Quality competition with motivated providers and sluggish demand

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ABSTRACT

We study incentives for quality provision in markets where providers are motivated (semi-altruistic); prices are regulated and firms are funded by a combination of block grants and unit prices; competition is based on quality, and demand adjusts sluggishly. Health or education are sectors in which the mentioned features are the rule. We show that the presence of motivated providers makes dynamic competition tougher, resulting in higher steady-state levels of quality in the closed-loop solution than in the benchmark open-loop solution, if the price is sufficiently high. However, this result is reversed if the price is sufficiently low (and below unit costs). Sufficiently low prices also imply that a reduction in demand sluggishness will lead to lower steady-state quality. Prices below unit costs will nevertheless be welfare optimal if the providers are sufficiently motivated.

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1. Introduction

In markets for health care or education, prices are often regulated and consumer choices are mainly based on other criteria, such as travelling distance and quality. In both types of markets, competition between publicly funded providers has become an increasingly topical policy issue in recent years, as an increasing number of countries have introduced market-based reforms which give providers (hospitals or schools) incentives to compete for consumers (patients or students).[1] This has, in turn, spurred a considerable body of theoretical literature studying the nature of quality competition in regulated markets.[2] However, with very few exceptions, this literature has ignored two arguably important features of such markets, namely *motivated providers* and *sluggish demand*.

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[1] These reforms typically include the combination of free choice of provider and activity-based payments. In health care, the original model for an activity-based payment system is the US Medicare and Medicaid programmes, where every hospital is paid a Diagnosis Related Group (DRG) tariff for every patient treated. Different variants of DRG pricing have now been introduced in a number of Western countries.

[2] See e.g., Ma and Burgess (1993), Wolinsky (1997), Gravelle (1999), Lyon (1999), Del Rey (2001), Beitia (2003), Brekke et al. (2006, 2007), Karlsson (2007) and Matsumura and Matsushima (2007).

In the literature on health care supply, it has long been recognised that providers may exhibit semi-altruistic preferences.[3] For example, physicians are typically portrayed as 'imperfect agents' for their patients, trading off patient benefits against lower profits (see e.g., McGuire, 2000). This notion has in recent years been complemented by an emerging literature on motivated agents in the broader public sector, where the assumption of 'mission oriented' workers (doctors, nurses, teachers) implies that the agents (e.g., hospitals or schools) to some extent share the objectives of the principal (government, in our examples).[4] Despite the emphasis given in the literature to the importance of motivated providers in the public sector in general, and in sectors like health care and education in particular, this aspect is largely absent in the existing literature on quality competition between publicly funded providers.[5] A notable recent exception is Brekke et al. (2011), who analyse within a static model hospital competition with regulated prices and show that the presence of provider motivation can potentially reverse a previously established positive relationship between competition and quality.[6]

For both health care and education, quality is a key market variable. In health care, since consumers are insured against medical expenditures, the quality of care is usually a much more relevant variable than price for the patient's choice of provider. Similarly, in education markets tuition fees play a relatively minor role in most European countries (though they are on the rise in several countries like England or Italy), and the quality of the institution is typically much more important for the student's choice of school or university. However, since quality is much less readily observable than prices, it is also reasonable to assume that demand adjusts much more sluggishly to quality changes than to price changes. This effect may be particularly strong in the context of health care or education, due to consumer habits or trust in specific providers. If consumers have sluggish beliefs about quality, demand will adjust sluggishly to quality changes, implying that it takes some time before the potential demand increase due to an increase in quality is fully realised.

The assumption that demand is sluggish and adjusts slowly to variations in providers' quality is consistent with existing empirical evidence. The assumption that providers' demand responds to quality has been tested empirically by modelling patients' choice of a hospital among a set of alternative ones using conditional logit models (Folland, 1983; Luft et al., 1990; Burns and Wholey, 1992; Hodgkin, 1996; Tay, 2003; Howard, 2005; Sivey, 2012). These studies find that higher quality and shorter distance increase the probability of choosing a provider. Distance to hospital is systematically a key predictor of patients' choice. Critically, demand elasticities with respect to quality are positive but small for most procedures and conditions.[7] Moreover, these empirical models specify provider choice as a function of past quality measures (as proxied by mortality rates, readmission rates, complication rates and waiting times) therefore introducing a dynamic element. Both the low elasticities of demand with respect to quality and the empirical specification of demand as a function of lagged quality are consistent with our dynamic modelling choice of demand as sluggish. The implications of sluggish demand for quality competition in regulated markets are analysed by Brekke et al. (2012a), using a differential-game framework where providers choose qualities in each period and demand adjusts sluggishly over time. However, that paper follows the standard assumption in the literature on quality competition in regulated markets by assuming that providers are pure profit-maximisers.

In the present paper we combine the two above-mentioned key features – *motivated providers* and *sluggish demand* – in a differential-game framework where providers are funded by a combination of block grants and unit prices, and compete on quality. We consider two different solution concepts: the open-loop and the feedback closed-loop solutions. In our differential game setting, the solution rules adopted by agents (i.e., the providers) capture the intensity of competition. Under the open-loop solution, each firm commits to an optimal quality plan at the beginning of the time considered, and then sticks to it forever. This solution is plausible within institutional contexts where investments in quality are decided infrequently. Under the feedback closed-loop solution, each firm knows the quality of the competitor at each point in time, not just the initial state. The key difference lies in the degree of commitment. The feedback solution is often interpreted as a more competitive solution because firms can change their quality at each point in time in response to the quality of the competitor.

The purpose of our analysis is three-fold. First, we derive the levels of quality in the different solution concepts off steady state as a function of the demand, and then compare the steady-state levels of quality in the different solution concepts to see whether more intense competition (under the closed-loop rule) yields higher quality levels. Second, we perform a welfare analysis where we derive the first-best optimal quality, both in and off steady state, and show how the optimal solution can be achieved by optimal price regulation, depending on the dynamic decision rules used by the providers. Third,

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[3] See e.g., Ellis and McGuire (1986), Chalkley and Malcomson (1998), Eggleston (2005), Heyes (2005), Jack (2005) and Kaarbøe and Siciliani (2011).

[4] See e.g., Francois (2000), Murdock (2002), Glazer (2004), Besley and Ghatak (2005, 2006), Delfgaauw and Dur (2007, 2008) and Prendergast (2007). See also Francois and Vlassopoulos (2008) for an extensive review of the motivated agents literature.

[5] See Brekke et al. (2011) for a more extensive discussion of the assumption of motivated providers, with further references to relevant literature (including experimental evidence).

[6] Glaeser and Shleifer (2001) show that non-profit firms have an incentive to provide higher quality than for-profit ones when firms have reputational concerns. As shown below, altruism also leads to higher quality. However, 'non-profit' firms and 'altruistic' firms are conceptually and analytically distinct assumptions. Indeed, as shown by Brekke et al. (2012b) within a spatial model, in the presence of altruistic providers non-profit constraints lead to higher quality only if firms are sufficiently altruistic. If altruism is low, then profit constraints reduce quality: in the presence of quality competition, firms have a lower incentive to attract patients because revenues and profits that arise cannot be appropriated (i.e., the profit motive to raise quality is weakened). In this study, we ignore the presence of profit constraints. This would make the specification of the problem more complex but would not alter the key results.

[7] The analyses are conducted for patients in need of specific treatments, such as coronary bypass, PTCA, kidney transplant, cataract surgery and hip replacement, or with a certain condition, such as acute myocardial infarction and pneumonia.