When Not-for-profit Competition Substitutes for Regulation*

Laure Athias, Leonor Fraga de Andrade, Pascal Wicht

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Abstract

How should quality regulation respond when for-profit providers enter public service markets historically served by not-for-profit organizations? We model a regulator who sets costly minimum standards after observing the market mix. Facing competition from a not-for-profit alternative, for-profit entrants attract residents only by offering higher observable quality, so that entry raises average market quality and substitutes for regulation at low for-profit shares. As for-profit provision expands and residents become captive, this discipline erodes: standards bind on more capacity and regulation tightens. The model predicts a U-shaped relationship between the for-profit share and regulatory stringency and, distinctively, that regulation begins to tighten before market quality peaks. We test these predictions on Swiss nursing homes, where 26 cantons regulate quality autonomously under federally fixed prices. Coding cantonal norms against an instrument developed independently to survey residents, we construct a new index of regulatory stringency, and identify the effect of market composition using a shift-share instrument built on predetermined elderly age composition. Regulation is U-shaped in the for-profit share, with an estimated minimum at 8.5%, while the qualification mix of staff—our measure of observable quality—follows the predicted inverted U, peaking at 17.1%. The quality a for-profit provider delivers is thus not a property of its ownership form but of the market it operates in, and the regulation it warrants varies accordingly.

JEL codes: H44, H75, I11, I18, L15, L31, L33, L51

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*Authors are listed in order of contribution. All authors are at the University of Lausanne. Corresponding author: Laure Athias, University of Lausanne, Quartier UNIL-Mouline, CH-1015 Lausanne, Switzerland (laure.athias@unil.ch). We declare no research support, financial reationships, or other potential conflicts of interest.

1 Introduction

Since the 1980s, public services historically delivered by not-for-profit organizations—health care, education, and long-term care among them—have been progressively opened to for-profit entry, so that these services are now delivered in *mixed markets*, in which not-for-profit incumbents coexist with for-profit entrants. For-profit providers have stronger incentives than not-for-profit ones to economize on quality wherever doing so raises profits (Hart *et al.*, 1997; Glaeser and Shleifer, 2001), observable dimensions included when consumers are captive. However, Besley and Malcomson (2018) show that a for-profit entrant facing a not-for-profit incumbent can attract consumers only by offering higher quality on the dimensions they *can* observe, so that entry may improve precisely the quality that standards are meant to secure. Their analysis characterizes a market in which the not-for-profit provider remains an active alternative for every consumer, and takes the regulatory environment as given. Whether the balance between these forces, and hence the appropriate stringency of regulation, shifts with the composition of the market is an open question. This paper takes up that question, and tests the answer on Swiss nursing-home markets.

We develop a model in which the regulator's choice of quality standards is endogenous to the ownership composition of the market, embedding as a primitive the quality mechanism of Besley and Malcomson (2018). Not-for-profit providers supply unobservable quality that for-profit providers cannot commit to; facing competition from a not-for-profit alternative, a for-profit provider can therefore attract residents only by compensating them with higher observable quality. Not-for-profit providers, however, deliver a quality mix distorted towards the unobservable dimension, and thus less observable quality than residents would prefer. As long as not-for-profit capacity can absorb the marginal resident, for-profit entry thus *raises* average observable quality in the market. But prices in these markets are regulated and capacity is licensed, so that excess demand is resolved through waiting lists rather than price: as the for-profit share expands and not-for-profit capacity shrinks relative to demand, a growing fraction of for-profit places serves captive residents with no outside option, on whom competitive discipline has no bite and quality falls to the regulatory floor. The regulator, who faces a convex cost of stringency, balances two forces. A *substitution* channel pushes regulation down when entry raises unregulated market quality; an *effectiveness* channel pushes it up as the captive segment—the capacity on which the standard binds—expands. The model delivers three testable predictions. First, regulatory stringency is U-shaped in the for-profit share. Second, observable market quality is inverted-U-shaped. Third, and this is the model's sharpest implication, the regulation minimum lies strictly *below* the quality peak: because the effectiveness channel is already active while quality is still rising, the regulator begins tightening before the erosion of competitive discipline shows up in market quality. Regulation is forward-leaning—it anticipates that erosion rather than reacting to it.

To test these predictions, we turn to the Swiss market for nursing homes, which offers an attractive setting for three reasons. First, the market consists of 26 distinct cantonal markets with very low cross-border mobility, and cantons enjoy complete autonomy over quantity and quality regulation, while prices are set at the federal level. Second, building on Swiss studies that define quality of life in nursing homes on the basis of legally guaranteed fundamental rights (Sommerhalder *et al.*, 2015), we construct a novel, standardized index measuring the extent to which each canton regulates 37 quality-of-life items grouped into six dimensions—the dimensions are not of our own devising: we adopt unchanged the instrument developed by Sommerhalder *et al.* (2015) to survey residents, so that what counts as quality of life was fixed independently of what cantons happen to regulate—, which we combine with cantonal data on for-profit market shares from the Swiss Federal Office of Public Health. Third, the expansion of for-profit nursing homes occurred mainly in the 1990s and 2000s, whereas the quality-of-life norms we study were mostly adopted in the 2010s. Although this timing makes it unlikely that the regulations we study shaped the historical composition of cantonal markets, it does not by itself

rule out anticipation effects, whereby cantons intending to regulate more stringently encouraged or discouraged for-profit entry in advance. More fundamentally, ownership composition is not randomly assigned: unobserved political, institutional and cultural factors may simultaneously shape which providers operate in a canton and how stringently it regulates. We therefore employ an instrumental-variables strategy based on a shift-share (Bartik) instrument that interacts cantons' predetermined 1990 exposure to six elderly age groups with national demographic shifts in those groups between 1990 and 2012. National age-group growth rates are driven by long-run mortality and fertility forces plausibly orthogonal to canton-specific determinants of regulation, while cantons are differentially exposed to the induced demand shifts according to their initial age structure—and demand growth is known to favor for-profit expansion, as not-for-profit providers face tighter capital-market constraints (Grabowski and Hirth, 2003). Following Borusyak *et al.* (2025), we condition on a rich set of canton-level confounders. Because the most natural threat to the exclusion restriction is that faster-ageing cantons regulate elderly care more stringently for reasons unrelated to ownership composition, these include the cantonal elderly population share and its growth over the period, so that identification comes from the *composition* of a canton's elderly population in 1990 rather than from how much it aged. We further probe the exclusion restriction with a placebo analysis showing that the instrument does not predict cantonal regulatory stringency in an unrelated domain, land-use regulation (Büchler and v. Ehrlich, 2023).

In line with our theoretical predictions, our findings indicate a nonlinear, U-shaped relationship between the for-profit market share and quality regulation. Regulation initially decreases as the for-profit share rises, reaches its minimum at approximately 8.5% according to our IV estimates (7.3% for OLS), and then increases. Beyond a for-profit share of approximately 16.9%, predicted regulation exceeds the level associated with a purely not-for-profit market: past this point, for-profit penetration is no longer regulation-saving relative to the historical benchmark. These conclusions survive a wide range of robustness analyses, including alternative estimators, alternative measures of market structure, reduced-form evidence, leave-one-canton-out analysis, and inference procedures designed for a small number of clusters.

To investigate the mechanism, we then estimate the effect of the cantonal for-profit share on several measures of observable nursing-home quality. For our preferred measure—the share of qualified care staff—we find the predicted inverted-U relationship: it rises with for-profit penetration up to approximately 17.1% and declines thereafter, a pattern confirmed by a Lind–Mehlum test under both conventional and wild-bootstrap inference. The estimates also confirm the model's sharpest prediction: the regulation minimum (8.5%) lies strictly below the quality peak (17.1%). Regulation begins to tighten while observable quality is still improving. This ordering is hard to rationalize if regulation merely mirrored quality, which would force the two turning points to coincide; it constitutes evidence for the effectiveness channel specifically.

The policy implication follows from the fact that regulation is costly. Where a sufficiently large not-for-profit sector is retained, competition between organizational forms delivers observable quality without recourse to formal standards; where it is not, the same quality must be secured through regulation, at the cost of enforcement, compliance, and the risk that standards divert providers' effort towards the dimensions they cover (Holmstrom and Milgrom, 1991). In settings like ours, where prices are regulated and capacity is licensed, so that residents become captive as not-for-profit provision recedes, the margin for substitution is moreover narrow: regulation begins to tighten once for-profit providers account for roughly 8.5% of a market, and observable quality peaks at around 17.1%. Preserving a not-for-profit sector large enough to contest for-profit entrants is therefore not only a question of who delivers public services, but of how much regulatory capacity governments must devote to them.

In taking regulatory stringency as the object to be explained, the paper connects to a literature on the determinants of regulation, which relates regulatory intensity to political ideology, legal origin, income and culture (Djankov *et al.*, 2002; La Porta *et al.*, 1999; Botero *et al.*, 2004;

Pitlik, 2007), and, in health care specifically, to sector capacity (Temkin-Greener *et al.*, 2021). This literature has not considered the ownership composition of the regulated market as a determinant of regulatory stringency; we show that it is a first-order one, and that its effect is non-monotonic.

We also contribute to the literature on strategic interaction between organizational forms, which emphasizes that providers' quality choices depend on market composition rather than on ownership alone (Hirth, 1999; Besley and Malcomson, 2018; Levaggi and Levaggi, 2020, 2023; Bisceglia *et al.*, 2023; Dewatripont and Tirole, 2024), with empirical support for positive spillovers from not-for-profit to for-profit providers (Grabowski and Hirth, 2003; Santerre and Vernon, 2007). We extend this literature in two respects. First, we show that the disciplining effect of not-for-profit competition is bounded: observable quality rises with for-profit penetration only while not-for-profit providers remain the dominant organizational form, and declines once they no longer contest a growing share of entrants. Second, to our knowledge we provide the first empirical test of the prediction of Besley and Malcomson (2018) that for-profit entry raises observable quality only while a not-for-profit alternative remains available to consumers.

Our findings also speak to the long-standing literature comparing the quality delivered by for-profit and not-for-profit providers (Arrow, 1963; Hansmann, 1980; Newhouse, 1970; Herrera *et al.*, 2014). That literature treats the ownership–quality relationship as a parameter to be estimated. Our results suggest it is better understood as a function of market composition: the same for-profit provider supplies higher observable quality where not-for-profit competitors remain numerous and lower quality where they do not. Comparisons of ownership forms estimated in a single market may therefore not transport to markets with a different mix.

The remainder of the paper is organized as follows. Section 2 lays out the institutional and historical background of nursing homes in Switzerland. Section 3 presents a simple model of quality regulation with mixed provision and derives our testable predictions. Section 5 describes the construction of our measure of quality regulation and the data. Section 6 reports our empirical strategy, baseline results, robustness checks, and placebo analysis. Section 7 examines mechanisms, and Section 8 concludes.

2 Nursing Homes in Switzerland

2.1 Institutional background

Three features of the Swiss institutional setting matter for our analysis: cantons regulate quality autonomously, prices are set federally, and cantonal markets are effectively closed and supply-constrained. Together they correspond to the environment modelled in Section 3.

Cantonal autonomy over quality regulation. Switzerland is one of the federal states where sub-national jurisdictions have the most extensive powers. Under the subsidiarity principle, cantons are competent in all domains not explicitly attributed by the Constitution to the federal government. Health care, including elderly care, is among the domains where cantonal powers are most extensive: the conditions to operate a nursing home, including quality standards, are determined by each canton. Cantons also issue operating authorizations, which they may withdraw in case of dysfunction, and thereby control the number and geographic distribution of nursing homes. Quality regulation is therefore a cantonal choice variable, and one that cantons can enforce.

Federally regulated prices. Financing is divided in two. Medical costs are covered by health insurers according to a tariff structure set in federal law, which operates as a price cap; residents contribute, but their contribution is capped. Accommodation costs are borne by residents, except that cantons cover all or part of them for residents whose income and assets

are insufficient—about half of all residents. Because the cantonal contribution is itself capped, accommodation costs face a *de facto* price cap as well. Providers therefore cannot compete on price, and the margin on which they compete for residents is quality.

Closed cantonal markets. Inter-cantonal mobility is very low: between 2014 and 2024, only 3.8–4.5% of nursing-home residents lived in a canton other than their previous one (Swiss Federal Office of Public Health). Two reasons account for this. Residents prefer to remain close to their relatives (Lalive d'Epinay and Braun, 1995), and cantons restrict the financing of residents placed in another canton[1]. The Swiss nursing-home market is thus effectively 26 cantonal markets with little permeability between them.

Excess demand and captive residents. These markets are characterized by excess demand. Crivelli *et al.* (2002) describe it as a chronic feature of the Swiss sector rather than a transitory one, arising from the interaction of subsidized prices with restricted entry: because cantons co-finance long-term care, facilities must figure in cantonal planning to be eligible for insurance reimbursement and operating subsidies, so that entry outside the plan is largely unviable. The data bear this out. In 2001, cantonal occupancy rates in nursing homes ranged from 92.4% to 100%, with a mean of 96.1% and a standard deviation of 2.1 percentage points[2]. No cantonal market operates with meaningful slack: the tightness of capacity is a feature of the Swiss sector as a whole rather than a characteristic distinguishing some cantons from others.

Demand is therefore rationed through waiting lists, and placement is determined less by the resident's choice than by where a vacancy can be found quickly for someone whose health, or whose family's capacity, makes admission urgent. Priority rules compound this: residents of the municipality owning a public or not-for-profit home are given precedence, so that an applicant from elsewhere may face no accessible not-for-profit alternative. Residents are consequently captive in the sense that matters for our analysis: quality can be observed ex post, but a resident who finds it wanting cannot readily move, both because vacancies are scarce and because leaving means abandoning an established environment and, often, proximity to family[3]. Observability therefore does not translate into competitive discipline where no alternative is available, which is the mechanism through which the not-for-profit sector's contestation of entrants weakens as its share declines.

2.2 Nursing homes missions: The present-day advent of quality of life mission

Charitable origins. Nursing home missions have largely evolved over time along with the more general evolution of the society. We can distinguish three different periods for nursing homes. The first institutions specially intended for elderly people appeared in Switzerland in the 18th century[4]. They have been created either by public authorities or by (not-for-profit)

[1] Although compulsory health insurance finances nursing home care uniformly across Switzerland (Art. 25a LAMal), cantons remain responsible for the residual financing of long-term care. Because the canton of origin bears this residual financing, admission to an out-of-canton nursing home typically requires prior authorization and is granted only under specific circumstances. For example, in the canton of Neuchâtel, admission to an out-of-canton nursing home is only approved by cantonal health authority when no suitable place is available within the canton or for other justified reasons; otherwise, the resident may still enter the nursing home, but the canton limits its financial contribution to the lower "out-of-canton" reimbursement rate (Service cantonal de la santé publique, n.d.; ARTIAS, 2015).

