financial performance dimension, both specifications (2) and (5) of the regression model (reported in Table 5) did not reveal statistically significant coefficients for the variable PH_CEO. As such, the analysis offers only limited support for Hypothesis 3 with regard to one performance measure: service quality. Nevertheless, it also suggests that while CEOs with a PH specialization are not having a positive impact on financial efficiency, in contrast to ‘all clinical hybrids’ (Hypothesis 2) this impact was not expressed in negative terms.

Table 5. OLS regression of financial performance.

VARIABLES	OP_MARG_RAT			OP_EFF		
	(1)	(2)	(3)	(4)	(5)	(6)
CLIN_CEO	-0.035*			-17.163*		
	0.019			9.663		
PH_CEO		-0.010			-9.297	
		0.020			10.237	
ADM_CEO			0.092***			16.427
			0.023			11.721
BACK_CEO	0.049**	0.050**	0.056***	-26.147**	-25.115**	-24.552**
	0.021	0.021	0.020	10.576	10.630	10.582
TENURE	0.005	0.005	-0.000	-4.803*	-4.780	-5.505**
	0.005	0.005	0.005	2.538	2.557	2.598
SIZE	0.004	0.002	-0.001	81.886***	80.380***	79.818***
	0.020	0.021	0.020	10.335	10.405	10.282
CASEMIX	0.096*	0.097*	0.094*	-256.460***	-256.855***	-256.157***
	0.057	0.057	0.055	29.439	29.644	29.515
POP_AGE	-0.021***	-0.020***	-0.019***	-1.972	-1.688	-1.603
	0.005	0.005	0.005	2.458	2.492	2.474
TEACH_HOSP	0.030	0.029	0.016	0.801	-0.124	-2.842
	0.022	0.023	0.021	11.138	11.269	11.197
RES_HOSP	0.100**	0.085**	0.091**	10.150	2.204	2.398
	0.042	0.041	0.040	21.200	20.787	20.631
OBSERVATIONS	228	227	228	247	246	247
F	4.13***	3.75***	5.58***	24.55***	23.97***	24.31***
Adjusted R ²	0.121	0.109	0.168	0.489	0.484	0.487
YEAR DUMMIES	YES	YES	YES	YES	YES	YES

Significance level indicated by *p*-value: * <0.1 ; ** <0.05 ; *** <0.01 .

As for the control variables, hospital size had a negative effect on the quality of the service provided both in terms of length and appropriateness, although it did impact (positively) on financial efficiency. The proxy for operational complexity (case mix) had mixed implications, being negative for length of stay, but positive for appropriateness of care and financial efficiency. Surprisingly, teaching and research statuses did not have any significant effect on the quality of care, while CEO tenure also had a variable impact on our key dimensions of performance.

As a further robustness test, we sought to exclude the possibility that our findings were affected by endogeneity problems due to reverse causality. To do this, we re-ran the pooled regressions by using lag values of the independent variables employed (see [Appendix B](#)). Here, the assumption is that CEOs would not be able to predict the hospital performance at time t from the information set available at time $t-1$, thus suggesting that the performance (at time t) is not explained by the tendency of CEO with certain backgrounds to be appointed on high-performing hospitals. The results of this robustness test were qualitatively similar to the ones reported for the main analysis. The findings of the base line models were also confirmed when the regressions were re-run using sector-adjusted performance values (see [Appendix C](#)).

Discussion and conclusions

The main point of departure in this paper are debates about the impact of hybrid professional managers on performance, specifically CEOs in healthcare. Drawing loosely on ideas from board human capital theory (Kor and Sundaramurthy 2009), the literature makes various assumptions about this performance impact. On the one

hand, it is assumed that the ‘sector specific’ knowledge of hybrids will be beneficial in terms of service quality outcomes (Hypothesis 1), while, on the other hand, the consequences may be less positive for financial efficiency (Hypothesis 2). A further question relates to possible differences *within* the category of clinical hybrids and, in particular, whether it makes a difference if hybrids have acquired more generalist human capital (Datta and Iskandar-Datta 2014) from earlier training and socialization in management (Noordegraaf 2015). Here the assumption (captured in Hypothesis 3) is that generalist clinical hybrids may be more effective in balancing both quality *and* efficiency goals.

