Moving Beyond the Public vs. Private Paradigm: Insights from the Ownership Structures in Swedish Primary Healthcare*

Axel Hellbom Almström† Andreea Enache‡ Klara Strömberg §

January 2024

Abstract

Guided by the theoretical framework of Hart et al. (1997)'s ownership model, we study the behaviour of different types of private entities in the primary healthcare market. Utilizing a difference-in-differences approach, we leverage a reimbursement reform in the Stockholm Region in 2016 as a natural experiment. We examine how private stand-alone (employee-owned) and private groups-owned (externally-owned) primary healthcare providers react to a reimbursement reform compared with their public counterparts. We find that private group-owned providers reduced General Practitioner (GP) contact by 1.17 visits per ten registrations compared to their public counterparts. By contrast, private stand-alone entities exhibit similar patterns to public entities. This heterogeneity in responses suggests that external investors, via managerial incentives, alter the behaviour of healthcare workers. On the contrary, the more patient-aligned behavior in employee-owned entities likely stems from their inherent closer interaction with patients. This suggests a deeper commitment to patient care that blends with their profit motives, distinguishing them from their externally-owned counterparts.

Keywords: Difference-in-Differences, Incomplete Contracts, Ownership Structure, Primary Healthcare, Reimbursement Incentives.

JEL Codes: D23, D86, G32, H75, I11, I18, J33, J38.

*We thank Anders Anell, Binnur Balkan, Petter Berg, Andrew Clark, Cecilia Dahlgren, Lina Maria Ellegård, Tore Ellingsen, Richard Friberg, Matilda Hagman, Peter Lindgren, Andrew Rhodes, and Robert Östling for feedback on this paper. We also thank Matilde Casamonti, Martin Albouy, and Ritwik Khanna for careful research assistance.

†Stockholm School of Economics.

‡Corresponding author: *andreea.enache@hhs.se*, Stockholm School of Economics.

§Stockholm School of Economics.

1 Introduction

Ensuring access to sustainable and equitable primary healthcare services is a pressing concern globally, especially within the context of a healthcare landscape marked by an increasing role of the private sector. How does the ownership of healthcare providers affect the quantity and quality of health services? A substantial literature studies differences between private providers and public providers and between non-profit and for-profit private healthcare providers.[1] Here, we highlight another distinction, namely the difference between internally-owned providers (employee-owned) and externally-owned providers that we label as private groups (such as joint ventures, consortiums or private equity entities). In short, we find evidence that employee owners are significantly less likely to reduce the provision of care in response to financial incentives than are externally-owned providers. This finding is consistent with the view that healthcare professionals are significantly motivated by their mission and not merely by financial rewards. It also suggests that external owners seek to limit the expression of such motives. This inquiry gains significance amidst a growing interest in understanding the impact of corporate ownership (such as acquisitions by private equity or physician practice management companies (PPMCs) on the quality of care (Zhu et al. (2020), La Forgia (2023), Dranove and Burns (2022), Eliason et al. (2020)).

Our empirical analysis is anchored in the theoretical model from Hart et al. (1997). This model emphasizes the relationship between ownership types and the trade-off between cost efficiency and maintaining quality of care. It suggests that different types of ownership (public, private group-owned, and employee-owned) come with distinct incentives, impacting how they respond to financial and policy shifts. For example, private group-owned entities may lean more towards cost efficiency due to profit motives, whereas employee-owned entities might focus more on quality, given their closer patient relationships. The Hart et al. (1997)'s model, detailed later in this section, provides a framework for understanding the diverse responses observed in our analysis.

We use data from the Stockholm Region, where private and public healthcare providers coexist within a quasi-market system that operates under regional-level regulations (Anell, 2011). This unique setting allows us to scrutinize how ownership structures within the private sector influence the response of primary care centers (PCCs) to changes in reimbursement rules (see Clemens and Gottlieb (2014), Ellis (1998)). Our primary focus is one aspect of the healthcare service quality, defined as access to a General Practitioner (GP), as opposed to seeing a nurse, or not being able to get a medical appointment at all. While acknowledging a departure from the traditional metrics used in healthcare literature, we consider that the opportunity to see a GP represents a higher quality of service compared to alternatives such as consulting a nurse, facing the refusal of a new medical appointment, or not receiving a follow-up appointment when needed. We argue that this perspective, focusing on the level of professional expertise accessible to the patient, offers a valid and insightful angle for analyzing service quality in the healthcare sector. Thus, we gauge the quality of healthcare services through the metric of the number of visits to a GP per registered individual.

The reimbursement system in the Swedish healthcare setup is a mix between capitation and fee-for-service models (Lindgren, 2019). In capitation, providers get a fixed payment per registered patient, encouraging careful resource use. However, this might limit services due to fixed payments, posing care quality concerns. Fee-for-service pays based on service amount and complexity. This encourages more services, but can risk overuse of resources (Magnus (1999), McGuire (2011)). We use a difference-in-differences design to study the 2016 reimbursement reform in Stockholm Region entailing both an almost 50% reduction in the fee-for-service for GP visits and an increase of capitation from 40% to 60%. This reform has been described, with a focus on the general development of the healthcare sector, in a policy monitoring study by Dahlgren et al. (2017).

[1] For differences between public and private providers, see for example Hackmann (2019), Bäuml and Kümpel (2021), Bergman et al. (2016), Bergstrom et al. (1986), Besley and Ghatak (2001). For differences between non-profit and for-profit providers, see Horwitz and Nichols (2009), Francois (2003), Herbst and Prüfer (2016), Vlassopoulos (2009).

We employ administrative data on visits and registrations for PCCs registered in Stockholm from 2012 to 2020. Our objective is to examine whether, following the reform, there were changes in patient contact (defined as visits per registered individual) patterns between different types of private providers and, as well, between public and private entities. We examine the way in which PCCs changed their use of GPs and nurses, as the reimbursement rates for these different types of labor services were changed, and whether this response differed between private groups-owned providers and stand-alone ones.

First, we find that private PCCs reduced their patient visits per registered individual more than public ones; the effect size for private providers is 0.6 fewer visits per ten registered individuals. The fact that private providers curtailed their visits to the GP more than public ones is in line with the incomplete-contract theory (Hart et al. (1997)) that suggests that private care providers will react more to this change than their public counterparts. Simultaneously, nurse visits increased for the private entities, signifying a GP-to-nurse shift contingent on provider's ownership. This prompts the gatekeeping mechanism, implemented by medical staff or online systems, to redistribute through a triage system the task from GPs to nurses in order to adapt to lower fees per GP visits. Arguably, the 2016 Sweden's healthcare reform enforced tight budget constraints on PCCs, creating rationing of GP-performed office visits and more task shifting to nurses. This in turn could have potentially created a breach in the continuity of care with consequences on the health outcomes of the patients (Kajaria-Montag et al., forthcoming).

Second and most interesting, when distinguishing between private groups-owned providers and employee-owned ones, the latter reduced their GP contact to the same extent as public PCCs, while private groups reduced GP contact by 1.17 visits per ten registrations compared to the public providers. This pivotal distinction between private groups and employee-owned providers underlines the intricate interplay between reimbursement incentives and the ownership structure of private entities. While both public and private providers display sensitivity to reimbursement modifications, the manner in which they respond diverges significantly based on ownership configurations. One can argue that healthcare is a mission-oriented sector, where professionals are bound by strong norms regardless of ownership (Besley and Ghatak, 2005). As such, healthcare professionals who own and operate PCCs may internalise the social benefits more comprehensively than private groups-owned PCCs that are run by external shareholders with different objectives (La Forgia, 2023).

Below, we outline the key components of the Hart et al. (1997) model that shed light on the heterogeneity of responses observed among three different types of healthcare providers (private groups, employee-owned and public providers) in the aftermath of the 2016 reimbursement reform in the Stockholm Region. The 2016 reform, mainly characterized by an almost 50% reduction in the fee-for-service for doctors, arguably prompted a cost-cutting reaction among healthcare providers. An important question arises: to what extent did this cost-reduction behavior compromise the quality of healthcare services? Hart et al. (1997) discusses the decision-making process for government (denoted by G) to provide services in-house or contract them out. The authors develop a model where a service provider, either a government employee (a public provider) or a private contractor, denoted by M, can invest in improving service quality or reducing cost. They argue that private providers, driven by profit motives, are more likely to invest in cost-reduction efforts, potentially at the expense of non-contractible quality. Agents are assumed to be rational and risk neutral. The government G signs a long-term contract with a manager M. The manager manages all non-human assets used to provide the service, denoted F for facility. These might be either public or private. If F is public, M is a public provider. If F is private, the manager is a private owner (in our case, either a private group provider or a GP-owned provider). The contract formed between the two parties is incomplete, which leaves room for M to engage in two types of innovations: i) cost reducing efforts at a cost e, borne by M and ii) quality enhancing efforts at a cost i, borne by M. Once M engages in an innovation they modify the service provided within the boundaries of the contract. Generally, the case for in-house service provision strengthens when non-contractible cost reduction significantly undermines non-contractible quality, or when enhancements in quality are marginal. When a contract is incomplete, i and e are

observable to G but not verifiable to an external enforcer. Once the parties learn about the nature of potential cost reductions or quality improvements, they might renegotiate the contract.

Their model has several key aspects. First, the contracts are incomplete. This represents the challenge of specifying all possible aspects of service quality and performance in a contract. Secondly, there is a trade-off between reducing costs and maintaining service quality, especially when quality is non-contractible. Thirdly, a crucial assumption is that the entity that owns the facility has also the residual control rights over the decision-making process concerning the non-contractible elements of service delivery. This means that any cost-cutting or quality improvement needs to be pre-approved by either the government (for the public entities) or by the private owner (for the other two types of private providers). Therefore, a public provider typically receives just a part of the rewards associated with enhancing quality or reducing costs and the compensation for any improvement is hampered by the possibility of the government to replace the public provider. The opposite happens for the private contractor who is the residual claimant of any improvements and therefore can renegotiate the contract with the government who is the buyer.

The variables in the Hart et al. (1997)'s model are: B (the benefit to society of the modified service through M's effort), C (the cost to M from M's effort), B_0 (the benefit to society without modification of the service), C_0 (cost to M without modification of the service), $c(e)$ (cost reduction from M's effort), $b(e)$ (benefit reduction from M's cost-reducing effort), $\beta(i)$ (benefit increase from M's quality-enhancing effort net of costs for improving the quality). Thus the benefit of the society can be written as $B = B_0 - b(e) + \beta(i)$ and the overall cost of M as $C = C_0 - c(e) + e + i$. We do not discuss here the assumptions about the properties of functions b and c and we do not expose the proofs for the various results in the paper. In a benchmark first-best case with complete contracting, M maximizes:

$$\max_{e,i}\{-b(e) + c(e) + \beta(i) - e - i\}. \tag{1}$$

We start by considering the first kind of innovation, namely the cost-cutting behavior, as we deem it to be the primary adaptive strategy of the healthcare providers to the Stockholm reform. The cost reductions could manifest in several ways: by delegating certain tasks traditionally performed by doctors to nurses (task-shifting), by accepting fewer initial visits, or by reducing the number of follow-up appointments.

The function $b(e)$ is crucial as it quantifies the decline in non-contractible quality due to non-contractible cost reduction. When a healthcare operator decides to cut costs, this will entail a reduction in the quality of service equal to $b(e)$. To allow for heterogeneity in the providers' behaviour, we replace $b(e)$ by $\theta b(e)$, with $\theta > 0$ (see Hart et al. (1997)). The parameter θ is a scaling factor that reflects the impact of cost reduction efforts on quality: a smaller θ indicates that cost reductions have a lesser negative impact on quality.

Next, we consider the second type of innovation, which involves enhancing quality. The increase in capitation, that was also a part of the Stockholm reimbursement reform, might have encouraged some providers to focus on attracting and retaining a larger patient base to benefit from this funding model. This could serve as an incentive for quality improvements aimed at increasing patient satisfaction and loyalty. By offering higher quality services, providers have the potential to retain their existing clientele or even draw in new ones. Among the three types of providers, those owned by GPs are in a favorable position to attract new customers. This advantage stems from their existing internal queue systems, which enable them to readily accommodate new patients.

When M implements cost-saving measures or quality enhancements, all the ensuing benefits accrue to M in instances where F is a private entity. This is because M retains the residual rights to the benefits and has the autonomy to determine whether to proceed with such innovations. Additionally, in this private setting, M is secure from replacement. Conversely, within a public institution, once M has executed quality improvements, the expertise becomes widely recognized within the organization, and G (being the residual claimant in this case) has the discretion to consider substituting M with an alternative provider. Thus, when the provider (F) operates under public ownership, the government

(G) is in a position to capture a certain share of the net societal benefits (i.e. $-b(e) + c(e) + \beta(i)$) that arise from the innovations of M. This share is quantitatively expressed as a fraction within the range of $0 \leq (1 - \lambda) \leq 1$. Here, λ is a parameter indicating the weakeness of M's incentives (if λ=1, then the public manager is irreplaceable and has the same renegotiation power as a private manager). Essentially, in the case of the public provider, G has the option to substitute the incumbent manager with a new manager, offering compensation that reflects only the direct expenses associated with their functioning, without an added margin for profit.