[2] Authors' calculations from Swiss Federal Statistical Office data on beds and residents in non-hospital health institutions. Occupancy is computed as the number of residents accommodated on 31 December 2001 divided by the number of available beds in institutions for the elderly and the chronically ill.

[3] Crivelli *et al.* (2002) note that the prediction of Nyman (1988), that excess demand leads facilities to reduce costs and quality, need not hold in Switzerland because cantonal authorities set and enforce quality standards. This is precisely the substitution between competitive discipline and regulation that our framework formalizes.

[4] Before that, elderly people who needed help were taken in by hospitals, together with the sick or insane people, as well as with homeless people (Seiler, 2004).

foundations thanks to legacies of rich people, and were often operated by religious congregations. The creation of these institutions was motivated by charitable or pious purposes, but also by the will of authorities to supervise certain groups. The life conditions in these institutions were frugal and residents had to follow a very strict discipline (Heller, 1994; van der Poel, 2010).

The welfare state and the medical mission. The paradigm began to shift at the end of World War II with the development of the welfare state, in particular with the creation of the old-age and survivors' insurance (1948) that gave retired people the right to receive a pension covering subsistence needs. This reduced the need to provide specific institutions for poor elderly people. From that period, and particularly from the 1970s, institutions for elderly people were no longer intended for poor people but reached a much wider population. Thus, many nursing homes have been created in the 1970s and 1980s. It was also during this period that the quality of medical care received an increased attention, partly due to the fact that this new type of residents *needed* more medical care, leading to the implementation in all nursing homes of a medical supervision provided by an external doctor[5].

This arrangement has an implication for what follows. Because medical supervision is provided by physicians external to the institution—practising alongside their activity in a hospital or their own practice, and reporting to the cantonal physician—oversight of medical care operates through a channel that is professionally defined and common to all cantons, rather than through cantonally-determined standards. The monitoring of medical care consequently varies little across cantons. Quality of life, by contrast, is monitored by cantonal authorities against criteria that each canton defines for itself, and it is on this dimension that regulatory stringency differs substantially between them. This is why our measure, constructed in Section 5.1, covers quality of life rather than medical care.

The quality-of-life turn. The last important change, which occurred during the 2010s, concerns the consideration of quality of life in nursing homes, consistent with the increased attention paid to the individual nature of residents' needs. It is reflected in the advent of training programmes in the social rather than the medical domain—sociocultural animators, socio-educational specialists—so that non-medical tasks are now performed by staff holding a corresponding qualification (Heller, 1994; Armbruster, 2008).

Two developments account for this shift. The first is the changing composition of demand described above: as residents entered nursing homes later, in greater numbers and for longer, the institution became a place of residence rather than a place of treatment, and the non-medical dimensions of daily life gained accordingly in importance. The second is a series of revelations about how residents are treated. A nationwide survey of 4,599 care workers across 156 Swiss nursing homes found that 50% had observed emotional abuse, 23.7% neglect and 1.4% physical abuse of residents (Blumenfeld Arens *et al.*, 2017); between 2010 and 2020, roughly 1,800 complaints concerning offences committed in nursing homes were recorded annually, almost five per day (Blick, 2022); and Swiss media have repeatedly reported serious deficiencies in care (Blick, 2022; RTS, 2024)[6]. Around 65% of residents aged 65 and over are estimated to be at risk of malnutrition (Genton Graf and Graf, 2020). Such patterns are not specific to Switzerland: Jogerst *et al.* (2006) measure an annual rate of 20.7 abusive events per 1,000 residents in Iowa nursing homes.

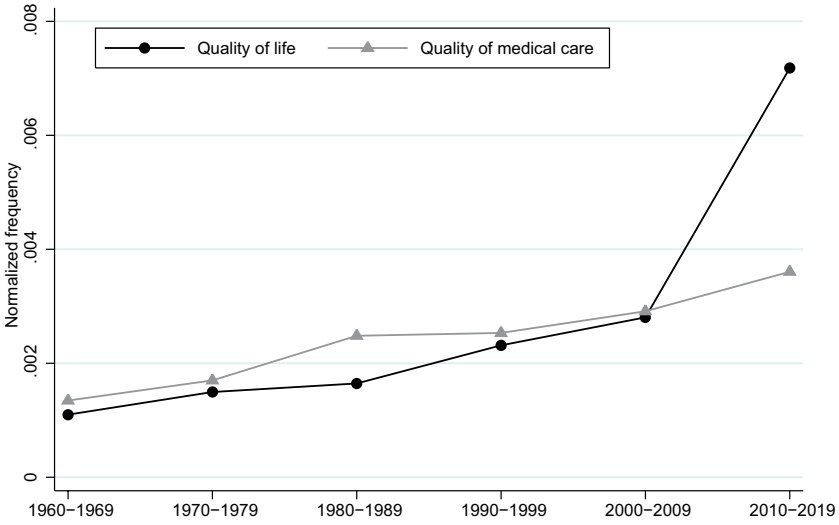
The timing of this shift can be dated. We examine the evolution of media coverage of quality-of-life *versus* quality-of-medical-care dimensions in nursing homes between 1960 and 2019[7]. As Figure 1 shows, coverage of both dimensions increased steadily and in parallel until

[5]Note that, contrary to hospitals, the medical mission of a nursing home is not to cure but to maintain the health status of residents who have medical needs due to their age or to chronic diseases.

[6]Reported cases include residents left unattended in toilets for prolonged periods, emergency call systems deliberately muted at night, and residents found lying on the floor after falls (Blick, 2022; RTS, 2024).

[7]See Appendix A for the construction of these variables.

the 2000s, with medical care consistently more prominent. From the 2010s the trends diverge sharply, quality-of-life coverage becoming about twice as prominent as coverage of medical care. Cantonal regulation followed: the norms we code, listed in Appendix B.3, date from 2013 to 2020, with most adopted around 2015. The ownership composition of cantonal markets, by contrast, was largely settled well before, as the next subsection describes.



Data: www.e-newspaperarchives.ch, own authors' calculations. Y-axis reports the sum of the occurrences of the expression Nursing home and terms related with quality of life and quality of care, normalized by the neutral term Switzerland, in the German and French language areas weighted by the relative shares of population of these areas.

Figure 1: Media exposure of quality of life related aspects in nursing homes

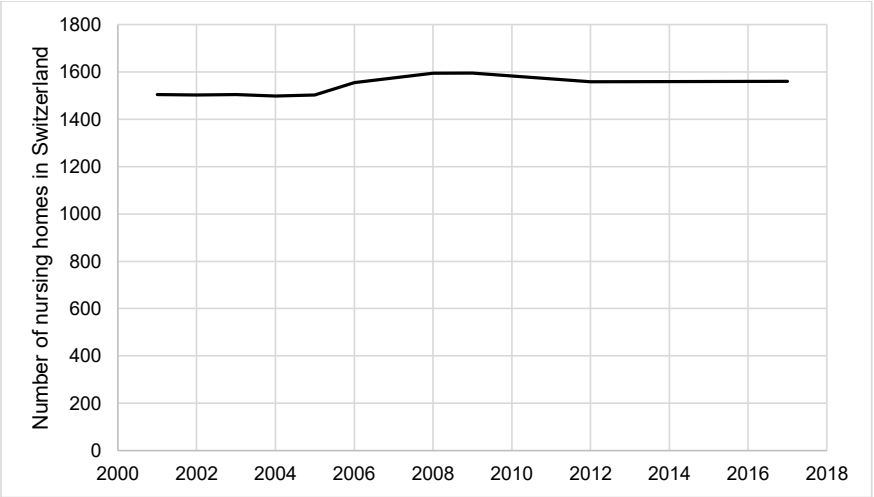
2.3 Historical market mix

Not-for-profit origins and late for-profit entry. As described above, the first nursing homes in Switzerland were established by public authorities and by private not-for-profit entities such as religious congregations and charitable foundations. For-profit provision emerged only with the transformation of the sector in the 1970s, and initially consisted of small family-owned establishments. Large for-profit operators appeared later still. The largest Swiss nursing-home group was founded in 1982 but began building its network only at the end of the decade: it changed name in 1989, a reorganization the company itself identifies as the foundation of its present network, and opened its first nursing home in October 1990. By 2012 it operated 67 homes. The second largest group was founded in 1989 and operated around 25 homes in 2012. Together, these two groups account for almost half of all for-profit facilities in our data.

Why for-profit provision expanded when it did. Two developments favoured for-profit entry from the 1990s. The first is demographic. Between 1990 and 2012 the Swiss population aged 65 and over grew by approximately 42%, and the population aged 80 and over by 56%, substantially increasing demand for long-term care (Swiss Federal Statistical Office, 2025). The second is fiscal. As Crivelli *et al.* (2002) note, slow economic growth combined with rising public expenditure on health and social care during the 1990s led the Swiss government to seek to contain the fiscal deficit and achieve efficiency gains. Because nursing homes absorb a considerable share of public health and social spending, the sector became a natural target for efficiency concerns, creating an environment favourable to private provision. Importantly for our purposes, the demographic pressure was national in origin, while its consequences for individual cantons depended on the age structure of their elderly populations in 1990 — the variation our

identification strategy exploits (Section 4.3).

A largely predetermined stock. Despite the expansion of for-profit provision, the stock of nursing homes remains largely historically determined. Most facilities were created several decades ago, particularly in the 1970s and 1980s, and much of the subsequent growth in capacity took the form of expanding existing not-for-profit homes rather than creating new ones. As a result, the vast majority of nursing homes remain in public or not-for-profit hands, and the total number of facilities has been remarkably stable: as Figure 2 shows, it has varied little over the last two decades. The market mix observed in 2012 is therefore largely the legacy of decisions taken well before.



Data: Swiss Federal Office of Public Health

Figure 2: Evolution of the number of nursing homes

Residents' satisfaction. One might worry that this historical distribution is not predetermined in the relevant sense: for-profit providers may have developed disproportionately in cantons where incumbent homes were perceived to deliver lower quality, and if those incumbents continued to underperform, the same cantons would today regulate more stringently for reasons unrelated to market composition. While the literature does not report differences in nursing-home quality across cantons, we use data on residents' satisfaction to assess this possibility. The Swiss Federal Statistical Office conducted in 2008/2009 a survey[8] of 3,103 nursing-home residents across cantons, including a question on self-perceived quality of life[9]. To obtain reliable information, we restrict the sample to respondents whom medical staff considered able to understand accurately all information given to them, orally or in writing, leaving 1,211 observations across 20 cantons[10]. A one-way ANOVA reveals no evidence of systematic differences in satisfaction across cantons (Table 1)[11].

Although these results alleviate the concern that the historical distribution of for-profit nursing homes reflects systematic differences in the observed quality of incumbent providers, they do not rule out other sources of endogeneity: unobserved political, institutional and cultural factors

[8]This survey is called: *Santé des personnes âgées vivant dans les institutions ESAI, Gesundheitszustand von betagten Personen in Institutionen EGBI.*

[9]More precisely, the question was "Generally speaking, how good is your quality of life?", measured on a scale between 1 (very good) and 5 (very bad). For clarity, we reversed this scale so that 1 corresponds to a very bad quality of life and 5 to a very good quality of life.

[10]Missing Cantons are Appenzell Innerrhoden, Nidwalden, Jura, Schaffhausen, Graubünden, and Uri.

[11]The result holds when health status is included as an additional factor in a two-factor ANOVA.

Table 1: Residents' satisfaction across Cantons (ANOVA)

Source of variation	Sum of squares	Degrees of freedom	Mean square	F-Value	p-value
Canton (between)	14.431	19	0.760	1.18	0.2619
Residual (within)	763.462	1191	0.641		
Total	777.893	1210	0.643		

Notes: One-way ANOVA; Factor: 20 Cantons; 1211 observations.

may simultaneously affect ownership composition and the design of cantonal quality regulation. We address the latter through the instrumental-variables strategy set out in Section 4.3.

3 A Simple Model of Quality Regulation with Mixed Provision

Besley and Malcomson (2018) characterize how the entry of for-profit providers into a market served by a not-for-profit incumbent affects the provision of observable and unobservable quality. Their analysis, however, is silent on the behavior of the regulator. This section embeds their quality mechanism, in reduced form, into a model in which a quality-motivated regulator chooses the stringency of observable-quality regulation *after* the ownership structure of the market has been determined. The model delivers three predictions that we take to the data: (i) regulatory stringency is U-shaped in the for-profit market share; (ii) observable market quality is inverted-U-shaped in the for-profit share; and (iii) the turning point of regulation lies strictly *below* the peak of observable quality. The third prediction is the model's sharpest: it distinguishes our framework from one in which regulation merely mirrors market quality, which would force the two turning points to coincide.

3.1 Environment

A canton contains a unit mass of residents, each of whom demands one unit of nursing-home care. There are two organizational forms: not-for-profit providers (including public ones), with capacity share $1 - P$, and for-profit providers, with capacity share $P \in [0, 1]$. The market mix P is predetermined by history, consistent with the institutional evidence that the stock of nursing homes in Switzerland was largely determined by the 1990s and 2000s, well before the quality-of-life regulations we study.

The service has two quality dimensions: observable quality $q \geq 0$ (the quality-of-life attributes codified in cantonal norms, e.g. leisure activities, privacy, meals) and unobservable quality $u \geq 0$ (non-contractible attributes of care). The price of care $\bar{p}$ is fixed by federal regulation and identical across ownership forms, as described in the previous Section; providers therefore compete only in quality. Aggregate capacity falls short of demand, so that markets clear by rationing (waiting lists) and residents who obtain a place are *captive*: they cannot costlessly switch providers ex post.

We assume throughout that observable quality q is also verifiable by the regulator, so that a minimum standard on q can be written into cantonal norms and enforced through inspection, whereas u is neither observable ex ante by residents nor verifiable by third parties, and therefore cannot be regulated. This distinction is what confines regulation to the observable dimension and underlies the multitasking concern of Holmstrom and Milgrom (1991): standards can raise q but may do so partly at the expense of u. Our index of cantonal norms (Section 5) measures stringency along the verifiable dimension only.

