

Does Religious Diversity in Health Team Composition Affect Efficiency? Evidence from Dubai

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Team cultural diversity, the degree to which working team members differ in culture-related factors, may affect healthcare teams’ outcomes. This paper focuses on one particular source of cultural diversity, namely religion, and examines its relation to the production efficiency of hospital wards. Building on the categorization-elaboration model of organizational diversity, the authors test an empirical model positing that team religious diversity has non-linear effects on efficiency, and considering the role of moderating variables of the relation diversity–efficiency. Empirically, the authors adopt a two-step approach, whereby the first step applies data envelopment analysis to estimate efficiency scores for each team, and the second investigates the effect of diversity and of moderating variables. The model is tested on a sample of hospital wards from three large hospitals in Dubai. The results suggest an inverse U-shaped relation between religious diversity and the wards’ efficiency. Evidence is provided that the relation is moderated by task complexity, task conflict, team leader tenure and diversity in nationality. This study advances research on the management of hospital team diversity by emphasizing the complexity of diversity effects and the importance of contextual factors.

Introduction

Cultural diversity is the result of differences between nationalities, ethnicities and religions, which in turn reflect deeper underlying norms and values (Stahl *et al.*, 2010).

Because of rising labour-market mobility, an increasing degree of cultural diversity characterizes organizations’ workforces and the composition of work groups. Healthcare is part of this trend: on the one hand, the growing complexity of clinical and surgical activities calls for the joint collaboration of diverse medical specialties and medical

roles; on the other, the shortage of medical professionals experienced by many countries leads to the hiring of foreign medical staff, presenting a diverse set of cultural characteristics.

Cultural diversity has been recognized as potentially beneficial in terms of patient satisfaction improvement (Ivancevich, 2007), more equitable management of health organizations (Weech-Maldonado *et al.*, 2012), effective communication (Dreachslin, Hunt and Sprainer, 2000), performance as perceived by patients (Weech-Maldonado *et al.*, 2003), strategic change (Naranjo-Gil, Hartmann and Maas, 2008) and innovation (Fay *et al.*, 2006).

However, contrasting evidence exists on the effects of cultural diversity on performance in the workplace. On the one hand, diversity allows the

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expansion of the capabilities of teams, and increases the capacity to change and innovate. On the other hand, several perceptions and approaches to work have to be integrated in teams composed of people with different cultural backgrounds, requiring time and effort to reach consensus on feasible solutions, and increasing coordination costs (Guillaume *et al.*, 2013).

Among the various sources of cultural diversity, scholarly research on the diversity–performance relation has focused mainly on nationality and ethnicity (Dahlin, Weingart and Hinds, 2005; Earley and Mosakowski, 2000), because nationality represents a key determinant of a person’s self-identity (Earley and Mosakowski, 2000). Religion remains a relatively neglected issue (Pitts and Wise, 2010), in spite of the fact that religious convictions may be deeply held and involve attitudes and obligations that affect the way in which people behave as employees (Hicks, 2003), thereby influencing organizational performance (Rao, 2012). This paper contributes to filling this research gap by empirically investigating the relation between workforce religious diversity and performance in hospitals.

The organizational context that we study – hospital care in Dubai – represents an exemplar case of widespread multinational, multi-religious teams in healthcare. The rising population, the growth in income levels and the government’s strategy to attract international medical tourism has led healthcare organizations to hire qualified foreign personnel to cope with the shortage in local professionals. While the issues created by multinationality cannot be denied, we believe that it is of particular relevance to analyse the effects created by multi-religious work teams, given that the Emirates is a predominantly Muslim country, and religion has an important influence on specific health practices (Kronfol, 2012). Further, when the health conceptions of healthcare professionals differ substantially from the cultural groups they serve, this may lead to confusion, conflicting health promotion goals and low adherence to treatment regimes (Hannawi and Al Salmi, 2014), thus affecting the quality and efficiency of healthcare.

Our measure of performance is the ward’s production efficiency. For several healthcare systems, including Dubai’s, the challenge is to satisfy increasing demand, while facing resource constraint in terms of staff and equipment. Therefore, the input–output relation is an important metric of performance on which to gauge the impact of

workforce diversity. With respect to the organizational diversity literature, production efficiency also offers the advantage of being an ‘objective measure’. As such, unlike perceptual measures of performance, it is not prone to biases in the measurement of the diversity–performance relation (van Dijk, van Engen and van Knippenberg, 2012).

Analogous to most studies on workforce diversity in healthcare, the team is considered the relevant unit of analysis, since teamwork is crucial in hospitals, where patient care is distinctively based on joint actions (Shortell *et al.*, 2001). The hospital ward is a reasonable proxy of the hospital team, especially for smaller wards. However, even if larger wards may encompass multiple teams, each of them cannot account for hospital output defined as patient cases treated without the collaboration and coordination of other teams belonging to the same ward (e.g. in surgical wards, cases treated result from the joint action of nursing and operating-room teams). Thus, in terms of efficiency, a hospital ward may be viewed as a team in charge of providing the whole care necessary to treat a patient.

The analysis is undertaken by adopting a two-step approach (Bozec, Dia and Bozec, 2010), whereby the first step measures production efficiency with bootstrapped data envelopment analysis (DEA), whereas the second step applies regression models to estimate the impact of diversity on efficiency.

Our results may be of interest to scholars and policy-makers alike. First, from a theoretical standpoint, the research contributes to further the understanding of the diversity–performance relationship, by showing that religious diversity has a curvilinear effect on efficiency, and by studying how relevant moderating variables shape this relationship. In this direction, the study addresses the call for research by Jackson, Joshi and Erhardt (2003), who see religion as an underrepresented but salient source of diversity. Next, the research develops a refined model of how religious diversity affects team efficiency in healthcare, a context increasingly called to address the issues raised by a multicultural workforce, and to cope with the demands of a multi-religious customer base. Although many of the arguments used in hypothesis development are specific to healthcare, the analysis may add to the understanding of multi-religious teams also in other industries that use teams

diverse in cultural background (Nederveen Pieterse, van Knippenberg and van Dierendonck, 2013). Finally, this paper presents *prima facie* evidence on hospital efficiency in Dubai, and identifies organizational and environmental variables that should be targeted to improve it.

In the following sections, we provide definitions of diversity grounded in the literature, we describe the theoretical background of the study and the hypotheses tested, the two-step methodology adopted, results concerning efficiency calculated with DEA, and evidence on the impact of multi-religious health teams on efficiency. The discussion and the limitations conclude the paper.

Cultural diversity

Diversity at work typically refers to differences between individuals ‘on any attribute that may lead to the perception that another person is different from self’ (van Knippenberg and Schippers, 2007). Cultural diversity is relevant to organizations’ research and management because individuals maintain culturally derived values, attitudes and behaviour in the workplace (Cox, 1993; Watson, Kumar and Michaelsen, 1993). Among other things, culture is expected to affect work ethics, the meaning assigned to time and the division of labour (Schein, 1985), all of which can affect organizational performance (Stahl *et al.*, 2010).