Let us now look at how the profit maximization functions look for the different types of entities in order to better assess their incentives for cost-cutting measures and quality improvement. We consider the more interesting case from Hart et al. (1997) where the renegotiation following the changes in the service takes place using Nash bargaining and thus G and M share the gains $50 : 50$.

If F is private, then M maximizes:

$$\max_{e,i} 1/2\beta(i) + c(e) - e - i. \tag{2}$$

Comparing equations (1) and (2) (the complete contracting versus incomplete one), we see that the private M fully internalizes the benefits from the cost-reducing effort, but only partially the benefits connected to quality improvement. Furthermore, M ignores the damage done to the quality by engaging in cost reduction, denoted $b(e)$.

If F is public, then the renegotiation concerns the share of profit that G cannot obtain without M's participation, and then M maximizes:

$$\max_{e,i} \left[\lambda/2(-b(e) + c(e) + \beta(i)) - e - i\right]. \tag{3}$$

Here, the benefit of cost reduction is also subject to sharing since, unlike their private counterparts, public providers require approval from G to implement such changes. Thus the gains of the public operators from engaging in the two types of innovations, depend on the magnitude of λ. A lower λ implies that the provider is easily replaceable, and thus has less bargaining power in the renegotiation process. This can lead to lower incentives for the public provider to engage in cost-efficiency measures or quality innovations. For example, primary healthcare providers who have established a strong reputation and high levels of trust with patients, or that serve in rural areas may have a higher λ.

The first part of *Proposition 3* in Hart et al. (1997) states that for θ sufficiently small, the private ownership is superior to public ownership in the provision of the good. We argue that private stand-alone (internally-owned) entities have a lower θ than the private groups (externally-owned). Thus the detrimental effect of cost-cutting measures on the quality of healthcare would be minimal, allowing these entities to balance cost efficiency with maintaining high-quality patient care. GPs have a professional commitment to patient care, which might mitigate the extent to which cost reduction efforts (e.g., using less expensive medical supplies) affect the quality of care. Therefore although they also have some profit motives, the professional ethics and the fact that they have a closer contact with the patients leads to a smaller reduction in quality.

In the latter part of *Proposition 3* in Hart et al. (1997), the function $b(e)$ is transformed into $\theta b(e)$ and $c(e)$ becomes $\phi c(e)$, with both θ and ϕ being positive and greater than zero. In such a setup, if θ and ϕ are relatively small and λ remains below 1, the inference is that private ownership tends to be more beneficial than public ownership. Below we argue why the private stand-alone (GP-owned) entities are more likely to have both lower θ and ϕ than the large private-groups providers. Firstly, GP-owned providers have a direct stake in both the financial and quality aspects of their practice. They are more likely to balance cost management with quality of care because their reputation and patient relationships are closely tied to the quality they deliver. This alignment could mean a lower θ, as their cost-cutting measures might be less likely to negatively impact quality. Secondly, externally-owned providers, particularly those driven by investor returns, might prioritize more aggressive cost-cutting strategies to maximize profits. This could result in a higher ϕ value, as their cost reduction efforts could

be more extensive. In contrast, GP-owned providers, managing costs with a closer view of patient care, might employ more conservative cost management strategies, suggesting a lower ϕ. Thirdly, GP-owned practices often focus on long-term patient relationships and community trust. This focus can lead to more patient-centric decision-making, which might translate into less drastic cost-cutting measures that could compromise patient care (lower θ) and more moderate cost management (lower ϕ). Finally, externally-owned providers, especially larger ones, may have different operational scales and scopes compared to GP-owned practices. This difference can influence the magnitude and impact of cost-reduction efforts and quality measures, potentially leading to different θ and ϕ values.

Our empirical findings resonate with the predictions of the Hart et al. (1997)'s model on how ownership structures influence the behavior of entities. In their model, private providers, motivated by profit, are expected to react more swiftly and significantly to financial changes compared to public entities. This is mirrored in our observation that private providers reduced their patient contact more markedly than public ones. The greater reduction in patient visits by private providers compared to public ones could be indicative of a higher ϕ in private entities, suggesting more aggressive cost management strategies. Furthermore, the nuanced behavior of employee-owned providers, akin to public providers, suggests a lower θ, where quality is less compromised by cost-cutting measures.

The remainder of the paper is organized as follows. Section 2 reviews related literature. Section 3 provides some background on healthcare in Sweden and Stockholm, explains the 2016 reform, and describes the data. Section 4 carries out the empirical strategy while distinguishing only between private and public entities. In section 4.2 we presents the results of the empirical analysis when the distinction between private stand-alone (employee-owned) and private groups (externally-owned) providers is being made. Section 5 concludes and suggests some possible extensions.

2 Contribution to the Literature

This paper makes contributions to several strands of the literature. First, we relate to the incomplete-contract theories for differences in behavior between private and public providers (Hart and Moore, 1990). Private providers internalize less of the social benefit of the services they provide, and are thus prone to cost-cutting innovations and more sensitive to monetary incentives. This cost-cutting behavior, however, may be harmful for the (non-contractable) quality of the care services provided, especially in a context of weak competition, absence of consumer choice and reputational mechanisms, or low innovative pressure (Hart et al., 1997).

Second, we contribute to the rich empirical research on the optimal design of reimbursement schemes within primary healthcare (Vlachy et al. (2023), Somé et al. (2020), Ma (1994) Ellis and McGuire (1986), Gosden et al. (2001), Adida et al. (2017)). As Sweden implements a reimbursement system that is a combination between capitation and fee-for service, our results have policy implications especially for countries such as UK, Ontario Canada, Norway, Sweden, the Netherlands, and Denmark, which also use mixed reimbursement schemes (for an experimental study on this topic see Brosig-Koch et al. (2017)). A similar paper to ours is Skovsgaard et al. (2023) that looks at the impact of a Danish reform of altering fee-for-service and capitation ratios in mixed compensation for general practitioners. The reform, shifting ratios from 80/20 to 20/80 for type 2 diabetes patients, led to reduced provision of both capitated and non-capitated services, including guideline-recommended processes. We distinguish from Skovsgaard et al. (2023) by taking into account also the structure of the private ownership (employee-owned PCCs versus private groups-owned PCCs). In the Swedish context, Dietrichson et al. (2020) examine the impact on quality of competition-enhancing reforms in Swedish primary healthcare from 2005-2013, using a difference-in-differences approach, but without taking into account the impact of the ownership. Other studies by Ellegård et al. (2018) and Ellegård (2020) explore how monetary incentives aimed at achieving predetermined targets influence the prescribing behaviors of General Practitioners (GPs) in Sweden. The study by Agerholm et al. (2015) explored the effects of a 2008 reform in Stockholm, which shifted the primary care reimbursement system from a mainly need-weighted capitation method to a predominantly fee-for-service model. This

research particularly focused on analyzing the impact of this change on the number of patient visits and the overall equity in healthcare access and distribution. Knutsson and Tyrefors (2022) considers the quality and efficiency of ambulance services in private hospitals in the Stockholm region: private ambulance services were better for contracted outcomes, such as answering calls faster, but worse for non-contractable outcomes, such as mortality rates. Gruber et al. (1999) investigate how changes in Medicaid reimbursement rates affect the level of treatment provided. Their findings indicate that reductions in Medicaid reimbursement can lead to actual decreases in the treatment intensity for Medicaid patients.

Third, we relate to the literature studying the impact of various structures of ownership and management on the quality of the healthcare services provided (Sloan (2000), Herbst and Prüfer (2016), Hart and Moore (1996), Chou (2002)). The paper by La Forgia (2023) highlights the effects of practice management changes, specifically the acquisition of physician-owned practices by PPMCs, on clinical outcomes. The research highlights that the impact varies based on the management approach adopted by PPMCs, i.e., financial management or clinical management. Employing the difference-in-differences technique, La Forgia (2023) reveals that when PPMCs emphasise financial management, there is a notable increase in C-section surgeries rates among integrated physicians, which in turn results in less optimal medical care and unfavourable patient consequences. Conversely, an opposite pattern emerges when PPMCs prioritise clinical management. Gupta et al. (2021) examines the impact of private equity ownership on U.S. nursing homes using patient-level Medicare data. Their findings indicate that private equity ownership is associated with an increase in mortality rates. Picone et al. (2002) explores how shifts in hospital ownership, particularly becoming or ceasing to be for-profit, impact care quality and Medicare payments. Our empirical findings on the private groups-owned providers confirm the findings previously obtained in the context of hospital practices or elderly care services.

Finally, our paper pertains to the healthcare management literature on the role of gatekeeping and routing processes. The primary care provider functions as a two-tier service system (Shumsky and Pinker, 2003; Lee et al., 2012), with a gatekeeper (first level) directing patients to appropriate care providers (second level) based on management guidance. The patient-initiated process involves contacting the PCC for an office visit, wherein the gatekeeper assesses the healthcare needs complexity to route patients either to a GP or a nurse. The existing literature focused on the impact of the Medicare reimbursement incentives on the patient routing to Skilled Nursing Facilities (Jin et al., 2022)), the consequences of the gatekeeping structure (two-stages gatekeeping versus one stage) on the admission errors in a hospital emergency department (Freeman et al., 2021), or on the impact of the workload management on the gatekeeping process (Freeman et al., 2017). Our study investigates how both the financial incentives and the ownership structure affect the gatekeeping behaviour and induce rationing of visits to GP. From this point of view, our work is more similar to the literature on the incentives to create decentralized gatekeepers in order to meet the budget constraints of the provider (Pollack and Zeckhauser, 1996). We suggest that a potential channel that could lead to a reduction in patient access to a GP (either through longer waiting times or by replacing the doctor visit with a nurse visit) is the adherence of gatekeepers to standards imposed by the private groups ownership. Thus, the gatekeeping process could act as a tool used mainly by the externally-owned providers in order to achieve their cost-cutting objectives (Hart and Moore, 1990).

To the best of our knowledge, this is the first paper that studies quantitatively the differences in care quality between private groups-owned and GP-owned providers following a change in the reimbursement schemes. We find empirical evidence that the shareholding structure is a key variable when assessing the quality of healthcare services (see Kc et al. (2020) for a review of the relevant operational and managerial factors in the healthcare studies).

3 Institutional Background and Data

3.1 Primary healthcare in Sweden

Healthcare in Sweden is provided in a quasi-market system, where providers administer care to patients and are reimbursed by the regional government. As noted above, the same system applies to region-administered (public) and private providers. The local government has substantial autonomy in shaping the reimbursement system and local regulations in each of the 21 Swedish regions.

Reimbursement schemes differ across regions, but also by the type of care provided: hospital or primary care. Primary care is mostly provided at care centres, and consists of regular checkups and day-to-day health services. If the patient requires more specialized or intensive treatment, they are referred to hospitals. Private practitioners are generally found in primary care, although there are some private hospitals. We will here focus on primary care, and more specifically general practice. The primary-care sector employs a variety of healthcare workers, such as GPs, nurses, Psychologists and Psychotherapists. We will consider GPs, nurses and assistant nurses; as such, unless stated otherwise, primary care will always refer to general practice in this paper.[2]

General practice (*Husläkarvård*) is the initial point of contact between patients and the healthcare system. This covers regular check ups, and the diagnosis, treatment and follow-up of a broad set of issues: it thus functions as a filter and gateway to other primary and hospital care. All PCCs providing general practice are subject to the same regulations and reimbursement rules, whether owned by the region, the resident GPs or any other party.

Local governments influence primary-care providers by a combination of direct regulation and reimbursement rules. Direct regulation sets out the rules for the medical practice, while the reimbursement system establishes what care can be billed. Reimbursement systems can be structured in a number of different ways, but a mix of two forms are predominant in general practice in Sweden: capitation and fee-for-service. The first is a prospective fixed type of reimbursement: a fixed funding figure is decided before any services and treatments are provided. In detail, capitation pays a fixed fee based on the number of individuals in the region who are registered at a given PCC. Registration is automatic and based on the individual's address, but people can choose to manually change their registration free of charge, even though most opt to stay with their automatically-registered centre. The capitation figure then varies according to the demographic characteristics of the population, such as age, the Care Need Index (CNI) and Adjusted Clinical Groups (ACG). The CNI measures the socioeconomic factors that help determine the care needs of individuals who are registered at a particular PCC. It is a composite index that comprises the following seven factors weighted differently: the number of children under five, foreign-born individuals outside European Union, elderly living alone, single parents, people that recently moved to the area, unemployed individuals, and people with low level of education. ACG is a risk adjustment system that classify and analyse patients based on their health status and healthcare utilisation patterns (healthcare records). Due to its predictability, most regions employ reimbursement schemes that are heavily skewed towards capitation, and in 2013 this covered over 80% of the total fees received by healthcare providers in most of the 21 regions (Dietrichson et al., 2020). Capitation has however been criticized as incentivizing the under-provision of healthcare (Anell, 2011; Gerdtham et al., 1999): capitation has been linked to cost-shifting behavior when regulations do not adequately enforce the PCC's responsibility to treat the patients. One example of this cost shifting is the increased referral of patients to specialists that has been found in Norwegian data (Iversen and Lurås, 2000).