Timing. (1) The market mix P is given. (2) The regulator observes P and sets a minimum observable-quality standard $R \geq 0$ at a convex cost. (3) Providers choose observable quality

subject to $q \geq R$; unobservable quality is determined by organizational form. (4) Residents are allocated to providers.

3.2 Provider behavior

We summarize the quality game in stage (3) by importing the two key results of Besley and Malcomson (2018) as primitives.

First, because of the non-distribution constraint and mission preferences, not-for-profit providers supply strictly positive unobservable quality, $u_N = \bar{u} > 0$, while for-profit providers, which cannot commit to non-contractible quality, supply $u_F = 0$ in equilibrium. Not-for-profit observable quality is $q_N = q_n$, with $q_n < q^*$, where q^* denotes the residents' preferred (first-best) level of observable quality: the not-for-profit quality mix is distorted toward the unobservable dimension[12].

Second, a for-profit provider can attract a resident who has access to a not-for-profit alternative only by compensating her for the loss of unobservable quality. With a fixed price, this requires $q_F \geq q_n + \bar{u} \equiv \hat{q} > q_n$. We assume $\bar{p}$ is high enough that serving residents at $\hat{q}$ is profitable, so that *contested* for-profit capacity supplies $q_F = \hat{q}$. A for-profit provider whose residents have no not-for-profit outside option—because not-for-profit capacity in the relevant local market is exhausted—faces no competitive constraint: since quality is costly and demand is guaranteed, it supplies the regulatory floor, $q_F = R$.

Let $\mu(P) \in [0, 1]$ denote the fraction of for-profit capacity that is contested. As P rises, not-for-profit capacity shrinks relative to (excess) demand and a growing fraction of for-profit places serves captive residents[13]:

Assumption 1. *$\mu(\cdot)$ is continuously differentiable on $[0, 1]$, with $\mu(P) = 1$ for $P \leq P_0$ for some $P_0 > 0$, μ strictly decreasing thereafter, and $\mu(1) = 0$. In addition, $\mu(P) + P\mu'(P)$ is strictly decreasing where $\mu < 1$. Continuous differentiability implies $\mu'(P_0) = 0$, so that μ departs smoothly from unity at P_0.*

Average observable quality in the market, given (P, R), is

$$Q(P, R) \;=\; (1 - P)\, q_n \;+\; P\big[\mu(P)\, \hat{q} + (1 - \mu(P))\, R\big] \;+\; \omega R, \tag{1}$$

where $\omega > 0$ captures the bite of the standard on not-for-profit providers: because their mix is distorted toward unobservable quality, a floor on observable quality forces a (costly) reallocation of their effort toward the regulated dimension. Define unregulated market quality $\bar{Q}(P) \equiv Q(P, 0)$ and the *quality gap* $G(P) \equiv q^* - \bar{Q}(P) > 0$, assumed positive throughout the relevant range, and the *effectiveness of regulation*

$$\varphi(P) \;\equiv\; \frac{\partial Q}{\partial R} \;=\; \omega + P\big(1 - \mu(P)\big), \tag{2}$$

i.e. the mass of capacity on which the standard binds. Note that $\varphi'(P) = 1 - [\mu(P) + P\mu'(P)]$, so that Assumption 1 makes φ' weakly positive throughout, and strictly increasing where $\mu < 1$, and hence strictly positive for $P > P_0$: regulation becomes mechanically more effective at raising average quality as the captive for-profit segment expands.

[12] Besley and Malcomson (2018) show that entry induces the incumbent to rebalance its mix toward observable quality. Allowing q_n to be weakly increasing in P on the contested range would only steepen the rising segment of market quality schedule and leave all results unchanged; we hold q_n fixed for tractability.

[13] This is naturally microfounded by heterogeneous local submarkets within a canton: for-profit capacity is contested in a submarket as long as not-for-profit capacity there can absorb the marginal resident. Consistent with this, Crivelli *et al.* (2002) note that residents of the municipality owning a public or not-for-profit home are given priority on its waiting list, so that an applicant from elsewhere may face no accessible not-for-profit alternative even where such capacity exists within the canton.

Lemma 1 (Inverted-U-shaped market quality)**.** *Under Assumption 1, unregulated observable quality $\bar{Q}(P)$ is strictly increasing on $[0, P_0]$ with slope $\bar{u} > 0$, and single-peaked, with a unique interior peak $\bar{P} \in (P_0, 1)$ defined by $\hat{q}\,[\mu(\bar{P}) + \bar{P}\mu'(\bar{P})] = q_n$.*

Proof. Let $m(P) \equiv \mu(P) + P\mu'(P)$. Differentiating (1) at $R = 0$ gives

$$\bar{Q}'(P) \;=\; -q_n + \hat{q}\, m(P),$$

so that the sign of $\bar{Q}'(P)$ is the sign of $m(P) - q_n/\hat{q}$. Since $\hat{q} = q_n + \bar{u}$ with $\bar{u} > 0$, we have $q_n/\hat{q} < 1$.

On $[0, P_0]$, $\mu = 1$ and $\mu' = 0$, so $m = 1 > q_n/\hat{q}$ and $\bar{Q}'(P) = \hat{q} - q_n = \bar{u} > 0$. By Assumption 1, m is strictly decreasing where $\mu < 1$, and $m(1) = \mu(1) + \mu'(1) \le \mu(1) = 0 < q_n/\hat{q}$. Hence m crosses $q_n/\hat{q}$ exactly once, at some $\bar{P} \in (P_0, 1)$. It follows that $\bar{Q}$ is strictly increasing on $[0, \bar{P})$ and strictly decreasing on $(\bar{P}, 1]$, with an interior maximum at $\bar{P}$ characterised by $\hat{q}\, m(\bar{P}) = q_n$. □

Lemma 1 is the Besley–Malcomson mechanism in reduced form: entry raises average observable quality at a rate equal to the compensating differential $\bar{u}$ as long as the not-for-profit sector disciplines every for-profit entrant, and lowers it once the captive segment has expanded sufficiently.

3.3 The regulator's problem

The regulator dislikes deviations of market quality from the residents' preferred level and faces a convex cost of stringency—enforcement and inspection resources, compliance costs shifted onto providers, and political opposition. The regulator maximizes:

$$\max_{R \ge 0} \; W(R; P) \;=\; -\frac{\lambda}{2}\left(q^* - Q(P, R)\right)^2 \;-\; \frac{c}{2}\, R^2, \qquad \lambda, c > 0, \tag{3}$$

where $\lambda > 0$ measures the weight the regulator attaches to residents' quality of life and $c > 0$ the marginal cost of regulatory stringency.

Since $Q(P, R) = \bar{Q}(P) + \varphi(P)R$ from (1) and (2), the quality gap at stringency R is $q^* - Q(P, R) = G(P) - \varphi(P)R$. Differentiating (3) with respect to R,

$$\frac{\partial W}{\partial R} \;=\; \lambda\, \varphi(P)\big[G(P) - \varphi(P)R\big] \;-\; cR,$$

which is strictly decreasing in R (the objective is strictly concave, with $\partial^2 W/\partial R^2 = -\lambda\varphi(P)^2 - c < 0$). Setting it to zero yields the interior optimum

$$R^*(P) \;=\; \frac{\lambda\, \varphi(P)\, G(P)}{c + \lambda\, \varphi(P)^2}. \tag{4}$$

Regulation thus responds to the market mix through two channels: a *substitution channel*—R^* falls when unregulated quality rises (G falls)—and an *effectiveness channel*—R^* rises when the mass of constrained providers grows (φ rises).

Assumption 2. *$c > \lambda\, \varphi(P)^2$ for all $P \in [0, 1]$.*

Assumption 2 requires regulation to be costly enough relative to the weight on quality that the regulator does not find it optimal to close the quality gap entirely. Since $\varphi(P) \le \omega + 1$, a sufficient condition in terms of primitives is $c > \lambda(\omega + 1)^2$. The restriction is substantive rather than technical: were it to fail, the regulator would implement q^* whatever the market mix, standards would be independent of ownership composition, and there would be no relationship to detect. That observed regulation falls well short of eliminating quality problems in Swiss nursing homes—as the evidence in Section 2 suggests—is consistent with the assumption holding.

Proposition 1 (U-shaped regulation)**.** *Under Assumptions 1–2, $R^*(P)$ is strictly decreasing on $(0, P_0]$ and strictly increasing at $P = \bar{P}$ and beyond. Hence R^* attains an interior minimum at some P_R with*

$$0 < P_R < \bar{P} :$$

the turning point of regulation lies strictly below the peak of observable market quality. If the effectiveness channel is shut down ($\varphi' \equiv 0$), the two coincide: $P_R = \bar{P}$.

Proof. Differentiating (4),

$$\operatorname{sign} \frac{dR^*}{dP} = \operatorname{sign} \Big[\varphi'(P)\, G(P) \big(c - \lambda \varphi(P)^2\big) \;-\; \varphi(P)\, \bar{Q}'(P) \big(c + \lambda \varphi(P)^2\big) \Big].$$

On $(0, P_0]$, $\varphi' = 0$ and $\bar{Q}' = \bar{u} > 0$, so $dR^*/dP < 0$. At $P = \bar{P}$, $\bar{Q}' = 0$ while $\varphi' > 0$ and $G > 0$, so by Assumption 2 $dR^*/dP > 0$; the same holds for $P > \bar{P}$, where $\bar{Q}' < 0$ makes both terms positive. By continuity R^* attains a minimum at some $P_R \in (P_0, \bar{P})$. When $\varphi' \equiv 0$ the first term vanishes identically and $\operatorname{sign}(dR^*/dP) = -\operatorname{sign}(\bar{Q}'(P))$, so R^* is minimized exactly at $\bar{P}$. □

Corollary 1. *(i) $R^*(0) = \lambda\omega\, G(0)/(c + \lambda\omega^2) > 0$ whenever $\omega > 0$: regulation is strictly positive even in fully not-for-profit markets. (ii) For $P < P_R$, competition and regulation are* substitutes*: entry lowers optimal stringency. For $P > P_R$,* regulation takes the place of competition*: further entry raises optimal stringency, and strictly more so beyond $\bar{P}$, where entry lowers market quality and raises the effectiveness of the standard simultaneously.*

The intuition for $P_R < \bar{P}$ is the model's key novel implication. Just below $\bar{P}$, additional for-profit entry still (weakly) raises average observable quality, which by the substitution channel pushes regulation down. But the same entry expands the captive segment on which the standard binds, raising the marginal return to regulation. Because the substitution motive vanishes smoothly as $\bar{Q}'(P) \to 0$ while the effectiveness motive is already strictly positive, the regulator starts tightening *before* market quality peaks. Regulation is forward-leaning: it anticipates the erosion of competitive discipline rather than reacting to it.

4 From Model to Empirics: Predictions and Identification

4.1 Empirical predictions

Three implications guide the empirical analysis. Proposition 1 predicts that regulatory stringency is U-shaped in the for-profit share, with an interior minimum P_R; Lemma 1 predicts that observable market quality is inverted-U-shaped, with an interior peak $\bar{P}$; and Proposition 1 further predicts that $P_R < \bar{P}$, so that regulation begins to tighten before quality peaks. The last is the sharpest of the three: it distinguishes the model from any framework in which regulation simply tracks market quality, which would place the two turning points at the same for-profit share. Section 6 tests the first prediction directly. Section 7 examines the second and third by estimating the relationship between market composition and observable quality, which is the channel through which the model links ownership structure to regulation.

These predictions are positive rather than normative. The regulator in (3) responds to the quality gap and to the mass of capacity on which a standard binds, but we do not observe the weights λ and c and therefore cannot assess whether observed regulation is optimal. Departures of actual from optimal stringency—capture, inattention, adjustment costs—would attenuate the predicted relationship without overturning its shape, so long as regulation responds, however imperfectly, to these two forces.

4.2 Estimation issues

Our objective is to estimate the effect of the for-profit nursing home market share on the regulation of quality of life while allowing for the non-linear relationship predicted by the theoretical framework. We estimate the following non-linear model:

$$Y_{c,d} = \alpha P_c + \beta P_c^2 + X_c'\gamma + \epsilon_{c,d} \tag{5}$$

where $Y_{c,d}$ denotes the standardized regulation score for quality-of-life dimension d in canton c, P_c is the share of for-profit nursing homes in the canton c, X_c is a vector of canton-level controls, and ϵ is the error term. As discussed in Section 5.1, the six dimensions capture distinct regulatory choices rather than repeated measures of a single cantonal stance; we nonetheless cluster at the canton level and report wild bootstrap p-values.

The main econometric challenge is the potential endogeneity of our independent variable. Unobserved political, institutional and cultural factors may simultaneously influence both the ownership structure of the nursing-home market and the adoption of quality-of-life regulations: cantons with a stronger tradition of public provision or a greater concern for quality of care may both limit for-profit expansion and adopt stricter standards, so that OLS estimates would confound the effect of for-profit entry with these underlying differences. Reverse causality is a further concern: a regulator that commits to a level of stringency before entry occurs would induce feedback from regulation to P, since cantonal authorities may be more or less willing to authorize for-profit facilities once standards are in place. A third concern is that for-profit providers may have entered disproportionately where incumbent homes were perceived to deliver lower quality; if those incumbents persistently underperformed, the same cantons would today regulate more stringently for reasons unrelated to ownership composition. The evidence on residents' satisfaction reported in Section 2.3 suggests this is unlikely, but it does not rule it out. Our restriction to facilities established before 2012 addresses the reverse-causality concern directly, and the instrumental-variables strategy set out below addresses all three.

4.3 IV strategy

Demographic variation should be expected to shape ownership structure. Using U.S. nursing-home markets, Grabowski and Hirth (2003) find that faster growth of the elderly population is associated with a significantly lower share of not-for-profit nursing homes. Their explanation is that not-for-profit organizations face tighter capital-market constraints when expanding capacity, so that rapidly growing markets are more likely to be served by for-profit entrants. Evidence from both the nursing-home and hospital sectors points in the same direction (Hansmann, 1987; Steinwald and Neuhauser, 1970). In the Swiss context, this mechanism is reinforced by cantonal planning: because facilities must figure in cantonal planning to be eligible for reimbursement and subsidies (Section 2.1), capacity expansion responds to demand as assessed by cantonal authorities, and the composition of a canton's elderly population shapes how that demand evolved.

