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Thus do all. Social interactions in inappropriate behavior for childbirth services in a highly decentralized healthcare system

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ABSTRACT

Empirical evidence supports the conjecture that social interactions among agents can produce both positive and negative effects. We build on this literature by exploring the role of social interactions in the hospital sector using the large incidence of cesarean sections, usually considered an inappropriate outcome in the childbirth service. In doing so, we lay out a simple model of hospitals' behavior where the effect of peers' behavior emerges simply by sharing the same regional health authority responsible for auditing inappropriate behavior. In this setting, enforcement congestion induces a peer effect among hospitals that could make inappropriate behaviors more likely and, as a result, could increase the excess variance among regions. Then, using a unique dataset of Italian hospitals and 2007–2012 cesarean data, we empirically investigate whether the behavior of each hospital is affected by the behavior of hospitals within the same region. Our empirical findings show a significant and strong presence of peer effects among hospitals.

Non è questa, non è quella: non fu mai, non vi sarà.

Don Alfonso, Atto I, *Così fan tutte*, libretto Da Ponte, L., musiche Mozart, W.A. (1790)

It's neither one nor the other. It never existed, and never will.

Don Alfonso, First Act, *Thus do all (women)*, libretto Da Ponte, L., composer Mozart, W.A. (1790)

1. Introduction

Over the past several decades, the role of social interactions has become increasingly important in economic discussions. Even if the origin of social interactions can be found in the sociological literature (Crane, 1991; Mayer, 1991), by now it is acknowledged that the interaction among agents can produce both positive and negative effects.[1] For instance, economic literature in education investigates the positive effects on students' outcomes of the interaction with classmates (Epple and Romano, 1998, 2011; Sacerdote, 2001; Zimmerman, 2003). Similarly, in health economics literature Apouey and Picone (2014) show the existence of social interactions for malaria preventive behaviors, whereas Moscone et al. (2012) investigate the role of social interaction in patients' hospital choice. On the other hand, negative effects of interaction have been found in crime (Glaeser et al., 1996), tax evasion (Galbiati and Zanella, 2012) and health behavior (Trogdon et al., 2008; Auld, 2011).

In this study, we explore the role of social interactions in inappropriate behavior in a hospital system characterized by high level of regional decentralization. More specifically, we first derive a model of hospitals' behavior where the effect of peers' behavior emerges simply by sharing the same Regional Health Authority (RHA) responsible for auditing inappropriate behavior. In particular, the enforcement congestion generated by the regional audit system induces a peer effect among hospitals that could make inappropriate behaviors more likely and, as a result, could increase the variation among regions not explained by differences in fundamentals (the so-called "excess variance", Skinner (2011)). Then, we test our predictions using both unadjusted and risk-adjusted cesarean section rate in a large panel of Italian hospitals for the period 2007–2012 as a case study. Our focus on this form of social interaction in the Italian hospital sector, as opposed to others such as professional norms and imitative behaviors, reflects the institutional setting of the Italian NHS, which is characterized by a high degree of decentralization at the regional level. In fact, each Italian region is responsible for its healthcare services and cannot afford to prosecute inappropriate behaviors in all hospitals within

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[1] As common in this strand of literature, we use the terms social interaction and peer effect to indicate what has been referred to by Manski (1993) as an endogenous effect.

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the region; therefore, inappropriate behavior of hospitals within a region makes the open road to the inappropriate behavior of their peers.

In our empirical analysis, we first carry out a traditional peer effect estimate, close to our model of hospitals' behavior. As will be shown, our empirical test is a particularly fortune case of peer effects analysis, since our non-linear model does not suffer from the "reflection problem" of linear-in-mean models (Manski, 1993; Brock and Durlauf, 2007; Blume et al., 2011). Then, we conduct the more recent (but less microfounded) spatial econometric analysis, where the spatial weights matrix is based again on the sharing of the same institutional authorities, in line with a few contributions claiming the primary importance of institutions respect to geography (Rodrik et al., 2004; Arbia et al., 2009; Atella et al., 2014). Finally, we perform different falsification tests to confirm that the estimated social interaction effects come really from the sharing of the same institutional authority. All our estimates show a significant and strong presence of peer effects among hospitals sharing the same institution, with implications for healthcare policies against inappropriateness.

Finally, the paper is linked to different strands of literature. The first strand of related literature refers to hospital misbehavior in childbirth services. Along with clinical factors, many explanations for high cesarean rates have been explored in the literature, including maternal age (Abdul-Rahim et al., 2009), physicians' perceptions of the safety of the procedure (Hopkins, 2000; Kabakian-Khasholian et al., 2007), "defensive medicine" (Dubay et al., 1999; Grant and McInnes, 2004; Amaral-Garcia et al., 2015), social and cultural factors (Lo, 2003; Hsu et al., 2008). However, together these factors do not account for the majority of the observed variation among hospitals (Kozhimannil et al., 2013). For this reason, many studies have investigated the hypothesis that providers are motivated by financial incentives in their choice of child delivery method, finding that they play a significant role in explaining cesarean section rates (Gruber et al., 1999; Grant, 2009). With regard to Italy, Cavalieri et al. (2014) find that whenever the regional reimbursement policy favors cesarean sections, providers have an incentive to shift deliveries to the more highly reimbursed cesarean procedure.

