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THE ONES THAT GOT AWAY?

STEALTH CONSOLIDATION IN THE FINNISH PRIVATE HEALTHCARE MARKET

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The ones that got away? Stealth consolidation in the Finnish private healthcare market*

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Abstract

Many countries have adopted merger control regimes to prevent anti-competitive mergers, but usually, only large deals must be notified to the authorities. This article examines the effect of exempt acquisitions in the Finnish private healthcare market. The market has experienced rapid consolidation, but only a small fraction of transactions have been notified to the Competition Authority. Using data from hundreds of acquisitions and employing a difference-in-differences approach, we find significant post-acquisition price increases in acquired clinics compared to non-acquired ones.

Keywords: Merger control, Price competition, Healthcare markets

JEL Codes: D43, L22, L11.

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1 Introduction

Recently, several studies have suggested that market concentration and market power have increased in both the United States and Europe (De Loecker et al., 2020; De Loecker et al., 2018; Grullon et al., 2019; Affeldt et al., 2021). One way firms can increase market concentration and market power is by merging with a competitor (Williamson, 1968). Such transactions can lead to reduced competition, higher prices for consumers, and decreased innovation. To prevent this, governments worldwide have adopted merger control regimes to identify and block anti-competitive deals. However, in most countries, only large deals must be notified to the authority. This approach is based on the assumption that only large mergers impact competition and warrant review. The issue of stealth consolidation arises when mergers and acquisitions take place without the oversight of antitrust authorities.

We begin our article by showing that in Finland, annually only about 5% to 10% of mergers are notified to the authority. We provide evidence indicating that the share of notified mergers, although higher than in Finland, is also relatively low in other European countries. In the main part of the article, we study the effect of acquisitions in the Finnish private healthcare market. The Finnish private healthcare market has experienced rapid consolidation, with large healthcare chains making hundreds of acquisitions. Due to a policy change in 2004, only a few of these acquisitions were notified to the Finnish authority. Given the drastic change in market concentration and the low share of notified mergers, the Finnish healthcare market provides an ideal setting to study the effect of acquisitions exempt from merger regulation.

Our empirical analysis focuses on the physician and dental markets. These markets consist of selling doctor's appointment times, dental check-ups and treatments, and auxiliary services, such as medical imaging and laboratory tests, to patients. We use detailed administrative data from the Finnish National Social Insurance Institution, which records 135.34 million treatments between 2008 and 2020 and encompasses 3,359 unique medical treatments in the physician market and 692 in the dental market.[1] In total, we link to our visit-level dataset 85 acquisitions in the physician market and 122 in the dental market. Using modern difference-in-differences (DiD) methods that account for the staggered nature of treatment assignment, we find that in the physician market post-acquisition prices for auxiliary services increased by around 20% and prices of appointment times by around 10%. In the dental market, we find that prices increased by around 10%.

Using the same methodology, we study how acquisitions affected treatment variety, the number of physicians and dentists, and the number of patient visits. In the physician market, we find that acquisitions did not affect the variety of treatments offered or the number of physicians in the acquired clinics, whereas we find a modest increase in the number of medical specialties covered by the clinic. We also find that after acquisition, the number of patient visits decreases in the acquired clinics, which is consistent with the price increases that followed the acquisitions. In the dental market, we find a small increase in the number of dentists and no significant effect on the number of patient visits.

Next, we examine the mechanisms through which acquisitions affect the pricing of target clinics. In this analysis, we focus on the physician market, where we have access to several complementary datasets. First, we test whether changes in local market concentration can explain the observed price changes. To study this, we split the acquisitions into in-market acquisitions, which had an impact on local market structure, and out-of-market acquisitions, where the target and the acquirer had no geographical overlap before the merger. We find that prices also increase in out-of-market acquisitions, implying that changes in local market concentration cannot account for all of the observed price changes post-acquisition. Instead, we find that a large fraction of the post-acquisition price changes in auxiliary services are explained by the target clinic adopting the pricing strategy of the acquirer; the national healthcare chains set the prices for most auxiliary services uniformly throughout Finland, and after acquisition, the uniform prices are extended to the acquired clinics. The correlation

[1] For the dental market, our data only extends up to 2019.

between the pre-acquisition price difference between the target and acquirer and the post-acquisition price change in the target clinic is 0.98. Because chains systematically price higher than independent clinics, the adoption of the acquiring firm's pricing strategy leads to an increase in prices of auxiliary services in the target clinic. Using a stylized model, we show that our estimates capture this price harmonization effect in auxiliary services but do not capture how the acquisitions cumulatively have affected the development of prices of auxiliary services in the chain-owned clinics.

In the last section of the article, we study factors that might explain higher prices in chains again, focusing on the physician market. First, using the stylized model, we show that the operational model in chains where physicians work as independent contractors on a revenue-sharing basis and are allowed to price their appointment times can create double-marginalization. From this we deduce that differences in organizational structure could explain a part of the price difference between independent and chain clinics. Second, we test whether the price difference between chains and independent clinics can be explained by quality differences. Using a consumer survey, we show that there is no cross-sectional difference in perceived quality between chain and independent clinics. However, the survey does reveal some differences between chain and independent clinics. For example, patients who value digital services are more likely to have visited a chain clinic. Finally, we examine potential differences in the objective functions of clinics. We estimate the DiD analysis separately for acquired non-profit and for-profit clinics. Prices increase more in clinics that were owned by a non-profit organization prior to the acquisition. This result indicates that the price difference between independent clinics and chains is partially explained by some independent clinics having non-profit motives.

Our work complements the expanding body of research exploring the implications and effects of merger control notification systems. Wollmann (2019) documents that in the US a large share of mergers are exempt from mandatory notification, and Kepler et al. (2023) finds evidence that firms structure deals to avoid antitrust scrutiny. They also find evidence that on average profit margins increase after acquisitions that just avoid mandatory notification. Feng et al. (2023) finds that stealth acquisitions in the US prescription drug markets have led to higher prices and Cunningham et al. (2021) finds that below-threshold mergers in the pharmaceutical industry have led to discontinuation of innovation projects. Morzenti (2022a) finds that in the US non-notified horizontal mergers on average lead to a 30% reduction in patenting activity. Wollmann (2024) shows that in the US dialysis industry, where prices are regulated, non-notified mergers have resulted in lower quality of care. The previously listed studies focus on the US, and are mostly industry-level studies. Morzenti (2022b) focuses on the economy-wide implications of notification thresholds and estimates the effect of relaxations of notification rules in several countries. He finds that such policy changes increase industry-level concentration and lead to a 2% decrease in labor share. We contribute to the stealth acquisition literature by providing the first industry-level case study of stealth consolidation outside the US. Our results demonstrate that stealth consolidation can also be a relevant concern outside the US.

This article also contributes to the literature that studies the effect of mergers in the healthcare sector. Several articles study the effect of hospital mergers, and most find that mergers of close competitors have resulted in higher prices.[2] The previous literature on the effect of mergers in the physician market is more limited. Koch and Ulrick (2021) and Zhang et al. (2021) are among the few articles to study consolidation in the physician market in the US. There are also two articles studying the effect of acquisitions in the Finnish physician market. Saxell and Nurminen (2020) studies the effect of physician clinic mergers on the prices set by physicians and, in line with this article, finds that prices increased after merger. Nurminen (2021) studies the effect of physician mergers on three specific diagnostic tests. Consistent with our results, he finds that mergers resulted in increases in prices for diagnostic services. Most of the existing literature, including studies on the Finnish market, has focused primarily on examining the impact of mergers on prices through changes in

[2]For the US market see e.g., Cooper et al. (2019), Brand et al. (2023), Dafny (2009), and Garmon (2017); and for the Dutch hospital market, see Kemp et al. (2012).

local market concentration. We contribute to the literature by showing that mergers and acquisitions can also affect pricing through the diffusion of firm strategies. Linked to our finding, DellaVigna and Gentzkow (2019) documents that in the US retail market, after acquisitions, the uniform prices of the acquirer are installed in the target store. Granja and Paixão (2022) finds a similar pattern in the US banking market. In the healthcare context, Eliason et al. (2020) shows that in the US dialysis industry, acquired clinics adopt the operational strategies of the acquirer. They show that this results in lower clinical quality. Similarly Andreyeva et al. (2024) finds that chain ownership has adverse effects on health outcomes in the hospital care market. In contrast, Janssen and Zhang (2023) finds that in the pharmacy market consolidation into chains has increased compliance with regulations, and La Forgia and Bodner (2023) finds that chain ownership improves the performance of fertility clinics.

This article is structured as follows. In Section 2, we begin by discussing the merger notification regime in the European Union and Finland, followed by an exploration of the Finnish healthcare sector. In Section 3, we outline our data and provide descriptive statistics. Section 4 delves into our primary empirical framework, and Section 5 presents the main results. In Section 6, we investigate the channels through which acquisitions affect prices. Section 7 explores the reasons why independent clinics set lower prices than chains. Finally, we offer some concluding remarks in Section 8.

2 Institutional setting

2.1 Merger control and size thresholds

In most European countries, only mergers that meet specific turnover thresholds must be notified and approved by the Competition Authority. Typically, member countries of the European Union have two cumulative thresholds. One is set for the combined turnover of the merging parties, and one is set for the individual turnover of each of the parties. In 2019, the average combined turnover threshold for countries in the European Union was around 130 million euros and the average threshold for individual turnover around 16 million euros.[3]

The economic rationale behind turnover thresholds is twofold: to reduce merger notification costs for both firms and the regulating authority, and the understanding that smaller transactions are less likely to be anti-competitive. Although the latter might be a reasonable assumption in certain settings, a simple example can illustrate potential problems with the turnover-based threshold system, particularly in geographically segmented markets. Imagine an industry where initially in every local market there are two independently run firms that compete with each other. Suppose that they each have 10 million turnover. Now, consider that a single firm starts to acquire the other firms. If the individual turnover threshold were set at the same level as the average in the member countries of the European Union, then none of the mergers in the example would have to be notified.

In this article, we study the effects of exempt acquisitions in Finland. Between 2008 and 2020, which is the time period we study, a transaction had to be notified to the Finnish authority if the combined international turnover of the merging parties was greater than 350 million euros and the individual domestic turnover of at least two parties was greater than 20 million euros.[4] In Figure 1, we plot the share of mergers that were notified to the Finnish Competition Authority between 2000 and 2020. The merger data originates from the Finnish business magazine Talouselämä and contain all transactions in which the turnover of the target firm exceeded one million euros. The share of mergers within the scope of merger control varies yearly between 4% and 23% with a clear drop in the number of merger filings in 2004. At that time, the Finnish notification system was reformed. Before the reform, the evaluation of a target firm's turnover involved aggregating the turnovers of all firms acquired by the buyer in the preceding two years, provided they operated in the same industry as

[3]The Figures are based onHorten, 2019. We show the turnover threshold individually for each country in Figure 12 in Appendix D.

[4]The Finnish merger control thresholds were lowered in 2023. After the reform, a merger must be notified if the combined domestic turnover of the parties exceeds 100 million euros and the turnover of at least two parties exceeds 10 million euros.

the target. This two-year rule was abandoned in 2004, and the number of notifications more than halved. Since then, the share of exempt mergers has been 90% to 95%.

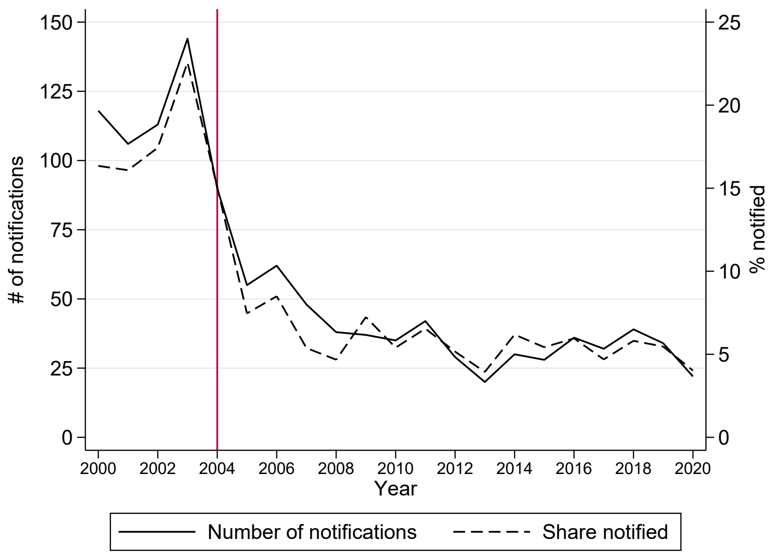

Figure 1: Share of mergers notified in Finland

The number of notifications is based on datasets provided by the OECD and Comparative Competition Law. The share of notified mergers is calculated by dividing the number of notified mergers by the number of all mergers in Finland. The data on the total number of mergers is based on a dataset compiled by the Finnish business magazine Talouselämä.