Focusing on Italian public hospitals, our analysis provided strong support for both Hypotheses 1 and 2. We found that clinical CEOs in general are having positive effects on hospital quality outcomes. This lends support to the assumptions of board human capital theory regarding the likely impact of sector specific knowledge and the findings of many previous studies (for example, Goodall 2011; Veronesi, Kirkpatrick, and Vallasca 2013). Sector specific knowledge facilitates what Goodall and Bäker (2015) term ‘expert leadership’, helping to improve both the quality of decision making (informed by understanding of the core business of healthcare) and the credibility of senior managers. By contrast, our analysis suggests that hybrid professional managers perform far less well in terms of financial efficiency goals (Hypothesis 2). Implied is that hybrid CEOs may lack the capabilities of non-clinical managers to make effective decisions in this area (Kirkpatrick, Vallasca, and Veronesi 2017). It is also possible that their primary contribution to improving quality may come at a cost in terms of financial control and profitability. The latter is suggested by the statistically negative association between clinical CEOs and financial management reported in Table 5.

However, the results were less conclusive with regard to Hypothesis 3, concerning the impact of CEOs with a PH background (our proxy for organizing professionals with more generalist expertise). While these CEOs still had a positive effect on one measure of service quality (length of stay), they had no (significant) impact on hospital financial performance. Therefore, we found no strong evidence to support the view that clinical hybrids with generalist human capital are substantially more likely to reconcile professional and managerial demands. All that can be said is that the impact of CEOs with a PH background on financial goals was *not* significantly negative—as was the case with all clinical hybrids. Tentatively, this suggests that PH doctors may be able to leverage their sector-specific (medical) knowledge (Ford-Eickhoff, Plowman, and McDaniel 2011) in ways that help raise quality without at least undermining efficiency. Given how cash strapped are many healthcare systems around the world, avoiding the trade-off between quality and costs should in itself be seen as a positive contribution of these organizing professionals.

These findings contribute to theory, research and policy in a number of ways. First, they add to the growing literature looking on how hybrid professionals on the governing boards of public sector organizations shape performance (Sarto and Veronesi 2016). Our results are consistent with earlier studies, highlighting the positive impact that hybrids—in our case, clinicians—seem to have on service quality outcomes (Goodall 2011; Jiang et al. 2009). However, they also offer a more nuanced picture. Unlike previous studies, our results emphasize the mixed consequences of placing clinical hybrids in key executive roles, specifically with regard to their negative effect on financial outcomes (see Veronesi, Kirkpatrick and Vallasca 2014

for competing findings in the English NHS). More tentatively, the Italian experience suggests that prior management development and socialization of clinical hybrids is important. While it is not having a significant impact on performance overall, our analysis shows that hybrids with a generalist PH background are nevertheless distinctive in their effects. Therefore, an important contribution of this study is to illustrate the variable impact of hybrid clinical managers on performance and how this, in turn, is linked to different types of human capital (specific vs. generalist) *within* this category.

A related contribution is to more specific debates about the consequences of increasing investments in management development and the emergence of new cadres of ‘organizing professionals’. Looked at from a wider perspective, these policies might be viewed as an attempt to bridge the gap between ‘professional’, ‘commercial’ and ‘managerial’ logics in healthcare, and other public services. By integrating management training and socialization at an earlier stage in professional careers, the practices of generalist hybrids may go beyond ‘pragmatic collaboration’ between logics (Denis, Ferlie, and Van Gestel 2015). There is also some overlap here with Skelcher and Smith’s (2015, 440) notion of ‘blended’ hybridization in which there is a ‘synergistic incorporation of elements of existing logics into a new and contextually specific logic’. To some extent, our results lend support for this conclusion, suggesting that PH doctors may be slightly more adept in managing cost quality trade-offs (see Noordegraaf 2015). However, as we noted earlier, the strategy of developing a cadre of organizing professionals in Italian public hospitals has not been transformational. Contrary to the assumptions made in board human capital theory, it seems that the expertise of these generalist hybrids is having only a partial impact on organizational outcomes.