We therefore employ a shift-share (Bartik) instrument that combines predetermined canton-specific exposure shares with national demographic shifts. Cantons differed in the age composition of their elderly populations in 1990, and because national demographic change over the following two decades affected age groups differentially, this predetermined composition generates variation across cantons in the growth of demand for nursing-home care. The instrument is defined as

$$z_c = \sum_{k=1}^{K} s_{ck} g_k, \tag{6}$$

where $(g_1, ..., g_k)$ is a set of national age-group shifts, and $(s_{c1}, ..., s_{ck})$ are sets of exposure shares that vary across cantons c.

The predetermined shares are defined as

$$s_{ck,1990} = \frac{\text{Population in age group } k}{\text{Population aged 65+}}, \tag{7}$$

where $k \in \{65\text{–}69,\ 70\text{–}74,\ 75\text{–}79,\ 80\text{–}84,\ 85\text{–}89,\ 90+\}$. In our case, the shares sum to one for each observation such that z_c is a share-weighted average of shifts rather than a share-weighted sum (Borusyak *et al.*, 2025).

The national demographic shifts are given by

$$g_k = \frac{\text{pop}_{k,2012} - \text{pop}_{k,1990}}{\text{pop}_{k,1990}}. \tag{8}$$

The period between 1990 and 2012 is particularly relevant because it coincides with the expansion of the for-profit nursing home sector in Switzerland, during which demographic aging generated substantial changes in the demand for long-term care services. Figure 3 illustrates the evolution of the national elderly population across the six age groups between 1990 and 2012. Over this period, the composition of the population aged 65 and over changed substantially, with a marked increase in the oldest age groups. Because the demand for institutional care rises steeply with age, cantons whose elderly populations were concentrated in the older groups in 1990 experienced a different evolution of demand from those whose elderly populations were younger—which is the variation the instrument exploits.

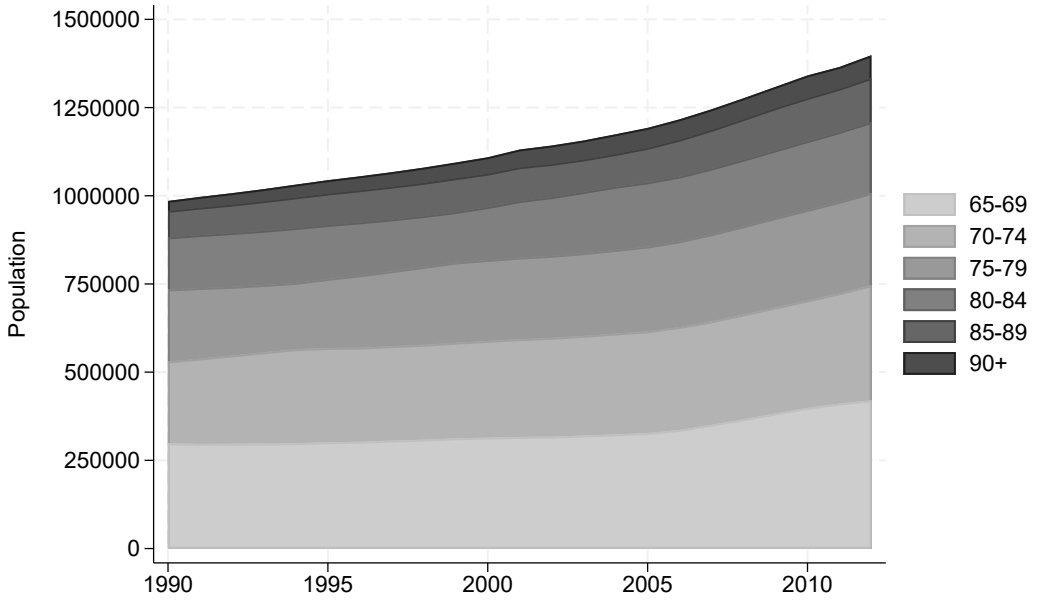


Figure 3: National demographic evolution across elderly age groups, 1990–2012

With six age-group shifts common to all cantons, the shifts contribute no cross-sectional variation: z_c is a fixed linear combination of a canton's 1990 exposure shares, with weights given by the national growth rates. Identification therefore rests on share exogeneity in the sense of Goldsmith-Pinkham *et al.* (2020) rather than on the exogeneity of the shifts (Borusyak *et al.*, 2025). The identifying assumption is that, conditional on the canton-level controls, the composition of a canton's elderly population in 1990 is unrelated to unobserved determinants of the quality-of-life norms adopted two decades later, and affects those norms only through its effect on the market mix of nursing-home provision.

Four features support this assumption. First, the exposure shares are predetermined: they are measured more than two decades before the regulations we study, and describe the age structure of a canton's elderly population at a date when for-profit provision was still negligible. This rules out mechanical reverse causality and contemporaneous confounding in the construction of the instrument. Second, the most plausible channel through which 1990 age composition could affect later regulation directly is that cantons with older elderly populations subsequently aged faster and came under greater political pressure to regulate elderly care. We control for this channel explicitly, conditioning on the cantonal share of the population aged 65 and over in 2012 and its growth between 1990 and 2012, so that identification comes from the *composition* of a canton's elderly population rather than from how much it aged. Third, following Goldsmith-Pinkham *et al.* (2020), we compute the Rotemberg weights, which measure the contribution of each exposure share to the overall estimate. Identification is driven by exposure to the oldest age groups: the weights are positive and increasing in age for the 80–84, 85–89 and 90+ groups (1.02, 1.35 and 1.69 respectively) and negative for the three younger groups, which is mechanical given that the shares sum to one within each canton. This is what the demand mechanism implies, since institutional care is concentrated among the very old—the mean age of residents in our sample is 85.3 years—so that a canton's 1990 exposure to the oldest cohorts, rather than its overall elderly share, is what predicts subsequent growth in demand for nursing-home places. Finally, in Section 6.3.3, we conduct a placebo analysis to assess whether the instrument predicts other forms of cantonal regulation outside the nursing-home sector; we show that the instrument does not predict the stringency of cantonal land-use regulation, measured by the index of Büchler and v. Ehrlich (2023), an unrelated domain.

Because our main estimations include both the share of for-profit nursing homes and its square, both variables are treated as endogenous, and we instrument them using the shift-share instrument and its square. We do not instrument the squared endogenous variable using the square of the fitted value from the first stage, thereby avoiding the forbidden-regression problem (Wooldridge, 2015). The shift-share instrument is standardized to have mean zero and unit standard deviation, and the second excluded instrument is the square of this standardized variable. Standardization is a rescaling of the excluded instruments and affects neither the identifying variation nor the second-stage estimates; it improves the numerical scaling of the first stage, since the raw instrument takes values in a narrow range around 0.39.

The first-stage results are reported in Appendix Table A2. The excluded instruments jointly predict both endogenous regressors, with Sanderson–Windmeijer conditional F-statistics of 21.05 for the linear for-profit share and 14.33 for the quadratic term, exceeding the conventional benchmark of 10. The Kleibergen–Paap F-statistic, which measures the joint strength of the instruments for both endogenous regressors, is 5.099. The contrast with the Sanderson–Windmeijer statistics is informative: each endogenous variable is well predicted individually, yet the system as a whole is less sharply identified, because the instruments do not distinguish the linear from the quadratic term as cleanly as they predict each in isolation. This reflects how much of the instrument's variation the controls absorb: they explain 64% of the variance of z_c, against 43% when the two aging controls are excluded. Since those controls are constructed from the same elderly population structure as the instrument itself, conditioning on them removes a substantial part of the variation available for identification—though it is precisely what makes the exclusion restriction credible. Consistent with this, Column (3) of Table 5, which retains only ln(population 65+), yields a Kleibergen–Paap statistic of 11.509 with coefficients essentially unchanged. Because the joint statistic falls below conventional thresholds, we report Anderson–Rubin tests alongside the 2SLS estimates in Section 6; these are valid regardless of instrument strength.

5 Data

5.1 Quality regulation

The quality of the services provided in nursing homes can be divided into two broad components: the quality of medical care, and the quality of non-medical services, the latter being closely related to the concept of quality of life. As discussed in Section 2.2, oversight of medical care operates through a channel that is professionally defined and common to all cantons, so that its monitoring varies little between them. By contrast, the quality-of-life dimension—residents' comfort, personal autonomy, dignity, privacy and living conditions—is governed by cantonal norms and exhibits substantially greater variation across cantons.

The concept of quality of life is based on the respect of the fundamental rights guaranteed by the Swiss Constitution, as well as the European Convention on Human Rights. Albeit neither the Constitution nor the ECHR attributes specific rights to elderly people (contrary to children and women), their vulnerability generates the need for the authorities to take action in order to ensure that elderly people enjoy the fundamental rights guaranteed to all people, in particular the right to human dignity, the right to personal freedom, the right to assistance when in need, and the right to privacy. These fundamental rights are largely covered in the study of Sommerhalder *et al.* (2015) that aims to provide an overview of the quality of life in Swiss nursing homes[14]. More precisely, Sommerhalder *et al.* (2015) conducted individual interviews with 1,035 nursing home residents in 51 nursing homes in 25 cantons. In these interviews, they asked the residents 37 closed questions covering 6 dimensions: comfort, day-to-day living, privacy, personal autonomy, individual's dignity, and "human being at the center". All the questions asked under each dimension are listed in Table 2, on the left part.

To capture how cantons regulate quality of life in nursing homes, we rely on the framework proposed by Sommerhalder *et al.* (2015). For each of the 37 survey questions, we examine whether the corresponding topic is addressed in the cantonal regulations that nursing homes have to respect. To construct our dependent variable, for each item in each canton, we attributed 2 points when the cantonal norms address it through an enforceable criterion, 1 when they address it only as a general principle, and 0 when they do not address it. The item scores are then summed within each of the six quality-of-life dimensions to obtain six dimension-specific regulation scores for each canton. Table 2 reports the coding of each item. Appendix B sets out the coding protocol in full, including the treatment of borderline cases, and provides illustrative examples of the relevant cantonal provisions together with the main legal sources used to construct the index.

A feature of the resulting index deserves comment, because it follows directly from the framework of Section 3. Cantonal norms regulate quality of life through structural and procedural requirements—a minimum number of leisure activities per week, the presence of a residents' committee, single rooms of a stated size, a telephone in each room, a nurse call system, the existence of a biography in the resident's file—rather than through the experience of residents themselves. This is not a shortcoming of cantonal regulation but a consequence of verifiability: a canton can write into its norms, and verify through inspection, whether a telephone is installed or a weekly programme exists, but it cannot write a standard on whether a resident feels respected or is spoken to gently. The pattern is visible at the item level in Table 2: the dimensions that are best covered—day-to-day living, privacy, and the components of dignity tied to concrete provisions such as call systems and lockable rooms—are those admitting verifiable

[14]The classification of Sommerhalder *et al.* (2015) is in line with the satisfaction measure of Ryden *et al.* (2000). The latter developed a detailed satisfaction instrument specifically designed for use with nursing home residents. This satisfaction instrument is based on 44 items covering 7 dimensions (Respect for resident's values and preferences; Information; Physical care; Psychological care; Involvement of family; Satisfaction with care providers; Satisfaction with the environment). The questions used by Sommerhalder *et al.* (2015) and Ryden *et al.* (2000) largely match. Both instruments are also in line with the classification of Zimmermann-Sloutskis *et al.* (2012).

proxies. Where cantons do address the remaining dimensions, they do so through general principles rather than enforceable criteria—"the dignity and personality of the residents is respected" (Valais)—which is why we code these items as only partially considered.

The implication is visible in the structure of the index itself. The ten items that no canton addresses (items 3–5, 7, 12, 17–18, 23–24, and 35)—whether staff come simply to chat, whether residents know one another well, whether the atmosphere at meals is pleasant—are precisely those that residents can observe but no inspector can certify, and they contribute no variation whatsoever. The entire cross-cantonal dispersion in our measure therefore comes from items on which compliance can be inspected: the heterogeneity we exploit is heterogeneity in how far cantons choose to regulate the verifiable dimension, not noise in the coding of ambiguous provisions. Our index thus measures regulatory stringency along the verifiable dimension of quality, which is the dimension the model treats as regulable. It does not capture, and is not intended to capture, the unobservable dimension on which not-for-profit providers are expected to have an advantage. This is the relevant object for our question: we ask how the intensity of *formal quality standards* varies with market composition, and formal standards are, by construction, written on what can be verified.

Because the six dimensions do not contain the same number of items, and because the dispersion of scores across cantons also varies from one dimension to another, we standardize the regulation measures within each dimension, so that the average degree of regulation is 0 and the standard deviation 1. The standardized score constitutes the dependent variable used in the empirical analysis. Note that standardization implies that a high score on a dimension that few cantons regulate reflects a smaller absolute difference than the same score on a widely regulated dimension. Section 6.3 reports ordinal and binary recodings of the index, which are insensitive to this scaling. The resulting dataset is organized at the canton–dimension level, with each canton contributing one observation for each of the six quality-of-life dimensions (156 observations).

Two forms of heterogeneity characterize these data. The first concerns overall stringency. As Figure 4 shows, total regulation scores range from zero in eight cantons to more than three times the Swiss average in Uri and Lucerne. The second, which aggregate scores conceal, concerns the *composition* of regulation: cantons with comparable overall stringency do not regulate the same aspects of quality of life. Figure 5 displays both. Each cell reports a canton's standardized score on one dimension, with cantons ordered by total stringency, so that the vertical gradient captures differences in overall stringency and the variation within each row captures differences in composition. Thurgau and Graubünden regulate comfort more than any other canton while remaining at or below the mean on every other dimension; Schwyz is among the most stringent on privacy and among the least on dignity; Fribourg concentrates on day-to-day living; Uri and Lucerne regulate intensively across nearly all dimensions. Compositional differences of this kind are concentrated among cantons that regulate at all: the lower third of the figure, comprising cantons whose norms are largely silent on quality of life, is close to uniform across dimensions.

This compositional heterogeneity supports our choice to treat the canton–dimension pair, rather than the canton, as the unit of observation, and to standardize within dimension. A canton that regulates one dimension intensively and others not at all is not equivalent to one that regulates all dimensions moderately, and collapsing the six dimensions into a single cantonal score would discard this variation.