Comparison of the share of exempt acquisitions to other European countries and the US illustrates that the exempt acquisitions are not only a potential issue in Finland. To determine the proportion of acquisitions exempt from merger control in the EU, we compared the total number of acquisitions to the total number of notifications in 2019. The number of notifications was collected from the annual reports national authorities have submitted to the OECD and the total number of mergers from the Institute for Mergers, Acquisitions and Alliance. In total, we were able to collect both figures for 14 European Union member countries.[5] The total number of mergers was 14,196 and the total number of notifications 2,638. The share of exempt mergers was thus around 81%, which is less than in Finland but

[5]These include: Germany, France, Netherlands, Spain, Sweden, Italy, Norway, Poland, Finland, Ireland, Belgium, Czech Republic, Portugal, and Hungary.

still high.[6] Wollmann (2019) reports the share of non-notified mergers by industry for the US.[7] The share of notified mergers varies between 47% and 82%, indicating that the share of non-notifiable mergers is high also in the US.[8]

One industry particularly affected by the Finnish merger control reform of 2004 was the healthcare industry, where between 2000 and 2020, the large healthcare chains conducted hundreds of acquisitions.[9] Before the reform, 40% of acquisitions in our database were notified to the competition authority; however, after the reform, the share of notified acquisitions dropped to just 2%. Of the seven mergers notified between 2008-2020, four were cleared unconditionally, two were cleared conditionally, and in one case the authority proposed a prohibition of the merger to the market court. Given the large number of transactions and the low share of notified mergers, Finland and in particular the Finnish private healthcare industry provide a particularly good setting to study the effects of exempt transactions on market outcomes.

2.2 Finnish private healthcare market

Healthcare in Finland is produced by both private and public providers. In 2020, the total expenditure on healthcare in Finland was approximately 23 billion euros (THL, 2023). The share of private providers in total expenditure was around 20%. However, the role of private providers is more substantial in basic healthcare, where the share of private providers in total expenditure, including dental care, rehabilitation and occupational health care, was greater than 40% in 2020 (THL, 2023).

Private providers sell their services to three main customer segments. First, they sell

[6]The notified mergers do not include those investigated by the European Commission. In 2019, the European Commission investigated a total of 382 merger. We provide more details on these Figures in the Appendix.

[7]Wollmann (2019) reports the shares only for the 30 industries with the most horizontal exempt mergers.

[8]In a follow up article Wollmann (2023) shows that accounting for merger with unpublicized values, increases considerably the estimated share of acquisitions that are exempted from merger control.

[9]These figures are based on the data from Talouselämä that has been supplemented from several other sources to have better coverage of smaller mergers not covered by the original data. The data set is described in more detail in Section 3.1.

services directly to patients who pay most of the costs out-of-pocket. A small fraction of the private fees, approximately 14% in 2020, is reimbursed to the patient by the Finnish National Health Insurance.[10] Private providers also sell healthcare services to firms through the occupational healthcare market. Finally, public providers can outsource the production of publicly provided services to private firms.

The focus of this article is the private provision of physician and dental services directly to patients. The physician market consists of selling appointment times and auxiliary services, such as radiology and laboratory tests, to patients. Physicians typically work in clinics as independent contractors. The clinic provides the physician with office space, the use of its brand and booking system, and the in-house production of auxiliary services such as medical imaging and laboratory tests. A physician working as an independent contractor decides her own appointment fees and pays a share of her revenue to the clinic as room rent. The clinic's revenue share is on average around 20% (FMA, 2021). Whereas fees for appointment times are determined by the physician, the clinic sets the prices for auxiliary services. In the dental market, similarly to the physician market, patients pay most of the service out-of-pocket. However, unlike in the physician market, the clinic sets the price for all services in the dental market.

Private physician and dental services differ in several ways from publicly provided healthcare services, with a notable difference being in waiting times. Although there are virtually no waiting times in the private sector, the public sector had an average waiting time of two-and-a-half weeks to see a physician in 2019, and the waiting period was much longer in the dental market. The second difference is the price paid by patients. In the public sector, the maximum price of a physician's appointment is legally capped to around 20 euros. (see e.g. STM, 2020). As we will detail in the subsequent section, costs in the private sector are significantly higher. In this article, we estimate the effect of acquisitions on private providers and do not consider the potential effects of the acquisitions on public providers.

[10] A fraction of households also have private health insurance that covers expenses from visiting a private provider.

3 Data and descriptive statistics

In this section, we provide a brief overview of the data used in this study. In the first subsection, we detail our data sources and give a brief description of each dataset. In the second subsection, we document aggregate trends in market concentration and prices. In the third subsection, we compare acquired clinics to non-acquired clinics and clinics owned by chains.

3.1 Data sources

In our analysis, we use two main datasets. The first dataset contains information on acquisitions in the Finnish private healthcare market. It has been compiled from the Finnish Patent and Registration Office's VIRRE database, from the merger database upheld by one of Finland's largest business magazines, Talouselämä, and from the annual reports of the large healthcare chains. The second dataset is administrative claims data from the Social Insurance Institution of Finland. It contains information on the exact treatments received by the patients, including the price paid. This data allows us to track the price development of individual clinics, keeping constant the mix of treatments offered by the clinics over time. We combine the two datasets using harmonized clinic names.[11]

Our data on mergers and acquisitions cover the acquisitions carried out by the seven largest private healthcare firms (hereafter "chains") of which three were active in the physician market and all seven in the dental market.[12] During our observation period, two chains were acquired by a competing chain. We exclude these mergers from our analysis. The acquisition database includes the name, business ID, the name of the acquirer, and the date the acquisition was announced. In total, the dataset includes 282 distinct acquisitions from the time period we have visit data. In the physician market, the total number of acquisitions

[11] As a robustness check, we also link the datasets using the Finnish business ID. This results in roughly the same matches, except for a few acquisitions where the business ID of the target firm is unavailable.

[12] These firms have been the most active acquirers in the private healthcare market. Another provider has also conducted several acquisitions. However, most of these acquisitions are in the rehabilitation and physiotherapy market, which is outside the scope of this study.

is 94. We are able to link 85 of these acquisitions to the administrative claims data. For the rest of the acquisitions, we cannot find the target clinic from the data. This is a problem, particularly at the beginning of the sample period, when we do not observe the identity of the service provider for many visits. Some of the clinics are closed after the acquisition and integrated with the existing clinics of the acquirer. For 62 of the 85 linked acquisitions, we observe data both before and after the acquisition. In the dental market, we observe a total of 188 acquisitions. Out of these, 122 can be linked to our data, and for 87 of these linked acquisitions, we have data both before and after the acquisition.

The administrative claims data from the Social Insurance Institution of Finland covers the years 2008-2020 and contains identifiers for patients and physicians, the name and address of the clinic, the date of the visit, the duration of the visit, detailed treatment codes specifying the medical services received by the patient, and the price paid for each of the treatments. For the dental market, we exclude the year 2020 from the data because we do not observe the provider name for any of the visits. Because all Finnish residents are entitled to the NHI benefit scheme, the data is highly representative, covering almost all visits in the private physician market. In total, the data records 135.34 million treatments received by the patients. After excluding observations in which the service provider is unknown or the visit is not linked to a clinic but only to a independent physician or dentist, the data records 97.90 million treatment instances.[13]

We have supplemented our main datasets with two additional ones. For information on cost development, we have collected cost data from the public sector. In Finland, municipalities can cooperate in the provision of health services by forming joint healthcare organizations. These joint organizations set prices for the member municipalities. Pricing is based on costs, with prices set to match average costs. Our data tracks procedure-level prices and covers the years 2008-2021. Using common identification codes for procedures,

[13] The share of observations with an unknown service provider declines throughout our sample period. In 2008, there were 1.85 million such observations, but by 2020, this number had decreased to only 0.36 million. For a more detailed analysis, see Saxell and Nurminen (2020).

we match it to the data covering prices in the private sector. Finally, to obtain information on service quality, we use a customer survey conducted by the Finnish Competition and Consumer Authority. The survey was conducted in 2020 as part of a merger investigation. In total, the survey has 1,941 respondents, of which 1,065 had visited a private physician in the past year. The survey includes questions about the perceived quality of private care and the reasons why patients chose a particular provider.

3.2 Mergers, market concentration, and prices in the private health-care market

Figure 2 illustrates the significant change in the market structure during the sample period. We plot the number of acquisitions we are able to link to the data by market and year. The number of linked acquisitions has varied between 0 and 43 each year and the total is 206. The highest number of mergers in our data occurred in 2015 and 2016. Of the 62 acquisitions in the physician market, we can link to the administrative claims data and observe data both before and after the acquisition, 25 were out-of-market acquisitions where the target and the acquirer had no geographical overlap within 30-kilometer radius before the acquisition. In the dental market, the number of in-market-acquisitions is 48 and the number of out-of-market acquisitions 39.

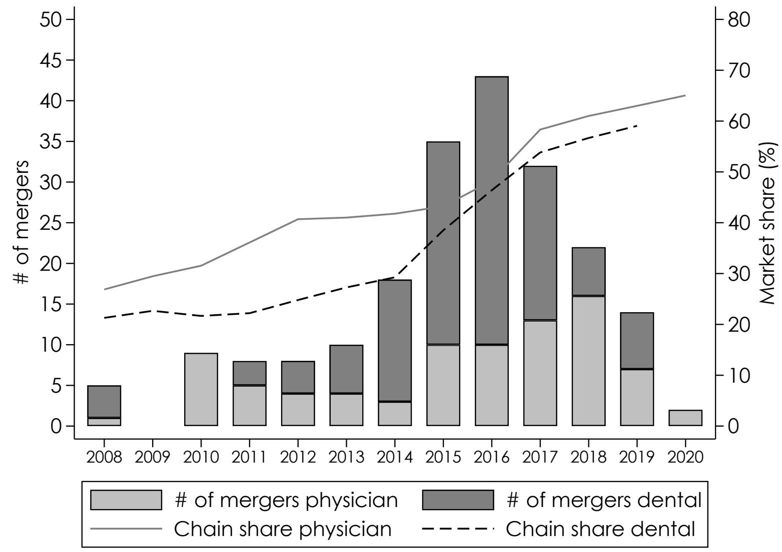

Figure 2: Acquisitions and market shares of large chains

The left vertical axis denotes the number of mergers and the right vertical axis represents the market share. Market share is calculated by dividing a chain's sales by the total turnover. Data includes observations with unknown service provider. In the physician market, there are three large chains; in the dental market, there are seven. For definition of chains see section 3.1.

Figure 2 also shows the development of the market shares of the chains. In 2008, the market share of these chains was below 30% in the physician market and around 20% in the dental market. In 12 years, the market share has more than doubled in both markets.[14] The increase in the national market share of chain providers has been driven both by the expansion to new local markets and by an increase in the local market share in municipalities where they were already active in 2008. For example, in the physician market the three large chains were active in 40 municipalities in 2008, whereas in 2020 they were already active in 76 municipalities.[15] To illustrate the increase in local market share in municipalities where the large chains were already active in 2008,in Helsinki, the market share of the three chains increased from 42% in 2008 to 55% in 2020.

[14] A similar trend has been observed also in the healthcare markets of other countries. For example, in the US hospital market Andreyeva et al. (2024) report that the share of bed capacity in independent hospitals has decreased from 42% to 19%.

[15] Here municipality is defined "active" if the total sales of the three chains in the municipality were over 100,000 euros within the calendar year.