Typically, sources of team diversity are classified in surface-level and deep-level sources (Harrison, Price and Bell, 1998). The former capture differences in overt characteristics, including race, gender, education and nationality (Ely and Thomas, 2001; Mannix and Neale, 2005). The latter refer to differences among members’ psychological characteristics, including personalities, values and attitudes. However, when cultural diversity is at issue, the distinction between surface-level and deep-level aspects is blurred. In fact, some surface-level differences such as ethnicity and nationality (Mannix and Neale, 2005) are actually a proxy for underlying differences (van Knippenberg and Schippers, 2007) concerning deep-level aspects (spiritual values, attitudes and practices deriving from own culture).

Religion and nationality have been considered in management and organizational studies as key reflections of culture. Nationality has been recognized as a ‘super-ordinate determinant of a

person’s self-identity, derived through a meaning system shared with others’ (Earley and Mosakowski, 2000). Hofstede (1992) considers religion one of the key factors underlying national culture, and an important source of cultural identity in general (Morley and Robins, 2013; Pitts and Wise, 2010).

Drawing from Schein (1985), Rao (2012) identifies three layers through which religion can represent a source of diversity. These include core values and beliefs (e.g. the role of work in life, work ethics), rituals, attitudes and structures (e.g. attitude towards women in the workplace or towards work itself), and behaviour and symbols (e.g. festivities, clothing).

Diversity and performance: theoretical background

Several theoretical perspectives have been proposed to explain the relation between performance and diversity. According to the Social Identity perspective, people prefer to interact and collaborate with individuals they consider similar for values and attitudes (Jehn, Northcraft and Neale, 1999). The Social Identity perspective is complemented by Social Categorization theory (Tajfel, 1982), which posits that individuals are inclined to categorize self and others into groups based on salient attributes. Both views entail that the impact of diversity on teams’ performance is negative, because it makes intra-group relations and social processes more problematic (Hogg and Terry, 2000; Stahl *et al.*, 2010).

In contrast, the Information/Decision-Making perspective (Ancona and Caldwell, 1992; Bantel and Jackson, 1989) argues that diversity has a positive impact on team outcomes, because it brings new abilities, sources of information and understanding inside the team (Jackson, 1992; Pfeffer, 1983; Watson, Kumar and Michaelsen, 1993), as well as a broader range of networks and perspectives (Guillaume *et al.*, 2013).

Regrettably, scholarly research is rife with empirical evidence supporting either the social categorization or the information/decision-making approaches, leading to inconsistent conclusions about the direction of the main effect of cultural diversity on performance.

One issue that prevents the full understanding of the diversity–performance relation is the

fact that both the social categorization and the information/decision-making perspectives assume linear main effects of diversity on performance (Kooij-de Bode, van Knippenberg and van Ginkel, 2010). Empirical models that have explicitly encompassed non-linear effects support a curvilinear relation between team cultural diversity and performance (Earley and Mosakowski, 2000; Dahlin, Weingart and Hinds, 2005), whereby both positive and negative effects may hold according to the degree of diversity. However, even when non-linear effects are allowed for, the shape of the cultural diversity–performance relation is ambiguous. While U-shaped relations have been found between diversity in education and information use and between diversity in nationality and the depth and integration of information (Dahlin, Weingart and Hinds, 2005), upright U-shaped relations have been reported between diversity in nationality and the range of information (Dahlin, Weingart and Hinds, 2005) and team effectiveness (Earley and Mosakowski, 2000).

In the attempt to reconcile the alternative theoretical views, the categorization-elaboration model (CEM)(van Knippenberg, De Dreu and Homan, 2004) argues that both social categorization and information/decision-making processes can stem from diversity. According to the CEM, the beneficial effects of diversity on performance arise from the contribution that diversity can give to the elaboration of task-related information and to the development of new perspectives. However, the elaboration and integration of diverse information may be successful up to a certain point, and then becomes more difficult for ‘lack of a common frame of reference’ (van Knippenberg and Schippers, 2007). Therefore, moderate levels of diversity lead to positive impacts on team performance, while both complete homogeneity and extreme diversity lead to lower performance, resulting in a curvilinear relation.

The overall shape of the diversity–performance relation will depend on moderation effects (see Guillaume *et al.* (2015) for a recent state of the art review on moderators). When diversity is perceived as salient, the team perceives threats to subgroup identity during the process of elaboration of task-relevant information. In such cases, social categorization processes trigger intergroup bias that negatively moderates the effects of diversity on performance. Conversely, the diversity–performance relation is positively moderated when diversity

is perceived as an opportunity, diversity is task relevant, and group members are motivated and able to process rich and diverse information (van Knippenberg, De Dreu and Homan, 2004).

The relation between diversity in religion and efficiency in healthcare

In what follows, CEM is adopted as the theoretical lens to interpret the relation between diversity in religion and team performance. Consistently, we argue that diversity in religion activates processes of task-relevant information-elaboration that is affected by moderating variables.

Given the relevance of the Muslim religion in Dubai, we posit that the separation between Muslims (the official religion of Dubai) and non-Muslim identifies the relevant measure of religious diversity. Given this dichotomization, moderate diversity entails that there will be a dominant religious group and a smaller sub-group (Harrison and Klein, 2007), whereas maximum diversity corresponds to the presence of two equally sized religious subgroups within the hospital team.

Religious diversity may activate information-elaboration processes whenever it ‘encourages individuals to rethink how they deal with everyone they encounter’(Gelb and Longacre, 2012, p. 514). In particular, employees’ religious diversity may help team members cope with the religious diversity of customers. In healthcare, effective decisions concerning patient care strongly rely not only on the integration of alternative views of clinicians in the team, but also on effective patient information extraction in order to choose adequate treatments. This may be encouraged by cultural affinity between the patient and the care provider, since the religion of patients may present specificities in terms of acceptable work and medical practices (Jhutti-Johal, 2013). Therefore, moderate degrees of religious diversity in health teams may allow them to cope with the diversity of patients through the cultural competence of clinicians, thus improving treatment outcomes and improving the efficiency of healthcare provision (see Dreachslin, Weelch-Maldonado and Dansky (2004) for a similar argument about the effect of racial diversity). However, when religious diversity becomes high, it undermines performance, owing to the effects that this has on teams’ acquisition of new

information and to the team's capacity to integrate information. We foresee two distinct effects at play. First, as diversity increases and the two religious subgroups tend to become similar in size, new team members of the same religious group do not add to the team's capacity to cater for culturally diverse patients. In fact, team members' frameworks will become overlapping, resulting in redundant information (Dahlin, Weingart and Hinds, 2005), and giving rise to decreasing returns from diversity. Second, as the percentage of members of staff of a given religion increases, opposite 'philosophies' of care may emerge associated with the different religions, resulting in failure to integrate these alternative views and in conflict in agreeing on patient treatment or on the treatment options proposed to patients (Curlin *et al* 2007).

To sum up, CEM supports the view that religious diversity has a curvilinear (inverse U-shaped) impact on hospital team efficiency that is triggered by information-elaboration processes.

Although the hospital staff religious diversity may positively influence information use and integration, it may also result in social categorization when it is perceived as salient and as a threat to the dominant cultural model of healthcare provision. The main argument supporting salience is that, although some religious differences are 'often below the level of consciousness', some symbols and artefacts are easily detectable (van Knippenberg, De Dreu and Homan, 2004). In particular, in healthcare, religious diversity can be deemed salient along the three lines identified by self-categorization theory (Turner *et al.*, 1987). It may be perceived as ready to use (e.g. overt differences such as dress codes, religious symbols), subjectively meaningful (different approaches to patient care), and result in relatively homogeneous categories that are clearly different from each other (different religions entail different behaviour in terms of prayers, holidays, etc.).

