Patient choice, competition and antitrust enforcement in Dutch hospital markets

– Marco Varkevisser

Patient choice, competition and antitrust enforcement in Dutch hospital markets

Marco Varkevisser

ISBN 978-94-90420-03-1

Chapters reprinted with kind permission of Cambridge University Press (chapter 3) and Springer Berlin / Heidelberg (chapters 4 and 5).

Cover image taken by Stéphanie van der Geest and edited by Optima Grafische Communicatie BV.

Printed by Optima Grafische Communicatie BV, Rotterdam.

Patient Choice, Competition and Antitrust Enforcement in Dutch Hospital Markets

Keuzegedrag van patiënten, concurrentie en mededingingsbeleid in Nederlandse ziekenhuismarkten

Proefschrift

ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de
rector magnificus

prof.dr. H.G. Schmidt

en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
donderdag 14 januari 2010 om 13.30 uur

door

Marco Varkevisser

geboren te Leiderdorp.

ERASMUS UNIVERSITEIT ROTTERDAM

Promotiecommissie

Promotor
Prof.dr. F.T. Schut

Overige leden
Prof.dr. M.F.M. Canoy
Prof.dr. M.C.W. Janssen
Prof.dr. W.P.M.M. van de Ven

Contents

Chapter 1

General introduction

1.1 Managed competition reforms in the Dutch health care system

In developed countries typically three waves of health care reform are observed (Cutler, 2002). The Netherlands is no exception to this (Van de Ven and Schut, 2008). First, from about 1940 to 1970, the focus was on ensuring universal coverage. When the Dutch government became worried about the seemingly uncontrollable growth of health care spending, the focus from about 1970 to 2000 shifted to cost containment by introducing controls, rationing, and expenditure caps. Since the strict reliance on cost containment resulted in long waiting lists and a lack of incentives for efficiency and innovation, the focus since about 2000 is on incentive-based reforms.

Already in 1987 a market-oriented health care reform was advised by the Dekker Committee. Some minor reforms were indeed implemented during the 1990s, but it lasted until 2006 before a major step was taken in the gradual transition from supply-side government regulation towards managed competition. January 1, 2006 marks the starting point of a health care system in which competing insurers are expected to become the prudent buyers of health care on behalf of their enrolees. With the implementation of the Health Insurance Act, a universal mandatory basic health insurance scheme is established with open enrollment and community rating (Enthoven and Van de Ven, 2007; Van de Ven and Schut, 2008). Individual consumers have an annual choice among private insurers, who can negotiate differentiated contracts, selectively contract, or vertically integrate with health care providers. Premium subsidies make basic health insurance affordable for everyone and a risk-equalization system compensates insurers for enrolees with predictably high medical expenses.

In addition to the implementation of the Health Insurance Act, market-based reforms in the Dutch health care system also include a gradual liberalisation of provider markets. Since February 2005, hospitals and insurers are able to negotiate prices per Diagnosis Treatment Combination (DBC) for a number of routine hospital services, such as cataract surgery and hip replacement.[1] From 2005 to 2009 the proportion of freely negotiable hospital production, called B-segment, has been increased from about 10 percent to about 34 percent of total hospital expenditure. For the remainder of hospital production, called A-segment, prices per DBC are determined by the Dutch Healthcare Authority (NZa).

[1] Each patient admitted to a Dutch hospital or visiting a hospital's outpatient clinic is categorised into a DBC. Each DBC includes all hospital activities and services (both inpatient and outpatient) associated with the patient's demand for care, from his initial consultation or examination to the final check-up.

The ultimate goal of the market-based health care reform is to increase the efficiency of health care provision by stimulating provider competition in two different ways. First, health insurers are encouraged to act as prudent buyers of care on behalf of their enrolees by increasing the incentives and freedom to negotiate contracts with individual providers about prices and/or quality. Though insurers gradually have started to take-up their new role, this transition is still work-in-progress (Van de Ven and Schut, 2009; Boonen, 2009). For several reasons insurers until now have been quite reluctant to selectively contract with providers and to offer preferred provider contracts to their customers: (i) supply and prices of most health care services are still heavily regulated; (ii) insurers often lack the quality information required for selective contracting; (iii) insurers fear a loss of reputation if they would restrict patient choice; and (iv) insurers run only limited financial risk on the costs of hospital care. Second, by providing consumer information patients are encouraged to make an active choice between alternative providers. From the opening up of markets such as the supply of domestic energy and telecommunications to competition, it can be learned that the behaviour of consumers is crucially important for the degree of competition (Waterson, 2003). How much do they search and how many firms do they search amongst? And how do they respond to observed differences between firms in the market?

This thesis focuses on the feasibility of hospital competition in the Netherlands. Though hospital markets are characterised by multiple imperfections, in large part deriving from the uncertainty and asymmetry of information between buyers (individual patients, insurers) and sellers (hospitals),[2] empirical evidence suggests that competition among providers can be socially beneficial by resulting in lower prices and/or higher quality (e.g. Kessler and McClellan, 2000; Gaynor, 2006).[3] For hospital competition to be effective, at least two necessary conditions need to be met: (i) insurers and patients must be able to choose from a sufficient number of hospital substitutes; and (ii) information about hospital quality must be reliable, comprehensive, and publicly available.

The remainder of this chapter is structured as follows. First, a brief description of the development of hospital market structure in the Netherlands is provided. Next, the role of merger control in Dutch hospital markets is discussed. Then the importance of public

---

[2] Excellent discussions of how the health care industry differs from other industries can be found in Gaynor and Vogt (2000) and Dranove and Satterthwaite (2000).

[3] Studies examining the consequences of competition in markets for health care almost exclusively deal with hospital markets in the US. In the Netherlands the data required for such analyses is not easily accessible for academic researchers, which seriously hampers the development of empirical work in this area.

reporting about hospital quality in competitive markets and recent Dutch initiatives in this area are highlighted. Finally, the central research questions of this thesis are outlined.

1.2 Changes in Dutch hospital market structure

When making choices, how many hospital substitutes are available for Dutch patients? In the past two decades hospital mergers have substantially reduced the number of hospitals in the Netherlands (e.g. Varkevisser et al., 2004). As a result of consolidation, the total number of organisations providing general inpatient hospital services has steadily declined from 162 in 1985 to 93 in 2009 (Table 1.1).

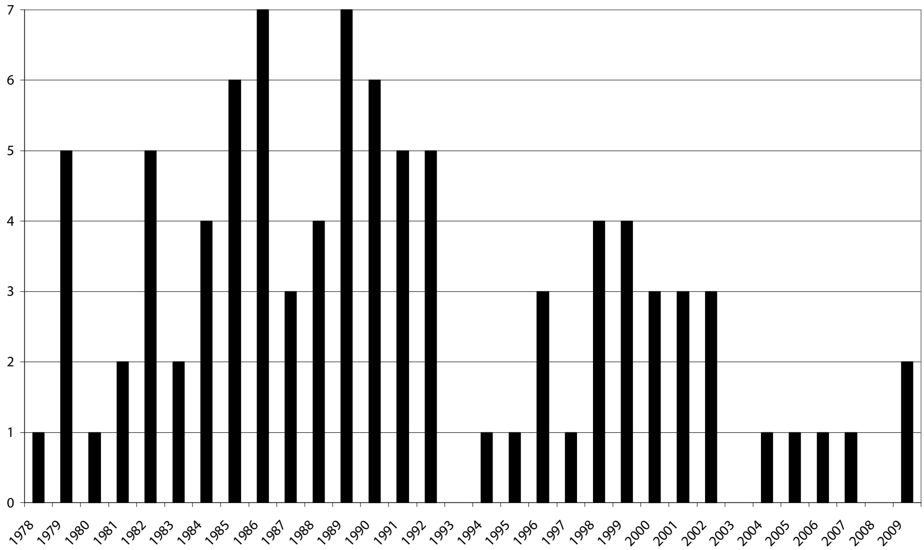
Table 1.1: Number of independent hospital organisations in the Netherlands

	1985	**1995**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
General hospitals	155	110	90	89	88	87	87	85
Academic hospitals	7	9	8	8	8	8	8	8
Total	**162**	**119**	**98**	**97**	**96**	**95**	**95**	**93**

Sources: statline.cbs.nl and NZa (2009)

From 1978 to 2009 the total number of hospital mergers in the Netherlands equals 92. As shown by Figure 1.1, merger activity was most intense in the mid-1980s and early-1990s. When analysing the reduction of independent hospital organisations in more detail, several reasons for hospital consolidation can be distinguished. Initially hospital consolidation involved mergers among small-scale hospitals. Since the early 1970s the Dutch government induced hospitals with less than 150-200 beds to merge in order to (i) reduce excess capacity caused by a substantial decrease in the average length of stay and (ii) safeguard public goals such as quality and continuity of care. In later years hospital consolidation most often involved mergers among medium- and large-scale hospitals. For a considerable period of time the global budgeting system for hospitals, replacing an open-ended budgeting system in 1983, included higher payments for bigger hospitals. That is, for the parameters in the variable part of the budget (e.g. admissions, nursing days) bigger hospitals received a higher payment per parameter than smaller hospitals to compensate them for higher costs associated with the provision of more sophisticated hospital services and differences in their case-mix. This "merger bonus" provided all hospitals with a financial incentive to consolidate in order to increase in scale. Consequently, during the 1980s and early-1990s the nature of the Dutch hospital industry changed substantially. From the late-1990s, merging hospitals seem to anticipate the gradual introduction of managed competition in the health care system.[4]

Figure 1.1: Hospital mergers in the Netherlands 1978-2009



Source: Den Hartog (2004) and NZa (2009)

At two different moments in time, the Dutch government attempted to stop hospital consolidation. First, in 1992 the State Secretary of Health at the time (Hans Simons) announced he would be reserved about new hospital mergers and therefore invited hospitals to consider alternatives. His legal instruments to prohibit hospitals from merging, however, were very limited (Section 1.3). Second, in 2002 the Minister of Health at the time (Els Borst) asked for a voluntary standstill agreement, in which all hospitals would agree to temporarily stop merging until a study by the Netherlands Board for Health Facilities (CBZ) on the spatial distribution of hospital services was completed. The Dutch Hospital Association (NVZ) complied with this request and urged its members not to merge. After the publication of the study (CBZ, 2002), concluding that hospital merger activity was not (yet) threatening the accessibility of hospital services, the NVZ argued there was no reason to continue the standstill agreement.

[4] When discussing consolidation in US hospital markets, Gaynor and Haas-Wilson (1999, pp.148/149) argue that in a changing health care system many mergers "can be understood as jockeying for position to make sure not to be the one left standing when the music stops, or as an attempt by providers to improve their bargaining positions relative to insurers."

1.3 Merger control in Dutch hospital markets

For many years mergers were not made the subject of competition policy in the Netherlands. The Economic Competition Act (WEM) of 1956 did not include preventive merger control. Under this act, cartels, other restrictive practices, and abuses of a dominant position were tolerated unless they were found to be contrary to the public interest.[5] In only a handful cases restrictive arrangements were found to be against the public interest so that for good reason the Netherlands was referred to as a "cartel paradise". For the hospital industry, the Hospital Facilities Act (WZV) of 1971 regulated entry and curbed investments. But this act provided the Minister of Health with very limited legal instruments to prohibit hospital mergers. If the merger plan would include the building of a new hospital, a license for this investment was required under the WZV. Hence, the government was only able to block a proposed hospital merger in case of development of new facilities.

In 1998 the Competition Act (Mw) has replaced the WEM. The Mw is modelled after the competition rules in the EC Treaty and subsequent legislation and includes (i) a prohibition on cartels; (ii) a prohibition on the abuse of a dominant position; and (iii) a preventive merger control regime. It is enforced by the Netherlands Competition Authority (NMa), an independent administrative body. Under the Mw, mergers between any firms (including hospitals) whose combined and individual turnovers exceed the thresholds that are in force are subject to notification and prior approval by the NMa. According to Section 41.2 of the Mw, the NMa will prohibit a merger "if, as a result of the proposed concentration, effective competition on the Dutch market or a part thereof would be appreciably impeded, specifically as a result of the creation or strengthening of a dominant economic position."[6]

Until 2004 the NMa did not assess proposed hospital mergers since it was argued that hospitals were not able to compete due to strict supply and price regulation. In January 2004, the NMa issued a position document in which it stated that as a result of institutional and regulatory changes in the Dutch health care system the economic and legal context now offers scope for competition among hospitals. This implied that from then

---

[5] That is, if firms informed the Minister of Economic Affairs about their cartel agreement. Reported agreements were registered in the Dutch "cartel register".

[6] A dominant position is defined as a position of one or more undertakings which enables them to prevent effective competition being maintained on the Dutch market or a part thereof, by giving them the power to behave to an appreciable extent independently of their competitors, their suppliers, their customers or end-users.

the anticompetitive effects of proposed hospital mergers needed to be assessed.[7] From 2004 to 2009 the NMa has permitted all eight proposed hospital mergers.[8] Since the implementation of the Healthcare Market Regulation Act (WMG) in October 2006, the Dutch Healthcare Authority (NZa) advices the NMa on proposed hospital mergers. In addition to the preventive merger control procedure, other than the former WZV the new Healthcare Providers Entry Act (WTZi) of 2006 allows the government to take action if a hospital merger would endanger the accessibility of emergency care.[9] Until now, this legal instrument has not been used.

1.4 Information about hospital quality

In addition to a sufficient number of hospital substitutes to choose from, public disclosure of reliable and comprehensive information about quality is also a necessary condition for effective hospital competition. In the absence of adequate sources of quality information about individual providers, patients (and/or their health insurers) can not choose a hospital with confidence that it is indeed the most preferred combination of quality and travel time without incurring prohibitive search costs (Dranove and Satterthwaite, 2000). Patients are then unable to give providers clear signals as to what they value implying that hospitals are not encouraged to meet their preferences and improve performances. Unclear signals may, for example, encourage hospitals to systematically underproduce unobserved clinical quality and overproduce patient convenience. Public disclosure of hospital quality indicators is therefore an important, but not sufficient, precondition for effective hospital competition.

There are, however, many problems in measuring quality of hospital care. Most importantly, hospital quality is multidimensional. When only a few outcomes are measured, hospitals may devote too much attention to these areas and may neglect unmeasured aspects of their performance. As can be learned from the effects of competitive reforms in the UK National Health Service during the 1990s, increased competition in combina-

---

[7] One might argue that because Dutch hospitals are not-for-profit-firms, the ability to benefit from the exercise of market power and the incentives for it are reduced. However, though not under shareholder pressure, empirical evidence suggests that not-for-profit hospitals do not behave differently from for-profit hospitals in regard to exercising market power (Gaynor and Vogt, 2000; Vita and Sacher, 2001). Hence, the degree and type of competition rather than hospital ownership *per se* seem to determine hospital behaviour (Varkevisser, 2008).

[8] In two cases, the proposed merger was allowed by the NMa but not consummated.

[9] By law, in case of an emergency each inhabitant should be able to reach an emergency department by ambulance within 45 minutes of travel time.

tion with a limited set of quality indicators may induce hospitals to reduce unmeasured and unobserved quality in order to improve measured and observed performances (Propper et al., 2004 and 2008).

Despite these difficulties, public reporting of comparative quality information has become an accepted way of improving hospital quality in many countries. For instance, quality report cards have been prominent in the US for almost two decades and since the late 1990s they are also a central feature of UK health care reform. After examining the experiences in these two countries, Marshall et al. (2003) make a series of recommendations on how to maximise the effectiveness of public quality reporting. First, if it is to be effective, public reporting needs to be mandatory. When it is not, hospitals may withdraw from a reporting scheme when they perceive that participation is not in their self-interest. Second, report cards should be tailored to the needs of users rather than rely on readily available data that is difficult to interpret. Third, to secure meaningful comparability hospital performance reporting requires at least some sort of risk-adjustment. The public disclosure of hospital performance indicators without adequate risk-adjustment may lead to risk selection by providers thereby decreasing social welfare rather than increasing it (Dranove et al., 2003). Fourth, increasing the public's interest and confidence in hospital quality reports is important for their effectiveness. When making consumer information about hospital quality publicly available without providing further support, patients may not search it out, not understand it, distrust it, and fail to make use of it.

Though in the past years several promising initiatives have been employed to improve transparency, public reporting on quality in Dutch hospital markets is currently still in its infancy. In addition to the information made public by individual hospitals and hospital rankings provided by the media, some hospital quality information has become available for patients on a government sponsored patient-oriented health care portal. Patients can use this portal for comparing hospitals on different sets of performance indicators,[10] developed by the Dutch Healthcare Inspectorate (IGZ) in cooperation with stakeholders (hospitals and medical specialists). An unresolved question is whether patients respond to this information and how this may impact hospital competition in the Netherlands.

[10] This portal, www.KiesBeter.nl (literally: "make better choices"), also allows consumers to compare health plans on prices, services, consumer satisfaction, and supplementary health insurance schemes.

1.5 Research questions and structure of this thesis

As discussed above, effective hospital competition first requires the availability of a sufficient number of hospital substitutes. Since hospital consolidation reduces the number of alternative choices, preventive merger control is of crucial importance. Antitrust agencies like the NMa, however, are struggling with the assessment of proposed hospital mergers. Most importantly, geographic market definition is rather complicated:[11] which hospitals are feasible substitutes from the patient's perspective? Due to the presence of third party payers (health insurers), price regulation, and the general unobservability of negotiated prices in deregulated hospital markets, the standard Small but Significant Non-transitory Increase in Price (SSNIP or "hypothetical monopolist") test is not applicable. Unfortunately, traditional alternative methods for defining hospital markets (Elzinga/Hogarty approach, critical loss analysis) suffer from serious methodological shortcomings and have proven to be inaccurate. Hence, the NMa and NZa are in need of new approaches for hospital market definition. Both international experiences and new approaches to hospital market definition that are suggested in the recent economic literature may provide useful starting points. The appropriate approach to defining geographic hospital markets, however, depends crucially on the prevailing institutions and market structure implying that antitrust enforcement practices in other countries and novel methodologies are not directly applicable in the Dutch context. Research is therefore needed to examine their applicability to hospital markets in the Netherlands.

Since the availability of a sufficient number of hospital substitutes is a necessary condition for successful market-based health care reforms in the Netherlands, effective antitrust enforcement is crucially important. However, it is not a sufficient condition. Effective hospital competition at least also requires market transparency and patient responsiveness to observed quality differences. Unfortunately, studies on patient choice are almost exclusively performed in the context of US hospital markets. Little is therefore known about patients' willingness to travel for higher quality in the Dutch setting where their choices are not affected by prices and hospitals directly compete for patients on non-price dimensions. Also in this area research is needed, taking patient heterogeneity and hospital differentiation explicitly into account.

[11] Assessing market power in hospital merger cases typically involves two steps: definition of the product market and definition of the geographic market. The first, however, has not nearly been as contentious as the latter.

This thesis aims to improve the understanding of patient choice, competition, and antitrust enforcement in Dutch hospital markets by addressing the following four central research questions:

1. What lessons can be learned from experiences with hospital merger control in countries with a competitive hospital sector?

2. What is the appropriate approach for defining geographic hospital markets in the Netherlands?

3. How to assess the substitutability of Dutch hospitals taking both patient and hospital heterogeneity into account?

4. Do patients respond to publicly available information about hospital quality and how may this affect competition in Dutch hospital markets?

The remainder of the thesis is structured as follows. To learn from international experiences with hospital merger control, Chapter 2 focuses on antitrust agencies' practices toward hospital mergers in three different countries with competitive hospital markets and preventive hospital merger control: the United States, Germany, and the Netherlands. Since geographic market definition is the Achilles' heel of hospital merger control, Chapter 3 discusses the strengths and weaknesses of both the methods historically employed as well as three new approaches to defining hospital markets (time-elasticity approach, competitor-share approach, and option demand approach). Particularly their applicability to Dutch hospital markets is discussed. Chapter 4, which is the first empirical analysis of actual hospital visits in the Netherlands (revealed preferences), assesses what patient characteristics and hospital attributes affect patients' decisions to bypass the nearest hospital for their first visit to the hospital's outpatient clinic. To take the heterogeneity of hospital care into account, bypass decisions for two different medical specialties are analysed: orthopaedic care, reflecting a regular type of hospital care, and the more sophisticated medical specialty of neurosurgery. Chapter 5 empirically analyses hospital substitutability in the market for neurosurgery by estimating hospitals' time-elasticities. In the Dutch context, time-elasticities provide relevant information about patients' propensity to consider alternative hospitals if a particular hospital would become more "costly". Chapter 6 examines whether in the market for angioplasty patients respond to publicly available information about hospital quality and what implications their choice behaviour may have for hospital competition. The market for angioplasty in the Netherlands provides a unique opportunity to empirically assess the impact of consumer information on quality competition in a regulated hospital market:

patient choice is affected by observed quality and geographic location only, hospital prices are fixed, and entry is restricted. To conclude the thesis, chapter 7 summarises the main conclusions and policy recommendations obtained from the preceding chapters.

Note to the reader

Because the chapters 2, 3, 4, 5, and 6 of this thesis are written as separate articles for publication in international journals, they can be read independently.

References

Boonen, L.H.H.M. (2009), *Consumer channeling in health care: (im)possible?*, dissertation, Erasmus University Rotterdam

CBZ (2002), *Spreiding ziekenhuiszorg* ('Spatial distribution of hospital services'), College Bouw Ziekenhuisvoorzieningen, Utrecht

Cutler, D.M. (2002), 'Equality, efficiency, and market fundamentals: the dynamics of international medical-care reform', *Journal of Economic Literature*, 40(3): 881-906

Den Hartog, M. (2004), *Effecten van marktstructuur en gedrag op het resultaat van algemene ziekenhuizen* ('Effects of market structure and conduct on the performance of general hospitals'), dissertation, Tilburg University

Dranove, D. and M.A. Satterthwaite (2000), 'The industrial organization of health care markets', in A.J. Cuyler and J.P. Newhouse (eds.), *Handbook of Health Economics*, volume I: 1093-1139, Amsterdam: Elsevier Science

Dranove, D., D. Kessler, M. McClellan and M. Satterthwaite (2003), 'Is more information better? The effects of "report cards" on health care providers', *Journal of Political Economy*, 111(3): 555-588

Enthoven, A.C. and W.P.M.M. van de Ven (2007), 'Going Dutch – Managed-competition health insurance in the Netherlands', *The New England Journal of Medicine*, 357(24): 2421-2423

Gaynor, M. (2006), *What do we know about competition and quality in health care markets?*, NBER Working Paper 12301, National Bureau of Economic Research, Cambridge (MA)

Gaynor, M. and D. Haas-Wilson (1999), 'Change, consolidation, and competition in health care markets', *Journal of Economic Perspectives*, 13(1): 141-164

Gaynor, M. and W.B. Vogt (2000), 'Antitrust and competition in health care markets', in A.J. Cuyler en J.P. Newhouse (eds.), *Handbook of Health Economics*, volume I: 1405-1487, Amsterdam: Elsevier Science

Kessler, D.P. and M.B. McClellan (2000), 'Is hospital competition wasteful?', *Quarterly Journal of Economics*, 115(2): 577-615

Marshall, M.N., P.G. Shekelle, H.T.O. Davies and P.C. Smith (2003), 'Public reporting on quality in the United States and the United Kingdom', *Health Affairs*, 22(3): 134-148

NZa (2009), *Monitor ziekenhuiszorg 2009* ('Monitor hospital care 2009'), Dutch Healthcare Authority, Utrecht

Propper, C., S. Burgess and K. Greene (2004), 'Does competition between hospitals improve the quality of care? Hospital death rates and the NHS internal market', *Journal of Public Economics*, 88(7-8): 1247-1272

Propper, C., S. Burgess and D. Gossage (2008), 'Competition and quality: evidence from the NHS internal market 1991-9', *The Economic Journal*, 118(1): 138-170

Van de Ven, W.P.M.M. and F.T. Schut (2008), 'Universal mandatory health insurance in the Netherlands: a model for the United States?', *Health Affairs*, 27(3): 771-781

Van de Ven, W.P.M.M. and F.T. Schut (2009), 'Managed competition in the Netherlands: still work-in-progress', *Health Economics*, 18(3): 253-255

Varkevisser (2008), 'Winst in de ziekenhuiszorg: wat leert de empirie ons?' ('Profit objectives and hospital care: what do we know from the empirical literature?'), *VGE Bulletin*, 25(1): 12-17

Varkevisser, M., S.A. van der Geest and F.T. Schut (2004), *Concurrentie tussen Nederlandse ziekenhuizen: de deelmarkt voor reguliere klinische zorg* ('Competition among Dutch hospitals: the submarket for regular inpatient care'), Studies in Economic Policy, nr. 13, OCFEB/iBMG, Erasmus University Rotterdam

Vita, M.G. and S. Sacher (2001), 'The competitive effects of not-for-profit hospital mergers: a case study', *Journal of Industrial Economics*, 49(1): 63-84

Waterson, M. (2003), 'The role of consumers in competition and competition policy', *International Journal of Industrial Organization*, 21(2): 129-150

Chapter 2

Hospital merger control: an international comparison

M. Varkevisser and F.T. Schut

Submitted for publication

Abstract

When relying on markets to allocate health care resources, strict enforcement of the antitrust laws in health care markets becomes essential. Hospital merger control is particularly important, since often only a small number of hospitals compete within a geographically limited market. To learn from international experiences with hospital merger control, in this paper the antitrust enforcement practices in three different countries with a competitive hospital sector are examined: the United States, Germany, and the Netherlands. In addition to a general comparison, for each of these countries one recent landmark case is analysed. From the findings of this international comparison two important lessons are formulated. First, geographic market definition is the Achilles' heel of hospital merger control but European antitrust enforcement agencies do not necessarily have to struggle with this issue as much as their US counterparts. Second, recent court decisions confirm that geographic hospital markets are rather small. Based on our observations we further conclude it is better for antitrust enforcement agencies to be too restrictive when assessing proposed hospital mergers rather than too permissive. In particular since hospital mergers may have serious anticompetitive effects and post-merger antitrust enforcement is not likely to offer an effective safety net.

2.1 Introduction

Traditionally, competition and antitrust enforcement has been important in the US health care system only. In recent years, however, more countries have started to turn away from reliance on strict supply rationing and price controls in health care (Cutler, 2002). Particularly in Germany and the Netherlands strict enforcement of the antitrust laws in health care markets is becoming more important as a result of recent market-oriented reforms (Stock et al., 2007; Van de Ven and Schut, 2008). However, from US experiences it follows that this is all but straightforward. Due to the unique attributes of health care markets (e.g. the presence of third party payers) the definition of relevant markets, which is a necessary step towards the objective of assessing providers' market power, is particularly challenging.

The focus of this paper is on hospital merger control since competitive pressures in hospital markets generally provoke horizontal consolidation (Gaynor and Haas-Wilson, 1999). Consolidation may add to efficiency by eliminating excess capacity and utilising economies of scale and/or scope. However, research indicates that mergers only produce significant cost savings when hospitals consolidate their services more fully while in fact most mergers do not (e.g. Dranove and Lindrooth, 2004; Kjekshus and Hagen, 2007). Since unambiguous cost advantages are absent, antitrust enforcement agencies have all the more reason to be suspicious when assessing proposed hospital mergers. In general, mergers may allow hospitals to exercise market power by raising prices and/or lowering quality. Studies on the effects of hospital mergers on prices, costs and quality provide clear evidence that hospital mergers in the US have actually deteriorated market outcomes. From the extensive survey of the empirical literature offered by Vogt and Town (2006), it follows that hospital consolidation in the 1990s raised prices by at least 5 percent and likely significantly more. When merging hospitals are closely located, prices even seem to increase by 40 percent or more. Hospital mergers also seem to reduce quality, though empirical evidence in this area is limited and mixed.[1]

[1] Even when consolidation is likely to improve health outcomes, the reduction in hospital price competition may very well erase these gains in consumer welfare (Ho et al., 2007).

Concerning the overall effect, Town et al. (2006) estimate that from 1990 to 2001 the primary impact of hospital mergers in the US appeared to be a transfer of consumers' surplus to hospitals' surplus. That is, the loss of total welfare was quite modest but hospital consolidation substantially reduced consumer welfare.[2]

To prevent anticompetitive effects from occurring and to safeguard effective competition in health care markets, preventive merger control is of crucial importance. Given the fact that in the US competition has always played an important role in allocating health care resources, it is not surprising to find that analyses of the likely effects of hospital mergers there have been an important part of antitrust enforcement since the early 1980s. However, enforcement of the antitrust laws in hospital markets has proven to be particularly difficult. Though the US antitrust enforcement agencies had considerable early success in challenging hospital mergers that were allegedly anticompetitive, they lost all seven cases litigated during the 1990s. In most of these cases, the primary reason was that courts disagreed with the agencies on the size of the relevant geographic market. In particular since due to the presence of third-party payers a hospital's price elasticity of demand is generally unknown, the standard Small but Significant Non-transitory Increase in Price (SSNIP or "hypothetical monopolist") test for defining geographic markets is difficult to implement in hospital markets.[3]

To learn from their longstanding experience with hospital merger control, in this paper we first take a close look at hospital merger control in the US (Section 2.2). Then we briefly examine hospital merger control in the European Union (Section 2.3). Since most hospital mergers are not covered by the EU's supranational competition policy, we focus on two countries with competitive hospital markets: Germany (Section 2.4) and the Netherlands (Section 2.5). To illustrate antitrust enforcement agencies' practices

---

[2] At least as far as mergers are concerned courts and antitrust enforcement agencies in both the US and Europe tend to use a consumer welfare standard (Motta, 2004, p.19). Some recent papers, however, discuss the proper objective of competition policy (e.g. Heyer, 2006; Carlton, 2007; Pittman, 2007). While economists generally prefer total welfare, an important argument in favour of the consumer welfare standard is that it simplifies decisions in merger cases. That is, the use of a total welfare standard would entail a difficult exercise in quantifying the changes in consumer and producer surplus in order to assess the net welfare effects. Additionally, horizontal mergers typically result in welfare transfers from consumers to producers that are likely overall to be quite regressive.

[3] The SSNIP test begins by positing a narrowly defined market (e.g. one particular zip code) and asking whether a hypothetical monopolist of all firms and products in the posited geographic market could profitably implement a small but significant non-transitory increase in price. If the hypothetical monopolist cannot do so, then the proposed market must be defined too narrow. Thus, including neighbouring zip codes should expand market definition. This procedure is repeated until the SSNIP question is answered affirmative.

towards hospital mergers, throughout the paper three recent case studies are discussed that can be viewed as important (national) landmark cases. When discussing these case studies the focus is on geographic market definition since this is particularly difficult in the hospital sector. The paper ends with some concluding remarks (Section 2.6).

2.2 Hospital merger control in the United States

2.2.1 Clayton Act and horizontal merger guidelines

In the US, Section 7 of the Clayton Act (1914) prohibits mergers and acquisitions where the effect "may be substantially to lessen competition, or to tend to create a monopoly." At the federal level, the responsibility to enforce antitrust laws is shared by the Federal Trade Commission (FTC) and the Department of Justice (DOJ). The premerger notification requirements of the Hart-Scott-Rodino Act (1976) allow the antitrust enforcement agencies to examine the likely effects of proposed mergers before they take place. In 2009 parties are required to notify both the FTC and DOJ about any merger or acquisition plan if the transaction has a value of more than $260 million. For transactions valued at less than this size-of-transaction threshold, notification is still required when the size of each party exceeds the size-of-person thresholds. Only relatively small mergers involving relatively small parties are less likely to raise antitrust concerns and thus excluded from the Clayton Act's coverage.

If a particular transaction is subject to notification, the parties must wait a specific period (usually 30 days) before they may complete it. During this waiting period either the FTC or the DOJ undertakes a preliminary review of the proposed merger.[4] After the preliminary review, the agency can terminate the waiting period, allow the initial waiting period to expire, or issue a request for additional information because it decides closer examination of the transaction is warranted. In case of closer examination, this stage has three potential outcomes. First, the agency may close the investigation and let the transaction go forward unchallenged. Second, the agency may enter into a negotiated consent agreement with the parties that includes provisions that will restore competition. Third, the agency may seek to stop the entire transaction by filing for an injunction in court. Unless the agency takes some action that results in a court order stopping the merger, the parties can consummate their transaction at the end of the specific waiting period. The decision not to challenge a proposed merger, however, does not preclude the enforcement agencies from initiating a post-merger enforcement action at a later

[4] The FTC and DOJ decide between themselves which agency will be responsible for this review.

time – as a recent hospital merger case illustrates (Section 2.2.4). According to Section 11(b) of the Clayton Act divestiture is the usual and appropriate remedy where a consummated merger is found to have substantially lessened competition.

To identify whether or not a merger is likely to cause competitive problems, the agencies employ the analytical process outlined in the Horizontal Merger Guidelines (FTC and DOJ, 1992). This process consists of five steps. First, it is assessed whether the merger would significantly increase concentration and result in a concentrated market, which requires defining the relevant product and geographic market. Second, it is assessed whether the merger, in light of market concentration and other factors that characterise the market, raises concern about potential adverse competitive effects.[5] Third, it is assessed whether entry would be timely, likely and sufficient either to deter or to counteract the competitive effects of concern. Fourth, any efficiency gains that reasonably cannot be achieved by the parties through other means are assessed (efficiency defence). Finally it is assessed whether either party to the transaction pre-merger would be likely to fail, causing its assets to exit the market (failing firm defence).

2.2.2 Experiences with hospital merger control

Since according to the agencies many hospital mergers do not present competitive concerns, an antitrust safety zone is set forth (DOJ and FTC, 1996). Hospital mergers falling within this zone will not be challenged, absent extraordinary circumstances. The safety zone applies to any merger between two general acute-care hospitals where one of the hospitals has an average of fewer than 100 licensed beds over the three most recent years, has an average daily inpatient census of fewer than 40 patients over the three most recent years, and is more than five years old. For hospital mergers that fall outside the antitrust safety zone, the five steps set forth in the Horizontal Merger Guidelines are followed.

Since the first hospital merger was challenged in 1981, the DOJ and FTC had initially considerable success on litigating hospital merger cases. During the 1990s, however, they lost all seven cases – from a total of about 900 hospital mergers – that were litigated. These losses in court constrained the agencies ability to control hospital concentration

[5] The Herfindahl-Hirschman Index (HHI) is used for measuring market concentration. The HHI is calculated by summing the squares of all individual market shares. Where the post-merger HHI exceeds 1,800 it will be presumed that mergers producing an increase in the HHI of more than 100 points are likely to create or enhance market power or facilitate its exercise (FTC and DOJ, 1992).

and gave overly permissive signals to hospitals.[6] Only recently, in a case involving *ex post* examination of a consummated hospital merger the FTC prevailed in court (Section 2.2.4).

Table 2.1 presents a list of hospital merger cases following the agencies' victory in the Rockford, Illinois case in 1989. The cases are denoted by the name of the city in which the merging hospitals are located.

Table 2.1: Hospital merger cases litigated in the US 1991-2008[a]

Case	Year	Winner in court	Primary reason(s) for court decision
Augusta, Georgia	1991	Hospitals	Not-for-profit organisation
Ukiah, California	1994	Hospitals	Geographic market definition
Joplin, Missouri	1995	Hospitals	Geographic market definition, not-for-profit organisation
Dubuque, Iowa	1995	Hospitals	Geographic market definition
Grand Rapids, Michigan	1996	Hospitals	Not-for-profit organisation, efficiencies
Long Island, New York	1997	Hospitals	Product market definition
Popular Bluff, Montana	1999	Hospitals	Geographic market definition
Evanston, Illinois	2007	FTC	
Falls Church, Virginia	2008	-[b]	

a. This overview is an update of the list of cases presented in Gaynor and Vogt (2000, p.1422).
b. There is no court decision since the merging hospitals decided to abandon the transaction after the FTC sought to stop it.

Supported by empirical evidence on the anticompetitive effects of consummated hospital mergers (e.g. Vita and Sacher, 2001; Simpson, 2003), the courts' reasoning in the cases of the 1990s has been widely criticized. From an economic perspective the most important flaws in their erroneous reasoning include judges' tendency to ignore the highly idiosyncratic nature of decision making by health care consumers, the propensity to overlook the importance of agency relationships in determining consumers' responses, and the failure to take into account that hospital services are highly differentiated (e.g. Greaney, 2002; Conners, 2003; Richman, 2007). In particular by accepting implausibly large geographic markets, courts underestimated the anticompetitive effects of hospital mergers.

[6] In this context "court" means court, or administrative law judge (ALJ), or full FTC since different cases are decided by different entities. If it is the FTC that seeks to stop a proposed merger by filing for an injunction in court, an ALJ within the FTC will decide the legality of the transaction. This decision may be appealed to the full five-member FTC and ultimately to the Supreme Court. If the DOJ is responsible for the merger case, the legality of the transaction is litigated in district court. A decision at that stage may be appealed to the circuit court and ultimately to the Supreme Court.

2.2.3 Geographic market definition

The DOJ and FTC have lost several court cases because the courts accepted the merging hospitals' use of the Elzinga/Hogarty approach or critical loss analysis to define the geographic market much more broadly than the antitrust enforcement agency. These methods, however, suffer from serious methodological shortcomings and are therefore inaccurate.[7]

The Elzinga/Hogarty approach is easy to apply and only requires commonly available patient flow data. It begins with a narrowly defined market and then expands the boundary until threshold conditions are met for both imports ("little in from outside" = LIFO) and exports ("little out from inside" = LOFI) of hospital services. In various court cases, the analysis focused on identifying geographic areas such that both statistics are either below 25 percent ("weak market") or 10 percent ("strong market"). The central problem underlying the Elzinga/Hogarty approach is the "silent majority fallacy" (Capps et al., 2002): the presence of some travelling patients who import and export hospital services does not necessarily discipline hospitals from exercising market power over the silent majority of non-travelling patients. Said another way, in markets with heterogeneous tastes for different services, the presence of travelling patients with one set of needs does not necessarily restrain the pricing of services to non-travelling patients with different needs. Suppose that 25 percent of all patients in an area travel significant distances to receive care. This, however, does not in any way indicate that the remaining 75 percent would be willing to similarly travel in response to a price increase – the assumption implicit in using the Elzinga/Hogarty approach. Hence, price increases are certainly feasible even in the presence of significant patient outflows. One might argue that use of the Elzinga/Hogarty approach would be less problematic when disaggregated clusters of hospital services that are close substitutes are analysed. But this would only solve part of the problem, since it incorrectly assumes that the only reason the "silent majority fallacy" exists is that patients' propensity to travel differs across types of hospital care. There are, however, numerous other reasons why the propensity to travel differs among patients (e.g. unobserved personal preferences). Additionally, selecting a non-arbitrary way to aggregate the results of disaggregated, hospital service-level Elzinga/Hogarty analyses would also be problematic.

Critical loss analysis involves three consecutive steps. The first step is to compute the hospitals' contribution margins, defined as price minus average variable costs. In the second step, the contribution margin is used to identify the percentage of patients the hospitals could lose before a small price increase – 5 percent is typically used – becomes

---

[7] A more detailed discussion of both methods can be found in Varkevisser et al. (2008).

unprofitable. This is the critical loss. The final step is to analyse whether the actual loss of patients would exceed the critical loss if all hospitals in the proposed market implemented a small but significant non-transitory increase in price. If so, then the price increase would be unprofitable, indicating that the hypothetical geographic market is too narrow and should be expanded to include more hospitals. The expected actual loss of patients is most commonly assessed using the concept of contestable zip codes. That is, it is assumed that all patients currently choosing one of the hospitals within the proposed market but living in area where many other patients (e.g. 50 percent or more) select hospitals outside the proposed market would switch to those outside hospitals in response to a price increase. Under this assumption critical loss analysis also suffers from the "silent majority fallacy". Danger and Frech (2001) detail an important methodological shortcoming of critical loss analysis: market definition via this approach is highly sensitive to the initial degree of market power. If price is already at the monopoly level, then any further increase in price will by definition result in lower profits. In such a situation, critical loss analysis incorrectly leads to an overly broad market.

Given their losses in court and the empirical evidence on the anticompetitive effects of hospital mergers, it not surprising to find that in their extensive report on competition in health care the US antitrust enforcement agencies specifically address the question how hospital merger control has worked and should work to protect existing and potential competition in American hospital markets (DOJ and FTC, 2004). Among other things, the agencies stress it is crucial that geographic hospital markets are defined properly. Based on their experience and research, they argue that the traditional methods discussed above are not valid or reliable in defining geographic markets in hospital merger cases. Instead, to properly delineate geographic markets courts should use different types of evidence, including strategic planning documents, customer testimonies, and empirical evidence regarding consumers' willingness to travel. The FTC and DOJ also encourage additional research on the pros and cons of new quantitative techniques for defining geographic hospital markets. In recent years, several new approaches to defining geographic hospital markets have been suggested in the health economics literature including the time-elasticity approach, the competitor share approach, and the option demand approach. However, these approaches each have their own strengths and weaknesses and have not yet been implemented in actual hospital merger cases (Varkevisser et al., 2008).

2.2.4 Case study: Evanston Northwestern Healthcare Corporation

Following the seven consecutive losses in court during the 1990s, the FTC in 2002 changed its strategy. While developing new methods for *ex ante* litigation of hospital mergers, a retrospective study of consummated hospital mergers was announced to find out whether merged hospitals behave anticompetitive. If so, *ex post* litigation could be appropriate. As a result of this new strategy, in February 2004 the FTC issued an antitrust complaint against Evanston Northwestern Healthcare Corporation (ENH) – a health system located on Lake Michigan's North shore close to Chicago, Illinois. For the US, this hospital merger is a landmark case since in contrast to previous cases the court here found that the relevant market was geographically limited. As a result, for the first time since the 1980s the FTC prevailed in court when challenging a hospital merger.