Figure 3 plots the price development in the private physician and dental market. The solid black line represents the overall price development in the private physician market and the solid gray line in the dental market. The construction of price indices involves computing a separate index for each distinct medical treatment in the data, followed by taking their weighted average, using the number of visits in 2008 as weights.[16] The dashed black line represents the consumer price index, which includes all services and products. Prices in the physician market have increased by approximately 57% between 2008 and 2020. In the dental market, prices have increased around 45% between 2008 and 2019. During the same period, the general price index increased only 14%.

Next, we examine the price development of laboratory tests and medical imaging separately. We focus solely on the physician market, where we are able to link price data with cost data from public providers. The most popular laboratory tests in the NHI data include the basic blood count, the pap test and the C-reactive protein (CRP) test, and the most popular medical imaging gynecologic ultrasound, chest x-ray, mammary gland x-ray examination, and knee x-ray. The solid gray line represents private providers, and the dashed gray line represents public providers. Both samples only include medical procedures that were available for both types of providers. Between 2008 and 2020, prices in the public sector rose by 11%, whereas in the private sector, they increased by 61%, which is more than five times the rate in the public sector. In the matched sample since 2015, the rate of price increase in the private sector has been considerably faster than in the public sector.

[16]Diagnostic services feature a significantly higher number of distinct treatment codes compared to appointment times.

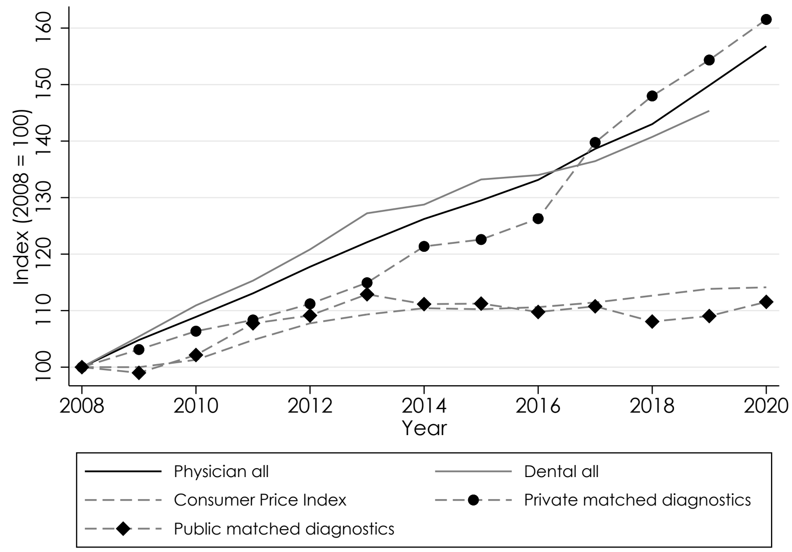

Figure 3: Price development over time

The solid black line represents the overall price development in the private physician market and solid gray line in the dental market. The dashed black line represents the consumer price index and it was collected from Statistics Finland's website. The solid gray line represents the price development of diagnostic services in the private market and the dashed gray line price development of diagnostic services in the public market. In public healthcare diagnostic services are not paid by the patient and the price represents the amount paid by member municipalities of services provided by joint healthcare organizations. All series are indexed to be 100 in 2008.

3.3 Comparing clinics and descriptive evidence

In Table 1, we divide the observations into four distinct groups. The first group consists of visits to acquired clinics before the acquisitions and the second of visits to acquired clinics after the acquisitions.[17] The third group consists of visits to independent clinics that are not acquired during our sample period.[18] The fourth includes chain-owned clinics. Clinics with fewer than 100,000 euros in sales are excluded from the sample. In all four groups, we have also excluded treatment codes that were offered by the clinic in less than one third of

[17]We have excluded clinics, which were closed after the acquisition from both groups.

[18]In the physician market, 'independent clinics' refer to all clinics except the three nationwide healthcare chains and a few specialized eye chains. In the dental market, this term includes all clinics except the seven national chains.

the quarters.[19] We continue to use these groups and sample restrictions throughout the rest of the article.

The first part shows summary statistics at the visit level, with each individual treatment recorded as a visit in the data. In total, the sample contains 16,309,011 visits to the acquired clinics in the physician market and 8,914,108 visits in the dental market. Of these, around 60% and 57% are observed before acquisition in the physician and dental markets, respectively. Patient characteristics are roughly similar in all four groups. The average age of patients is slightly higher in acquired clinics both before and after acquisitions than in chain clinics and non-acquired independent clinics in the physician market. In the dental market, the distance traveled is slightly higher in acquired clinics before acquisition. The average distance traveled by the patients increases slightly in the acquired clinics after the acquisition in the physician market whereas it decreases in the dental market.[20] The average price paid by the patients increases considerably in the acquired clinics after the acquisition. This can be explained by an increase in price or a change in the treatment mix.

In the second part, the data is aggregated at the clinic-quarter-procedure level. At this level of aggregation, we observe the acquired clinics 390,371 times in the physician market, with considerably more observations in auxiliary services where the number of distinct treatments is higher. In the dental market, we have 166,168 observations from acquired clinics. The first two rows show the value of a price index, where the average price of each treatment in each clinic in a given quarter is divided by the within-quarter aggregate average price.[21] This allows us to compare the relative price level of different types of clinics, keeping the mix of medical procedures in different clinics constant. In the acquired clinics, the price index increases by around 0.15 after the acquisitions in auxiliary services, by 0.05 in appointment times, and by 0.08 in the dental market. The price index is considerably higher in

[19]For the acquired clinics we add those treatment codes that have been offered in at least eight quarters within a 16-quarter window around the acquisition.

[20]The distribution of distances traveled by patients is right-skewed, with the average distance being more than twice the median.

[21]Note that the whole dataset was used to calculate the average prices in each quarter.

both auxiliary services and appointment times in the chain clinics compared to non-acquired independent clinics and acquired independent clinics before the acquisitions.

Finally, in the third part, the data is aggregated at the quarter-clinic level. The number of physicians working in the acquired clinics is 29.76 before acquisition and 29.99 after acquisition.[22] This is roughly the same as in chain clinics but considerably higher than in non-acquired independent clinics. The number of medical specialties and distinct treatments is higher in the chain and acquired clinics compared to the non-acquired clinics.[23] The average turnover in the acquired clinics is around 380,000 euros before the acquisition and 455,000 euros after, whereas the number of visits is around 4,900 before the acquisition and 4,700 after. Dental clinics are smaller compared to physician clinics. The number of dentists working in acquired clinics increases from 5.94 to 7.35. The average turnover of acquired dental clinics grew from 176,00 euros to 223,000 after the acquisitions, whereas the number of visits increased roughly from 2,300 to 2,600.

4 Empirical framework

The main objective of this article is to estimate the effect of acquisitions in the private healthcare market. To do this, we employ a difference-in-differences (DiD) strategy. The treatment group consists of the acquired clinics and the control group of independent clinics that were not acquired during our sample period. The central identifying assumption in the DiD analysis is that in the absence of treatment, the outcomes would have evolved similarly in the control and treatment group. In our setting, this common trend assumption requires that prices and other outcomes would have evolved similarly in the non-acquired and acquired clinics without the acquisitions.

A potential concern is the endogeneity of acquisitions. The chains could have, for exam-

[22]We have classified a medical professional working in a clinic if they have on average at least two appointment times per week in a given quarter.

[23]The number of distinct specialties was determined from the specializations of physicians who had at least one appointment time in the clinic during the given quarter.

Table 1: Descriptive statistics by clinic type

	Pre-acq	Post-acq	Always ind	Always chain
Panel A Physician market				
Procedure-level				
Average age	44.51	43.41	42.90	41.39
Sex (1=male, 2 = female)	1.62	1.59	1.65	1.61
Distance	20.46	24.76	22.29	20.89
Price doctor's appointment	71.36	90.86	85.07	81.82
Price auxiliary services	83.84	104.57	85.19	91.50
# of visits auxiliary services	4,124,384	2,835,786	5,052,379	11,335,537
# of visits reception	5,715,994	3,632,847	6,217,341	14,558,901
Clinic-quarter-procedure-level				
Price index auxiliary services	0.90	1.05	0.98	1.07
Price index doctor's appointment	1.02	1.07	1.00	1.08
# of obs auxiliary services	214,140	155,326	219,967	566,628
# of obs reception	12,372	8,533	25,559	28,984
Clinic-quarter-level				
# of specialities	16.51	18.14	6.37	18.69
# of distinct treatments	142.05	156.19	49.48	159.02
# of regular doctors	29.43	29.82	9.62	33.19
# of visits	4,880.31	4,658.97	1,666.71	4,978.95
Turnover	381,385	455,120	146,257	431,578
# of clinics in group	85	85	199	168
Panel B Dental market				
Procedure-level				
Average age	53.21	54.96	54.07	54.82
Sex (1=male, 2 = female)	1.56	1.55	1.54	1.57
Distance	20.25	17.24	16.52	15.46
Price	76.06	85.27	70.60	79.22
# of visits	5,057,861	3,856,247	9,923,524	14,493,952
Clinic-quarter-procedure-level				
Price index	1.05	1.13	0.97	1.07
# of obs	97,045	69,123	298,875	282,160
Clinic-quarter-level				
# of distinct treatments	50.95	55.94	37.95	44.72
# of regular doctors	5.94	7.35	3.11	4.66
# of visits	2,325.69	2,601.12	1,067.97	1,633.65
Turnover	176,017	223,178	75,692	129,974
# of clinics in group	107	107	288	341

Panel titles indicate the level of the data. See text for more details.

ple, acquired clinics in geographical markets where demand is increasing or chosen target clinics based on some other indicators of future profitability. As shown in Table 1 there are differences in the characteristics of the non-acquired and acquired clinics. However, most of these characteristics vary little over time and are effectively controlled in the DiD analysis by clinic-fixed effects. More importantly, we demonstrate in the next section that we do not find any evidence that acquired independent clinics have different pre-acquisition trends in outcomes relative to the non-acquired independent clinics. Based on this we find it plausible to assume that without the acquisitions the acquired clinics would have continued to evolve similarly to the non-acquired independent clinics. We also check the robustness of the results by using future targets as a control group.

A second key assumption in the DiD analysis is that the control group is not affected by the treatment. A potential concern in our main control group is that the acquisitions also affect the non-acquired clinics. In particular, in Bertrand pricing models, prices of competing firms are complements, implying that if post-acquisition prices increase in the acquired clinics, then prices would also increase in the competing clinics (see, e.g., Deneckere and Davidson, 1985). To alleviate this concern, we construct an alternative control group in which we only include clinics that have not experienced any acquisitions within a 30-kilometer radius. Finally, the DiD analysis also relies on the assumption that the treatment has no effect before its implementation. It is unlikely that the acquired clinics alter their behavior before the acquisition is complete. To support this, we have examined the pricing trends prior to the acquisition and found no evidence of anticipation.

Typically in the literature, the DiD analysis has been implemented using the following two-way fixed effects (TWFE) model:

$$Y_{ijt} = \alpha_{ij} + \lambda_t + \beta^{TWFE} D_{jt} + \epsilon_{ijt} \tag{1}$$

where Y_{ijt} is the logarithm of the price of treatment i in clinic j in quarter t. D_{jt} is the treatment indicator, which takes the value one after the acquisition for the treated group and is zero otherwise. α_{ij} and λ_t are treatment-clinic and time fixed effects, respectively. The parameter of interest is β^{TWFE}, which, under the parallel trends assumption, identifies the average treatment effect on the treated (ATT).

Recent methodological advances have shown that β^{TWFE} may be biased in staggered settings under heterogeneous treatment effects (de Chaisemartin and D'Haultfœuille, 2020; Goodman-Bacon, 2021; Callaway and Sant'Anna, 2021; Sun and Abraham, 2021).[24] The bias is generated by the variance weighting of the estimator and from using the early-treated units as controls for the later-treated units (Goodman-Bacon, 2021). The latter is a problem if the treatment effects are dynamic, meaning that they change over time. This aspect may particularly impact our setting, as Mariuzzo and Ormosi (2019) document that many empirical studies have found that the price effects of mergers are dynamic.