We posit that, when religious diversity is low to moderate, it is likely that no threat will be perceived by religious subgroups and, therefore, no negative intergroup bias will ensue. In support of this reading, Dahlin, Weingart and Hinds (2005) found that some measures of performance (depth and integration of information) benefited from moderate levels of overt cultural diversity (nationality), suggesting that sources of diversity expected to generate social categorization processes ended up improving the ability to explore information and integrate

it. However, when diversity is high, i.e. equally sized and homogeneous religious subgroups form in the workplace, subgroups will tend to express internally cohesive views and positions that may be perceived as a potential risk. In a hospital setting, strong religious subgroups of medical professionals with different views of work ethics, time and the division of labour may give rise to relational conflicts, leading to lower performance (Hannawi and Al Salmi, 2014).

Therefore, the social categorization effects triggered by religious diversity (if any) do not affect the curvilinear shape of the diversity–efficiency relationship as determined by information-elaboration processes. Even if high religious diversity were to activate intergroup bias, this would go in the same direction as the negative effect of high diversity on information integration, thus preserving the negative slope of the curve. Therefore, we formulate the following hypothesis:

H1: Diversity in terms of religion is related to ward efficiency following an inverted U-shaped relation, whereby moderate diversity is associated with higher efficiency with respect to low and high religious diversity.

Moderation effects

In CEM, the relation between diversity and team performance is moderated on the one hand by task informational and decision requirements, task ability and motivation and, on the other, by social categorization processes that produce affective evaluative reactions (van Knippenberg, De Dreu and Homan, 2004). Specifically, diversity is expected to be more positively related to performance when performance relies on the processing and integration of task-relevant information (van Dijk, van Engen and van Knippenberg, 2012), as is the case for complex, knowledge-intensive tasks. On the contrary, social categorization disrupts the positive effects of diversity stemming from information-elaboration whenever social categorization generates a perceived threat to subgroup identity (van Knippenberg, De Dreu and Homan, 2004).

Below we discuss the moderating effects of four variables, namely task complexity and task conflict management (which can be brought back to task requirements), team leader tenure and diversity in

nationality (which can be connected to affective-evaluative reactions).

Task complexity

High decision and informational requirements are typical of teams involved in complex tasks, where complexity relates to the task ambiguity, structuredness, routineness and interdependence (McGrath, 1984). In turn, information-elaboration processes will be positively related to performance, entailing that diversity will play more beneficial effects in teams involved in complex tasks with respect to teams involved in independent, routine, less-structured tasks (van Dijk, van Engen and van Knippenberg 2012). In this direction, there is predominant evidence that diversity is beneficial for teams operating in uncertain and dynamic environments (Guzzo and Dickson, 1996; Stewart, 2006), as also confirmed by a recent meta-analysis (van Dijk, van Engen and van Knippenberg, 2012).

Several activities that are part of hospital care are strongly interdependent, because quality care relies on collective action (Shortell *et al.*, 2001), and are often non-routine, because each patient is unique and requires tailored care. This generates the need for deep-level elaboration of information, and may benefit from the daily integration of different perspectives and experiences, in order to solve unexpected or non-standardized cases. Within hospitals, there are different degrees of complexity, with surgical activities in general considered 'more complex' than medical ones (Becker and Steinwald, 1981), so that diversity is expected to play differently according to the specialty of the ward. Specifically, we expect that wards carrying out complex tasks benefit from diversity more than wards involved in routine tasks do. In particular, the impact of information-elaboration processes at moderate levels of diversity is enhanced in complex tasks, while for simple tasks we expect the curve between diversity and efficiency to be flatter, owing to the low information requirements. This line of reasoning leads to formulation of the following hypothesis:

H2: Task complexity moderates the inverted U-shaped relation between religious diversity and efficiency, such that when task complexity is high, moderate levels of diversity are associated with significantly higher efficiency gains than when task complexity is low.

Task conflict

Several scholars have posited that task conflict mediates the relationship cultural diversity–team performance, the rationale being that diverse cultural backgrounds lead to conflicting preferences concerning group goals, which in turn lead to divergences during the decision-making process (Pelled, Eisenhardt and Xin, 1999; Vodosek, 2007), and give rise to intra-group conflict (Jehn, 1995; Stahl *et al.*, 2010).

Although some studies support the notion that task conflict will benefit team performance (Simons and Peterson, 2000), on the grounds that contrasting perspectives will inspire group members to collect new data and to consider challenges fully (Tjosvold, 1986), there is predominant evidence of the negative role of task conflict on team performance. Task conflict hinders decision-making, disrupts the information exchange among team members, and can undermine the engagement in decision implementation (De Dreu and Weingart, 2003; Schweiger, Sandberg and Ragan, 1986).

The CEM argues that task conflict *per se* does not produce positive/negative impacts of diversity on performance, but rather it may activate information-elaboration/affective-evaluative reactions. Therefore, both positive and negative impacts may arise from conflict, suggesting a moderation, rather than a mediation relation (van Knippenberg, De Dreu and Homan, 2004), and entailing that conflict may help/hinder performance according to how it is managed (van de Ven *et al.*, 2008).

In hospital wards, task conflicts may emerge from differences in medical role, in preferred protocols, and in resource utilization and sharing, requiring the integration of different positions in order to reach a decision. In a study of medical clinics, van de Ven *et al.* (2008) find that, where conflict resolution is in place, diversity is associated with higher performance. Building on this finding and elaborating on the CEM, we posit that, when task conflicts are unmanaged, information-elaboration processes are disrupted and, in particular, the integration of diverse information is hindered, so that unmanaged conflicts are associated with lower efficiency. Further, we conjecture that the task conflict management is effective when diversity is low to medium, while it is ineffective when diversity is high, since task

conflict may be coupled with the difficulty in integrating competing visions of healthcare and the relational conflict arising from inter-group bias. The above discussion leads to formulate the following hypothesis:

H3: Unmanaged task conflicts moderate the inverted U-shaped relation between religious diversity and efficiency such that when diversity is low to medium, a low rate of unmanaged task conflict improves efficiency. When diversity is high, conflict management has low to no effect on ward efficiency.