Fee-for-service reimbursement is on the contrary a retrospective reimbursement: healthcare providers are paid according to their actual use of resources. Funding consists of a fee for every billable service (visits, tests and treatment) that the PCC provides. As such, the financial risks are borne to a greater extent by the region, as the expenditures cannot be perfectly predicted before provision. Patients generally seek care from their registered provider; they are however free to use any provider

[2]Our definition of GPs does not distinguish between those with different levels of specialized training (for Swedish readers, note that we translate general practitioner to *Husläkare* as opposed to *Allmänläkare*). assistant nurses assist nurses and GPs in carrying out tasks that do not require extensive medical training.

both inside and outside of the region. As a result, regions pay a small fee to providers in other regions. When this happens, it is the provider's rather than the patients' reimbursement scheme that determines the fee. For example, a Stockholm resident receiving care in another region results in the Stockholm region paying according to the reimbursement system in force in the other region. Fees can also vary based on the nature of the service as well as the patient, diagnosis and the type of medical profession that provided the service. The reimbursement system in the Swedish healthcare setup is a mix between capitation and fee-for-service models. Capitation aims for efficiency but raises concerns about underusing resources. In capitation, providers get a fixed payment per patient, encouraging careful resource use. However, this might limit services due to fixed payments, posing care quality concerns. Fee-for-service pays based on service amount and complexity. This encourages more services, but can risk overuse of resources (Magnus, 1999; McGuire, 2011).

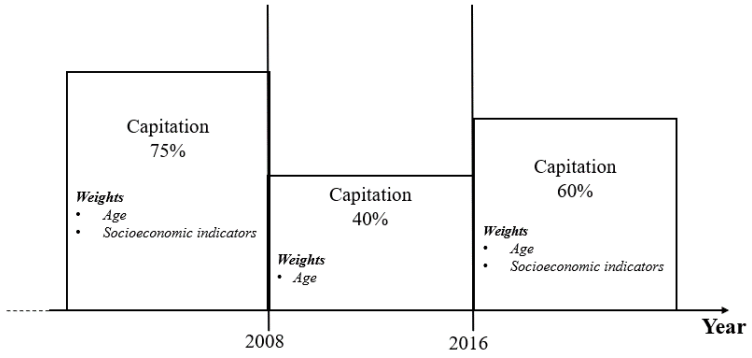
3.2 The 2016 Policy Reform in Stockholm Region

Stockholm Region is the largest of the 21 regions that make up the Swedish regional system, and is responsible for the delivery of all of the publicly-financed healthcare for the region's 2.4 million inhabitants. Private providers account for approximately one third of Region Stockholm's total healthcare delivery, including both primary care and hospital care. However, private providers are especially prominent in primary care, and Stockholm has the highest share of private providers of all Swedish regions: private providers accounted for 68% of primary-care provision in 2018 in Region Stockholm. Similarly, in the same year 63% of visits to GPs in Stockholm were handled by a private primary-care centre, which is notably higher than the national average figure of 44%.

Stockholm introduced patient choice for primary care in 2008, at the same time as a new reimbursement system. Prior to 2008, reimbursement was largely based on capitation, which accounted for 75% of all reimbursements. The post 2008 system took a notably different approach, with capitation now accounting for only 40% of total reimbursement and the remaining 60% being primarily fee-for-service reimbursement. The new scheme aimed to facilitate the establishment of new PCCs and encourage greater patient contact. The low share of capitation between 2008 and 2016 distinguished the Stockholm scheme from the capitation-dominated policies in other regions.

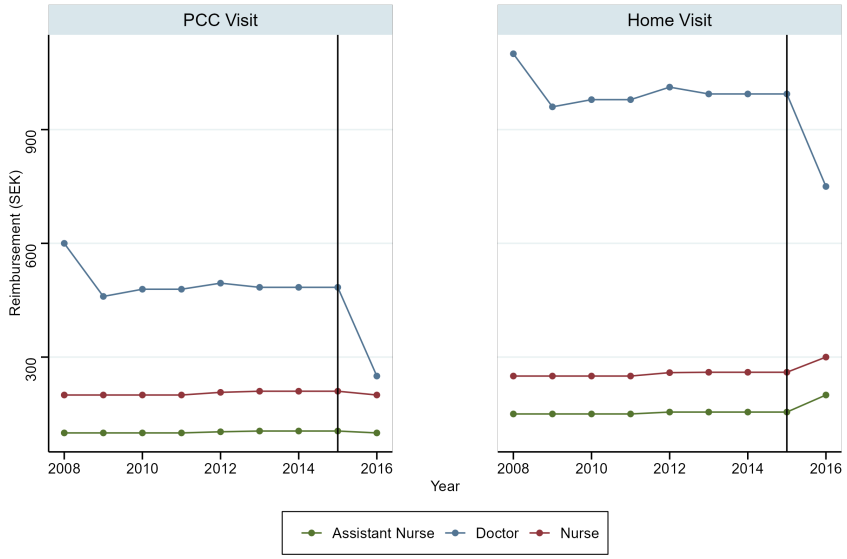
The Stockholm Region again changed the reimbursement system via a new policy that came into effect on January 1st 2016, under which general practice would be reimbursed with a greater degree of capitation (see Figure 1). This reform was motivated by costly over-provision that was ascribed to fee-for-service reimbursement. Examples of this over-provision included in-person visits when a phone call would have sufficed, and the underutilization of nurses due to higher payments for visits that were handled by GPs. Capitation consequently rose from around 40% of reimbursement pre-reform to 60% post-reform. The new Stockholm scheme hence became more similar to those in the rest of the country, with a greater emphasis being placed on the number of registered patients. The new policy also meant that any visit handled by a trained healthcare professional, whether a GP or a nurse, would be reimbursed more equally. In practice, this meant reducing payments for GP visits by almost one half, to the same level as that for visits to nurses (see Figure 2 and Appendix C for the 2008 – 2016 reimbursement rates). The reform included other changes. In addition to the age of the registered patient, socioeconomic factors were re-introduced in the calculation of the capitation reimbursement (previously removed in the 2008 reform).

Figure 1: Capitation reimbursement in the Stockholm Region in recent years



Source: Authors' rendering based on (Agerholm et al., 2015).

Figure 2: Fee-for-service reimbursement in the Stockholm Region in recent years



3.3 Data

PCC-level data was provided by the Stockholm Region database, VAL, also called the Stockholm County Patient Care Register, which covers all primary-care visits that were financed by the Stockholm Region reimbursement system. Data collection began in 1993 in order to track healthcare provision and evaluate improvements.

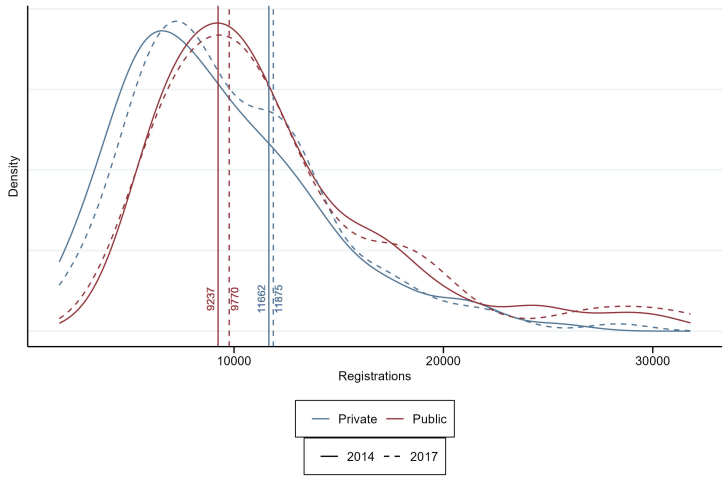
The VAL database is especially useful for two reasons. First, as it contains regional invoice data, we can access any data that is relevant for the reimbursement models at the PCC level for the whole of the Stockholm Region. Second, it allows us to match visits dataset to registrations dataset. The first contains information on the visits for all 259 PCCs across Stockholm that were active at some point over the 2012-2020 period; the latter contains the number of individuals registered at each PCC. After cleaning and merging these two datasets (see Appendix B), we have information on the registration and service provision of 187 PCCs over the 2012-2020 period, 67 public and 120 private PCCs (48 private groups-owned and 72 GP-owned PCCs).[3]

[3]We dropped all PCCs with missing data for any of the years 2012-2020 in the visits dataset, as well as all PCCs from Norrtälje municipality where the reimbursement model is different from that in the rest of Stockholm.

The medical personnel working at a PCC include a wide range of professions such as GPs, nurses, assistant nurses, Psychologists, Psychotherapists, Physiotherapists, Occupational Therapists, Social Workers etc. As well as merging visits data with registration data, we were able to distinguish visits to GPs, nurses and assistant nurses. We are primarily interested in these three types of visit as these were targeted by the reform.

Public PCCs had an average of 11,750 registered patients over these nine years, and private PCCs 9,500. Figure 3 depicts the spread of sizes for public and private PCCs one year before the 2016 reform was announced and one year after it took effect. Registrations increased for both types of entities as a consequence of a higher capitation rate entitled by the 2016 reform. The effect is higher for the private providers.

Figure 3: The density of registrations in the dataset pre- and post-reform



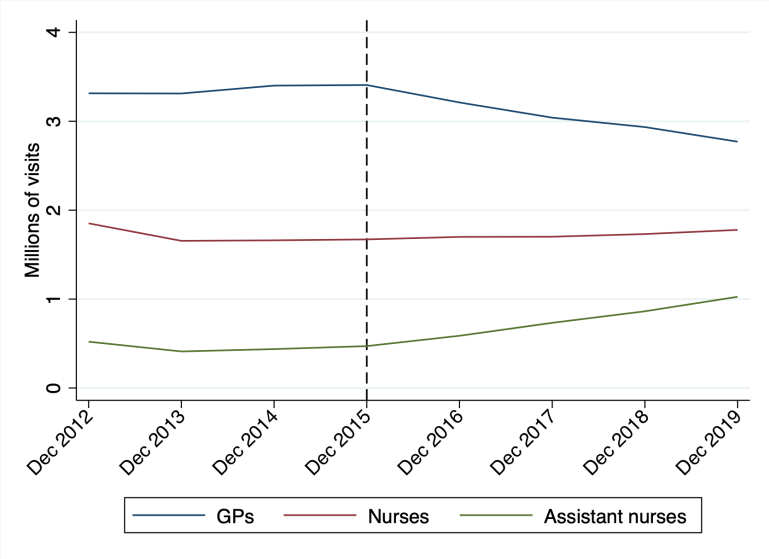
The vertical lines indicate the average number of registrations in 2014 and 2017 for public, respectively private entities.

In addition to our main datasets, we use two other data sources: Kolada and CNI data. Kolada is a publicly-available database containing a wide variety of regional- and municipal-level data that we will use to compare primary-care visits per inhabitant across Stockholm and similar regions. While the data is not as detailed as that in our main dataset, it still allows us to compare visit trends between regions, and will be useful for our argument that the 2016 reform is the most-probable cause of the change in visit statistics in Stockholm.

The Care Need Index data is publicly available online from Stockholm Region and, in addition to the PCC's total CNI score, we also have information on its constituent elements such as the unemployment and immigration rates. These factors are weighted in the CNI score by their contribution to care needs, as estimated by a survey of Swedish GPs carried out by Statistics Sweden. The CNI data is only publicly available for recent years, so we do not use it as a control variable. However, we will still appeal to it to illustrate the similarities in demographic composition between public and private PCCs.

Our dataset covers 51,850,930 visits, of which 49,133,043 were handled by either a GP, a nurse or an assistant nurse. Figure 4 shows the change over time in these categories of visits over the 2012-2019 period.

Figure 4: Visits with GPs, nurses and assistant nurses



The dashed vertical line corresponds to the moment of the reform. Source: Region Stockholm, VAL

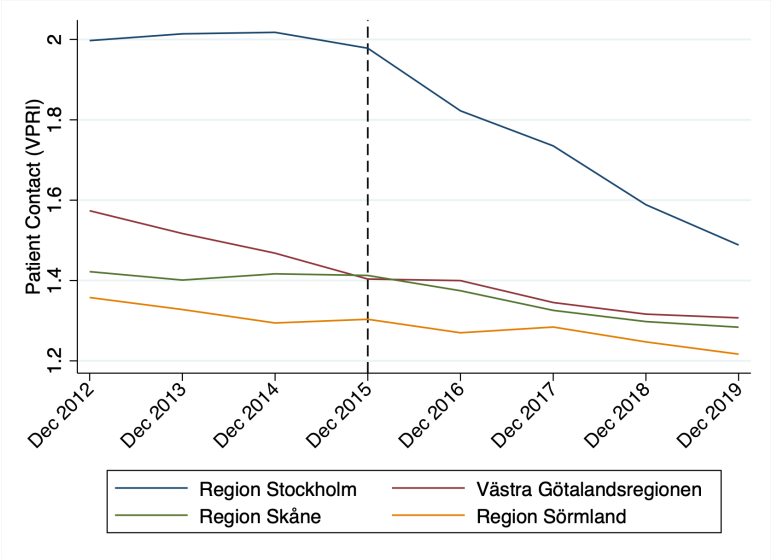
4 Empirical Analysis

Our analysis requires an outcome that reflects alignment to the reimbursement incentives. As noted in previous research, a fee-for-service scheme provides incentives for the greater provision of patient contact while capitation reduces these incentives. The increased capitation from the reform should then produce fewer patient contacts when accounting for the size of the care center and the lower fee-for-service payments should decrease them as well. We will analyze the outcome of patient visits per registered individual (VPRI), which reflects the extent of patient contact while controlling for the size of the care centre. A lower VPRI score will indicate greater alignment with the incentives from the reimbursement scheme. If the predictions of the Hart et al. (1997)'s model hold, private care providers will reduce their VPRI more than public care providers after the 2016 reform.