Various methods have been developed to address these issues. We use the methodology proposed by Callaway and Sant'Anna (2021) ("CS method") because it allows for dynamic heterogeneous treatment effects in a staggered setting with binary treatment. In the Appendix, we discuss alternative estimators and present results using two alternative estimators. The CS method is based on grouping treated units into cohorts that start receiving the treatment at the same period and estimating separate ATTs for each cohort (g) and time period (t). Under parallel trends and no anticipation, the average treatment effect can be identified by comparing the expected change in outcome for cohort g between periods $g-1$ and t with that for a control group not yet treated in period t.

$$ATT(g,t) = \mathbb{E}[Y_{ij,t} - Y_{ij,g-1} | G_{ij} = g] - \mathbb{E}[Y_{ij,t} - Y_{ij,g-1} | G_{ij} = g'] \;\; g' > t \tag{2}$$

[24]For a review of the literature see Roth et al. (2023) and de Chaisemartin and D'Haultfœuille (2023).

$ATT(g,t)$ can be estimated by replacing expectations with their sample analogs.

$$\widehat{ATT(g,t)} = \frac{1}{N_g}\sum_{g}[Y_{ijt} - Y_{ij,g-1}] - \frac{1}{N_{g'}}\sum_{g'}[Y_{ijt} - Y_{ij,g-1}] \;\; \forall \;\; g' > t \tag{3}$$

Callaway and Sant'Anna (2021) propose two options for g'. The first uses only never-treated units, and the second uses all not-yet-treated units. We use only never-treated units in the control group in our main specification. The cohort- and time period-specific ATTs can be aggregated across cohorts and overall impacts into a single policy effect.

$$ATT = \sum_{g}\sum_{t} = \omega(g,t) * ATT(g,t) \tag{4}$$

The different cohorts are weighted to match their relative frequencies in the treated population. We cluster standard errors at the clinic level.[25]

We examine the effect of acquisitions on several different outcomes. The main outcome is the logarithm of price. Given that physicians set the prices for appointment times and the clinic for auxiliary services, we estimate the effects separately for these two groups.[26] In contrast, for the dental market, where the clinic also sets prices for dental check-ups, we group all treatments together. In addition to price, service quality is important in determining consumer welfare, particularly in the healthcare sector. The reimbursement dataset does not contain any variables directly related to quality. However, we observe service variety, which is often used as a measure of quality. We use three different measures of service variety as an outcome variable. The first one is treatment variety, which measures the number of unique medical treatments offered in the clinic. The second is specialty variety, which counts the number of medical specialties of physicians who work in the clinic. The third measure of service variety counts the number of physicians or dentists who work regularly in the clinic. Finally, we test how acquisitions affected the number of patient visits. Again, for the

[25] We implement the CS method using the csdid package in Stata (Rios-Avila et al., 2022).

[26] In the data, diagnostic services account for 80% of auxiliary services. Other significant categories include hospital services, such as surgeries and fertility services.

physician market, we estimate the effect on the number of visits separately for the auxiliary services and appointment times. When we estimate the effect of acquisitions on the number of patient visits and service variety, we collapse the data to the clinic-quarter level.

Although acquisitions are discrete events, their effects may materialize gradually over time. Due to this, we exclude the first two quarters after acquisition of the data. In our main analysis, we focus solely on the effects of acquisitions in acquired clinics. In Section 6.3, we discuss how the acquisitions affect the pre-existing clinics of the acquirer.

5 Main results

5.1 Price

Table 2 presents our DiD estimates using the logarithm of price as the outcome variable. Panel A shows the results for physician appointment times, Panel B for auxiliary services, and Panel C for dental services. The first column uses all non-acquired clinics as the control group. In the second column, the control group is restricted to those non-acquired, independent clinics that experience no acquisitions in their local market. The third column employs a control group comprised of clinics that were acquired after our sample period.

All specifications reveal an economically and statistically significant increase in the price of all types of services. For the appointment times of physicians, point estimates range between 0.093 and 0.113, implying that, on average, acquisitions have increased prices by approximately 10-12%.[27] This is of similar magnitude to the estimated effect on dental services, which is 9-12%. For auxiliary services, we estimate a price increase that is around twice as large, at 20%. These results are robust to the choice of control group as the differences in point estimates between different specifications are minor.

[27] To translate the point estimates to percentage changes we use the following transformation: $e^{0.093} - 1 = 0.0975$ and $e^{0.113} - 1 = 0.1196$.

Table 2: Acquisitions effect on prices

Panel A: Doctor's appointment			
	Log(price)	Log(price)	Log(price)
ATT	0.093***	0.098***	0.113***
	(0.014)	(0.017)	(0.020)
Control	1	2	3
Panel B: Auxiliary services			
	Log(price)	Log(price)	Log(price)
ATT	0.185***	0.186***	0.181***
	(0.029)	(0.030)	(0.030)
Control	1	2	3
Panel C: Dental market all			
	Log(price)	Log(price)	Log(price)
ATT	0.109***	0.113***	0.089***
	(0.011)	(0.014)	(0.014)
Control	1	2	3

Dependent variable is the logarithm of price. Column 1 shows results using all non-acquired independent clinics as control group. In column 2 control group is restricted to non-acquired inpendent clinics, which experience no acquisitions in their local market. In column 3 control group is restricted to those clinics that acquired after our sample period. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To evaluate the credibility of our empirical setting, in Figure 4, we plot the results of an event-study specification, estimated using the CS method.[28] The event-study specification estimates the average mean differences between the treated and control groups separately for each period. In Figure 4 for the pre-treatment period we use short short differences, i.e. comparisons of consecutive periods (Roth, 2024). In Appendix F we also report results using

[28]Unlike the event-study graphs generated using the TWFE method, the CS method does not require omitting one pre-treatment period.

long differences for the pre-treatment period. In both specifications before the acquisition, the point estimates are close to zero and, with one exception, statistically insignificant. Post-acquisitions, the point estimates increase considerably and become statistically significant. The price change is particularly large and sudden in the auxiliary services. Together, the results suggest that there were no anticipatory effects and that the acquired and non-acquired clinics followed a similar trend before the acquisitions.

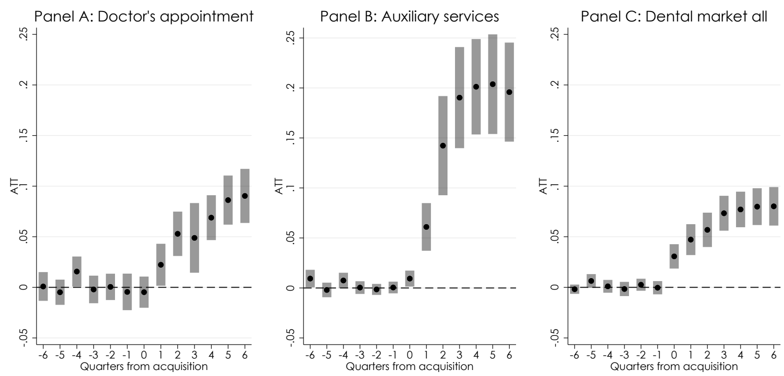

Figure 4: Event-study estimates

The dependent variable in all three panels is the logarithm of price. Quarters outside the 12-quarter window depicted in the figure are included in the regression but not shown here. The grey area represents 95% confidence intervals.

5.2 Variety

In this subsection, we examine the effect of acquisitions on variety. We use the main specification where the control group consists of all non-acquired clinics. The results are shown in Table 3.[29] The acquisitions had no statistically significant effect on treatment variety in the physician market or on the number of regular physicians working in the clinic. Although we do not find an effect on these two variables, we do find that acquisitions had a statistically significant effect on the number of specialties at the $p < 0.10$ level. The number of specialties offered in the acquired clinics increased by 1.7, representing approximately 10% of their average number of specialties prior to acquisition.

[29]Event-studies for all treatment variety outcomes are provided in the Appendix.

For the dental market, we find statistically significant results at the $p < 0.05$ level for both the variety of treatments and the number of dentists working in the clinic. The number of treatments increased by 4.59, which represents approximately 9% of the pre-treatment average of 50.9. Similarly, the number of dentists working regularly in the clinic increased by 0.83, amounting to an approximate 14% increase from the pre-treatment average of 5.9. The change in treatment variety in the dental market could be explained by two factors. First, it could reflect new investment in machinery, allowing the dental clinic to offer new treatments. Alternatively, it could result from the dental clinics offering rarer treatments more often after acquisitions.

Table 3: Acquisitions effect on variety

	# of specialities	# of treatments	# of physicians	# of treatment	# of dentists
ATT	1.704*	11.166	-0.180	4.589**	0.829**
	(0.885)	(8.957)	(1.277)	(2.337)	(0.414)
Market	Physician	Physician	Physician	Dental	Dental

All outcome variables in levels. Data at the clinic-quarter level. All specifications use the main control groups, which includes all non-acquired independent clinics, and the Callaway and Sant'Anna, 2021 method described in the text. Standard errors clustered at the clinic level. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.3 Number of patient visits

Next, we examine the effect of acquisitions on the number of visits. We continue to use the main control group. The first two columns of Table 4 show the results for the physician market. The number of visits to auxiliary services decreases by 178 but this decrease is not statistically significant. The number of appointment time visits decreases by 349, and this reduction is statistically significant at the $p < 0.10$ level. Summing up, the decreased visits amount to 527, representing approximately 11% of the pre-treatment average number of visits in the physician market. The last two columns focus on the dental market. In contrast to the physician market, we estimate an increase in the number of visits to dental services. Specifically, there is an increase of 260 visits, which constitutes about 12% of the pre-treatment average. However, this result is not statistically significant. In the previous subsection, we showed that the number of dentists working in the acquired clinics increased, which might explain why we do not observe a decrease in the number of visits for the dental market. The last column suggests that visits per dentist have decreased, but this finding is also not statistically significant.

Table 4: Acquisitions effect on number of visits

	# of visits	# of visits	# of visits	# of visits per dentist
ATT	-177.681	-349.303*	259.892	-19.644
	(182.800)	(185.431)	(205.797)	(17.985)
Market	Physician	Physician	Dental	Dental
Services	Auxiliary	Appointment	All	All

All outcome variables in levels. Data at the clinic-quarter level. All specifications use the main control groups, which includes all non-acquired independent clinics, and the Callaway and Sant'Anna (2021) method described in the text. Standard errors clustered at the clinic level. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We also examined the change in the number of visits using the event-study approach, where the treatment effect is estimated separately for each quarter. The results are reported in Figure 5. Different from Table 4 we also see a statistically significant drop in auxiliary services. The number of visits in auxiliary services starts to decrease quite rapidly, and the point-estimates remain negative during the 12-quarter window depicted in the Figure. We have also plotted the point estimates for an even longer time period, and eventually, after around 20 quarters, the negative effects fade away and the estimates become statistically insignificant. This could be explained by a change in the composition of the treatment group rather than patterns in the number of visits to the acquired clinics. For most of the acquired clinics, we do not observe data over five years after the acquisition (20 quarters), and thus the estimates represent the effect on clinics acquired in the very early years of our data. For other outcomes, including variety and price, we do not find a similar disparity between the average effect and long-term estimates.

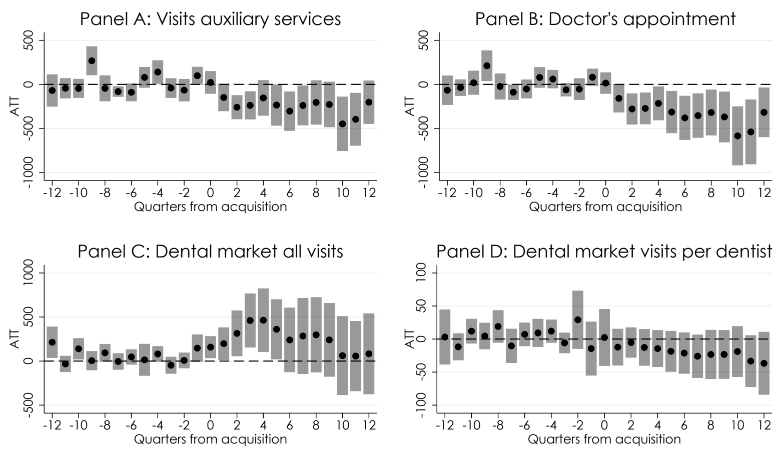

Figure 5: Event-study estimates

Dependent variable given in panel title. Quarters outside the 24-quarter window depicted in the figure are included in the regression but not shown here. The grey area represents 95% confidence intervals. Short differences are used to construct point estimates for pre-treatment period.