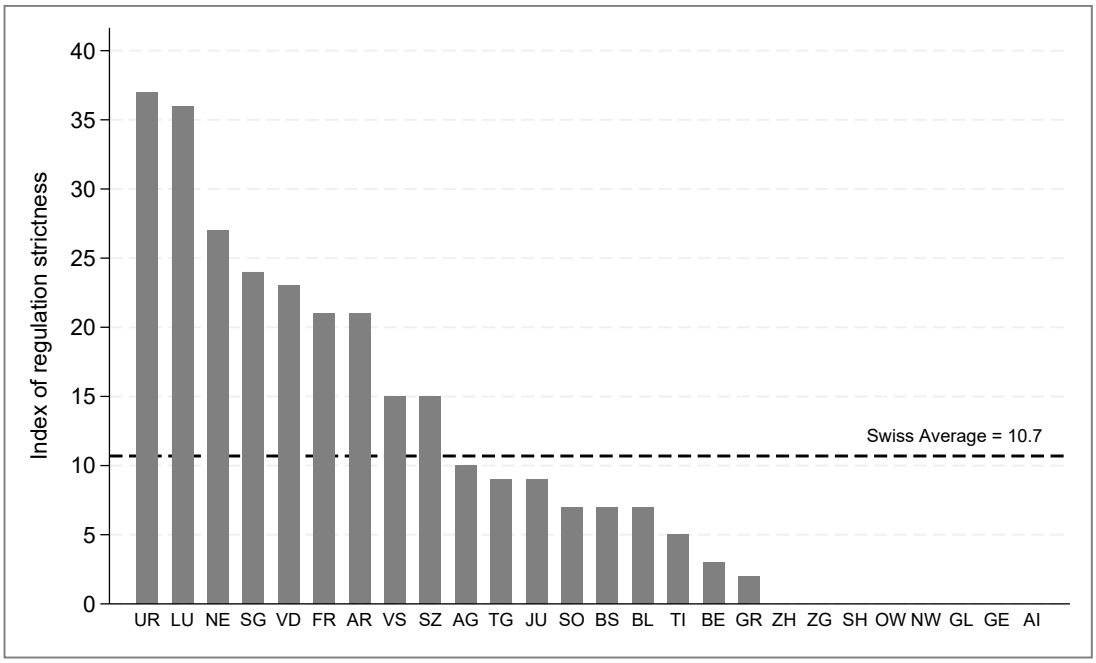
5.2 For-profit shares

Our main source of data is the nursing-home database of the Swiss Federal Office of Public Health (FOPH). After excluding assisted-living flats, homes at least partly intended for non-elderly residents (for example adults with disabilities), and facilities dedicated exclusively to short-term stays, the 2016 database contains 1,552 nursing homes. Since our objective is to examine whether the ownership structure of the nursing home market influenced the subsequent adoption

Table 2: Quality of life regulation in Swiss Cantons

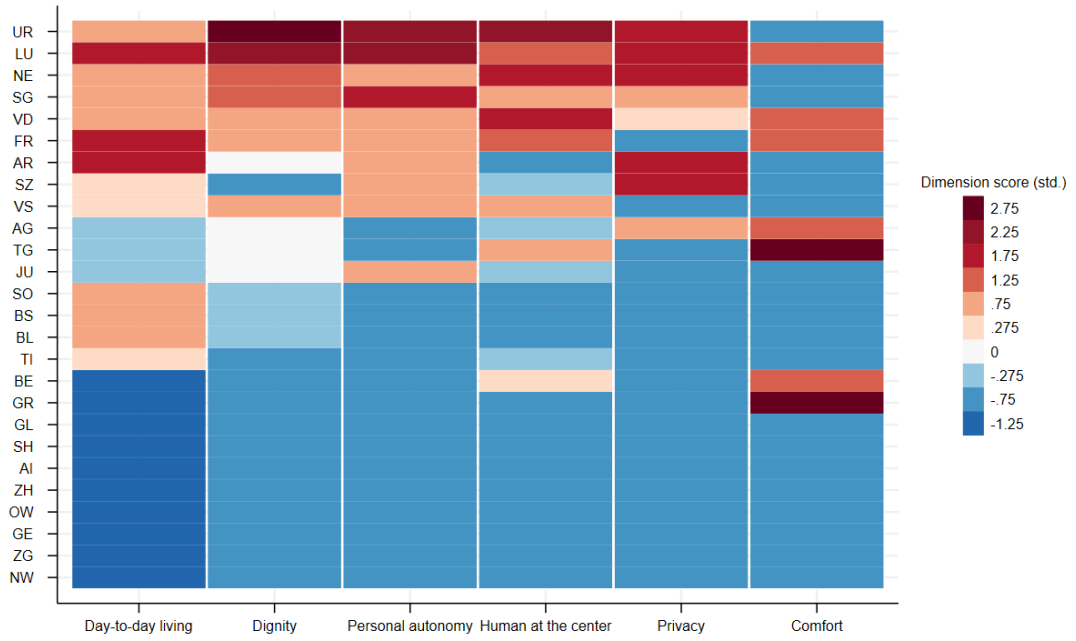
Quality dimensions in Sommerhalder *et al.* (2015)		Number of cantons where the item is . . . in their cantonal norms: Fully considered	Partially considered	Not considered
Dimension of comfort				
1.	Do you have physical pain?	0	2	24
2.	Have you already had pains because you have lied down or seated in one position for too long?	0	7	19
3.	Is it sometimes too cold here?	0	0	26
4.	Are sometimes your clothes lost in the laundry room?	0	0	26
5.	Are sometimes your clothes damaged in the laundry room?	0	0	26
Dimension of day-to-day living				
6.	Are there leisure activities that give you pleasure?	15	0	11
7.	Are there leisure activities that give you pleasure during the week-end?	0	0	26
8.	Can you change things that you don't like here?	5	0	21
9.	Do you appreciate the meals?	12	0	14
10.	Can you sometimes eat your favorite meal?	10	0	16
11.	Is there a pleasant atmosphere during the meals?	0	1	25
12.	Are you disturbed by noise when you are in your room?	0	0	26
Dimension of privacy				
13.	Is there a place where you can stay alone whenever you want?	7	1	18
14.	Can you have private telephone conversations?	5	0	21
15.	Can you enjoy enough privacy when you receive visits?	7	1	18
Dimension of personal autonomy				
16.	Is it easy for you to move alone in your room?	1	0	25
17.	Are your personal items placed so that you can take them easily?	0	0	26
18.	Are your personal items in the bathroom placed so that you can take them easily?	0	0	26
19.	Can you look after your personal items as you want?	2	8	16
20.	Can you get up in the morning when you want?	2	8	16
21.	Can you go to bed in the evening when you want?	2	8	16
22.	Can you choose the clothes you want to wear?	2	8	16
23.	Can you practice hobbies that give you pleasure?	0	0	26
24.	Do you sometimes help other people?	0	0	26
Dimension of individual's dignity				
25.	Are you treated with respect?	0	7	19
26.	Are you treated politely by the staff?	0	7	19
27.	Are you handled gently?	0	5	21
28.	Does the staff respect your modesty?	0	8	18
29.	Do you feel secure?	1	0	25
30.	Do you receive help when you need it?	8	0	18
31.	Are your personal belongings kept safe?	3	0	23
Dimension "human being at the center"				
32.	Does the staff pay interest in what you did in your life?	3	5	18
33.	Does the staff know you well, that is it knows what is important for you and what you value?	3	5	18
34.	Does the staff know what you like and what you dislike?	3	5	18
35.	Do employees come to you just to chat?	0	0	26
36.	Is there somebody working here in whom you can confide?	1	5	20
37.	Do the other residents know you well, that is they know what is important for you and what you value?	0	3	23

Notes: This table reports our coding, based on cantonal laws in force, of the extent to which each canton addresses the 37 quality-of-life items defined in Sommerhalder *et al.* (2015). An item is coded as fully considered when the cantonal norms address it through an enforceable criterion, partially considered when they address it only as a general principle, and not considered when they do not address it. Entries report the number of cantons in each category, out of 26. Appendix B sets out the coding protocol and provides illustrative provisions for each item.



Notes: The bars represent the total regulation score for each canton, before standardization, obtained by summing the dimension-specific scores across the six quality-of-life dimensions. Within each dimension, an item scores 2 when the cantonal norms address it through an enforceable criterion, 1 when they address it only as a general principle, and 0 when they do not address it. See Section 5.1.

Figure 4: Quality of life regulation across cantons



Notes: Each cell reports a canton's regulation score on one quality-of-life dimension, standardized within dimension to mean zero and standard deviation one. Cantons are ordered by total regulation score; dimensions are ordered by mean stringency.

Figure 5: Quality-of-life regulation across cantons and dimensions

of quality-of-life regulations, we consider only the nursing homes established before 2012[15]. The restriction to homes established before 2012 is unlikely to affect the representativeness of the sample. Published FOPH statistics, which use a broader definition than our cleaned sample, record 1,505 nursing homes in Switzerland in 2003 against 1,581 in 2012, implying that roughly 95% of the facilities operating in 2012 already existed a decade earlier.

This restriction leaves a sample of 1,216 nursing homes, among which 402 (33.1%) are owned by the public sector (including companies owned by public authorities), 624 (51.3%) by private not-for-profit institutions, and 190 (15.6%) by private for-profit companies. We use this sample to compute our explanatory variable, that is, the share of for-profit nursing homes in each canton. In alternative specifications, we measure the for-profit share using the number of beds and the number of long-term residents (also from the FOPH), thereby accounting for differences in the size of nursing homes.

The share of for-profit homes strongly varies from one canton to another, from zero (in 8 cantons) to 39.5% in the canton of Neuchâtel (see Table 3). Three features of this distribution matter for what follows. First, for-profit provision remains a minority form everywhere: the national share is 15.6%, and and no canton exceeds 40%. Second, the distribution has substantial mass at zero, with eight cantons hosting no for-profit facility at all. Third, the variation is not obviously aligned with the usual cantonal cleavages: high for-profit shares are found in both German-speaking (Appenzell Ausserrhoden, Thurgau, Bern) and French-speaking cantons (Neuchâtel, Vaud), and in both urban and rural ones, while several wealthy cantons with large urban populations (Geneva, Basel-Stadt, Zug) have very low shares. The controls described below account for these dimensions explicitly.

Finally, the distribution bears on how the non-linear specification is identified. Twelve cantons lie above the estimated turning point of 8.5% reported in Section 6, but most sit close to it: only five (Appenzell Ausserrhoden, Bern, Neuchâtel, Thurgau and Vaud) exceed 25%. The rising segment therefore rests on a limited number of observations, and we assess its sensitivity to individual cantons in Section 6.3.2.

5.3 Control variables

Identification requires that, conditional on observed characteristics, a canton's 1990 elderly age composition is unrelated to unobserved determinants of quality regulation. Following Borusyak *et al.* (2025), we therefore condition on a set of canton-level characteristics that plausibly affect both the ownership structure of the nursing-home sector and the intensity of quality regulation. The literature points to political, cultural, economic and demographic factors as the main determinants of regulatory intensity; we address each in turn. Definitions and sources are reported in Table A3, and descriptive statistics in Table 4.

Political ideology. Left-wing governments are generally found to regulate more and right-wing governments to deregulate and to privatize (Bortolotti *et al.*, 2004; Pitlik, 2007; Potrafke, 2010, 2017). Cantons have their own political majorities, and we capture cantonal ideology through *Right-Wing*, the average Parlarating score of the canton's representatives in the National Council. Parlarating is an annual academic ranking that scores each member of the lower house of the federal parliament on a left–right scale from -10 to $+10$ on the basis of roll-call votes (Hohl and Jeitziner, 2002).

Culture: language and religion. Preferences over regulation are shaped by culture (Aghion *et al.*, 2010; Pinotti, 2012; Pitlik and Kouba, 2015), and Switzerland offers substantial cultural variation within a single institutional framework. Language is the most powerful marker of

[15]Data on the year of creation of nursing homes are not available. However, a comparison of the nursing homes lists of 2012 and 2016 allows us to identify homes that first appear in the 2016 list.

Table 3: Nursing homes providers across cantons

Canton	**Code**	**Number of nursing homes**	**For-profit nursing homes [%]**	**Private not-for-profit nursing homes [%]**	**Public nursing homes [%]**
Aargau	AG	73	4.11	71.23	24.66
Appenzell Innerrhoden	AI	2	0.00	50.00	50.00
Appenzell Ausserrhoden	AR	20	30.00	20.00	50.00
Bern	BE	215	28.84	48.84	22.33
Basel-Landschaft	BL	28	0.00	96.43	3.57
Basel-Stadt	BS	30	3.33	80.00	16.67
Fribourg	FR	39	0.00	38.46	61.54
Geneva	GE	46	6.52	78.26	15.22
Glarus	GL	8	0.00	12.50	87.50
Grisons	GR	39	10.26	64.10	25.64
Jura	JU	10	20.00	30.00	50.00
Lucerne	LU	55	5.45	20.00	74.55
Neuchâtel	NE	38	39.47	57.89	2.63
Nidwalden	NW	6	16.67	83.33	0.00
Obwalden	OW	7	0.00	85.71	14.29
St. Gallen	SG	96	14.58	21.88	63.54
Schaffhausen	SH	14	0.00	28.57	71.43
Solothurn	SO	45	17.78	62.22	20.00
Schwyz	SZ	27	7.41	51.85	40.74
Thurgau	TG	40	30.00	45.00	25.00
Ticino	TI	57	0.00	54.39	45.61
Uri	UR	9	11.11	44.44	44.44
Vaud	VD	91	29.67	68.13	2.20
Valais	VS	39	0.00	84.62	15.38
Zug	ZG	15	6.67	80.00	13.33
Zurich	ZH	167	14.97	35.93	49.10
Switzerland		**1,216**	**15.63**	**51.32**	**33.06**

Notes: Data are based on our calculations using data from the Swiss Federal Office of Public Health. The table reports the 1,216 nursing homes established before 2012 that constitute our estimation sample, after excluding assisted-living flats, facilities at least partly intended for non-elderly residents, and facilities dedicated exclusively to short-term stays. Shares are percentages of the number of nursing homes in each canton. Public ownership includes companies owned by public authorities.

identity in the country: German-speakers are more supportive of free markets and individual responsibility, and demand for social policies is significantly higher in the French-speaking area (Eugster *et al.*, 2011). The cleavage operates directly on the margin we study. Exploiting the discontinuity at the Swiss language border, Athias and Wicht (2025) find that French-speaking municipalities are 60% less likely than adjacent German-speaking ones to contract public service provision to the private sector, at identical institutions and policies. We therefore include a dummy equal to one for the 19 German-speaking cantons, including two multilingual cantons with a German-speaking majority. The second cultural cleavage is religious. La Porta *et al.* (1999) find that countries with high Catholic shares are more interventionist, and Protestant societies are generally held to be more supportive of unregulated markets (Weber, 2001). Because the confessional map of Switzerland dates to the Reformation and does not coincide with language borders, we measure this dimension by the share of Protestants in each canton rather than by a dummy.