Team leader tenure

Tenure can be defined as the amount of time a team has spent together (Pfeffer, 1983). The longer the tenure, the smoother and more automatic the team processes, since tenure reduces group conflict and enhances integration among group members (Jehn and Mannix, 2001). In particular, the development of a common group identity because of longer tenure is expected to reduce the social categorization effects of diversity (Earley and Mosakowski, 2000; Harrison, Price and Bell, 1998; Watson, Kumar and Michaelsen, 1993). In hospitals, a central role in developing this identity is played by the head of ward, who is in charge of selecting the appropriate medical protocols and organizational routines (Ancarani, Di Mauro and Giammanco, 2011). Therefore, it is plausible that the longer the head of ward tenure, the stronger the common identity developed in the ward/team, and the smoother internal processes. Elaborating on the concept of top management team behavioural integration (Hambrick, 1984), we argue that the head of a ward should have intimate and thorough knowledge of the team members, including a great understanding of the competitive and political dynamics underlying team interactions. Thus, longer-tenured heads of ward should be better able to facilitate the team's social processes and enhance collaboration than shorter-tenured heads are (Simsek *et al.*, 2005). However, the team leader tenure is expected to be more effective when the level of religious diversity of the team is low with respect to when the level of diversity is high. Recalling that social categorization processes due to religious diversity are expected to be activated only by high levels of diversity, at low diversity the team leader has to handle no intra-group

bias, therefore making the most of the experience stemming from tenure. As diversity increases, the team leader will have to cope with the negative effects of social categorization, which reduces the beneficial effects of his tenure. Accordingly, we formulate the following hypothesis:

H4: The tenure of the head of ward moderates the inverted U-shaped relation between religious diversity and efficiency such that, when diversity is low to medium high, tenure significantly improves efficiency. When diversity is high, high tenure has low positive effects on ward efficiency.

Diversity in nationality

Given the multi-religious, multinational nature of hospital teams in Dubai, the religious diversity–performance relation is likely to be affected when it is compounded with diversity in nationality. In the healthcare context, religious diversity entails different philosophical approaches to life and care, while diversity in nationality should bring into the hospital different education systems, experiences and organizational models at work. Since many Emirati doctors are educated and trained abroad, they share many experiences and models with foreign physicians. Therefore, it is plausible that the information-elaboration potential of national diversity is negligible. However, diversity in nationality may trigger social categorization effects that may negatively moderate the information-elaboration processes attached to religious diversity. Indeed, in Dubai several disadvantages are attached to being an expatriate worker, such as unfavourable immigration policies, being paid less, less likely to be promoted within organizations, and being disfavoured in taking leading positions. While low levels of national diversity may be perceived as irrelevant, high national diversity may activate in Emirati workers the fear that their status in the workplace be challenged by expatriates or may lead expatriates to dispute the privileges of Emiratis, thus determining threats to subgroup identity. This negative effect of high national diversity is expected to be stronger when coupled with high religious diversity. In this instance, two social categorization effects will reinforce each other. Consistent with the above line of reasoning, we posit that:

H5: Diversity in nationality moderates the inverted U-shaped relation between religious

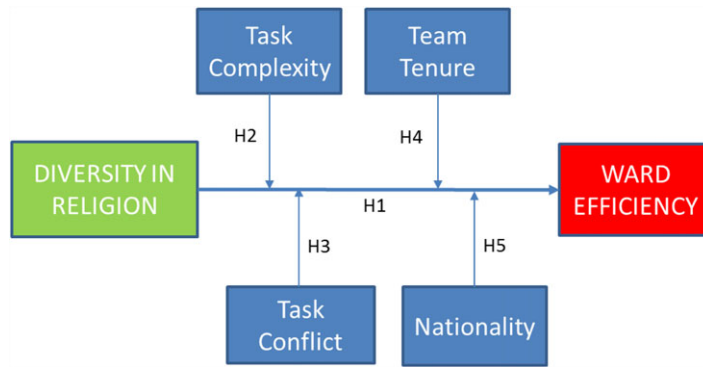


Figure 1. Model of the relation between religious diversity and wards' efficiency

diversity and efficiency such that, when diversity is low to medium high, diversity in nationality is associated with no efficiency losses. When diversity in religion is high, high diversity in nationality determines a significant loss in efficiency.

Figure 1 summarizes the relations among the model variables.

Methodology

In order to test our model, we implemented a two-stage approach. In the first stage, we calculated our metric of team/ward performance, namely the production efficiency of each hospital ward, through DEA. In the second stage, we estimated the impact of religious diversity and other explanatory variables on efficiency using truncated regression. As we discuss below, advanced bootstrap techniques were adopted, in line with a growing literature on the determinants of efficiency in the healthcare industry (De Nicola, Gitto and Mancuso, 2012; De Nicola *et al.*, 2014).

First stage: DEA

Data envelopment analysis is a non-parametric method developed by Charnes, Cooper and Rhodes (1978) that defines a production frontier and evaluates the efficiency scores of a set of units, with a common set of inputs and outputs. Being a non-parametric technique, DEA does not require assumptions about the functional form of the production frontier (Bozec, Dia and Bozec, 2010; Daraio and Simar, 2007). In mathematical terms, the DEA undertaken adopts the hypotheses of

variable returns to scale and output orientation, providing the solution to the following linear problem:

$$\begin{aligned}
 \hat{\theta}_i &= \max_{\theta, \lambda} \theta \\
 \text{s.t. } & x_i \geq X\lambda \\
 & \theta y_i \leq Y\lambda \quad i = 1, 2, \dots, n \\
 & 1'\lambda = 1 \\
 & \lambda \geq 0
 \end{aligned}
 \tag{1}$$

where $\hat{\theta}_i \geq 1$ is a measure of the technical efficiency, n is the number of wards, Y is a $s \times n$ matrix of s outputs, X is a $r \times n$ matrix of r inputs, λ represents a $n \times 1$ vector of weights which allows obtaining a convex combination between inputs and outputs, and $1'$ is a vector of ones. The technical efficiencies obtained solving (1) suffer under a statistical perspective, because the construction of the DEA estimator is biased due to the ambiguity connected to the sampling variation and to the number of inputs and outputs used. To address this issue, in our study a consistent bootstrap estimation procedure was employed to estimate the sampling distributions of the technical efficiencies by simulating their data generation process. Bias-corrected efficiency scores were then obtained from the bootstrap sample (Simar and Wilson, 1998, 2008).

The use of input or output orientation in the analysis of hospital efficiency is an open debate. In fact, the input orientation assumes that managers have more control over inputs (e.g. beds, medical equipment and medical staff) than over outputs (e.g. the number of patients). Under an output perspective, managers can attract patients through marketing and/or increasing reputation or services quality (Pilyavsky *et al.*, 2006). Since the main

aim of the paper is to identify potential sources of efficiency improvement in order to increase the demand for services provided by the Dubai health system, we coherently chose an output orientation.

Further, DEA loses discriminative power when the sample is made up of a small number of units, with several input and output variables. This effect, known as the ‘curse of dimensionality’, was minimized by employing the technique proposed by Daraio and Simar (2007), which allows the number of variables entering the DEA model to be reduced, with minimal loss of information. Specifically, starting from the three inputs and three outputs described below, we aggregated them into one input factor and one output factor.¹

Second stage: truncated regression

In the second stage, a truncated regression was adopted to examine the impact of a set of explanatory variables (other than inputs and outputs already used in DEA analysis) on wards’ technical efficiency:

$$\hat{\theta}_i = z_i\beta + \varepsilon_i \quad i = 1, 2, \dots, n \quad (2)$$

where $\hat{\theta}_i \geq 1$ are the technical efficiencies, z_i is a set of explanatory variables, and ε_i is $N(0, \sigma)$ with left-truncation at $1 - z_i\beta$. Since x_i and y_i are correlated with z_i , the error term ε_i in (2) is correlated with z_i , thus violating the basic regression assumption. Moreover, the efficiency scores are serially correlated, so that conventional inference (based on OLS or similar) is invalid in this setting (Simar and Wilson, 2007). Under some mild assumption, truncated regression with bootstrap methods can be used to construct the bias-corrected estimator of the efficiency scores and to obtain valid confidence interval estimates for the parameters in the Second-stage regression. Simar and Wilson (2007) prove that this double bootstrap procedure performs very well.