Compared to the increase in price, the estimated effects on the number of patient visits are modest. This is likely explained by several factors. First, as suggested in the previous subsection, there is an increase in service variety, which could mitigate the impact of price hikes on demand. Moreover, as we will explore in subsequent sections, chains and independent clinics differ in other dimensions that may influence patient choice. These include, for example, the availability of digital services that could have been installed in the acquired clinics after the acquisitions. Second, patients on the physician market may not be very price sensitive. The consumer survey included questions about what factors influenced the choice of patients. Only 12% of the patients list price as one factor that influenced their choice. Furthermore, when asked what type of information the patients collected before their provider choice, only 7% of the patients declared that they collected price information. Both of these findings suggest that patients are not very price sensitive, at least in the short-term. In particular, this can be the case for auxiliary services, where a patient may not know in advance which services she will end up using. Consistent with our results, Nurminen (2021) finds that the elasticity with respect to the price of diagnostic services is small.

6 Mechanism

6.1 Local market concentration

In the previous section, we observed that prices in the acquired clinics rise considerably post-acquisition. In this section, we first test whether estimated price increases can be explained by changes in local market concentration. Subsequently, our analysis will be specifically focused on the physician market. We divide the acquired clinics into two groups and estimate the price effects separately for each. The first group includes acquired clinics where the acquirer had at least one clinic within 30 kilometers of the target clinic (*in-market acquisition*). The second group consists of those acquired clinics where the acquirer had no clinic within 30 kilometers of the target (*out-of-market acquisition*).[30] Essentially, only the first group of acquisitions had an impact on local market concentration, potentially increasing the local market power of the acquirer. If the estimated price effects were indeed the result of increased local market concentration, we would expect to see price increases primarily in in-market acquisitions, with no significant effect in out-of-market acquisitions.

The results are shown in Table 5. The first two columns show the results for in-market acquisitions. In this group, prices increase after the acquisition by 22% in auxiliary services and by 11% in appointment times. For out-of-market acquisitions, we also find a statistically and economically significant increase in prices, with prices for auxiliary services increasing by 15% and prices for appointment hours by 7%. These findings suggest that changes in local market concentration alone cannot fully account for the observed price changes following the

[30] We calculate the distance between clinics using their postal codes.

acquisitions.

Table 5: Acquisitions effect on prices by type of transaction

	Log(price)	Log(price)	Log(price)	Log(price)
ATT	0.197***	0.105***	0.144***	0.068***
	(0.035)	(0.017)	(0.045)	(0.021)
Type	In-market	In-market	Out-of-market	Out-of-market
Service	Auxiliary services	Doctor's appointment	Auxiliary services	Doctor's appointment

Dependent variable is the logarithm of price. Out-of-market refers to acquisitions where the acquirer had no clinics within 30 kilometers of the target and in-market if the acquirer had at least one clinic within 30 kilometers of the target. All specifications use the main control groups, which includes all non-acquired independent clinics, and the Callaway and Sant'Anna, 2021 method described in the text. Standard errors clustered at the clinic level. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.2 Price harmonization

In the previous subsection, we illustrated that changes in local market concentration do not fully explain the observed post-acquisition price increases in the acquired clinics. In this subsection, we explore a second potential mechanism: the adoption of a specific pricing strategy by firms. The pricing strategy of the acquirer could be extended to the acquired unit post-acquisition. This could be particularly relevant if chains maintain uniform pricing across different geographical markets. In such cases, after an acquisition, these standardized prices could be extended to the target clinics.

First, we examine the extent of uniform pricing in the chains. For each medical treatment and chain, we calculate the yearly median price and then divide the visit-level prices by this measure. In diagnostic services for almost 70% of observations, this ratio is equal to one.[31] Given that chains operate tens of clinics in several municipalities, this gives a strong indication of uniform pricing in chains. We repeat this exercise for appointment times.

[31] We plot the distribution of this ratio in Appendix A.

Unlike in diagnostic services, we do not find evidence of uniform pricing in appointment times, which are set by physicians. Instead, we observe that the prices of appointment times can vary even within a clinic, which is consistent with physicians pricing their appointment times independently.

If the estimated price effects are explained by chains installing their uniform prices in newly acquired clinics, then post-acquisition price changes simply reflect the pre-acquisition price differences between the acquirer and the target. We separately calculate for each medical treatment the percentage difference in price between the target clinic and the chain before and after the acquisition. In Figure 6 we plot the median price difference between the acquirer and the target eight quarters before and 12 after the acquisition. The solid line represents auxiliary services, and the dashed line represents appointment times. In auxiliary services, before the acquisition, the median price difference between the chain and the acquired clinic is around 16%-18%. After the acquisition, the median price difference starts to converge to zero, and three quarters after the acquisition, the median price difference is zero. In appointment times, we observe a similar convergence. However, the difference does not converge to zero; instead, it remains positive, implying that physicians in acquired clinics continue to set prices slightly below the chain average.

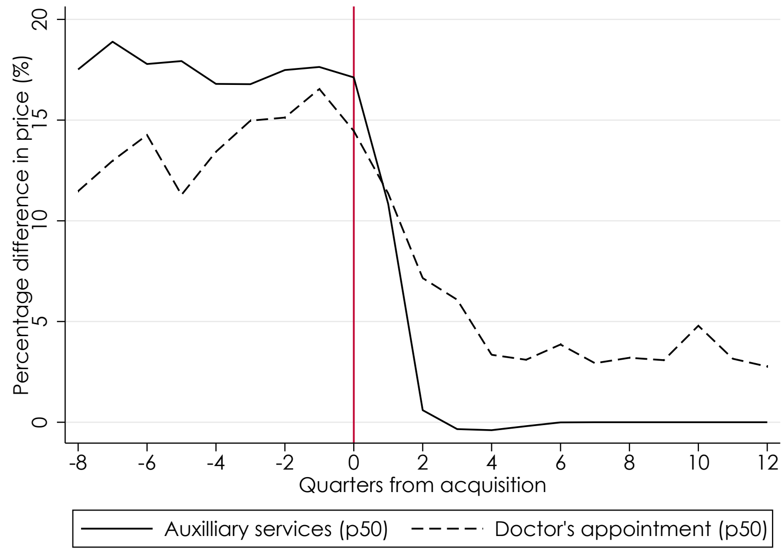

Figure 6: The median price difference between the acquirer and the target over time

In this figure, we plot the median price difference between the chain and the target over time for all acquired clinics that were not closed after the acquisition. To construct the figure we first calculate the price difference between the acquirer and the target for every individual medical treatment before and after the acquisition. After this, we calculate the median price difference over all medical treatments and targets. We conduct the analysis separately for auxiliary services (solid line) and for appointment times (dashed line).

Next, for each target, we calculate the average price difference with the acquirer two quarters prior to the acquisition and the average price change in the target clinics after the acquisition. The price change is calculated by comparing prices two quarters before the acquisition to prices within one year after the acquisition.[32] Figure 7 shows the correlation between these two measures. Panel A focuses on auxiliary services. The correlation between the pre-merger price difference and the post-merger price change is 0.98. Most of the observations are above the 45-degree line, implying that prices rose after the acquisition more than by the pre-acquisition price difference. This follows from chains implementing annual price increases and with prices being harmonized to the updated prices rather than on the old prices. Figure 7 also illustrates that the post-acquisition price changes are highly heterogeneous across acquisitions. In some clinics, prices of auxiliary services more than double

[32]Following the approach of our main analysis, we exclude the first six months following the acquisition.

after the acquisition, whereas in some acquired clinics, we observe no change in prices post-merger. For appointment times, the correlation between pre-acquisition price difference and post-acquisition price change is much weaker.

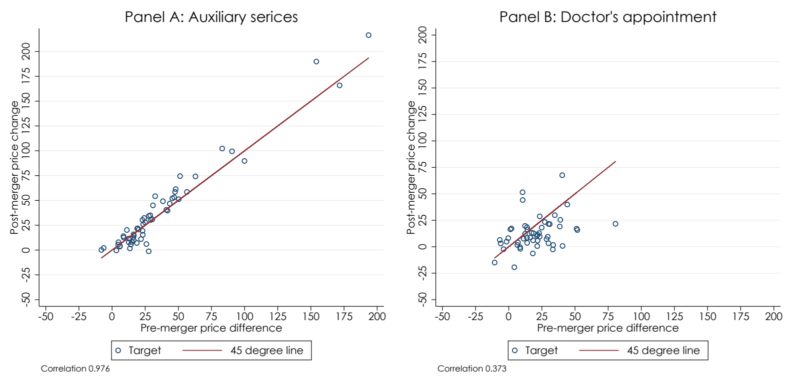

Figure 7: Pre-merger price difference and post-merger price change

In this figure, we examine the correlation between pre-merger price difference and post-merger price change. The observational unit is an acquired clinic. For each clinic, we calculate the average price difference to the acquirer and the average post-merger price change. The correlation between the two measures is depicted in the bottom left corner of both panels.

6.3 Decomposing price effects using a stylized model

Based on our results, the observed price changes in auxiliary services are driven by price harmonization. In this section, we use a model to capture the essential elements that affect the pricing incentives of the clinics.[33] As discussed in Section 2, physicians work in clinic chains as independent contractors. However, many independent clinics are owned and operated by the physicians themselves. Using the model, we decompose the different channels through which a merger between an independent clinic and a chain affects prices. Then we link the findings of the model with our empirical estimates.

The model is built on a differentiated goods Bertrand competition setup. There are n clinics, indexed by $i \in \{1, \dots n\}$. Each clinic i produces a set of complementary healthcare services. For simplicity, we consider only two types of services: physician's appointment

[33] An early version of the model was developed by the Finnish Competition Authority in a recent merger case in the healthcare sector.

service A and an auxiliary service B, which can be imaging or laboratory tests, for example. The clinic's marginal costs of producing these services are denoted by c_{Ai} and c_{Bi}. The associated consumer demands $D_{Ai}(p)$ and $D_{Bi}(p)$ depend on $p = (p_A, p_B)$ that collects prices of all clinics, $p_A = (p_{A1}, \ldots, p_{An})$ and $p_B = (p_{B1}, \ldots, p_{Bn})$. We assume that both consumer demands are decreasing in own prices p_{Ai} and p_{Bi} reflecting the fact that the services are typically consumed together.

We allow for two types of organizational structures: physician-owned and non-physicial-owned clinics. In the latter case, the physician acts as an independent contractor and pays room rent to the clinic. The clinic is only responsible for pricing the auxiliary service. Letting σ_i denote the share of the physician's revenue collected by the clinic as room rent, the clinic chooses the price of the auxiliary service to maximize

$$\pi_{Bi}(p) \equiv (p_{Bi} - c_{Bi}) D_{Bi}(p) + \sigma_i p_{Ai} D_{Ai}(p).$$

The physician chooses its appointment fee to maximize its profit from appointments net of the room rent it must pay to the clinic:

$$\pi_{Ai}(p) \equiv (p_{Ai} - c_{Ai}) D_{Ai}(p) - \sigma_i p_{Ai} D_{Ai}(p).$$

By contrast, when the clinic is physician-owned, the owner simply chooses the price of both services to maximize the total profit

$$\Pi_i(p) \equiv \pi_{Ai}(p) + \pi_{Bi}(p).$$

The organizational structure of the clinic has important implications for its pricing decisions. When choosing its appointment fee, the independent physician has an incentive to set a higher fee than the one owning the clinic:

$$\frac{\partial \pi_{Ai}}{\partial p_{Ai}} = \frac{\partial \Pi_i}{\partial p_{Ai}} - (p_{Bi} - c_{Bi}) \frac{\partial D_{Bi}}{\partial p_{Ai}} - \left(D_{Ai} + p_{Ai} \frac{\partial D_{Ai}}{\partial p_{Ai}} \right) \sigma_i. \tag{5}$$

There are two reasons for this. First, due to room rent paid to the clinic, the physician incurs a higher cost from each appointment. Second, when setting the higher price, the independent contractor does not account for the reduction in the sales of the auxiliary service.