Antitrust complaint and ordered remedy

In their antitrust complaint the FTC alleged that following the acquisition of the nearby Highland Park Hospital in January 2000, ENH was able to raise its prices far above price increases of other comparable hospitals as a result of the transaction. When seeking a remedy to restore competition "to the benefit of consumers seeking competitively priced health care" the FTC's complaint contemplated a divestiture of the acquired hospital (FTC, 2004). In his initial decision – that was issued in October 2005 – the Administrative Law Judge (ALJ) ordered this contemplated relief. The ALJ agreed with the FTC that ENH's acquisition of Highland Park Hospital in 2000 resulted in "substantially lessened competition" and higher prices for health insurers and consumers (FTC, 2005). In his decision the ALJ stated that "contemporaneous and post-acquisition evidence establishes that ENH exercised its enhanced post-merger market power to obtain price increases significantly above its pre-merger prices and substantially larger than price increases obtained by other comparison hospitals." Explanations for these price increases other than the exercise of market power were ruled out. To address the anticompetitive effects of ENH's acquisition of Highland Park, the ALJ wrote that "divestiture is the most effective and appropriate remedy." It was ordered that ENH must divest and convey the Highland Park Hospital assets to an FTC-approved buyer and in an FTC-approved manner. ENH appealed to the ALJ's decision. Though the initial decision has been criticised heavily by some legal experts for being unconvincing and analytical flawed,[8] on appeal the full FTC confirmed it in August 2007. The Commission agreed with the ALJ that ENH's acquisition of Highland Park "gave the combined entity the ability to raise prices through the exercise of market power" and therefore warranted a remedy (FTC, 2007a). However, the Commission determined that "this is the highly unusual case" in which a conduct remedy is more appropriate than a divestiture. Since a long time had already elapsed after the merger, a divestiture would be difficult with a greater risk of unfore-

[8] Harris and Argue (2006), for example, criticise the decision for finding direct anticompetitive effects based on unilateral action while at the same time identifying a market structure that is inconsistent with unilateral effects. Campbell (2007) argues that the analytical tools utilised by the ALJ to prove the case are unorthodox, while the result does not fit comfortably with the reality of the hospital industry.

seen costs and failures. To restore competition, it was therefore ordered that ENH should establish two separate and independent negotiating teams to allow health insurers to negotiate separately again with ENH and its former competitor Highland Park Hospital.[9] In 2008, ENH elected to forego further appeals and accept this remedy (Haas-Wilson and Garmon, 2009).

Implications for geographic market definition

In contrast to previous hospital merger cases the court here found that the market was geographically limited. According to the FTC's complaint the relevant geographic market was the area "in which a significant number of individuals who seek hospital care at the three ENH hospitals reside" (FTC, 2004).[10] This relevant geographic market was evidenced, among other things, by ENH's "ability to profitably impose significant and non-transitory price increases upon private payers in their purchase of acute care hospital services at those hospitals." The ALJ confirmed the limited size of the relevant geographic market by holding it larger than that proposed by the FTC's complaint, but smaller than the market advocated by ENH itself. It was therefore argued that the merger was indeed likely to create or enhance market power.

More interesting from a general perspective, the ALJ's decision contains some interesting observations on defining geographic hospital markets. First, it concludes that the Elzinga/Hogarty test, given its methodological shortcomings (Section 2.2.3), is "not appropriate" for defining geographic hospital markets. Second, it is emphasized that though courts do not compel "scientific precision" any hospital market should be "well-defined". That is, it must correspond to the "commercial realities" of the hospital industry. Third, the ALJ states that determination of the geographic market must be based on a dynamic "forward looking" analysis which considers not only where consumers have gone in the past for hospital services, but what "practical alternatives" they would have in the future. Fourth, a key issue in determining the geographic market is identifying

[9] Some academic experts on health economics and the economics of industrial organisation have argued that this remedy is likely to be ineffective for two reasons (FTC, 2007b). First, given that both negotiating teams report to the same ENH central office, there will be ample, hard to oversee opportunities for collusion. Effective price competition is therefore improbable. Second, the ruling is an invitation to collude on quality, about which the decision says nothing. For example, ENH and Highland Park may decide to segment the availability of services and therefore create a "must have" status for each hospital. In its final opinion, the full FTC acknowledges these criticisms but argues that a divestiture would have a substantial negative impact on Highland Park's cardiac surgery program (FTC, 2008d). Standing alone the hospital would not have the volume to maintain its program so that competition might not be restored.

[10] In this *ex post* examination of a consummated hospital merger, geographic market definition is required to assess whether the post-merger concentration level and its increase violate the federal antitrust laws.

which hospitals managed care organisations need to have in their (restricted) hospital networks in order to establish viable, competitive networks.[11] According to the ALJ, in US hospital markets it is this "first stage price competition" that is of critical concern to the antitrust analysis. By defining the relevant product market as general acute care inpatient services "sold to managed care organizations" the ALJ emphasizes that in US hospital markets prices are determined during negotiations over network participation and composition between health insurers and hospitals. Hence, in a setting with managed care and selective contracting, health insurers – rather than individual patients – appear to be the relevant hospital customers from an antitrust perspective.

Since the evidence establishes that people select managed care plans including a hospital that is close both geographically and in travel time, the ALJ concludes, geographic hospital markets are essentially local. On appeal the full FTC agreed with ENH that the ALJ did not address the central issue in defining geographic markets: over what geographic region could a hypothetical monopolist impose a SSNIP? But since the consummated merger enabled ENH to raise prices by a substantial amount through the unilateral exercise of market power, it is concluded that the geographic area in which the three hospitals are located nonetheless constitutes a well-defined antitrust geographic market (FTC, 2007a).

2.2.5 Renewed strength for the FTC after its success in the ENH case?

Possibly strengthened by its success in the ENH case, in May 2008 the FTC for the first time in many years sought to block a hospital merger *ex ante*. A complaint was issued challenging the proposed acquisition by Inova Health System Foundation (Inova) – based in Falls Church, Virginia – of Prince William Health System (PWHS). According to the FTC, the proposed acquisition would substantially reduce the competition for general acute care inpatient hospital services in Northern Virginia and therefore violate the federal antitrust laws. As a result of the merger, the FTC states, "consumers will pay higher prices and lose the benefits of non-price competition" (FTC, 2008a). As in the ENH case, the relevant geographic market defined by the FTC is rather small. Here it is an area no larger than Northern Virginia. For the hospitals located in Northern Virginia approximately 90 percent of their patients came from Northern Virginia, while at the same time approximately 90 percent of the patients who reside in Northern Virginia go to hospitals in Northern Virginia (FTC, 2008b). According to the FTC the explanation for these patterns is simply that patients "prefer to be admitted to a high quality general acute care hospital close to where they live." The merger would leave only five hospitals in this relevant market.

---

[11] Managed care organisations include vertically integrated Health Maintenance Organisations (HMOs) as well as more loosely structured Preferred Provider Organisations (PPOs).

Under various measures (beds, privately-insured discharges, and inpatient revenue from commercial payers) both the concentration of the relevant market and its increase are then well above the level at which a merger between Inova and PWHS is presumptively unlawful. It is therefore concluded that the merger, if consummated, would substantially lessen hospital competition in Northern Virginia. Following the FTC's challenge, Inova and PWHS decided to withdraw their plans for a merger since it "threatened to prolong completion of the merger by as much as two years, which both health systems believe is not in the best interest of the communities they serve" (Inova, 2008). According to the FTC, however, the decision by Inova and PWHS to abandon their transaction is caused by the "strong evidence in support of its case" disclosed in a preliminary court hearing (FTC, 2008c). After the hospitals' decision to terminate the proposed acquisition, the FTC dismissed its complaint since there was no need for further litigation. Consequently, details on the approach used for definition of the relevant geographic market in this particular hospital merger case have not been made public.

2.3 Hospital merger control in the European Union

Mergers were not made the explicit object of supranational European competition policy until adoption of the Merger Regulation in 1989. Pursuant to Article 2 of the Merger Regulation, the European Commission (EC)[12] has to determine "whether the merger would significantly impede effective competition, in particular through the creation or the strengthening of a dominant position, and should therefore be declared incompatible with the common market" (EC, 2004a). The Merger Regulation does not deal with all proposed mergers in the EU: decisions should be taken by national antitrust enforcement agencies unless there are good reasons to take them at the centralised level of the EC. However, since national antitrust laws are to a large extent reproducing the same features as the supranational antitrust laws (Motta, 2004, p.9), major differences in enforcement policies across EU member states are not to be expected.

The EC has jurisdiction on a merger if it has a community dimension. Mergers have a community dimension where the aggregate turnover of the firms involved exceeds certain stated thresholds and is achieved in different member states. Mergers where each of the firms achieve more than two-thirds of their aggregate community-wide turnover within one and the same member state by definition do not have a community dimension. If a merger has a community dimension, parties should notify the EC about

[12] Or more precisely, the Directorate General for Competition that acts following the directives of the European Commissioner responsible for competition policy.

their plans before consummating the merger. After a preliminary review, the EC may decide either to allow the merger or that the proposed transaction “raises doubts” as to its compatibility with the common market. In the latter case, the likely competitive effects of the merger will be assessed more substantively. This process has three possible outcomes. The EC may decide to allow the merger, prohibit the merger, or allow the merger subject to a remedy. In contrast to the US, it is not possible for European antitrust enforcement agencies to order a divestiture once an unchallenged merger is consummated. To provide guidance on its appraisal of horizontal mergers the EC has issued guidelines. The guidelines specify the factors and conditions that are relevant when assessing the likely competitive effects of a merger (EC, 2004b). These factors and conditions include market shares and concentration levels, possible anticompetitive effects, countervailing buying power, and entry. In the EC’s horizontal merger guidelines it is recognised that a merger may bring about efficiencies that counteract the adverse effects on competition and the potential harm to consumers that it might otherwise have. That is, any substantiated efficiency claim brought forward by the merging parties is considered in the overall assessment of the proposed merger. A failing firm defence is also stated in the EC’s merger guidelines.

Since within the EU health care systems are organised nationally, hospital mergers most often do not have an impact that goes beyond the national borders of an individual member state. But occasionally a hospital merger has a community dimension. Most recently, in 2007 the EC reviewed a proposed transaction under which two providers of investment management (APW from the UK and APSA from France) and a Jersey-based private equity firm (Nordic Capital) would acquire joint control over Capio. This Swedish provider of health care owned private hospitals, diagnostic centres and private psychiatric hospitals in a wide range of EU member states, including the UK where one of the acquiring parties (APW) already controlled a provider of health care services. Using a separate product market for acute general hospital services provided by private hospitals, the EC concluded that the merger would raise serious competition concerns in the UK. Since the EC argues that most patients do not travel far for their treatment,[13] geographic hospital markets are defined as local. The proposed concentration was therefore approved conditional upon the divestiture of Capio’s UK-based private acute general hospitals, its independent sector treatment centres (ISTCs) outsourcing business, and its specialist eye hospital. This divestiture would remove the horizontal overlap in the

[13] To substantiate this point of view, the EC refers to an earlier decision by the UK Competition Commission in which it was concluded that competition on local hospital markets is considered to take place in areas extending to a 30 minutes drive in each direction starting from any one hospital (CC, 2000).

UK and therefore eliminate the risk of less effective competition in the local markets concerned (EC, 2007).

2.4. Hospital merger control in Germany

2.4.1 Act against Restraints of Competition

The Act against Restraints of Competition (*Gesetz gegen Wettbewerbsbeschränkungen*, abbreviated: GWB), which came into effect in 1958, assigns the task of protecting competition at the national level in Germany to the Federal Cartel Office (*Bundeskartellamt*, abbreviated: BKA). A procedure for preventive merger control was introduced in the GWB with the second amendment in 1973. Since then this procedure has been enforced relatively strictly, leading to a considerable number of merger prohibitions but also to frequent modifications of merger proposals and the abandonment of many others (Motta, 2004, p.11). One of the main principles behind competition policy in Germany is the protection of economic freedom. Mergers could lead to the creation of dominant firms which could limit the economic freedom of competitors. A proposed merger will therefore be prohibited when it is "expected to create or strengthen a dominant position", unless the merger "will also lead to improvements of the conditions of competition and that these improvements will outweigh the disadvantages of dominance" (Section 36.1). According to the GWB, a firm is dominant when, on a properly defined market, it has no competitors or is not exposed to any substantial competition or has a paramount market position in relation to its competitors (Section 19.2). For assessing a firm's market position the GWB mentions several factors that should be taken into account. These include its market share, its financial power, legal or factual barriers to market entry by other firms, actual or potential competition by firms, and the ability of the opposite market side to resort to other firms.

The BKA's preventive merger control only applies to mergers between undertakings whose aggregate worldwide turnover exceeds €500 million and of which at least one undertaking realises more than €25 million in Germany. Mergers that are subject to control must always been notified prior to be being put into effect. The BKA then examines the proposed merger. After a preliminary review, a more substantive examination will be initiated if the BKA finds it necessary. After examining the proposed merger the BKA decides whether it is cleared, prohibited or cleared subject to a remedy. If a merger is cleared, the parties should inform the BKA once it is consummated. Though the notification threshold is rather high, it is unlikely this has resulted in an antitrust enforcement policy that was overly permissive because so far mergers between German hospitals typically involve the acquisition of public hospitals by large private hospitals chains. However, it is important to recognise that mergers between independent hospitals may not be subject to the BKA's merger control whereas these mergers may substantially reduce competition in local or regional hospital markets.

2.4.2 Experiences with hospital merger control

To date the BKA has examined more than 100 hospital merger cases. Most of these cases were cleared within one month, but some have been challenged (Bangard, 2007). Particularly since the year 2000 an increasing number of public hospitals are being sold to private hospital chains, which is mainly driven by the large budget deficits of public authorities at the regional and municipal level (Schulten, 2006). As a result of this wave of hospital take-overs, hospital merger control has become increasingly important in Germany. To ensure that hospital markets are organised as competitive as possible, the BKA applies the GWB rather strictly in this industry. In recent years, four proposed hospital mergers were prohibited and one was cleared subject to the condition that the merging parties should sell one hospital location to a third party. In March 2005, for the first time, the BKA prohibited a proposed hospital merger. Following this prohibition, the Federal Court of Justice (*Bundesgerichtshof*) in Germany has recently confirmed that the GWB is fully applicable to the hospital industry (BGH, 2008). There are no social law or hospital law provisions that preclude application of the GWB's merger control provisions to markets for hospital services. Additionally, the court concluded that the objectives of antitrust law and health policy are not in conflict with one another. Table 2.2 presents a list of hospital mergers cases since the BKA first prohibited a proposed merger. The cases are denoted by the names of the merging hospitals.

Table 2.2: Hospital merger cases in Germany 2005-2008

Merging hospitals	Year	Conclusion by the BKA
Rhön and *Bad Neustadt / Mellrichstadt*	2005	Prohibited and confirmed in court
Rhön and *Eisenhüttenstadt*	2005	Prohibited
Asklepios and *LBK Hamburg*	2005	Cleared, subject to the condition of selling one location
Nürnberg and *Nürnberger Land*	2005	Cleared
Humaine and *Fresenius*	2006	Cleared
Greifswald and *Wolgast*	2006	Prohibited[a]
Hannover and *Wunstorf*	2007	Cleared
LBK Hamburg and *Mariahilf*	2007	Prohibited
Rhön and *Wesermarsch Klinik*	2008	Cleared

a. In January 2008, however, the Federal Minister of Economics and Technology (*Bundesminister für Wirstschaft und Technologie*) permitted the proposed merger. It was argued that the merger, despite its likely anticompetitive effects, served the public interest since one of the hospitals involved was a rather small university hospital suffering from scale-related inefficiencies.

2.4.3 Approach to defining geographic hospital markets

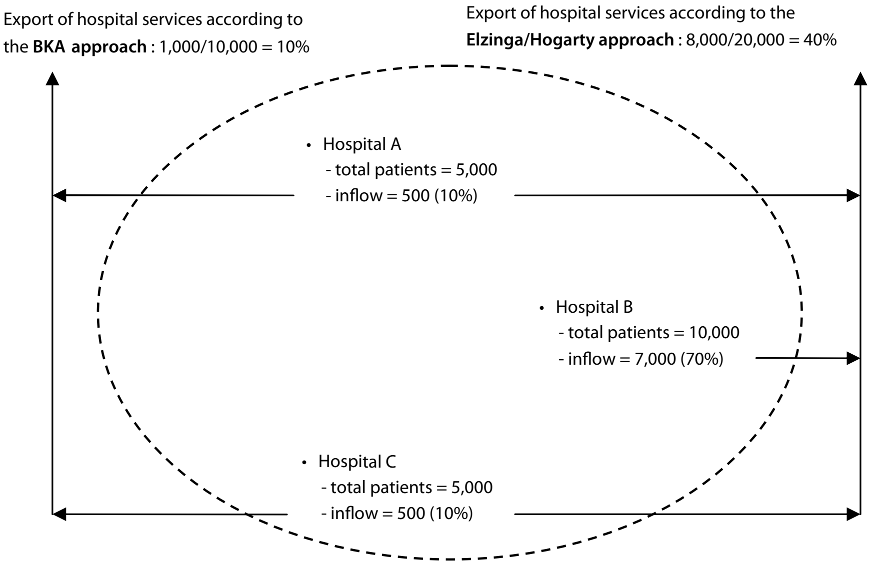
The BKA defines the relevant product market as the market for acute hospital services, including general hospitals and specialised clinics but excluding rehabilitation and other nursing centres. For defining geographic hospital markets the BKA uses a static backward-looking approach based on the analysis of patient flow data. Rather than "merely theoretical" hospital alternatives, the BKA argues that only "practical" alternatives should be taken into account when defining the relevant geographic market (BKA, 2005a). By considering where patients have gone in the past for hospital services, the BKA infers which hospitals are substitutable from the perspective of patients. Generally, the BKA's approach to defining geographic hospital markets consists of two steps. In the first step the catchment areas of each hospital located within a greater area of about 100 by 120 kilometres around the merging hospitals are identified. In the second step, which is the decisive one, the behaviour of patients is analysed.

Since the BKA approach to defining geographic hospital markets also relies on patient flow data, at first sight it seems closely related to the well-known and widely criticized Elzinga/Hogarty approach (Section 2.2.3). There are, however, two fundamental differences.

First, when computing the export of hospital services the BKA does not aggregate patient inflows to all hospitals located in the hypothesized geographic market but only takes into account patients travelling to the merging hospitals. Overstatement of the true size of geographic hospital markets, which has proven to be an important pitfall when analysing patient flow data, is therefore less likely to occur. Consider the following example to illustrate this. Suppose we start with a hypothesized geographic market that in addition to the merging general hospitals A and C also includes the academic teaching hospital B (Figure 2.1).

Since the latter offers hospital services that are highly differentiated from the services offered by the other hospitals, 70 percent of its 10,000 patients come from outside the hypothesized market, whereas the percentage of travelling patients for the other hospitals is only 10 percent of 5,000 patients each. Under these hypothetical circumstances, it is easy to see how the BKA's approach leads to a different delineation of the relevant geographic market than the Elzinga/Hogarty approach. To start with the latter, the relevant statistic for the export of hospital services ("little out from inside", LOFI) equals 40 percent which is higher than the threshold that is generally used for a "weak" market. Hence, according to the Elzinga/Hogarty approach the geographic market is too narrowly defined and its boundary should therefore be expanded. When the BKA computes the export of hospital services from the hypothesized geographic market, however, it only analyses the inflow of patients to the merging hospitals (A and C) rather than the aggregate inflow to all hospitals (A, B, and C) in the market. The percentage of exports is then rather low (10 percent), which implies that the hypothesized geographic market should not be enlarged. Since the highly differentiated product provided by hospital B induces patients to travel for specific reasons, it would indeed be incorrect to conclude that hospitals A and C face competition from hospitals elsewhere. Note that when hospital B would provide the same services as those provided by the other hospitals while still attracting many patients from outside the hypothesized market (e.g. due to its high quality), the BKA's approach may result in a geographic hospital market that is defined too small.

Figure 2.1: Using the export of hospital services for hospital market definition



The second difference with the Elzinga/Hogarty approach is that the BKA's approach is based on pragmatic considerations, including case-specific characteristics, rather than fixed thresholds. From the BKA's decisions it follows that generally only areas from which a substantial percentage of the patients travel to one of the merging hospitals are potentially included in the relevant market (Kallfass and Kuchinke, 2006). That is, when patients living in the hypothesized market also visit hospitals located there so that mutual patient flows between both areas are substantial. Whereas the Elzinga/Hogarty approach tends to include gradually more areas simply to meet the 90 percent or 75 percent import and export thresholds, the BKA only includes or excludes neighbouring areas after assessing their specific competitive situation.

The BKA's approach is unlikely to suffer from the "silent majority fallacy" because it is recognised that the presence of travelling patients does not necessarily restrain hospitals from behaving anticompetitive. More specifically, whereas the Elzinga/Hogarty approach incorrectly assumes that the presence of some travelling patients already disciplines hospitals from exercising market power over the silent majority of non-travelling patients, the BKA assumes that only the presence of many travelling patients disciplines hospitals from exercising market power over the then silent minority of non-travelling patients. Despite its use of patient flow data to define geographic hospital markets the BKA is therefore not likely to overstate the true size of the relevant market. On the contrary, as legal experts rightly argue (Badtke, 2008), the BKA's approach may result in hospital markets that are defined too small rather than too large. Hence, the emphasis seems to be on avoiding Type II errors (allowing the hospital merger while it does restrict actual hospital competition) rather than avoiding Type I errors (prohibiting the hospital merger while it does not restrict actual hospital competition).

2.4.4 Case study: Rhön-Klinikum AG / Bad Neustadt / Mellrichstadt

In August 2004 Rhön-Klinikum AG, one of the leading private hospitals groups in Germany, notified the BKA of its plan to acquire two public hospitals: one in Bad Neustadt (about 150 kilometres east of Frankfurt am Main) and one in Mellrichstadt (about 15 kilometres north of Bad Neustadt). In particular since at the time of the proposed merger Rhön-Klinikum nation-wide already operated 30 hospitals with an aggregate turnover of more than €1,000 million, the BKA decided to substantively assess the likely competitive effects of the proposed acquisition. From this assessment it was concluded that the transaction would further strengthen Rhön-Klinikum's dominant position in the two different relevant markets concerned (BKA, 2005a). For Germany, this is a landmark case since for the first time the BKA prohibited a proposed hospital merger and also prevailed in court.[14]

Geographic market definition

By applying its two step approach to defining geographic hospital markets, the BKA in this particular case concluded that (i) for most general hospitals the vast majority of patients are living nearby, implying that the export of hospital services from one area to another is low and (ii) most patients choose hospitals close to their homes and do not travel to more distant alternatives, implying that the import of hospital services

---

[14] Shortly after this decision, the BKA also prohibited Rhön-Klinikum AG from acquiring the municipal hospital in Eisenhüttenstadt. It was concluded that this merger would strengthen Rhön's already dominant position in the the Frankfurt/Oder region because it already owned the principal hospital in that area (BKA, 2005b).

from one area to another is low too. The BKA agreed that some patients are willing to travel, but since they travel for particular reasons (e.g. specialised care) their behaviour was not expected to significantly affect hospital competition. As a result, two different geographic markets were defined that are both rather small: the Bad Neustadt / Bad Kissingen market and the Meiningen market. In these areas the proposed merger would have increased Rhön-Klinikum's market shares to about 65 percent and 60 percent, respectively (BKA, 2005a).

Court decisions

Following its decision to prohibit the hospital merger, the BKA has prevailed in court twice. First, in April 2007 the Düsseldorf Higher Regional Court (*Oberlandesgericht Düsseldorf*) confirmed the approach used by the BKA for defining the relevant geographic market. The court stated that patient flow data provide reliable information about the substitutability of hospitals and may therefore be used by the BKA for geographic market definition. Since hospitals' substitutability crucially depends on the distance patients are willing to travel from their homes to a hospital, the court argued, analysing where patients have gone in the past for hospital services is appropriate. It is concluded that areas only belong to the same geographic market when mutual patient flows between them are "substantial" (OGD, 2007). Second, an appeal on points of law by the merging hospitals against this decision was dismissed in January 2008 by the Federal Court of Justice (*Bundesgerichtshof*) which made the BKA's prohibition of the merger final. The highest court in Germany confirmed that the use of patient flow data is appropriate when defining the relevant geographic market in hospital merger cases. Therefore, the BKA's approach to defining geographic markets is found to be "legally tenable" (BGH, 2008). In its decision the court also argued that patients' potential hospital alternatives should not be taken into account when they did not actually visit these hospitals in the past. This implies that most value is attached to revealed preference data. However, the court emphasised that potential alternatives are not meaningless. These are called "particularly useful" when assessing the factors that may limit or extend the merged hospital's market power.

2.5 Hospital merger control in the Netherlands

2.5.1 Competition Act and guidelines for antitrust enforcement in health care

The Dutch Competition Act (*Mededingingswet*, abbreviated: Mw), implemented in 1998 and amended in 2004, is enforced by the Netherlands Competition Authority (*Nederlandse Mededingingsautoriteit*, abbreviated: NMa). In addition to the prohibition on cartels and the prohibition on abuse of a dominant position, the Mw also includes preventive merger control. In general, NMa's merger control only applies to mergers between undertakings whose combined turnover exceeded €113 million in the preceding calendar year and of which at least €30 million was realised in the Netherlands by at least two of the undertakings involved. Since geographic markets for health care tend to be rather small, these thresholds are temporarily lowered for health care markets in order to safeguard the emerging and still fragile competition in the new Dutch health care system. Since January 1, 2008 health care providers should notify the NMa about merger plans when their combined turnover exceeded €55 million in the preceding calendar year and of which at least €10 million was realised in the Netherlands by at least two of the undertakings involved. To prevent these lower thresholds from applying to mergers between undertakings for which delivery of health care services is only a small part of their business, a third threshold has been added. That is, for at least two of the undertakings involved individual turnover from health care services must exceed €5.5 million.[15]

Mergers qualifying for these thresholds must be reported to the NMa prior to being consummated. After notification, the NMa carries out a first, general review of the proposed merger. According to Section 37.2 of the Mw a merger requires a license when there is reason to assume that "a dominant position that appreciably restricts competition on the Dutch market or a part thereof could arise or be strengthened as a result of the said concentration." If the merging parties submit an application for a license, the NMa starts a more specific and substantial assessment of the proposed merger. Based on its findings, at the end of this licensing phase the NMa decides to allow the merger, prohibit the merger, or allow the merger subject to a remedy. Section 41.2 of the Mw states: "A license shall be refused if, as a result of the proposed concentration, effective competition on the Dutch market or a part thereof would be appreciably impeded, specifically as a result of the creation or strengthening of a dominant economic position." Based on European jurisdiction, a dominant position is defined in the Mw as "a position of one or more undertakings which enables them to prevent effective competition being maintained on the Dutch market or a part thereof, by giving them the power to behave to an appreciable extent independently of their competitors, their suppliers, their customers or end-users" (Section, 1.i). However, in addition to lowering the notification thresholds the Dutch government also aims at the introduction of specific merger guidelines for the health care industry. The bill required for this is expected to be introduced in parliament by the summer of 2011.

[15] These lowered thresholds are particularly relevant for nursing homes and home health care organisations, since mergers in these markets generally do not qualify for the general thresholds.

In 2002, the NMa issued their first guidelines for antitrust enforcement policy in markets for health care. As a result of some fundamental changes in the Dutch health care system (Helderman et al., 2005; Schut and Van de Ven, 2005), these guidelines were revised in 2007. Other than the initial guidelines, the revised ones also include a section on preventive merger control. After explaining the procedures of both the notification and licensing phase, the NMa briefly discusses how they will assess whether there is a dominant position. First, the relevant market is defined and then several elements are considered, including market shares and concentration levels, countervailing buyer power, and the likelihood of entry (NMa, 2007). When assessing the likely competitive effects of a proposed hospital merger, the NMa has to take into account the opinion of the Dutch Healthcare Authority (*Nederlandse Zorgautoriteit*, abbreviated: NZa).[16]

2.5.2 Experiences with hospital merger control

Prior to 2004, the NMa did not assess proposed hospital mergers since it was argued that hospitals were not able to compete due to supply and price regulation. In 2004, however, the NMa issued a position document in which it stated that institutional and regulatory changes in Dutch health care markets had created scope for competition (NMa, 2004a). As a result, it was therefore concluded that providers of hospital services compete with each other so that the Mw also applies to the hospital industry. From 2004-2008, nine proposed hospital mergers have been assessed by the NMa. In six cases the notification phase ended with the conclusion that a license was not required. For three proposed hospital mergers the NMa ordered a more specific and substantial assessment. Table 2.3 presents a list of hospital mergers cases since the NMa first assessed a proposed merger in 2004. The cases are denoted by the names of the merging hospitals.

So far, two hospital mergers have been subject to a substantive assessment by the NMa during the licensing phase. In both cases the merger was cleared by the NMa at the end of this phase. So there has not yet been a need for any defendants to challenge any decision in a hospital merger case. As a result, contrary to the US and Germany, there have not (yet) been court decisions on hospital market definition in the Netherlands implying there is no industry-specific jurisprudence.

2.5.3 Case study: Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord

In April 2004 two neighbouring general hospitals (Hilversum and Gooi-Noord) located in the region between Amsterdam and Utrecht, notified the NMa about their plan to merge. After the first general assessment in the notification phase, the NMa in July 2004

[16] The NZa is an autonomous administrative agency under the Dutch Ministry of Health, Welfare and Sport that since 2006 monitors and regulates health care markets in the Netherlands.

concluded that a license was required for this proposed merger since it could restrict actual competition in the Dutch market for hospital care. Following the hospitals' application for a license, the NMa in December 2004 started a more specific and substantial assessment of the concentration. For the Netherlands, this is a landmark case since it was the first proposed hospital merger that has been subject to a substantive assessment by the NMa and it therefore created a precedent.

Table 2.3: NMa decisions in Dutch hospital merger cases 2004-2008

Merging hospitals	Year	First stage	Second stage
Juliana Kinderziekenhuis/RKZ and *Leyenburg*	2004	No license required	-
Ziekenhuis Hilversum and *Ziekenhuis Gooi-Noord*	2005	License required	License issued
Erasmus MC and *Havenziekenhuis*	2005	No license required	-
Ziekenhuis Walcheren and *Oosterscheldeziekenhuizen*	2006	License required	Application withdrawn
Laurentius Ziekenhuis and *St. Jans Gasthuis*	2007	No license required	-
Vlietland Ziekenhuis and *MC Rijnmond Zuid*	2007	No license required	-
MC Alkmaar and *Gemini Ziekenhuis*	2007	No license required	-
St. Lucas Ziekenhuis and *Ziekenhuis Delfzicht*	2008	No license required	-
Ziekenhuis Walcheren and *Oosterscheldeziekenhuizen*	2008	License required	License issued[a]

a. In March 2009, the NMa approved this merger in order to "safeguard the quality of basic hospital care" in the central region of the sparsely populated province of Zeeland. To prevent the merged hospital from exercising market power, "strict conditions" have been imposed (NMa, 2009). In this particular merger case the geographic hospital market was not disputed.

Geographic market definition

Based on market research and jurisdiction from other countries (i.e. the US, Germany, and New Zealand), the NMa identified two separate product markets: one for inpatient and one for outpatient general hospital care. In the first general assessment during the notification phase, the Elzinga/Hogarty approach was used for defining the geographic market. From this approach it followed that the relevant market was rather small. The NMa therefore concluded that patients currently prefer hospitals located close to their homes and that, as a consequence, the proposed merger would substantially lessen competition (NMa, 2004b). At the same time, it was stated that the Elzinga/Hogarty approach was a static test. Further research focusing on where patients could go and would be willing to go when given an incentive to do so was therefore concluded to be necessary.

This research was carried out in the licensing phase. First, interviews were carried out with general practitioners (GPs),[17] other hospitals, and health insurers. Whereas GPs and other hospitals expected patients to bypass the merging hospitals when these would exercise market power, health insurers did not expect patients' willingness to travel to be high. Second, patients' stated preferences were investigated by a conjoint analysis.[18] From this analysis it followed that the vast majority of patients would travel to other hospitals when the nearest hospital would increase its price or deteriorate its quality. These results indicated that the relevant geographic market was larger than initially assumed. Third, econometric simulations using patients' revealed preferences confirmed the initial assumption that the geographic market was rather small.

Unfortunately for the NMa, the research findings in this merger case were ambiguous. Based on the geographic market defined when using stated preference data the merger should be allowed, whereas based on the geographic market defined when using revealed preference data the merger should be prohibited. Confronted with these contradictory findings, the NMa concluded as follows. Though in general greater value should be attached to revealed preferences, patients' willingness to travel could be expected to increase in the near future due to the increasing availability of consumer information about quality differences within the Dutch hospital sector. According to the NMa it was therefore "less evident that greater weight should be given to the revealed preferences in the assessment of the present case" (NMa, 2005). As a result, the NMa decided there were "insufficient grounds" for defining a geographical market that is rather small. Since the reverse also holds, this decision reveals that the emphasis here was on avoiding a Type I error (prohibiting the merger while it does not restrict actual hospital competition) rather than on avoiding a Type II error (allowing the merger while it does restrict actual hospital competition).

Final decision

All things considered, in June 2005 the NMa decided to clear the merger between both hospitals because there was "insufficient evidence to deem it plausible that a dominant position will arise or be strengthened as a result of the proposed merger on the markets for clinical and non-clinical general hospital care" (NMa, 2005). This conclusion implies that indirectly greater weight was given to consumers' stated preferences – even though

---

[17] In the Netherlands, patients require a referral from their GP to visit a hospital for non-emergency care.

[18] Conjoint analysis deals with situations in which a patient has to choose among hospital options that simultaneously vary among two or more attributes. The hypothetical problem facing the patient is how to trade off the possibility that hospital X is better than hospital Y on attribute A but worse than hospital Y on attribute B, and so on. The goal of conjoint analysis is to determine how much each hospital attribute contributes to patients' preferences.

it was admitted that what people say they will do is often not the same as what they will actually do if the hypothetical situation becomes reality. Additionally, the expectation that Dutch patients' willingness to travel is likely to increase in the near future due to increased transparency is not based on empirical evidence and therefore (highly) speculative. Future analysis of post-merger market outcomes should reveal whether or not the NMa erred in this hospital merger case.

2.5.4 Geographic market definition in recent hospital merger cases

In contrast to the US and German antitrust enforcement agencies, the NMa does not appear to follow a consistent approach to defining hospital markets. Whereas in the case study discussed above geographic market definition played a central role, in the most recent hospital merger cases the NMa simply relied on a rather crude "travel time analysis". When determining the relevant geographic market, patients' average travel times to both the merging hospitals as well as their potential competitors are computed. When it is found that for many patients of the merging hospitals at least one closer or equally close hospital alternative is present, the NMa decided the merger is unlikely to result in a dominant position. This methodology suffers from at least two major shortcomings. First, the heterogeneity of both patients and hospitals is not taken into account while of crucial importance when assessing hospital market power (Varkevisser et al., 2008). The NMa's approach focuses solely on travel times, but other factors – such as (perceived) quality, waiting time and patients' personal preferences – are also important when determining hospitals' substitutability (Varkevisser et al., 2009). Second, the observation that the merged hospital will not have a dominant market position because after the merger almost all their patients apparently have at least one other hospital alternative at their disposal is far too simple. Most importantly, the presence of one potential competitor is not by definition sufficient for effective competition among hospitals.[19] Additionally, a hospital's market power is not only affected by the number of competitors but by other factors as well, including market shares, the (financial) strength of competing hospitals, the presence of capacity constraints or the extent to which the services of the merging hospitals are close substitutes. None of these were explicitly taken into account by the NMa in recent hospital merger cases.

[19] After empirically examining the relationship between market structure and competition for US hospital markets, Abraham et al. (2007) conclude that besides mergers which take local hospital markets to monopoly also mergers resulting in duopoly cause significant harm to consumers.

2.6 Conclusion

European governments increasingly rely on market-based incentives to improve efficiency in their health care system. Preventive merger control is then of crucial importance. To learn from international experiences with hospital merger control, in this paper we examined antitrust enforcement practices in three different countries with a competitive hospital sector: the United States, Germany, and the Netherlands. For each of these countries one recent hospital merger is discussed as being an important (national) landmark case. These merger cases are summarised in Table 2.4.

Based on the international experiences with hospital merger control discussed in this paper, two important lessons can be formulated. First, more than in any other industry, geographic market definition is the Achilles' heel of merger control in hospital markets. European antitrust enforcement agencies, however, do not necessarily have to struggle with this issue as much as their US counterparts. In a managed care setting, which is typical for the US, the key issue for geographic market definition is which hospitals managed care organisations need to have in their networks. When hospitals compete for inclusion in insurers' networks the analysis of commonly available patient flow data alone for defining hospital markets is inappropriate. However, in a setting where hospitals compete directly for patients, which is the case in many European countries, hospitals' substitutability crucially depends on patients' willingness to travel. Patient flow data is then pre-eminently useful for defining geographic hospital markets.[20] That is, when used properly. The Elzinga/Hogarty approach of expanding a hypothesized market until strict thresholds are met for both the imports and exports of hospitals services has proven inaccurate and is therefore inappropriate. When analysing where patients have gone in the past, antitrust enforcement should rather investigate the particular reasons why some patients travel while others do not. Supplemented by an empirical analysis of patient hospital choice using revealed preference data (Varkevisser et al., 2008), these insights should be used to substantiate any conclusions about other hospitals (not) taken into account as feasible alternatives for the merging hospitals.

Second, recent court decisions in both the US and Germany confirmed that geographic hospital markets are rather small. Though the appropriate approach to defining geographic markets depends on how health insurers contract with hospitals and how

[20] Despite the gradual introduction of managed competition in the Netherlands, hospitals there also compete directly for patients through non-price factors. However, patient flow data would become less useful for defining Dutch hospital markets if insurer-hospital negotiations over network participation and composition increase.

patients choose their hospital, the results seem to be consistent regardless of the prevailing institutions and market structure. In a managed care setting, people require health plans to include at least one hospital that is close to where they live which makes hospital markets essentially local. In a setting where patients do not commit to (restricted) provider networks but choose hospitals when they need care, patient flow data show that most patients prefer hospitals nearby.

Table 2.4: Summary of recent hospital mergers that are (national) landmark cases

	United States	**Germany**	**The Netherlands**
Hospital(s) involved	Evanston Northwestern Healthcare Corporation	Rhön, Bad Neustadt, and Mellrichstadt	Hilversum and Gooi-Noord
Period	2004-2007	2005-2008	2004-2005
Type	*Ex post* examination of a consummated merger.	*Ex ante* examination of a proposed merger.	*Ex ante* examination of a proposed merger.
Size of the relevant geographic market according to the antitrust enforcement agency	Limited to the area in which a significant number of the hospitals' patients reside.	Rather small since patient flow data revealed that most patients choose hospitals nearby.	Ambiguous since the use of stated preference data indicated a larger area than revealed by patient flow data.
Conclusion by the antitrust enforcement agency	The merger substantially lessened competition and a divestiture is needed to restore competition.	The merger would further strengthen Rhön's already dominant position and is therefore prohibited.	Insufficient evidence that the merger would create or strengthen a dominant position and it is therefore cleared.
Final court decision	The merger indeed substantially lessened competition, but in this case a conduct remedy is more appropriate than a divestiture.	The merger would indeed further strengthen Rhön's dominant position and is therefore prohibited.	-

To conclude, since empirical studies provide clear evidence that hospital mergers may have serious anticompetitive effects while claimed cost savings are most often not achieved an asymmetry between the cost of Type I and Type II errors is likely to exist in the hospital sector.[21] That is, the reduction in social welfare caused by allowing a proposed hospital merger that restricts actual hospital competition (Type II error) will generally be (far) greater than the reduction in social welfare caused by blocking a proposed hospital merger that does not restrict actual hospital competition (Type I error). This asymmetry

21 Note that such an asymmetry has also been identified for other industries, e.g. Lévêque (2006).

is even more acute when identifying the exercise of market power *ex post* is extremely difficult. Since in European countries hospitals typically compete for patients by quality rather than price, this observation is particularly relevant there. Even in the US, where research on health care quality has become increasingly more sophisticated than in Europe, quality issues have not had a major impact on competition law and policy because of its complexity and judicial scepticism (Hyman, 2004). In hospital markets with quality competition post-merger antitrust enforcement is therefore not likely to offer an effective safety net. Hence, it is better for antitrust enforcement agencies to be too restrictive when assessing proposed hospital mergers rather than too permissive. In addition to the potential welfare costs, being too permissive also prevents the development of industry-specific jurisprudence – as the situation in the Netherlands clearly illustrates. Without a deeper understanding of how courts tend to deal with the unique attributes of hospital markets, information about the evidence required to prevail in court is lacking. This may seriously hamper the effectiveness of antitrust enforcement in future hospital merger cases. To ensure hospital markets work efficiently, antitrust enforcement agencies should thus be willing to litigate hospital mergers aggressively and to take the risk of losing a substantial proportion of the cases initiated.