Economic conditions. Income and economic activity are systematically related to regulatory intensity (La Porta *et al.*, 1999; Pitlik, 2007; Pinotti, 2012), and fiscal conditions to both regulation and privatization decisions: governments under budgetary pressure have stronger incentives to regulate and to accelerate privatization (Bortolotti *et al.*, 2004; Potrafke, 2010; Ruiz-Villaverde *et al.*, 2018). We therefore control for the logarithm of cantonal GDP per capita, capturing the level of economic development and the resources available to public authorities; for the logarithm of the per capita yield of the Federal Direct Tax, which proxies the wealth of the cantonal population and hence potential demand for higher-end nursing homes; and for the logarithm of cantonal debt per capita.

Market size and structure. Population is strongly positively correlated with regulatory intensity (Pinotti, 2012; Büchler and v. Ehrlich, 2023). Mulligan and Shleifer (2005) argue that this reflects a supply-side mechanism: because regulation involves large fixed costs of legislation and enforcement, its per capita cost falls with the size of the jurisdiction, so that larger jurisdictions regulate more irrespective of preferences. We therefore control for the logarithm of total cantonal population, which is also related to the privatization of public services. We also control for the share of the population living in urban areas, since urban and rural long-term care markets differ in provider density and market structure, with rural areas hosting fewer, smaller and more often publicly owned facilities (Dalton *et al.*, 2002). Finally, we control for the number of nursing-home beds per hundred inhabitants aged 80 and over. Temkin-Greener *et al.* (2021) find that U.S. states with fewer beds per elderly resident adopt more stringent regulations. In our setting, the supply of beds relative to the elderly population also captures the importance of the sector within a canton, which may affect both ownership composition and regulatory intensity.

Demographic ageing. As discussed in Section 4.3, the most plausible direct channel from the instrument to regulation runs through ageing itself: cantons whose populations aged faster may regulate elderly care more stringently for reasons unrelated to ownership composition. We therefore control for the share of the population aged 65 and over in 2012 and for the growth of that population between 1990 and 2012, so that identification comes from the composition of a canton's elderly population rather than from how much it aged.

6 Market Mix and Quality Regulation

This section presents our estimates of the effect of the for-profit market share on the stringency of quality-of-life regulation. We first report the baseline OLS and 2SLS results, then the inference procedures on which we rely. We next establish that the estimated relationship is U-shaped

Table 4: Descriptive statistics (cantonal level)

	Mean	Std. Dev.	Min.	Max.	Source of the data
% of for-profit nursing homes	11.417	11.706	0	39.474	Swiss Federal Office of Public Health
Shift-share instrument	0.393	0.005	0.385	0.405	Swiss Federal Statistical Office
Right-wing	0.937	2.568	-3.460	8.600	Parlarating
German	0.731				Swiss Federal Statistical Office
% Protestants	21.580	13.391	4.403	55.499	Swiss Federal Statistical Office
Ln GDP p.c.	11.196	0.277	10.846	12.005	Swiss Federal Statistical Office
Ln Debt p.c.	1.664	0.685	0.319	3.476	Swiss Federal Statistical Office
Ln FTD yield p.c.	7.706	0.480	7.043	8.854	Swiss Federal Tax Administration
NH beds per 100 pop. 80+	24.236	4.780	16.672	38.138	Swiss Federal Office of Public Health
Ln Population	12.093	1.138	9.662	14.158	Swiss Federal Statistical Office
% Urban population	74.069	23.122	0	98.706	Swiss Federal Statistical Office
% of long-term clients in for-profit NHs	9.097	9.388	0	27.966	Swiss Federal Office of Public Health
% of beds in for-profit NHs	8.799	9.292	0	26.526	Swiss Federal Office of Public Health
% Population 65+	17.658	1.693	14.413	21.042	Swiss Federal Statistical Office
% Growth in population 65+ (1990–2012)	43.642	25.016	-1.829	98.304	Swiss Federal Statistical Office

Note: The shift-share instrument is reported in raw form; it is standardized before estimation.

rather than merely convex. Finally, we report a series of robustness checks concerning the construction of the regulation index, the influence of individual cantons, and the exclusion restriction.

6.1 Baseline OLS and IV results

The baseline OLS and 2SLS estimates are reported in Table 5. Our preferred specification is the 2SLS model in Column (1), which controls for the share of the population aged 65 and over in 2012 and its growth between 1990 and 2012. Column (2) reports the corresponding OLS estimates, and Column (3) replaces these demographic controls with the logarithm of the population aged 65 and over.

As predicted by the model, the coefficient on the linear term is negative and that on the quadratic term positive, the latter significant at the 1% level in every specification. The implied minimum occurs at a for-profit share of 8.45% under 2SLS and 7.29% under OLS[16]. The comparison between OLS and 2SLS is itself informative. The coefficient on the linear term is -0.032 under OLS, -0.047 under 2SLS, and -0.072 in Column (3), becoming larger in magnitude as identification improves. This is the direction predicted by the endogeneity concern set out in Section 4.3: if cantons with a stronger tradition of public provision both limit for-profit expansion and regulate more stringently, OLS attenuates the negative relationship at low for-profit shares, and instrumenting corrects for it.

Figure 6 illustrates the estimated relationship. An increase in the share of for-profit nursing homes is associated with less stringent quality regulation while the for-profit sector accounts for a relatively small share of the market. Beyond the turning point the marginal effect becomes positive, so that further increases in the for-profit share are associated with more stringent regulation. This is the pattern predicted by the model of Section 3: entry into a market dominated by not-for-profit providers improves observable quality and thereby reduces the returns to regulating, but only while the not-for-profit sector remains large enough to contest each entrant. As for-profit provision expands, that competitive discipline weakens, quality deteriorates, and regulation tightens.

The Kleibergen–Paap F-statistic equals 5.099 in Column (1), against 11.509 in Column (3), while the estimated coefficients are remarkably similar across the two specifications. The lower statistic in the baseline arises because controlling for both the level and the growth of the

[16]Since $\alpha < 0$ and $\beta > 0$, the marginal effect changes sign at $-\alpha/2\beta$, the minimum of the estimated curve.

elderly population absorbs variation closely related to the instrument: since the instrument is itself constructed from predetermined age-group shares, these controls capture much of the same underlying demographic variation and leave less of it available for identification. The Sanderson–Windmeijer conditional F-statistics nonetheless remain above the conventional benchmark of 10 for both endogenous regressors, indicating that each is sufficiently identified conditional on the other. Taken together with the stability of the coefficients, this suggests that the low joint statistic reflects the stringency of the demographic controls rather than a fragile first stage.

Because the quadratic specification is nonetheless more weakly identified under these controls, we complement the 2SLS estimates with inference procedures that are robust to weak identification. The Anderson–Rubin test rejects the joint null that the coefficients on the two endogenous regressors are zero ($p = 0.0022$ in Column 1), providing identification-robust evidence that for-profit penetration affects quality regulation. Figure 7 reports the corresponding two-dimensional confidence regions. The region lies almost entirely where the quadratic coefficient is positive, providing robust evidence of convexity and ruling out both a monotone linear relationship and an inverted U-shape. Consistent with the point estimate, it is concentrated in the negative region for the linear coefficient, although it is not entirely bounded away from zero on that dimension.

Inference based on conventional cluster-robust standard errors may also be unreliable with a limited number of clusters. We therefore report Webb wild cluster bootstrap p-values (Cameron *et al.*, 2008), which are designed for precisely this setting (MacKinnon and Webb, 2017; Roodman *et al.*, 2019). The joint bootstrap test rejects the null that the coefficients on the endogenous regressors are jointly zero in every specification ($p = 0.054$, 0.011 and 0.007 respectively).

6.2 The shape of the relationship

A significant quadratic term establishes convexity but not, by itself, a U-shape: the turning point may lie outside the observed support, in which case the relationship is monotone over the range of the data. We therefore apply the test of Lind and Mehlum (2010), reported in Table 5. Under conventional inference the test confirms a U-shape in the baseline specification, with a significantly negative slope at the lower bound of the observed support (-0.047, $p = 0.078$) and a significantly positive slope at the upper bound (0.172, $p < 0.01$), and a turning point at 8.45%, well within the support. Because inference with 26 clusters may be unreliable, we also report Webb wild-bootstrap p-values: the upper-bound slope remains significantly positive ($p = 0.021$) while the lower-bound slope—which at $P = 0$ coincides with the linear coefficient—is no longer significant ($p = 0.142$). The convexity of the relationship and its rising segment at higher for-profit shares are therefore robust under both standards; the downward segment is significant conventionally but not under the more demanding bootstrap, and it is the reduced form that establishes it under both.

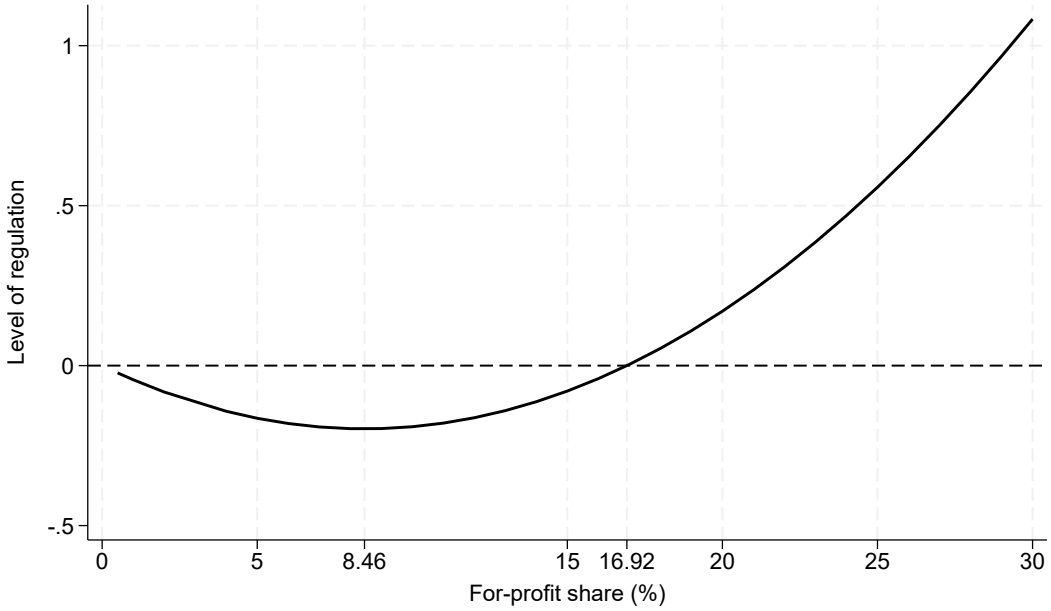
The reduced form regresses the regulation index directly on the instrument and its square. It does not recover the effect of the for-profit share itself, but it is unaffected by weak identification, and therefore provides the most robust evidence available on the shape of the relationship. Table 6 reports the regression of the regulation index directly on the instrument and its square. The estimated relationship is convex, with a positive and highly significant quadratic term and a turning point at -0.084 standard deviations of the standardized instrument. The Lind–Mehlum test confirms a U-shape, with a significantly negative slope at the lower bound of the support (-0.731, $p = 0.009$) and a significantly positive slope at the upper bound (1.145, $p < 0.001$). Crucially, *both* boundary slopes remain significant under Webb wild-bootstrap inference ($p = 0.058$ and $p = 0.029$ respectively).

Taken together, the results provide evidence of a U-shaped relationship between the for-profit share and quality regulation.

Table 5: Nursing Homes Market Mix and Regulation of Quality

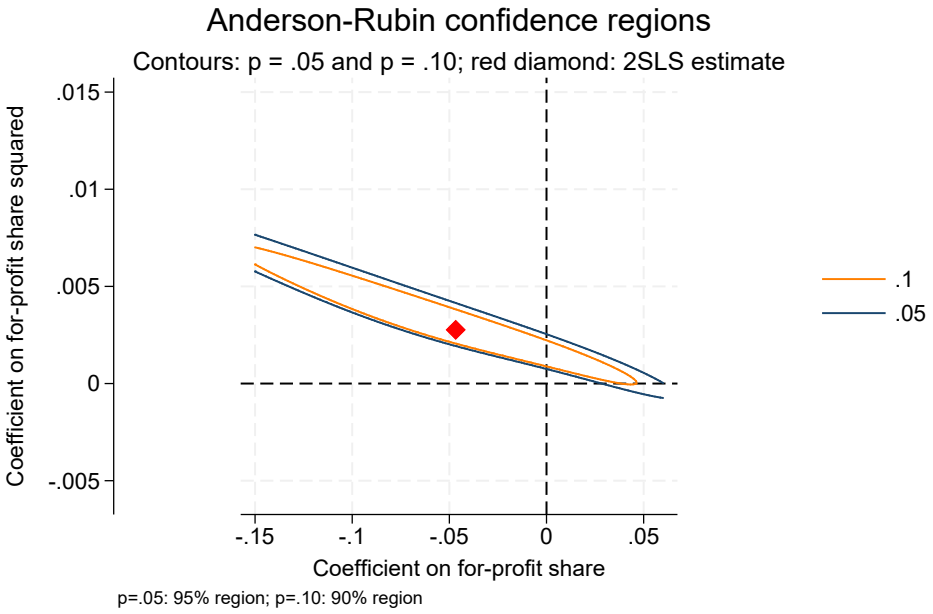
Dep. Var.: Regulation Quality of Life (std.)	(1) 2SLS	(2) OLS	(3) 2SLS
% of for-profit nursing homes	-0.0467	-0.0319	-0.0716*
	(0.0328)	(0.0211)	(0.0418)
(% of for-profit nursing homes)^2	0.00276***	0.00219***	0.00377***
	(0.00102)	(0.000643)	(0.00123)
Canton-level controls	Yes	Yes	Yes
Population 65+ controls (share & growth)	Yes	Yes	No
Population 65+ control (log level)	No	No	Yes
Observations	156	156	156
R-squared	0.446	0.450	0.409
Kleibergen–Paap rk Wald F statistic	5.099		11.509
Sanderson–Windmeijer F (share of FP nursing homes)	21.05		27.28
Sanderson–Windmeijer F ((share of FP nursing homes)^2)	14.33		29.43
Anderson–Rubin test p-value	0.0022		0.0001
Webb wild-bootstrap p-value (% FP nursing homes)	0.255	0.221	0.209
Webb wild-bootstrap p-value ((% FP nursing homes)^2)	0.0335	0.0587	0.0379
Joint Webb wild-bootstrap p-value	0.0540	0.0111	0.0074
Lind–Mehlum U-test			
Lower-bound slope	-0.0467	-0.0319	-0.0716
Conventional p-value	0.0780	0.0715	0.0442
Webb wild-bootstrap p-value	0.142	0.109	0.126
Upper-bound slope	0.172	0.141	0.226
Conventional p-value	< 0.0001	< 0.0001	< 0.0001
Webb wild-bootstrap p-value	0.0207	0.0143	0.0215
Turning point	8.45%	7.29%	9.50%
Overall Lind–Mehlum p-value	0.0780	0.0715	0.0442