For a first visual assessment of the data, we compare Stockholm with two other regions featuring large metropolitan areas: Region Skåne and Västra Götalandsregionen. Figure 5 plots the changes in patient contact in Stockholm and these other two regions, as well as in Sörmland that also has a reimbursement system with a high degree of fee-for-service. As the 2016 reform only affected Stockholm, we should not see any significant fall in patient visits after 2016 in the other regions.

There is a notable break in the trend in patient contact in Stockholm starting around 2016, which does not appear in the other regions: the change in patient contact in Stockholm after 2016 thus likely reflects the response to the reform. The small general drop in all regions (mainly in 2018 and 2019) likely comes from a combination of the entry of online providers and cost-reduction efforts in the other regions. As we will argue below, online providers operating outside the conventional system through direct-to-consumer telemedicine are unlikely to significantly impact our results.

Figure 5: Visits in large regions and low-capitation regions



Note: These figures only include visits handled by doctors, including visits outside of general practice. Authors' calculations (Source: Kolada, 'Nyckeltal: Läkarbesök Primärvård,Antal/1000 Inv', [website], www.kolada.se/verktyg/fri-sokning/ (accessed May 1 2021))

Before proceeding with the estimation details, it is useful to make some further clarifications.

First, the Swedish government put forward a vision to become world-leading in digital-health provision by 2025, and there has indeed been a rise in the use of digital-health services in recent years with individuals being able to quickly schedule visits to GPs via mobile and web applications. According to the Swedish Association of Local Authorities and Regions (2021), digital visits accounted for 4.6 percent of all visits in primary care in 2018.[4] As online care providers did not figure in 2012, they do not appear in our sample. Total visits are not expected to be greatly affected by the entrance of online providers, as these only represented a relatively small market share in 2018. More importantly, there are no clear reasons why competition from online providers should adversely affect one of our two target groups but not the other.

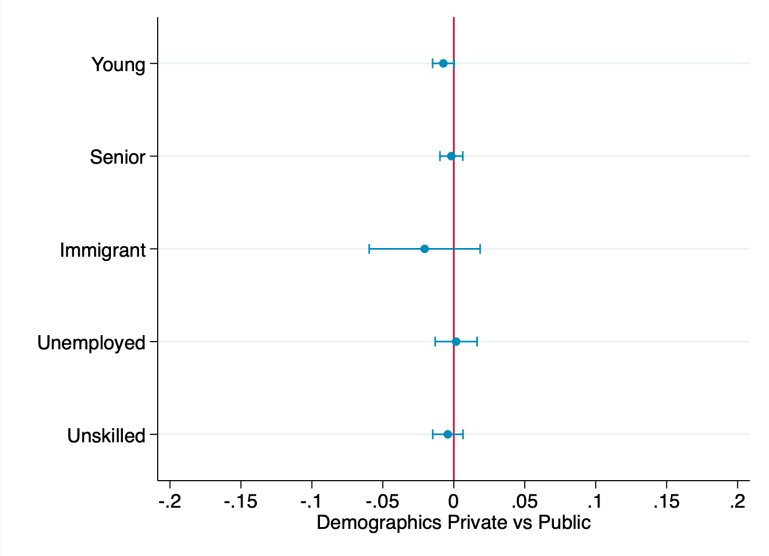
Second, the 2016 reform was rolled out simultaneously throughout Stockholm. However, seven PCCs did not take part in the reform. Four of these took part in a project called "Kroninnovation", which consisted of a different reform (but with a similar capitation to fee-for-service mix as the 2016 reform), and the other three remained in the old reimbursement system. We were not able to identify the four PCCs in the Kroninnovation project, but correspondence with Region Stockholm indicated that three were private and one public. We were not able to identify the three PCCs that did not take part in the reimbursement reform either, but three is only few relative to our whole sample.

Third, our analysis considers private ownership to be the only difference between the treatment and control groups. However, one might worry that these groups may also differ in socioeconomic terms. If, for example, private healthcare centres are located in areas with demographic characteristics associated with lower care needs, they may be able to reduce patient contact without any serious risk to patient health. We argue that socioeconomic differences are unlikely to explain our estimation results for private and public providers. Comparing these factors, we conclude that private and public PCCs have similar demographic compositions, as illustrated in Figure 6.[5]

[4] *Vision for eHealth 2025, Follow-up 2019*, eHealth Agency, 2020, `https://ehalsa2025.se/wp-content/uploads/2021/02/Follow-up-2019_Vision-e-health-2025.pdf` (as cited in Grant Thornton's report, 2018).

[5] The data depicted in Figure 6 is limited to the year 2020, as it corresponds to the timeframe for which we had available data.

Figure 6: Socioeconomic characteristics of private and public PCCs (2020)



Note: Authors' calculations (Source: Region Stockholm, 'Ersättning för Huläkarverksamhet' [website], https://vardgivarguiden.se/avtal/vardavtal/avtal-vardval-lov/lov-vardval-stockholm/huslakarverksamhet/ersattning/ (accessed March 7 2021).)

The method that we use to see how various types of providers reacted to the reimbursement reform is a difference-in-differences approach. We apply the difference-in-differences model by splitting our sample into two periods: the pre-reform period before 2016 and the post-reform period starting in 2016. Our main outcome variables of patient contact come from the matched visits and registration data, where we calculate the number of patient visits per registered individual (VPRI) for each PCC i in year t. We consider both VPRI A, where all visits are included, and VPRI B, which only includes visits handled by GPs, nurses and assistant nurses. The difference between the two consists mostly of visits handled by other occupations such as Psychologists, Psychotherapists, Physiotherapists, and Occupational Therapists. As the latter group of medical occupations are likely be only poor substitutes for GPs, nurses and assistant nurses, we expect the effect of the reform on VPRI A and VPRI B to be very similar.

Besides VPRI A and VPRI B, we consider several other outcome variables. Thus we look at VPRI GP (GP visits only), VPRI Nurse A (visits only to qualified nurses, i.e. Nurse A), and VPRI Nurse B (visits to all nurses, including assistant nurses). This enables us to further investigate how PCCs changed their patient contact per registered individuals, and in particular whether PCCs shifted visits from one category to another. The main focus is on VPRI GP, as the reduction in the fee-for-service was quite drastic for this category.

We exclude the years 2012 and 2020 from our data sample for two reasons. First, this helps to prevent other events from affecting the results such as Covid-19.[6] Second, by excluding PCCs without observations from 2012 or 2020 from our dataset, and not including these years in our regression, we ensure that none of the PCCs in our estimation sample opened or closed in 2013-2019. These PCCs may well have more-extreme values for the outcome variables, as in reality are recorded continuously throughout the sample period but registrations are only recorded at the end of the year. A PCC that opened in November 2012 would then have very few in reality but could still have many registrations. If newly-opened PCCs are more likely to be either private or public, this would bias our estimates.

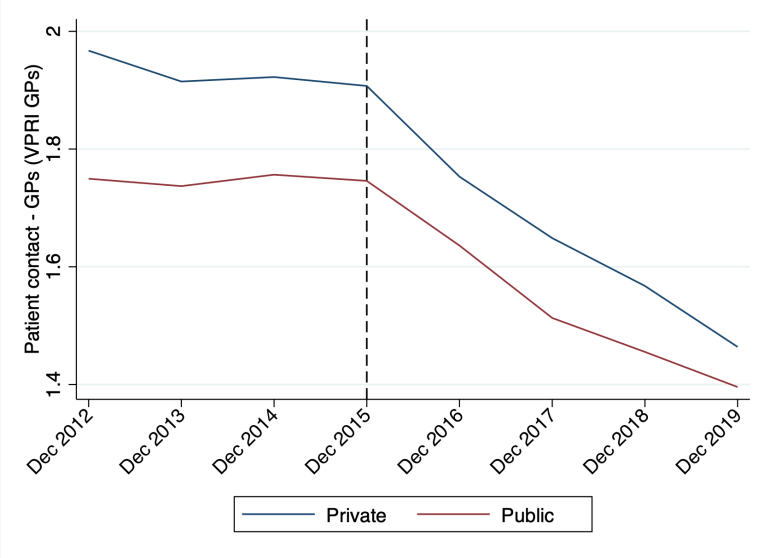
[6]The name Covid-19 refers to the year of its initial discovery, 2019. However, the virus did not come to the WHO's attention until December 31st 2019, and was not picked up by Swedish agencies until early 2020, which is why we can safely include 2019 in our data.

4.1 Without Private Ownership Differentiation

In this section we focus only on the difference between the private and public providers, without delving into the private ownership structure.

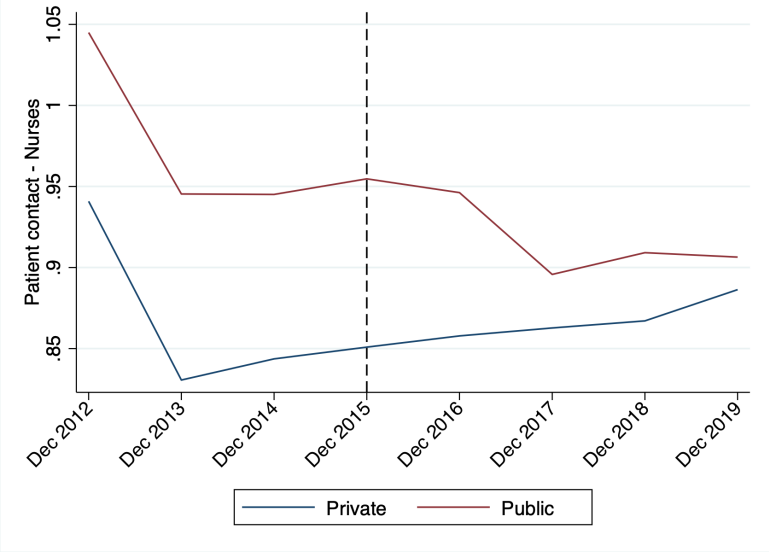
Figures 7 and 8 plot the changes in VPRI GP and, respectively, VPRI Nurse A for the two groups over the 2012-2019 period. In the Appendix F we show the plot also for VPRI A (all types of visits).

Figure 7: Changes in patient contact between 2012 and 2019



Patient contact is measured by VPRI. The dashed vertical line corresponds to the year of the reform.

Figure 8: Changes in patient contact between 2012 and 2019



Patient contact is measured by VPRI. The dashed vertical line corresponds to the year of the reform.

Parallel trends are also evaluated through regressions that are presented in Appendix F. As the reform was announced in mid-2015 and its implementation on January 1st 2016, we check for anticipation effects (see Appendix G) and we do not find evidence of any anticipatory effects.

4.1.1 Results and Discussion

Our regressions take the form:

$$VPRI_{it} = \beta_0 + \beta_1 PostReform_t + \beta_2 Private_i + \delta_1 Private_i \times PostReform_t + ProviderFE_i + \epsilon_{it}. \quad (4)$$

We cluster standard errors at the PCC level. $PostReform$ is a dummy for the observation being post-reform, and as such is 1 for the years 2016-2019 and 0 for 2013-2015. $Private$ is a dummy for privately-managed PCCs. $Private_i \times PostReform_t$ is the interaction between $PostReform$ and $Private$, and is the main variable of interest: the related coefficient δ_1 reflects the combined effect of the year being 2016-2019 and the PCC being privately owned, showing the difference between the reaction of private and public PCCs to the reform. The effect of the reform on public PCCs is then β_1 and that for private PCCs $\beta_1 + \delta_1$. Lastly, $ProviderFE$ is a fixed effect controlling for the PCC's level of initial patient contact, which will therefore increase the precision of the estimates.

In the Appendix G, we have incorporated the outcomes of the regression analysis including yearly time-fixed effects. The outcomes from the specification outlined earlier (which includes the $PostReform$ dummy variable) and the model with yearly fixed-effects are identical. Consequently, we have opted to retain the specification involving the $PostReform$ dummy in the main text. This choice is guided by the desire for a more straightforward interpretation of the impact of the reform on public entities. In Appendix H, we have also presented the overall effect of the reform, i.e. without differentiation between public and private entities.

The estimated coefficients from Equation 4 are listed in Table 1.

Table 1: Patient contact for public and private PCCs

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GP [GP]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse or Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PostReform	0.019	-0.017	-0.246***	-0.034	0.230***
	(0.038)	(0.039)	(0.018)	(0.023)	(0.034)
PostReform*Private	-0.116**	-0.132**	-0.060**	0.061*	-0.072
	(0.057)	(0.056)	(0.029)	(0.032)	(0.046)
Private	0.217***	0.214***	0.125***	0.092***	0.089***
	(0.032)	(0.032)	(0.017)	(0.018)	(0.026)
Constant	2.929***	2.811***	1.780***	0.998***	1.030***
	(0.022)	(0.022)	(0.010)	(0.013)	(0.019)
Pre-mean Private	3.13	3.01	1.93	0.87	1.09
Pre-mean Public	3.09	2.99	1.75	0.97	1.24
Fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,309	1,309	1,309	1,309	1,309

Notes. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at PCC level.