References

Abraham, J.M., M. Gaynor and W.B. Vogt (2007), 'Entry and competition in local hospital markets', *Journal of Industrial Economics*, 55(2): 265-288

Bangard, A. (2007), 'Krankenhausfusionskontrolle' ('Hospital merger control'), *Zeitschrift für Wettbewerbsrecht* ('Journal of Competition Law'), 2: 183-238

Badtke, F. (2008), *Die Anwendbarkeit der deutschen und europäischen Fusionskontrolle auf Zusammenschlüsse von Krankenhäusern* ('The applicability of German and European merger control to hospital mergers'), dissertation, Humboldt-Universität, Berlin

BGH (2008), *Beschluss KVR26/07 – Kreiskrankenhaus Bad Neustadt*, Bundesgerichtshof, Bonn

BKA (2005a), *Beschluss B10-123/04 – Rhön-Klinikum AG – Landkreis Rhön-Grabfeld*, Bundeskartellamt, Bonn

BKA (2005b), *Beschluss B10-109/04 – Rhön-Klinikum AG – Krankenhaus Eisenhüttenstadt GmbH – Stadt Eisenhüttenstadt*, Bundeskartellamt, Bonn

Campbell, T. (2007), 'Defending hospital mergers after the FTC's unorthodox challenge to the Evanston Northwestern – Highland Park transaction', *Annals of Health Law*, 16(2): 213-239

Capps, C.S., D. Dranove, S. Greenstein and M. Satterthwaite (2002), 'Antitrust policy and hospital mergers: recommendations for a new approach', *Antitrust Bulletin*, 47(4): 677-714

Carlton, D.W. (2007), 'Does antitrust need to be modernized?', *Journal of Economic Perspectives*, 21(3): 155-176

CC (2000), *BUPA/Community Hospitals Group: a report on the proposed merger*, UK Competition Commission, London

Conners, J.R. (2003), 'A critical misdiagnosis: how courts underestimate the anticompetitive implications of hospital mergers', *California Law Review*, 91: 543-578

Cutler, D.M. (2002), 'Equality, efficiency, and market fundamentals: the dynamics of international medical-care reform', *Journal of Economic Literature*, 40(3): 881-906

Danger, K.L. and H.E. Frech (2001), 'Critical thinking about "critical loss" in antitrust', *Antitrust Bulletin*, 46(2): 339-355

DOJ and FTC (1996), *Statements of health care antitrust enforcement policy*, US Department of Justice and The Federal Trade Commission, Washington DC

DOJ and FTC (2004), *Improving health care: a dose of competition*, US Department of Justice and The Federal Trade Commission, Washington DC

Dranove, D. and R. Lindrooth (2004), 'Hospital consolidation and costs: another look at the evidence', *Journal of Health Economics*, 22(6): 983-997

EC (2004a), *Merger Regulation*, European Commission, Brussels

EC (2004b), *Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings*, European Commission, Brussels

EC (2007), *Case No COMP/M.4367 – APW / APSA / Nordic Capital / Capio*, European Commission, Brussels

FTC and DOJ (1992), *Horizontal merger guidelines*, The Federal Trade Commission and US Department of Justice, Washington DC

FTC (2004), *In the matter of Evanston Northwestern Healthcare Corporation: complaint*, The Federal Trade Commission, Docket No. 9315, Washington DC

FTC (2005), *In the matter of Evanston Northwestern Healthcare Corporation: initial decision*, The Federal Trade Commission, Docket No. 9315, Washington DC.

FTC (2007a), *In the matter of Evanston Northwestern Healthcare Corporation: opinion of the Commission*, The Federal Trade Commission, Docket No. 9315, Washington DC

FTC (2007b) *In the matter of Evanston Northwestern Healthcare Corporation: brief amicus curiae of economics professors*, The Federal Trade Commission, Docket No. 9315, Washington DC

FTC (2008a), *FTC and Virginia Attorney General seek to block Inova Health System Foundation's acquisition of Prince William Health System*, The Federal Trade Commission, press release, Washington DC

FTC (2008b), *In the matter of Inova Health System Foundation and Prince William Health System: complaint*, The Federal Trade Commission, Docket No. 9326, Washington DC

FTC (2008c), *Statement of FTC's Bureau of Competition regarding Inova Health System's announced withdrawal of plans to merge with Prince William Health System*, The Federal Trade Commission, press release, Washington DC

FTC (2008d), *In the matter of Evanston Northwestern Healthcare Corporation: opinion of the Commission on remedy*, The Federal Trade Commission, Docket No. 9315, Washington DC

Gaynor, M. and D. Haas-Wilson (1999), 'Change, consolidation, and competition in health care markets', *Journal of Economic Perspectives*, 13(1): 141-164

Gaynor, M. and W.B. Vogt (2000), 'Antitrust and competition in health care markets', in A.J. Cuyler and J.P. Newhouse (eds.), *Handbook of Health Economics*, volume I: 1405–1487, Amsterdam: Elsevier Science

Greaney, T.L. (2002), 'Whither antitrust? The uncertain future of competition law in health care', *Health Affairs*, 21(2): 185-196

Haas-Wilson, D. and C. Garmon (2009), *Two hospital mergers on Chicago's north shore: a retrospective study*, FTC Bureau of Economics Working Paper No. 294, The Federal Trade Commission, Washington DC

Harris, B.C. and D.A. Argue (2006), 'FTC v. Evanston Northwestern: a change from traditional hospital merger analysis?', *Antitrust*, Spring: 34-40

Helderman, J-K, F.T. Schut, T.E.D. van der Grinten and W.P.M.M. van de Ven (2005), 'Market-oriented health care reforms and policy learning in the Netherlands', *Journal of Health Politics, Policy and Law*, 30(1-2): 189-209

Heyer, K. (2006), 'Welfare standards and merger analysis: why not the best?', *Competition Policy International*, 2(2): 29-54

Ho, V., R.J. Town and M.J. Heslin (2007), 'Regionalization versus competition in complex cancer surgery', *Health Economics, Policy and Law*, 2(1): 51-71

Hyman, D.A. (2004), 'Five reasons why health care quality research hasn't affected competition law and policy', *International Journal of Health Care Finance and Economics*, 4(2): 159-166

Inova (2008), *Statement from Inova Health System and Prince William Health System about the proposed merger*, press release, Inova Health System, Falls Church (VA)

Kallfass, H.H. and B.A. Kuchinke (2006), *Die räumliche Marktabgrenzung bei Zusammenschlüssen von Krankenhäusern in den USA und in Deutschland: eine wettbewerbsökonomische Analyse* ('Geographic market definition in hospital merger cases in the United States and in Germany: an antitrust analysis'), Diskussionspapier Nr. 52, Institut für Volkswirtschaftslehre, Technische Universität Ilmenau

Kjekshus, L. and T. Hagen (2007), 'Do hospital mergers increase hospital efficiency? Evidence from a National Health Service country', *Journal of Health Services Research and Policy*, 12(4): 230-235

Lévêque, F. (2006), 'Antitrust enforcement in the electricity and gas industries: problems and solutions for the EU', *The Electricity Journal*, 19(5): 27-34

Motta, M. (2004), *Competition policy: theory and practice*, Cambridge: Cambridge University Press

NMa (2004a), *Visiedocument ziekenhuiszorg* ('Position document hospital care'), Nederlandse Mededingingsautoriteit, Den Haag

NMa (2004b), *Besluit betreffende zaak 3897 / Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord: meldingsfase*, Nederlandse Mededingingsautoriteit, Den Haag

NMa (2005), *Besluit betreffende zaak 3897 / Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord: vergunningfase*, Nederlandse Mededingingsautoriteit, Den Haag (English translation available at www.nmanet.nl/engels/home/Decisions/2005/3897BVC_engels.asp)

NMa (2007), *Richtsnoeren voor de zorgsector* ('Guidelines for the health care industry'), Nederlandse Mededingingsautoriteit, Den Haag

NMa (2009), *NMa imposes strict conditions on hospital merger*, press release, The Hague

OGD (2007), *Beschluss VI-Kart 6/05 (V)*, Oberlandesgericht Düsseldorf, Düsseldorf

Pittman, R. (2007), 'Consumer surplus as the appropriate standard for antitrust enforcement', *Competition Policy International*, 3(2): 205-224

Richman, B.D. (2007), 'Antitrust and nonprofit hospital mergers: a return to basics', *University of Pennsylvania Law Review*, 156: 121-150

Schut, F.T. and W.P.M.M. van de Ven (2005), 'Rationing and competition in the Dutch health-care system', *Health Economics*, 14(S1): S59–S74

Schulten, T. (2006), *Liberalisation, privatisation and regulation in the German healthcare sector/hospitals*, Wirtschafts- und Sozialwissenschaftliches Institut (WSI), Hans-Böckler-Stiftung, Düsseldorf

Stock, S.A.K., M. Redaelli and K.W. Lauterbach (2007), 'Disease management and health care reforms in Germany: does more competition lead to less solidarity?', *Health Policy*, 80(1): 86-96

Simpson, J. (2003), 'Geographic markets in hospital mergers: a case study', *International Journal of the Economics of Business*, 10(3): 291–303

Town, R., D. Wholey, R. Feldman and L.R. Burns (2006), *The welfare consequences of hospital mergers*, NBER Working Paper 12244, National Bureau of Economic Research, Cambridge (MA)

Van de Ven, W.P.M.M. and F.T. Schut (2008), 'Universal mandatory health insurance in the Netherlands: a model for the United States?', *Health Affairs* 27(3): 771-781

Varkevisser, M., C.S. Capps and F.T. Schut (2008), 'Defining hospital markets for antitrust enforcement: new approaches and their applicability to the Netherlands', *Health Economics, Policy and Law*, 3(1): 7-29

Varkevisser, M., S.A. van der Geest and F.T. Schut (2009, forthcoming), 'Assessing hospital competition when prices don't matter to patients: the use of time-elasticities', *International Journal of Health Care Finance and Economics*, DOI: 10.1007/s10754-009-9070-6

Vita, M.G. and S. Sacher (2001), 'The competitive effects of not-for-profit hospital mergers: a case study', *Journal of Industrial Economics*, 49(1): 63-84

Vogt, W.B. and R. Town (2006), *How has hospital consolidation affected the price and quality of hospital care?*, Research Synthesis Report No. 9, Robert Wood Johnson Foundation, Princeton (NJ)

Chapter 3

Defining hospital markets for antitrust enforcement: new approaches and their applicability to the Netherlands

M. Varkevisser, C.S. Capps and F.T. Schut

Health Economics, Policy and Law, 2008, 3(1): 7-29

Abstract

Effective antitrust enforcement is of crucial importance for countries with a market-based health care system in which hospitals are expected to compete. Assessing hospital market power – a central issue to competition policy – is, however, complicated because the presence of third party payers and the general unobservability of prices make it difficult to apply the standard methods of market definition. Alternative, less formal methods historically employed in the hospital industry have proven inaccurate. These methods were even called inapplicable in a recent US court decision. In this paper we discuss the strengths and weaknesses of several new approaches to defining hospital markets that are suggested in recent economic literature. In particular we discuss the applicability of the time-elasticity approach, competitor share approach, and option demand approach to the recently partly deregulated Dutch hospital market. We conclude that the appropriate approach depends crucially on how health insurers contract with hospitals and how patients select their hospital.

3.1 Introduction

Market-based health care reforms can only be successful when competition is protected by effective antitrust enforcement. A central issue in antitrust enforcement is measuring market power, which typically requires first defining the product and geographic markets. Though appropriate market definition is a challenging issue in any industry, this is particularly so in the hospital sector. Since hospital prices (both those negotiated by health insurers and those faced by patients) are generally not observed, the standard SSNIP test for defining markets is difficult to implement here.[1] Unfortunately, traditional alternative methods for defining hospital markets have proven inaccurate. Courts' acceptance of those methods, and the large geographic markets they implied, played a significant role in the series of unsuccessful efforts by the antitrust enforcement agencies in the United States to block hospital mergers. Between 1994 and 1999 US antitrust enforcement agencies lost six out of seven consecutive hospital merger cases because the courts accepted the defendants' overly broad market definition (Gaynor and Vogt, 2000). Only recently, in a case involving *ex post* examination of a consummated hospital merger has a set of merging hospitals failed to prevail in court. In that case, won by the US Federal Trade Commission (FTC), the presiding administrative law judge called the methods traditionally applied to defining hospital markets "inapplicable" (FTC, 2005, p.30). This clearly illustrates that antitrust enforcement agencies, both in the US and Europe, are in need of new approaches for hospital market definition.

The aim of this paper is to discuss in general the strengths and weaknesses of several new approaches to hospital market definition that are suggested in recent economic literature and in particular their applicability to (deregulated) Dutch hospital markets. The remainder of the paper is organised as follows. In Section 3.2 we briefly discuss defining hospital product markets. Section 3.3 summarises the most important shortcomings of the two approaches traditionally used for defining geographic hospital markets: the Elzinga/Hogarty approach and critical loss analysis. The methodological pros and cons of three new approaches to hospital market definition are discussed in detail in Section 3.4: the time-elasticity approach, the competitor share approach, and the option demand approach. Section 3.5 focuses on how to define hospital markets in the Netherlands. The paper ends with some concluding remarks in Section 3.6.

1 The Small but Significant Non-transitory Increase in Price (SSNIP) test begins by positing a narrowly defined market and asking whether a hypothetical monopolist of all firms and products in the posited market could profitably implement a small but significant non-transitory increase in price. If the hypothetical monopolist cannot do so, then the proposed market must be defined so narrowly as to exclude a close substitute. Thus the market definition should be expanded to include the next closest competitor or product. The process is repeated until the SSNIP question is answered affirmative.

3.2 Hospital product market definition

Assessing market power typically involves two steps: definition of the product market and definition of the geographic market. The first has not been nearly as contentious as the latter. In US hospital merger cases, the product market has typically been defined as a "broad group of medical and surgical diagnostic and treatment services for acute medical conditions where the patient must remain in a health care facility for at least 24 hours for recovery or observation" (DOJ and FTC, 2004). In a recent case, the FTC added the phrase "sold to managed care organizations" to this traditional, aggregate product market (FTC, 2005, p.27). This addition emphasises that in the US, hospital prices are determined during negotiations over network participation and composition between insurers and hospitals.

Despite the general lack of debate over the relevant product market, Zwanziger et al. (1994) recommend an alternative, disaggregated approach that attempts to capture the fact that inpatient care is differentiated. The key issues in their approach are (i) the extent to which treatments of two different diseases can be performed with the same personnel and equipment, and (ii) the cost for a hospital to convert from providing one service to another. Since many hospital services do not require highly specialised equipment and/or training, they argue that entry into most disease-specific markets is low cost. For many such markets, a hospital needs only add a physician in the appropriate specialty to its staff, along with a modest amount of equipment suitable to that specialty. They therefore suggest treating the physician as the key input into hospital care, and cluster Diagnosis Related Groups (DRGs) into service categories based on the least specialised physician capable of treating that disease. Their initial attempt to define such product markets resulted in 48 service categories, applicable to each local area, and subdivided into primary, secondary, and tertiary categories. Based on their mix of patients, each hospital can then be classified as a primary, secondary or tertiary hospital. According to Zwanziger et al. (1994, p.439), this provides a method of "bridging the disaggregate services categories developed by health services researchers and hospital administrators and the overly aggregate one used in most antitrust cases." Based on an examination of two hospital markets in the state of California (San Luis Obispo and Sacramento), Sacher and Sylvia (1998) conclude that even a very limited disaggregation of the standard inpatient acute care cluster indeed can provide a fuller understanding of hospital competition. Nevertheless, the precise effect of the level of aggregation on the outcomes of antitrust analyses is unclear.

3.3 Traditional approaches to defining geographic markets

Due to the difficulty of implementing the SSNIP test in hospital markets, geographic market definition has historically relied heavily upon two alternative, less formal approaches: the Elzinga/Hogarty approach and critical loss analysis.

3.3.1 Elzinga/Hogarty approach

In many US hospital merger cases, courts relied on patient flow data to define geographic markets, using the method introduced by Elzinga and Hogarty (1973). This method is easy to apply and only requires commonly available discharge data. It begins with a narrowly defined market and then expands the boundary until threshold conditions are met for both imports ("little in from outside" = LIFO) and exports ("little out from inside" = LOFI) of hospital services:

$$\text{(3.1)} \qquad \text{LIFO} = 1 - \frac{\text{patient outflows}}{\text{patients living in area}}$$

$$\text{(3.2)} \qquad \text{LOFI} = 1 - \frac{\text{patient inflows}}{\text{patients treated in area}}$$

In various court cases, the analysis focused on identifying geographic areas such that both statistics are either above 75%, or above 95% (Gaynor and Vogt, 2000).

Overstatement and understatement

As detailed by Werden (1989), the Elzinga/Hogarty (E/H) approach suffers from serious methodological shortcomings. As a theoretical matter, use of the LOFI and LIFO criteria could either overstate or understate the true size of geographic hospital markets. Overstatement occurs when hospitals in two areas sell horizontally differentiated products, which induces travel for specific (e.g. tertiary) services between those areas. Although hospital care is in fact highly differentiated by location and other dimensions, the E/H approach would incorrectly conclude that both hospitals are in the same market. In contrast, the E/H approach will understate true market size when hospitals in two different areas are very close substitutes so that there are no patient flows between them. The E/H approach would then incorrectly indicate that the two hospitals are not in the same market. Though use of the E/H approach theoretically may lead to geographic markets that are too small or too broad, empirical evidence indicates that using patient flow data for market definition in practice leads to overly broad hospital markets (e.g. Simpson, 2003).

The silent majority fallacy

Capps et al. (2001, 2002) argue that the central problem underlying the E/H approach is what they label the "silent majority fallacy": the presence of a set of travellers does not necessarily discipline hospitals from exercising market power over the silent majority of non-travelling patients. Said another way, in markets with heterogeneous tastes for different services, the presence of some travellers with one set of needs does not necessarily restrain the pricing of services to non-travelling patients with different needs. Suppose that 30% of all patients in an area travel significant distances to receive care; this does not in any way indicate that the remaining 70% would be willing to similarly travel in response to a price increase – the assumption implicit in using the E/H approach. Hence, price increases are certainly feasible even in the presence of significant patient outflows. Additionally, the use of flow data is even more questionable in a managed care setting where patients select their insurers *ex ante*, before they fully learn their medical needs. *Ex post*, some patients will experience conditions for which they are willing to travel – and actually do travel – a great distance to receive care. This, however, in no way indicates that at the time of choosing their health insurance they did not place a high value on having one or more local hospitals in their provider network. That is, patient flows observed *ex post* cannot be directly translated into insurers' *ex ante* bargaining power.

Applicability to antitrust enforcement

Given the shortcomings mentioned above, it is not surprising that the US Department of Justice and the US Federal Trade Commission concluded that "[t]o date, the Agencies' experience and research indicate that the Elzinga-Hogarty test is not valid or reliable in defining geographic markets in hospital merger cases" (DOJ and FTC, 2004, p.26). As already mentioned in the introduction, in a more recent court decision the presiding administrative law judge even concluded that patient flow data and the E/H approach are "inapplicable" to geographic market definition for a differentiated product such as hospital services (FTC, 2005, p.30).[2] One might argue that the use of patient flow data would be less problematic when disaggregated clusters of hospital services that are close substitutes are analysed instead of one aggregate cluster of general acute care inpatient hospital services (Section 3.2). This, however, would only solve part of the problem since it incorrectly assumes that the only reason the "silent majority fallacy" exists is that patients' propensity to travel differs across types of hospital care. There are,

[2] In an administrative opinion following the respondent's appeal, the Commission agreed with this initial decision (FTC, 2007, p.77/78): "We should view patient flow data with a high degree of caution (…) and, at best, we should use it as one potentially very rough benchmark in the context of evaluating other types of evidence."

however, numerous other reasons why the propensity to travel differs among patients (e.g. unobserved personal preferences). Additionally, selecting a non-arbitrary way to aggregate the results of disaggregated, service-level E/H analyses would also be problematic.

3.3.2 Critical loss analysis

Critical loss (CL) analysis, introduced by Harris and Simons (1989), is another widely used technique for defining geographic hospital markets. Applying the CL approach to a proposed hospital market involves three steps. The first step is to compute the hospitals' contribution margins, defined as price minus average variable costs. In the second step, the contribution margin is used to identify the percentage of patients the hospitals could lose before a small price increase – 5% is typically used – becomes unprofitable: this is the "critical loss." The final step is to analyse whether the actual loss of patients would exceed the critical loss if all hospitals in the proposed market implemented a small but significant non-transitory increase in price (SSNIP). If so, then the SSNIP would be unprofitable, indicating that the hypothetical geographic market is too narrow and should be expanded to include more hospitals. The expected actual loss of patients is most commonly assessed using the concept of "contestable zip codes". That is, it is assumed that all patients currently choosing one of the hospitals within the proposed market but living in area where many other patients (e.g. 50%) select hospitals outside the proposed market would switch to those outside hospitals in response to a price increase. Under this assumption CL analysis suffers from exactly the same "silent majority fallacy" as the E/H approach.

"Cellophane fallacy"

Using CL to define geographic hospital markets has been widely criticised in the economic literature for several reasons (e.g. Langenfeld and Li, 2001; Katz and Shapiro, 2003; O'Brien and Wickelgren, 2004). Danger and Frech (2001) detail what is perhaps the most important methodological shortcoming of CL analysis: market definition via the CL approach is highly sensitive to the initial degree of market power. If price is already at the monopoly level, then any further increase in price will by definition result in lower profits. The expected loss is then necessarily greater than the critical loss for any price increase, since the latter is zero. In such a situation CL analysis would incorrectly lead to an overly broad market. This problem is a variation of the well-known "cellophane fallacy" where reduction of aggregate market demand or replacement with inferior substitutes induced by monopoly prices is confused with substitution that would preclude monopoly pricing.[3]

Applicability to antitrust enforcement

Overall, the pros of applying the CL approach are that it is relatively easy to use and intuitively appealing. The most important cons are that it is only easy to do incorrectly and that the intuition underlying the CL approach is internally inconsistent and may generate false conclusions. Since the cons may well outweigh the pros, "the limitations and difficulties of conducting a proper critical loss analysis should be fully considered if this method is used to define a hospital geographic market" (DOJ and FTC, 2004, p.26).

3.4 New approaches to defining geographic hospital markets

In recent years, US economists have proposed several new approaches to defining geographic hospital markets. This section discusses the methodological strengths and weaknesses of the time-elasticity approach (Capps et al., 2001; 2002), the competitor share approach (Capps et al., 2001; 2002), and the option demand approach (Capps et al., 2003). Since hospital markets in the Netherlands – and in other European countries as well – substantially differ from those in the US, the applicability of these approaches to Dutch hospital markets is analysed separately in Section 3.5.

3.4.1 Time-elasticity approach

Like all the new approaches to hospital market definition, the time-elasticity approach is an attempt to indirectly estimate the demand elasticity faced by hospitals. When hospital prices are not observed directly or when possible price differences across hospitals are irrelevant to patients, non-monetary factors such as travel time are likely to function as "prices" (Acton, 1975).

The key questions underlying geographic market definition – and merger analysis as its primary application – are the degree of substitutability among (i) the merging hospitals, (ii) the merging hospitals and other hospitals in the hypothetical market, and (iii) hospitals inside and hospitals outside of this market. Ideally one would like to identify the hospital and group level price elasticities of demand to answer each of these questions. The same questions, however, can also be answered, at least qualitatively, by using

[3] The theoretically correct test should not ask whether a hypothetical monopolist could increase prices relative to current prices, but rather relative to competitive prices (Motta, 2004, p.105). Of course, since these prices are typically not observed this is rather complicated.

time-elasticities. Within a logit demand framework the probability that patient *i* chooses hospital *j* is estimated using (i) patient *i*'s characteristics, (ii) hospital *j*'s attributes, and (iii) characteristics specific to the combination of patient *i* and hospital *j*, specifically travel time. To solve the "silent majority fallacy", or at least greatly reduce its impact, this approach focuses explicitly on the substitutability of hospitals taking both patient heterogeneity and hospital differentiation into account.

Parameter estimates from a patient choice model are used to simulate the effects of artificially raising travel time from every patient to a particular hospital by a certain percentage (e.g. 5%), holding all other hospital attributes constant. To assess a merger, the effects of increasing travel time to a pair of hospitals simultaneously are compared to the effects of increasing travel time to each hospital individually. If the time-elasticity under jointly increased travel times is much lower than under individual travel time increases, then the hospitals are close substitutes and thus more likely to have market power post-merger. Under the simplifying assumption that consumers are willing to trade time for money at a constant rate,[4] price elasticities are directly proportional to time elasticities.[5] In conjunction with the inverse-elasticity pricing rule, this implies that margin increases resulting from a merger are directly proportional to reductions in time-elasticity under joint travel time increases vis-à-vis unilateral travel time increases. Table 3.1 illustrates how time elasticities can be used to define geographic hospital markets in merger cases. The same methodology is readily adapted to defining geographic markets in non-merger cases. Market definition then requires identifying the smallest set of hospitals such that a simultaneous travel time increase to all hospitals in the set would lead to relatively little substitution to outside hospitals.

Although the assumption of direct proportionality between price and time elasticities underlying the time-elasticity approach is quite strong and has to be tested empirically (e.g. by stated preference research), the approach could definitely serve a useful role in assessing hospital market power. Particularly for hospital markets where patients do not face any monetary prices or where information on actual hospital prices is not readily available. Even when time elasticities would not be directly proportional to price elasticities, it is reasonable to assume that patients are willing to trade travel time for money at an unknown (and possibly non-linear) rate. Therefore estimated time elasticities are at least indicative of hospitals' market power.

[4] That is, if patients are willing to travel five more minutes to save €50, then they are willing to travel ten more minutes to save €100.

[5] If utility is linear in both time and income then there is a linear relationship between price elasticities and time elasticities. See Appendix 1 of Capps et al. (2001) for the mathematical proof of this lemma.

Table 3.1: Using time elasticities to define geographic hospital markets

Scenario	Relevant question	Answers from empirical simulation	
Artificially raise travel time to hospital *j*	Many patients switch to hospital *k*?	Yes	Yes
Artificially raise travel time to hospital *k*	Many patients switch to hospital *j*?	Yes	Yes
Artificially raise travel time to hospital *j* and *k* simultaneously	Almost all patients stay with hospital *j* or *k*?	**Yes**	**No**
	Conclusion:	Hospitals *j* and *k* are close substitutes and there are no other competitors in the relevant market. Hence, a merger between these two hospitals is likely to be anticompetitive.	Hospitals *j* and *k* are close substitutes, but there are also other competitors in the relevant market. Hence, a merger between these two hospitals is not likely to be anticompetitive.

3.4.2 Competitor share approach

The competitor share (CS) approach focuses on the degree of overlap in the type of patients hospitals treat. By definition this approach uses a less aggregated hospital product market definition than commonly applied in hospital merger cases (Section 3.2). In contrast to the conceptually similar but reduced form disaggregated approach of Zwanziger et al. (1994),[6] the CS approach does have a theoretical underpinning: it builds up from the notion that hospital prices are a function of the underlying service-level demand elasticities. It uses a logit demand framework to derive an exact expression for a hospital's price elasticity, which can be rewritten as a function of other hospitals' market shares competing for the same patients.[7] This implies that the increase in price two hospitals can obtain by merging (or colluding) depends on the degree of overlap in patients. Consider the extreme example of a market with three hospitals, each admitting the same number of patients. Further, suppose there are only two types of hospital care patients could need: service 1 or service 2. Under these hypothetical circumstances the anticompetitive effect of a merger between any two hospitals will depend not on their aggregate market shares (33.3% each), but rather on their market shares in the submarkets 1 and 2 as well as the relative sizes of each submarket. The merger would not be anticompetitive if one hospital treats only type 1 conditions and the other only type 2. Alternatively, if the merging hospitals only overlap in type 1 patients but such patients are rare, then the aggregate price effects of a merger may also be negligible. As there are many services in hospital markets, the empirical challenge is to quantify

---

[6] Implementations include Keeler et al. (1999), Dranove and Ludwick (1999), and Capps and Dranove (2004).

[7] The mathematical details of the CS approach are in Capps et al. (2001).

the extent of submarket overlap between a pair of hospitals and then map that into predicted merger effects.

To implement this, each hospital is modelled as setting a different price for each possible submarket – defined as an insurer-hospital service pair. To assess the likely effects of a merger, the difference in demand elasticity two hospitals face when pricing jointly instead of unilaterally is calculated. In general, the elasticity reduction under joint pricing, and therefore the expected price increase, will be greater as the overlap between two hospitals in the various submarkets is greater. This methodology is also readily applicable to defining geographic markets in non-merger cases. Market definition then requires identifying the smallest set of hospitals such that a hypothetical joint price increase would lead to relatively little substitution to outside hospitals.

An important drawback of the CS approach is that it assumes hospitals charge insurers or their patients a different price for each hospital service. In the US and many other countries this assumption is only partially accurate since hospitals are commonly paid by per diem rates or case rates, rather than fee for service.[8]

3.4.3 Option demand approach

Whereas both the time-elasticity approach and competitor share approach assume that patients select their hospitals when they need care, in a managed care setting patients commit to a potentially restricted network of hospitals prior to knowing their medical needs fully. The option demand (OD) approach was developed specifically to model markets in which managed care organisations (MCOs) contract with hospitals.[9]

Willingness-to-pay

The objective of the OD approach is to calculate each consumer's *ex ante* willingness-to-pay (WTP) for inclusion of a particular hospital in an MCO's network. This is his WTP for a particular hospital at the beginning of the year when he selects his MCO, but prior to falling ill and requiring hospital care. Consumer *i*'s interim WTP (i.e. after knowing his health status but before evaluating hospital alternatives) for the option to select

---

[8] Hospitals reimbursed under a per diem system typically charge a single daily rate for general medical/surgical admissions, a higher rate for intensive care unit days, and perhaps a small number of additional daily rates for other classes of services. Under a case rate system, reimbursement varies with the patient's diagnosis (as measured by the patient's Diagnosis Related Group, or DRG), but the payment is prospective and does not vary with the services actually rendered. Only fee for service reimbursement matches the assumption that patients or their insurers pay a different price for each hospital service.

[9] The mathematical details of applying the OD approach to hospitals markets are in Capps et al. (2003). A similar approach is also described in Town and Vistnes (2001).

hospital *j* from an MCO's network G is computed as his decrease in expected interim utility (V^{IU}) when that hospital is removed from the network:

(3.3) $\Delta V^{IU}_{j} = V^{IU}(G) - V^{IU}(G/j)$

where (G/*j*) denotes network G with hospital *j* excluded. Converting this difference to monetary terms gives the consumer's interim WTP (i.e. his WTP conditional upon knowing his illness) to retain that hospital as a feasible option. Each consumer's *ex ante* WTP to include hospital *j* in the network is constructed as the sum over all possible conditions of the product of (i) his interim WTP for that hospital conditional upon a particular diagnosis, and (ii) the probability that, given his demographics and location, he will draw that particular diagnosis during the coming year. The population's WTP to include hospital *j* in the network is obtained by summing the *ex ante* WTP for all individual consumers.

The OD model uses the empirical joint density of the demographics, clinical indications, and locations to determine each patient's distribution of clinical states conditional on his socio-economic characteristics and the geographical location of his home. Though necessary from an empirical perspective, this assumption may be questionable for two reasons. First, from the risk adjustment literature it follows that patient *i*'s probability of requiring hospitalisation in the year to come cannot be predicted accurately by using only his demographics and location (Van de Ven and Ellis, 2000). Second, the assumption itself that each patient is able to *ex ante* predict his probability of being sufficiently ill during the next year to require hospitalisation seems quite strong.

Bargaining power and hospital profits

In deregulated hospital markets MCOs negotiate with hospitals over prices. Consumers make their choice among competing health plans on the basis of insurance premiums and the value each MCO's network provides to them. The potential gain hospital *j* and an MCO can obtain and split is the difference between consumers' *ex ante* WTP for inclusion of hospital *j* and the additional costs or benefits its inclusion causes:

(3.4) $\Delta WTP^{EA}_{j}(G) - \Delta C_{j}(G)$

The proportion of this surplus hospital *j* captures depends on the relative bargaining power of the hospital and the MCO. For example, a favourable location and/or other favourable characteristics give hospitals leverage against an MCO's attempts to negotiate a low price. Although restrictive, Capps et al. (2003) assume that each hospital captures the fixed proportion α of this gain.[10] Since economically rational hospitals will only accept an MCO's contract if its price at least covers variable costs, the contribution hospital *j* earns towards fixed costs and profit from the managed care segment of its business is

$$\pi_j = \alpha[\Delta WTP^{EA}_j(G) - \Delta C_j(G)] + u_j \quad (3.5)$$

where π_j denotes a hospital's incremental contribution above variable costs.

If consumers' WTP is indeed an appropriate measure of hospitals' market power, then it should be strongly positively correlated with profits. Capps et al. (2003) validated this hypothesis. First, they estimated a logit patient choice model to recover the parameters of the utility function. Second, they used the estimated parameters to construct estimates of the probability that patient *i* chooses hospital *j*, which in turn are used to calculate consumers' aggregate WTP for a hospital. Third, they regressed profits from managed care patients on WTP in order to estimate the parameter α that translates WTP into profits.

Geographic market definition

The WTP measure obtained by estimation of the OD-model can be used to predict how prices will change if two or more hospitals would act as a single entity, holding costs constant. In managed care markets, (merged) hospitals may increase their prices by coordinating their decision to join an MCO. Intuitively, hospitals will do much "better" when acting jointly if their simultaneous withdrawal imposes a much larger decrease in consumers' WTP for an MCO's network than either could impose unilaterally. Using the WTP measure of market power for antitrust geographic market definition requires two steps.

The first step is to estimate the increase in profit that hospitals can obtain by acting as a single entity. A set of hospitals' joint WTP is likely to be large when they are close substitutes and consumers do not have an alternative closely substitutable hospital. Under such circumstances hospitals *j* and *k*'s joint WTP may greatly exceed the sum of their individual WTPs because losing access to both *j* and *k* is then far worse than losing access to either *j* or *k* alone. The formula for estimating the profit effect of a merger between two hospitals is

$$\Delta\pi_{j+k} = \alpha[\Delta WTP^{EA}_{j+k}(G) - \Delta WTP^{EA}_j(G) - \Delta WTP^{EA}_k(G)] \quad (3.6)$$

[10] It is possible to incorporate more sophisticated bargaining models, such as the model of intra-firm bargaining in Stole and Zwiebel (1996).

where α is the coefficient on WTP estimated by regressing hospital profits on consumers' WTP. The additional leverage two hospitals obtain by working together is the difference between their joint WTP and the sum of their individual WTPs. Because consumers' *ex ante* utility (weakly) increases when they have more options for their hospital care this difference is, by definition, equal to or greater than zero.[11] This difference will be smaller when hospitals *j* and *k* are not closely substitutable while other hospitals are, and vice-versa.

The second step in defining the geographic market is to estimate the associated change in prices. Following the SSNIP guidelines, this exercise is conducted under the assumption that the merger does not affect costs.[12] As the SSNIP question is generally formulated in terms of prices rather than profits, the expected percentage increase in profits derived from the OD model is translated into an expected percentage increase in price by assuming quantity is unchanged. This price change reflects the increase in average revenue necessary to generate the predicted increase in profits, under the assumption that (i) the number of patients and (ii) the average cost at each hospital do not change as a result of the merger. In their original paper, Capps et al. (2003) simply regressed hospital profits on consumers' *ex ante* WTP to estimate the dollar value of additional units of WTP. For example, if each unit of WTP is worth an additional €5,000 in profit and for a merger of hospitals *j* and *k* ΔWTP^{EA}_{j+k} is estimated to be 2,500 then the merger would increase joint profits by €12.5 million. This additional profit would come about due to higher prices at hospitals *j* and *k*. Because most patients' marginal payment does not depend on which contracted hospital they choose, higher hospital prices charged to third party payers will not affect patients' hospital choice decisions. This implies that a price increase should not affect quantity. Given this, the effect of a merger on average revenue is computed by dividing the revenue change by the combined number of admissions. Table 3.2 illustrates this.

Using the OD approach for geographic market definition in merger and non-merger cases is straightforward: identify the smallest set of competitors such that the implied increase in profits should these hospitals set prices jointly exceeds some threshold (e.g. 5%).

[11] Although the WTP to pay for a particular hospital is weakly decreasing in the size of the network, assuming free disposal, patients would never pay more for fewer options.

[12] The objective of this exercise is to identify the geographic market, not whether the merger is, on net, beneficial or harmful. The latter question is addressed after the market is defined.

Table 3.2: Using WTP to estimate the effects of a merger (hypothetical example)

Hospital	Admissions	Total revenue	Revenue per admission	Consumers' *ex ante* WTP
Hospital *j*	6,000	€45.0 mln.	€7,500	9,000
Hospital *k*	3,000	€25.0 mln.	€8,333	5,000
j+k, pre-merger	9,000	€70.0 mln.	€7,778	14,000
j+k, post-merger	9,000	€82.5 mln.	€9,167	16,500
Estimated merger effects:				
ΔWTP^{EA}_{j+k}	2,500			
$\Delta REVENUE_{j+k}$	€12.5 mln.	+17.9%		

3.5 How to define relevant hospital markets in the Netherlands?

In the previous sections we discussed the general pros and cons of several new approaches to hospital market definition. Since the current market-based health system reform in the Netherlands calls for effective antitrust enforcement, we now focus on defining markets for Dutch hospitals.

3.5.1 Hospital product markets

As explained in Section 3.2, the appropriate level of hospital service aggregation depends on the extent to which hospitals are able to shift personnel, equipment, and other inputs across service categories. Using this concept of substitution in supply Zwanziger et al. (1994) argue that the physician should be considered as the key input into hospital care. Therefore a key factor for determining the appropriate level of (dis)aggregation of hospital services seems to be the extent to which the hospital management can substitute one type of medical specialist for another.

Contrary to US hospitals, Dutch hospitals have a "closed" medical staff in which the only way a physician can join a hospital's staff is to be accepted by the incumbent medical group and the hospital management.[13] Most Dutch medical specialists are self-employed entrepreneurs organised in partnerships per specialty, which are represented at the

[13] US hospitals typically have an "open" medical staff, which offers the hospital management more opportunities to hire and fire medical specialists. For example, the Federal Trade Commission and the Department of Justice summarised their views on hospitals' discretion over physician privileges as follows (DOJ and FTC, 2004, p.27): "Generally speaking, antitrust law does not limit individual hospitals from unilaterally responding to competition (…) by terminating physician admitting privileges."

hospital level. Though the hospital board has the formal power to admit new physicians, it is largely dependent on the co-operation of the medical specialists (Scholten and Van der Grinten, 2002; 2005). Once accepted, new medical specialists sign an "admission contract" with the hospital. The terms of this contract are based on a uniform model contract, formulated by the national association of medical specialists. Most admission contracts are permanent (valid until the age of 65) and cannot be terminated by the hospital, except for forceful reasons such as malpractice, (mental) illness or loss of license. As a consequence, most Dutch medical specialists have a lifetime affiliation with a single hospital. The rigid admission contracts make it difficult for hospital management to substitute one type of medical specialist for another. The limited possibilities for physician input substitution imply that two Dutch hospitals offering different services cannot readily compete by adjusting their product mix. Thus, in contrast to the US, a more disaggregated approach to hospital product market definition may be appropriate in the Dutch context. This does not imply, however, that each specialty constitutes a separate relevant product market. From an antitrust perspective, medical specialties may be analysed as a group if "there is no compelling reason to believe demand and supply substitution opportunities, entry conditions, or market shares differ significantly" (Baker, 1988, p.138).

Varkevisser et al. (2004) apply this pragmatic approach to non-emergency care in Dutch hospitals. Taking into account each medical specialty's complexity, volume of patients, and potential economies of scale and scope, they identify five different economically homogeneous specialty clusters that could be used for antitrust analysis: (1) medical specialties that are or could be provided by general hospitals as well as specialised health providers such as specialty hospitals and/or stand-alone ambulatory surgery centres, (2) high-volume complex medical specialties, (3) low-volume complex medical specialties, (4) high-volume regular medical specialties, and (5) low-volume regular medical specialties. The results of their analysis are summarised in Table 3.3.

3.5.2 Geographic hospital markets

As discussed in Section 3.4, three new approaches to defining geographic hospital markets are suggested in recent economic literature: the time-elasticity approach, the competitor share approach, and the option demand approach. The assumptions underlying each of these approaches, summarised in Table 3.4, determine their suitability for defining Dutch hospital markets. The two critical factors that determine how well each approach fits with the prevailing market structure are (i) how Dutch health insurers contract with hospitals and (ii) how patients select their hospital.

Table 3.3: Pragmatic approach to economically homogeneous specialty clusters

Complexity?	Regular	Regular	Complex
Feasible in specialty hospitals and/or ambulatory surgery centres?	**Yes**	**No**	**No**
High volume	Cardiology Surgery Dermatology Internal medicine Paediatrics Ophthalmology Orthopaedics Cosmetic surgery	Gastroenterology Gynaecology & obstetrics ENT Urology	Pulmonary medicine Neurology
Low volume		Allergology Dental surgery Nuclear medicine Radiotherapy Rheumatology	Geriatrics Neurosurgery

Source: Varkevisser et al. (2004, p.80)

Table 3.4: Key features of three new approaches to hospital market definition

	Time-elasticity approach	Competitor share approach	Option demand approach
How do hospitals compete?	Patients select their hospital when they actually need care. When selecting their hospital patients do not face monetary prices (or prices do not vary across hospitals).	Patients select their hospitals when they actually need care. When selecting their hospital patients face monetary prices that differ across hospitals.	Patients commit to a network of hospitals before knowing their medical needs fully. Insurers market health plans with (restricted) provider networks.
Crucial assumption(s)?	Since out-of-pocket payments are absent or do not differ across hospitals, actual transaction prices are not relevant for patient hospital choice. Travel time functions as a "price" for quality differences.	Hospitals charge insurers (or their patients) different prices for each hospital service category. Each hospital's price elasticity is therefore a function of its underlying service-level demand elasticities.	Insurers negotiate with hospitals over prices. The financial gain hospitals and insurers can split by bargaining depends on consumers' *ex ante* WTP for inclusion of a particular hospital in their network.
How can this approach be used for geographic market definition?	Time-elasticities are assumed to be (directly proportional) related to price-elasticities. By artificially raising travel time, expected demand responses can be simulated.	The difference in demand elasticity is simulated when hospitals set prices jointly as opposed to unilaterally. This elasticity reduction depends on the hospitals' degree of geographic and service overlap.	Hospitals' joint WTP determines the additional profit they can gain by working together. If hospitals are close substitutes (i.e. strong competitors) then their joint WTP will significantly exceed the sum of individual WTPs.

Insurer-hospital contracting in the Netherlands

In a managed care setting health insurers, rather than individual patients, appear to be the relevant hospital customers from an antitrust perspective. In an environment with managed care and selective contracting, the option demand (OD) approach accurately depicts hospital competition. Despite the (gradual) introduction of managed competition since 2005 in the Netherlands (Schut and Van de Ven, 2005), the OD approach is currently less suitable for defining Dutch hospital markets than it may appear. The new Health Insurance Act allows health insurers to selectively contract with hospitals. So far, however, this option has hardly been used: health insurers do not offer contracts with restricted provider networks. There are several reasons for the absence of selective contracting (Varkevisser et al., 2006). First, health insurers have very limited experience with bargaining and information about differences in quality and efficiency across hospitals is lacking. Second, due to the absence of reliable performance indicators, consumers seem to distrust any contracting policy that restricts their freedom of choice. Third, insurers are only allowed to negotiate prices for a minority of total hospital services.