Similarly, when choosing the price for the auxiliary service, the non-physician-owned clinic sets a higher price, failing to internalize the demand lost by the physician:

$$\frac{\partial \pi_{Bi}}{\partial p_{Bi}} = \frac{\partial \Pi_i}{\partial p_{Bi}} - (p_{Ai} - \sigma_i p_{Ai} - c_{Ai}) \frac{\partial D_{Ai}}{\partial p_{Bi}}. \tag{6}$$

As such, the organizational structure of non-physician-owned clinics generates double marginalization and thus leads to higher prices, unless the use of independent contractors generates other efficiencies outweighing these distortions in pricing incentives.

Double marginalization is created by any merger, where a non-physician-owned clinic acquires a physician-owned clinic, leading to changes in the target's organizational structure. If the acquisition is an out-of-market acquisition, i.e. the acquiring firm is not present in the geographical market served by the target firm, the only additional merger effect arises from the harmonization of the prices of auxiliary services. If the acquisition is an in-market acquisition, further price effects are caused by the elimination of competition between the merging parties in the relevant market.

To further analyze these additional pricing effects, consider a merger between a non-physician-owned clinic j (the acquiring firm) and a physician-owned clinic i (the target). Post-merger the physician of the target firm has no longer ownership of the clinic and thus, has incentives to price its appointments higher, as described by (5). The incentives of the physician working in the acquiring firm remain unchanged.

Considering the merger's impact on the prices of auxiliary services, assuming these prices are harmonized, the change in the target firm's price can be decomposed into two parts:

$$\Delta p_{Bi} = \underbrace{p^*_{Bj} - p^*_{Bi}}_{\text{harmonization}} + \Delta p_{Bj},$$

where $p^*_{Bj} - p^*_{Bi}$ is the difference between the acquirer's and target's pre-merger prices, which is the harmonization effect, and Δp_{Bj} is the change in the acquiring firm's price due to the merger. This latter effect can be further decomposed into two parts:

$$\Delta p_{Bj} \cong \left.\frac{\partial \pi_{Bi}}{\partial p_{Bi}}\right|_{p_{Bi}=p^*_{Bj}} + \underbrace{\frac{\partial \pi_{Bi}}{\partial p_{Bj}} + \frac{\partial \pi_{Bj}}{\partial p_{Bi}}}_{\text{in-market effects}}.$$

The first term is the out-of-market effect, which captures the potentially different demand and cost conditions faced by the target firm. If the term is positive, the pre-merger price of the acquiring firm is too low compared to the optimal price that the target alone would choose to maximize the clinic's profit from auxiliary services and room rent (thus accounting for double marginalization). The second part captures the in-market effects, which arise from the elimination of mutual competition between the merging parties:

$$\frac{\partial \pi_{Bi}}{\partial p_{Bj}} = (p_{Bi} - c_{Bi}) \frac{\partial D_{Bi}}{\partial p_{Bj}} + \sigma_i p_{Ai} \frac{\partial D_{Ai}}{\partial p_{Bj}}.$$

When setting the price of auxiliary services to account for the in-market effects, the merged entity internalizes not only the competition between the auxiliary services sold by the merging parties but also part of the impact on the demands for the appointments through room rent collected from the physicians.

Based on the model, the change in prices after acquisitions can be decomposed into three different components: price harmonization, out-market effects which capture the potentially different demand and cost conditions faced by the target firm, and in-market effects that arise from the loss of competition. The timing of these effects is likely to differ. Price harmonization occurs when the uniform prices are adopted in the acquired clinic. The in-market and out-market effects are realized when the acquiring clinic updates its uniform prices. In Appendix A. we show that the uniform prices are mainly updated once a year.

In our analysis, we have estimated the price effect for target clinics. Our estimates for auxiliary services initially capture the effect of price harmonization on target clinics. Individual acquisitions of only locally operating clinics are unlikely to individually have a major effect on the national prices set by chains. However, cumulatively they can have a significant effect on the national prices set by the chains. Because prices are updated only once a year, we cannot use the DiD analysis to study the effect of individual acquisitions on the uniform prices set by the acquirer. A comprehensive way to study how acquisitions have impacted the uniform prices set by the chain would be to estimate a structural model of demand and supply and then simulate the counterfactual development of uniform prices without acquisitions.[34]

7 Understanding differences between chain and independent clinics

7.1 Operational model

In the foregoing analysis, we find that post-acquisition the acquirer adjusts the prices of the target clinic to match its own price level. Because chains consistently price higher than independent clinics, price harmonization leads to higher prices in acquired clinics. In this section, we study factors that might explain this persistent price difference between the chains and independent clinics.

One difference between independent clinics and chains is the operational model. The implications of this were discussed in Section 6.3. Physicians work in clinic chains as in-

[34] For an example of such an empirical strategy, see Wollmann (2024), who estimates the quality effects of acquisitions in the US dialysis industry, in a setting where the acquiring chains set quality at the national level.

dependent contractors. However, many independent clinics are owned and operated by physicians themselves. Using the model, we showed that the operational model chosen by the chains can create double marginalization and results in higher prices. The model thus provides one channel through which we can explain the persistent pricing difference between chain and independent clinics.

In the model, we abstract from other differences between the independent clinics and the chains. These could include, for example, the quality of services and other objectives of clinics. If such differences existed, similar to prices, they could be transferred to the acquired clinics after the acquisition. For example, if chains would consistently offer better quality, this could through harmonization of practices post-acquisition result in higher quality in acquired clinics. In the following sections, we analyze the differences between chains and independent clinics along these dimensions.

7.2 Quality

One possible explanation for the price difference between chains and independent clinics is that chains offer higher quality of care. To investigate this, we use data from the consumer survey. Respondents evaluated the quality of care in the private physician market on a scale from one to five, with higher scores indicating better quality. For all respondents, the identity of the provider they last visited is observed. Using this information, we create an indicator variable equal to one if the patient's last visit was to one of the chains. We regress the quality score on the indicator variable and several patient background characteristics, including sex, age, and income.[35] The results are shown in Table 6. In the first column, we do not include any background covariates. In the second column, we add age and sex, and in the third column, we include region and income-group fixed effects. In all three specifications, the coefficient on the indicator variable is statistically insignificant. The economic magnitude of the point estimates is also small. The average quality score in private care is 4.28 and the

[35] Income is observed in 10,000 euro brackets up to 90,000 euros.

highest point estimate is only 0.028.[36]

Table 6: Differences in perceived quality between chains and independent clinics

	Quality score (1-5)	Quality score (1-5)	Quality score (1-5)
Chain	0.025	0.028	0.025
	(0.059)	(0.059)	(0.059)
N	1064	1064	1063
Region FE	No	No	Yes
Income group FE	No	No	Yes

Dependent variable is the is score given to the quality of private scare. The outcome scaled between 1 to 5. Higher score indicates higher satisfaction. Robust standard errors in parentheses. In second and third column age and sex are included as controls. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The reimbursement data and the survey do not allow us to compare clinical quality between chains and independent clinics. To address this, we have collected data on the number of malpractices. In Finland, patients can claim compensation by filing a medical malpractice notice with the Patient Insurance Centre. The Finnish Patient Insurance Centre reports annually the number of malpractices separately for the public and private sectors. The data is not available at the producer level. However, given the large shift in market share toward large providers, if large providers offered better quality care, it would create a decreasing trend in the number of medical malpractices reported in the private sector. Between 2008 and 2020, there is no decreasing trend in the number of malpractices reported in the private sector, and the number of malpractices develops roughly similarly in the private and public sectors. These results are discussed in more detail in the Appendix.

Next, using the same survey, we assess whether independent clinics and chains differ in other dimensions than quality of care. The survey includes questions about the reasons patients chose a particular private clinic. Using a similar regression framework as above, we

[36]For comparison, in public care the average score is 3.76.

find that patients who last visited a chain clinic are more likely to list the availability of a digital booking system, the availability of remote appointment, access to specialists, and treatment variety as factors influencing their choice. Conversely, consumers who visited an independent clinic are more likely to list low prices and a good brand reputation. We discuss these results in more detail in the Appendix.

Overall, we conclude that using the limited information available on quality, we do not find evidence that chains offer higher quality medical care. However, we find evidence that patients who visit independent clinics and chains value different factors when choosing a provider. This can affect the mix of patients between independent and chain clinics and partially explain the observed price difference between them. Additionally, the survey results could suggest that chain clinics have better digital services. In press releases, the introduction of digital services has been repeatedly listed as one reason why independent clinic owners decided to sell their practice to chains.[37] If chains extend their digital systems to the clinics they acquire, the availability of such services in acquired clinics would increase. Due to the absence of relevant data, we are unable to statistically assess this effect.

7.3 Objective function

Some independent clinics in the physician market are or were owned by non-profit organizations before the acquisition. In principle, holding all other factors fixed, such as costs and productivity, non-profit operators should set lower prices than for-profit operators. Thus, differences in objective functions could explain why chains set higher prices compared to some independent clinics. To test this hypothesis, we separately estimate the price effect of acquisitions on acquired clinics, distinguishing them based on their ownership status. For all of the acquired clinics in the data, we collect information on the ownership status from public sources, such as press releases.[38] In total, we identify five target firms that prior to

[37] See, e.g., Mehiläinen (2017) and Mehiläinen (2019).

[38] For some clinics we are also able to establish the non-profit status based on the clinic name, which contains a reference to a non-profit organization.

the acquisition were owned by a non-profit organization and 27 clinics that are owned by a non-profit operator. In 2010, the total market share of non-profit clinics was 8% but this had dropped to less than 1% by 2020. This decline is largely explained by the acquisitions.

The results are shown in Table 7. The first two columns report the price effect for non-profit clinics. The first column shows that, on average, the prices of auxiliary services increase by 29% when the target was a non-profit. For appointment times, the price increase after acquisition is 11%. Columns three and four report the same results for acquired clinics that prior to the acquisition were not owned by a non-profit organization. In this group, the prices of auxiliary services increase by 17%. This is considerably less than in acquired clinics which prior to the merger were owned by a non-profit organization. The disparity in appointment times is less pronounced. For clinics operating on a for-profit basis before acquisition, appointment time prices rise by 9%, which is a two-percentage-point smaller increase than the 11% observed in non-profit clinics.

Table 7: Acquisitions effect on prices by pre-acquisitions ownership status

	Log(price)	Log(price)	Log(price)	Log(price)
ATT	0.255***	0.100***	0.154***	0.090***
	(0.066)	(0.013)	(0.028)	(0.018)
Ownership	Non-profit	Non-profit	For-profit	For-profit
Service	Auxiliary services	Doctor's appointment	Auxiliary services	Doctor's appointment

Dependent variable is the logarithm of price. All specifications use the main control groups, which includes all non-acquired independent clinics, and the Callaway and Sant'Anna, 2021 method described in the text. Standard errors clustered at the clinic level. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The finding that prices increase more in non-profit clinics post-acquisition is consistent with the non-profit hypothesis. However, our results also show an increase in the price in for-profit clinics post-acquisition. This implies that non-profit motives are only able to explain some, but not all, of the observed price differences between independent clinics and chains.

8 Conclusion

Because effective competition is a crucial driver of economic well-being, governments worldwide have implemented merger control to prevent anticompetitive mergers. In this article, we first demonstrate that in Finland only a small fraction of mergers are notified to the authority due to high turnover thresholds. We then study the effect of below-threshold acquisitions in the Finnish private healthcare market, using a difference-in-differences framework. We estimate that the prices of auxiliary services, like medical imaging and laboratory tests, increase by around 20% after acquisitions and the prices of appointment times by around 10%. We also report price estimates for the private dental market, where we find that acquisitions lead on average to just over 10% higher prices.