Notes: This table reports the estimated coefficients from 2SLS and OLS regressions. The dependent variable is the standardized level of quality regulation across dimensions. All regressions include canton-level control variables (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT Yield p.c., NB NH bed/Pop. over 80, Ln Population, % urban population). Columns (1) and (2) control for the share of the population aged 65 and over in 2012 and its growth between 1990 and 2012 in each canton, while column (3) controls for the logarithm of the population aged 65 and over. Robust standard errors clustered at the canton level are reported in parentheses. Webb wild-bootstrap p-values are computed using 9,999 replications and Webb weights. The Lind–Mehlum section reports the lower- and upper-bound slopes of the estimated quadratic relationship, their conventional and Webb wild-bootstrap p-values, the estimated turning point, and the overall Lind–Mehlum test of a U-shaped relationship. The 95% Fieller intervals for the turning point are $[-11.32; 12.48]$, $[-6.44; 11.13]$ and $[-3.90; 12.98]$ in Columns (1)–(3) respectively. $^*p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.



Note: The curve shows the parabola corresponding to the estimated coefficients of the 2SLS model (Table 5, Column (1)).

Figure 6: Impact of the for-profit market shares on regulation strictness



Notes: The blue and orange contours correspond to the 95% and 90% confidence regions, respectively. The red diamond denotes the 2SLS point estimate.

Figure 7: Anderson–Rubin confidence regions for the 2SLS estimates.

Table 6: Reduced-form relationship between the Bartik instrument and regulation quality

Dep. Var.: Regulation Quality of Life (std.)	(1) Reduced form
Shift-share (Bartik) instrument	0.0420
	(0.115)
(Shift-share (Bartik) instrument)^2	0.250***
	(0.0716)
Canton-level controls	Yes
Population 65+ controls (share and growth)	Yes
Observations	156
R-squared	0.379
Lind-Mehlum U-test	
Lower-bound slope	-0.731
Conventional p-value	0.00871
Webb wild-bootstrap p-value	0.0582
Upper-bound slope	1.145
Conventional p-value	0.0002
Webb wild-bootstrap p-value	0.0286
Turning point (standardized Bartik)	-0.0840
Overall Lind-Mehlum p-value	0.00871

Notes: This table reports the estimated coefficients from the reduced-form regression. The dependent variable is the standardized level of quality regulation across dimensions. The instruments are the standardized shift-share (Bartik) instrument and its square. The regression includes the same canton-level control variables as in the baseline estimations (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT Yield p.c., NH beds/population over 80, Ln Population, % urban population), as well as controls for the share of the population aged 65 and over in 2012 and its growth between 1990 and 2012 in each canton. Robust standard errors clustered at the canton level are reported in parentheses. The Lind–Mehlum U-test reports the lower- and upper-bound slopes of the estimated quadratic relationship, their conventional and Webb wild-bootstrap p-values, the estimated turning point, and the overall Lind-Mehlum test of a U-shaped relationship. *$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$.

6.3 Robustness checks

6.3.1 Measurement and functional form

The index treats regulation scores as interval-scaled, so that the difference between scores of two and four is taken to be the same as between four and six. We address this by re-estimating the baseline using two measures that require only ordinal information. The first is ordinal with three categories: *LOW* where a canton's norms are silent on the dimension, *MEDIUM* where the dimension is regulated but below the cross-cantonal mean, and *HIGH* where it is regulated above the mean. The second is binary, distinguishing cantons regulating above the mean of a dimension from those regulating at or below it. Both discard information on how far apart scores are and retain only their ordering, so that estimates based on them are unaffected by the cardinal content of the index.

Table 7 reports the estimates using these alternative measures of regulation. Columns (1) and (3) present a recursive IV ordered probit model and a recursive IV probit model estimated using the conditional mixed process (CMP) estimator (Roodman, 2011), instrumenting the share of for-profit nursing homes and its squared term with the same shift-share instrument and its square as in the baseline 2SLS specification. Columns (2) and (4) report the corresponding standard ordered probit and probit estimates. The results are consistent with those obtained using the continuous regulation index. Across all specifications, the coefficient on the share of for-profit nursing homes is negative and the coefficient on its squared term positive, and the quadratic term remains statistically significant under Webb wild-bootstrap inference in all four specifications. The boundary slopes have the predicted signs throughout, with the upper-bound slope significant in every specification; the lower-bound slope is significant only in the instrumented versions. This mirrors the attenuation pattern documented in Section 6, where the linear term is smaller in absolute value under OLS than under 2SLS, and underlines the importance of instrumenting: the declining segment at low for-profit shares emerges once the endogeneity of market composition is accounted for.

A related concern is that our dependent variable relies on standardization to make scores comparable across dimensions. Because the raw dimension scores are bounded counts with a substantial mass at zero, we re-estimate the baseline specification directly on the non-standardized scores using count models, which make no cardinality assumption about the standardized index. Since dimensions contain different numbers of items—so that a raw score of four means something different for personal autonomy, with nine items, than for privacy, with three—all specifications include dimension fixed effects, which absorb these differences.

Table 8 reports the results. Column (1) presents Poisson estimates and column (2) negative binomial estimates. In both specifications the coefficient on the linear term is negative and the coefficient on the squared for-profit share positive and significant, reproducing the convex relationship found in the baseline. The estimated overdispersion parameter of the negative binomial model is not statistically distinguishable from zero ($\ln \alpha = -1.667$, s.e. 2.062), indicating no evidence of overdispersion beyond the Poisson benchmark; the two specifications accordingly deliver nearly identical estimates. The dimension fixed effects are jointly large and highly significant, confirming that raw scores are not comparable across dimensions and that the standardization used in the baseline is warranted.

6.3.2 Sample and influential observations

Having established that the result does not depend on how the regulation index is scaled or modelled, we now ask whether it depends on particular cantons or on how we measure for-profit penetration.

A potential concern is that the estimated nonlinear relationship is driven by a small number of influential cantons. As shown in Table 3, the distribution of for-profit nursing homes is highly uneven across Switzerland. To assess whether our findings are driven by any individual

Table 7: Ordered Probit and Probit estimates

Dependent variables:	Regulation Quality of Life (3 categories)		Regulation Quality of Life (dummy)	
	(1) IV Ordered Probit (CMP)	(2) Ordered Probit	(3) IV Probit	(4) Probit
% of for-profit nursing homes	-0.243***	-0.0503	-0.212**	-0.0563
	(0.0802)	(0.0475)	(0.0840)	(0.0427)
(% of for-profit nursing homes)^2	0.00824***	0.00319**	0.00749**	0.00341***
	(0.00315)	(0.00141)	(0.00299)	(0.00123)
Canton-level controls	Yes	Yes	Yes	Yes
Population 65+ controls (share and growth)	Yes	Yes	Yes	Yes
Pseudo R^2		0.3172		0.395
Observations	156	156	156	156
Webb wild-bootstrap p-value (% FP nursing homes)	0.0458	0.255	0.0956	0.190
Webb wild-bootstrap p-value (% for-profit)^2)	0.0520	0.0165	0.0870	0.0163
Joint Webb wild-bootstrap p-value	0.1614	0.0546	0.278	0.0549
U-shape test on latent index				
Lower-bound slope	-0.243	-0.0503	-0.212	-0.0563
Conventional p-value	0.001	0.145	0.006	0.094
Upper-bound slope	0.407	0.202	0.379	0.213
Conventional p-value	0.010	0.001	0.0085	< 0.001

Notes: This table reports robustness checks using ordered probit models with the regulation quality-of-life index recoded into three ordered categories and recoded into a dummy variable. Column (1) reports a recursive IV ordered probit estimated by conditional mixed process (CMP). Column (2) reports the standard ordered probit estimates. Column (3) reports a recursive IV probit model. Column (4) reports the standard probit estimates. Columns (1) and (3) treat the share of for-profit nursing homes and its square as endogenous and instrument them using the Bartik instrument and its square. All specifications include the baseline canton-level controls (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT Yield p.c., NB NH bed/Pop. over 80, Ln Population, % urban population) and controls for the share of the population aged 65 and over in 2012 and its growth between 1990 and 2012. Webb wild-bootstrap p-values are computed using 9,999 replications and Webb weights. Robust standard errors clustered at the canton level are reported in parentheses. $^*p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.

Table 8: Count-model estimates of quality regulation

Dep. Var.: Quality-of-Life Regulation	(1) Poisson	(2) Negative Binomial
% of for-profit nursing homes	-0.0291	-0.0332
	(0.0648)	(0.0615)
(% of for-profit nursing homes)^2	0.00277*	0.00300*
	(0.00167)	(0.00173)
Canton-level controls	Yes	Yes
Population 65+ controls (share & growth)	Yes	Yes
Dimension FE	Yes	Yes
Observations	156	156

Notes: This table reports estimated coefficients from Poisson and negative binomial regressions. The dependent variable is the raw quality-regulation score, measured as the sum of the level of quality regulation within each dimension. All regressions include canton-level controls (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT yield p.c., NB NH bed/Pop. over 80, Ln Population, and % urban population), as well as controls for the share of the population aged 65 and over in 2012 and its growth between 1990 and 2012 in each canton. Dimension fixed effects are included in all specifications. Robust standard errors clustered at the canton level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

canton, we re-estimate the baseline specification while sequentially excluding each canton from the sample. Table 9 reports the resulting leave-one-canton-out estimates. The estimated coefficients remain very stable across all specifications. In every case, the coefficient on the share of for-profit nursing homes remains negative, while the coefficient on its squared term remains positive and statistically significant. In particular, the linear coefficient ranges from -0.0806 to -0.0224, while the quadratic coefficient ranges from 0.00198 to 0.00358. These results indicate that the estimated nonlinear relationship is not driven by any single canton.

Table 9: Leave-one-out robustness analysis

Omitted canton	Linear coefficient	Quadratic coefficient
None (baseline)	-0.0467	0.00276***
AG	-0.0492	0.00284***
AI	-0.0573	0.00312**
AR	-0.0419	0.00248**
BE	-0.0495	0.00285***
BL	-0.0255	0.00227**
BS	-0.0503	0.00285***
FR	-0.0489	0.00282***
GE	-0.0572	0.00322***
GL	-0.0360	0.00210**
GR	-0.0537	0.00293***
JU	-0.0549	0.00316**
LU	-0.0416	0.00272***
NE	-0.0577	0.00325**
NW	-0.0224	0.00207*
OW	-0.0429	0.00263***
SG	-0.0417	0.00265***
SH	-0.0389	0.00258**
SO	-0.0232	0.00198**
SZ	-0.0541*	0.00273***
TG	-0.0614*	0.00334***
TI	-0.0618*	0.00338***
UR	-0.0806**	0.00328***
VD	-0.0781**	0.00358***
VS	-0.0518	0.00291***
ZG	-0.0381	0.00224**
ZH	-0.0335	0.00243**

Notes: Each row reports the estimated coefficients from the baseline specification after sequentially excluding one canton from the sample. All regressions include the same set of baseline canton-level controls and demographic controls as the preferred specification. Statistical significance is denoted by *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

One additional concern is that the baseline specification exploits variation across both cantons and quality-of-life dimensions, resulting in six observations per canton. Although standard errors are clustered at the canton level, one may wonder whether the estimated relationship is influenced by treating the six dimensions as separate observations. To address this concern, we collapse the data to a single observation per canton by averaging the standardized regulation score across the six dimensions and re-estimate the baseline specification. Table 10 reports the results using the same 2SLS strategy and control variables as in the baseline model. The estimated coefficients remain unchanged. The coefficient on the share of for-profit nursing homes remains negative, while the coefficient on its squared term remains positive in both the OLS and 2SLS specifications. As expected, statistical precision decreases because the sample size falls from 156 to 26 observations. Nevertheless, the nonlinear relationship remains statistically significant, and the estimated coefficients are similar in magnitude to those obtained in the baseline specification. These findings indicate that the results are not driven by treating the

six quality-of-life dimensions as separate observations and continue to hold when each canton contributes only a single observation.

Table 10: Collapsed canton-level estimates

Dep. Var.: Average standardized quality regulation score	(1) 2SLS	(2) OLS
% of for-profit nursing homes	-0.0539	-0.0491
	(0.0579)	(0.0380)
(% of for-profit nursing homes)^2	0.00334*	0.00270**
	(0.00179)	(0.00115)
Canton-level controls	Yes	Yes
Population 65+ controls (share and growth)	Yes	Yes
Observations	26	26
R^2	0.650	0.672

Notes: This table reports a robustness check in which the dependent variable is the average standardized quality regulation score computed across the six quality-of-life dimensions, resulting in one observation per canton. Column (1) reports the 2SLS estimates, instrumenting the share of for-profit nursing homes and its squared term using the standardized Bartik instrument and its square. Column (2) reports the corresponding OLS estimates. Both specifications include the baseline canton-level controls reported in the baseline specification. Heteroskedasticity-robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Finally, in order to account for the fact that our baseline measure of market share does not take into account differences in the size of for-profit and not-for-profit nursing homes, we use the share of beds in for-profit nursing homes and the share of long-term care residents in for-profit nursing homes as alternative endogenous measures of for-profit market penetration. The corresponding 2SLS estimates are reported in Table 11. The results are highly consistent with the baseline specification and again support a U-shaped relationship between for-profit penetration and quality regulation. The estimated minimum is reached when the share of for-profit beds is approximately 8.53% and when the share of long-term care residents in for-profit nursing homes is approximately 9.2%, both very close to the 8.45% obtained in the baseline. Notably, in both specifications the Lind–Mehlum test confirms the U-shape under Webb wild-bootstrap inference at both bounds, so that the declining segment at low for-profit shares—imprecisely estimated in the baseline—is significant when market penetration is measured by beds or residents.