Using the OD approach's WTP measure for geographic market definition may also be problematic from an empirical perspective since it requires an estimate of the increase in profits that hospitals can obtain by acting as a single entity. To estimate hospitals' monetary value of additional units of consumers' WTP hospital profits are regressed on aggregated WTP. In the Netherlands, however, most hospital care is still price-regulated, and all Dutch hospitals have a not-for-profit status. As a result, any empirical relationship between WTP and profits does not (necessarily) reflect differences in hospitals' attractiveness to either insurers or patients.

Based on the arguments mentioned above, we believe that the OD approach does not accurately depict the current competition in Dutch hospital markets. Except for the likely difficulty obtaining suitable data, however, it could be useful for analysing hospital competition in the deregulated sub-market if insurers begin selectively contracting for these services. If the new Dutch health system evolves such that more prices are actually determined during insurer-hospital negotiations over network participation and composition, then the model of OD will become more appropriate.

Patient hospital choice in the Netherlands

Since patients do not commit to a potentially restricted network of hospitals before knowing their medical needs fully, they select their hospital when they actually need medical care. Both the competitor share (CS) approach and the time-elasticity approach use this assumption. The CS approach further assumes out-of-pocket payments vary by procedure and hospital so that patients are – at least to some extent – price sensitive.

However, almost all Dutch citizens are fully insured for hospital care. Only 5 percent of the population opted for a small voluntary deductible, ranging from €100 to €500. Moreover, for the Dutch formerly privately insured Van Vliet (2004) found that the demand for hospital care is minimally affected by the level of deductible. The CS approach's assumption that hospitals charge different prices for each hospital service category is also inaccurate for the Netherlands. First, most hospital prices are still fixed and therefore not subject to insurer-hospital bargaining at all. Second, in the deregulated part of the hospital market insurers and hospitals usually bargain one uniform discount for all hospital services in question (NZa, 2006). In sum, the CS approach – like the OD approach – does not (yet) depict actual competition among Dutch hospitals and is therefore at present not the most appropriate approach to defining hospital markets.

Since Dutch hospitals compete with each other directly for patients through non-price factors only – such as travel time (i.e. location), hospital waiting time, and (perceived) quality of care – the time-elasticity approach seems at present the appropriate approach to defining hospital markets in the Netherlands. Its application in both merger and non-merger cases is simple in principle: identify the smallest set of hospitals such that a simultaneous and hypothetical travel time increase to all hospitals in the set would lead to relatively little substitution to outside hospitals.[14, 15] The time-elasticity approach, however, does require estimating a patient choice model. Though challenging in any hospital market, this is particularly so in Dutch hospital markets since reliable data on patient characteristics and hospital attributes are not (yet) widely available.[16] The lack of data on observed hospital quality may seriously hamper estimation of a model that correctly predicts patient flows if it is an important determinant of consumer choice (Tay, 2003). Varkevisser and Van der Geest (2007) find that hospital attributes reflecting (perceived) quality significantly affect patients' decisions to visit or bypass the nearest hospital in the Netherlands. Therefore, crucial questions are which quality dimensions patients recognize and how they act upon any differences. More research is definitely needed in this area.

[14] Capps et al. (2002) show that, despite its simplicity, this approach yields results consistent with those of the theoretically more sophisticated CS and OD approach. This is perhaps not surprising, given the common underlying logit demand structure.

[15] Since the approach focuses on travel times that are exogenous to hospitals rather than market determined prices, the well-known "cellophane fallacy" is avoided. That is, the defined market does not include hospitals which only impose an apparent "competitive" constraint due to the fact that current prices at the hospital(s) at investigation are already above competitive levels.

[16] Additionally, Dutch hospitals markets are currently in transition, so that revealed preference data needed to estimate a model of patient choice are not necessarily indicative of future behaviour.

3.5.3 Recent hospital merger cases

Though the Dutch hospital industry was already quite concentrated (Varkevisser et al., 2004) the Netherlands Competition Authority (NMa) from 2004 to 2007 has permitted all hospital mergers that required approval – without providing an exact definition of the relevant market (Table 3.5). Since there was clearly no need for the defendants to challenge the outcomes, there are no Dutch court decisions on hospital market definition.

Table 3.5: Hospital merger cases in the Netherlands 2004-2007[a]

Merging hospitals	Year	Product market(s)	Geographic market	Conclusion
Juliana Kinderziekenhuis/Rode Kruis Ziekenhuis and *Ziekenhuis Leyenburg*	2004	Inpatient and outpatient general hospital care	EH-test: no exact definition	Initial investigation: license is not required
Ziekenhuis Hilversum and *Ziekenhuis Gooi-Noord*	2005	Inpatient and outpatient general hospital care	EH-test, time-elasticity approach, and conjoint analysis: no exact definition	Permitted after a substantive assessment
Erasmus MC and *Havenziekenhuis*	2005	Inpatient and outpatient general hospital care	EH-test: no exact definition	Initial investigation: license is not required
Ziekenhuis Walcheren and *Oosterscheldeziekenhuizen*	2006	Inpatient and outpatient general hospital care	EH-test and patient travel time analysis	Initial investigation: license is required[b]
Laurentius Ziekenhuis and *St. Jans Gasthuis*	2007	Inpatient and outpatient general hospital care	Patient travel time analysis: no exact definition	Initial investigation: license is not required[c]
Samenwerkende Schiedamse en Vlaardingse Ziekenhuizen and *MC Rijnmond Zuid*	2007	Inpatient and outpatient general hospital care	Patient flow data: no exact definition	Initial investigation: license is not required[c]
MC Alkmaar and *Gemini Ziekenhuis*	2007	Inpatient and outpatient general hospital care	Patient travel time analysis: no exact definition	Initial investigation: license is not required

Notes:

a. Prior to 2004 the NMa did not assess hospital mergers since, according to the competition authority, there was no scope for competition among hospitals.

b. During the substantive assessment, the hospitals in 2007 withdrew their application for a license. Following a new application, the NMa in 2009 approved the merger subject to conditions.

c. Though permitted, this merger has not been consummated.

Only for the merger between the two general hospitals *Hilversum* and *Gooi-Noord* the geographic market has been assessed substantively. After an initial investigation in 2004, the NMa concluded that a license was required for this proposed merger, since it could restrict actual competition in the Dutch market for hospital care. Following the hospitals' application for a license the NMa carried out further research. With respect to definition of the product market a division into separate markets for inpatient and outpatient general hospital care was assumed. Since it was recognised that the static E/H approach used in previous hospital merger cases was "not sufficiently reliable" for geographic market definition, both patients' revealed and stated preferences were analysed. Stated preferences were investigated by a conjoint analysis and revealed preferences by examining residents' willingness to travel to alternative hospitals.

The results from these analyses were not unambiguous: the use of stated preference data resulted in a larger geographic market than the use of revealed preference data. It was argued that although in general greater value should be attached to revealed preferences, patients' willingness to travel could be expected to increase in the near future due to the increasing availability of transparency information on quality differences within the Dutch hospital sector. As a result, the NMa (2005, p.29) stated "it is therefore less evident that greater weight should be given to the revealed preferences in the assessment of the present case." In the end, in June 2005 the NMa approved the proposed merger since there was "insufficient evidence to deem it plausible that a dominant position will arise or be strengthened as a result of the proposed merger on the markets for clinical and non-clinical general hospital care." This conclusion implies, indirectly, that greater weight was given to consumers' stated preferences; even though it was admitted that what people say they will do is often not the same as what they will actually do if the hypothetical situation becomes reality. Future analysis of post-merger market outcomes should demonstrate whether or not the NMa erred in this specific merger case.

3.6 Concluding remarks

Assessing hospital market power is a serious problem for antitrust authorities: the standard method for market definition is difficult to implement in hospital markets and alternative, less formal methods have proven inaccurate. Since an effective competition policy is of crucial importance to countries with a market-based health care system in which hospitals are expected to compete, antitrust enforcement agencies need new approaches to defining hospital markets.

In this paper we discuss three such approaches suggested in the recent economic literature: the time-elasticity approach, competitor share approach, and option demand approach. Since these methods were developed within the context of US hospital markets, we also examine their applicability in the Dutch context where, since partial deregulation in 2005, health insurers are now allowed to selectively contract with hospitals. We conclude that the suitability of these new approaches to defining geographic markets crucially depends on the hospital industry's prevailing institutions and market structure.

With regard to hospital product market definition, in the Netherlands a more disaggregated definition seems appropriate than in the US because the lifetime hospital staff privileges for Dutch medical specialists make it difficult for hospitals to adjust their product mix. The appropriate approach to defining geographical hospital markets depends on how health insurers contract with hospitals and how patients select their hospital. We conclude that the competitor share approach and the option demand approach do not accurately depict the way Dutch hospitals currently compete. Despite the gradual introduction of managed competition in 2005/06, most hospital prices are still fixed, out-of-pocket payments are absent, and most patients do not face restricted hospital networks. Dutch hospitals therefore compete directly for patients through non-price factors only, such as travel time and (perceived) quality. As a result, in the current context, the time-elasticity approach seems to be the appropriate approach to defining hospital markets in the Netherlands. However, if the expected further deregulation of hospital prices is implemented and insurer-hospital negotiations over network participation and composition increase, the option demand approach may become more appropriate.

Though the focus of this paper is on defining hospital markets, it includes two important lessons for other types of health care as well. First, given their methodological shortcomings, the traditional approaches to defining geographic markets (Elzinga-Hogarty approach and critical loss analysis) are inaccurate and therefore inapplicable. Second, the appropriate approach to market definition in any deregulated health care market depends crucially on (i) how health insurers contract with providers, and (ii) how patients select their provider.

References

Acton, J.P. (1975), 'Nonmonetary factors in the demand for medical services: some empirical evidence', *Journal of Political Economy*, 83(3): 595-614

Baker, J.B. (1988), 'The antitrust analysis of hospital mergers and the transformation of the hospital industry', *Law and Contemporary Problems*, 51(2): 93-164

Capps, C.S., D. Dranove, S. Greenstein and M. Satterthwaite (2001), *The silent majority fallacy of the Elzinga-Hogarty criteria: a critique and new approach to analyzing hospital mergers*, Working Paper 8216, National Bureau of Economic Research (NBER), Cambridge (Mass.)

Capps, C.S., D. Dranove, S. Greenstein and M. Satterthwaite (2002), 'Antitrust policy and hospital mergers: recommendations for a new approach', *Antitrust Bulletin*, 47(4): 677-714

Capps, C.S., D. Dranove and M. Satterthwaite (2003), 'Competition and market power in option demand markets', *RAND Journal of Economics*, 34(4): 737-763

Capps, C.S. and D. Dranove (2004), 'Hospital consolidation and negotiated PPO prices', *Health Affairs*, 23(2): 175-181

Danger, K.L. and H.E. Frech (2001), 'Critical thinking about "critical loss" in antitrust', *Antitrust Bulletin*, 46(2): 339-355

DOJ and FTC (2004), *Improving health care: a dose of competition*, US Department of Justice and the US Federal Trade Commission, Washington DC

Dranove, D. and R. Ludwick (1999), 'Competition and pricing by nonprofit hospitals: a reassessment of Lynk's analysis', *Journal of Health Economics*, 18(1): 87-98

Elzinga, K.G. and T.F. Hogarty (1973), 'The problem of geographic market delineation in antimerger suits', *Antitrust Bulletin*, 18(1): 45-81

FTC (2005), *In the matter of Evanston Northwestern Healthcare Corporation: initial decision*, US Federal Trade Commission, Docket No. 9315, Washington DC

FTC (2007), *In the matter of Evanston Northwestern Healthcare Corporation: opinion of the Commission*, US Federal Trade Commission, Docket No. 9315, Washington DC

Gaynor, M. and W.B. Vogt (2000), 'Antitrust and competition in health care markets', in A.J. Cuyler and J.P. Newhouse (eds.), *Handbook of Health Economics*, volume I: 1405-1487, Amsterdam: Elsevier Science

Harris, B. and J. Simons (1989), 'Focusing market definition: how much substitution is necessary?', *Research in Law & Economics*, 12: 207-226

Katz, M.L. and C. Shapiro (2003), 'Critical loss: let's tell the whole story', *Antitrust*, 17(2): 49-56

Keeler, E., G. Melnick and J. Zwanziger (1999), 'The changing effects of competition on non-profit and for-profit hospital pricing behaviour', *Journal of Health Economics*, 18(1): 69-86

Langenfeld, J. and W. Li (2001), 'Critical loss analysis in evaluating mergers', *Antitrust Bulletin,* 46(2): 299-337

Motta, M. (2004), *Competition policy: theory and practice*, Cambridge (UK): Cambridge University Press

NMa (2005), *Decision no. 3897/156: Ziekenhuis Hilversum - Ziekenhuis Gooi-Noord*, Netherlands Competition Authority, The Hague

NZa (2006), *Monitor onderhandelingen B-segment* ('Monitor report on the hospital-insurer negotiations for deregulated hospital care'), Dutch Healthcare Authority, Utrecht

O'Brien, D.P. and A.L. Wickelgren (2004), 'A critical analysis of critical loss', *Antitrust Law Journal*, 71(1): 161-184

Sacher, S. and L. Silvia (1998), 'Antitrust issues in defining the product market for hospital services', *International Journal of the Economics of Business*, 5(2): 181-202

Scholten, G.R.M. and T.E.D. van der Grinten (2002), 'Integrating medical specialists and hospitals: the growing relevance of collective organisation of medical specialists for Dutch hospital governance', *Health Policy*, 62(2): 131-139

Scholten, G.R.M. and T.E.D. van der Grinten (2005), 'The integration of medical specialists in hospitals: Dutch hospitals and medical specialists on the road to joint regulation', *Health Policy*, 72(2): 165-173

Schut, F.T. and W.P.M.M. van de Ven (2005), 'Rationing and competition in the Dutch health-care system', *Health Economics*, 14(S1): S59-S74

Simpson, J. (2003), 'Geographic markets in hospital mergers: a case study', *International Journal of the Economics of Business*, 10(3): 291-303

Stole, L. and J. Zwiebel (1996), 'Intra-firm bargaining under non-binding contracts', *Review of Economic Studies*, 63(3): 375-410

Tay, A. (2003), 'Assessing competition in hospital care markets: the importance of accounting for quality differentiation', *RAND Journal of Economics*, 34(4): 786-814

Town, R.J. and G. Vistnes (2001), 'Hospital competition in HMO networks', *Journal of Health Economics*, 20(5): 733-53

Van de Ven, W.P.M.M. and R.P. Ellis (2000), 'Risk adjustment in competitive health plan markets', in A.J. Culyer and J.P. Newhouse (eds.), *Handbook of Health Economics*, volume I: 755-845, Amsterdam: Elsevier Science

Van Vliet, R.C.J.A. (2004), 'Deductibles and health care expenditures: empirical estimates of price sensitivity based on administrative data', *International Journal of Health Care Finance and Economics*, 4(4): 283-305

Varkevisser, M. and S.A. van der Geest (2007), 'Why do patients bypass the nearest hospital? An empirical analysis for orthopaedic care and neurosurgery in the Netherlands', *European Journal of Health Economics*, 8(3): 287-295

Varkevisser, M., S.A. van der Geest and F.T. Schut (2004), *Concurrentie tussen Nederlandse ziekenhuizen: de deelmarkt voor reguliere klinische zorg* ('Competition among Dutch hospitals: the submarket for regular inpatient care'), Studies in Economic Policy, nr. 13, OCFEB/iBMG, Erasmus University Rotterdam

Varkevisser, M., N. Polman and S.A. van der Geest (2006), 'Zorgverzekeraars moeten patiënten kunnen sturen' ('Health insurers must be able to channel patients'), *Economisch Statistische Berichten*, 91(4478): 38-40

Werden, G.J. (1989), 'The limited relevance of patient migration data in market delineation for hospital merger cases', *Journal of Health Economics*, 8(4): 363-376

Zwanziger, J., G. Melnick and K.M. Eyre (1994), 'Hospitals and antitrust: defining markets, setting standards', *Journal of Health Politics, Policy and Law*, 19(2): 423-447

Chapter 4

Why do patients bypass the nearest hospital? An empirical analysis for orthopaedic care and neurosurgery in the Netherlands

M. Varkevisser and S.A. van der Geest

European Journal of Health Economics, 2007, 8(3): 287-295

Abstract

Using data for 2003, we find that both for non-emergency orthopaedic care (38%) and neurosurgery (54%) numerous Dutch patients did not visit the nearest hospital. Our estimation results show that extra travel time negatively influences the probability of hospital bypassing. Good waiting time performance by the nearest hospital also significantly decreases the likelihood of a bypass decision. Patients seem to place a lower negative value on extra travel time for orthopaedic care than for neurosurgery. The valuation of shorter waiting time also varies between these two types of hospital care. A good performance of the nearest hospital on waiting time decreases the likelihood of a bypass decision most for neurosurgery. In both samples, patients are more likely to bypass the nearest hospital when it is a university medical centre or a tertiary teaching hospital. Patient characteristics, such as age and social status, are also found to significantly affect hospital bypassing. From our analysis it follows that both patient and hospital care heterogeneity should be taken into account when assessing the substitutability of hospitals.

4.1 Introduction

Patients' decisions which hospital to visit have been debated in the health economics literature for several decades. Empirical studies were aimed initially at health planners and hospital administrators, since effective planning and management of health care require models that explain and predict regional hospital utilisation (Lee and Cohen, 1985). In the late eighties, however, a wider range of people became interested in which factors influence patient choice among hospitals. In particular health insurers who are marketing health plans with a limited set of providers need to know the attributes that affect the choice of hospital. Since many developed countries are experiencing the urgency of an incentive-based health system reform and start to deregulate hospital markets (Cutler, 2002), such knowledge is becoming increasingly important. The international health policy virus of "reform" also affects Europe; health insurers and patients now have greater freedom of choice in many EU member states (Maynard, 2005). In the Netherlands, competing health insurers are now allowed to contract selectively. Since February 2005 they are able to negotiate contracts with individual hospitals (Schut and Van de Ven, 2005).

Research on patient decision behaviour is especially important for health insurers in deregulated hospital markets. Experience from the United States shows that insurers' bargaining clout depends crucially on their ability to channel patients to hospitals with which favourable discounts have been negotiated (Sorensen, 2003). For patients, such channelling may imply that they have to bypass the nearest hospital and travel to a more distant hospital. As patients generally dislike travelling, it can reasonably be assumed they would be willing to bypass the nearest hospital for particular reasons. For example, higher quality of care or shorter waiting times may compensate patients for the inconveniences of increased travel time (Montefiori, 2005).

This paper is the first empirical analysis of actual hospital visits in the Netherlands (revealed preferences). Using individual patient level non-emergency hospital utilisation data for the year 2003, we estimate a logit model to assess which patient characteristics and hospital attributes affected decisions to visit or bypass the nearest hospital. To take the heterogeneity of hospital care into account, we analysed two different medical specialties: orthopaedic care, reflecting a regular type of hospital care, and the more sophisticated medical specialty of neurosurgery. Differences in medical complexity between these two types of care can be illustrated by the percentage of total hospital visits that ultimately result in an inpatient hospital admission. In the Netherlands each year over 515,000 patients need specialised orthopaedic care of which only around 15 percent is admitted as inpatient. For neurosurgery the corresponding figures are approximately

30,000 and almost 40 percent, respectively. Our analysis indicates that for both medical specialties, travel time and hospital attributes as well as patient characteristics significantly affect patients' decisions to bypass the nearest hospital.

4.2 Empirical literature on hospital bypassing: United States only

Several previous papers examined patients' decisions to visit or bypass the nearest hospital.[1] These papers exclusively analyse hospital bypassing in the United States. Bronstein and Morrisey (1991) find that for rural pregnant women in the state of Alabama, travel distances and hospital equipment (reflecting perceived quality differences) were important considerations in the choice of an obstetrics hospital. These authors conclude that rural women with more resources travelled away from their nearest hospital toward hospitals in metropolitan areas, hospitals with high birth volumes, and those with so-called high-risk bassinets. White and Morrisey (1998) report that, in California, bypass rates were higher for more complex procedures (such as back, joint, and vascular surgery) and highest for highly complex procedures such as open heart surgery and kidney transplant. They do not, however, control for individual service offerings by hospitals what may bias their results. Tai et al. (2004) analyse the hospital bypassing behaviour of rural Medicare beneficiaries. The results of their estimation reveal that distance, hospital attributes (greater size and scope) as well as patient characteristics (age and income) had a substantial influence on the decision to visit or bypass the nearest hospital.

4.3 Previous studies on patient behaviour in the Netherlands

Prior to the introduction of the new Health Insurance Act in January 2006, Dutch citizens were either enrolled in compulsory social health insurance (about two-thirds of the population) or voluntarily insured with private health insurers (nearly the remaining one-third of the population). Within both health insurance schemes, patients were free to choose any hospital. In the social health insurance scheme, patients' hospital costs were always fully reimbursed. Cost sharing arrangements were common only in the private health insurance scheme. Research by ECORYS-NEI (2003) indicates that travel time is the most important hospital attribute for Dutch patients, followed by (perceived) hospital expertise and own previous experiences with a hospital. Van der Schee et al. (2005) find that the Dutch patient's ideal hospital has a good reputation, requires 15 minutes

[1] Since this paper focuses on hospital bypassing in particular, we do not discuss the extensive literature on patient hospital choice in general.

of travel time at most, has an 7x24 emergency department, guarantees each patient a regular physician, has sufficient parking facilities, participates in a regional network of health providers, and has short waiting times. Non-emergency care patients especially seem to prefer hospitals that have a good reputation, while the other attributes (including travel time) are of minor importance to these patients. From NMa (2005), it follows that patients in the Netherlands attach a higher value to quality indicators such as reputation than they do to travel time. This result suggests that when hospitals improve quality, patients are willing to accept more travel time.

4.4 Conceptual model and estimation method

In this paper we empirically analyse hospital bypass decisions made by Dutch patients. The empirical specification and the underlying conceptual model are similar to those used in previous empirical studies (Bronstein and Morrisey, 1991; Tai et al., 2004). Both are based on standard utility theory. From this theory it follows that the decision to visit or bypass the nearest hospital is determined by characteristics of that hospital in combination with specific characteristics of the patient. Theoretically, patients are expected to choose between the nearest and a further hospital taking extra travel time and (perceived) quality into consideration. The type of hospital competition that results can be considered as a variant of the standard Hotelling model (Calem and Rizzo, 1995; Xavier, 2003).

From previous research it follows that, in the Netherlands, the decision which hospital to visit is most often made by patients themselves, alone or in consultation with their general practitioner (ECORYS-NEI, 2003). Since Dutch GPs do not face economic incentives to refer patients to particular hospitals, it is not in their interest to neglect patients' interests when deciding which hospital to visit. Our empirical specification therefore asserts that patients (or GPs as their agents), given their needs and preferences, decide to visit or bypass the nearest hospital on the basis of its attractiveness. We estimate the following linear logit specification:

$$B_i = \alpha + \beta T_i + \delta X_i + \lambda Z_i + \varepsilon_i \quad (4.1)$$

where B_i is a dummy variable that has value one when patient i bypassed the nearest hospital providing the medical specialty analysed and value zero otherwise; T_i reflects extra travel time that is required for patient i to reach the next-nearest hospital providing the medical specialty analysed; X_i is a vector of patient characteristics; Z_i is a vector of attributes of the nearest hospital providing the medical specialty analysed; and ε_i is the error term.

We expect the likelihood of a bypass decision to decrease when extra travel time to the next-nearest hospital increases. In addition to this variable, we distinguish eight patient characteristics: gender, age, retirement, unemployment, disability, social security, self-employment, and geographic environment. Note that, since all patients are enrolled in social health insurance, their annual income in 2003 did not exceed €31,750. Because the opportunity costs of increased travel time are likely to depend on income, the potential impact of any remaining differences in income is expected to be captured by the explanatory variables reflecting the patient's social status (retirement, unemployment, disability, social security, and self-employment). The effect of gender on patients' bypass decisions is unclear in advance. Older or disabled patients are likely to be less mobile than younger ones and thus less likely to bypass the nearest hospital. Unemployed patients may be more likely to bypass the nearest hospital because their opportunity costs of increased travel time are lower, whereas the opposite may hold for self-employed patients. We expect patients living in urban areas to be more likely to bypass the nearest hospital, because they most often have more nearby hospital alternatives than patients living in rural areas.

Our model specification suggests that patients, given their personal characteristics, will accept the inconvenience and higher costs of travelling to a more distant hospital when they perceive the nearest hospital as unattractive. Based on the insights gained from previous research on stated preferences (Van der Schee et al., 2005), we examine five important features of the nearest hospital to test their ability to attract patients: university medical centre, tertiary teaching hospital, total number of beds, volume of relevant first hospital outpatient visits, and waiting time performance. Note that, because all patients in our sample are fully insured for hospital care and co-payments are absent, hospital prices do not affect patients' bypass decisions. Due to perceived quality differences, patients may prefer both academic and teaching hospitals over general hospitals. We expect the likelihood of a bypass decision to be negatively affected by hospital size. Patients may prefer larger hospitals that also treat many similar patients. Relatively low waiting time is also expected to increase the attractiveness of the nearest hospital.

4.5 Data

Our principal data source is the Agis Health Database.[2] This database contains detailed information on non-emergency first hospital outpatient visits (in Dutch "eerste polikliniek bezoeken"; i.e. EPBs) by socially insured Agis enrolees during the year 2003. The available data include the patient's age, gender, zip code, social status, and administration number; the medical specialty attended; and the zip code and name of the hospital visited. We extracted observations on hospital visits for orthopaedic services ($n = 62{,}213$) and neurosurgical services ($n = 5{,}648$). From these samples we omitted all observations on patients younger than 18 years, because for under-aged children the decision to bypass the nearest hospital may be complicated by unobserved individual characteristics. Patients older than 90 years were also excluded from our sample, because the (medical) condition of such patients is most often highly specific. We also omitted all observations on patients who travelled more than 60 minutes, because it is likely that these patients were away from home when they needed hospital care. The resulting study sample contained 53,307 EPBs for orthopaedic care and 5,168 EPBs for neurosurgical care. Table 4.1 reports the descriptive statistics of all variables included in our specification.

4.5.1 Dependent variable

The dependent variable has the value one when patient *i* bypassed the nearest hospital and the value zero otherwise.[3] Despite the fact that, in 2003, Dutch patients did not face any financial incentives to bypass the nearest hospital, numerous patients travelled to an alternative hospital. On average, patients in our sample travelled 15.7 minutes for an orthopaedic EPB and 18.4 minutes for a neurosurgical EPB.[4] Because average travel time to the nearest hospital providing orthopaedic care and neurosurgery is only 11.9 and 12.6 minutes respectively, these figures show that for both medical specialties a substantial number of patients went to a more distant hospital. For orthopaedic services almost four out of every ten patients did not visit the nearest hospital. The percentage of patients who bypassed the nearest hospital is even higher for neurosurgical services.

---

[2] In 2003 Agis was one of the largest Dutch health insurers representing approximately 1.7 million customers of which more than 85 percent was enrolled in social health insurance.

[3] To test the robustness of our results, we also tried an alternative definition of the dependent variable; i.e. assigning the value one only when patients bypassed the nearest hospital by travelling at least 5 minutes extra. This did not significantly alter the estimated coefficients.

[4] In this study estimated travel times refer to the fastest route by car. These are obtained using a database that includes all 4-digit zip codes in the Netherlands and accounts for differences in average speed that exist between different road types.

Table 4.1: Descriptive statistics of the study samples

	Orthopaedic care				Neurosurgery			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Bypassed nearest hospital	0.38	0.49	0	1	0.54	0.50	0	1
Minimum extra travel time (minutes)	6.77	5.90	0	54	5.76	5.43	0	51
Nearest hospital attributes:								
University medical centre	0.07	0.26	0	1	0.09	0.29	0	1
Tertiary teaching hospital	0.22	0.41	0	1	0.32	0.46	0	1
Hospital beds (x100)	5.42	2.28	1	14	6.14	2.03	2	14
Relevant EPBs (x100)	62.27	22.65	4	227	5.87	4.08	0	24
Waiting time below average	0.49	0.50	0	1	0.43	0.50	0	1
Patient attributes:								
Female	0.63	0.48	0	1	0.60	0.49	0	1
Age (years)	53.65	18.13	18	90	52.56	15.13	18	90
Unemployed	0.02	0.14	0	1	0.02	0.14	0	1
Incapacitated for work	0.17	0.37	0	1	0.25	0.43	0	1
Retired	0.35	0.48	0	1	0.26	0.44	0	1
On social security	0.04	0.21	0	1	0.06	0.24	0	1
Self-employed	0.02	0.14	0	1	0.02	0.14	0	1
Total EPBs in 2003	1.18	0.45	1	5	1.25	0.50	1	4
Urbanisation	2.38	1.24	1	5	2.15	1.18	1	5

Over 50 percent visited a more distant hospital than strictly necessary.[5] For those patients who decided to bypass the nearest hospital, travel time on average increased by 10.0 minutes in case of an orthopaedic EPB and by 10.8 minutes in case of a neurosurgical EPB.

4.5.2 Independent variables

We expect the decision to bypass the nearest hospital to be negatively affected by travel time to the next-nearest hospital. Therefore, we calculated the extra time that is minimally required to reach another hospital in case a patient would decide to bypass the nearest one. Because hospital output quality was not measured in 2003, our specification includes several attributes of the nearest hospital as a proxy for its (perceived)

[5] Note that, in contrast to White and Morrisey (1998), we explicitly control for individual hospitals' service offering. Orthopaedic care is provided by all Dutch hospitals, whereas neurosurgical services are offered by around two-thirds of the hospitals.

quality: type of hospital, hospital size, and waiting time performance. Type of hospital is captured by two dummy variables. First, we constructed a variable that has value one when the nearest hospital is a university medical centre and value zero otherwise. Second, we constructed a variable that has value one when the nearest hospital is a tertiary medical teaching hospital and zero otherwise. Data on hospital size is obtained from the Dutch Ministry of Health, Welfare and Sports. To capture possible care-specific size effects, we included not only the nearest hospital's number of beds but also its annual number of EPBs for orthopaedics and neurosurgery, respectively. An issue that may arise in estimation of our logit model is whether it is smaller hospital size that increases the likelihood of hospital bypassing or higher bypass rates that lead to smaller hospital size. This possible endogeneity may bias the estimated coefficient for hospital size. In this paper, however, the latter variable is treated as exogenous. The fact that our model is static and does not deal with dynamic issues supports this assumption. Since it takes some time to adjust hospital capacity, the possible impact of patients' decisions to bypass the nearest hospital is a function of the cumulative number of patients over past years.

Data on individual hospital waiting times was obtained from the Netherlands Hospital Association. Since it was not compulsory for Dutch hospitals to report waiting times, this data contained many missing values. We therefore had to construct a dummy variable to test whether patients' hospital choice was affected by differences in waiting times. This variable has value one when the nearest hospital's average waiting time for an orthopaedic or neurosurgical EPB was known to be below the national average in 2003 and zero otherwise. One could argue that hospital waiting time is affected by patients' bypassing decisions and therefore endogenous which may bias the estimated coefficient of hospital waiting time. Since this paper uses a static specification of hospital bypassing, however, we are able to treat hospital waiting time as exogenous.

Data on patient characteristics was obtained from the Agis Health Database. From this database we were able to specify several socio-economic explanatory variables for each patient. The patient's age is included as a continuous variable, whereas gender is captured by a dummy variable that was assigned the value one for female patients. Each patient's total number of EPBs in 2003 and social status were also incorporated.[6] The latter is captured by five different dummy variables that were assigned the value one when the patient was retired, unemployed, incapacitated for work, on social security, or self-employed and the value zero otherwise. Using data from Statistics Netherlands we also specified a multinomial discrete variable to test for the possible effect of ur-

[6] Patients' own previous experiences with hospitals may also affect their bypass decisions. Unfortunately, such information is lacking in the database.

banisation. This variable was assigned the value 1 (very urban areas), 2 (urban areas), 3 (moderate urban areas), 4 (rural areas) or 5 (very rural areas). Although one might expect the opposite, the correlation matrix reveals that this explanatory variable is not highly correlated with the variable that captures minimum extra travel time (Table 4.2).

Table 4.2: Correlation matrix

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Urbanisation		**0.18**	**-0.07**	**-0.20**	**-0.16**	**-0.01**	**0.01**
(2) Minimum extra travel time	*0.16*		**-0.17**	**-0.23**	**-0.06**	**-0.14**	**-0.15**
(3) University medical centre	*-0.03*	*-0.18*		**-0.15**	**0.06**	**0.43**	**0.03**
(4) Tertiary teaching hospital	*-0.32*	*-0.04*	*-0.22*		**0.25**	**0.07**	**0.01**
(5) Relevant EPBs	*-0.09*	*-0.23*	*0.68*	*-0.01*		**0.41**	**-0.45**
(6) Hospital beds	*0.18*	*0.11*	*0.46*	*-0.11*	*0.43*		**-0.19**
(7) Waiting time below average	*0.25*	*0.11*	*-0.22*	*-0.53*	*-0.10*	*0.07*	

Correlation coefficients for **orthopaedics** are in **bold**.
Correlation coefficients for *neurosurgery* are in *italic*.

4.6 Estimation results

4.6.1 Orthopaedic care

Our findings for orthopaedic care confirm the expected negative relationship between extra travel time required to reach the next-nearest hospital and the decision to bypass the nearest hospital (see Table 4.3). Holding all patient characteristics hospital attributes constant, the results suggest that patients are more than 10 percent less likely to bypass their nearest hospital if going to an alternative hospital implies at least 5 minutes of extra travel time.

The patient characteristics gender, unemployment and social security did not significantly affect the decision to bypass or use the nearest hospital for orthopaedic services. The likelihood of bypassing the nearest hospital decreases with patient age. As expected, older patients are less likely to bypass the nearest hospital. When patients retire, however, the probability that they visit a further hospital increases. This suggests that the opportunity costs of increased travel time are lower for these patients. The same seems to hold for patients who are incapacitated to work. Self-employed patients are also more likely to bypass the nearest hospital, as are patients admitted to a hospital more frequently and patients who live in rural areas. The latter result conflicts with our *ex ante* expectation. Apparently patients in rural areas are less averse to travel for orthopaedic care than patients in urban areas. This can perhaps be explained by the fact that those patients are already more used to travel for specific services like specialised health care, since these services are often not available locally.

We were surprised to find that, holding all other attributes constant, patients were almost 35 percent more likely to bypass the nearest hospital when this hospital was a university medical centre.[7] The marginal effect for tertiary teaching hospitals is much smaller, but still positive and significant. The probability of a bypass increases by almost 6 percent when the nearest hospital is a tertiary teaching hospital. In our opinion there are three plausible explanations for these results. First, GPs may advise patients to bypass these hospitals for their first outpatient visit. Research by the weekly magazine Elsevier in 2003 revealed that Dutch physicians, nurses and hospital managers did not classify university medical centres among the best hospitals they know, despite their excellent medical expertise. It appeared that, according to the respondents, university hospitals especially suffered from bureaucracy (Elsevier, 2003). Second, patients themselves may prefer admittance to a general hospital for their first hospital visit because of (perceived) quality differences that are particularly relevant to them, such as doctor communication skills and hospital staff's responsiveness (Sofaer et al., 2005). They may, for example, expect to get more personal attention in a general hospital than in a relatively large university medical centre that is aimed at scientific research. Furthermore, in the latter type of hospital it is far more likely for patients to be (initially) treated by a medical resident instead of a fully qualified physician. Third, and additional to the preceding demand side considerations, both university and tertiary teaching hospitals may be reluctant to accept too many patients for their first outpatient visit because they are oriented primarily towards providing highly specific care.

Patients, however, seem to prefer larger general hospitals over smaller ones. Hospital size, measured by the number of beds and the annual number of orthopaedic EPBs, significantly affects patients bypass decisions. Although the estimated marginal effects are rather small, on average patients are less likely to bypass the nearest hospital when it has more beds or treats more patients.

As expected, patients are significantly less likely to bypass their nearest hospital when they know its waiting time for an orthopaedic EPB is relatively low. The marginal effect of this hospital attribute, however, is quite small. A good waiting time performance of the nearest hospital decreases the probability of a bypass by only around 2 percent.

---

[7] This result is not a spurious finding due to collinearity. Although there is some correlation between the explanatory variables university medical centre and number of beds (Table 4.2), exclusion of the latter does not change the sign and significance of the estimated coefficient.

Table 4.3: Estimation results

	Orthopaedic care			Neurosurgery		
	Coeff. (SE)		Marginal effect	Coeff. (SE)		Marginal effect
Minimum extra travel time	-0.111 (0.002)	***	-2.27%	-0.065 (0.008)	***	-1.33%
Nearest hospital attributes:						
University medical centre	1.592 (0.048)	***	34.21%	1.785 (0.214)	***	29.81%
Tertiary teaching hospital	0.274 (0.026)	***	5.70%	0.486 (0.106)	***	10.02%
Hospital beds (x100)	-0.098 (0.007)	***	-2.01%	-0.218 (0.025)	***	-4.45%
Relevant EPBs (x100)	-0.004 (0.001)	***	-0.08%	-0.104 (0.013)	***	-2.13%
Waiting time below average	-0.107 (0.024)	***	-2.19%	-0.490 (0.096)	***	-10.39%
Patient attributes:						
Female	0.009 (0.021)		0.18%	-0.092 (0.067)		-1.88%
Age (years)	-0.013 (0.001)	***	-0.26%	-0.012 (0.004)	***	-0.24%
Unemployed	0.047 (0.075)		0.97%	0.671 (0.251)	***	13.03%
Incapacitated for work	0.207 (0.030)	***	4.31%	0.303 (0.087)	***	6.14%
Retired	0.152 (0.041)	***	3.13%	0.229 (0.133)	*	4.63%
On social security	-0.021 (0.051)		-0.43%	-0.191 (0.145)		-3.92%
Self-employed	0.163 (0.072)	**	3.39%	0.320 (0.228)		6.41%
Total EPBs in 2003	0.250 (0.022)	***	5.14%	0.102 (0.068)		2.08%
Urbanisation	0.143 (0.011)	***	2.73%	-0.123 (0.036)	***	-2.48%
Constant	0.731 (0.072)	***		2.916 (0.248)	***	
Included observations	48,778			4,545		
Correct predictions:						
- bypass = 0	87%			53%		
- bypass = 1	33%			79%		
- overall	67%			68%		

Note: *** Significance at 1%; ** at 5%; and * at 10%. To account for unobserved geographic differences we also included dummy variables capturing patients' province of residence. These estimation coefficients are available on request. Exclusion of these provincial dummy variables did not significantly alter the estimation results. Correct predictions are obtained when the predicted probability is ≤50% and the observed bypass = 0, or when the predicted probability is >50% and the observed bypass = 1.

4.6.2 Neurosurgery

For neurosurgery, the estimated marginal effects also reveal that patients are less likely to bypass the nearest hospital when travel time to the next-nearest hospital increases (Table 4.3). A minimum extra travel time of 5 minutes decreases the probability of a bypass by approximately 6.5 percent. Patient gender does not significantly affect hospital bypass decisions. The same holds for social security and self-employment. Holding all other attributes constant, older patients are less likely to travel farther than necessary for neurosurgical hospital care. That is, the likelihood of a bypass decision decreases with age. The opposite is true, however, once patients retire. After retirement the probability of bypassing the nearest hospital increases by almost 5 percent. Unemployed patients in need of neurosurgical hospital care are also more likely to bypass the nearest hospital. Patients who are incapacitated to work are also more likely to bypass. Urbanisation has a significant and negative effect on patients' decisions not to visit the nearest hospital. Patients living in more rural areas are less likely to bypass the nearest hospital providing neurosurgery. This is not surprising, because travel time is already relatively high for these patients as neurosurgical services are only available in larger (regional) hospitals. The total number of hospital admissions in a year, measured by EPBs per patient, does not significantly affect patients' bypass decisions for neurosurgical care. Patients who visited a hospital more frequently in 2003 are as likely to bypass the nearest hospital as patients who are referred to a hospital only once.

Again, the likelihood that a particular patient bypasses the nearest hospital strongly increases when this hospital is a university medical centre or a tertiary medical teaching hospital.[8] These hospital attributes have positive marginal effects of almost 30 percent and 10 percent, respectively. As mentioned before, we are not sure whether this effect reflects GPs' advices to patients, the latter's own preferences based on perceived quality differences, or admission restrictions imposed by these types of hospital. Just as we found for the orthopaedic sample, on average, patients prefer larger general hospitals above smaller ones for neurosurgical services. They are less likely to bypass the nearest hospital that provides these services when it has more beds and more neurosurgical EPBs.

For our neurosurgery sample we find a strong negative relationship between hospital waiting time performance and the likelihood of hospital bypassing. Holding the other attributes constant, patients were more than 10 percent less likely to bypass the nearest hospital that provides neurosurgery when its waiting time was known to be relatively low.