The second strand refers to the financial incentives in misbehavior and the role of audit systems in preventing it. Indeed, the problem of financial incentives motivating inappropriate behavior in hospitals is not specific to cesarean sections, rather it is a more general problem associated with the tariff systems.[2] Therefore, many NHSs have tried to combine the tariff system with some form of auditing to combat the unintended consequences of tariff mechanisms (Busse et al., 2011). Nonetheless, while diverting considerable human and financial resources, audit systems do not seem to be effective in stemming inappropriate behavior in health systems (Lomas et al., 1991; Ivers et al., 2012), especially in medical procedures in the gray area of medicine (Chandra et al., 2011), such as childbirth medical services. For instance, due to the financial incentives to misreport the birth weight in Germany DRG system, Jürges and Köberlein (2015) find evidence of the manipulation of patient records that can hardly be detected by audits. Finally, the paper is related to the growing literature on the impact of decentralization on health systems (Saltman et al., 2007; Costa-Font and Greer, 2013; Regmi, 2014).[3]

The remainder of the paper is structured as follows. In Section 2, we first illustrate the institutional background based on the role of RHA in the Italian hospital system, and then describe our model of hospitals' behavior. In Section 3, we describe our data and discuss our empirical strategy. The results are presented in Section 4. Finally, Section 5 concludes with a discussion on the implications for healthcare policies against inappropriateness.

2. Background and model

2.1. A hospital system characterized by high level of regional decentralization

The National Health Service (*Servizio Sanitario Nazionale*, SSN) in Italy exhibits some interesting institutional features as decentralization processes have made the Regions the main institutional authorities for each hospital and, in particular, the third-party payers for the health services provided. Since 1978, Italy relies on a SSN, which grants universal access to a uniform level of care throughout the country. Over the time, the country has undergone a set of reforms inspired by the principles of regionalization, managed competition and managerialism (France et al., 2005). As a result, responsibilities for the financing and delivery of healthcare are now in charge of Regional governments, which administer, organize and finance healthcare according with their populations' needs, albeit within the national regulatory framework. Regions act through a network of geographic and population-defined independent public entities – Local Health Authorities (*Aziende Sanitarie Locali*) with their own budgets and management – which directly run small public hospitals (*Presidi Ospedalieri*), major public hospitals (*Aziende Ospedaliere*), which are granted the status of trusts with full managerial autonomy, and accredited private providers.

Furthermore, Regional governments are fully responsible of the audit system to contrast the misbehavior in hospital sector.[4] This audit system is particular important due the financial incentives in misbehavior connected with the use in Italy of DRG tariffs system.[5]

Since our empirical test aims to ascertain whether being "surrounded" by other hospitals who are more likely to use (inappropriate) medical procedures has an impact on hospitals' behavior, focusing on cesarean sections in Italian SSN seems particularly appropriate. In fact, the recent worldwide upward trend in cesarean rates (OECD, 2011) has drawn the attention of both scholars and policymakers, raising concern about the clinical appropriateness of some cesarean deliveries. In particular, in absence of specific therapeutic reasons, the alternative vaginal delivery is generally considered a more appropriate treatment (e.g., Althabe et al., 2006; Betràn et al., 2007; Belizàn et al., 2007).[6] Furthermore, cesarean section rates exhibit frequently a high variation among

[2] For a recent discussion on the typical incentives, both desirable and undesirable, associated with the tariff systems, see e.g. Cots et al. (2011).

[3] For a discussion of the Italian case, see Turati (2013).

[4] Each RHA has formally implemented the system of audit of hospital activity based on general rules provides by the Italian Minister of Health (see, article 79 of the National Laws 133/2008).

[5] The inpatient care in Italy is generally financed through a per case funding system, based on tariffs related to the DRG classification of discharges (version 24), and on a differentiation of ordinary, day hospital and day surgery cases. The tariff-based system exhibits different features across regions, too. Moreover, tariffs can play different roles depending on the type of hospital care provider. Broadly speaking, they represent the "real price" for the accredited private hospitals while for public ones they can be used just as a regional device to assess hospital activity and to determine the global hospital budget. Furthermore, Regions can discriminate tariffs across providers to make them closer to their actual costs and local specificities. For an in deep discussion on tariff system for childbirth delivery see Cavalieri et al. (2014), and for a more general discussion on hospital tariff system in Italy see Finocchiaro Castro et al. (2014).

[6] Medically unjustified cesarean deliveries have implications not only for patients but also for the overall society, as they impose a financial burden on the system, while diverting resources from other public services. In this perspective, the health effects of C-section for children and their mothers is out of our investigation. For a recent finding on this topic, see Jensen and Wüsta (2015).