Given the nature of our data, it is possible to only speculate about the reasons for this limited impact. One possibility is that clinical hybrids who have invested more time and energy in developing management capabilities are less able than other doctors to leverage sector specific knowledge. As Christopher Pollitt (1990, 438) once observed, ‘professional experience, unexercised, is a decaying asset’. Equally, it is possible that organizing professionals have less credibility amongst their peers, viewed as having dual commitments (Croft, Currie, and Lockett 2015) or being labelled as a ‘lower status’ occupation through their association with management. In this regard, the specific context of Italy may also be significant. It is notable, for example, that, in Italy, attempts to develop hybrids with generalist expertise have focused primarily on PH doctors who, according to most international rankings of medical specialization, find themselves at the bottom (or close to it) of the status pecking order (Norredam and Album 2007). Related to this is the possibility that, in Italy, the cultural divide between medicine and management has tended to be particularly strong in the past (Lega 2008), although it is hard to say whether this is more or less true than other European healthcare systems.

Turning to policy implications, our findings are less clear. On the one hand, they support the general thrust of policies aimed at enhancing clinical leadership, showing how clinical hybrid CEOs may add value in terms of service quality (Ham, Clark, and Spurgeon 2011). However, at the same time they raise questions about the effectiveness of investments in early career management development and socialization for doctors (Busari, Berkenbosch, and Brouns 2011). Contrary to more critical

assessments (see, e.g., Mcgovern et al. 2015), our results suggest that these policies are having a small, albeit limited, impact on performance, helping to balance quality and efficiency objectives. But, whether these marginal gains are considered to be worthwhile will depend on the expectations of policy makers and on what outcomes they value. While the PH specialization is associated with satisfactory (but unspectacular) performance in service quality, as we noted earlier, it may help to minimize the risks of financial under-performance. In this regard, PH specialization may be perceived as valuable, especially if the minimum objective of governments is to create what Llewellyn and Northcote (2005, 555) term ‘average hospitals’, which are ‘cheaper to run and easier to control than highly differentiated ones’.

When drawing these conclusions, it is important to note certain caveats and directions for future work. An obvious concern is the need for more longitudinal research to strengthen our conclusions about the assumed direction of causality—whether it is the human capital of CEOs impacting on performance or vice-versa? Although our robustness tests increase the confidence in the assumed relationships, access to further years of data would be useful. Second, we clearly need to know more about the internal dynamics of the governance of Italian public hospitals to better understand *why* there is a relationship between different types of human capital and performance. While we can speculate about the ability and motivation of hybrid professional managers to influence strategic decisions, further research investigating how actors enact different leadership styles would be advantageous. Work of this kind might also uncover relevant differences in clinical orientations and identity of CEOs, which further impact on their practice. Third, the analysis could be re-run using alternative performance measures. Although length of stay is a useful quality indicator—notably in the Italian SSN where bed blocking is historically a significant concern (Nutri et al. 2012)—it could also signal inferior quality if patients are forced to leave prematurely. Lastly, we need to look beyond the Italian case to fully understand the nature and consequences of organizing professionals. Indeed, Italy may be distinctive in a number of respects. We noted earlier, for example, that local and regional political networks play an important role in shaping the appointment of hospital managers (Sarto et al. 2016) and their ability to leverage resources (such as capital and HR investments) (Fattore, Dubois, and Lapenta 2012). The focus on PH only rather than broader clinical expertise might also be significant as we noted earlier. Either way, there is scope to extend this research to other contexts to better understand how different patterns of hybrid professional management are emerging and their impact.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix A. OLS regression of length of care and appropriateness continuous factors.^a