4.6.3 Differences between orthopaedic care and neurosurgery

Table 4.3 reveals similarities as well as differences regarding the factors affecting patients' hospital bypass decisions for orthopaedic care and neurosurgery. The first interesting difference between the two medical specialties analysed in this paper refers to patient attitudes towards extra travel time. Although for both samples patients are less likely

[8] Again, this result is not a spurious finding due to collinearity. Although there is some correlation between university medical centre and hospital size (Table 4.2), exclusion of the number of beds or neurosurgical EPBs does not change the sign and significance of the estimated coefficient.

to bypass the nearest hospital when travel time to the next-nearest hospital increases, this effect is much stronger for orthopaedic EPBs than for neurosurgical EPBs. This result suggests that, in the case of more complex treatments, patients place a lower negative value on extra travel time, which is consistent with previous findings (White and Morrisey, 1998). Another interesting difference concerns the estimated marginal effect for urbanisation. Whereas we find that patients from rural areas are more likely to bypass the nearest hospital for orthopaedic care, we find the opposite for neurosurgery. Our explanation for this result is that in rural areas a substantial number of patients are not able to visit the hospital closest to their home for neurosurgical care because it simply does not offer such services. These patients may therefore be less likely to bypass the nearest hospital providing the care they need than patients in the orthopaedic sample, as for the latter admission to the geographically closest hospital is always feasible. The third difference that catches the eye is perhaps the most interesting. Hospital waiting time performance appears to have a much stronger effect on patients' bypass decisions for neurosurgical services than for orthopaedic services. Apparently, the valuation of shorter waiting time varies with types of hospital care. The importance of waiting time as a determinant of hospital bypass decisions seems to be more important for complex procedures.

4.7 Conclusion

Despite the absence of financial incentives, in 2003 numerous Dutch patients bypassed the nearest hospital for both orthopaedic care (38 percent) and neurosurgery (54 percent). The estimation results of our logit specification reveal that extra travel time and hospital waiting time performance significantly affect the decisions made by patients to visit or bypass the hospital closest to their homes. As expected, we find a negative relationship between extra travel time and hospital bypassing. Relatively low waiting time also significantly decreases the likelihood of patients deciding to bypass the nearest hospital. Patients, however, seem to place a lower negative value on extra travel time for orthopaedic care than for neurosurgery. The valuation of shorter waiting time also varies between these two types of hospital care. A good performance of the nearest hospital on waiting time decreases the likelihood of a bypass most for neurosurgery. We are surprised to find that, in both samples, patients were more likely to bypass the nearest hospital when this was a university medical centre or a tertiary teaching hospital. Apparently patients did not prefer admission to such hospitals for their initial visit. In addition to travel time and hospital attributes, patient characteristics, such as age and social status, also significantly affected hospital bypass decisions. These results have important policy implications for European health planners, hospitals, and especially health insurers who are marketing health plans with a limited set of providers. To properly assess the substitutability of hospitals that underlies hospital market power, they explicitly have to take both patient and hospital care heterogeneity into account.

References

Bronstein, J.M. and M.A. Morrisey (1991), 'Bypassing rural hospitals for obstetrics care', *Journal of Health Politics, Policy and Law*, 16: 87-118

Calem, P.S. and J.A. Rizzo (1995), 'Competition and specialization in the hospital industry: an application of Hotelling's location model', *Southern Economic Journal*, 61: 1182-1198

Cutler, D.M. (2002), 'Equality, efficiency, and market fundamentals: the dynamics of international medical care reform', *Journal of Economic Literature*, 40: 881-906

ECORYS-NEI (2003), *Vraagfactoren ziekenhuizen* ('Determinants of hospital choice'), Rotterdam

Elsevier (2003), *De beste ziekenhuizen* ('The best hospitals'), 27 September: 38-50

Lee, H.L. and M.A. Cohen (1985), 'A multinomial logit model for the spatial distribution of hospital utilization', *Journal of Business Economics and Statistics*, 3: 159-168

NMa (2005), *Besluit betreffende zaak 3897 / Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord: vergunningfase*, Nederlandse Mededingingsautoriteit, Den Haag (English translation available at www.nmanet.nl/engels/home/Decisions/2005/3897BVC_engels.asp)

Maynard, A. (2005), 'European health policy challenges', *Health Economics*, 14: S255-S263

Montefiori, M. (2005), 'Spatial competition for quality in the market for hospital care', *European Journal of Health Economics*, 6: 131-135

Schut, F.T. and W.P.M.M. van de Ven (2005), 'Rationing and competition in the Dutch health-care system', *Health Economic*s, 14: S59-S74

Sofaer S., C. Crofton, E. Goldstein, E. Hoy and J. Crabb (2005), 'What do consumers want to know about the quality of care in hospitals?', *Health Services Research*, 40: 2018-2036

Sorensen, A.T. (2003), 'Insurer-hospital bargaining: negotiated discounts in post-deregulated Connecticut', *Journal of Industrial Economics*, 51: 469-490

Tai, W.C., F.W. Porell and E.K. Adams (2004), 'Hospital choice of rural Medicare beneficiaries: patient, hospital attributes, and the patient-physician relationship', *Health Services Research*, 39: 1903-1922

Van der Schee, E., D. Delnoij and J. Kerssens (2005), 'Keuze van ziekenhuizen: welke overwegingen zijn belangrijk voor consumenten?' ('Hospital choice: which considerations are important for consumers'), *Tijdschrift voor Geneeskunde*, 83: 113-115

White, W.D. and M.A. Morrisey (1998), 'Are patients travelling further?', *International Journal of the Economics of Business*, 5: 203-221

Xavier, A. (2003), 'Hospital competition, GP fundholders and waiting times in the UK internal market: the case of elective surgery', *International Journal of Health Care Finance and Economics*, 3: 25-51

Chapter 5

Assessing hospital competition when prices don't matter to patients: the use of time-elasticities

M. Varkevisser, S.A. van der Geest and F.T. Schut

International Journal of Health Care Finance and Economics, forthcoming, DOI: 10.1007/s10754-009-9070-6

Abstract

Health care reforms in several European countries provide health insurers with incentives and tools to become prudent purchasers of health care. The potential success of this strategy crucially depends on insurers' bargaining leverage vis-à-vis health care providers. An important determinant of insurers' bargaining power is the willingness of consumers to consider alternative providers. In this paper we examine to what extent consumers are willing to switch hospitals when they are fully covered for hospital services, which is typical for many European countries. Since prices do not matter to these patients, we estimate time-elasticities to assess hospital substitutability. Using data from a large Dutch health insurer on non-emergency neurosurgical outpatient hospital visits in 2003, we estimate a conditional logit model of patient hospital choice taking both patient heterogeneity and hospital characteristics into account. We use the parameter estimates to simulate the demand effect of an artificial increase in travel time by 10 percent for every patient, holding all other hospital attributes constant. Overall, the resulting point estimates of hospitals' time-elasticities are fairly high, although variation is substantial (-2.6 to -1.4). Sensitivity tests reveal that these estimates are very robust and differ significantly across individual hospitals. This implies that all hospitals in our study sample have at least one close substitute which is an important precondition for effective hospital competition.

5.1 Introduction

After decades of central price and capacity control, several European governments are now reforming their health care system by introducing competition. In countries like Germany, the Netherlands, and Switzerland competition has recently been introduced in social health insurance to motivate health insurers to act as prudent purchasers of health care. Differential and selective contracting of providers is expected to encourage providers to reduce prices of services, increase quality and to better tailor services to consumer needs. In order to obtain these benefits it is important that health insurers have sufficient bargaining power vis-à-vis health care providers. Empirical evidence indicates that the willingness of consumers to switch providers is most important in determining insurers' abilities to negotiate favourable contracts (Sorensen, 2003). As in any market, the intensity of competition among health care providers will therefore be driven by consumers' preferences for different providers.

To assess the feasibility of effective provider competition typically the price-elasticity of demand for individual providers is estimated. If the demand faced by an individual provider is price-inelastic, the provider has a strong market position which may hamper competition. But what if prices do not matter to consumers? In the Netherlands as well as in many other European countries health insurance coverage is very comprehensive and out-of-pocket payments are either absent or do not differ across provider alternatives. This implies that consumers are insensitive to differences in price. In addition, as opposed to the United States, consumers in Europe typically do not commit to a restricted provider network when buying health insurance.[1] Under these circumstances, providers compete directly for patients by non-price factors only and travel time is then the "price" consumers face when selecting a health care provider (Varkevisser et al., 2008).

In this paper we argue that when monetary prices do not matter to consumers, provider substitutability that underlies each provider's individual bargaining clout can be assessed by estimating time-elasticities. A provider's time-elasticity measures consumers' propensity to switch to other providers in response to an artificial increase in travel time. A relatively low time-elasticity implies that compared to other providers only a few patients are likely to switch when that particular provider would become more costly (in terms of travel costs) and therefore less attractive, suggesting the absence of close

[1] Models specifically designed to estimate the value consumers place on different provider networks (Town and Vistnes, 2001; Capps et al., 2003) do therefore not accurately depict markets for health care in European countries. Switzerland may be an exception, since there integrated insurer-provider organisations have a significant and increasing market share.

substitutes. In that case, the provider has a stronger bargaining position than other providers which lowers the health insurer's ability to negotiate price discounts and/or quality improvements. It is more difficult for an insurer to divert patients from a provider with time-inelastic demand than to divert patients from a provider with time-elastic demand. Time-elasticities thus at least have an ordinal meaning. Assuming that patients are willing to trade time for money at a constant rate, price-elasticities are directly proportional to time-elasticities (Capps et al., 2001). However, since we do not know patients' time-money trade-off there is no cardinal meaning to the time-elasticities we estimate in this paper.

Computing time-elasticities requires the estimation of a patient choice model from which the demand for each provider can be derived. In this paper, we use a unique dataset from a large Dutch health insurer on non-emergency neurosurgical outpatient hospital visits in 2003 to analyse patients' preferences for hospitals. We assume that patients visit the hospital that maximizes their utility given their own characteristics and the characteristics of the hospitals (e.g. travel time to the hospital, quality) in their choice set. Based on this theoretical framework, we estimate a conditional logit model (McFadden, 1974). A hospital's time-elasticity is then computed by simulating the demand effect of an artificial increase in travel time to the hospital by 10 percent for every patient, holding all other attributes constant. Our results show that patient demand for neurosurgery is rather time-elastic, but estimated time-elasticities differ significantly across individual hospitals. Hence, in the market for neurosurgery some hospitals face fewer close substitutes than others and therefore have a stronger market position. Information about hospital substitutability revealed by the estimation of time-elasticities is relevant for assessing the feasibility of selective contracting by health insurers and also for assessing proposed hospital mergers by antitrust enforcement agencies.

Our contribution to the existing literature is twofold. First, we provide a test for the feasibility of effective competition among health care providers in a setting where prices do not matter to consumers. Studies on patient hospital choice are almost exclusively performed in the context of US hospital markets, which is quite different from the more regulated health care setting in most European countries. We show how predicted patient flows following an artificial change in travel time can be used to identify which hospitals are competitors. Second, unlike previous studies that only present point estimates of hospitals' demand elasticities we use a parametric bootstrap method to obtain confidence intervals for the estimated time-elasticities.

The remainder of this paper is structured as follows. Section 5.2 describes the regulated context in which during our study period hospital prices were determined in the

Netherlands. Section 5.3 gives a brief overview of the existing empirical literature on patient hospital choice. Section 5.4 describes our conditional logit model of patient hospital choice and the data used for the empirical analysis. Section 5.5 presents the time-elasticities of Dutch hospitals based on our simulation results and the results of the robustness tests. Section 5.6 concludes.

5.2 Price determination in the Dutch hospital sector

From 1983 to 2005 per diem rates for Dutch hospitals were derived from a global budget (Schut and Van de Ven, 2005). The hospital budget was partly fixed and partly determined by the volume of production that each hospital had to negotiate with health insurers. If actual hospital production exceeded the *ex ante* negotiated level of output, next year's prices had to be reduced to compensate for the resulting difference between a hospital's revenue and its budget. For each hospital, all health insurers paid the same price (per diem rate). During this period, people entitled to social health insurance (two thirds of the total population) were fully covered for hospital care. Hence, for the majority of the Dutch population hospital prices did not matter. As a result of price regulation, however, Dutch patients' price-insensitivity and the absence of selective contracting did not result in arbitrarily high prices for hospital services.

Only since 2005 hospitals and health insurers are able to freely negotiate prices, service, and quality for part of the hospital services. From 2005 to 2009 the proportion of the freely negotiable hospital production has been increased from 10 percent to 34 percent of total hospital expenditure.

5.3 Empirical literature on patient hospital choice: a brief overview

Most of the early literature on patient hospital choice examines patterns of hospital utilisation using spatial interactions models, most commonly in the form of gravity models. Such models hypothesise that a greater level of spatial interaction between two areas is expected when the population masses of those areas are larger and the spatial distance between them is smaller. Representative studies include Morill et al. (1970), Roghmann and Zastowny (1979), and McGuirk and Porell (1984). Since the mid-eighties, however, researchers have used random utility theory to analyse in more detail why patients prefer a particular hospital to others (e.g. Folland, 1983; Lee and Cohen, 1985). The widespread availability of individual patient level utilisation data in the United States enabled the development of sophisticated econometric methods to estimate the probability that patients will be admitted to a particular hospital, explicitly incorporating the existence of other hospitals.[2] From these studies it follows that, in addition to distance or travel time, both hospital and patient attributes have a substantial impact on hospital admission choices. In particular hospital quality seems to affect patient choice. It is important to notice that most studies reveal the trade-off between travel time and hospital quality to vary with patient characteristics. These studies include Bronstein and Morrisey (1991), Burns and Wholey (1992), Phibbs et al. (1993), Hodgkin (1996), Tay (2003), Tai et al. (2004), and Howard (2005). From these findings it can be concluded that hospitals offer a differentiated product to a segmented market. As a result, simply aggregating all patients may lead to biased estimation results, even when these patients suffer from the same specific medical condition.

5.4 Conditional logit model of patient hospital choice

5.4.1 The model

Our model is based on standard random utility theory. It uses a patient-level utility function in which travel time and hospital attributes reflecting quality differences are the main determinants of patient hospital choice. When selecting a hospital, patients are assumed to weigh the costs of increased travel time (including both monetary costs as well as the opportunity costs of time for themselves and/or their relatives) against the benefits (higher quality). The utility of patient *i* who visits hospital *j* is represented by

$$U_{ij} = \delta \cdot t_{ij} + \sum_{k=1}^{n} \lambda_k \cdot H_{kj} + \sum_{l=1}^{m} \rho_l \cdot P_{li} \cdot t_{ij} + \sum_{k=1}^{n} \sum_{l=1}^{m} \sigma_{kl} \cdot H_{kj} \cdot P_{li} + \gamma_{ij} \tag{5.1}$$

where t_{ij} reflects travel time from patient *i*'s home to hospital *j*; $H_{.j}$ is a vector of hospital *j*'s attributes; $P_{.i}$ is a vector of patient *i*'s socio-economic characteristics; and γ_{ij} represents the idiosyncratic part of patient *i*'s evaluation of hospital *j*. Note that prices are not included in this function because we study patient choice in a setting where prices are irrelevant: patients are fully insured for hospital services without facing any out-of-pocket pay-

[2] In their extensive review article, Porell and Adams (1995) summarise and assess the historical developments in hospital choice literature from the late 1960s until the early 1990s.

ments. We assert that patient i, given his needs and preferences, visits hospital j when visiting any other alternative hospital would result in lower utility.[3]

By interacting travel time and hospital attributes with the individual patient characteristics, we allow the trade-off between travel time and hospital quality to vary across patients.[4] When a particular hospital would become less attractive, its patients possibly make different decisions. Depending on their place of residence and other individual characteristics some patients may still decide to visit this hospital, while others may change to another nearby hospital or prefer to travel further for their hospital care. This flexibility is a major advantage of the model, because it allows us to analyse the substitutability of hospitals more precisely.

5.4.2 Empirical specification

For the empirical specification of Equation 5.1, we define the dependent variable HC_{ij} which is assigned the value 1 when patient i visited hospital j and the value 0 otherwise. For each patient a choice set of feasible hospital alternatives is defined (N_i). We estimate Equation 5.1 as a conditional logit model (McFadden, 1974). It is therefore assumed that, for each patient, the relative probabilities of visiting any two hospitals are independent of any other available alternatives. This restriction, called the independence of irrelevant alternatives (IIA) assumption, implies that one assumes all systematic variation in patients' taste to be sufficiently captured by the explanatory variables incorporated into the logit model. The remaining, unobserved portion of utility is then essentially white noise. To test whether the IIA-assumption is valid in this context, we perform the Hausman-McFadden (1984) test. If this assumption is not violated patient i's probability of visiting hospital j is represented by

$$\text{(5.2)} \qquad \Pr_{ij} = \frac{\exp(\delta \cdot t_{ij} + \sum_{k=1}^{n} \lambda_k \cdot H_{kj} + \sum_{l=1}^{m} \rho_l \cdot P_{li} \cdot t_{ij} + \sum_{k=1}^{n} \sum_{l=1}^{m} \sigma_{kl} \cdot H_{kj} \cdot P_{li})}{\sum_{j=1}^{N_i} \exp(\delta \cdot t_{ij} + \sum_{k=1}^{n} \lambda_k \cdot H_{kj} + \sum_{l=1}^{m} \rho_l \cdot P_{li} \cdot t_{ij} + \sum_{k=1}^{n} \sum_{l=1}^{m} \sigma_{kl} \cdot H_{kj} \cdot P_{li})}$$

[3] In the Netherlands the decision which hospital to visit is made by patients themselves, most often in consultation with their general practitioner (GP). Since Dutch GPs do not face any economic incentives to refer patients to particular hospitals, it is not in their interest to ignore patients' preferences.

[4] In this paper quality as perceived by the patient and his advising GP determines hospital choice, rather than hospitals' unobservable intrinsic clinical quality.

This study analyses choices concerning patients' first outpatient non-emergency hospital visits for neurosurgery.[5] Since these visits to the hospital's outpatient clinic are patients' first appointment with a physician for initial consultation or examination, the severity of their illness is at that moment not yet fully known.[6] The decision to visit hospital *j* is expected to be negatively affected by the travel time from patient *i*'s home. Based on the findings from previous research, we include four additional hospital attributes to test for their ability to attract patients: university medical centre, overall reputation, reputation for neurosurgery, and waiting time. Previous research revealed that Dutch patients are less likely to choose academic hospitals for their first hospital visit, whereas a shorter waiting time increases the attractiveness of a hospital (Varkevisser and Van der Geest, 2007). Since in the Netherlands hospital clinical quality was not yet systematically measured in 2003, in this paper indicators of hospitals' overall reputation and reputation for neurosurgery are included as a proxy for hospital quality as perceived by the patient and his advising GP.

An issue that arises when estimating a model of patient hospital choice is the potential endogeneity of quality: does high quality attract patients or does a high number of patients lead to high quality? If the latter is true, hospitals with geographically attractive locations may gradually become high-quality hospitals over time. In our sample, however, there is no correlation between a hospital's reputation and its size. Hence, higher-quality hospitals are not systematically higher-volume hospitals. We therefore treat quality as exogenous in the model, so that the causation runs from quality to patient choice and not in reverse.

Another potential endogeneity problem may occur if hospital waiting time is affected by patients' hospital choice. This would be the case if consumers have a preference for hospitals with high waiting times because they interpret higher waiting times as a signal of higher quality. However, empirical evidence for the Netherlands (NZa, 2007) as well as for other countries (e.g. Hanson et al., 2004; Martin et al., 2007) shows that patients tend to avoid hospitals with relatively high waiting times. We also do not observe any correlation between waiting time, overall reputation and reputation for neurosurgery in our data. Hence, high quality is here not associated with high waiting time. Therefore

[5] For emergency visits it is likely that patients simply choose the nearest hospital rather than the hospital that, given its attributes, would maximise their utility.

[6] Neurosurgical conditions include primarily brain, spinal cord, vertebral column and peripheral nerve disorders. By far the most common procedure is surgery to correct a hernia.

we treat each hospital's waiting time as an exogenous explanatory variable and expect a negative sign for it.[7]

All other things equal, patients are more likely to end up in large hospitals than in smaller ones. To control for this exogenous size effect, hospital *j*'s total number of beds and its annual volume of first outpatient hospital visits for neurosurgery are also included as explanatory variables.

The patient characteristics in our model include gender, age (adult vs. non-adult), employment, and social status.[8] The effect of gender on patients' hospital choice is unclear beforehand. Non-adult patients may be associated with a higher propensity to travel, since parents are likely to be less averse to travel when seeking the best neurosurgical hospital care available for their children.

Since all patients in our dataset are enrolled in social health insurance, their annual income during our study period (2003) did not exceed the threshold for eligibility (€31,750). Most patients are salaried employees (or their dependents). Those who are not, are identified by the following dummy variables: unemployment, retirement, incapacity for work, social security, and self-employment. Retired patients may be more averse to travel than others because they are more likely to have physical problems restricting their mobility. More distant hospitals are also expected to be less attractive to unemployed patients and patients on social security. Given their low income, it is likely that they are less willing to incur travel expenses. Patients who are incapacitated for work are likely to have a serious chronic condition which could make them more sensitive to (perceived) hospital quality differences. Hence, they may be more willing to travel to a distant but better performing hospital. On the other hand, these patients are also likely to have physical impairments that may reduce their propensity to travel. Finally, self-employed patients may be less willing to travel because they are likely to have higher opportunity costs of (travel) time since – in contrast to salaried employees – their income is directly related to actual working time.[9]

---

[7] Nevertheless, if hospital waiting time – contrary to our expectations – would be perceived as a high quality signal, patients' disutility of waiting time is likely to be underestimated. We do not have sufficient data to construct reliable instrumental variables to correct for this potential bias. As long as we find hospital waiting time to be negatively correlated with hospital choice, this potential bias may not be a serious problem.

[8] Patients' own previous experiences with hospitals may also affect their decisions. Unfortunately, such information is lacking in our dataset.

[9] As a result of collective labour agreements, nearly all salaried employees in the Netherlands have the right to visit a doctor during working time without loss of income.

5.4.3 Data

Our principal data source is the Agis Health Database that contains individual patient level data from a large Dutch health insurer (Agis). In 2003, Agis was one of the largest Dutch health insurers representing approximately 1.4 million socially insured amounting to a nationwide market share of 14 percent. Its key geographical areas include both urban (Amsterdam, Utrecht) and rural areas. Since all patients in the sample are enrolled in a social health insurance plan no-one has to pay an out-of-pocket price for hospital services.

From the Agis Health Database we obtained observations on non-emergency first outpatient hospital visits for neurosurgery in 2003. In addition to each patient's socio-economic characteristics, the available data include the zip code and name of the hospital visited. There are 66 hospitals in the Netherlands providing neurosurgery. The most common types of neurosurgery (such as hernia repairs) are performed in all these hospitals.

Patients' travel times are defined as the fastest route by car from patient *i*'s home to each hospital and are calculated in minutes. This route is obtained from a database that includes all 4-digit zip codes in the Netherlands and accounts for differences in average speed that exist between different road types.[10] If patients travelled extremely long to the hospital visited, it can reasonably be assumed that they were away from home when they needed health care. For those patients, travel time from their place of residence incorrectly measures the travel costs incurred, which may bias the estimation results. In this paper we therefore exclude all patients who travelled more than 60 minutes (4.6 percent). For the remaining patients a set of hospital choices is defined (N_i). Each patient's choice set consists of all hospitals providing neurosurgery that can be reached within 60 minutes of travel time. Note that on average patients travelled 19 minutes, while for 95 percent of the patients actual travel time did not exceed 45 minutes. More than 80 percent travelled less than 30 minutes. In the Netherlands, even patients who need a very complex neurosurgical treatment do not have to travel more than 60 minutes to the nearest hospital capable of performing the surgery. Hence, within the Dutch context a limit to each patient's hospital choice set of 60 minutes of travel time is not likely to be restrictive when analysing actual choice behaviour. Since Dutch health insurers were not allowed to contract selectively with hospitals in 2003 there are no further restrictions on patients' choice sets.

---

[10] As Dutch zip codes consist of four numbers followed by two letters (e.g. 3000 DR), the maximum inaccuracy in distance between this point and the actual starting point and destination could be about 250 meters in urban areas and 1,000 meters in rural areas at most.

The resulting study sample contains 5,389 individual patient hospital visits. From Table 5.1 it follows that for almost 90 percent of these patients the choice set includes at least 15 hospitals. Only little more than 2 percent of the patients can reach at most 5 hospitals within 60 minutes of travel time from their home. On average, patient *i*'s choice set includes 26 hospitals. Average travel time to the nearest hospital providing neurosurgery is 13 minutes. Varkevisser and Van der Geest (2007) found that for their first outpatient hospital visit 54 percent of the neurosurgery patients bypassed the nearest hospital alternative. For these patients bypassing the nearest hospital resulted in about 11 minutes more travel time than would be strictly necessary.

Table 5.1: Number of hospitals in patients' choice sets

Hospitals (#)	Patients (#)	Patients (%)	Patients (cum. %)
1	1	0%	0%
2	20	0%	0%
3	31	1%	1%
4	30	1%	2%
5	40	1%	2%
6	74	1%	4%
7	68	1%	5%
8	43	1%	6%
9	90	2%	7%
10	39	1%	8%
11	19	0%	8%
12	28	1%	9%
13	26	1%	9%
14	78	1%	11%
15	9	0%	11%
16	26	1%	12%
17	88	2%	13%
18	74	1%	15%
19	33	1%	15%
20	198	4%	19%
21	176	3%	22%
22	256	5%	27%
23	112	2%	29%
24	165	3%	32%
25	219	4%	36%
26	88	2%	38%
27	97	2%	40%
28	394	7%	47%

Table 5.1: Number of hospitals in patients' choice sets (continued)

Hospitals (#)	Patients (#)	Patients (%)	Patients (cum. %)
29	541	10%	57%
30	779	15%	71%
31	155	3%	74%
32	364	7%	81%
33	258	5%	86%
34	149	3%	89%
35	210	4%	92%
36	158	3%	95%
37	46	1%	96%
38	79	2%	98%
39	60	1%	99%
40	61	1%	100%
41	7	0%	100%
Sum	5,389	100%	
Mean	26		
Modus	30		

Note: each patient's choice set comprises all hospitals providing neurosurgery within 60 minutes of travel time.

As already mentioned, a lack of data forces us to use indicators such as hospitals' reputation as a proxy for quality. However, we do not consider this to be a serious shortcoming. Due to the absence of clinical quality indicators during the study period, patients at that time also had to rely on (information about) hospitals' reputation for making choices. Information on hospital's overall reputation and reputation for neurosurgery are both taken from an annual survey among Dutch physicians, nurses and hospital managers published in a popular news magazine (Elsevier, 2003). The explanatory variable reflecting each hospital's overall reputation measures several hospital-specific items, including both positive items (e.g. attitude towards patients, medical and nursing staff expertise, facilities) and negative items (e.g. financial problems, medical staff disputes, high staff turnover). This dummy variable has the value 1 if hospital *j*'s unweighted sum of its bonus and penalty points exceeds the national average and the value 0 otherwise. The reputation for neurosurgery is also captured by a dummy variable. This variable has the value 1 if hospital *j* is recommended by at least 33 percent of the respondents and the value 0 otherwise.

Data on individual hospital waiting times is obtained from the Netherlands Hospital Association. In 2003, this data was accessible for patients by the internet and also frequently published in a Dutch newspaper. To test our hypothesis that hospitals with lower waiting times are more attractive to patients than other hospitals, we use a dummy variable that has value 1 when hospital *j*'s waiting time for a neurosurgical first hospital visit was reported to be below the national average in 2003 and the value 0 otherwise.

Finally, we control for exogenous hospital size effects by including two additional explanatory variables on hospital size that are obtained from the Dutch Ministry of Health, Welfare and Sports. To capture possible diagnosis-specific size effects, we did not only include hospital *j*'s total number of beds but also its annual number of first outpatient hospital visits for neurosurgery. This variable includes patients from all social health insurance plans and private insurers.

Table 5.2 reports the descriptive statistics of all variables that are included in our logit specification.

Table 5.2: Descriptive statistics of the study sample

Variable	Mean	St. dev.	Minimum	Maximum
Actual travel time (in minutes by car)	19	12	0	60
Patient attributes (n = 5,389)				
Female	0.59		0	1
Non-adult	0.04		0	1
Retired	0.25		0	1
Unemployed	0.02		0	1
Incapacitated for work	0.25		0	1
Social security	0.06		0	1
Self-employed	0.02		0	1
Hospital attributes (n = 66)				
University medical centre	0.12		0	1
Good overall reputation	0.48		0	1
Good reputation for neurosurgery	0.09		0	1
Waiting time below average	0.39		0	1
Total hospital beds	611	268	210	1,368
First hospital visits for neurosurgery	655	591	0	2,380

5.4.4 Estimation results

For the conditional logit estimation of Equation 5.1 we use the maximum likelihood estimation method and standard iterative procedures for its optimisation. Maximum likelihood estimation of the conditional logit model can be shown under very general conditions to provide estimators that are asymptotically efficient and normally distributed (McFadden, 1974). In particular when the dataset has many combinations of hospitals and residency zip codes with no actual visits ("zero flows"), maximum likelihood is the preferred estimation method for conditional logit models of patient hospital choice. As shown by Garnick et al. (1989), maximum likelihood estimates are far less sensitive to the presence of zero flows than alternative estimation techniques.

As already mentioned, we perform the Hausman-McFadden test to test the validity of the IIA assumption. This chi-squared test compares the estimated parameters and covariance matrices from the full choice set with a restricted choice set. For this study, the test statistic indicates we cannot reject the null hypothesis that the difference in coefficients is not systematic. Hence, the IIA assumption seems to hold here implying that all systematic variation in patients' taste is sufficiently captured by the explanatory variables.

In order to measure goodness of fit we analyse predicted versus actual hospital choice. Following Town and Vistnes (2001), a "hit-or-miss" criterion is constructed where the predicted choice for a patient is the hospital having the maximum predicted probability. The model correctly predicts 43 percent of patients' hospital choices. Given the large number of hospital alternatives available to patients (on average 26), this prediction rate suggests the model provides a high degree of explanatory power. The hospital choice model estimated by Town and Vistnes (2001) correctly predicts about 30 percent of hospital choices for their different samples. Most studies on patient hospital choice, however, do not report how well their estimated models predict patients' actual choices. By exception, Capps et al. (2001) report that 35 percent of the patients in their sample visited the hospital having the maximum predicted probability.

Detailed estimation results are presented in Table 5.3.[11] The coefficient for travel time is negative and statistically significant at 1% indicating that in general patients are averse to travel.

[11] We also estimated a full model including all possible interactions of patient characteristics and hospital attributes. The likelihood-ratio test indicates that the full model is statistically preferred over the reduced one. However, we prefer to use the latter since most interaction variables included in the full model are insignificant and the reduced model's estimated parameters are more easy to interpret, while both the overall model performance and predicted market shares do not substantially differ between both models.

Table 5.3: Estimation results conditional logit model

	Coefficient		SE
Travel time	-0.1600	**	0.0037
Hospital attributes:			
University medical centre	-1.7820	**	0.0870
Good overall reputation	0.1101	*	0.0448
Good reputation for neurosurgery	0.0161		0.0599
Waiting time below average	0.3397	**	0.0356
Total hospital beds	0.0016	**	0.0001
First hospital visits for neurosurgery	0.0018	**	0.0001
Interacted with *Female*:			
Travel time	-0.0105	**	0.0038
University medical centre	-0.0164		0.0712
Interacted with *Non-adult:*			
Travel time	0.0532	**	0.0085
University medical centre	4.1262	**	0.2804
Interacted with *Retired:*			
Travel time	-0.0180	**	0.0052
University medical centre	0.1213		0.0916
Interacted with *Unemployed:*			
Travel time	0.0135		0.0125
University medical centre	-0.1924		0.2746
Interacted with *Incapacitated for work:*			
Travel time	0.0171	**	0.0045
University medical centre	0.6456	**	0.0867
Interacted with *Social security:*			
Travel time	-0.0257	**	0.0096
University medical centre	0.1249		0.1561
Interacted with *Self-employed:*			
Travel time	0.0174		0.0115
University medical centre	0.0118		0.2618
Log likelihood	-8951.69		
Degrees of freedom	21		
Number of patients	5,388		
Number of patient-hospital combinations	142,037		

Note: ** denotes significance at 1%; * at 5%.

The estimation results for the hospital attributes show that patients are generally less likely to choose a university medical centre for their first outpatient neurosurgical hospital visit. There are two plausible explanations for this. First, for non-tertiary care Dutch physicians, nurses and hospital managers do not classify university medical centres among the best hospitals they know (Elsevier, 2003) which may explain patients' preferences for general hospitals. Second, patients may expect to get more personal attention in a general hospital than in a university medical centre that is aimed at scientific research as well as medical education and where it is more likely for them to be (initially) treated by a medical resident instead of a fully qualified physician. From the estimation results it follows that a hospital's overall reputation significantly affects patients' choices. A good overall reputation increases a hospital's attractiveness. The estimated parameter for a hospital's reputation for neurosurgery is also positive, though not statistically significant. This may be due to the fact that only 6 of the 66 Dutch hospitals providing neurosurgery have a specifically good reputation for this medical speciality. Patients are in general also more likely to choose hospitals for which waiting time is below the national average.

From Table 5.3 it follows that several patient characteristics significantly affect hospital choice, particularly in relation to travel time. Both female patients, retired patients, and patients on social security are significantly less inclined to travel. The opposite holds for non-adults and patients incapacitated for work. The latter are likely to suffer from chronic diseases and to have previous experiences with hospitals. This may explain why they are less averse to travel and more likely to visit a university medical centre. Our finding that also children are more likely to visit a university medical centre can be explained by the fact that in the Netherlands specialised facilities for paediatric care are concentrated in these hospitals. Overall, 26 percent of the adult patients included in our study sample visit a university medical centre for their first neurosurgical outpatient visit, while this percentage for non-adult patients is 89 percent.

5.5 Using time-elasticities to assess hospital competition

5.5.1 Computing time-elasticities

In this section we demonstrate how to compute time-elasticities for individual hospitals and use these to assess hospital substitutability. The underlying general methodology is obtained from Capps et al. (2001). Estimating the time-elasticity of hospital *j* involves four successive steps. In the first step, hospital *j*'s market share is predicted by summing up patients' estimated choice probabilities for hospital *j*. In the second step, travel time to hospital *j* is artificially increased by a certain percentage (e.g. 10 percent) for every patient while holding travel time to all other hospitals at their true level. This implies that patients are virtually moved away from hospital *j* and brought relatively closer to other hospital alternatives in their choice set. These hospitals therefore become relatively more attractive to them. In the third step, hospital *j*'s "new" market share is calculated. Using the estimated parameters from the patient choice model, new choice probabilities are calculated and summed up for hospital *j* as well as all other hospitals to reveal substitution patterns. In the final step, hospital *j*'s time-elasticity is computed dividing its percent change in predicted market share (number of patients) by the percent change in travel time. This exercise identifies the extent to which other hospitals are substitutes for hospital *j*, holding all other things equal.[12]

Since many of the 66 hospitals included in our dataset have individual market shares that are negligible, we only estimate time-elasticities for the hospitals with a predicted market share of at least 2.5 percent since those are located in Agis' key geographical areas. Together these hospitals have a predicted cumulative market share of almost 85 percent (n = 13). Using the parameter estimates from Table 5.3, for each of these hospitals we predict the percent change in market share when travel time to that particular hospital is artificially increased by 10 percent. From Table 5.4 it follows that the resulting time-elasticities show considerable differences.[13]

The highest time-elasticity (-2.6) is found for hospital 22. This general hospital looses 41 of its 158 predicted neurosurgical patients to other hospitals when travel time is artificially raised by 10 percent for every patient in our study sample. As revealed by the thirteenth column of Table 5.5, 10 patients switch to hospital 32 (24 percent). The closest substitute for hospital 22, however, appears to be hospital 18 that is not included in the table but gains 13 patients (32 percent) when patients' "price" for visiting hospital 22 increases by 10 percent. Its relatively high time-elasticity implies that from all thirteen hospitals for which we have estimated time-elasticities hospital 22 potentially has the least bargaining power vis-à-vis health insurers.

---

[12] Buchmueller (2006) applies a quite similar approach when analysing the health plan choices of retirees. He uses the coefficient estimates from a conditional logit model for calculating the predicted change in each plan's markets share caused by a hypothetical $5 increase in premium while holding the premiums of all competing plans constant. Since the observed prices differ considerably among the plans included in his analysis, the hypothetical percentage increase in premiums is (much) higher for the less expensive health plans. As a result, the predicted changes in market shares are ambiguous.

[13] For reasons of confidentiality, hospital names are not revealed.

Table 5.4: Estimated time-elasticities

Hospital *j*	Predicted patients	Travel time +10%	
		ΔPatients	Time-elasticity
Hospital 56	714	-137	-1.9
Hospital 32	669	-99	-1.5
Hospital 52	550	-85	-1.5
Hospital 46	464	-91	-2.0
Hospital 37	344	-63	-1.8
Hospital 03	315	-69	-2.2
Hospital 59	293	-63	-2.1
Hospital 63	248	-53	-2.1
Hospital 14	242	-52	-2.2
Hospital 39	239	-33	-1.4
Hospital 22	158	-41	-2.6
Hospital 48	149	-31	-2.1
Hospital 64	136	-30	-2.2

Table 5.5: Where do patients go if travel time to their first-best hospital is artificially increased?

Hospital *j*	Predicted patients (#)	ΔPatients (#) for each hospital when travel time to hospital *j* is increased by 10%:												
		56	**32**	**52**	**46**	**37**	**03**	**59**	**63**	**14**	**39**	**22**	**48**	**64**
Hospital 56	714	-137	26	4	4	19	7	5	8	15	2	2	8	6
Hospital 32	669	32	-99	4	5	8	5	3	14	9	2	10	3	7
Hospital 52	550	4	4	-85	26	2	12	14	4	1	8		1	2
Hospital 46	464	4	4	22	-91	2	11	12	5	1	6		1	2
Hospital 37	344	22	8	2	3	-63	3	2	2	9	1		7	2
Hospital 03	315	8	5	11	12	3	-69	10	5	2	4		1	2
Hospital 59	293	5	3	11	11	2	9	-63	3	1	4		1	1
Hospital 63	248	11	14	5	6	3	6	3	-53	3	2		1	4
Hospital 14	242	16	8	1	2	8	2	1	3	-52	1		4	2
Hospital 39	239	2	2	11	11	1	6	6	2	1	-33			1
Hospital 22	158	2	7									-41		
Hospital 48	149	10	3	1	1	7	1	1	1	4			-31	1
Hospital 64	136	8	8	2	2	2	2	1	5	2	1		1	-30
Other hospitals	868	12	8	10	10	6	5	6	2	3	2	27	4	1
Sum	**5,388**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: since "fractional" patients are here rounded up/down to the nearest value, the columns are subject to round-off errors.

For the hospital with the highest predicted market share, hospital 56, a time-elasticity with the value -1.9 is estimated. When we artificially increase travel time to this university medical centre by 10 percent for every patient, it looses 137 of its initially predicted 714 patients for neurosurgery. The closest substitutes for this hospital appear to be the hospitals 32, 37, and 14. The number of patients substituting toward these alternative hospitals is 32, 22, and 16, respectively. Jointly these three general hospitals located nearby adopt more than 50 percent of the patients leaving hospital 56 following an increase in "price" there.

The hospital with the lowest time-elasticity (-1.4) is hospital 39: a medium-sized general hospital located in the inner city of Amsterdam. Only 33 of its predicted 239 patients switch to another hospital for their first neurosurgical outpatient visit when more travel time would be required. Patients apparently have relatively strong preferences for this hospital. Hence, in our study sample hospital 39 potentially has the best bargaining position with health insurers.

As revealed by Table 5.6, all hospitals in our study sample face substitutes. When a hospital would become less attractive, other hospitals will experience an increase in market share. If we identify competitors as those hospitals that at least 5 percent of the patients would substitute toward, Table 5.6 reveals that for all hospitals the number of competitors is fairly high. The minimum number of substitutes is 4 (hospitals 22, 37, and 48) and the maximum number is 7 (hospitals 3, 56, 63, and 64). However, the hospital substitution patterns found here reveal that overall about 25 percent of all switching patients are adopted by hospital *j*'s closest substitute. The three closest substitutes jointly adopt more than half of the patients predicted to leave hospital *j* following an artificial increase in travel time. Hence, the vast majority of hospital alternatives are only appealing to relatively few patients each. We therefore computed an HHI for the diverted patients.[14] The lower the value of this HHI, the more scattered the patients substituting away from hospital *j* are among the other hospitals. Note that if this "diversion HHI" tends to 1, the market is likely to be either a monopoly (if the time-elasticity estimated for hospital *j* is low) or duopoly (if the time-elasticity estimated for hospital *j* is high). Since the estimated time-elasticities are fairly high while the computed HHIs are rather low, all hospitals in our study sample seem to face strong competition in the market for neurosurgery.

[14] We thank one of the reviewers for making this suggestion.

Table 5.6: Assessing hospital substitutability (travel time +10%)

	ΔPatients	Hospital substitutes[a]	Percentage patients switching to hospital *j*'s: Closest substitute	Two closest substitutes	Three closest substitutes	HHI[b]
Hospital 56	-137	7	24%	40%	52%	0.119
Hospital 32	-99	6	26%	41%	49%	0.121
Hospital 52	-85	5	26%	39%	53%	0.131
Hospital 46	-91	6	28%	41%	54%	0.137
Hospital 37	-63	4	30%	43%	55%	0.143
Hospital 03	-69	7	17%	33%	46%	0.108
Hospital 59	-63	6	22%	40%	56%	0.130
Hospital 63	-53	7	25%	41%	51%	0.128
Hospital 14	-52	5	28%	46%	63%	0.154
Hospital 39	-33	6	24%	43%	56%	0.137
Hospital 22	-41	4	31%	56%	67%	0.179
Hospital 48	-31	4	27%	48%	59%	0.147
Hospital 64	-30	7	24%	43%	57%	0.135

Notes:

a. Those hospitals that at least 5 percent of the patients substitute toward.

b. This HHI is a concentration measure for the diverted patients.