In Eq. (2), $\hat{\theta}_i$ is a measure of inefficiency, that is an increase of $\hat{\theta}_i$ represents an efficiency reduction. The algorithm adopted requires this measure in order to avoid a double bounded truncated regression.

¹Mathematically, the factor A , is obtained as follows: $A = Xa$, where X is the matrix of the input (output) variables, and a is the first eigenvector of the matrix XX' (Daraio and Simar, 2007).

Data

Input–output data

In line with the empirical literature on health-care performance measurement using DEA (De Nicola, Gitto and Mancuso, 2012; Kounetas and Papatthanassopoulos, 2013; Pilyavsky *et al.*, 2006), three inputs (beds, doctors, nurses) and three outputs (inpatient surgery discharges, inpatient non-surgery discharges and outpatients) were used to estimate technical efficiency. Data referring to the end of 2012 and concerning three large Dubai public hospitals were obtained from the Dubai Health Authority (DHA). The three hospitals are comparable in terms of size, organization and provision of healthcare services. In fact, there are 48 wards in each hospital, and there are slight differences in the number of beds: 629, 590 and 484 for Dubai, Rashid and Latifa, respectively.

At the time of the study, the total number of specialty wards in the three hospitals was about 150. Fifty-six of these were excluded from the study, as their levels of activity were extremely low. Moreover, the wards of Radiology, Intensive Care, Emergency Care and Neonatology Intensive Care were excluded, because of the intensity of their resource absorption (Ancarani, Di Mauro and Giammanco, 2009). This cleansing left 73 wards, 66 of which completed the questionnaire (medical = 49, surgical = 17), with a response rate of 90%.

Tables 1 and 2 report the main descriptive statistics of the input–output variables. The wards appear to be heterogeneous in terms of size and outputs.

Table 1. Descriptive statistics: medical wards ($n = 49$)

	Min.	Median	Mean	Max	SD
<i>Inputs</i>					
Number of physicians	1.0	7.0	8.7	29.0	6.4
Number of beds	1.0	12.0	17.6	69.0	17.3
Number of nurses	4.0	16.0	26.4	104.0	25.1
<i>Outputs</i>					
Number of outpatients	6.0	4104.0	7018.0	50,600.0	9331.3
Number of inpatient (surgery)	0.0	34.0	144.2	1212.0	253.0
Number of inpatient (medical)	0.0	330.0	893.6	7806.0	1543.1

Table 2. Descriptive statistics: surgical wards (n = 17)

	Min.	Median	Mean	Max.	SD
<i>Inputs</i>					
Number of physicians	3.0	10.0	15.1	19.0	10.7
Number of beds	2.0	8.0	25.8	32.0	34.0
Number of nurses	4.0	34.0	49.6	78.0	41.1
<i>Outputs</i>					
Number of outpatients	8.0	4286.0	4324.0	5731.0	3572.2
Number of inpatient surgery	0.0	208.0	678.6	876.0	979.8
Number of inpatient non-surgery	0.0	535.0	541.5	700.0	556.6

Second-stage data

For the second-stage analysis, data on the composition of the workforce by nationality and religion referring to the end of 2012 was obtained from DHA. Further, a questionnaire was built ad hoc and was delivered in January 2013 to 73 heads of wards. The questionnaire was used to gather information on variables used as moderators (tenure, conflict management) and other variables known to influence hospital efficiency (competence acquisition, staff training, patient specificities), which were then used as controls (Chilingerian, 1995).

Our measures of diversity in religion and in nationality were operationalized as separation (Harrison and Klein, 2007). Specifically, the percentage of non-Emiratis physicians was contrasted with the percentage of Emiratis (foreign nurses was not included because of its homogeneity across specialties), while the percentage of non-Muslim members of the medical staff was contrasted with the percentage of Muslims.

To measure conflict management inside wards, each head of specialty was asked whether he/she had successfully managed task conflicts. Three types of conflicts were considered: among nurses, among physicians and across medical roles. An index was calculated, taking value 0 if conflict had been managed successfully, and value 1/2/3 if one/two/three types of conflicts were present. Hence, our measure captures the failure to manage conflicts, focusing on the scope of conflict, rather than the frequency or the intensity.

Within hospitals, surgical cases tend on average to be more complex, since surgery more often requires specialized facilities (Becker and Steinwald, 1981) and exhibits higher interdependence. There-

Table 3. Descriptive statistics: second-stage variables (n = 66)

Variable	Min.	Median	Mean	Max.	SD
Foreign physicians (%)	0.0	75.0	73.0	100.0	18.0
Non-Muslim members of staff (%)	65.0	80.0	80.0	95.0	9.0
Conflict (sum of scores)	0.0	1.0	0.8	3.0	0.83
Tenure of the team leader (years)	1.0	5.0	6.0	15.0	3.0
Competencies (physicians)	0.0	1.0	0.8	1.0	0.4
Competencies (nurses)	0.0	1.0	0.8	1.0	0.4
Physicians who attended training (%)	0.0	20.0	18.0	100.0	17.0
Nurses who attended training (%)	0.0	10.0	11.0	50.0	10.0
Non-Muslim patients (%)	20.0	62.0	62.0	85.0	13.0

fore, surgical/medical wards can proxy more/less complex tasks within hospitals. Accordingly, a dummy for surgical specialties was included as a proxy of task complexity.

Tenure of the team leader was measured by the number of years since the head of ward had been appointed. In order to measure competence acquisition, heads of ward were asked whether in the past two years the ward had acquired key competencies among physicians or nurses. Training was assessed by the percentage of physicians and nurses who had attended training in the last two years.

Finally, patient specificities were proxied by the percentage of Muslim patients treated. As already argued, owing to religious constraints in terms of approved medical treatments, Muslims may demand different procedures (Jhutti-Johal, 2013). Table 3 reports descriptive statistics for the variables collected through the questionnaire.

Results

First stage: DEA

The DEA scores were calculated separately for medical and surgical specialties in order to increase homogeneity among the wards analysed. Since DHA does not collect data on each ward's case mix, it was not possible to keep this source

Table 4. Geometric mean and distribution of the bias corrected efficiency scores by hospital

Medical wards			
Quartile	Dubai	Latifa	Rashid
I	12.24%	8.16%	4.08%
II	10.20%	10.20%	4.08%
III	8.16%	4.08%	10.20%
IV	4.08%	12.24%	10.20%
Geometric Mean	2.821	3.196	4.397
Surgical wards			
	Dubai	Latifa	Rashid
I	6%	6%	12%
II	6%	12%	6%
III	12%	0%	18%
IV	6%	6%	12%
Geometric Mean	2.300	1.816	1.906

of heterogeneity in the input–output mix into account. To mitigate this issue, we used inpatient surgery discharges and inpatient non-surgery discharges as separate outputs (O’Neill *et al.*, 2008). In Table 4, the quartile position for the biased corrected efficiency scores is analysed with respect to the three hospitals and the type of ward. The geometric mean for each hospital is reported.

The geometric means reported in Table 4 show that for the wards providing more intensive care, namely the surgical wards, the level of efficiency is considerably higher than in the medical wards.