The estimated DiD coefficient in Table 1 is statistically significant for the total number of patient contacts per registered individual for all types of visits except VPRI Nurse B, i.e. visits to nurses/assistant nurses. In the years following the reform, private PCCs when compared to public PCCs had approximately 1.2 fewer visits for every ten patients for all visits, 1.3 fewer considering only those with GPs/nurses/assistant nurses, and 0.6 fewer visits to the GP. At the same time, the

number of visits to the Nurse A increased by 0.6 visits per 10 registered patients. This confirms our hypothesis that the rationing of visits to the doctors was conducted by the private providers through a substitution by the qualified nurses.

Public PCCs had higher VPRI Nurse B figures post-reform, with an estimated coefficient of 0.23. On the contrary, the post-reform VPRI Nurse A Coefficient is insignificant and negative for public PCCs. Thus, there is a clear shift in patient contact for public PCCs. While overall patient contact then did not decrease significantly for public providers, there was a fall in visits to GPs and a rise in visits to assistant nurses. As such, GP patient contact by public providers fell by around two and a half visits per ten registered individuals, while Nurse B visits rose by almost the same amount. One interpretation is that nurses replaced more GPs in patient visits (given that the compensation for nurses did not change, while that for GPs halved), and some of the easier tasks of the nurses (not requiring licensed training) were passed on to assistant nurses.

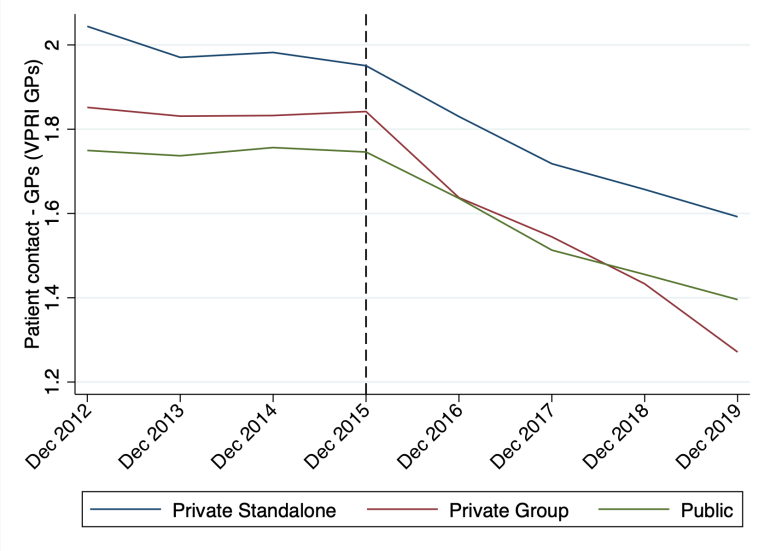
4.2 Private Ownership Differentiation

In this part of the analysis, we introduce 2 dummy variables, $PrivateGroups$ (for private PCCs that belong to large financial groups or trusts) and $PrivateStandalone$ (for employee-owned PCCs). We construct 2 interaction terms, $PrivateGroups$ x $PostReform$ and $PrivateStandalone$ x $PostReform$, which are 1 for PCCs with large private owners and, respectively GP owners, in the 2016-2019 period. Our sample contains 48 private groups-owned and 72 stand-alone (GP-owned) PCCs. In our data these PCCs are owned by Capio or Helsa, with the majority falling under Capio's ownership.[7] Several primary healthcare providers, classified as private groups, were associated with private equity for a significant part of our study duration (although not consistently throughout the entire period). In order to maintain consistency across the entire observation timeframe, we chose to only differentiate between private groups-owned and employee-owned PCCs. For example, Capio has undergone significant ownership changes, including its acquisition by private equity funds like Apax Europe Funds, Apax France Funds, and Nordic Capital Fund VI in 2006 (Lindbom and Jost, 2021). Following nine years under private equity ownership, Capio returned to the public market in June 2015. However, in November 2018, it became part of Générale de Santé, a leading European healthcare services provider. These ownership shifts suggest a history of private equity involvement in Capio's management, potentially influencing its behavior and decision-making even after 2015. This dynamic may continue to shape Capio's strategies and operations, reflecting the imprint of its private equity ownership.

To obtain a clearer picture of the trend in the main outcome variable, the total number of visits per registered individuals, we plot the VPRI GP and VPRI Nurse A trends in Figure 9 and, respectively, 10. In the Appendix F we show the plot also for VPRI A (all types of visits).

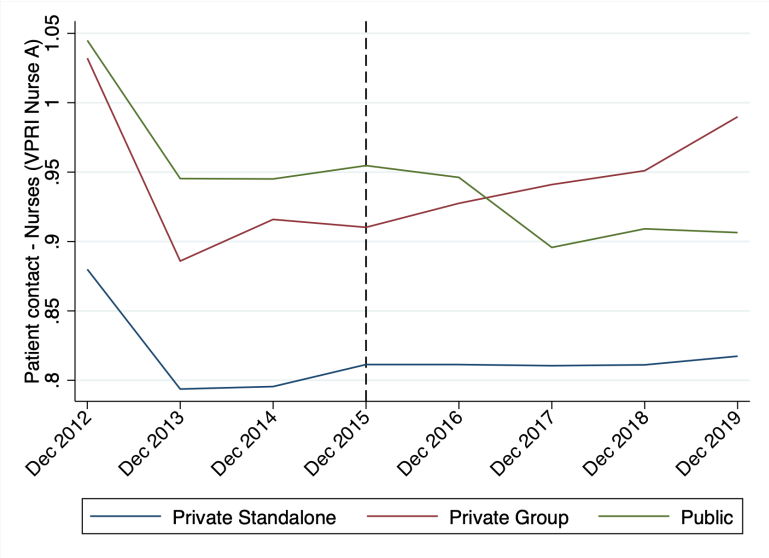
[7] Praktikertjänst, which is run as a large cooperative, is not included. The descriptive policy evaluation by Dahlgren et al. (2017) used a similar grouping.

Figure 9: Changes in patient contact between 2012 and 2019



Patient contact is measured by VPRI. The dashed vertical line corresponds to the year of the reform. Source: Region Stockholm, VAL.

Figure 10: Changes in patient contact between 2012 and 2019



Patient contact is measured by VPRI. The dashed vertical line corresponds to the year of the reform.

The trends are similar up until 2015, when the private group-owned care centres start having a sharper and continuous deviation from the common trend. As confirmed also by the analysis below, private standalone and public entities seem to have aligned post-reform trends.

4.2.1 Results and Discussion

We run the regression below on the full sample, including both privately- and publicly-owned PCCs and accounting for different types of private ownership[8]:

$$\begin{aligned} VPRI_{it} =& \beta_0 + \beta_1 PostReform_t + \beta_2 PrivateStandalone_i + \beta_3 PrivateGroups_i + \\ &+ \delta_1 PrivateStandalone_i \times PostReform_t + \delta_2 PrivateGroups_i \times PostReform_t + \\ &+ ProviderFE_i + \epsilon_{it}. \end{aligned} \tag{5}$$

This analysis allows us to see how large private providers (externally-owned) and internally-owned ones are altering their behaviour post-reform compared with the public ones. We are mostly interested in the two interaction effects, which have the same interpretation as in the previous regressions. The estimated coefficients from Equation 5 are listed in Table 2.

Table 2: Patient contact for private groups, private stand-alone and public PCCs

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GPs [GP]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse/ Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PostReform	0.019	-0.017	-0.246***	-0.034	0.230***
	(0.039)	(0.039)	(0.018)	(0.023)	(0.034)
PrivateStandalone x PostReform	-0.090	-0.110*	-0.022	0.046	-0.088*
	(0.066)	(0.065)	(0.038)	(0.033)	(0.047)
PrivateGroups x PostReform	-0.155**	-0.166**	-0.117***	0.082	-0.048
	(0.077)	(0.076)	(0.033)	(0.050)	(0.070)
PrivateStandalone	0.202***	0.201***	0.103***	0.101***	0.098***
	(0.038)	(0.037)	(0.022)	(0.019)	(0.027)
PrivateGroups	-0.302***	-0.368***	-0.191***	-0.144***	-0.178***
	(0.044)	(0.043)	(0.019)	(0.028)	(0.040)
Constant	2.929***	2.811***	1.780***	0.998***	1.030***
	(0.022)	(0.022)	(0.010)	(0.013)	(0.019)
Pre-mean Groups	3.12	3.01	1.84	0.94	1.17
Pre-mean Standalone	3.14	3.02	1.99	0.82	1.03
Pre-mean Public	3.09	2.99	1.75	0.97	1.24
Fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,309	1,309	1,309	1,309	1,309

Notes. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at PCC level.

When looking at the VPRI GP in Table 2, there is no significant difference in the response of GP-owned providers when compared with their public counterparts. On the other hand, the private groups-owned PCCs reduce their GP contact by 1.17 visits for 10 registered patients when compared with the public entities. The previously-identified drop in private PCC GP visits in Table 1 was then driven by large private groups. Private stand-alone PCCs exhibit similar patterns to public PCCs, so that GPs have still significantly reduced their role in private stand-alone PCCs, even though not as much as in private groups PCCs. This is as expected: private stand-alone PCCs are often owned by

[8]In Appendix I, we also present a differences-in-difference analysis where we look only at the two types of private entities and the benchmark group is the internally-owned providers.

the GPs who work there. It is thus unlikely that an employed owner would reduce their own role as much as an outside owner would reduce the role of employed GPs.

We then conclude that especially large private groups PCCs reacted more to the reimbursement reform when compared to the public PCCs. More specifically, they appear to be more willing to change the way in which they accomplish their medical mission, i.e they are ready to a more drastic rationing of GP visits in order to respond to a tighter budget constraint created by the 2016 reform. This is in line with the predictions from the Hart et al. (1997)'s model. Region Stockholm has more control over the public PCCs, which they administer, than over private PCCs, where their control is constrained to contractual arrangements. The private groups PCCs thus internalize social benefits less and adhere more strictly to the monetary incentives in the reimbursement scheme.

Our study's outcomes align with the theoretical framework proposed by Hart et al. (1997). According to their theory, mainly profit-driven externally-owned providers are likely to respond to reimbursement adjustments more rapidly and extensively than their public counterparts. This theory is reflected in our data, which shows a more pronounced decrease in patient interactions among externally-owned providers, implying more assertive financial management tactics (a higher ϕ). Additionally, the behavior observed in employee-owned providers, which closely resembles that of public institutions, could indicate a lower value of θ, suggesting that their commitment to quality is less affected by cost reduction efforts. Notably, despite being profit-oriented, employee-owned providers demonstrate more altruistic behavior, potentially influenced by their direct interactions with patients.

5 Final Remarks

Prior studies have identified disparities in outcomes between public and private care providers. Our contribution extends this literature by demonstrating that outcomes also diverge when distinguishing between two types of private entities: private groups of providers, often affiliated with private equity or consortiums, and stand-alone (employee-owned) providers. Our analysis reveals that internally-owned healthcare providers exhibit a more favorable response to reimbursement schemes, maintaining higher levels of care quality. We explained this phenomenon through the Hart et al. (1997)'s ownership model. At the same time, this empirical observation can be attributed to the elimination of agency problems, particularly evident in stand-alone entities where the principal is also the agent (see Besley and Ghatak (2001)). A third alternative explanation points to the impact of professional duty, suggesting that closer and more continuous patient contact in internally-owned providers cultivates a stronger sense of duty compared to larger healthcare providers or chains (see Ellingsen and Mohlin (2022) for an analysis of factors influencing dutifullness). In the case of the private groups entities, professionals may encounter obstacles in direct patient interaction (e.g., through a gatekeeping process), or they may have strong external stakeholder directives justifying a reduction in care levels and quality. Nevertheless we consider that these two alternative explanations are implicitly nested into the Hart et al. (1997)'s model.

While we currently lack a structural model to assess the welfare implications of having different types of private entities providing healthcare services (this idea is reserved for a planned companion paper), our results unmistakably highlight substantial differences in the behavior of externally versus internally-owned providers. A structural estimation of the parameters θ and ϕ from Hart et al. (1997)'s model would give us a more accurate image of the heterogeneity between the different types of providers. This would require a different set of data where one can more directly measure the quality of healthcare services and the cost of providing these services. This might include detailed patient health outcomes, specific costs associated with different healthcare activities, and perhaps even more granular data on the types of services provided during patient visits. Additionally, data on internal decision-making processes of healthcare providers, which might not be readily available, could be crucial for a deeper understanding of how different ownership structures affect the trade-offs between cost efficiency and quality of care. Unfortunately our aggregated data at the level of PCC

cannot allow us to produce such estimates. Nevertheless, our current reduced-form approach still provides valuable insights into the role of ownership in the behavior of different healthcare entities.

Our research findings extend beyond the realm of healthcare and have broader implications for various governance challenges, notably in the educational sector. The rise of different types of private schools, akin to the diversity observed in healthcare ownership structures, presents a parallel governance landscape.