5.5.2 Sensitivity tests

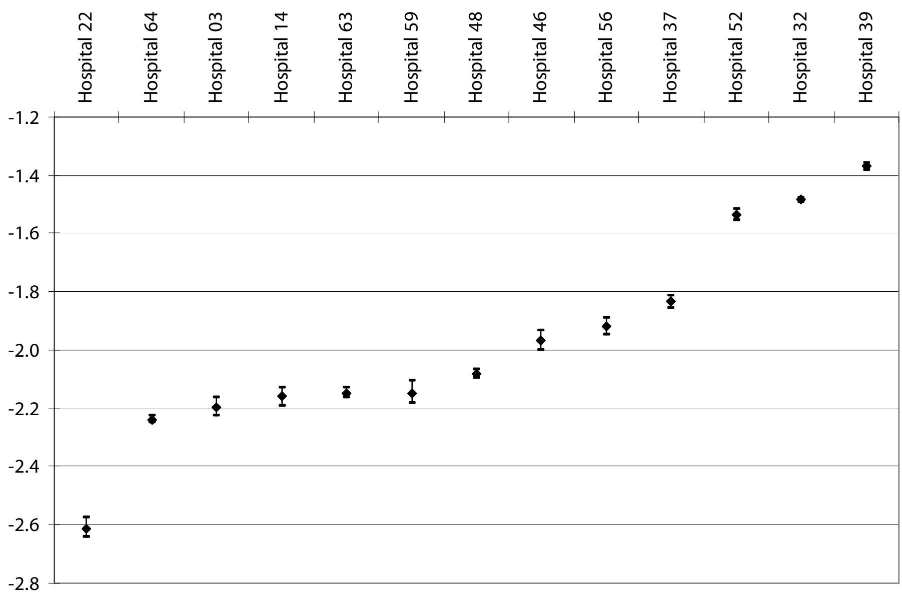
To test for the robustness of our findings, we use the vector of estimated parameters and corresponding covariance matrix from our conditional logit model to randomly draw 1,000 sets of alternative, equally probable model parameters from a multivariate normal distribution with this vector and matrix as means and covariance, respectively.[15] For each of these sets of coefficients hospital *j*'s time-elasticity is computed, resulting in a sample of 1,000 different time-elasticities from which we construct a 95% confidence interval for the time-elasticity of hospital *j*. Since the estimated time-elasticity is defined as the percent change in number of patients divided by the percent change in travel time, it may depend on the size of the artificial travel time change used. As an additional sensitivity test, using the same sets of alternative model parameters, we therefore also compute hospitals' time-elasticities using a 5 percent increase in travel times. The results from both Monte Carlo simulations are summarised in Table 5.7 and Figure 5.1. From the sensitivity tests it follows that the estimated time-elasticities are very robust.

[15] This parametric bootstrap is also referred to as the Krinsky-Robb method. The only assumption this method requires is that the estimated coefficients are joint normally distributed (Krinsky and Robb, 1986; 1990), which is in fact a statistical property of the conditional logit model. Maximum likelihood estimation of this model under very general conditions provides estimators that are normally distributed. The approximation is reasonably good even in quite small samples (McFadden, 1974, pp.119/120).

Table 5.7: Sensitivity tests estimated time-elasticities

	Travel time +10%				Travel time +5%			
	Results parametric bootstrap (*n* = 1,000)				Results parametric bootstrap (*n* = 1,000)			
	Mean	St. dev.	95% confidence		Mean	St. dev.	95% confidence	
Hospital 22	-2.6	0.02	-2.6	-2.6	-2.8	0.02	-2.9	-2.8
Hospital 64	-2.2	0.01	-2.2	-2.2	-2.4	0.01	-2.4	-2.4
Hospital 03	-2.2	0.02	-2.2	-2.2	-2.4	0.02	-2.4	-2.3
Hospital 14	-2.2	0.02	-2.2	-2.1	-2.3	0.02	-2.4	-2.3
Hospital 63	-2.1	0.01	-2.2	-2.1	-2.3	0.01	-2.3	-2.3
Hospital 59	-2.1	0.02	-2.2	-2.1	-2.3	0.02	-2.3	-2.3
Hospital 48	-2.1	0.01	-2.1	-2.1	-2.2	0.01	-2.3	-2.2
Hospital 46	-2.0	0.02	-2.0	-1.9	-2.1	0.02	-2.1	-2.1
Hospital 56	-1.9	0.01	-1.9	-1.9	-2.0	0.02	-2.1	-2.0
Hospital 37	-1.8	0.01	-1.9	-1.8	-2.0	0.01	-2.0	-1.9
Hospital 52	-1.5	0.01	-1.6	-1.5	-1.6	0.01	-1.6	-1.6
Hospital 32	-1.5	0.00	-1.5	-1.5	-1.6	0.00	-1.6	-1.6
Hospital 39	-1.4	0.01	-1.4	-1.4	-1.5	0.01	-1.5	-1.4

Figure 5.1: Estimated time elasticities' robustness (travel time +10%)



5.6 Concluding remarks

In several European countries, governments increasingly rely on competition as a strategy to encourage health care providers to reduce prices and increase quality. The success of this strategy depends on consumers' propensity to switch health care providers. Health insurers will not be able to negotiate favourable contracts (i.e. price discounts and/or quality improvements) with health care providers whose demand is rather inelastic.

In this paper we illustrate how to assess the feasibility of competition among hospitals in a setting where patients are insensitive to hospital prices, which is the case in many European countries. When insurance coverage is comprehensive for hospital services and out-of-pocket payments are absent or do not differ across hospitals, travel time functions as the only "price" for patients. In this setting hospitals' relative bargaining power with insurers can be assessed by computing their time-elasticities: the percent change in market share divided by the artificial percent change in travel time.

The time-elasticity approach starts by estimating a conditional logit model of patient hospital choice. Using data from a large Dutch health insurer on non-emergency neurosurgical outpatient hospital visits in 2003, we find that patients are indeed averse to travel. We use the parameter estimates to compute time-elasticities for thirteen Dutch hospitals. We simulate how patients, given their own characteristics, would respond when more travel time is required to visit the hospital, holding all other hospital attributes constant.

From our simulations it follows that the point estimates of hospitals' time-elasticities range from -1.4 to -2.6. When travel time is raised by 10 percent for every patient, the former hospital looses 14 percent of its patients to other hospitals while the latter looses as many as 26 percent of its patients. Our analysis reveals that overall hospital demand in the Netherlands is rather time-elastic which may suggest that effective hospital competition for neurosurgery is feasible. Estimated time-elasticities differ significantly across individual hospitals. In the market for neurosurgery some hospitals thus face fewer close substitutes than others and therefore have a stronger market position.

One should keep in mind that this paper analyses hospital substitutability in one particular submarket, defined as an insurer-hospital service pair. The empirical findings are therefore not necessarily representative for hospitals' substitutability in other submarkets. From a conceptual perspective, however, our findings clearly indicate that in a setting where patients' decisions which hospital to visit are based on non-price factors only, the time-elasticity approach can be a useful instrument to assess hospital substitutability that underlies hospital competition. Such information is not only relevant for assessing the feasibility of selective contracting by health insurers, but also for assessing proposed hospital mergers by antitrust enforcement agencies. First, time-elasticities can be used for ruling out hospitals as close substitutes allowing for instance for quick review of mergers not involving close substitutes. Second, by using time-elasticities for ranking hospital substitutes, antitrust analysis can focus on a particular set of hospitals that are the merging hospitals' closest substitutes. The ensuing analysis might then be qualitative and quantitative in nature, but it would be at least focused on the right hospitals.

References

Bronstein, J.M. and M.A. Morrisey (1991), 'Bypassing rural hospitals for obstetrics care', *Journal of Health Politics, Policy and Law*, 16(1): 87-118

Burns, L.R. and D.R. Wholey (1992), 'The impact of physician characteristics in conditional choice models for hospital care', *Journal of Health Economics*, 11(1): 43-62

Buchmueller, T. (2006), 'Price and the health plan choices of retirees', *Journal of Health Economics*, 25(1): 81-101

Capps, C.S., D. Dranove, S. Greenstein and M. Satterthwaite (2001), *The silent majority fallacy of the Elzinga-Hogarty criteria: a critique and new approach to analyzing hospital mergers*, Working Paper 8216, National Bureau of Economic Research (NBER), Cambridge (Mass.)

Capps, C.S., D. Dranove and M. Satterthwaite (2003), 'Competition and market power in option demand markets', *RAND Journal of Economics*, 34(4): 737-763

Elsevier (2003), *De beste ziekenhuizen*, ('The best hospitals'), 27 Sept: 38-50

Folland, S.T. (1983), 'Predicting hospital market shares', *Inquiry*, 20(1): 34-44

Garnick, D.W., E. Lichtenberg, C.S. Phibbs, H.S. Luft, D.J. Peltzman and S.J. McPhee (1989), 'The sensitivity of conditional choice models for hospital care to estimation technique', *Journal of Health Economics*, 8(4), 377-397

Hanson, K., W.C. Yip and W. Hsiao (2004), 'The impact of quality on the demand for outpatient services in Cyprus', *Health Economics*, 13(12): 1167-1180

Hausman, J. and D. McFadden (1984), 'Specification tests for the multinomial logit model', *Econometrica*, 52(5): 1219-1240

Hodgkin, D. (1996), 'Specialized service offerings and patients' choice of hospital: the case of cardiac catheterization', *Journal of Health Economics*, 15(3): 305-332

Howard, D.H. (2005), 'Quality and consumer choice in healthcare: evidence from kidney transplant', *Topics in Economic Analysis & Policy*, 5(1): 1-20

Krinsky, I. and A.L. Robb (1986), 'On approximating the statistical properties of elasticities', *Review of Economics and Statistics*, 68(4): 715-719

Krinsky, I. and A.L. Robb (1990), 'On approximating the statistical properties of elasticities: a correction', *Review of Economics and Statistics*, 72(1): 189-190

Lee, H.L. and M.A. Cohen (1985), 'A multinomial logit model for the spatial distribution of hospital utilization', *Journal of Business & Economic Statistics*, 3(2): 159-168

Martin, S., N. Rice, R. Jacobs and P. Smith (2007), 'The market for elective surgery: joint estimation of supply and demand', *Journal of Health Economics*, 26(2): 263-285

McFadden, D. (1974), 'Conditional logit analysis of qualitative choice behavior', in P. Zarembka (ed.), *Frontiers in Econometrics*, 105-142, New York: Academic Press

McGuirk, M.A. and F.W. Porell (1984), 'Spatial patterns of hospital utilization: the impact of distance and time', *Inquiry*, 21(1): 84-95

Morill, R.L., R.J. Earickson and P. Rees (1970), 'Factors influencing distances travelled to hospitals', *Economic Geography*, 46(2): 161-172

NZa (2007), *Richting geven aan keuzes: visiedocument* ("Channelling consumer choice"), Dutch Healthcare Authority (NZa), Utrecht

Phibbs, C.S., D.H. Mark, H.S. Luft, D.J. Peltzman-Rennie, D.W. Garnick, E. Lichtenberg and S.J. McPhee (1993), 'Choice of hospital for delivery: a comparison of high-risk and low-risk women', *Health Services Research*, 28(2): 201-222

Porell, F.W. and E.K. Adams (1995), 'Hospital choice models: a review and assessment of their utility for policy impact analysis', *Medical Care Research and Review*, 52(2): 158-195

Roghmann, K.J. and T.R. Zastowny (1979), 'Proximity as a factor in the selection of health providers: emergency room visits compared to obstetric admissions and abortions', *Social Science & Medicine*, 13D(1): 61-63

Schut, F.T. and W.P.M.M. van de Ven (2005), 'Rationing and competition in the Dutch health-care system', *Health Economics*, 14(S1): S59-S74

Sorensen, A.T. (2003), 'Insurer-hospital bargaining: negotiated discounts in post-deregulated Connecticut', *Journal of Industrial Economics*, 51(4): 469-490

Tai, W.C., F.W. Porell and E.K. Adams (2004), 'Hospital choice of rural Medicare beneficiaries: patient, hospital attributes, and the patient-physician relationship', *Health Services Research*, 39(6): 1903-1922

Tay, A. (2003), 'Assessing competition in hospital care markets: the importance of accounting for quality differentiation', *RAND Journal of Economics*, 34(4): 786-814

Town, R.J. and G. Vistnes (2001), 'Hospital competition in HMO networks', *Journal of Health Economics*, 20(5): 733-753

Varkevisser, M. and S.A. van der Geest (2007), 'Why do patients bypass the nearest hospital? An empirical analysis for orthopaedic care and neurosurgery in the Netherlands', *European Journal of Health Economics*, 8(3): 287-295

Varkevisser, M., C.S. Capps and F.T. Schut (2008), 'Defining hospital markets for antitrust enforcement: new approaches and their applicability to the Netherlands', *Health Economics, Policy and Law*, 3(1): 7-29

Chapter 6

Quality competition in regulated hospital markets: consumer information and patient choice for angioplasty

M. Varkevisser, S.A. van der Geest and F.T. Schut

Submitted for publication

Abstract

In hospital markets with regulated prices, competition among hospitals may increase quality. This requires reliable and detailed information about hospital quality, sufficient patient responsiveness to observed differences in quality, and the availability of a sufficient number of hospital alternatives. Using detailed claims data for 2006, we estimate a conditional logit model to examine how patients respond to consumer information about hospital quality in the Dutch market for angioplasty. We find that patient hospital choice is significantly affected by publicly available performance indicators despite that these indicators provide patients with conflicting signals. Since the available outcome measures are not adjusted for differences in case-mix increasing the room for competition, as recently proposed by the government, may encourage hospitals to select risks.

6.1 Introduction

In hospital markets with regulated prices hospitals compete for patients on non-price dimensions; i.e. geographic location and observed quality. In such markets competition may increase quality and improve consumer welfare if some preconditions are fulfilled. Patients must be able to choose from a sufficient number of hospitals, and information about hospital quality must be reliable, comprehensive, and publicly available. Patients (and/or their health insurers) otherwise can not choose a hospital with confidence that it is the most preferred combination of quality and travel time without incurring prohibitive search costs (Dranove and Satterthwaite, 2000). Furthermore, patients must respond to observed quality information, implying that the information must be easily accessible and understandable.

There is some empirical evidence that if prices are regulated observed quality is higher in more competitive hospital markets (Gaynor, 2006). Other studies, however, show that increased competition may have adverse effects on hospital quality. First, empirical studies about the effects of competitive reforms in the UK National Health Service show that increased competition in combination with a lack of consumer information may induce hospitals to reduce unmeasured and unobserved quality in order to improve measured and observed performances (Propper et al., 2004 and 2008). Second, empirical studies in US hospital markets show that if quality information is not adequate hospitals may be encouraged to avoid sick patients and/or seek the healthy ones. For instance, Dranove et al. (2003) find that the adoption of mandatory coronary artery bypass graft (CABG) surgery report cards in the states of New York and Pennsylvania in the early 1990s led to substantial risk selection by providers. To minimise this incentive it is essential to adjust health outcomes for differences in patient characteristics. Without some sort of risk-adjustment, hospitals treating the most serious cases necessarily appear to have low quality.

In this paper we examine both the appropriateness of publicly available quality indicators and how patients respond to this information to assess the feasibility of effective quality competition among hospitals. We focus on the Dutch market for angioplasty, or percutaneous coronary intervention (PCI), since this market provides a unique opportunity to empirically assess quality competition in a regulated hospital market. In this market patient hospital choice is only affected by observed quality and geographic location. Additionally, hospital prices are fixed by the Dutch Healthcare Authority (NZa) and entry is restricted by the Minister of Health. Moreover, several quality indicators are publicly available, so consumers may choose among providers that differ in observed quality. Assessing patients' responsiveness to observed quality differences and its potential effect on quality competition in this market is also interesting from a policy perspective. The Dutch government recently announced its intention to repeal the current entry regulation, implying an expected increase in competition in the market for angioplasty.

For this study, we use claims data from a large Dutch health insurer that provides a record of all enrolees who were admitted to a hospital for non-emergency angioplasty in 2006. The dataset includes detailed information about individual patients and their hospital choices. Supplemented by publicly available consumer information from two different sources we are able to examine the impact of observed quality differentiation on patient choice in the market for angioplasty given hospitals' geographic location and other exogenous attributes.

The paper is structured as follows. Section 6.2 describes the main features of the market for angioplasty in the Netherlands. Section 6.3 examines the publicly available hospital quality indicators and evaluates their consistency. Section 6.4 presents the data used for analysing patient hospital choice. Section 6.5 discusses both the model as well as the estimation results obtained by using a conditional logit framework. Section 6.6 analyses how patients respond to publicly available consumer information about hospital quality by computing their willingness to travel for improvements in a particular hospital quality indicator. Section 6.7 assesses (potential) hospital competition in this regulated market by simulating patient demand responses to hypothetical changes in observed quality, taking into account actual hospital differentiation. Section 6.8 concludes by summarising the most important findings and discussing their policy implications.

6.2 Market for angioplasty in the Netherlands

6.2.1 Supply regulation

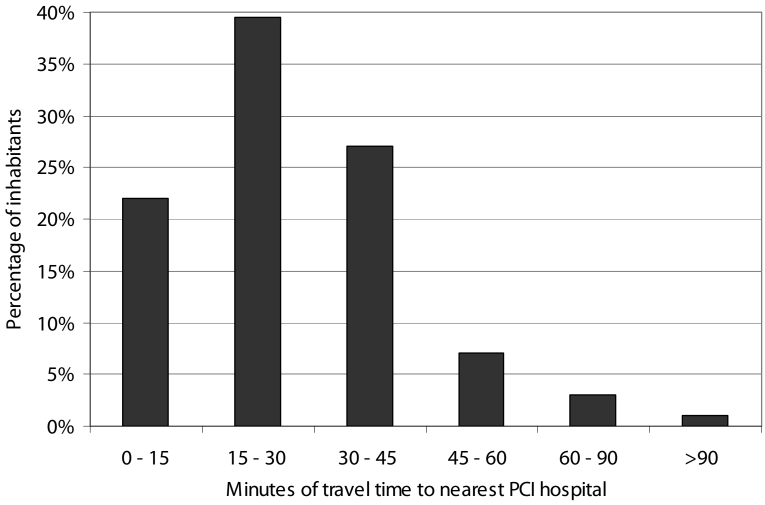
In the Netherlands, the Health Council (GHR) evaluates the effectiveness, efficiency, safety, and availability of (new) health technologies. Since 1998 this mandate is based on the Special Medical Procedures Act (WBMV). The WBMV focuses on quality of care and appropriate use, rather than on cost containment (Den Exter et al., 2004).[1] Since much of the care provided to patients with cardiovascular disease consists of interventions that are highly complex in nature, cardiac surgery and interventional cardiology were made

[1] For cost containment other supply constraints were introduced by the Dutch government, including the Hospital Facilities Act (WZV) and the Health Care Prices Act (WTG).

subject to the provisions of the WBMV. Accordingly, only hospitals with a permit granted by the government are allowed to perform angioplasty.[2]

The planning instrument provided by the WBMV made it possible for the government to exercise control over the quality and accessibility of specialised cardiac procedures in the Netherlands in order to safeguard the care provided to patients, both in terms of quality, capacity, as well as geographical distribution.[3] In 2006, nineteen hospitals were allowed to perform PCI and about 95 percent of the Dutch population was able to reach at least one of these hospitals within 60 minutes of travel time (Figure 6.1).

Figure 6.1: Travel time to nearest PCI hospital in the Netherlands (2006)



Source: www.zorgatlas.nl

After the introduction of PCI in the 1970s, this type of intervention has been performed more often than foreseen. In 1995 it was anticipated that by 2000 a total of 12,000 PCIs

---

[2] Angioplasty is performed to improve blood flow to the heart. It is a medical procedure in which a balloon is used to open a blockage in a coronary (heart) artery narrowed by atherosclerosis, a condition in which plaque builds up on the inner walls of the arteries. In the Netherlands, this procedure is also referred to as "dotteren" (named after C.T. Dotter, one of the pioneers who developed the procedure).

[3] In the United States certificate of need (CON) entry regulation was mainly imposed to contain costs by preventing a costly medical arms race. As in the Netherlands, such regulation also required hospitals to obtain approval from the state government before establishing certain services, such as angioplasty. Because prospective payment and managed care lessened the need for these supply controls, since the mid-1980s many states have repealed CON regulation for angioplasty (Vaughan Sarrazin and Rosenthal, 2004).

would be carried out. The actual figure that year, however, was 17,000. By 2005, this number had even increased to 32,000. This figure is expected to increase further to well over 40,000 interventions by 2010 (GHR, 2007). The main cause of this increase is that PCI has successfully replaced more complicated and risky surgical interventions, particularly coronary artery bypass grafting (CABG). By now, due to new techniques angioplasty on an outpatient same-day discharge base can be safely performed in the majority of patients with stable and unstable angina pectoris and with single- and multivessel PCI (Slagboom et al., 2005).

Anticipating these developments and responding to hospitals willing to enter the market for angioplasty,[4] the Dutch Minister of Health asked the Health Council whether it would be desirable to either modify or repeal the current entry regulation. In 2007 the Health Council concluded that maintaining the requirements concerning the minimum number of procedures and the availability of interventional cardiologists remained essential (GHR, 2007). First, a hospital should at least perform 600 PCI procedures per year.[5] Second, within a hospital at least four interventional cardiologists should be available. According to the Council, if additional capacity would be required the decision to allow new hospitals to enter the market for angioplasty needs to be prepared and implemented at the regional level to facilitate close collaboration at the level of primary care (GPs and ambulance services) and secondary care (PCI centres and cardiac centres with on-site heart surgery facilities). Despite the ongoing discussion regarding the arguments for and against further expansion of the number of PCI centres in the Netherlands (e.g. Zijlstra and De Boer, 2007), the Minister of Health recently expressed his intention to repeal the current entry regulation so that any hospital would be free to enter the market for angioplasty.[6] That is, if they are able to meet the requirements for starting a PCI programme mentioned in the Dutch guidelines for interventional cardiology (see Aengevaeren et al., 2005). First, there has to be a formal cooperation agreement with one of the existing centres that has cardiac surgery on site for the purpose of supervision, support, backup, and training in the initial phase. Second, the new centre has to demonstrate that 400 PCIs can be reached within two years and 600 PCIs within three to five years.

---

[4] Since hospitals and physicians are reasonable well reimbursed for their efforts per PCI procedure, financial arguments are very likely to play a role in the minds of the hospitals that have ambitions to start a new PCI centre (Zijlstra and De Boer, 2007).

[5] Studies examining the relation between the number of patients undergoing angioplasty at a hospital and their post-surgical outcomes indicate that minimum procedure volumes for hospitals and physicians contribute to yielding better outcomes (e.g. Ho, 2004).

[6] Urged by the parliament, in September 2009 this policy measure has been postponed to a later year.

6.2.2 Price regulation

Each patient admitted to a Dutch hospital or visiting a hospital's outpatient clinic is categorised into a Diagnosis and Treatment Combination (DBC). Each DBC includes all hospital activities and services (both inpatient and outpatient) associated with the patient's demand for care, from his initial consultation or examination to the final check-up. Since 2005, hospitals and insurers are able to negotiate prices per DBC for a number of routine hospital services. From 2005 to 2009 the proportion of freely negotiable hospital production, called B-segment, has been increased from about 10 to about 34 percent of total hospital expenditure. However, for the vast majority of hospital production, called A-segment, prices per DBC are still determined by the Dutch Healthcare Authority and do not differ across individual hospitals. This price regulation also applies to angioplasty. In 2006 the fixed price (including the reimbursement for hospital costs and a fixed physician fee, but excluding the cost of capital) of an outpatient and inpatient PCI was €6,400 and €9,000, respectively. As a result, for PCI procedures hospitals and insurers are only able to negotiate volume and quality.

6.2.3 Quality information

As a result of recent initiatives, hospital quality information becomes more available for patients in the Netherlands. Since 2005 some hospital quality information has become easily accessible on the government sponsored patient-oriented health care portal www.KiesBeter.nl (literally: "make better choices"). Already in its first year about 1.7 million people visited this website and early 2006 about 23 percent of the Dutch population was aware of its existence (Gravestein et al., 2006). Patients can use the portal for comparing individual hospitals on different sets of hospital outcome measures developed by the Dutch Healthcare Inspectorate (IGZ) in cooperation with stakeholders (hospitals and physicians). These sets, published on the internet with a one-year time lag, include hospital wide quality indicators and treatment-specific indicators. Indicators measuring the quality of PCI procedures performed by hospitals however are not (yet) available.[7]

When comparing hospitals for PCI procedures, patients can use the quality indicator measuring the percentage of heart failure patients that was readmitted to the same hospital within 12 weeks after discharge. The hospital's readmission rate after treatment for heart failure is a general indicator of the success of its cardiac treatment. If the Dutch guidelines on heart failure are followed, morbidity and the number of readmissions are

[7] Such data is being collected only recently within the context of the National Cardiovascular Data Registry (NCDR) database for PCIs (Van der Velde et al., 2008). However, though participation is mandatory for all PCI hospitals, public disclosure of their performances is not. Each individual hospital is the owner of its own data and information about performances are not available to third parties.

likely to decrease. The quality of life for heart failure patients will then also increase. An important limitation of this indicator is however that, as all other IGZ performance indicators, it is not adjusted for differences in the case-mix of hospitals.

Another quality indicator available to patients is the percentage of patients with pressure ulcers that arose after admission to the hospital. This indicator provides patients with general information about hospital wide quality. Pressure ulcers can be extremely painful, cause discomfort and, in some cases, even lead to life-threatening complications. Proper care can prevent them from occurring in the hospital.

In addition to the patient-oriented health care portal, patients can rely on hospital ratings provided by the media. A popular Dutch news magazine (Elsevier) annually ranks Dutch hospitals on overall reputation using information obtained from an annual questionnaire among general practitioners, medical specialists, residents, nurses, hospital managers, and hospital board members. The same questionnaire also provides information about hospitals' reputation for cardiology, which is also published in this magazine.

6.3 Consistency of publicly available quality information

For consumer information to be helpful, the available indicators should agree on the ranking of hospitals. If not, information may confuse rather than inform patients (e.g. Rothberg et al., 2008). Taking the perspective of a patient seeking to choose the best hospital for angioplasty, we here examine the quality information publicly available for angioplasty patients in 2006 and evaluate their consistency. For each of the four quality indicators discussed above, we rank all hospitals. As Figure 6.2 illustrates, the publicly available consumer information fails to agree on either top- or bottom-performing PCI hospitals. Hospitals ranked first by one indicator are often ranked much lower by another indicator and vice versa. This is likely to complicate patient choice, particularly since no guidance is offered to patients what specific indicator benefits them most. For example, is it more important to choose a hospital with a low prevalence of pressure ulcers or one that has a good reputation?

Even when two indicators claim to measure the same type of performance (quality of a hospital's cardiac department), agreement among them seems to be poor as illustrated by Figure 6.3. Since tied ranks exist, we compute the Pearson Product Moment Correlation for assessing the degree of linear relationship between any two indicators. As Table 6.1 shows, pair wise correlations are all fairly low implying that the measures are only weakly associated.

Figure 6.2: PCI hospitals' rankings based on four different indicators

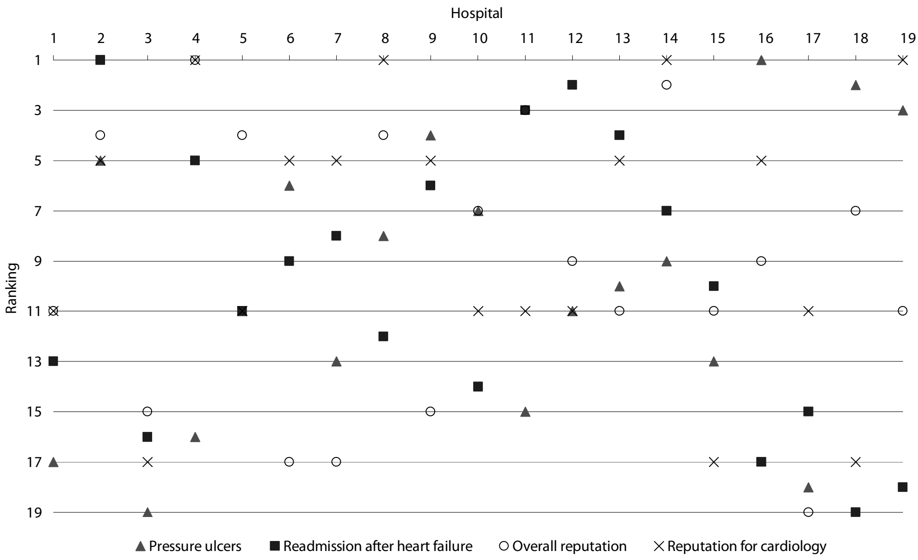
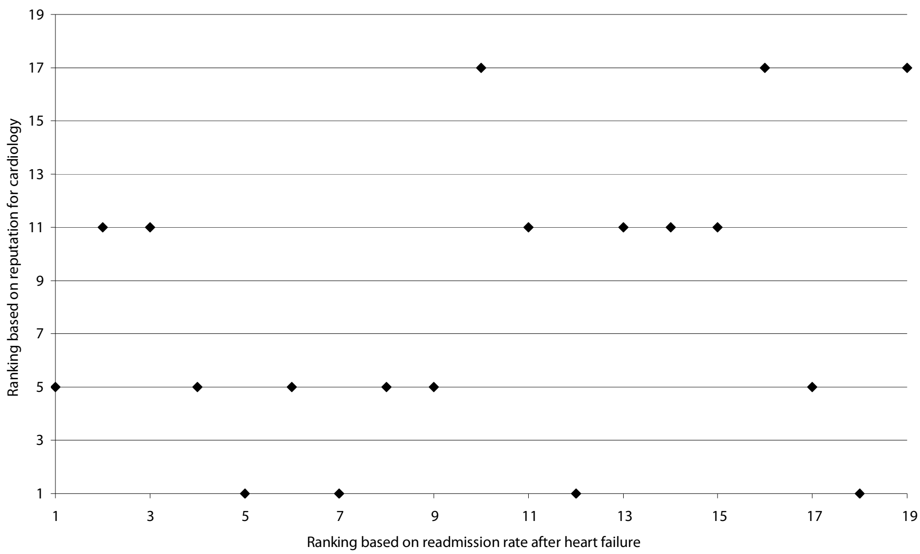


Figure 6.3: Readmission rate after heart failure and reputation for cardiology



Correlation is highest between pressure ulcers and readmission rate after heart failure (r = -0.32), pressure ulcers and reputation for cardiology (r = -0.30), and overall reputation and reputation for cardiology (r = 0.30). While both measuring the quality of the hospital's cardiac department, correlation between readmission rate for heart failure patients (IGZ) and reputation for cardiology (Elsevier) is very low (r = -0.20). This lack of consistency may be explained by the shortcomings of both the hospital outcome measures as well as the publicly available information about hospital reputation. The first are not adjusted for differences in the case-mix of hospitals and the latter are criticised for lacking validity.

Table 6.1: Correlation between publicly available indicators measuring hospital quality

	Pressure ulcers	Readmission after heart failure	Overall reputation	Reputation for cardiology
Pressure ulcers	1.00			
Readmission after heart failure	-0.32	1.00		
Overall reputation	-0.09	-0.21	1.00	
Reputation for cardiology	-0.30	-0.20	0.30	1.00

Note: association is measured by the Pearson Product Moment Correlation.

Quality scores for the university medical centre UMC St. Radboud, located in the city of Nijmegen, provide a clear illustration of how publicly available consumer information may complicate patient choice in the market for angioplasty. The observed readmission rate after heart failure (less than 4 percent; n = 52 patients) suggests high performance of this hospital's cardiac department, whereas its reputation for cardiology is among the worst in the Netherlands. In this case, the latter indicator better reflects the actual situation in 2006 than the first: in April 2006 the IGZ ordered the hospital to "cease to perform cardiac surgery on adults" with immediate effect since cardio-surgical care provided to adults was "not of the required standard" (IGZ, 2006). This order was repealed in October 2006.[8] Within this context the low readmission rate is less strange than it may appear. Preceding the order not to perform heart surgery on all adults, the IGZ in 2005 already ordered the hospital not to perform heart surgery on high-risk patients. In the absence of risk-adjustment, this "mandatory risk selection" is very likely to have reduced the observed percentage of readmissions after heart failure.

To summarise, publicly available consumer information about hospital quality in the Netherlands is incomplete and provides patients with conflicting information. Key question is then whether patients nevertheless use this information and respond to differences in observed quality between PCI hospitals.

[8] Note that in the period April-October 2006 UMC St. Radboud was still allowed to perform PCIs.

6.4 Data

Our principal data source is the Agis Health Database that contains individual patient level data from a large Dutch health insurer (Agis). We obtained data on 2,916 hospital visits for non-emergency angioplasty in 2006. In 2006 this insurer represented about 1,200,000 enrolees corresponding with a national market share of 9 percent. The geographical key market of Agis includes both urban (Amsterdam, Utrecht) and rural areas. For each patient we observe the name of the hospital visited and the zip code of his residence. The available data also provides individual patient characteristics (gender, age) and information about the severity of the patient's illness and his medical condition. First, the data allows us to distinguish whether PCI was performed as an inpatient procedure or on an outpatient same-day discharge base. Second, we know whether the patient before or after he underwent PCI in 2006 also suffered a heart attack and/or was diagnosed for open heart surgery. Remember that our study sample includes non-emergency PCI procedures only. Hence, the latter variables reflect the general health status of the patient. In addition to the variables described above, to further capture patient heterogeneity a dummy variable is defined indicating whether the patient lives in a major city.[9]

Patients' travel times are defined as the fastest route by car from the patient's home to each hospital and are calculated in minutes. This route is obtained from a database that includes all 4-digit zip codes in the Netherlands and accounts for differences in average speed that exist between different road types. As already mentioned in Section 6.2.1, travel times to the nearest PCI centre are rather small in the Netherlands. If patients travelled extremely long, it can therefore reasonably be assumed that these patients were away from home when admitted to a hospital. For those patients, travel time from their place of residence incorrectly measures the travel costs incurred, which may bias the estimation results. To avoid this bias we exclude all patients who travelled more than 60 minutes (n = 142; i.e. 5 percent). For the remaining patients (n = 2,774) a fixed set of hospital alternatives is defined (N_i). Each patient's choice set consists of all hospitals performing PCI that can be reached within 60 minutes of travel time. As Figure 6.1 illustrates, this threshold is not too restrictive.

Since Dutch health insurers in 2006 did not contract selectively with hospitals we impose no further restrictions on patients' choice sets. Almost 90 percent of the patients included in our study sample have at least 4 PCI hospitals in their choice set. As shown

[9] The four major cities in the Netherlands are Amsterdam (744,000 inhabitants), Rotterdam (534,000 inhabitants), The Hague (476,000 inhabitants), and Utrecht (259,000 inhabitants).

by Table 6.2, the most common choice set (n = 606; i.e. 22 percent) includes 10 hospitals. There are some patients who have only one hospital in their choice set. These patients (n = 104; i.e. 4 percent) are excluded from the estimation sample because they do not make a choice. As a result, the final study sample includes 2,670 patients. On average, these patients travelled 25 minutes to a hospital for PCI. Table 6.3 summarises the individual patient characteristics for the empirical analysis.

Table 6.2: Number of PCI hospitals in patients' choice sets

Hospitals (#)	Patients (#)	Patients (%)	Patients (cum. #)	Patients (cum. %)
13	22	1%	22	1%
12	206	7%	228	8%
11	270	10%	498	18%
10	606	22%	1,104	40%
9	564	20%	1,668	60%
8	153	6%	1,821	66%
7	369	13%	2,190	79%
6	176	6%	2,366	85%
5	62	2%	2,428	88%
4	52	2%	2,480	89%
3	97	3%	2,577	93%
2	93	3%	2,670	96%
1	104	4%	2,774	100%
Number of hospitals in choice set:				
Mean	9			
Modus	10			

The hospital attributes observed by patients in 2006 include both general characteristics (type, size) as well as publicly available consumer information about hospital quality (Section 6.2.3). Because long waiting lists are absent for angioplasty (GHR, 2007), PCI hospitals are not differentiated in terms of this attribute. There is also no differentiation in prices across hospitals. Hospitals' prices are fixed by the government and the decisions of patients are not affected by prices: angioplasty is included in the mandatory basic health insurance package, out-of-pocket payments for enrolees with a (voluntary) deductible do not differ across hospital alternatives (and are also far below the costs of a PCI procedure), and insurers do not offer preferred provider contracts with differentiated co-payments.

Table 6.3: Descriptive statistics patients in study sample

Variable	Mean	SD	Minimum	Maximum
Actual travel time (in minutes by car)	22	13	0	60
Patient characteristics (n = 2,670)				
Female	0.34		0	1
Age ≥75	0.24		0	1
Inhabitant of major city	0.43		0	1
Inpatient admission	0.67		0	1
Diagnosed for open heart surgery	0.39		0	1
Suffered from heart attack	0.26		0	1

Data on hospital type (university medical centre or general hospital) and size (number of beds) is obtained from the web-based Dutch National Atlas of Public Health (www.zorg-atlas.nl). IGZ provided the data on hospitals' readmission rate after treatment for heart failure and point prevalence of pressure ulcers. Since the hospital outcome measures become available with a one-year time lag, we use data from 2005 for analysing patient hospital choice in 2006. Data on hospital reputation is obtained from Elsevier (2006) presenting the results of a questionnaire among more than 7,000 respondents. We use the hospital's average score on a 1 (the hospital's overall reputation is very poor) to 10 (the hospital's overall reputation is excellent) rating scale to measure its overall reputation. The variable capturing hospital's reputation for cardiology has the maximum value +3 if >50% of the respondents compliment on the hospital's cardiology department. It has the minimum value -3 if >50% of the respondents criticise the hospital's cardiology department. The other values +2 (-2), +1 (-1), and 0 represent situations in which 33-49%, 20-32%, or <20% of the respondents compliment on (criticise) the hospital's cardiology department, respectively. Table 6.4 lists the hospital attributes used in this paper and their descriptive statistics.

Table 6.4: Descriptive statistics PCI hospitals in the Netherlands (2006, $n = 19$)

Hospital	City	UMC[a]	Number of beds	Readmission after heart failure[c]	Pressure ulcers[b]	Overall reputation[d]	Reputation for cardiology[e]
1. MC Alkmaar	Alkmaar	No	913	3.4	7.0	7.1	1
2. AMC	Amsterdam	Yes	1,200	12.7	11.1	7.5	2
3. VUmc	Amsterdam	Yes	713	5.4	8.9	6.8	0
4. OLVG	Amsterdam	No	550	9.3	9.3	8.0	3
5. Alysis Zorggroep	Arnhem	No	750	8.6	5.9	7.5	1
6. Amphia Ziekenhuis	Breda	No	1,368	11.5	9.9	6.7	2
7. HaGa Ziekenhuis	Den Haag	No	1,017	6.0	6.0	6.7	2
8. Catharina Ziekenhuis	Eindhoven	No	600	12.8	2.3	7.5	3
9. MS Twente	Enschede	No	1,070	5.9	3.9	6.8	2
10. UMC Groningen	Groningen	Yes	1,339	10.4	5.4	7.4	1
11. Noorderbreedte	Leeuwarden	No	930	6.2	7.2	7.6	1
12. LUMC	Leiden	Yes	882	5.1	6.7	7.2	1
13. AZM	Maastricht	Yes	715	17.7	2.8	7.1	2
14. St. Antonius Ziekenhuis	Nieuwegein	No	584	3.0	4.4	7.8	3
15. UMC St. Radboud	Nijmegen	Yes	953	3.8	8.7	7.1	0
16. Erasmus MC	Rotterdam	Yes	1,237	18.0	2.4	7.2	2
17. MC Rijnmond-Zuid	Rotterdam	No	745	7.2	7.2	6.6	1
18. UMC Utrecht	Utrecht	Yes	822	7.6	7.0	7.4	0
19. Isala Klinieken	Zwolle	No	1,004	6.9	5.1	7.1	3
Mean			915	8.5	6.4	7.2	2
Minimum			550	3.0	2.3	6.6	0
Maximum			1,368	18.0	11.1	8.0	3
Standard deviation			247.50	4.4	2.5	0.4	1.0

Notes:

a. University medical centre.

b. Measured as point prevalence ($t = 2005$).

c. Measured as the percentage heart failure patients readmitted to the hospital within 12 weeks after discharge ($t = 2005$).

d. Average hospital score on a rating scale from 1 (very poor reputation) to 10 (excellent reputation).

e. Hospital score on a rating scale from -3 (very poor reputation) to 3 (excellent reputation).

Sources: www.zorgatlas.nl, Dutch Healthcare Inspectorate (IGZ), and Elsevier (2006).

6.5 Model and estimation results

6.5.1 The model

Our choice model is based on the assumption that patients are rational agents that maximise utility.[10] We use a patient-level utility function in which travel time and hospital attributes are the main determinants of patient hospital choice. When selecting a hospital, patients are assumed to weigh the costs of increased travel time against higher quality.[11] The utility that patient *i* derives from being admitted for angioplasty at hospital *j* is specified as follows:

$$U_{ij} = \delta \cdot t_{ij} + \sum_{k=1}^{n} \lambda_k \cdot H_{kj} + \sum_{l=1}^{m} \rho_l \cdot P_{li} \cdot t_{ij} + \sum_{k=1}^{n} \sum_{l=1}^{m} \sigma_{kl} \cdot H_{kj} \cdot P_{li} + \gamma_{ij} \tag{6.1}$$

where t_{ij} reflects travel time from patient *i*'s home to hospital *j*; $H_{.j}$ is a vector of hospital *j*'s attributes observed by the patient; $P_{.i}$ is a vector of patient *i*'s observed characteristics; and γ_{ij} represents the idiosyncratic part of patient *i*'s evaluation of hospital *j*. We assert that patient *i*, given his needs and preferences, will choose hospital *j* when choosing any other alternative hospital included in his choice set (N_i) would result in lower utility. Note that prices are not included in Equation 6.1 because prices for angioplasty are regulated and not relevant for patients when making hospital choices. Angioplasty is included in the mandatory basic health insurance package and out-of-pocket payments do not differ across hospital alternatives. Consequently, hospitals are differentiated by geographic location and observed quality only. By interacting travel time and hospital attributes with the individual patient characteristics, we allow the trade-off between the costs and benefits of increased travel time to vary across patients.