Second-stage analysis: truncated analysis

Table 5 summarizes the explanatory variables used in the regression model.

As stated above, our aim is to make diversity operational as separation, namely a situation whereby diversity effects are thought to be symmetrical on a continuum, while whether team members are high or low on the construct of interest does not matter (Bell *et al.*, 2011). Maximum separation will hold when members of a team are split equally between two extreme categories. Diversity in religion (the percentage of non-Muslim members of staff) and in nationality (the percentage of foreign physicians) were each measured using Blau (1977) index, $(1 - \sum p_i^2)$, where p_i is the percentage of team members with attribute i (Biemann and Kearney, 2010; Dahlin, Weingart and Hinds, 2005). The underpinning of the use

Table 5. Second-stage variable definition

Variable	Definition
D hospital	Dummy for the wards in Dubai hospital
R hospital	Dummy for the wards in Rashid hospital
Diversity in religion	Muslim vs. non-Muslim members of staff measured with Blau index
Diversity in religion ²	Square of diversity in religion
Task complexity	Dummy for surgical specialties
Conflicts	Score from 0 to 3 according to the perception by the head of ward of the presence of unmanaged conflicts among staff
Tenure of the ward leader	Tenure of the head of ward measured in years
Diversity in nationality	Emiratis vs. non-Emiratis physicians measured with Blau index
Training and competence acquisition	Factor obtained from a factorial analysis combining physicians’ key competencies gained by the specialty, nurses key competencies gained by the specialty, % of physicians who attended training, % of nurses who attended training (min = −1.87, max = 3.80; Cronbach’s alpha = 0.66)
Non-Muslim patients	Muslim vs. non-Muslim patients measured with Blau index

of Blau’s index is symmetry in behaviour, i.e. we shall assume that a predominantly Muslim team behaves in the same way as one that is predominantly non-Muslim.

In addition, a quadratic term of the Blau index for religious diversity was added to the model specification, in order to allow for curvilinear effects of diversity (Hypothesis 1). Four moderation effects between religious diversity and task conflict, task complexity, team leader tenure and diversity in nationality respectively were considered. Following Aiken and West (1991) and Dawson (2014), we model curvilinear by linear interactions by considering the linear interaction term and the interaction between the squared term and the moderator.

Table 6 reports the estimated coefficients from three models. The dependent variable is an inverse measure of production efficiency; therefore, negative coefficients indicate efficiency improvement and positive coefficients indicate efficiency decline. Model 1 considers the curvilinear impact of religious diversity and the direct (non-moderated) effect of the other regressors. Model 2 isolates the

Table 6. Second-stage results: truncated regression

Variable	Model 1	Model 2	Model 3
Intercept	-5.396***	-5.119***	-3.088***
D hospital	-2.471*	-3.388**	-3.491***
R hospital	1.667	1.477	0.739
Training and competence acquisition	-1.275***	-1.454***	-1.319***
Non-Muslim patients	1.964***	1.965***	2.241***
Task complexity	-11.463***	-11.344***	-17.296***
Conflicts	2.151***	2.213***	-0.637
Tenure of the ward leader	-2.939***	-3.155***	-2.296**
Diversity in nationality	2.502***	0.783	2.217**
Diversity in religion	-0.302	-1.033*	0.798
Diversity in religion ²	4.246***	4.467***	3.434***
Diversity in religion × Conflicts			-0.844*
Diversity in religion ² × Conflicts			2.277**
Diversity in religion × Task complexity			-1.159*
Diversity in religion ² × Task complexity			6.103
Diversity in religion × Tenure of the team leader			3.113***
Diversity in religion ² × Tenure of the team leader			-1.623**
Diversity in religion × Diversity in nationality		1.106	-0.045
Diversity in religion ² × Diversity in nationality		1.519**	0.109
Sigma	4.894***	4.838***	4.328***

Statistical significance: *** (1%) ** (5%) * (10%), according to bootstrap confidence intervals. Dependent variable: DEA-VRS estimates ≥ 1 .

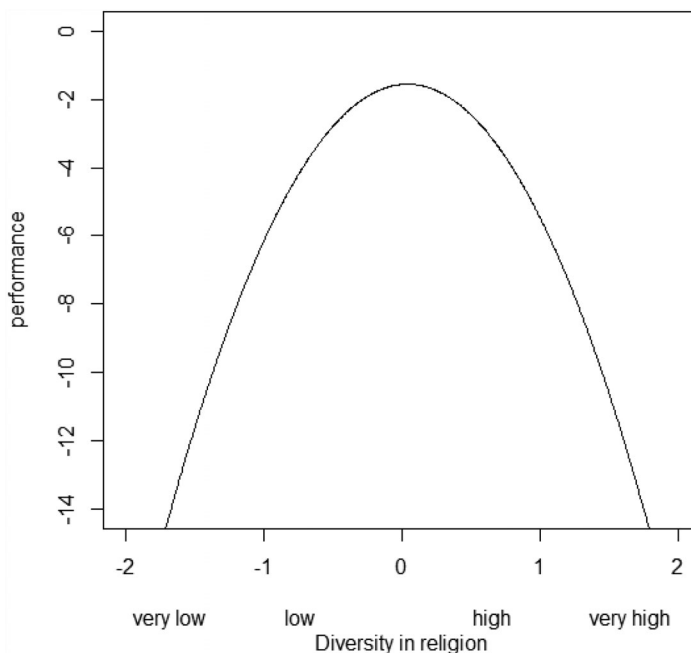


Figure 2. Relationship between efficiency and diversity in religion

interaction with diversity in nationality, while Model 3 encompasses all moderating effects.

The table shows that the quadratic term of religious diversity is always statistically significant and positive (concave upward curve), so the im-

pact on inefficiency is negative for low (below the mean) levels of religious diversity and positive for high (above the mean) levels of diversity (Hypothesis 1 confirmed). Figure 2 visualizes the relation between performance (on the vertical axis) and

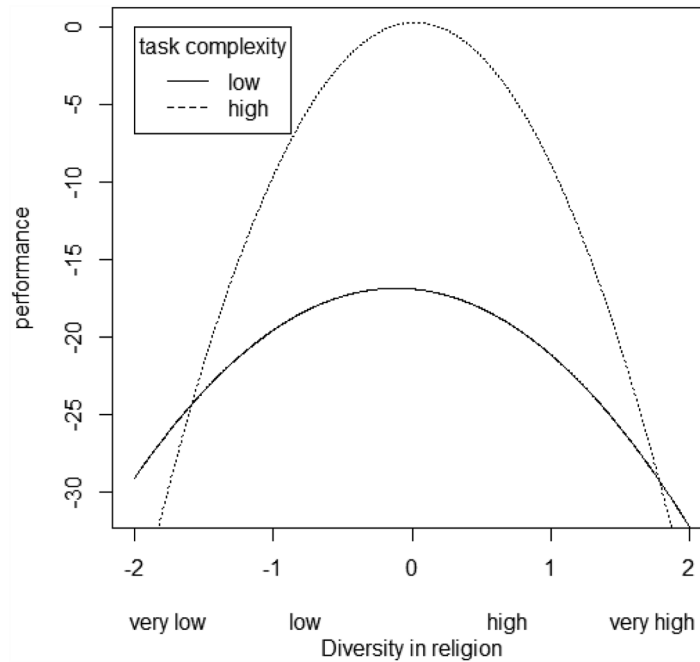


Figure 3. Interaction effect of diversity in religion and task complexity

diversity in religion (calculated in terms of deviation from the mean: 0 = mean value; $\pm 1 = \pm$ one standard deviation; $\pm 2 = \pm$ two standard deviations), showing that homogeneous teams and highly heterogeneous teams underperform moderately diverse ones.