References

Adida, Elodie, Hamed Mamani, and Shima Nassiri, "Bundled payment vs. fee-for-service: Impact of payment scheme on performance," *Management Science*, 2017, *63* (5), 1606–1624.

Agerholm, Janne, Daniel Bruce, Antonio Ponce de Leon, and Bo Burström, "Equity impact of a choice reform and change in reimbursement system in primary care in Stockholm County Council," *BMC Health Services Research*, 2015, *15* (1), 1–10.

Anell, Anders, "Choice and privatisation in Swedish primary care," *Health Economics, Policy and Law*, 2011, *6* (4), 549–569.

Bäuml, Matthias and Christian Kümpel, "Hospital responses to the refinement of reimbursements by treatment intensity in DRG systems," *Health Economics*, 2021, *30* (3), 585–602.

Bergman, Mats A, Per Johansson, Sofia Lundberg, and Giancarlo Spagnolo, "Privatization and quality: Evidence from elderly care in Sweden," *Journal of Health Economics*, 2016, *49*, 109–119.

Bergstrom, Theodore, Lawrence Blume, and Hal Varian, "On the private provision of public goods," *Journal of Public Economics*, 1986, *29* (1), 25–49.

Besley, Timothy and Maitreesh Ghatak, "Government versus private ownership of public goods," *The Quarterly Journal of Economics*, 2001, *116* (4), 1343–1372.

_ and _ , "Competition and incentives with motivated agents," *American Economic Review*, 2005, *95* (3), 616–636.

Brosig-Koch, Jeannette, Heike Hennig-Schmidt, Nadja Kairies-Schwarz, and Daniel Wiesen, "The effects of introducing mixed payment systems for physicians: Experimental evidence," *Health Economics*, 2017, *26* (2), 243–262.

Chou, Shin-Yi, "Asymmetric information, ownership and quality of care: an empirical analysis of nursing homes," *Journal of Health Economics*, 2002, *21* (2), 293–311.

Clemens, Jeffrey and Joshua D Gottlieb, "Do physicians' financial incentives affect medical treatment and patient health?," *American Economic Review*, 2014, *104* (4), 1320–1349.

Dahlgren, Cecilia, Matilda Hagman, and Clas Rehnberg, "Uppföljning av utvecklingen inom husläkarverksamheten efter förändring av ersättningsmodellen," 2017.

Dietrichson, Jens, Lina Maria Ellegård, and Gustav Kjellsson, "Patient choice, entry, and the quality of primary care: Evidence from Swedish reforms," *Health Economics*, 2020, *29* (6), 716–730.

Dranove, David and Lawton Robert Burns, *Big Med: megaproviders and the high cost of health care in America*, University of Chicago Press, 2022.

Eliason, Paul J, Benjamin Heebsh, Ryan C McDevitt, and James W Roberts, "How acquisitions affect firm behavior and performance: Evidence from the dialysis industry," *The Quarterly Journal of Economics*, 2020, *135* (1), 221–267.

Ellegård, Lina Maria, "Effects of pay-for-performance on prescription of hypertension drugs among public and private primary care providers in Sweden," *International journal of health economics and management*, 2020, *20* (3), 215–228.

_ , Jens Dietrichson, and Anders Anell, "Can pay-for-performance to primary care providers stimulate appropriate use of antibiotics?," *Health Economics*, 2018, *27* (1), e39–e54.

Ellingsen, Tore and Erik Mohlin, "A model of social duties," Technical Report, Working Paper 2022.

Ellis, Randall P, "Creaming, skimping and dumping: provider competition on the intensive and extensive margins," *Journal of Health Economics*, 1998, *17* (5), 537–555.

_ **and Thomas G McGuire**, "Provider behavior under prospective reimbursement: Cost sharing and supply," *Journal of Health Economics*, 1986, *5* (2), 129–151.

Forgia, Ambar La, "The impact of management on clinical performance: evidence from physician practice management companies," *Management Science*, 2023, *69* (8), 4646–4667.

Francois, Patrick, "Not-for-profit provision of public services," *The Economic Journal*, 2003, *113* (486), C53–C61.

Freeman, Michael, Nicos Savva, and Stefan Scholtes, "Gatekeepers at work: An empirical analysis of a maternity unit," *Management Science*, 2017, *63* (10), 3147–3167.

_ **, Susan Robinson, and Stefan Scholtes**, "Gatekeeping, fast and slow: An empirical study of referral errors in the emergency department," *Management Science*, 2021, *67* (7), 4209–4232.

Gerdtham, U-G, Clas Rehnberg, and Magnus Tambour, "The impact of internal markets on health care efficiency: evidence from health care reforms in Sweden," *Applied Economics*, 1999, *31* (8), 935–945.

Gosden, Toby, Frode Forland, Ivar Sonbo Kristiansen, Matthew Sutton, Brenda Leese, Antonio Giuffrida, Michelle Sergison, and Lone Pedersen, "Impact of payment method on behaviour of primary care physicians: a systematic review," *Journal of Health Services Research & Policy*, 2001, *6* (1), 44–55.

Gruber, Jon, John Kim, and Dina Mayzlin, "Physician fees and procedure intensity: the case of cesarean delivery," *Journal of Health Economics*, 1999, *18* (4), 473–490.

Gupta, Atul, Sabrina T Howell, Constantine Yannelis, and Abhinav Gupta, "Does private equity investment in healthcare benefit patients? Evidence from nursing homes," Technical Report, National Bureau of Economic Research 2021.

Hackmann, Martin B, "Incentivizing better quality of care: The role of Medicaid and competition in the nursing home industry," *American Economic Review*, 2019, *109* (5), 1684–1716.

Hart, Oliver and John Moore, "Property Rights and the Nature of the Firm," *Journal of Political Economy*, 1990, *98* (6), 1119–1158.

_ **and** _ , "The governance of exchanges: members' cooperatives versus outside ownership," *Oxford Review of Economic Policy*, 1996, *12* (4), 53–69.

_ **, Andrei Shleifer, and Robert W Vishny**, "The proper scope of government: theory and an application to prisons," *The Quarterly Journal of Economics*, 1997, *112* (4), 1127–1161.

Herbst, Patrick and Jens Prüfer, "Firms, nonprofits, and cooperatives: A theory of organizational choice," *Annals of Public and Cooperative Economics*, 2016, *87* (3), 315–343.

Horwitz, Jill R and Austin Nichols, "Hospital ownership and medical services: Market mix, spillover effects, and nonprofit objectives," *Journal of Health Economics*, 2009, *28* (5), 924–937.

Iversen, Tor and Hilde Lurås, "The effect of capitation on GPs' referral decisions," *Health Economics*, 2000, *9* (3), 199–210.

Jin, Ginger Zhe, Ajin Lee, and Susan Feng Lu, "Patient Routing to Skilled Nursing Facilities: The Consequences of the Medicare Reimbursement Rule," *Management Science*, 2022, *68* (12), 8722–8740.

Kajaria-Montag, Harshita, Michael Freeman, and Stefan Scholtes, *Continuity of care increases physician productivity in primary care*, Management Science, forthcoming.

Kc, Diwas Singh, Stefan Scholtes, and Christian Terwiesch, "Empirical research in healthcare operations: Past research, present understanding, and future opportunities," *Manufacturing & Service Operations Management*, 2020, *22* (1), 73–83.

Knutsson, Daniel and Björn Tyrefors, "The Quality and Efficiency of Public and Private Firms: Evidence from Ambulance Services," *Quarterly Journal of Economics*, 2022, *137* (4), 2213–2262.

Lee, Hsiao-Hui, Edieal J Pinker, and Robert A Shumsky, "Outsourcing a two-level service process," *Management Science*, 2012, *58* (8), 1569–1584.

Lindbom, Christoffer and Noah Jost, "Private equity ownership in the Swedish secondary healthcare sector and its impact on financial performance, availability and quality of care," 2021.

Lindgren, Peter, *Ersättningen och e-hälsan*, SNS Förlag, 2019.

Magnus, Stephen A, "Physicians' financial incentives in five dimensions: A conceptual framework for HMO managers," *Health Care Management Review*, 1999, pp. 57–72.

McGuire, Thomas G, "Physician agency and payment for primary medical care," 2011.

Picone, Gabriel, Shin-Yi Chou, and Frank Sloan, "Are for-profit hospital conversions harmful to patients and to Medicare?," *RAND Journal of Economics*, 2002, pp. 507–523.

Pollack, Harold and Richard Zeckhauser, "Budgets as dynamic gatekeepers," *Management Science*, 1996, *42* (5), 642–658.

Shumsky, Robert A and Edieal J Pinker, "Gatekeepers and referrals in services," *Management Science*, 2003, *49* (7), 839–856.

Skovsgaard, Christian Volmar, Troels Kristensen, Ryan Pulleyblank, and Kim Rose Olsen, "Increasing capitation in mixed remuneration schemes: Effects on service provision and process quality of care," *Health Economics*, 2023.

Sloan, Frank A, "Not-for-profit ownership and hospital behavior," *Handbook of Health Economics*, 2000, *1*, 1141–1174.

Somé, Nibene H, Rose Anne Devlin, Nirav Mehta, Gregory S Zaric, and Sisira Sarma, "Stirring the pot: Switching from blended fee-for-service to blended capitation models of physician remuneration," *Health Economics*, 2020, *29* (11), 1435–1455.

to Albert Ma, Ching, "Health care payment systems: cost and quality incentives," *Journal of Economics & Management Strategy*, 1994, *3* (1), 93–112.

Vlachy, Jan, Turgay Ayer, Mehmet Ayvaci, and Srinivasan Raghunathan, "The business of healthcare: The role of physician integration in bundled payments," *Manufacturing & Service Operations Management*, 2023, *25* (3), 996–1012.

Vlassopoulos, Michael, "Quality, reputation and the choice of organizational form," *Journal of Economic Behavior & Organization*, 2009, *71* (2), 515–527.

Zhu, Jane M, Lynn M Hua, and Daniel Polsky, "Private equity acquisitions of physician medical groups across specialties, 2013-2016," *JAMA*, 2020, *323* (7), 663–665.

A Private primary-care providers by region

Table 3: The fraction of private primary-care providers by region in 2018

Region	Private providers
Örebro	10 - 19%
Norrbotten	10 - 19%
Västerbotten	10 - 19%
Jämtland	10 - 19%
Dalarna	10 - 19 %
Värmland	20 - 29 %
Östergötland	20 - 29 %
Kalmar	20 - 29 %
Blekinge	30 - 39 %
Kronoberg	30 - 39%
Gävleborg	30 - 39%
Västernorrland	30 - 39 %
Sörmland	30 - 39 %
Jönköping	30 - 39%
Gotland	30 - 39%
Skåne	40 - 49 %
Uppsala	40 - 49 %
Västra Götalandsregionen	40 - 49 %
Västmanland	50 - 59%
Halland	50 - 59%
Stockholm	60 - 69%

Source: Swedish Association of Local Authorities and Regions.

B Data cleaning

Table 1: Changes to panel

Change	Explanation	Impact
Initial Dataset	Dataset including visitation statistics for all PCCs in Stockholm County	259
Dropping Norrtälje	All PCCs in Norrtälje were removed from the dataset	-8
Merging similar PCCs	Some PCCs are registered twice due to different spelling and renaming	-14
Dropping PCCs with missing data	PCCs with missing data for any of the years 2012 - 2020 were dropped from the dataset	-49
Dropping PCCs without listings	Excluding a single PCC lacking listing data	-1
Total size of used dataset	*The number of PCCs included in final regression*	*187*

C Changes to visit reimbursements by profession

Figure 11: Changes to visit reimbursements by profession

REIMBURSEMENT PER VISIT

(Swedish Kr)

	PCC visit			Home visit		
Year	Doctor	Nurse	Assistant Nurse	Doctor	Nurse	Assistant Nurse
2008	600	200	100	1100	250	150
2009	460	200	100	960	250	150
2010	479	200	100	979	250	150
2011	479	200	100	979	250	150
2012	495	207	103	1012	259	155
2013	484	210	105	994	260	155
2014	484	210	105	994	260	155
2015	484	210	105	994	260	155
2016	250	200	100	750	300	200

Note: Reimbursement per visit 2008 – 2016. The data on fee-for-service reimbursements comes from the Stockholm Region (Förfrågningsunderlag 2008 - 2016) Source: Region Stockholm.