VARIABLES	LENGTH OF CARE			APPROPRIATENESS		
	(1)	(2)	(3)	(4)	(5)	(6)
CLIN_CEO	−0.332** 0.131			0.112 0.137		
PH_CEO		−0.136 0.139			−0.216 0.142	
ADM_CEO			0.322** 0.157			−0.233 0.177
BACK_CEO	−0.166 0.141	−0.124 0.142	−0.127 0.141	−0.002 0.151	−0.007 0.151	−0.018 0.151
TENURE	0.002 0.034	0.001 0.034	−0.008 0.034	0.040 0.036	0.034 0.036	0.054 0.038
SIZE	0.554*** 0.149	0.509*** 0.151	0.497*** 0.148	−0.444*** 0.140	−0.435*** 0.140	−0.427*** 0.139
CASEMIX	2.789*** 0.425	2.778*** 0.433	2.820*** 0.428	1.745*** 0.400	1.706*** 0.399	1.760*** 0.399
POP_AGE	−0.152*** 0.033	−0.148*** 0.034	−0.147*** 0.034	−0.039 0.034	−0.034 0.035	−0.044 0.034
TEACH_HOSP	−0.029 0.148	−0.055 0.151	−0.110 0.150	0.155 0.156	0.188 0.156	0.192 0.155
RES_HOSP	−0.264 0.310	−0.463 0.304	−0.445 0.300	1.522*** 0.317	1.602*** 0.308	1.562*** 0.307
OBSERVATIONS	164	164	164	152	151	152
F	8.74***	8.74***	9.28***	13.49***	13.81***	13.71**
Adjusted R ²	0.300	0.300	0.314	0.427	0.435	0.431
YEAR DUMMIES	YES	YES	YES	YES	YES	YES

Significance level indicated by *p*-value: * <0.1 ; ** <0.05 ; *** <0.01 .

^aThe factors are inversely proportional to the performance dimensions.



Appendix B. Robustness test: Logistic regressions with lagged values

VARIABLES	LOC			APPROP			OP_MARG_RAT			OP_EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CLIN_CEO	1.367***			0.881			-0.033			-11.326		
PH_CEO	0.417	0.906**		0.590	-0.161		0.025	0.010		9.826	-4.498	
ADM_CEO		0.420	-0.995*		0.668	-1.080		0.026	0.089***		10.476	
BACK_CEO	0.847*	0.628	0.508	0.634	0.671	0.748	0.035	0.036	0.030	-8.411	-7.724	15.873
TENURE	0.452	0.427	0.428	0.698	0.687	0.649	0.029	0.029	0.039	-8.411	-7.724	12.441
SIZE	0.106	0.101	0.109	0.419**	0.412**	0.689	0.008	0.009	0.028	10.918	10.970	-7.3060
CASEMIX	-0.956**	-0.807*	-0.672	0.171	0.170	0.498***	0.007	0.007	0.003	-0.446	-0.099	-1.315
POP_AGE	0.480	0.453	0.444	-1.760**	-1.779**	-1.677**	0.009	0.004	0.004	53.668***	51.937***	2.793
TEACH_HOSP	-6.665***	-6.366***	-6.299***	0.830	0.813	0.812	0.030	0.030	0.029	11.276	11.314	52.041***
RES_HOSP	1.566	1.512	1.508	4.970**	4.625**	5.230**	0.185**	0.187**	0.183	-331.584***	-332.339***	11.748
OBSERVATIONS	0.339***	0.281***	0.293***	2.077	1.984	2.070	0.077	0.078	0.075	30.792	31.014	30.754
LR chi2	0.110	0.107	0.107	-0.220	-0.245	-0.277	-0.024***	-0.023***	-0.021	1.239	1.414	1.695
R ²	-0.270	-0.233	0.013	0.172	0.170	0.176	0.007	0.007	0.007	2.631	2.668	2.645
YEAR DUMMIES	0.459	0.449	0.440	0.376	0.377	0.577	0.018	0.014	0.004	5.474	4.610	2.699
	0.221	1.038	0.983	0.677	0.690	0.667	0.031	0.031	0.030	11.425	11.583	11.449
	0.955	0.915	0.907				0.123	0.103**	0.115	-32.764	-39.055*	-37.891
	157	156	157	69	68	69	0.059**	0.058	0.056	22.507	22.004	21.782
	42.18***	36.25***	34.43***	21.59***	19.87***	21.46***	143	142	143	162	161	162
	0.194	0.168	0.158	0.227	0.212	0.225	3.50***	3.27***	4.44**	28.97***	28.46***	29.06***
	YES	YES	YES	YES	YES	YES	0.137	0.126	0.179	0.610	0.607	0.611
	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