When estimating a patient choice model the potential endogeneity of quality might cause problems in two different ways. First, does high quality attract patients or does a high number of patients lead to high quality? If the latter is true, hospitals with geo-

[10] One issue that arises in modelling patient hospital choice in the Netherlands is the role of the referring general practitioner (GP). In general, however, the decision of which hospital to visit is most often made by the patients themselves, alone or in consultation with their GP. Since Dutch GPs do note face financial incentives to refer patients to particular hospitals, it is not in their interest to neglect patients' preferences. However, if (some) GPs know more about hospital quality than observed in the publicly available data, the estimation results may be biased. Since we do not have data on the characteristics of individual patients' GPs, we are not able to correct for this potential bias.

[11] Since Dutch insurers do not selectively contract with hospitals, models specifically designed to estimate the value consumers place on different provider networks (Town and Vistnes, 2001; Capps et al., 2003) do not accurately depict hospital markets in the Netherlands (Varkevisser et al., 2008).

graphically attractive locations may gradually become high-quality hospitals over time. In our sample, however, hospitals with higher observed quality are not systematically higher-volume hospitals. We therefore treat quality as exogenous in the model. That is, the causation runs from quality to patient choice and not in reverse. Second, hospital outcome measures and patient choice are potentially endogenous. Hospitals might avoid sick patients and/or select healthy patients which in turn could affect observed quality because the IGZ performance indicators (prevalence of pressure ulcers, percentage readmissions after heart failure) are not adjusted for differences in the case-mix of hospitals. For several reasons, however, this is unlikely to be the case: (1) because patients observe last year's outcome measures when comparing hospitals, we use quality data from 2005 for analysing patient hospital choice in 2006; (2) public reporting on hospital outcomes has been introduced in 2005, so it is unlikely that hospitals responded immediately by starting to select patients, particularly since they had limited incentives to do so;[12] (3) in our study sample observed differences (gender, age, and medical condition) among a hospital's PCI patients in 2006 are not correlated with its observed quality in the same year, suggesting the absence of a selection bias.

Assuming that the random component of utility affecting hospital choice is independent and identically distributed (iid) extreme value, we apply a conditional logit model (McFadden, 1974). This implies that patient *i*'s probability of visiting hospital *j* is represented by:

$$\text{(6.2)} \qquad \Pr_{ij} = \frac{\exp(U_{ij})}{\sum_{j=1}^{N_i} \exp(U_{ij})}$$

For the conditional logit estimation of Equation 6.1 we use the maximum likelihood estimation method and standard iterative procedures for its optimisation. Maximum likelihood estimation of the conditional logit model can be shown under very general conditions to provide estimators that are asymptotically efficient and normally distributed (McFadden, 1974).

6.5.2 Estimation results

The model estimates, shown in Table 6.5, are generally as expected. The coefficient for travel time is negative and statistically significant. With the exception of the performance indicator measuring the percentage of patients with pressure ulcers, publicly available consumer information on hospital quality is found to have an impact on patient hospital choice with the expected signs. The coefficient on the readmission rate after treatment

[12] Hospitals are reasonably well reimbursed for PCI procedures and supply regulation prevents entry.

for heart failure is negative and significant, while the coefficients on hospitals' overall reputation and reputation for cardiology are both positive and significant. These outcomes suggest that patients respond to the publicly available consumer information about hospital quality.

Table 6.5: Conditional logit estimates of patient hospital choice

	Coefficient		SE
Travel time	-0.1529	*	0.0119
University medical centre	9.1235	*	0.9532
Number of beds	-0.0055	*	0.0012
Readmission rate after treatment for heart failure	-0.3687	*	0.0535
Point prevalence of pressure ulcers	0.0203		0.0685
Overall reputation	1.8668	*	0.4525
Reputation for cardiology	2.8832	*	0.2970
Interacted with *Age ≥75*:			
Travel time	0.0017		0.0100
University medical centre	-0.8206		0.4303
Number of beds	0.0015	*	0.0007
Readmission rate for heart failure	-0.1726	*	0.0514
Point prevalence of pressure ulcers	0.2679	*	0.0648
Overall reputation	1.1370	*	0.3904
Reputation for cardiology	-0.2880		0.1487
Interacted with *Female*:			
Travel time	0.0076		0.0087
University medical centre	0.0632		0.4011
Number of beds	-0.0001		0.0006
Readmission rate for heart failure	0.0930	*	0.0380
Point prevalence of pressure ulcers	-0.1422	*	0.0495
Overall reputation	-0.7502	*	0.3363
Reputation for cardiology	0.1032		0.1370
Interacted with *Major city*:			
Travel time	-0.0336	*	0.0098
University medical centre	-1.0554	*	0.5180
Number of beds	-0.0014		0.0007
Readmission rate for heart failure	0.1887	*	0.0510
Point prevalence of pressure ulcers	-0.0909		0.0616
Overall reputation	-0.8997		0.4739
Reputation for cardiology	-0.1806		0.1687

Table 6.5: Conditional logit estimates of patient hospital choice (continued)

	Coefficient		SE
Interacted with *Open heart surgery*:			
Travel time	-0.0371	*	0.0098
University medical centre	0.2952		0.4117
Number of beds	-0.0004		0.0007
Readmission rate for heart failure	-0.0541		0.0492
Point prevalence of pressure ulcers	0.2034	*	0.0608
Overall reputation	-4.2509	*	0.3744
Reputation for cardiology	1.3317	*	0.1569
Interacted with *Heart attack*:			
Travel time	0.0099		0.3150
University medical centre	0.4627		0.4124
Number of beds	-0.0006		0.0007
Readmission rate for heart failure	0.0945		0.0559
Point prevalence of pressure ulcers	0.0774		0.0432
Overall reputation	-1.9504	*	0.3978
Reputation for cardiology	0.6995	*	0.1489
Interacted with *Inpatient:*			
Travel time	-0.0001		0.0120
University medical centre	-8.3613	*	0.9631
Number of beds	0.0083	*	0.0012
Readmission rate for heart failure	0.1016		0.0577
Point prevalence of pressure ulcers	-0.0826		0.0728
Overall reputation	1.0880	*	0.4602
Reputation for cardiology	-3.0575	*	0.3028
Number of patients	2,670		
Number of patient-hospital combinations	22,722		

Note: * Significance at 5%.

When statistically significant, the coefficients of the interaction terms capturing patient heterogeneity generally have plausible signs. For instance, patients living in a major city as well as more seriously ill patients (i.e. non-emergency PCI patients who in 2006 were also diagnosed for open heart surgery) have a more negative coefficient on travel time, suggesting that *ceteris paribus* these patients are less willing to travel. Patients' willingness to travel for improvements in observed quality will be discussed in detail in the next section.

To measure our model's goodness of fit we analyse predicted versus actual hospital choice. Each hospital's predicted market share (MS_j) is computed by summing up patients' estimated choice probabilities for that hospital:

$$MS_j = \sum_{i=1}^{n} Pr_{ij} \tag{6.3}$$

where Pr_{ij} is the probability that patient *i* will choose hospital *j*. As Table 6.6 shows, hospitals' predicted market shares are very similar to actual market shares. Hence, at the individual hospital level model predictions are quite accurate. As an additional measure, following Town and Vistnes (2001), we construct a "hit-or-miss" criterion where the predicted choice for a patient is the hospital having the maximum predicted probability.

Table 6.6: Predicted versus actual hospital choice

Hospital name	**Actual patients**		**Predicted patients**		
	MS_j	%	MS_j	%	cum%
St. Antonius Ziekenhuis	625	23%	635	24%	24%
OLVG	548	21%	545	20%	44%
AMC	487	18%	495	19%	63%
UMC Utrecht	315	12%	271	10%	73%
VUmc	215	8%	224	8%	81%
Isala Klinieken	205	8%	181	7%	88%
Alysis Zorggroep	38	1%	71	3%	91%
Zorggroep Noorderbreedte	62	2%	49	2%	93%
UMC St. Radboud	48	2%	44	2%	94%
LUMC	27	1%	40	1%	96%
UMC Groningen	10	0%	22	1%	97%
MC Alkmaar	12	0%	19	1%	97%
Erasmus MC	8	0%	17	1%	98%
HaGaZiekenhuis	18	1%	13	0%	98%
Catharina Ziekenhuis	15	1%	12	0%	99%
Amphia Ziekenhuis	16	1%	12	0%	99%
MC Rijnmond-Zuid	13	0%	10	0%	100%
Medisch Spectrum Twente	8	0%	10	0%	100%
AZM	0	0%	0	0%	100%
Sum	**2,670**		**2,670**		

Overall, the model correctly predicts 67 percent of patients' hospital choices suggesting a high degree of explanatory power. The hospital choice model estimated by Town and Vistnes (2001) correctly predicts about 30 percent of hospital choices for their different samples (8,000 patients per sample and 109 California hospitals). Most studies on patient hospital choice, however, do not report how well their estimated models predict patients' actual choices. By exception, Capps et al. (2001) and Varkevisser et al. (2009) report the percentage of patients actually visiting the hospital having the maximum predicted probability to be 35 percent (27,631 patients and 22 San Diego hospitals) and 43 percent (5,389 patients and 66 Dutch hospitals), respectively.

6.6 Patients' willingness to travel for improvements in quality

To examine patients' responsiveness to publicly available consumer information in more detail, we compute patients' willingness to travel for improvements in observed quality. This willingness to travel reflects the value (in terms of travel costs) patients place on improvements in a particular aspect of observed hospital quality. For assessing the potential implications of patient choice behaviour in the market for angioplasty, we are primarily interested in patients' willingness to travel for changes in a hospital's readmission rate rather than changes in its reputation. The reason for this is that hospital outcome measures are more suitable for assessing potential short run demand responses underlying hospital competition because changes in reputation usually take more time.[13]

From the general properties of discrete choice models it follows that the sum of estimated coefficients on readmission rate for heart failure divided by the sum of estimated coefficients on travel time represents the patient's willingness to travel for improvements in this hospital outcome measure (WTT_i). This relation is derived from Equation 6.1 as follows. We first take the total derivative of utility with respect to travel time and readmission rate and set this derivative to zero. Then we solve this equation for the change in travel time that keeps utility constant if the percentage of heart failure patients readmitted to the hospital changes. WTT_i is then the increase in travel time that keeps patients' representative utility constant given an improvement in readmission rate. Since in our patient choice model both travel time and hospital quality measures are interacted with the individual patient characteristics (see Equation 6.1), WTT_i is allowed to vary across patient groups:

$$\text{(6.4)} \qquad \mathrm{WTT}_i = \frac{\lambda + \sum_{l=1}^{m} \sigma_l \cdot P_{li}}{\delta + \sum_{l=1}^{m} \rho_l \cdot P_{li}}$$

[13] In the short run, a hospital's reputation can be treated as a fixed asset giving it a competitive advantage or disadvantage.

where $P_{.i}$ is a vector of patient *i*'s observed characteristics.

Based on the patient characteristics observed in the data, we distinguish 48 different patient groups in the market for angioplasty (Appendix 6.A). The largest patient group ($n = 234$) consists of all male patients admitted as an inpatient who are less than 75 years old, live outside one of the major cities, and are relatively healthy (i.e. in 2006 they did not suffer a heart attack nor were they diagnosed for open heart surgery). Most patient groups, however, comprise a very small number of patients. The 25 smallest patient groups jointly account for little more than 20 percent of the study sample, whereas the aggregate share of the 10 largest patient groups is 53 percent.

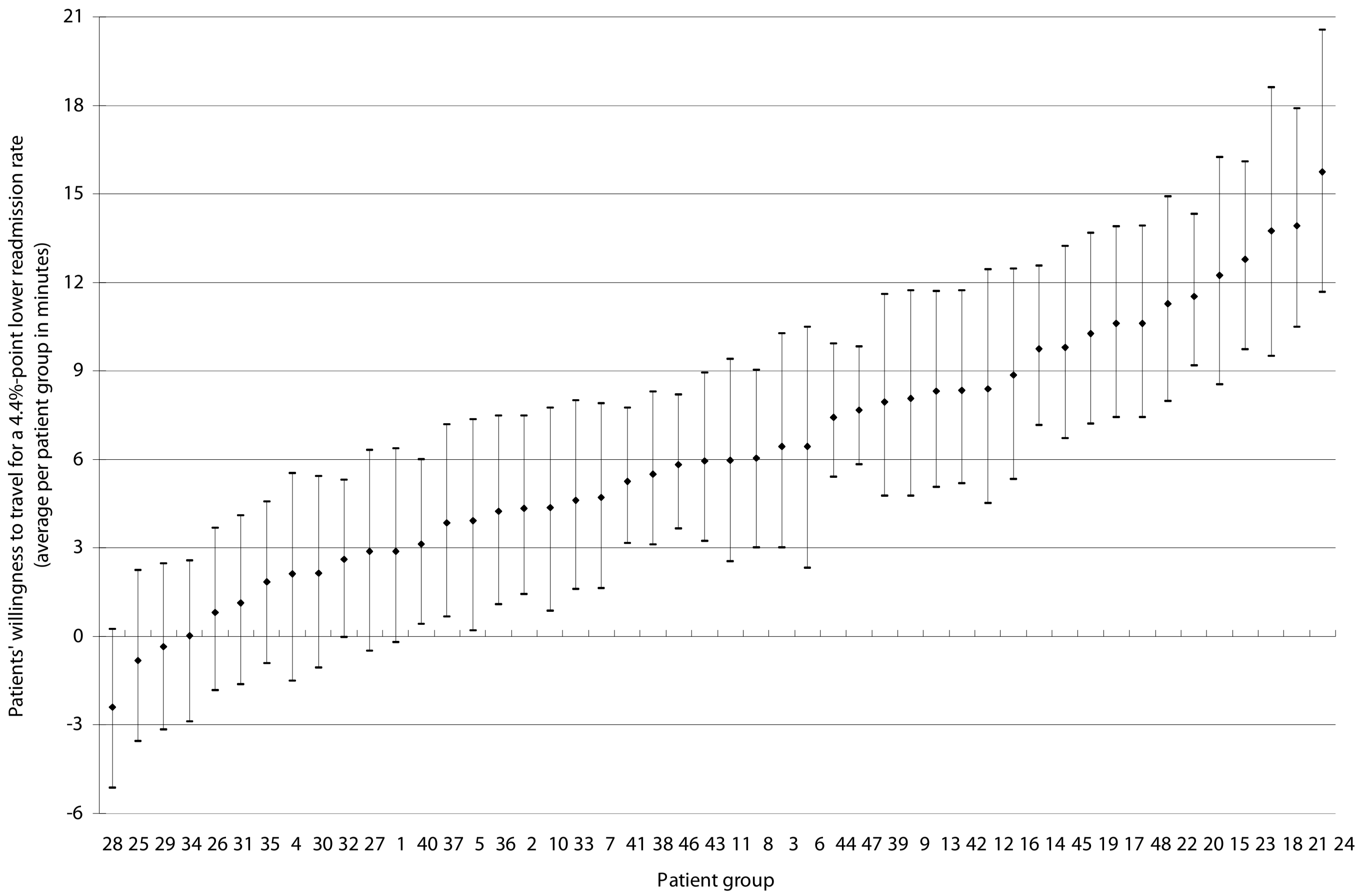
Overall, patients' willingness to travel for hospitals with lower readmission rates seems to be quite modest. In our study sample patients are only willing to travel about 6 minutes extra for a one-standard-deviation (4.4%-point) lower readmission rate. Or alternatively, a similar decrease in travel time would be required to keep patients' utility constant given a 4.4%-point higher readmission rate. Given that average actual travel time in our study sample is only 22 minutes, patients are willing to travel about 27 percent further for a standardised reduction in the readmission rate when expressed in relative terms.

However, as illustrated by Figure 6.4 (see Appendix 6.A for details), it follows from our estimation results that willingness to travel for better observed quality differs significantly across patient groups. For some patient groups the point estimate of WTT_i at the 5%-level does not statistically differ from zero.[14] Since patients in these groups are relatively sick and live in a major city (Amsterdam, Utrecht), geographic proximity and reputation for cardiology appear to be far more important to them when choosing a hospital for angioplasty.

For some other patient groups willingness to travel is found to be quite substantial. Patients not living inside a major city have the highest WTT_i. Depending on their other personal characteristics, the increase in travel time that keeps these patients' utility constant given a 4.4%-point lower readmission equals 8 to 16 minutes. In relative terms, these patients are willing to increase travel time by as much as 40 percent (or more) for visiting a hospital whose cardiac treatment appears to be more successful.

[14] Confidence intervals are obtained by a parametric bootstrap (Krinsky and Robb, 1986; 1990). We used the vector of estimated parameters and corresponding covariance matrix from our conditional logit model to randomly draw 1,000 sets of alternative, equally probable model parameters from a multivariate normal distribution with this vector and matrix as means and covariance, respectively.

Figure 6.4: Patients' willingness to travel for lower readmission rate after heart failure



From the analysis presented above it follows that the trade-off between travel time and a hospital's readmission rate significantly differs across patients, depending on their personal characteristics. So the answer to the question whether Dutch patients in the market for angioplasty respond to this publicly available hospital outcome measure is ambiguous: most patients do while some don't.

6.7 Assessing competition among PCI hospitals in the Netherlands

From the previous section it follows that most patients in the market for angioplasty are willing to travel for a lower readmission rate. However, estimating patients' willingness to travel does not reveal predicted demand effects of unilateral changes in observed quality for individual hospitals. To assess hospital substitutability that underlies competition among PCI hospitals in the Netherlands, we here simulate short-run patient demand responses to changes in a hospital's readmission rate taking into account patient heterogeneity and actual hospital differentiation (location, type, size, and reputation). The more patients are predicted to substitute toward alternative hospitals following an increase in this performance indicator, the more important it is for hospitals to care about publicly available outcome measures in order to avoid a loss of market share.

6.7.1 Hypothetical hospital closure

For identifying hospital substitutability in the market for angioplasty in the Netherlands in general, we first consider the hypothetical closure of a hospital by removing that hospital from each patient's choice set. Considering the closure of a hospital is equivalent to analysing an extreme fall in all aspects of hospital quality to the point where demand for hospital *j* is zero. The goal of this simulation is to assess hospital substitutability by identifying patients' second-best hospital given the geographic location, observed quality, and reputation of the then remaining hospital alternatives. From this simulation it follows that the geographically nearest hospitals appear to be hospital *j*'s closest competitors (Appendix 6.B). For those hospitals with neighbouring hospitals within 40 kilometres (25 miles) the effect of a hypothetical closure on further hospitals is quite small or even absent.

We identify competitors as those hospitals that at least 10 percent of the patients would substitute toward. We also computed an HHI for the diverted patients. The lower the value of this HHI, the more scattered the patients substituting away from hospital *j* are among the other hospitals. If the value of this "diversion HHI" increases, (potential) competition from other hospitals decreases. The value 1 would suggest that the market for hospital *j* includes one other hospital at most. Table 6.7 reveals that for more than half of the Dutch PCI hospitals the number of potential competitors is two at most. For most of these hospitals computed HHIs are also fairly high, suggesting these hospitals have relatively strong market positions.

Table 6.7: Assessing potential hospital competition

Hospital name	City	Hospital substitutes[a]	Diversion HHI[b]
UMC Groningen	Groningen	1	0.881
UMC Utrecht	Utrecht	2	0.593
Medisch Spectrum Twente	Enschede	2	0.548
Zorggroep Noorderbreedte	Leeuwarden	2	0.517
Catharina Ziekenhuis	Eindhoven	2	0.462
OLVG	Amsterdam	2	0.421
VUmc	Amsterdam	2	0.409
Alysis Zorggroep	Arnhem	2	0.403
St. Antonius Ziekenhuis	Nieuwegein	2	0.345
Amphia Ziekenhuis	Breda	2	0.343
UMC St. Radboud	Nijmegen	3	0.380
MC Rijnmond-Zuid	Rotterdam	3	0.362
HaGaZiekenhuis	Den Haag	3	0.313
AMC	Amsterdam	3	0.311
MC Alkmaar	Alkmaar	3	0.282
Isala Klinieken	Zwolle	3	0.240
Erasmus MC	Rotterdam	4	0.251
LUMC	Leiden	4	0.197

Notes:

a. Those hospitals that at least 10 percent of the patients substitute toward.

b. This HHI is a concentration measure for the diverted patients.

6.7.2 Predicted demand effect of reduction in observed readmission rate

To further examine Dutch PCI hospitals' substitutability, we determine the impact of a standardised increase in each hospital's readmission rate on its own demand and that of all other hospitals. Note the relation of the logit choice probability to representative utility is S-shaped. This shape implies that if the representative utility of a hospital alternative is very high compared with other alternatives, a small decrease in utility has little effect on the probability of being chosen: it is still sufficiently better than the other alternatives such that this small deterioration doesn't hurt. The point at which a reduction in observed quality has the strongest effect on an individual hospital's demand is when at least two hospital alternatives are almost equally attractive to the patient. An increase in hospital *j*'s readmission rate after heart failure will have less effect on patient demand when other hospitals are far less attractive than when simulating the same quality reduction for a hospital located in an area where other hospitals are sufficiently attractive to induce a moderate share of patients to choose it.

From the simulation results it follows that when the readmission rate increases by one-standard-deviation (4.4%-point), a hospital's demand among the angioplasty patients studied decreases by about one-third on average. However, as revealed by Table 6.8 and Figure 6.5, depending on local/regional hospital differentiation the predicted impact of a standardised reduction in observed quality substantially differs across individual hospitals though some of the confidence intervals obtained by a parametric bootstrap are quite large. For instance, despite its point-estimate of -24 percent the predicted loss of patients for the university medical centre in Rotterdam is not statistically significant at the 5%-level. The smallest statistically significant impact is found for two general hospitals in The Hague and Eindhoven. The predicted loss of patients for these hospitals is 13 percent and 19 percent, respectively. The biggest impact on patient demand (-45 percent or more) is found for university medical centres in Amsterdam, Leiden, and Nijmegen.

From the estimated demand effects it follows that for most hospitals decreased observed quality is predicted to cause many patients to substitute towards alternative hospitals. Again, predicted substitution patterns indicate that in the market for angioplasty competition is most intense among neighbouring hospitals. For instance, following a unilateral increase in the readmission rate of the biggest university medical centre in Amsterdam (AMC) the vast majority of all switching patients (65 percent) is predicted to substitute toward the other two PCI hospitals in Amsterdam.

Figure 6.5: Effect of higher readmission rate on hospital demand

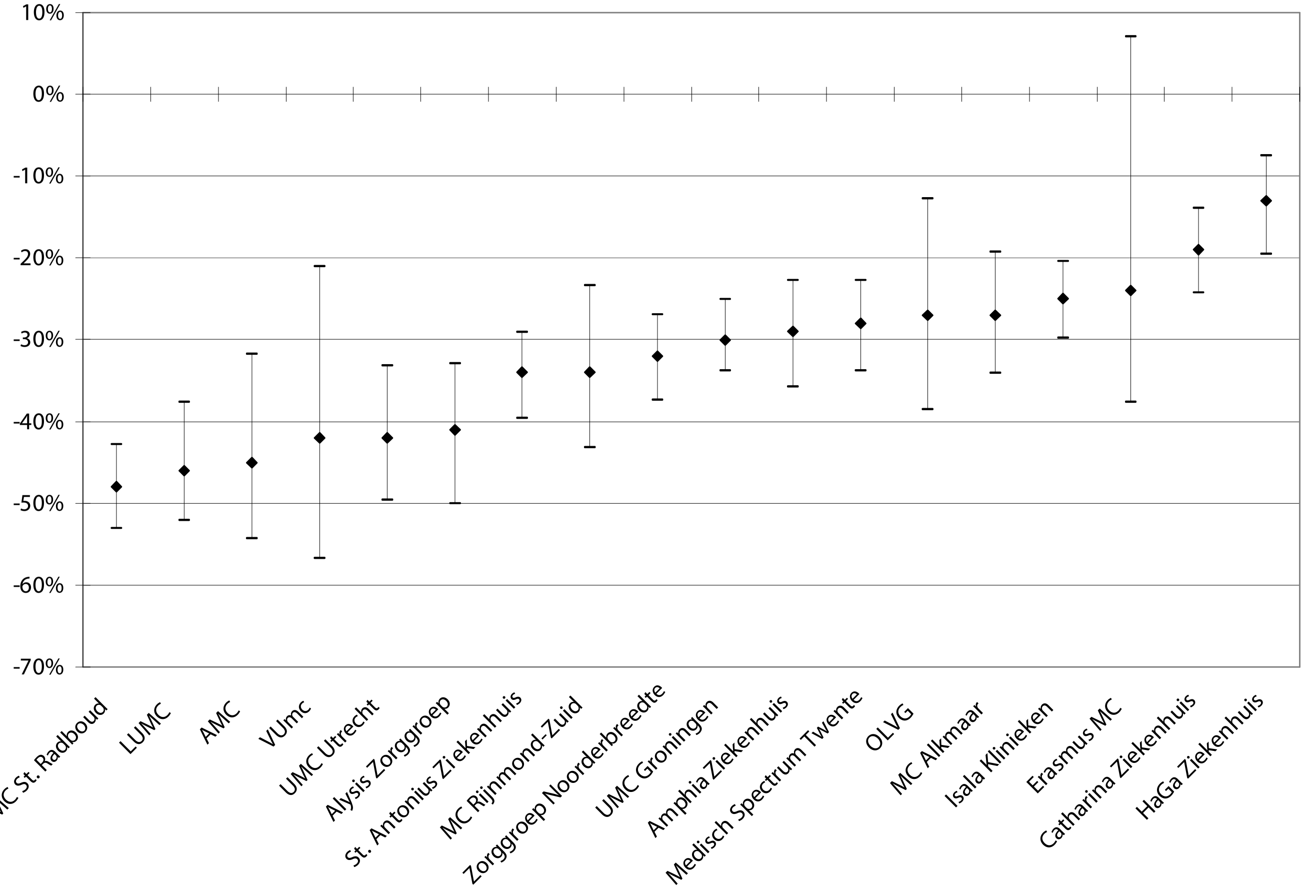


Table 6.8: Effect of unilateral increase in readmission rate

Hospital name	Predicted patients	Standardised increase readmission rate: change in predicted patients		
UMC St. Radboud	49	-23	-48%	(0.0259)
LUMC	40	-18	-46%	(0.0378)
AMC	495	-221	-45%	(0.0599)
VUmc	224	-93	-42%	(0.0943)
UMC Utrecht	271	-113	-42%	(0.0414)
Alysis Zorggroep	71	-30	-41%	(0.0438)
St. Antonius Ziekenhuis	635	-217	-34%	(0.0277)
MC Rijnmond-Zuid	12	-4	-34%	(0.0509)
Zorggroep Noorderbreedte	44	-14	-32%	(0.0270)
UMC Groningen	19	-6	-30%	(0.0228)
Amphia Ziekenhuis	13	-4	-29%	(0.0351)
Medisch Spectrum Twente	10	-3	-28%	(0.0281)
OLVG	545	-147	-27%	(0.0665)
MC Alkmaar	22	-6	-27%	(0.0392)
Isala Klinieken	181	-45	-25%	(0.0244)
Erasmus MC	12	-3	-24%	(0.1082)
Catharina Ziekenhuis	10	-2	-19%	(0.0255)
HaGaZiekenhuis	17	-2	-13%	(0.0319)
Sum	**2,670**			

Note: standard deviations in parentheses are obtained by a parametric bootstrap (n = 1,000).

6.8 Conclusion

In this paper we examine whether Dutch patients in the market for angioplasty respond to publicly available information about hospital quality and what implications their choice behaviour may have for quality competition using detailed claims data from the year 2006. The market for angioplasty in the Netherlands provides a unique opportunity to empirically assess quality competition in a regulated hospital market: patient choice is affected by observed quality and geographic location only, hospital prices are fixed, and entry is restricted. The most important findings of the paper can be summarised as follows. First, publicly available consumer information about hospital quality in the Netherlands is incomplete and inconsistent. Even when measuring the same type of performance, hospitals ranked first by one indicator are generally ranked much lower by another indicator and vice versa. Second, observed quality nevertheless significantly affects patient hospital choice though willingness to travel for a lower readmission rate is found to significantly differ between patient groups. Third, simulation results suggest that unilateral changes in observed quality (readmission rate after heart failure) induce many patients to substitute toward alternative hospitals but hospital substitutability is found to be restricted to a few neighbouring hospitals. Fourth, since patients are found to respond to changes in a hospital outcome measure that is not adjusted for differences in the case-mix of hospitals, increased competition may encourage hospitals to select risks in order to improve measured quality and avoid a loss of market share. Risk selection can take many different forms. For instance, hospitals could implement changes in marketing to attract healthy patients and/or delay treatment for sick patients.

From a policy perspective, these findings suggest that a sudden repeal of entry regulation in the Dutch market for angioplasty, as initially proposed by the Minister of Health, may have serious adverse effects. If more hospitals start to perform PCIs, this may increase financial incentives for improving measured and observed performances (e.g. readmission rate) at the expense of unmeasured and unobserved quality (e.g. accessibility). The policy decision from September 2009 to maintain the current entry regulation until the market for angioplasty becomes more transparent is therefore sensible. Public disclosure of reliable and detailed hospital quality indicators that are adjusted to differences in the case-mix of hospitals should be the first step toward more competition and higher quality in this market. In the short run, increased competition in the Dutch market for angioplasty by permitting entry of new PCI hospitals is less welcome than it may appear.

Although this paper analyses patients' responsiveness to publicly available information about hospital quality in one particular submarket, its policy implication is generally applicable. That is, increased competition in regulated markets where hospitals compete for patients on non-price dimensions is only likely to increase quality when it is combined with public disclosure of hospital quality indicators that are comprehensive and adjusted for differences in the case-mix of hospitals.

References

Aengevaeren, W.R.M., G.J. Laarman, M.J. Suttorp, J.M. ten Berg, A.J. van Boven, M.J. de Boer, J.J. Piek, G.V.A. van Ommen, J.G.F. Bronzwaer, P. Smits and J.W. Deckers (2005), 'Dutch guidelines for interventional cardiology: institutional and operator competence and requirements for training', *Netherlands Heart Journal*, 13(11): 416-422

Capps, C.S., D. Dranove, S. Greenstein and M. Satterthwaite (2001), *The silent majority fallacy of the Elzinga-Hogarty criteria: a critique and new approach to analyzing hospital mergers*, Working Paper 8216, National Bureau of Economic Research (NBER), Cambridge (Mass.)

Capps, C.S., D. Dranove and M. Satterthwaite (2003), 'Competition and market power in option demand markets', *RAND Journal of Economics*, 34(4): 737-763

Den Exter, A., H. Hermans, M. Dosljak and R. Busse (2004), *Health care systems in transition: Netherlands*, WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies, Copenhagen

Dranove, D., D. Kessler, M. McClellan and M. Satterthwaite (2003), 'Is more information better? The effects of "report cards" on health care providers', *Journal of Political Economy*, 111(3), 555-588

Dranove, D. and M.A. Satterthwaite (2000), 'The industrial organization of health care markets', in A.J. Cuyler and J.P. Newhouse (eds.), *Handbook of Health Economics*, volume I: 1093-1139, Amsterdam: Elsevier Science

Elsevier (2006), *De beste ziekenhuizen* ('The best hospitals'), 30 September: 84-111

Gaynor, M. (2006), *What do we know about competition and quality in health care markets?*, NBER Working Paper 12301, National Bureau of Economic Research, Cambridge (MA)

GHR (2007), *Cardiac interventions: a 2007 update*, publication no. 2007/01, Health Council of the Netherlands, The Hague

Gravestein, X., E.J.E. van der Hijden, J.M.J. Janssens, A.J.M. van Loon, H.B. Mulder, H.C. Ossebaard, D.A.J. Vogelpoel and W.J.J. Vrijsen (2006), *Geboortejaar KiesBeter.nl in feiten en cijfers* ('Healthcare portal: facts and figures'), RIVM, Bilthoven

Ho, V. (2004), 'Certificate of need, volume, and percutaneous transluminal coronary angioplasty outcomes', *American Heart Journal*, 147(3): 442-448

IGZ (2006), *Adult cardiac surgery: letter to St Radboud University Medical Centre*, Healthcare Inspectorate, April 24, The Hague

Krinsky, I. and A.L. Robb (1986), 'On approximating the statistical properties of elasticities', *Review of Economics and Statistics*, 68(4): 715-719

Krinsky, I. and A.L. Robb (1990), 'On approximating the statistical properties of elasticities: a correction', *Review of Economics and Statistics*, 72(1): 189-190

McFadden, D. (1974), 'Conditional logit analysis of qualitative choice behavior', in P. Zarembka (ed.), *Frontiers in Econometrics*, 105-142, New York: Academic Press

Propper, C., S. Burgess and K. Greene (2004), 'Does competition between hospitals improve the quality of care? Hospital death rates and the NHS internal market', *Journal of Public Economics*, 88(7-8): 1247-1272

Propper, C., S. Burgess and D. Gossage (2008), 'Competition and quality: evidence from the NHS internal market 1991-9', *The Economic Journal*, 118(1): 138-170

Rothberg, M.B., E. Morsi, E.M. Benjamin, P.S. Pekow and P.K. Lindenauer (2008), 'Choosing the best hospital: the limitations of public quality reporting', *Health Affairs*, 27(6): 1680-1687

Slagboom, T., F. Kiemeneij, G.J. Laarman and R. van der Wieken (2005), 'Outpatient coronary angioplasty: feasible and safe', *Catheterization and Cardiovascular Interventions*, 64(4): 421-427

Town, R.J. and G. Vistnes (2001), 'Hospital competition in HMO networks', *Journal of Health Economics*, 20(5): 733-753

Van der Velde, E.T., J. Brinkhuis, A. Kloosterman, N.H.J.J. van der Putten, W.A. Dijk, R. Hoekema, W.R.M. Dassen, R. Brand, I. van der Veen, P. Boorsma and M.J. Schalij (2008), 'Implementation of a national database infrastructure for registration of clinical procedures and as tool for national benchmarking', *Proceedings of Computers in Cardiology 2008*, 35: 261-264

Varkevisser, M., C.S. Capps and F.T. Schut (2008), 'Defining hospital markets for antitrust enforcement: new approaches and their applicability to the Netherlands', *Health Economics, Policy and Law*, 3(1): 7-29

Varkevisser, M., S.A. van der Geest and F.T. Schut (2009, forthcoming), 'Assessing hospital competition when prices don't matter to patients: the use of time-elasticities', *International Journal of Health Care Finance and Economics*, DOI: 10.1007/s10754-009-9070-6

Vaughan Sarrazin, M.S. and G.E. Rosenthal (2004), 'Hospital volume and outcome after coronary angioplasty: is there a role for certificate of need regulation?', *American Heart Journal*, 147(3): 383-385

Zijlstra, F. and M.J. de Boer (2007), 'Should more hospitals in the Netherlands provide PCI without on-site cardiac surgery?', *Netherlands Heart Journal*, 15(5): 171-172

Appendix 6.A: Descriptive statistics patient groups

Patient group	Age ≥75	Major city	Female	Open heart surgery	Inpatient	Heart attack	Freq.	Perc.	Actual travel time	WTT_i	
1	yes	yes	yes	yes	yes	yes	6	0.2%	7	3	
2	yes	yes	yes	yes	yes		14	0.5%	10	4	*
3	yes	yes	yes	yes			29	1.1%	15	6	*
4	yes	yes	yes		yes	yes	48	1.8%	12	2	
5	yes	yes	yes		yes		39	1.5%	10	4	*
6	yes	yes	yes				21	0.8%	13	6	*
7	yes	yes		yes	yes	yes	7	0.3%	10	5	*
8	yes	yes		yes	yes		14	0.5%	15	6	*
9	yes	yes		yes			26	1.0%	13	8	*
10	yes	yes			yes	yes	23	0.9%	11	4	*
11	yes	yes			yes		46	1.7%	11	6	*
12	yes	yes					17	0.6%	12	8	*
13	yes		yes	yes	yes	yes	18	0.7%	34	8	*
14	yes		yes	yes	yes		35	1.3%	31	10	*
15	yes		yes	yes			20	0.7%	30	12	*
16	yes		yes		yes	yes	31	1.2%	29	9	*
17	yes		yes		yes		37	1.4%	25	11	*
18	yes		yes				18	0.7%	37	14	*
19	yes			yes	yes	yes	12	0.4%	31	10	*
20	yes			yes	yes		43	1.6%	32	12	*
21	yes			yes			27	1.0%	27	14	*
22	yes				yes	yes	34	1.3%	31	11	*
23	yes				yes		40	1.5%	26	13	*
24	yes						27	1.0%	35	16	*

Appendix 6.A: Descriptive statistics patient groups (continued)

Patient group	Age ≥75	Major city	Female	Open heart surgery	Inpatient	Heart attack	Freq.	Perc.	Actual travel time	WTT_i	
25		yes	yes	yes	yes	yes	11	0.4%	12	-1	
26		yes	yes	yes	yes		28	1.0%	16	1	
27		yes	yes	yes			73	2.7%	16	3	
28		yes	yes		yes	yes	43	1.6%	11	-2	
29		yes	yes		yes		65	2.4%	11	0	
30		yes	yes				30	1.1%	14	2	
31		yes		yes	yes	yes	33	1.2%	14	1	
32		yes		yes	yes		50	1.9%	13	3	
33		yes		yes			143	5.4%	14	5	*
34		yes			yes	yes	124	4.6%	12	0	
35		yes			yes		162	6.1%	11	2	
36		yes					87	3.3%	13	4	*
37			yes	yes	yes	yes	24	0.9%	36	4	*
38			yes	yes	yes		50	1.9%	30	5	*
39			yes	yes			44	1.6%	28	8	*
40			yes		yes	yes	59	2.2%	27	3	*
41			yes		yes	yes	119	4.5%	23	5	*
42			yes				52	1.9%	34	8	*
43				yes	yes	yes	61	2.3%	28	6	*
44				yes	yes		130	4.9%	28	7	*
45				yes			136	5.1%	27	10	*
46					yes	yes	151	5.7%	28	6	*
47					yes		234	8.8%	25	8	*
48							129	4.8%	34	11	*
Total	**632**	**1,139**	**914**	**1,034**	**1,791**	**685**	**2,670**	**100%**	**22**	**6**	
	24%	43%	34%	39%	67%	26%					

Note: * Significance at 5% (standard deviation obtained by a parametric bootstrap: n = 1,000). Travel time represents the average time (in minutes) travelled for PCI by the patients included in that group. WTT_i is the patient group's willingness to travel (in extra minutes) for a one-standard-deviation (4.4%-point) lower readmission rate.

Appendix 6.B: Where do patients go if their first-best hospital would close?

OLVG		**100%**	**St. Antonius Ziekenhuis**		**100%**
AMC	11 km.	56%	UMC Utrecht	19 km.	52%
VUmc	10 km.	32%	AMC	36 km.	26%
St. Antonius Ziekenhuis	42 km.	6%	OLVG	42 km.	8%
UMC Utrecht	49 km.	2%	VUmc	45 km.	3%
LUMC	47 km.	2%	UMC St. Radboud	82 km.	3%
MC Alkmaar	54 km.	1%	Amphia Ziekenhuis	62 km.	2%
			Isala Klinieken	101 km.	2%
			Erasmus MC	58 km.	1%
			MC Rijnmond-Zuid	59 km.	1%
			Alysis Zorggroep	69 km.	1%
			LUMC	57 km.	1%
AMC		**100%**	**VUmc**		**100%**
OLVG	11 km.	45%	AMC	12 km.	46%
VUmc	12 km.	27%	OLVG	10 km.	44%
St. Antonius Ziekenhuis	36 km.	17%	St. Antonius Ziekenhuis	45 km.	4%
UMC Utrecht	43 km.	6%	LUMC	40 km.	3%
LUMC	49 km.	3%	MC Alkmaar	47 km.	1%
MC Alkmaar	56 km.	1%	UMC Utrecht	52 km.	1%
Isala Klinieken	108 km.	1%			
UMC Utrecht		**100%**	**Isala Klinieken**		**100%**
St. Antonius Ziekenhuis	19 km.	76%	Alysis Zorggroep	65 km.	44%
AMC	43 km.	11%	Medisch Spectrum Twente	109 km.	12%
OLVG	49 km.	5%	St. Antonius Ziekenhuis	101 km.	12%
Alysis Zorggroep	65 km.	2%	UMC Utrecht	87 km.	9%
VUmc	52 km.	2%	Zorggroep Noorderbreedte	92 km.	8%
Isala Klinieken	87 km.	2%	AMC	108 km.	7%
UMC St. Radboud	90 km.	1%	UMC St. Radboud	88 km.	7%
			UMC Groningen	106 km.	1%
			OLVG	110 km.	1%
			VUmc	115 km.	1%
Zorggroep Noorderbreedte		**100%**	**Alysis Zorggroep**		**100%**
UMC Groningen	62 km.	59%	UMC St. Radboud	24 km.	56%
Isala Klinieken	92 km.	41%	Isala Klinieken	65 km.	27%
			UMC Utrecht	65 km.	9%
			St. Antonius Ziekenhuis	69 km.	5%
			AMC	95 km.	1%
			Medisch Spectrum Twente	93 km.	1%

Appendix 6.B: Where do patients go if their first-best hospital would close? (continued)

Medisch Spectrum Twente		**100%**	**UMC Groningen**		**100%**
Isala Klinieken	109 km.	66%	Zorggroep Noorderbreedte	62 km.	94%
Alysis Zorggroep	93 km.	33%	Isala Klinieken	106 km.	6%
UMC St. Radboud	116 km.	1%			
UMC St. Radboud		**100%**	**MC Alkmaar**		**100%**
Alysis Zorggroep	24 km.	55%	AMC	56 km.	35%
St. Antonius Ziekenhuis	82 km.	24%	VUmc	47 km.	28%
Isala Klinieken	88 km.	12%	OLVG	54 km.	27%
Catharina Ziekenhuis	68 km.	4%	LUMC	70 km.	7%
UMC Utrecht	90 km.	4%	St. Antonius Ziekenhuis	85 km.	2%
Amphia Ziekenhuis	98 km.	1%			
LUMC		**100%**	**HaGaZiekenhuis**		**100%**
AMC	49 km.	31%	LUMC	28 km.	42%
OLVG	47 km.	21%	Erasmus MC	26 km.	32%
VUmc	40 km.	18%	MC Rijnmond-Zuid	38 km.	18%
St. Antonius Ziekenhuis	57 km.	13%	St. Antonius Ziekenhuis	68 km.	3%
HaGaZiekenhuis	28 km.	6%	AMC	69 km.	2%
Erasmus MC	39 km.	5%	VUmc	60 km.	1%
UMC Utrecht	64 km.	3%	OLVG	67 km.	1%
MC Alkmaar	70 km.	2%			
MC Rijnmond-Zuid	50 km.	1%			
MC Rijnmond-Zuid		**100%**	**Catharina Ziekenhuis**		**100%**
Erasmus MC	7 km.	56%	Amphia Ziekenhuis	60 km.	63%
Amphia Ziekenhuis	47 km.	17%	St. Antonius Ziekenhuis	80 km.	24%
St. Antonius Ziekenhuis	59 km.	12%	UMC St. Radboud	68 km.	8%
HaGaZiekenhuis	38 km.	6%	UMC Utrecht	90 km.	4%
LUMC	50 km.	6%	Alysis Zorggroep	84 km.	1%
UMC Utrecht	66 km.	2%			
AMC	84 km.	1%			
Amphia Ziekenhuis		**100%**	**Erasmus MC**		**100%**
St. Antonius Ziekenhuis	62 km.	50%	MC Rijnmond-Zuid	7 km.	41%
MC Rijnmond-Zuid	47 km.	28%	St. Antonius Ziekenhuis	58 km.	22%
Catharina Ziekenhuis	60 km.	7%	HaGaZiekenhuis	26 km.	15%
Erasmus MC	53 km.	6%	LUMC	39 km.	11%
UMC Utrecht	72 km.	6%	UMC Utrecht	65 km.	5%
UMC St. Radboud	98 km.	1%	Amphia Ziekenhuis	53 km.	2%
AMC	97 km.	1%	AMC	78 km.	2%
			OLVG	76 km.	2%
			VUmc	70 km.	1%

Note: AZM not included, because there are no Agis enrolees for whom it is the first-best PCI hospital.