D Summary statistics including all 2012-2020 observations

Table 4: Summary statistics including all 2012-2020 observations

	Obs.	Mean	SD	Min	Max
Public					
All visits	603	34914.5	16414.0	12066.0	114526.0
GP visits	603	18068.2	8926.6	4414.0	61814.0
Nurse Visits	603	10349.0	5135.2	2410.0	30872.0
Nurse/Assistant Nurse visits	603	15313.6	7630.1	3049.0	52906.0
Registrations	603	11750.8	5697.2	3911.0	31801.0
VPRI all	603	3.1	0.6	1.7	5.0
VPRI GP/Nurse/Assistant Nurse	603	2.9	0.6	1.5	5.0
VPRI GP	603	1.6	0.3	0.7	2.3
VPRI Nurse	603	0.9	0.3	0.3	2.2
VPRI Nurse/Assistant Nurse	603	1.4	0.5	0.4	3.4
Private Group					
All visits	432	30146.1	13279.1	559.0	81412.0
GP visits	432	15728.0	6951.8	499.0	46197.0
Nurse Visits	432	9620.0	5638.9	60.0	43843.0
Nurse/Assistant Nurse visits	432	12914.0	7585.8	60.0	46554.0
Registrations	432	10114.6	4155.2	536.0	28334.0
VPRI all	432	3.0	0.7	1.0	6.3
VPRI GP/Nurse/Assistant Nurse	432	2.9	0.7	1.0	6.2
VPRI GP	432	1.6	0.4	0.7	2.7
VPRI Nurse	432	0.9	0.4	0.1	2.9
VPRI Nurse/Assistant Nurse	432	1.3	0.6	0.1	4.3
Private Standalone					
All visits	648	27429.6	15492.4	1674.0	115950.0
GP visits	648	15268.2	7683.8	1414.0	45523.0
Nurse Visits	648	7578.5	5634.1	99.0	43759.0
Nurse/Assistant Nurse visits	648	10396.1	7624.8	99.0	52875.0
Registrations	648	9164.5	5032.8	1228.0	26236.0
VPRI all	648	3.1	1.2	1.0	21.6
VPRI GP/Nurse/Assistant Nurse	648	2.9	0.7	0.9	5.7
VPRI GP	648	1.8	0.5	0.6	3.9
VPRI Nurse	648	0.8	0.4	0.1	2.6
VPRI Nurse/Assistant Nurse	648	1.1	0.5	0.1	3.7
Total					
All visits	1683	30808.6	15636.2	559.0	115950.0
GP visits	1683	16389.4	8075.9	499.0	61814.0
Nurse Visits	1683	9095.1	5596.2	60.0	43843.0
Nurse/Assistant Nurse visits	1683	12804.3	7901.9	60.0	52906.0
Registrations	1683	10335.0	5200.3	536.0	31801.0
VPRI all	1683	3.1	0.9	1.0	21.6
VPRI GP/Nurse/Assistant Nurse	1683	2.9	0.7	0.9	6.2
VPRI GP	1683	1.7	0.4	0.6	3.9
VPRI Nurse	1683	0.9	0.4	0.1	2.9
VPRI Nurse/Assistant Nurse	1683	1.2	0.5	0.1	4.3

E Summary statistics including all 2013-2019 observations

Table 5: Summary statistics including all 2013-2019 observations

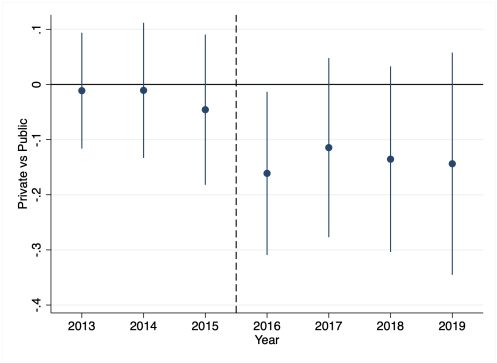
	Obs.	Mean	SD	Min	Max
Public					
All visits	469	35297.5	16472.4	12305.0	114526.0
GP visits	469	18575.0	8816.7	6964.0	61814.0
Nurse Visits	469	10491.0	5104.9	2471.0	30872.0
Nurse/Assistant Nurse visits	469	15174.2	7591.5	3049.0	52906.0
Registrations	469	11797.6	5701.6	4075.0	31801.0
VPRI all	469	3.1	0.5	2.0	5.0
VPRI GP/Nurse/Assistant Nurse	469	2.9	0.5	1.8	5.0
VPRI GP	469	1.6	0.2	0.9	2.3
VPRI Nurse	469	0.9	0.3	0.3	2.2
VPRI Nurse/Assistant Nurse	469	1.3	0.4	0.4	3.3
Private Group					
All visits	336	30199.2	12959.1	4676.0	81412.0
GP visits	336	16182.2	6822.5	3327.0	46197.0
Nurse Visits	336	9465.3	5372.8	872.0	43843.0
Nurse/Assistant Nurse visits	336	12500.1	7136.2	875.0	46554.0
Registrations	336	10155.3	4164.0	1536.0	28334.0
VPRI all	336	3.0	0.6	1.7	6.3
VPRI GP/Nurse/Assistant Nurse	336	2.9	0.6	1.4	6.2
VPRI GP	336	1.6	0.3	0.8	2.7
VPRI Nurse	336	0.9	0.3	0.1	2.3
VPRI Nurse/Assistant Nurse	336	1.2	0.5	0.1	4.3
Private Standalone					
All visits	504	27398.1	14742.2	2512.0	80832.0
GP visits	504	15732.4	7694.3	2185.0	45523.0
Nurse Visits	504	7538.1	5435.4	225.0	31640.0
Nurse/Assistant Nurse visits	504	10149.2	7207.8	225.0	38905.0
Registrations	504	9186.9	4950.0	1410.0	24097.0
VPRI all	504	3.1	0.7	1.4	6.0
VPRI GP/Nurse/Assistant Nurse	504	2.9	0.7	1.3	5.6
VPRI GP	504	1.8	0.5	0.6	3.8
VPRI Nurse	504	0.8	0.4	0.1	1.9
VPRI Nurse/Assistant Nurse	504	1.1	0.5	0.1	3.1
Total					
All visits	1309	30947.3	15344.6	2512.0	114526.0
GP visits	1309	16866.4	8010.2	2185.0	61814.0
Nurse Visits	1309	9090.8	5454.0	225.0	43843.0
Nurse/Assistant Nurse visits	1309	12553.1	7637.6	225.0	52906.0
Registrations	1309	10370.8	5174.6	1410.0	31801.0
VPRI all	1309	3.1	0.6	1.4	6.3
VPRI GP/Nurse/Assistant Nurse	1309	2.9	0.6	1.3	6.2
VPRI GP	1309	1.7	0.4	0.6	3.8
VPRI Nurse	1309	0.9	0.3	0.1	2.3
VPRI Nurse/Assistant Nurse	1309	1.2	0.5	0.1	4.3

F Parallel trends assumption

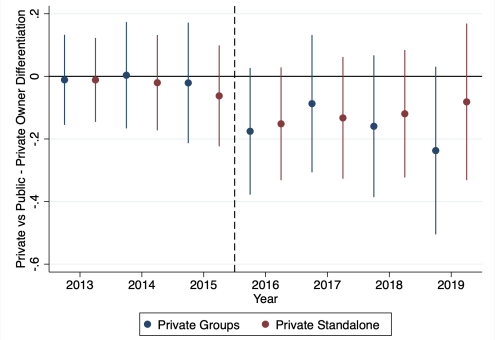
Our difference-in-differences analysis assumes that the trends in the main outcome variables are similar in the treatment and control groups in the pre-reform years. We thus consider the trend in the outcome variables from 2012 to 2015. Whilst the policy reform came into effect on January 1st 2016, care providers may well have been informed about it in late 2015, which might affect the trend (we check for this in the Robustness section below). Parallel trends are shown below using a dynamic diference in difference method with two-way fixed effects (Figure 12). We also show the basic difference in means (Figure 13). The outcomes are observed annually (at the end of the year), and we exclude 2012 and 2020 for the same reasons as in the main regressions.

Figure 12: Parallel Trends - Two Way Fixed Effects

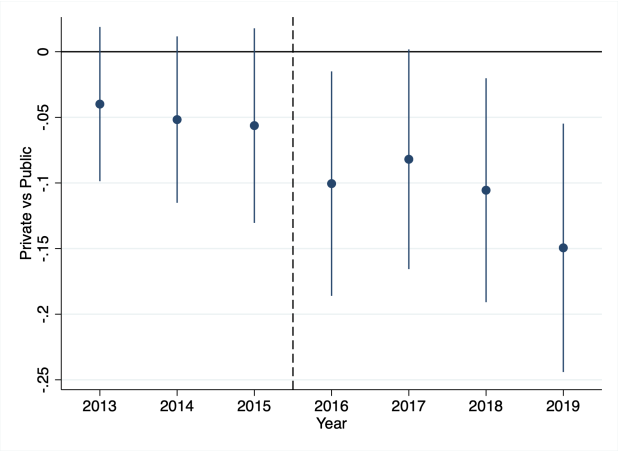
Private vs Public - VPRI A



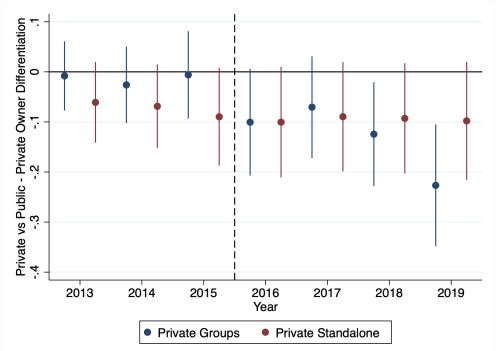
Private Owner Differentiation - VPRI A



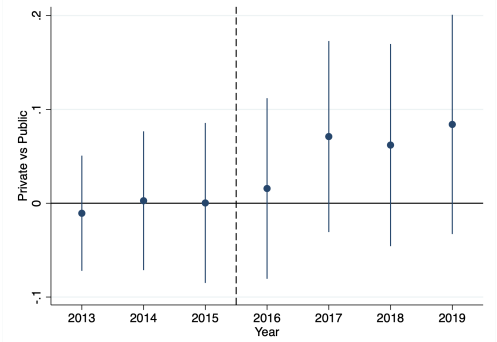
Private vs Public - VPRI GP



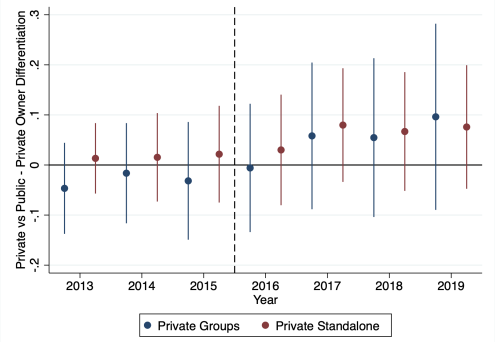
Private Owner Differentiation - VPRI GP



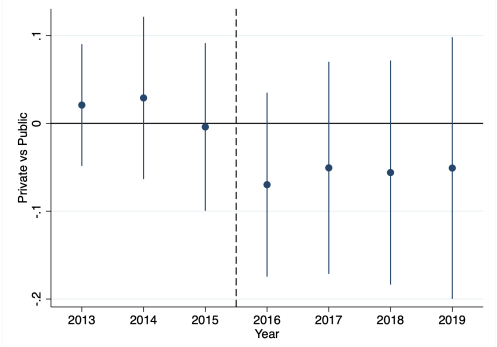
Private vs Public - VPRI Nurse A



Private Owner Differentiation - VPRI Nurse A



Private vs Public - VPRI Nurse B



Private Owner Differentiation - VPRI Nurse B

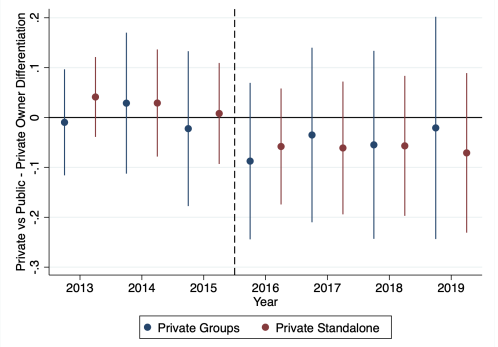
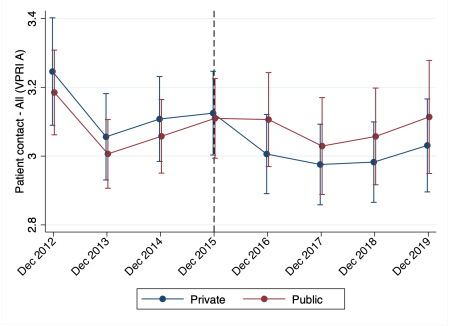
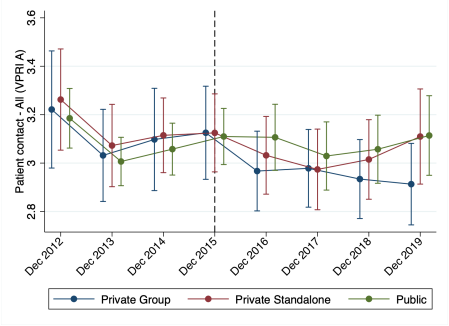