Models 2 and 3 allow testing of the moderation hypotheses (2–5). The hypothesis of a significant moderation is fully supported for task conflict management and head of ward tenure (Hypotheses 3 and 4, respectively) for which both first-order and second-order interaction terms are statistically significant. For task complexity (Hypothesis 2), only the first-order interaction term is statistically significant, leading to a partial support of the hypothesis. Model 2 supports the moderating effect of diversity in nationality (Hypothesis 5). However, this effect becomes insignificant in Model 3, signalling interdependencies between diversity in nationality and other moderators. Therefore, this result is not robust to model specification, lending only partial support to Hypothesis 5.

In order to evaluate moderation effects thoroughly, graphical analysis was undertaken along the lines of Aitken and West (1991) (Figures 3–6). On the horizontal axis, low/high diversity indicates values of religious diversity \pm one standard error

from the mean, while very low/high refer to values \pm two standard errors from the mean. In order to facilitate interpretation, the inefficiency measure obtained from DEA was inverted and can therefore be taken to indicate performance (efficiency).

Figure 3 illustrates the moderating effect of task complexity, showing that the improvement in performance is maximum for moderate levels of diversity.

Figure 4 depicts the impact of unmanaged task conflicts on the diversity–performance relation. The beneficial effect of conflict management is lower when diversity is high with respect to when diversity is low, while there is no discernible effect of conflict management when diversity is moderate.

Figure 5 indicates that, although the impact of diversity on efficiency unambiguously increases with tenure, this effect diminishes with diversity. Tenure has the maximum impact when diversity is low, whereas at high diversity the impact is negligible.

Finally, Figure 6 (based on Model 2) shows that higher levels of diversity in nationality are detrimental to efficiency. Further, while for low religious diversity the impact of diversity in nationality is marginal (left-hand side of

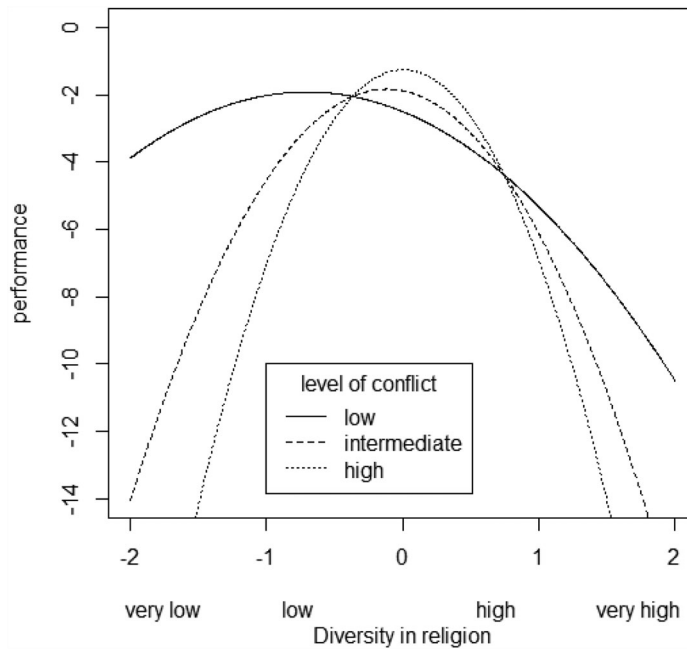


Figure 4. Interaction effect of diversity in religion and task conflict

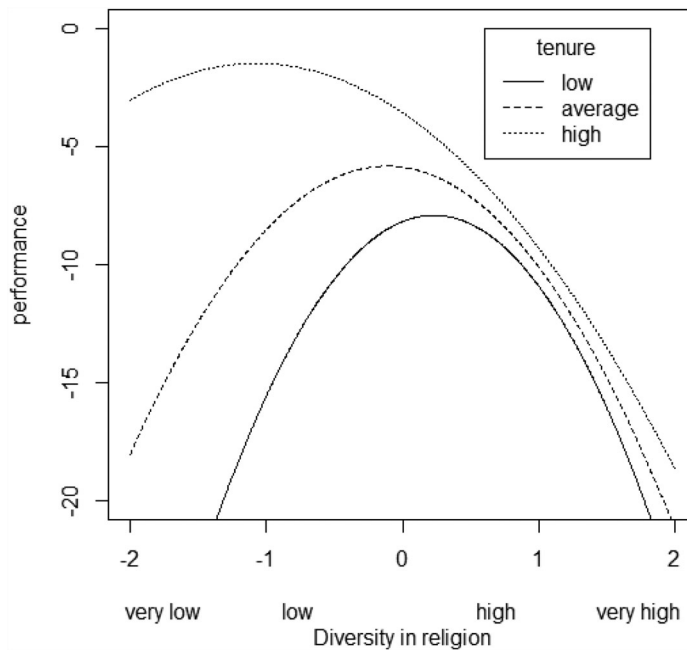


Figure 5. Interaction effect of cultural diversity and head of ward tenure

the figure), for high levels of religious diversity, the negative impact of nationality is more significant.

It is worth noticing that the coefficient of training and competence acquisition is negative and significant, showing that gains of efficiency are

obtained in the specialties where competences have increased.² Patient specificities are significantly

²Interaction terms between diversity and training and competence acquisition were also probed, but these turned out to be non-significant.

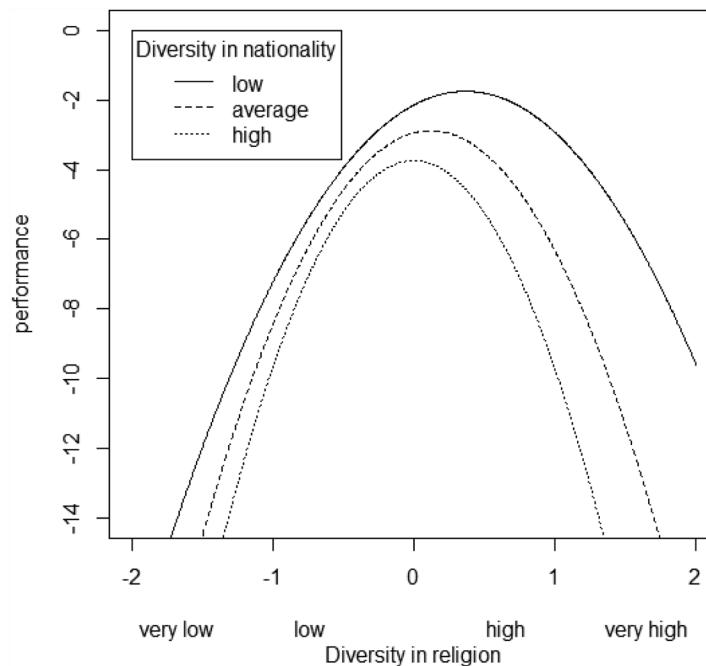


Figure 6. Interaction effect of diversity in religion and diversity in nationality

and positively related to inefficiency, as suggested in the literature.