Then we examine the mechanisms through which acquisitions affect pricing in the target clinics. In this analysis, we focus on the physician market where we have access to complementary datasets. We find that the price effects observed in auxiliary services are driven by the diffusion of pricing strategies. Chains set prices uniformly across different clinics and geographical markets, and after acquisitions, uniform prices are installed in the acquired clinics. Because chains set prices consistently higher than independent clinics, acquisitions have resulted in higher prices. Using a stylized model, we show that our estimates capture the price harmonization effect of acquisitions, but do not capture how acquisitions cumulatively have affected the development of prices of auxiliary services in chain-owned clinics.

Finally, we study why chains set higher prices compared to independent clinics. From the stylized model, we deduce that differences in organizational structure between chains and independent clinics may explain some of the observed price difference. Next, we examine whether quality differences provide one explanation for the observed difference. Using a consumer survey, we show that patients do not perceive the quality of chain and independent clinics differently. Although we do not find differences in perceived quality of care, we do find evidence that chain and independent clinics potentially differ among other dimensions, such as the availability of digital services. Finally, we study whether differences in objective functions can explain why chains set consistently higher prices than independent clinics. The results indicate that prices increase more in clinics that were owned by a non-profit organization prior to being acquired. This supports the idea that some of the price differences between chains and independent clinics could be explained by differences in objective functions.

This article adds to the recent policy debate on stealth consolidation, a term used to describe anticompetitive deals that escape regulatory oversight due to their small size (Wollmann, 2019). Recently, the European Commission announced that it will start accepting referrals of transactions from national competition authorities that fall below the national merger control thresholds (European Commission, 2021a).[39] The focus of the Commission is on deals that involve innovative market entrants, with a particular focus on pharmaceutical and digital markets. Our results show that stealth consolidation can also be harmful in more traditional settings. Also in the US, the Federal Trade Commission (FTC) is putting a special focus on addressing the competitive problems caused by stealth consolidation (Khan, 2023). In 2023, the Federal Trade Commission sued a dominant provider of anesthesia services, which executed a roll-up scheme, systematically buying competing anesthesia practices (FTC, 2023). Our results demonstrate that such roll-up schemes can significantly affect market dynamics.

We also contribute to the debate on the effects of market consolidation in healthcare markets. Our article demonstrates that acquisitions in the healthcare market can affect prices both through the diffusion of strategies and through increased market power, the latter typically being the focus in the previous literature. Based on our results, acquisitions in the Finnish healthcare market have led to higher prices for patients visiting acquired clinics. A comprehensive welfare analysis of acquisitions would require also evaluating other effects of the acquisitions, such as the effect on the national prices set by the chains. This remains an interesting avenue for future research.

[39] The referral system was, for example, used to investigate the merger between Illumina and Grail (European Commission, 2021b).

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Appendix A. Pricing in chain clinics

In this section, we present some stylized facts about the pricing of diagnostic services in chain clinics. First, we examine the variation in prices. In particular, our aim is to establish to what extent chains set uniform prices across different clinics. Using visit-level data, we calculate the annual median price for each medical treatment across all three chains. Then we normalize all price observations by dividing them by the respective median price specific to each chain and medical treatment. If the chains exercise uniform pricing, then for a high share of observations this normalized price measure should be equal to one, whereas if the chains set prices separately for each of the clinics, then the distribution should have no clear spike at one. The distribution of this normalized price measure is plotted in Figure 8. For almost 70% of the observations, the normalized price measure equals one, indicating that chains set uniform prices across all clinics in most diagnostic services.

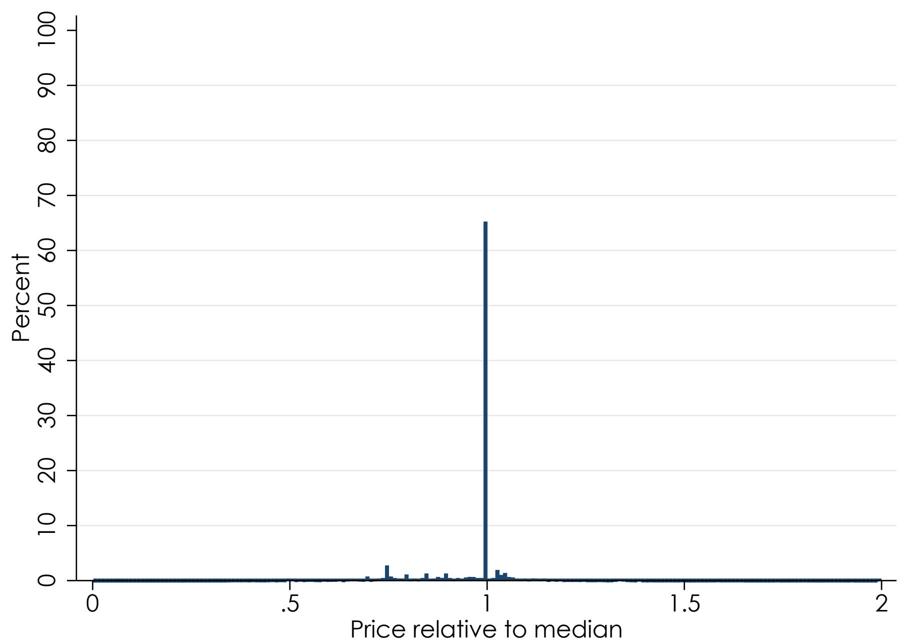

Figure 8: Uniform pricing in chains in auxiliary services

In this figure, we plot the normalized price dispersion of laboratory tests and medical imaging in the three largest chains. The prices have been normalized by dividing all price observations by the yearly within-chain median price. Figure includes data from acquired clinics one year after their acquisition.

Next, we examine the frequency of price changes in chains. In particular, we examine whether prices for diagnostic services are adjusted continually throughout the year or whether they are updated only once a year. We calculate the percentage change in price compared to the last quarter separately for each chain and medical treatment. The average quarterly price changes over time are plotted in Figure 9. In the first quarter of the year, price changes are considerably higher than in other quarters; on average, prices increased by 3.2% in the first quarter, by 0.9% in the second quarter, by 0.6% in the third quarter, and by 0.8% in the fourth quarter. This pattern strongly suggests that chains primarily update their prices at the beginning of the year. An exception to this trend occurred in 2015 and 2016, where no significant price changes were observed in the first quarter, but rather prices increased evenly across quarters. This could be due to changes in reimbursement rates during these years.

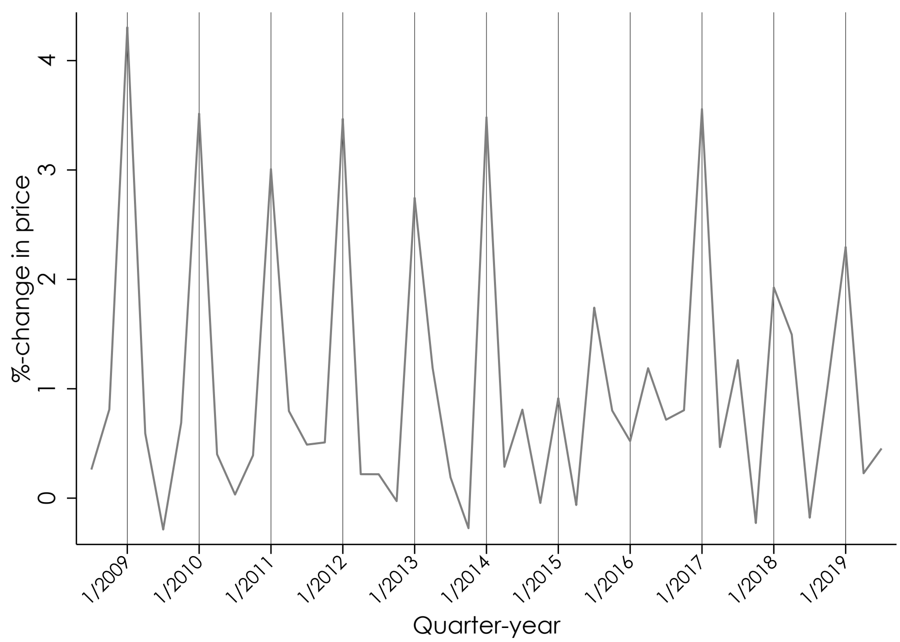

Figure 9: Average price changes by quarter

In this figure, we plot the average quarterly price changes in chain clinics. Acquired clinics are included one year after the acquisition.

Appendix B. Additional results for Section 7.1.

In this section, we report some of the results discussed in Section 7.1. In the consumer survey, the respondents were asked whether a certain factor, such as the price level or reputation of a clinic, affected their last choice of a service provider. Respondents were not limited in the number of factors they could list. We generate an indicator variable that is equal to one if the respondent reported that the factor affected her choice. Then we regress this indicator variable on several background characteristics and on a dummy variable equal to one if the patient visited a chain clinic. The results, including the unconditional mean of the dependent variable, are reported in Table 8. Respondents who last visited a chain clinic valued six out of the seven factors differently from respondents who visited an independent clinic. Respondents who last visited a chain clinic are more likely to list the availability of specialists, the online booking system, the ability to use remote services, and the variety of treatments as factors influencing their choice, whereas patients visiting an independent clinic are more likely to list the price level and the reputation of the clinic.

Table 8: Factors affecting provider choice

	(1) Price	(2) Reputation	(3) Quality	(4) Variety	(5) Specialist	(6) Remote	(7) Digital
Chain	-0.045*	-0.080**	-0.018	0.077**	0.079**	0.044***	0.089***
	(0.027)	(0.036)	(0.018)	(0.034)	(0.038)	(0.011)	(0.032)
Age	-0.002**	-0.002*	0.000	0.002*	0.007***	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Male	0.045**	-0.010	0.022	0.010	-0.150***	0.002	-0.067**
	(0.022)	(0.028)	(0.014)	(0.029)	(0.031)	(0.014)	(0.029)
N	1063	1063	1063	1063	1063	1063	1063
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Income FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean	0.128	0.254	0.053	0.299	0.254	0.047	0.283

Dependent variable is an indicator variable, which gets value 1 if the respondent named it as one of the factors that affected her choice. The first column refers to price of services, the second column to the reputation of the clinic, the third column refers to treatment quality, the fourth column to treatment variety, the fifth column to the availability of specialists and the sixth column on the availability of a digital booking platform. Robust standard errors in parentheses. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 10 plots the number of compensated malpractices in both the private and public sectors. The data encompasses not only the private physician market but also includes data on the number of malpractices reported in other sectors of the private healthcare market, such as dental and occupational health services. In the private sector, the number of compensated malpractices decreased from 2008 to 2012 by almost 20%, but then began to slowly increase. The number of malpractices in the private sector is slightly higher in 2020 than in 2008, whereas the public sector saw a slight decrease in the same period.

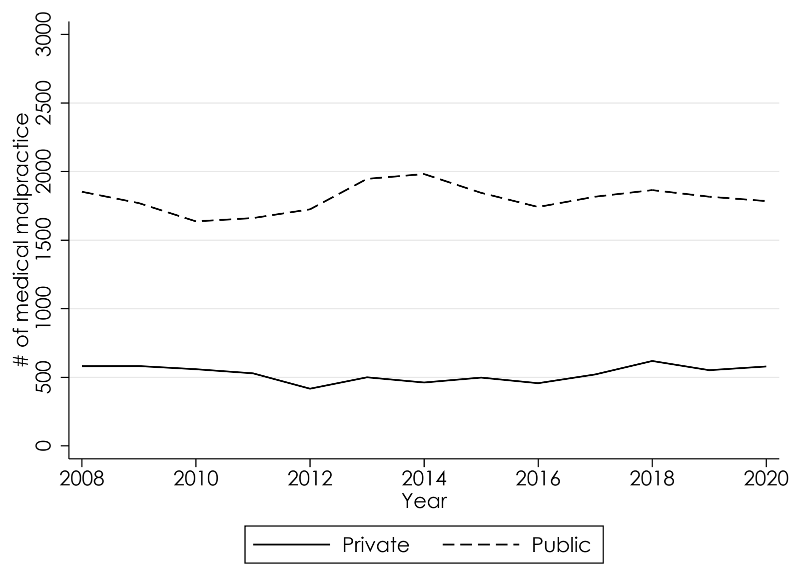

Figure 10: Number of malpractices in private and public sector

In this figure, we plot the number of compensated malpractices in the private and public sectors. The solid line corresponds to the private sector and the dashed line to the public sector. The information was collected from the annual reports of the Finnish Patient Insurance Centre. The numbers for a given year might differ slightly in different annual reports because some cases take more than a calendar year to process. For each year, we use the latest figure available. For example, the number of malpractices for the year 2012 is reported for the last time in the annual report of the year 2017.