Figure 13: Parallel Trends - Differences in Means

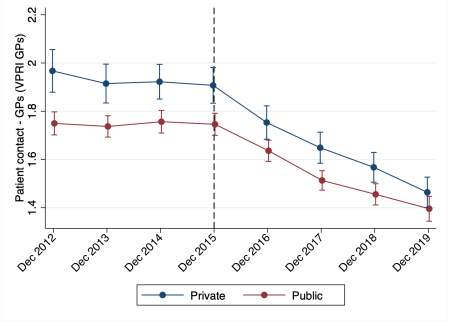
Private vs Public - VPRI A



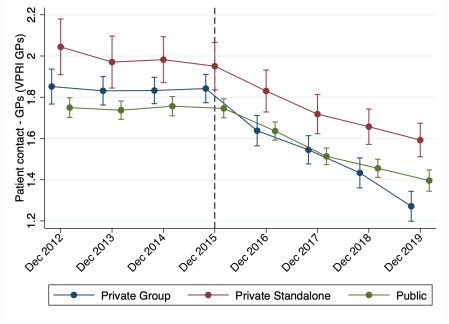
Private Owner Differentiation - VPRI A



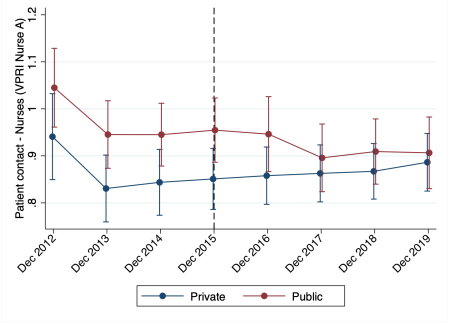
Private vs Public - VPRI GP



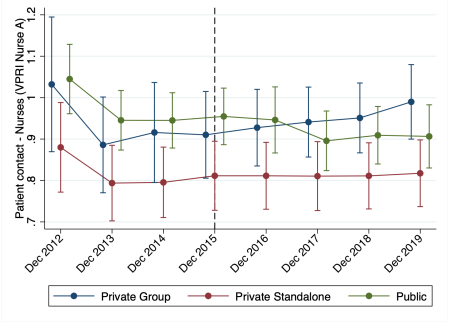
Private Owner Differentiation - VPRI GP



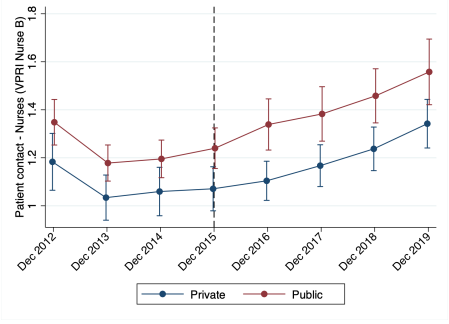
Private vs Public - VPRI Nurse A



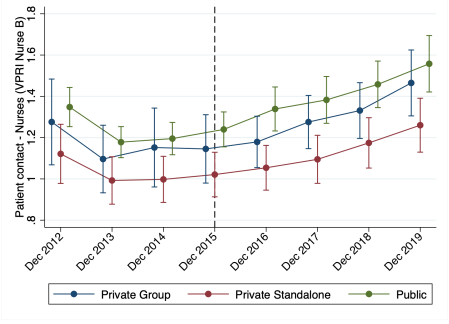
Private Owner Differentiation - VPRI Nurse A



Private vs Public - VPRI Nurse B



Private Owner Differentiation - VPRI Nurse B



G Robustness Tables

Table 6: Patient contact for public and private PCCs: Two Way Fixed Effects

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GP [GP]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse or Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PostReform*Private	-0.116**	-0.132**	-0.060**	0.061*	-0.072
	(0.057)	(0.056)	(0.030)	(0.032)	(0.046)
Constant	3.038***	2.937***	1.851***	0.872***	1.086***
	(0.024)	(0.024)	(0.015)	(0.013)	(0.016)
Pre-mean Private	3.13	3.01	1.93	0.87	1.09
Pre-mean Public	3.09	2.99	1.75	0.97	1.24
Time Fixed effects	Yes	Yes	Yes	Yes	Yes
PCC Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,309	1,309	1,309	1,309	1,309

Notes. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at PCC level. Pre-mean refers to the pre-reform mean of the outcome of interest for private PCCs only.

Table 7: Patient contact for private groups and private stand-alone PCCs: Two Way Fixed Effects

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GP [GPs]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse/ Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PrivateGroups x PostReform	-0.065	-0.056	-0.095**	0.036	0.039
	(0.086)	(0.084)	(0.044)	(0.050)	(0.070)
Constant	3.056***	2.949***	1.915***	0.831***	1.034***
	(0.034)	(0.033)	(0.022)	(0.018)	(0.022)
Pre-mean Groups	3.12	3.01	1.84	0.94	1.17
Pre-mean Standalone	3.14	3.02	1.99	0.82	1.03
Time Fixed effects	Yes	Yes	Yes	Yes	Yes
PCC Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	840	840	840	840	840

Notes. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at PCC level.

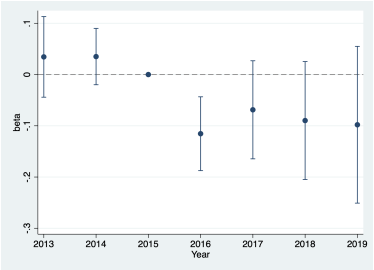
Table 8: Patient contact for private groups, private stand-alone and public PCCs: Two Way Fixed Effects

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GPs [GP]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse/ Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PrivateStandalone x PostReform	-0.090	-0.110*	-0.022	0.046	-0.088*
	(0.066)	(0.065)	(0.038)	(0.033)	(0.047)
PrivateGroups x PostReform	-0.155**	-0.166**	-0.117***	0.082	-0.048
	(0.077)	(0.076)	(0.033)	(0.050)	(0.070)
Constant	3.038***	2.937***	1.851***	0.872***	1.086***
	(0.024)	(0.024)	(0.015)	(0.013)	(0.016)
Pre-mean Groups	3.12	3.01	1.84	0.94	1.17
Pre-mean Standalone	3.14	3.02	1.99	0.82	1.03
Pre-mean Public	3.09	2.99	1.75	0.97	1.24
Time Fixed effects	Yes	Yes	Yes	Yes	Yes
PCC Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,309	1,309	1,309	1,309	1,309

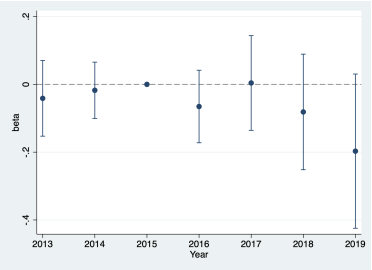
Notes. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at PCC level.

Figure 14: Granger Test for Anticipation Effects

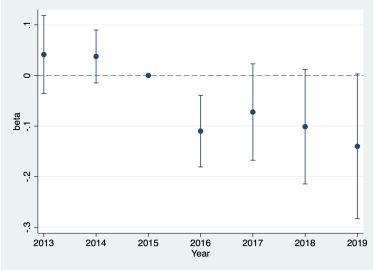
Private vs Public - VPRI A



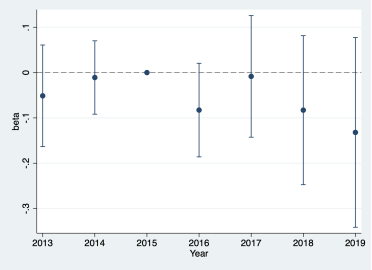
Private Groups vs Standalone - VPRI A



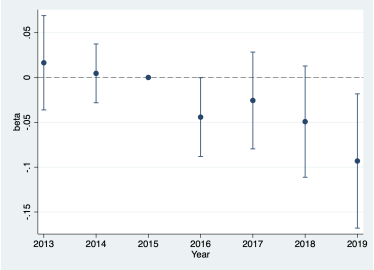
Private vs Public - VPRI B



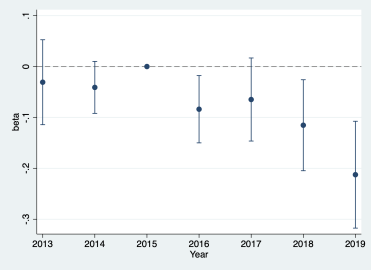
Private Groups vs Standalone - VPRI B



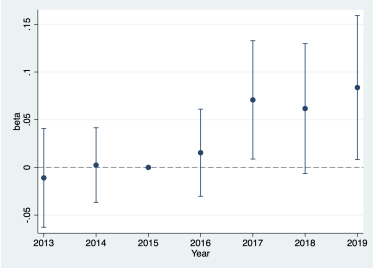
Private vs Public - VPRI GP



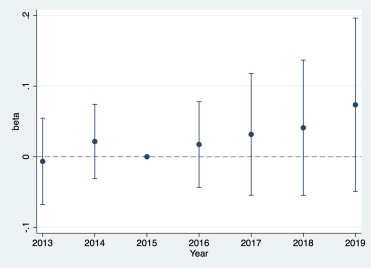
Private Groups vs Standalone - VPRI GP



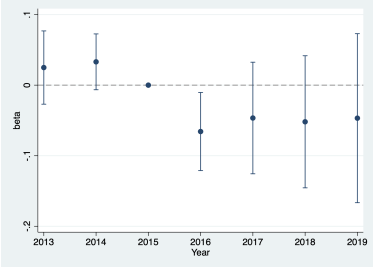
Private vs Public - VPRI nurse



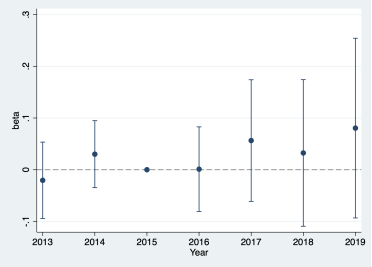
Private Groups vs Standalone - VPRI nurse



Private vs Public - VPRI Nurse B



Private Groups vs Standalone - VPRI Nurse B



H Overall effect of the reform

To examine the overall effect of the reform we first regress each of our outcome variables on the variable $PostReform$, which takes on the value of 1 in the years following the reform (2016-2019), without controlling for ownership or the interaction term.

Table 9: Patient contact for all PCCs

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GP [GP]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse/ Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PostReform	-0.056*	-0.101***	-0.285***	0.005	0.184***
	(0.030)	(0.030)	(0.016)	(0.017)	(0.024)
Constant	2.972***	2.859***	1.802***	0.975***	1.057***
	(0.017)	(0.017)	(0.009)	(0.010)	(0.014)
Pre-mean Private	3.13	3.01	1.93	0.87	1.09
Pre-mean Public	3.09	2.99	1.75	0.97	1.24
Fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,309	1,309	1,309	1,309	1,309

Notes. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at PCC level.

The $PostReform$ variable attracts negative estimated coefficients for VPRI A and B, in line with our assumption that the reform as a whole had the intended effect of reducing patient contact. The coefficient for the $PostReform$ variable in the VPRI B specification is statistically-significant having a negative value of -0.10, which means that care centres had approximately one less patient contact per ten registered individuals post-reform. Of the Nurse variables, only the coefficient of the $PostReform$ variable in the VPRI Nurse B specification is statistically significant, showing that the visits to either nurses or assistant nurses were approximately 0.18 higher post-reform; this corresponds to around two more Nurse B visits per ten registered individuals, indicating that assistant nurses have taken on a more-prominent role in patient visits. Table 9 shows that the 2016 reform had the intended effect of reducing patient contact. The VPRI B (i.e. visits to GPs/nurses/assistant nurses) effect is larger in size than that for VPRI A (all visits), which confirms our expectation that the reform had a greater impact on the GP/nurse/assistant nurse category than the category of other professionals. Next, we estimate a more-dramatic drop in visits to GPs. This is again to be expected, as the reimbursement for these visits fell sharply.

I Private groups versus private stand-alone

We run the following regression, including only observations on privately-owned PCCs.

$$\begin{aligned} VPRI_{it} = \beta_0 + \beta_1 PostReform_t + \beta_3 PrivateGroups_i + \\ + \delta_2 PrivateGroups_i * PostReform_t + \gamma ProviderFE_i + \epsilon_{it} \end{aligned} \tag{6}$$

The δ_2 coefficient is interpreted as the difference between the reactions of groups of private PCCs and employee (GP)-owned PCCs to the reform. As in our main analysis, we run the same regression for the VPRI A, VPRI B, VPRI GP, VPRI Nurse A and VPRI Nurse B outcomes. The estimated coefficients from Equation 6 appear in Table 10.

Table 10: Patient contact for private groups and private stand-alone PCCs

	VPRI A [All]	VPRI B [GP/Nurse/ Assistant Nurse]	VPRI GP [GPs]	VPRI Nurse A [Nurse]	VPRI Nurse B [Nurse/ Assistant Nurse]
	(1)	(2)	(3)	(4)	(5)
PostReform	-0.071	-0.126**	-0.268***	0.012	0.142***
	(0.054)	(0.052)	(0.034)	(0.023)	(0.033)
PrivateGroups x PostReform	-0.065	-0.056	-0.095**	0.036	0.039
	(0.086)	(0.083)	(0.044)	(0.050)	(0.070)
PrivateGroups	-0.897***	-0.944***	-1.320***	0.304***	0.377***
	(0.049)	(0.048)	(0.025)	(0.029)	(0.040)
Constant	3.523***	3.386***	2.910***	0.550***	0.476***
	(0.031)	(0.030)	(0.019)	(0.013)	(0.019)
Pre-mean Groups	3.12	3.01	1.84	0.94	1.17
Pre-mean Standalone	3.14	3.02	1.99	0.82	1.03
Fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	840	840	840	840	840

Notes. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at PCC level.

There is a statistically-significant estimated coefficient at the 95% level in Table 10 on the interaction term in the VPRI GP regression. Post-reform, VPRI GP for large private actors (private groups of PCCs) fell by approximately 0.1 contacts for every registered patient. The other estimated DiD coefficients are insignificant. Groups of PCCs then reduce GP contact by one more visit per ten registrations as compared to stand-alone PCCs.