Discussion

Multicultural hospital teams have an enormous potential to create value and to deal with complex organizational challenges. In the context of health-care in Dubai, and increasingly also in many other countries, religious diversity is becoming a key issue for the effectiveness, efficiency and quality of care, especially in countries where religion permeates the daily life of people.

In terms of contribution to theory, our analysis is the first to test and provide evidence of a curvilinear relation between religious diversity and a measure of performance (efficiency), thus confirming that both positive and negative effects can stem from diversity (van Knippenberg, De Dreu and Homan, 2004). In this respect, results confirm the need to test for second-order effects of the source of cultural diversity (Cheng *et al.*, 2012; Dahlin, Weingart and Hinds, 2005).

In particular, the inverse U-shaped relation suggests that a moderate degree of diversity adds information-elaboration capabilities and is beneficial to performance (van Knippenberg and

Schippers, 2007). Conversely, when diversity is high, information-elaboration processes become difficult and negatively affect performance.

We have conjectured that, when diversity is high social categorization effects generated by the salience of diversity might reinforce the negative effect of information-elaboration processes. If so, since our data do not allow disentangling the two effects, the shape of the diversity–efficiency curve at high levels of diversity would result from a combined effect of the negative information elaboration and of social categorization.

The analysis of moderators shows that task conflict management and head of ward tenure fully moderate the relation between religious diversity and efficiency.

Wards characterized by failure to manage conflicts were expected to exhibit lower efficiency, because of their lower ability to integrate diverse perspectives. However, our results show that this is true only when diversity is either low or high. When diversity is moderate, increasing degrees of conflict management do not seem to matter to efficiency. One possible explanation relies on CEM's argument that the positive effects of information elaboration are at their highest when diversity is moderate, implying that, when information

elaboration is high, the information elaboration potential of task conflicts is activated, leading to improved performance. When diversity is low, information elaboration is low and efficiency can be improved through conflict management. When diversity is high, lack of a common frame of reference worsens processes of information elaboration, hence task conflict management is able again to improve efficiency.

Long-tenured leaders improve the religious diversity – efficiency relation only when religious diversity is low. In this instance, the team leader can apply his/her experience to extract the team potential effectively and to make it consistent with the shared norms and treatment protocols of the ward. As diversity increases, the ability to contribute to information elaboration by steering the team decreases, because pre-existing norms and models might be increasingly questioned by one of the two sub-groups.

Results also lend partial support to the moderating effect of task complexity on religious diversity. Consistent with the CEM, wards characterized by higher task complexity benefit more from moderate diversity, because their higher information processing requirements lead to better exploit the information elaboration potential offered by moderate degrees of religious diversity.

The analysis of the moderating effect of diversity in nationality suggests that social categorization processes are activated only in combination with high religious diversity. This result calls for a more in-depth analysis of the combined effects of different sources of cultural diversity, along the lines laid down by faultlines theory (Lau and Murnighan, 1998).

Our findings about the moderators generally align with previous literature on other sources of cultural diversity. However, the theoretical lens of the CEM, on the one hand, and the finding of a curvilinear relation between religious diversity and performance, on the other, allow uncovering subtler effects of the moderators on the diversity–performance relation. First, our study lends support to previous evidence on the negative role of conflict (De Dreu and Weingart, 2003) and on the need to adopt conflict management practices (van de Ven *et al.*, 2008). The analysis of interactions between head of ward's tenure and diversity confirms that tenure is effective at aligning the ward around common objectives, commitments or conclusions

(Stahl *et al.*, 2010). Finally, our results lend moderate support to the beneficial effects of diversity for more complex tasks (surgical cases) than for less complex tasks (medical cases) (Stahl *et al.*, 2010; van Dijk, van Engen and van Knippenberg, 2012).

From a managerial viewpoint, the main implication of the study is that management should be aware that there is a 'right mix' of religious diversity. Emphasis is currently being placed at the national level on increasing the share of Emiratis workforce, with the aim to deliver healthcare that matches the mix of cultural identities of patients (Hannawi and Al Salmi, 2014). We point out that in implementing this policy, the creation of two large subgroups (Muslim and non-Muslim, Emiratis vs. expatriates) that may become confrontational must be avoided.

In terms of managerially actionable information, results show that diversity is more beneficial in surgical wards than in medical ones. Hence, hospital managers should not be wary of creating multicultural teams and should encourage this trend especially in surgical units.

In the hospital context, task conflict among care-givers reduces efficiency by making information exchange and processing more difficult in activities that require patient-tailored and timely solutions. The interaction between conflict and diversity shows that the negative impact of conflict on efficiency is stronger when diversity is low than when it is high. Therefore, in these instances conflict management is especially useful, either through integrative methods of communication and conflict resolution (van De Ven *et al.*, 2008) or via the creation of a climate inside the ward oriented to collaboration and the agreement of common goals (Ancarani, Di Mauro and Giammanco, 2011).

Our analysis also points to the importance of the head of ward tenure in improving performance. However, the results also indicate that tenure makes little difference when diversity is high. When wards are characterized by two clearly distinct sub-groups, the information exchange processes and negotiation of procedures becomes more complex and even long-tenured leaders are no longer able to manage it successfully. Managers' experience may therefore be no panacea when the composition of the team is very diverse, and conflict management practices are necessary.

Limitations and future research

Further research is needed to ascertain the robustness of our findings, and to investigate the channels through which multi-religious hospital teams drive better performance.

First, a warning is necessary concerning the generality of the results of this study, and their potential extension to contexts and industries other than healthcare. The literature on religion and health openly suggests that healthcare is a sector where religion matters, because of its reflections on the meaning assigned to life and on acceptable medical practices. Hence, in other industries performance may be less sensitive to religious diversity. Furthermore, with respect to other services, hospitals carry out activities that can be classified as highly complex, owing to their interdependence. Hence, sectors where activities are less complex may benefit to a lesser extent from religious diversity.

Other limitations of this study must be acknowledged. First, the post hoc nature of data collection and lack of longitudinal data do not allow the assessment of unambiguous causality links or productivity changes on a before–after basis. Therefore, a full assessment of the impact of the introduction of workforce diversity will be possible only by replicating this study in the future. This would not only add to the understanding of the long-term impact of diversity on team performance, but would also increase the knowledge of the internal dynamics of diverse teams. Next, because Dubai hospitals do not collect information on wards' case-mix, the heterogeneity of production processes and the complexity of care could not be fully controlled for. In addition, richer measures (based on scales rather than nominal variables) of task complexity and conflict management should be probed to understand fully their impact on performance.

Further, our data do not allow the disentangling at a high level of diversity the direct effect of the information-elaboration processes and the possible moderation effect of social categorization processes. Therefore, future studies of religious diversity that separately capture measures of the two effects are required to clarify this issue.

Finally, we acknowledge that lack of information on the nationality and religion of individual hospital employees has prevented the use of fault-line measures of diversity that would have allowed

splitting a team into relatively homogeneous subgroups.

Future research should address these issues relevant for diversity management in healthcare, therefore contributing to understanding of how team diversity may contribute to enhance the effectiveness and efficiency of health organizations.

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