Appendix C. Event-study estimates for variety

In this section, we provide event study estimates from the DiD analysis, where product variety measures are used as outcome variables. We use the main control group where all non-acquired clinics are included in the control group. The results are reported in Figure 11. In none of the outcome variables used we find a consistent trend or a high-share of significant coefficients before the acquisition. This seems to suggest that the acquired and non-acquired clinics followed a similar pre-trend also in treatment variety measures. Post-acquisition we find significant coefficients for speciality variety in the physician market and treatment variety and number of doctors in the dental market. These results align with the average effects shown in Table 3.

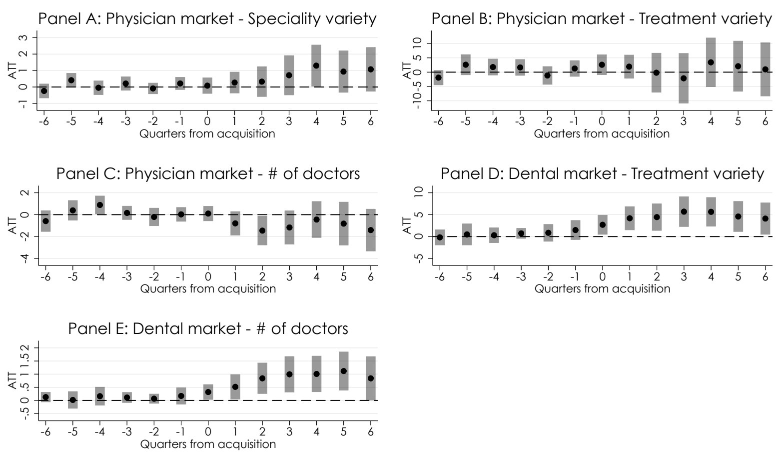

Figure 11: Event-study estimates

In this figure, we plot the event-study estimates for measures of treatment variety. The outcome variable is given in the titles of the panels. Quarters outside the 12-quarter window are included in the regression but not shown here. The grey area represents 95% confidence intervals. Observations within two-quarters of acquisition are included in this plot. Short differences are used to construct point estimates for pre-treatment period.

Appendix D. Merger control thresholds in the European Union

Figure 12 shows the turnover thresholds of merger control in the European Union in 2020. In all countries, except Germany[40] and Malta[41] the turnover thresholds were based on two indicators.The first indicator is the combined turnover of the merging parties and the second indicator the individual turnover of each merging party. The average threshold for combined turnover was 130 million euros and the average individual turnover threshold was 16 million euros. The figures are not directly comparable across countries, as turnover thresholds are based on worldwide turnover in some nations and on domestic turnover in others. In addition, some countries have sector-specific rules or rules that require transactions to be notified if a given market share threshold is met.

[40]Germany has more than two cumulative turnover thresholds and mergers can also become notifiable based on transaction value.

[41]In Malta, the individual thresholds is evaluated based on the share of turnover becoming from domestically.

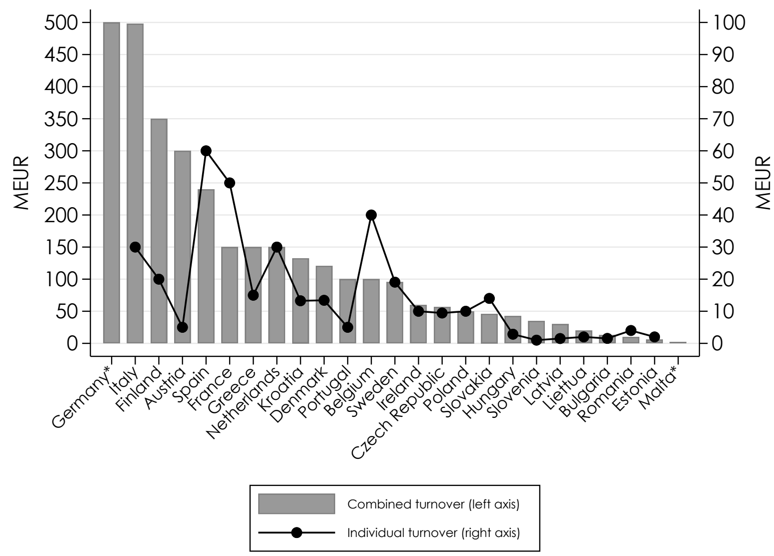

Figure 12: Turnover thresholds in the European Union member countries in 2020

In this figure we plot the merger control thresholds in European Union member countries in 2020. Luxembourg and Cyprus are omitted from the Figure. The information on the turnover thresholds was collected from the Merger Control poster of the law firm Horten (Horten, 2019). Local currencies were transferred to euros using the average exchange rate in 2020. Germany and Malta do not have a separate turnover threshold for all parties.

Appendix E. Price effect estimates using alternative methods

In this Section we discuss alternative estimators that could be used to estimate the effect of the acquisitions studied in this paper. We also present results from two alternative estimators.

Several estimators for staggered settings have been proposed in the recent difference-in-differences literature. In this article, we chose to use the method proposed by Callaway and Sant'Anna (2021). One alternative is given by Sun and Abraham (2021). Because we only use never-treated clinics (during our observation period) as controls, the method by Sun and Abraham (2021) is identical to the CS method. A second alternative is given by Borusyak et al. (2024). We opt not to use it because it relies on stronger parallel trends assumption than the CS method (de Chaisemartin and D'Haultfœuille, 2023). A third alternative is to use a stacked event study approach applied, for example, in Cenzig et al. (2019).

The first alternative estimator we present results is a simple two-way fixed effects model and the second is a stacked event study. First, we present the results from the two-way fixed effects model. The model, including it's problems in our empirical setting, is discussed in more detail in Section 4. The results for all three different services and using all three different control groups are shown in Table 9. The results are close to those reported in 2 obtained using our preferred methodology. When the first control group is used, the estimated price effects are slightly higher in all three services. In contrast, the results are slightly lower using the two-way fixed effect when the third control group is used.

Table 9: Acquisitions effect on prices using TWFE

Panel A: Doctor's appointment

	Log(price)	Log(price)	Log(price)
ATT	0.098***	0.084***	0.086***
	(0.015)	(0.016)	(0.017)
Control	1	2	3

Panel B: Auxiliary services

	Log(price)	Log(price)	Log(price)
ATT	0.207***	0.176***	0.172***
	(0.026)	(0.021)	(0.022)
Control	1	2	3

Panel C: Dental market all

	Log(price)	Log(price)	Log(price)
ATT	0.116***	0.092***	0.069***
	(0.011)	(0.013)	(0.013)
Control	1	2	3

Dependent variable is the logarithm of price. Column 1 shows results using all non-acquired independent clinics as control group. In column 2 control group is restricted to non-acquired inpendent clinics, which experience no acquisitions in their local market. In column 3 control group is restricted to those clinics that acquired after our sample period. Significance at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Next, we present the results using the stacked event study approach. In the stacked event study approach, a separate data set is created for each treatment cohort. Each sample has both treatment groups and control groups. Only units that were not treated within the sample window are included in the control group. These individual data sets are stacked and the following equation is estimated using the stacked data set:

$$Y_{ijt} = \alpha_{ij} + \lambda_t + \sum_{k \in (m,...0,...n)} \gamma_k D_{i,t-k} + \epsilon_{ijt} \tag{7}$$

where Y_{ijt} is the logarithm of the price of treatment i in clinic j in quarter t. $D_{i,t-k}$ is an indicator variable for event time k, meaning that the event took place k quarters before the acquisition. α_{ij} and λ_t are treatment-clinic and time fixed effects, respectively. The parameters of interest are γ_k, which capture the dynamic effects of the acquisitions. We implement the stacked event-study method using the stackedev package in Stata (Bleiberg, 2021). The time and treatment-clinic fixed effects are interacted with the stack and the standard errors are clustered on unit (clinic) by stack.

The results of the stacked event study, using control group 1, are shown by type of service in Figure 13. The magnitudes of the point estimates are very close to those reported in 4 using our preferred methodology. All of the event studies show a clear jump after the acquisitions and before the acquisition, the only of the estimated coefficients before the acquisition is statistically significant. We conclude that our estimates of the price effects are robust also to using this alternative estimation strategy.

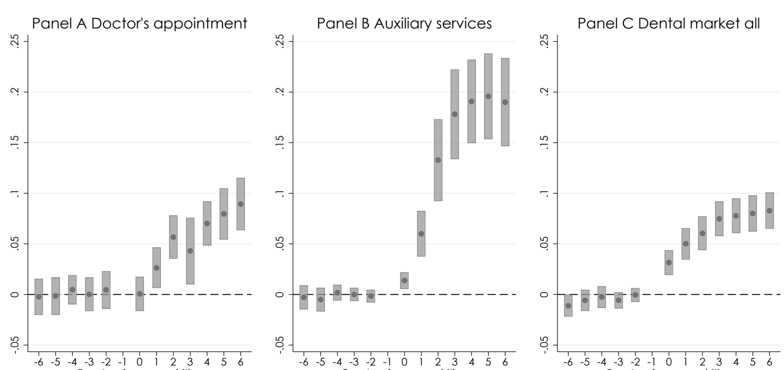

Figure 13: Stacked event-study estimates

The outcome variable in all three panels is the logarithm of price. All spefications use control group 1. The grey area represents 95% confidence intervals. One quarter before the acquisition is used as a reference month and is dropped from the regression.

Appendix F. Event-study estimates using long differences

In this section, we present results from an event study specification using the CS method with long differences for the pre-period. Roth (2024) discusses the construction of event study estimates for the CS method. The default option constructs the event study estimates asymmetricly across the pre-treatment and post-treatment periods. The pre-treatment coefficients average short differences, i.e. comparisons of consecutive periods. In contrast, the post-treatment coefficients are "long differences", i.e. comparisons relative to the period before treatment. The default option produces pseudo-ATTs. They estimate the effect of the treatment if the treatment had occurred in that period.

It is also possible to obtain event-study estimates using long differences. Event-studies using long differences allow for better examination of whether the treatment and control group followed a similar trend in the outcome before the treatment. The results using long differences for both the pre- and post-period are shown in Figure 14. By definition, the results for the post-period are exactly as in Figure 4. For the pre-treatment period again all estimates except one for the dental market are statistically insignificant. These results strongly suggest that the acquired and non-acquired clinics followed similar price trends before the acquisition.

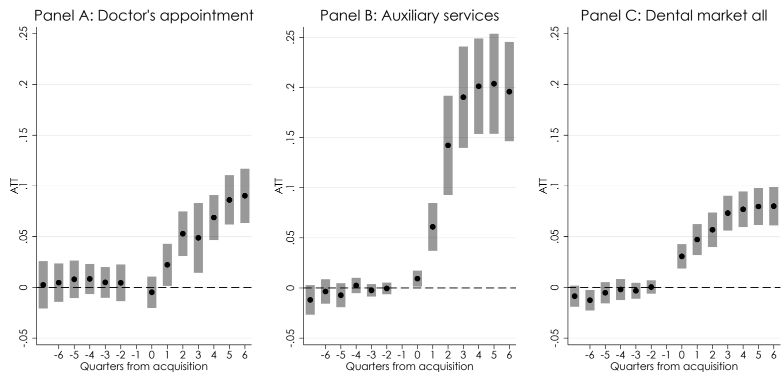

Figure 14: Event-study estimates using long-differences

The outcome variable in all three panels is the logarithm of price. Results are obtained using the method by Callaway and Sant'Anna (2021) and using long differences. All specifications use control group 1. The grey area represents 95% confidence intervals. One quarter before the acquisition is used as a reference month and is dropped from the specification.