* Significance level indicated by p-value: * < 0.1; ** < 0.05; *** < 0.01.

Appendix C. Robustness test: OLS regressions with sector-adjusted performance indicators^a

VARIABLES	LENGTH OF CARE			APPROPRIATENESS			OP_MARG_RAT			OP_EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CLIN_CEO	-0.332** 0.131			0.112 0.137			-0.035* 0.019			-17.163* 9.663		
PH_CEO		-0.136 0.139			-0.216 0.142			-0.010 0.020			-9.297 10.237	
ADM_CEO			0.322*** 0.157			-0.233 0.177			0.092*** 0.023			16.427 11.721
BACK_CEO	-0.166 0.141	-0.124 0.142	-0.127 0.141	-0.002 0.151	-0.007 0.151	-0.018 0.151	0.049** 0.021	0.050** 0.021	0.056*** 0.020	-26.147** 10.576	-25.115** 10.630	-24.552** 10.582
TENURE	0.002 0.034	0.001 0.034	-0.008 0.034	0.040 0.036	0.034 0.036	0.054 0.038	0.005 0.005	0.005 0.005	-0.000 0.005	-4.803* 2.538	-4.780* 2.557	-5.505** 2.598
SIZE	0.554*** 0.149	0.509*** 0.151	0.497*** 0.148	-0.444*** 0.140	-0.435*** 0.140	-0.427*** 0.139	0.004 0.020	0.002 0.021	-0.001 0.020	81.886*** 10.335	80.380*** 10.405	79.818*** 10.282
CASEMIX	2.789*** 0.425	2.778*** 0.433	2.820*** 0.428	1.745*** 0.400	1.706*** 0.399	1.760*** 0.399	0.096* 0.057	0.097* 0.057	0.094 0.055	-256.460*** 29.439	-256.855*** 29.644	-256.157*** 29.515
POP_AGE	-0.152*** 0.033	-0.148*** 0.034	-0.147*** 0.034	-0.039 0.034	-0.034 0.035	-0.044 0.034	-0.021*** 0.005	-0.020*** 0.005	-0.019*** 0.005	-1.972 2.458	-1.688 2.492	-1.603 2.474
TEACH_HOSP	-0.029** 0.148	-0.055 0.151	-0.110 0.150	0.155 0.156	0.188 0.156	0.192 0.155	0.030 0.022	0.029 0.023	0.016 0.022	0.801 11.138	-0.124 11.269	-2.842 11.197
RES_HOSP	-0.264 0.310	-0.463 0.304	-0.445 0.300	1.522*** 0.317	1.602*** 0.308	1.562*** 0.307	0.100** 0.042	0.085** 0.041	0.091** 0.040	10.150 21.200	2.204 20.787	2.398 20.631
OBSERVATIONS	164 9.66***	164 8.74***	164 9.28***	152 13.49***	151 13.81***	152 13.71***	228 4.13***	227 3.75***	228 5.58***	247 24.55***	246 23.97***	247 24.31***
F	0.323	0.300	0.314	0.427	0.435	0.431	0.121	0.109	0.168	0.489	0.484	0.487
YEAR DUMMIES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Significance level indicated by p-value: * < 0.1; ** < 0.05; *** < 0.01.