Chapter 7

Summary and conclusion

The final chapter of this thesis first answers the central research questions formulated in the general introduction. Next, some policy recommendations and suggestions for further research are offered, based on the main findings of the preceding chapters.

7.1 Research questions

As stated in Chapter 1, this thesis aims to improve the understanding of patient choice, competition, and antitrust enforcement in Dutch hospital markets by addressing four central research questions. In this section each of these questions is answered.

7.1.1 What lessons can be learned from experiences with hospital merger control in countries with a competitive hospital sector?

From the examination of the experiences with preventive hospital merger control in the United States, Germany, and the Netherlands, as discussed in Chapter 2, three major findings stand out.

First, more than in any other industry, geographic market definition is the Achilles' heel of antitrust enforcement in hospital markets. Due to the presence of health insurance a hospital's price elasticity of demand is not useful for defining geographic markets. However, European antitrust enforcement agencies do not necessarily have to struggle with this issue as much as their counterparts in the US. In a typical European setting, hospitals compete directly for patients and prices are not relevant for them when making hospital choices. Under these conditions hospitals' substitutability crucially depends on patients' willingness to travel. As shown by experiences with hospital merger control in Germany, commonly available patient flow data are then useful for defining geographic hospital markets.

Second, recent court decisions in the US and Germany confirm that geographic hospital markets are rather small. In the US managed care setting people prefer health plans that include at least one nearby hospital suggesting geographic hospital markets are essentially local. In the German setting, where patients do not commit to restricted provider networks when buying health insurance, patient flow data show that most patients prefer hospitals nearby. Hence, hospital markets seem to be geographically limited regardless of the prevailing institutions and market structure.

Third, the German Bundeskartellamt (BKA) and the Netherlands Competition Authority (NMa) have different attitudes towards proposed hospital mergers, though national antitrust laws in EU member states to a large extent resemble the same features as supranational European competition policy. In Germany the emphasis is on avoiding Type II errors (allowing a proposed hospital merger that restricts actual hospital competition), whereas in the Netherlands the emphasis is on avoiding Type I errors (blocking a proposed hospital merger that does not restrict actual hospital competition).

7.1.2 What is the appropriate approach for defining geographic hospital markets in the Netherlands?

The standard method for market definition (SSNIP test) is difficult to implement in hospital markets and the methods historically employed (Elzinga/Hogarty approach and critical loss analysis) have proven inaccurate. Some new approaches to hospital market definition are therefore suggested in the recent economic literature. Chapter 3 discusses both the general strengths and weaknesses of the time-elasticity approach, the competitor share approach, and the option demand approach as well as their applicability to Dutch hospital markets. From this discussion it follows that the appropriateness of each of these approaches depends crucially on (i) how health insurers contract with hospitals and (ii) how patients choose their hospital.

Despite the gradual introduction of managed competition in the Dutch health care system, most hospital prices are still fixed, out-of-pocket payments are absent, and patients do not face restricted hospital networks. The competitor share approach (assuming that prices set by hospitals are a function of the underlying service-level demand elasticities) and the option demand approach (assuming that patients commit to a potentially restricted network of hospitals prior to knowing their medical needs) do therefore not accurately depict Dutch hospital markets. Since the introduction of managed competition in the Dutch health care system is still work-in-progress, the option demand approach may become more appropriate in the future. That is, if hospital prices in the Netherlands are further deregulated and insurer-hospital negotiations over network participation and composition increase.

Currently, Dutch hospitals compete directly for patients on non-price dimensions (geographic location and observed quality). In this context, the time-elasticity approach is the appropriate approach to defining geographic hospital markets in the Netherlands. This approach is an attempt to indirectly estimate the demand elasticity faced by hospitals using the notion that when the decisions of patients are not affected by money prices, travel time functions as a price. The substitutability among (merging) hospitals can then be assessed by estimating a patient choice model and simulating the demand effects of an artificial increase in travel time from every patient to a particular hospital by a certain percentage, holding all other hospital attributes constant. Hospitals that are predicted to loose only a few patients after a (simultaneous) percentage increase in travel time do not seem to have close substitutes. Using this approach for geographic market definition requires identifying the smallest set of hospitals such that a simultaneous travel time increase to all hospitals in the set would lead to relatively little substitution to outside hospitals.

7.1.3 How to assess the substitutability of Dutch hospitals taking both patient and hospital heterogeneity into account?

When patients are insensitive to prices, hospital substitutability that underlies the intensity of provider competition is determined by patients' willingness to travel for quality differences. If patients do not consider alternative providers and automatically visit the nearest hospital when seeking care, effective hospital competition is not feasible. The empirical analysis in Chapter 4 shows that, even in the absence of financial incentives and adequate consumer information, numerous Dutch patients in 2003 bypassed the nearest hospital alternative capable of treating their disease for orthopaedic care (38 percent) and neurosurgery (54 percent). This finding suggests the feasibility of hospital competition. In addition to travel time and hospital attributes (type, size, waiting time), patient characteristics (age and social status) are also found to significantly affect hospital bypass decisions. This illustrates the relevance of taking both patient heterogeneity as well as hospital differentiation into account when assessing hospital substitutability.

To analyse the feasibility of effective competition among Dutch hospitals in more detail, Chapter 5 applies the time-elasticity approach. More specifically, time-elasticities are estimated to assess hospitals' relative bargaining power in the market for neurosurgery. This analysis, using a large health insurer's claims data from 2003, shows that patients are generally averse to travel. Nevertheless, the most important hospitals in the study sample (located in Amsterdam, Utrecht, and surrounding areas) all seem to have at least some close substitutes. The point estimates of hospitals' time-elasticities suggest that overall hospital demand is rather time-elastic, implying the feasibility of effective hospital competition in the neurosurgery market. However, estimated time-elasticities differ significantly across individual hospitals. Though the empirical analysis in Chapter 5 consists of one particular submarket, defined as an insurer-hospital service pair, it shows how the time-elasticity approach can be a useful instrument to assess hospital substitutability. This is not only relevant for assessing the feasibility of selective contracting by health insurers, but also for assessing proposed hospital mergers by antitrust enforcement agencies.

7.1.4 Do patients respond to publicly available information about hospital quality and how may this affect competition in Dutch hospital markets?

In markets where hospitals compete for patients on dimensions other than price, competition is expected to increase quality. This positive relation, however, requires market transparency, patient responsiveness to quality differences and a sufficient number of hospital substitutes to choose from. Chapter 6 examines whether in the Dutch market for angioplasty, or percutaneous coronary intervention (PCI), patients respond to consumer information about hospital quality. This regulated market provides a unique opportunity for empirically assessing the impact of consumer information on patient choice and hospital competition: patient choice is affected by observed quality and geographic location only, hospital prices are fixed, and entry is restricted. The analysis first reveals that publicly available information about hospital quality does not adequately inform patients and even provides them with conflicting signals. Even when measuring the same type of performance, hospitals ranked first by one indicator are generally ranked much lower by another indicator and vice versa. Using detailed claims data for analysing patient hospital choice in 2006, it is found that most patients are nevertheless responding to differences in observed quality. However, hospital substitutability in this market is found to be restricted to a few neighbouring hospitals. Particularly because publicly available hospital outcome measures are not adjusted for differences in the case-mix of hospitals, competition in this market may induce both incumbent as well as new PCI hospitals to improve on an observed inadequate performance indicator (e.g. readmission rate) by avoiding sick patients and/or seeking healthy patients. If such risk selection occurs, increasing the room for competition by reducing current regulatory entry barriers may reduce patient welfare rather than improve it.

7.2 Policy recommendations and research suggestions

Based on the research presented in this thesis the following policy recommendations and research suggestions are offered:

1. From a welfare perspective and similar to antitrust enforcement agencies in Germany and the United States, the NMa should be more restrictive when assessing proposed hospital mergers. Since Dutch hospitals on average already seem to face diseconomies of scale (Blank and Merkies, 2004), hospital mergers in the Netherlands are unlikely to result in cost savings. Additionally, empirical evidence suggests that higher outcome quality is associated with the concentration of complex surgical procedures rather than with the consolidation of hospitals through mergers (Ho et al., 2008). Combined with empirical evidence that hospital mergers may have serious anticompetitive ef-

fects (Vogt and Town, 2006; Dafny, 2009), the reduction in social welfare caused by a Type II error (not blocking a merger that is anticompetitive) is therefore expected to be greater than the reduction in social welfare caused by a Type I error (blocking a merger that is not anticompetitive). Being overly permissive also prevents the development of industry-specific jurisprudence, as the current situation in the Netherlands clearly illustrates. Without deeper understanding of how courts tend to deal with the unique attributes of Dutch hospital markets, the effectiveness of antitrust enforcement in future hospital merger cases may be hampered. The evidence required to prevail in court is currently unknown. The NMa should therefore litigate proposed hospital mergers that are potentially anticompetitive more aggressively, thereby accepting the risk of losing some of the cases then initiated (see also Varkevisser and Schut, 2008).

2. To accurately define the geographic market in hospital merger cases, the NMa should more carefully investigate the particular reasons why some patients travel while others do not. Supplemented by an empirical analysis of patient hospital choice using revealed preference data, these insights should be used to substantiate conclusions about other hospitals (not) taken into account as feasible alternatives for merging hospitals. As shown by experiences from the US, new methods for geographic market definition provides antitrust enforcement agencies with powerful evidence that hospitals may possess far more market power than previously acknowledged (Dranove and Sfekas, 2009). Since in the current context the time-elasticity approach is the appropriate approach to defining Dutch hospital markets, the NMa should apply this new approach when assessing proposed hospital mergers. The same holds for the Dutch Healthcare Authority (NZa) when assessing whether individual hospitals have significant market power. The benefit of estimated time-elasticities for antitrust enforcement is twofold. First, they can be used for ruling out hospitals as close substitutes allowing for instance for quick review of mergers not involving close substitutes. Second, they can be used for ranking hospital substitutes so that antitrust analysis can focus on a particular set of hospitals that are identified as closest substitutes.

3. To increase the efficiency of health care provision by means of provider competition, Dutch hospital markets should become more transparent. In addition to the presence of a sufficient number of hospital alternatives, the public availability of reliable and comprehensive information about hospital quality is another important precondition for effective hospital competition. In Dutch hospital markets, however, hospital quality information is currently incomplete and often provides patients (as well as health insurers) with conflicting information. Additionally, the hospital outcome measures developed by the Dutch Healthcare Inspectorate (IGZ) and published on the internet (www.KiesBeter.nl) are not adjusted for differences in the case-mix of hospitals. As

a result of these deficiencies, expanding the room for competition may provide hospitals with an incentive to focus on what is (incorrectly) measured rather than what is important. Public disclosure of reliable, sufficiently detailed, and risk-adjusted hospital quality indicators is therefore a necessary step before further liberalising Dutch hospital markets.

4. To better understand competition in Dutch hospital markets and the effects of hospital mergers, the NZa in close cooperation with the NMa should initiate a research programme focusing on how consolidation affects price, cost and quality of care in Dutch hospital markets. Within this programme a number of consummated hospital mergers needs to be selected for intensive study, similar to the Hospital Merger Retrospectives Project of the US Federal Trade Commission (FTC).[1] To stimulate the development of in-depth analyses, the data required for empirical work in this area should be made accessible to academic researchers.

References

Blank, J.L.T. and A.H.Q.M. Merkies (2004), 'Empirical assessment of the economic behaviour of Dutch general hospitals', *Health Economics*, 13(3): 265-280

Dafny, L. (2009), 'Estimation and identification of merger effects: an application to hospital mergers', *Journal of Law and Economics*, 52(3): 523-550

Dranove, D. and A. Sfekas (2009), 'The revolution in health care antitrust: new methods and provocative implications', *Milbank Quarterly*, 87(3): 607-632

Haas-Wilson, D. and C. Garmon (2009), *Two hospital mergers on Chicago's north shore: a retrospective study*, FTC Bureau of Economics Working Paper No. 294, The Federal Trade Commission, Washington DC

Ho, V., R.J. Town and M.J. Heslin (2007), 'Regionalization versus competition in complex cancer surgery', *Health Economics, Policy and Law*, 2(1): 51-71

Tenn, S. (2008), *The price effects of hospital mergers: a case study of the Sutter-Summit transaction*, FTC Bureau of Economics Working Paper No. 293, The Federal Trade Commission, Washington DC

Thompson, A. (2009), *The effect of hospital mergers on inpatient prices: a case study of the New Hanover-Cape Fear transaction*, FTC Bureau of Economics Working Paper No. 295, Federal Trade Commission, Washington DC

[1] Retrospective studies of consummated hospital mergers conducted in this project include Tenn (2008), Haas-Wilson and Garmon (2009), and Thompson (2009).

Varkevisser, M. and F.T. Schut (2008), 'NMa moet strenger zijn bij toetsen ziekenhuisfusies' ('NMa should be more stringent when assessing proposed hospital mergers'), *Economisch Statistische Berichten*, 4532: 196-199

Vogt, W.B. and R. Town (2006), *How has hospital consolidation affected the price and quality of hospital care?*, Research Synthesis Report No. 9, Robert Wood Johnson Foundation, Princeton (NJ)

Samenvatting

Het Nederlandse zorgstelsel verandert. Na decennia van strikte aanbodregulering is de nadruk de afgelopen jaren steeds meer op de introductie van marktprikkels komen te liggen. De invoering van de Zorgverzekeringswet per 1 januari 2006 vormt in dit opzicht een mijlpaal. Binnen de door de overheid vastgestelde randvoorwaarden krijgen zowel zorgverzekeraars als zorgaanbieders geleidelijk meer vrijheden. Om zorgaanbieders te prikkelen hun prijs-kwaliteitverhouding (verder) te verbeteren, is een belangrijke rol weggelegd voor onderlinge concurrentie. Ten eerste worden verzekeraars gestimuleerd om zich namens hun verzekerden als kritische zorginkopers op te stellen. Met (voorkeurs)aanbieders dienen zij goede afspraken te maken over de prijs en kwaliteit van zorg. Ten tweede worden consumenten (patiënten) aangemoedigd om wanneer zij zorg nodig hebben verschillende aanbieders met elkaar te vergelijken om zodoende een weloverwogen keuze te maken.

Dit proefschrift richt zich op de kansen en bedreigingen voor concurrentie tussen Nederlandse ziekenhuizen. Voor effectieve concurrentie is vereist dat ziekenhuismarkten aan bepaalde voorwaarden voldoen. Allereerst moeten verzekeraars en patiënten uit voldoende ziekenhuizen kunnen kiezen. Daarnaast moet informatie over de kwaliteit van ziekenhuizen betrouwbaar, veelomvattend en openbaar zijn. Bovendien moeten patiënten gevoelig zijn voor waarneembare verschillen in kwaliteit en de beschikbare informatie ook gebruiken.

Uit **hoofdstuk 1** blijkt dat in Nederland aan deze voorwaarden momenteel niet zonder meer wordt voldaan. In de eerste plaats is het aantal ziekenhuisorganisaties als gevolg van fusies afgenomen van 162 in 1985 tot 93 in 2009. Aangezien nieuwe ziekenhuisfusies het aantal keuzemogelijkheden verder doen afnemen, is het cruciaal dat voorgenomen fusies door de Nederlandse Mededingingsautoriteit (NMa) streng worden getoetst. Als een fusie de onderlinge concurrentie sterk vermindert, dient deze door de NMa in beginsel te worden verboden. De bijzondere kenmerken van ziekenhuiszorg zorgen bij dit belangrijke onderdeel van het mededingingsbeleid echter voor problemen. Vooral de afbakening van geografische ziekenhuismarkten is lastig, omdat moeilijk is vast te stellen welke ziekenhuizen in de ogen van patiënten onderling uitwisselbaar (substitueerbaar) zijn en dus met elkaar concurreren. In de tweede plaats staat de informatievoorziening over de kwaliteit van ziekenhuizen ondanks enkele recente en op zich veelbelovende initiatieven in Nederland eigenlijk nog in de kinderschoenen. Bovendien is onduidelijk of openbare kwaliteitsinformatie, zoals die bijvoorbeeld via de website www.KiesBeter.nl beschikbaar is, van invloed is op de ziekenhuiskeuzen van patiënten.

Kwantitatief onderzoek naar het gebleken keuzegedrag van patiënten is tot op heden namelijk uitsluitend uitgevoerd in buitenlandse ziekenhuismarkten.

Om het keuzegedrag van patiënten, concurrentie en mededingingsbeleid in Nederlandse ziekenhuismarkten beter te begrijpen, staan in dit proefschrift vier onderzoeksvragen centraal:

1. Welke lessen kunnen worden getrokken uit ervaringen met het toetsen van ziekenhuisfusies in landen met concurrentie tussen ziekenhuizen?

2. Wat is de meest geschikte methode om de geografische omvang van ziekenhuismarkten in Nederland te bepalen?

3. Hoe kan, met inachtneming van waarneembare verschillen tussen ziekenhuizen en patiënten, worden bepaald welke Nederlandse ziekenhuizen substituten van elkaar zijn?

4. Reageren patiënten op openbare informatie over de kwaliteit van Nederlandse ziekenhuizen en welke gevolgen kan hun keuzegedrag hebben voor de wijze waarop ziekenhuizen met elkaar concurreren?

De eerste onderzoeksvraag wordt beantwoord door in **hoofdstuk 2** de praktijkervaringen met ziekenhuisfusies van mededingingsautoriteiten in de Verenigde Staten, Duitsland en Nederland met elkaar te vergelijken. Deze analyse levert drie concrete lessen op. De eerste les luidt dat, meer dan in andere sectoren, afbakening van de geografische markt de achilleshiel vormt bij de mededingingsrechtelijke beoordeling van voorgenomen ziekenhuisfusies. Als gevolg van de aanwezigheid van zorgverzekeringen is voor individuele ziekenhuizen namelijk geen prijselasticiteit van de vraag bekend. Hierdoor kunnen ziekenhuismarkten niet op de gebruikelijke manier worden afgebakend. De tweede les is dat, onafhankelijk van de precieze (institutionele) omstandigheden, ziekenhuismarkten in geografisch opzicht over het algemeen beperkt van omvang lijken te zijn. De derde les luidt dat, hoewel de nationale mededingingswetten van Duitsland en Nederland zijn gebaseerd op dezelfde Europese wet- en regelgeving, de toepassing ervan bij het toetsen van ziekenhuisfusies aanzienlijk verschilt. De Duitse mededingingsautoriteit (Bundeskartellamt) wil vooral voorkomen dat een voorgenomen ziekenhuisfusie onterecht wordt goedgekeurd, terwijl in Nederland de NMa vooral wil voorkomen dat een voorgenomen ziekenhuisfusie onterecht wordt verboden.

Om de tweede onderzoeksvraag te beantwoorden zijn in **hoofdstuk 3** traditionele en nieuwe methoden om ziekenhuismarkten af te bakenen geanalyseerd. Naast de sterke en zwakke punten van deze methoden, is vooral ook aandacht besteed aan de toepasbaarheid van de nieuwe methoden in de Nederlandse context. Uit dit deel van de analyse volgt dat het berekenen van zogeheten (reis)tijdelasticiteiten momenteel de meest geschikte methode is om de geografische omvang van ziekenhuismarkten in Nederland af te bakenen. Als patiënten een ziekenhuis kiezen spelen prijsoverwegingen namelijk geen rol. Iedereen is verplicht verzekerd voor ziekenhuiszorg en het eigen risico is (zeer) beperkt, zodat men geen prijsverschillen ervaart. Onder dergelijke omstandigheden is reistijd feitelijk de enige prijs die patiënten betalen voor een bezoek aan een ziekenhuis. Door de reistijd naar een ziekenhuis voor alle patiënten denkbeeldig met een bepaald percentage te verhogen wordt het betreffende ziekenhuis onaantrekkelijker gemaakt. Vervolgens kan met behulp van modelsimulaties worden berekend hoeveel patiënten als gevolg van deze denkbeeldige 'prijsverhoging' naar andere ziekenhuizen zullen uitwijken. Ziekenhuizen die naar verwachting slechts een beperkt percentage patiënten kwijtraken, ondervinden (vrijwel) geen concurrentie van andere ziekenhuizen. Laatstgenoemde ziekenhuizen behoren in dat geval tot een andere geografische markt. Wanneer zorgverzekeraars in de toekomst meer selectief zouden gaan contracteren neemt de bruikbaarheid van tijdelasticiteiten af. Voor de afbakening van geografische ziekenhuismarkten kan dan gebruikt worden gemaakt van de meerprijs die verzekerden bereid zijn aan een verzekeraar te betalen als deze een bepaald ziekenhuis in het netwerk van gecontracteerde zorgaanbieders opneemt.

Voor de beantwoording van de derde onderzoeksvraag zijn twee kwantitatieve analyses uitgevoerd. Allereerst is in **hoofdstuk 4** met behulp van declaratiegegevens uit 2003 van een grote Nederlandse zorgverzekeraar onderzoek gedaan naar de keuzen van patiënten om het dichtstbijzijnde ziekenhuis al dan niet over te slaan en dus wel of niet verder te reizen dan strikt noodzakelijk. Om rekening te houden met de heterogeniteit van ziekenhuiszorg zijn de eerstepolikliniekbezoeken van twee verschillende medisch specialismen geanalyseerd, te weten orthopedie (aanwezig in alle Nederlandse ziekenhuizen) en neurochirurgie (aanwezig in circa tweederde van de Nederlandse ziekenhuizen). Uit de analyse volgt dat, ondanks de afwezigheid van financiële prikkels en adequate kwaliteitsinformatie, veel patiënten niet automatisch naar het dichtstbijzijnde ziekenhuis gaan. Om de substitueerbaarheid van Nederlandse ziekenhuizen in meer detail te onderzoeken zijn in **hoofdstuk 5** voor dertien ziekenhuizen vervolgens tijdelasticiteiten berekend. Hiervoor is opnieuw gebruikt gemaakt van gedetailleerde gegevens uit 2003 die inzicht verschaffen in de achtergrondkenmerken van verzekerden en de ziekenhuizen die zij voor hun eerste bezoek aan de polikliniek neurochirurgie hebben bezocht. Zoals vooraf kon worden verwacht laten de schattingsresultaten zien dat patiënten reistijd sterk negatief waarderen. Dat wil zeggen, dichterbij gelegen ziekenhuizen zijn voor hen in principe aantrekkelijker dan verder weg gelegen ziekenhuizen. Naast reistijd hebben echter ook andere ziekenhuiskenmerken een meetbaar effect op het keuzegedrag van patiënten. In de markt voor neurochirurgie neemt de kans dat een patiënt een bepaald ziekenhuis kiest niet alleen toe als de reistijd korter is, maar ook als dat ziekenhuis vergeleken met andere ziekenhuizen een relatief korte wachtlijst en/of een goede reputatie heeft. Voor alle ziekenhuizen waarvoor een tijdelasticiteit is berekend, geldt dat deze redelijk hoog is. Als de reistijd met 10% zou toenemen, wijken relatief veel patiënten uit naar een ander ziekenhuis. Ondanks de gebleken vrij sterke afkeer van extra reistijd, impliceert dit resultaat dat mensen momenteel veelal nog uit voldoende nabijgelegen ziekenhuizen kunnen kiezen. Hoewel de analyse betrekking heeft op één specifieke deelmarkt, laat hoofdstuk 5 zien dat het berekenen van tijdelasticiteiten in Nederland een bruikbare methode is om de vraag te kunnen beantwoorden welke ziekenhuizen door patiënten als substituten worden gezien en daarom met elkaar concurreren.

De vierde onderzoeksvraag komt aan bod in **hoofdstuk 6**. In dit hoofdstuk wordt, opnieuw met behulp van declaratiegegevens van een grote Nederlandse zorgverzekeraar, het keuzegedrag van patiënten geanalyseerd die in 2006 een niet-spoedeisende dotterbehandeling hebben ondergaan. Hierbij is vooral gekeken naar het effect van openbare kwaliteitsinformatie op het keuzegedrag van patiënten. Op grond van de Wet op Bijzondere Medische Verrichtingen (WBMV) hadden dat jaar negentien ziekenhuizen een vergunning om patiënten te dotteren. Alvorens na te gaan of de openbare informatie over de kwaliteit van Nederlandse ziekenhuizen met een dottervergunning een meetbaar effect heeft gehad op de keuzen van patiënten, is eerst de beschikbare kwaliteitsinformatie zelf geanalyseerd. De publieksinformatie, afkomstig uit twee verschillende bronnen, blijkt incompleet en inconsistent. Zelfs wanneer twee indicatoren dezelfde prestatie claimen te meten, is het eerder regel dan uitzondering dat een ziekenhuis op grond van de ene indicator tot de beste ziekenhuizen wordt gerekend terwijl het op grond van de andere indicator veel lager wordt gerangschikt. Ondanks deze tekortkomingen laten de schattingsresultaten zien dat de openbare kwaliteitsindicatoren wel degelijk van invloed zijn geweest op het keuzegedrag van patiënten. Zo blijken de meeste patiënten bereid verder te reizen dan noodzakelijk om een ziekenhuis te kunnen bezoeken met een lager percentage heropnames. Uit modelsimulaties blijkt vervolgens dat een stijging van het aantal heropnames op de afdeling cardiologie voor veel ziekenhuizen een flinke daling van de vraag naar hun dotterbehandelingen zal betekenen. De onderlinge concurrentie in deze deelmarkt wordt echter sterk beperkt door de relatief grote afstanden tussen ziekenhuizen met een dottervergunning. Voor de meeste ziekenhuizen is het aantal (potentiële) concurrenten beperkt tot twee à drie relatief nabijgelegen ziekenhuizen. Op het eerste gezicht lijkt het dus verstandig om de huidige toetredingsdrempels op deze markt te verlagen dan wel af te schaffen om zodoende de kwaliteitsconcurrentie te stimuleren. Een toename van de concurrentie brengt echter ook risico's met zich mee. Zo is het percentage heropnames niet gecorrigeerd voor verschillen in zorgzwaarte. Ziekenhuizen die veel ernstig zieke patiënten behandelen kunnen daardoor slechter scoren dan ziekenhuizen die vooral minder ernstig zieke patiënten behandelen. Deze tekortkoming zou ziekenhuizen bij een toename van de onderlinge concurrentie kunnen aanzetten tot maatschappelijk ongewenst gedrag. Gezien de grote financiële belangen zouden ziekenhuizen om een verlies aan marktaandeel te voorkomen zich dan namelijk vooral kunnen gaan richten op de behandeling van de meeste gezonde hartpatiënten.

Op grond van de bevindingen zoals gepresenteerd in dit proefschrift worden in **hoofdstuk 7** de volgende vier beleidsaanbevelingen en suggesties voor verder onderzoek gedaan:

1. Vanuit welvaartsperspectief bezien zou de NMa, net als de mededingingsautoriteiten in Duitsland en de Verenigde Staten, strenger moeten zijn bij het beoordelen van ziekenhuisfusies. Allereerst zijn alle Nederlandse ziekenhuizen nu al zo groot dat verdere schaalvergroting waarschijnlijk geen kostenvoordelen zal opleveren. Daarnaast zijn, gelet op de huidige omvang van Nederlandse ziekenhuizen, fusies niet noodzakelijk om kwaliteitsverbeteringen te realiseren. Gecombineerd met het feit dat ziekenhuisfusies aanzienlijke negatieve gevolgen kunnen hebben, is het welvaartsverlies van een Type II fout (een concurrentiebeperkende fusie wordt onterecht goedgekeurd) naar verwachting groter dan het welvaartsverlies van een Type I fout (een niet-concurrentiebeperkende fusie wordt onterecht tegengehouden). Een ander nadeel van een te weinig strenge houding bij het beoordelen van voorgenomen ziekenhuisfusies is dat geen nuttige sectorspecifieke jurisprudentie ontstaat. Zolang onduidelijk is hoe rechters omgaan met de specifieke kenmerken van ziekenhuismarkten in Nederland, blijft ook onduidelijk welke bewijsvoering nodig is om in voorkomende gevallen ziekenhuisfusies die de onderlinge concurrentie te sterk doen afnemen daadwerkelijk te kunnen tegenhouden.

2. Om bij de beoordeling van voorgenomen ziekenhuisfusies de geografische markt nauwkeuriger te kunnen afbakenen dient de NMa meer gedetailleerd in kaart te brengen waarom sommige patiënten wel en andere niet naar verder weg gelegen ziekenhuizen reizen. Aangevuld met empirisch onderzoek op het gebied van het gebleken keuzegedrag ontstaat zo een beter beeld van de substitueerbaarheid en onderlinge concurrentie van ziekenhuizen. In de huidige context is het berekenen

van (reis)tijdelasticiteiten momenteel de meest geschikte methode om de geografische omvang van ziekenhuismarkten af te bakenen. Deze nieuwe methode zou dan ook door de NMa moeten worden toegepast. De methode is ook van toegevoegde waarde voor de Nederlandse Zorgautoriteit (NZa) wanneer zij antwoord moet geven op de vraag of individuele ziekenhuizen al dan niet over aanmerkelijke marktmacht beschikken.

3. Om de voordelen van concurrentie tussen ziekenhuizen te kunnen realiseren is het noodzakelijk dat meer en betere kwaliteitsinformatie beschikbaar komt. Mede omdat de huidige prestatie-indicatoren van de Inspectie voor de Gezondheidszorg (IGZ) geen rekening houden met verschillen in zorgzwaarte, kan een toename van de onderlinge concurrentie ziekenhuizen onder de huidige omstandigheden aanzetten tot maatschappelijk ongewenst gedrag, zoals risicoselectie.

4. Om beter inzicht te krijgen in de werking van markten voor ziekenhuiszorg en de effecten van ziekenhuisfusies in het bijzonder, verdient het aanbeveling dat de NMa in nauwe samenwerking met de NZa een onderzoeksprogramma opstart naar het voorbeeld van een programma van de Amerikaanse FTC (Federal Trade Commission). Ten einde de ontwikkeling van innovatief onderzoek op dit gebied te stimuleren, is het van belang de hiervoor benodigde kwantitatieve gegevens beschikbaar te stellen voor wetenschappelijk onderzoek.

Curriculum Vitae

Marco Varkevisser (1974) is an assistant professor of Health Economics at the institute of Health Policy and Management (iBMG), Erasmus University Rotterdam (EUR). After graduating from the Erasmus School of Economics in 1998, he started working as a research fellow at the Research Centre for Economic Policy (OCFEB), a joint venture of the Ministry of Economic Affairs, the Ministry of Finance, the Ministry of Social Affairs and Employment, De Nederlandsche Bank, and the Erasmus University Rotterdam. From 1998 to 2004, his research focused on competition and regulation issues in various industries (e.g. provision of drinking water, waste management, retail gasoline markets, health care markets). In 2004 he started working as a research fellow at the EUR research institute SEOR (until 2009) as well as iBMG.

From 2005 to 2009 he worked on his dissertation. During this period Marco published articles in the *European Journal of Health Economics*, *Health Economics, Policy and Law*, and the *International Journal of Health Care Finance and Economics.* In addition to these international publications, he also published many articles in national journals (e.g. *Economisch Statistische Berichten*) and Dutch newspapers (*Het Financieele Dagblad*, *Trouw*, *NRC Handelsblad*). Since starting his dissertation, he has specialised in competition and antitrust enforcement in health care markets. Next to the research included in his PhD thesis, he also worked on projects for third-parties including the Ministry of Health, Welfare and Sports (VWS), the Netherlands Competition Authority (NMa), and the Dutch Healthcare Authority (NZa).

As a teacher, Marco is involved in both iBMG's bachelor programme and its master programme Health Economics, Policy and Law (HEPL). He teaches the economics of health care (bachelor), competition law and economics in health care (master), and the economics and financing of health care systems (master). Additionally, Marco supervised several bachelor and master theses.

Marco is a member of the Board of Directors of the Dutch-Flemish Association for Health Economics (*Vereniging voor Gezondheidseconomie*) and editor-in-chief of its journal, the *VGE Bulletin*.

PhD Portfolio

Name:	Marco Varkevisser
University:	Erasmus University Rotterdam (EUR)
Department:	institute of Health Policy and Management (iBMG)
PhD period:	2005-2009
Promotor:	Prof.dr. F.T. Schut

Presentations on competition and antitrust enforcement in health care (selection)

-	VU University, Amsterdam, guest lecture	2009
-	Erasmus Honours Programme, Rotterdam, guest lecture	2009
-	Dutch Healthcare Authority (NZa), Utrecht, seminar	2009
-	Netherlands Competition Authority (NMa), The Hague, seminar	2009
-	Erasmus Honours Programme, Rotterdam, guest lecture	2008
-	25th Academy Health Annual Research Meeting, Washington DC, poster presentation	2008
-	Health Economics Interest Group Meeting, Washington DC, oral presentation	2008
-	Bundeskartellamt, Bonn, seminar	2008
-	Erasmus University Rotterdam, seminar	2008
-	University of Oslo, guest lecture and seminar	2007
-	Netherlands Competition Authority (NMa), The Hague, workshop	2007
-	Dutch Healthcare Authority (NZa), Utrecht, seminar	2006
-	6th European Conference on Health Economics, Budapest, oral presentation	2006
-	University of Bologna, guest lecture	2006
-	5th World Congress of the international Health Economics Association, Barcelona, oral presentation	2005

Publications in English

-	Leunis, A. and M. Varkevisser, 'Internal medicine residents' perceptions of the learning environment in Dutch teaching hospitals', *Medical Teacher*, forthcoming	2009
-	Boonen, L.H.H.M., S.A. van der Geest, F.T. Schut and M. Varkevisser, 'Pharmaceutical policy in the Netherlands: from price regulation toward managed competition', in A. Dor (ed.), *Advances in Health Economics and Health Services Research*, volume 22, forthcoming	2009

- Varkevisser, M., S.A. van der Geest and F.T. Schut, 'Assessing hospital competition when prices don't matter to patients: the use of time-elasticities', *International Journal of Health Care Finance and Economics*, forthcoming — 2009
- Varkevisser, M., C.S. Capps and F.T. Schut, 'Defining hospital markets for antitrust enforcement: new approaches and their applicability to the Netherlands', *Health Economics, Policy and Law*, 3(1): 7-29 — 2008
- Varkevisser, M. and S.A. van der Geest, 'Why do patients bypass the nearest hospital? An empirical analysis for orthopaedic care and neurosurgery in the Netherlands', *European Journal of Health Economics*, 8(3): 287-295 — 2007

Publications in Dutch (selection)

Articles in national journals

- Varkevisser, M., S.A. van der Geest, M. Appelman en J.N. Struijs, 'Regionale machtspositie zorggroepen baart zorgen', *Economisch Statistische Berichten*, 94(4572): 701 — 2009
- Geest, S.A. van der en M. Varkevisser, 'Kwaliteitsinformatie en de marktaandelen van IVF-centra', *Economisch Statistische Berichten*, 93(4549): 756-758 — 2008
- Varkevisser, M. en F.T. Schut, 'Consumentenbelang gaat boven concurrentenbelang (reactie)', *Economisch Statistische Berichten*, 93(4534): 285 — 2008
- Varkevisser, M. en F.T. Schut, 'NMa moet strenger zijn bij toetsen ziekenhuisfusies', *Economisch Statistische Berichten*, 93(4532): 196-199 — 2008
- Geest, S.A. van der, I. Mosca, F. Pellikaan en M. Varkevisser, 'In beweging voor de fysiotherapeut', *Economisch Statistische Berichten*, 92(4516): 506-508 — 2007
- Varkevisser, M., S.A. van der Geest, E. Maasland en F.T. Schut (2007), 'Opleiden medisch specialisten moet transparanter', *Economisch Statistische Berichten*, 92(4511): 340-342 — 2007
- Schut, F.T. en M. Varkevisser, 'Zorgautoriteit moet niet alleen blaffen, maar ook kunnen bijten', *Economisch Statistische Berichten*, 91(4479): 58-60 — 2006
- Varkevisser, M., N. Polman en S.A. van der Geest, 'Zorgverzekeraars moeten patiënten kunnen sturen', *Economisch Statistische Berichten*, 91(4478): 38-40 — 2006

Book contributions

-	Schut, F.T. en M. Varkevisser, 'Marktordening in de gezondheidszorg', in F.T. Schut en F.F.H. Rutten (red.), *Economie van de gezondheidszorg*, leerboek voor universitair en hoger onderwijs, 247-288, Maarssen: Elsevier Gezondheidszorg	2009
-	Geest, S.A. van der, F.T. Schut en M. Varkevisser, 'Gezondheidszorg', in C.A. de Kam en A.P. Ros (red.), *Jaarboek overheidsfinanciën 2006*, 57-86, Den Haag: Sdu Uitgevers	2006
-	Geest, S.A. van der, F.T. Schut en M. Varkevisser, 'Gezondheidszorg', in C.A. de Kam en A.P. Ros (red.), *Jaarboek overheidsfinanciën 2005*, 97-121, Den Haag: Sdu Uitgevers	2005

Op-Eds

-	Brouwer, W.B.F. en M. Varkevisser, 'Voorrangszorg met voorrang mogelijk maken', *Het Financieele Dagblad*, 11 mei	2009
-	Schut, F.T., M. Varkevisser en W.P.M.M. van de Ven, 'In VS blijken fusies [van zorgverzekeraars en ziekenhuizen] succes voor patiënten', *NRC Handelsblad*, 2 februari	2009
-	Varkevisser, M., W.B.F. Brouwer en R. van Duuren, 'Bevrijd ziekenhuizen van juk winstverbod', *NRC Handelsblad*, 17 december	2008
-	Schut, F.T. en M. Varkevisser, 'Fusiedrang bedreigt ontluikende marktwerking', *Zorgvisie*, nummer 11 / november	2008
-	Geest, S.A. van der en M. Varkevisser, 'Verbeter informatie over farmacie', *Het Financieele Dagblad*, 9 augustus	2008
-	Varkevisser, M., 'Gehandicapte kan in instelling gelukkig zijn', *Trouw*, 17 april	2007
-	Brouwer, W.B.F. en M. Varkevisser, 'Vragen rond zorgstelsel liggen nog voor ons', *Trouw*, 3 november	2006
-	Varkevisser, M., 'Repareer met spoed de Ziekenfondswet', *Trouw*, 7 juni	2005

Teaching at iBMG

-	'Economics and financing of health care systems', master HEPL, lecturer and course coordinator (since 2009)	2006 - now
-	'Algemene economie van de gezondheidszorg', bachelor, lecturer	2005 - now
-	'Law and economics of competition policy in health care', master HEPL, lecturer	2005 - now
-	'Zorgstelsel en zorgverzekering', bachelor, lecturer	2005 - now
-	Bachelor thesis, supervisor	2005 - now
-	Master HEPL thesis, supervisor	2005 - now

– The ultimate goal of the market-based health care reform in the Netherlands is to increase the efficiency of health care provision by stimulating provider competition. This PhD thesis focuses on the feasibility of hospital competition in the Netherlands. Effective hospital competition first requires the availability of a sufficient number of substitutes. Since hospital consolidation reduces the number of choices, preventive merger control is of crucial importance. Antitrust enforcement agencies are, however, struggling with the assessment of proposed hospital mergers. Most importantly, more than in any other industry, geographic market definition is rather complicated in hospital markets. In addition to a sufficient number of hospital substitutes, effective competition at least also requires market transparency and patient responsiveness to observed quality differences. Little is known, however, about patient choice behaviour in the Netherlands. The aim of this thesis is to improve the understanding of patient choice, competition, and antitrust enforcement in Dutch hospital markets.

Marco Varkevisser is an assistant professor of Health Economics at the institute of Health Policy and Management (iBMG), Erasmus University Rotterdam. After graduating from the Erasmus School of Economics in 1998, his research focused on competition and regulation issues in various industries. Over the years he has specialised in competition and antitrust enforcement in health care markets.