6.3.3 Placebo

Although the baseline specification controls for the overall level and evolution of demographic aging, one remaining concern is that the shift-share instrument may still capture broader cantonal characteristics associated with regulatory activity, rather than affecting nursing-home quality regulation exclusively through changes in the market share of for-profit providers. To assess this possibility, we conduct a placebo analysis using the CRED Land-Use Restrictiveness Index (CLURI) developed by Büchler and v. Ehrlich (2023), which measures the stringency of residential land-use regulation in Switzerland, a regulatory domain for which the proposed nursing-home mechanism does not apply. Because the CLURI is measured at the municipal level, we aggregate it to the cantonal level in two ways: as a simple average across the municipalities of each canton, and as an average weighted by municipal population. The two capture different notions of a canton's regulatory stance—the first treats each municipality equally, the second reflects the regulatory environment faced by the typical resident—and we report both. Following Büchler and v. Ehrlich (2023), we take the natural logarithm of the variables. We then estimate reduced-form regressions of these placebo outcomes on the standardized Bartik instrument and its squared term, while including the same set of controls as in the baseline specification. Under the exclusion restriction, the instrument should not predict regulatory outcomes outside the nursing-home sector.

Table 11: 2SLS estimates using alternative measures of for-profit market share

Dep. Var.: Regulation Quality of Life (std.)	(1) 2SLS	(2) 2SLS
Share of beds in for-profit NHs	-0.0922**	
	(0.0425)	
(Share of beds in for-profit NHs)^2	0.00540***	
	(0.00172)	
Share of long-term residents in for-profit NHs		-0.122***
		(0.0460)
(Share of long-term residents in for-profit NHs)^2		0.00661***
		(0.00191)
Baseline canton-level controls	Yes	Yes
Population 65+ controls (share and growth)	Yes	Yes
Kleibergen-Paap rk Wald F statistic	6.666	4.977
Observations	156	156
R-squared	0.453	0.449
Sanderson-Windmeijer multivariate F test of excluded instruments – share of FP nursing homes	13.46	10.76
Sanderson-Windmeijer multivariate F test of excluded instruments – (share of FP nursing homes)^2	15.13	10.19
Anderson-Rubin test p-value	0.0022	0.0022
Webb wild-bootstrap p-value (% for-profit)	0.0393	0.0241
Webb wild-bootstrap p-value (% for-profit)^2	0.0134	0.0142
Joint wild-bootstrap p-value	0.0245	0.0381
Lind–Mehlum U-test		
Lower-bound slope	-0.0922	-0.122
Conventional p-value	0.0158	0.00452
Webb wild-bootstrap p-value	0.0337	0.0227
Upper-bound slope	0.195	0.248
Conventional p-value	< 0.0001	< 0.0001
Webb wild-bootstrap p-value	0.0099	0.0381
Turning point	8.53	9.201
Overall Lind-Mehlum p-value	0.0158	0.00452

Notes: This table reports robustness checks using alternative measures of the for-profit market share. Column (1) measures market share as the share of beds in for-profit nursing homes, while Column (2) uses the share of long-term care residents in for-profit nursing homes. Both report 2SLS estimates using the corresponding Bartik instrument and its square. Both specifications include the baseline canton-level controls reported in the baseline specification. The table reports weak-identification diagnostics, Anderson–Rubin identification-robust inference, Webb wild cluster bootstrap p-values, and Lind–Mehlum U-test statistics. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 12 reports the results. Neither the standardized instrument nor its squared term is statistically significant for either version of the CLURI, and the point estimates are small: the quadratic terms are, if anything, negative, the opposite of what a general propensity to regulate would imply.

Table 12: Reduced-form placebo tests using land-use regulation

Dep. Vars.	(1) Weighted average land-use restrictive index	(2) Average land-use restrictive index
Shift-share (Bartik) instrument	-0.0327	-0.0480
	(0.0282)	(0.0299)
(Shift-share (Bartik) instrument)^2	-0.00949	-0.00531
	(0.0149)	(0.0113)
Canton-level controls	Yes	Yes
Population 65+ controls (share and growth)	Yes	Yes
Observations	26	26
R^2	0.691	0.684

Notes: This table reports reduced-form placebo regressions of two measures of land-use regulation on the standardized shift-share (Bartik) instrument and its squared term. The dependent variables are the weighted-average and average versions of the CRED Land-Use Restrictiveness Index (CLURI) (Büchler and v. Ehrlich, 2023), aggregated from the municipal to the cantonal level, weighting municipalities equally (column 2) or by population (column 1). Both specifications include the baseline canton-level controls (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT yield p.c., NB NH bed/Pop. over 80, ln population, and % urban population), as well as controls for the share of the population aged 65 and over in 2012 and its growth between 1990 and 2012 in each canton. Heteroskedasticity-robust standard errors are reported in parentheses; the placebo regressions are estimated at the canton level, so that clustering coincides with heteroskedasticity-robust inference. $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.10$.

7 Mechanism: Observable Quality and the Ordering of Turning Points

The previous section established a U-shaped relationship between the for-profit market share and the intensity of quality regulation, with an interior minimum at approximately 8.5%. The model of Section 3 attributes this pattern to the behavior of observable market quality. Building on the provider-behavior primitives of Besley and Malcomson (2018)—for-profit entrants cannot compete on unobservable quality and must therefore offer higher observable quality than the not-for-profit incumbent so long as residents retain a not-for-profit alternative—Lemma 1 predicts that observable quality is inverted U-shaped in the for-profit share: it rises while the not-for-profit sector is large enough to contest every entrant, and declines once a growing share of for-profit capacity serves captive residents. Proposition 1 adds a sharper, distinctive prediction on the *ordering* of turning points: because the effectiveness channel operates before the substitution channel is exhausted, the minimum of regulation should lie below the peak of observable quality. This section tests both predictions by examining whether the relationship between the share of for-profit nursing homes and observable quality is itself nonlinear, and where its peak lies relative to the regulation minimum estimated in Section 6.

We estimate the following model:

$$S_{i,c} = \alpha P_c + \beta P_c^2 + X_c'\gamma + Z_{i,c}'\delta + \epsilon_{i,c} \tag{9}$$

where the dependent variable $S_{i,c}$ is a measure of quality for nursing home i in canton c. We consider five measures: unqualified care staff (in full-time equivalents) per 100 residents,

qualified nursing and care staff per 100 residents, total nursing and care staff per 100 residents, qualified medical staff per 1,000 days of accommodation, and the share of total staff employed as qualified nursing and care personnel. P_c denotes the share of for-profit nursing homes in canton c, X_c the same canton-level controls as in the baseline estimations, and $Z_{i,c}$ a vector of nursing-home-level controls. Standard errors are clustered at the canton level. Definitions and descriptive statistics of the variables used in this section are reported in Tables A5 and A4.

Two remarks on interpretation are in order. First, these estimates are descriptive of the mechanism rather than causal: the canton-level endogeneity concerns discussed in Section 4.3 apply equally here. Instrumenting the for-profit share and its square at the facility level does not yield informative estimates, and we therefore treat the location of the turning points, and in particular their ordering relative to the regulation minimum of Section 6, rather than the individual coefficients, as the informative objects. Second, the staffing measures capture the observable dimension of quality on which cantonal norms are written; by construction, we make no claim about unobservable quality.

Among these measures, we regard the share of qualified staff as the preferred indicator of observable quality in our setting, for two reasons that are independent of the estimates. First, the institutional environment leaves providers little discretion over staffing *levels*: prices are fixed at the federal level and cantonal care-intensity assessments largely pin down total staffing requirements, so the skill *composition* of staff is the margin on which quality competition can operate. Second, staff qualification is a standard quality indicator in the literature on ownership and care quality: Broms *et al.* (2024) document that nonprofit homes employ more educated personnel, and skill mix is among the quality dimensions on which ownership differences are most consistently found. Staffing levels and medical staffing are reported as complementary measures.

Results are reported in Table 13. For our preferred measure, the inverted U-shape is established in full: the share of qualified nursing and care staff (Column 5) rises with for-profit penetration up to a peak of approximately 17.1% and declines thereafter, with a significantly positive slope at the lower bound and a significantly negative slope at the upper bound of the observed support under both conventional and Webb wild-bootstrap inference (overall Lind–Mehlum $p = 0.013$ conventional, 0.045 bootstrap). The complementary measures—qualified staffing levels and qualified medical staff (Columns 2 and 4)—display the same concave pattern; for both, the decline beyond the turning point is robust, with upper-bound slopes significant under both inference methods, while the rising segment at low for-profit shares is imprecisely estimated. The remaining columns support a compositional reading of these results. Total nursing and care staff (Column 3) shows no significant relationship with the for-profit share, suggesting that the margin of adjustment is the composition of staff rather than its overall level. Column (1) corroborates this: unqualified staffing declines at low for-profit shares (with a lower-bound slope of -0.440, significant at the 10% level), mirroring the rise in qualified staffing, so that the skill-share result in Column (5) reflects movements of both its numerator and its denominator in the directions the mechanism requires, rather than an artifact of the ratio. Figure 8 illustrates the estimated relationship for the share of qualified nursing and care staff in total staff. The curve reaches its maximum at a for-profit share of approximately 17.13%, and the 95% Fieller interval for this turning point, [7.46, 21.54], lies entirely within the observed range of for-profit shares. The peak is therefore identified as an interior maximum rather than extrapolated from the fitted quadratic.

Together with the baseline results of Section 6, this estimate speaks to the model's predictions in two ways. First, the regulation minimum ($P_R \approx 8.45\%$) lies below the peak of observable quality ($\bar{P} \approx 17.13\%$), the ordering predicted by Proposition 1: the regulator begins tightening while quality is still rising, as the model implies when the effectiveness channel operates ahead of the substitution channel. Under a pure substitution mechanism ($\varphi' \equiv 0$) the two turning points would coincide. We note, however, that the difference is not precisely estimated: the

95% Fieller intervals for the two turning points ([−11.3, 12.5] and [7.5, 21.5]) overlap, so that the point estimates are consistent with the predicted ordering without establishing it. Second, under the quadratic specification the for-profit share at which regulation returns to its level in a fully not-for-profit market is mechanically twice the regulation minimum, approximately 17.0% (Figure 6). That this point essentially coincides with the estimated quality peak (17.1%) admits a natural interpretation: regulatory stringency exceeds its pure not-for-profit benchmark precisely where further for-profit entry begins to reduce observable quality—the region in which, in the language of the model, competitive discipline has eroded and regulation replaces it.

Thus, the evidence indicates that observable quality—most clearly, the qualification mix of staff—first improves and then deteriorates as for-profit penetration rises, with the deterioration beyond the turning point corroborated across all qualified-staffing measures. These findings accord with Lemma 1 and Proposition 1: competition initially strengthens quality incentives, which reduces the need for regulation, and the regulator begins tightening before quality peaks, anticipating the erosion of competitive discipline rather than merely reacting to it.

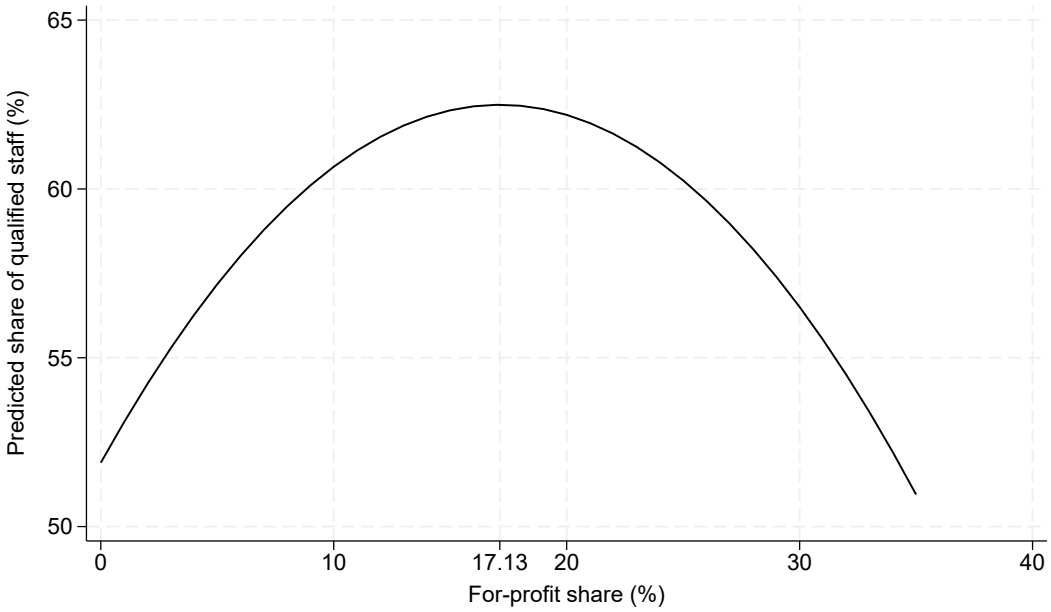
Table 13: For-profit market share and observable quality

Dep. Vars.	(1) Unqualified care staff per 100 residents	(2) Qualified nursing and care staff per 100 residents	(3) Total nursing and care staff per 100 residents	(4) Qualified medical staff per 1,000 days	(5) Share of qualified care staff (%)
% of for-profit nursing homes	-0.440*	0.261	-0.180	0.0109	1.238**
	(0.250)	(0.245)	(0.271)	(0.0145)	(0.523)
(% of for-profit nursing homes)^2	0.00910	-0.0111*	-0.00199	-0.000516*	-0.0361**
	(0.00626)	(0.00546)	(0.00459)	(0.000293)	(0.0131)
Observations	1,204	1,204	1,204	1,203	1,203
R-squared	0.455	0.647	0.591	0.179	0.193
Lind–Mehlum inverted-U test					
Lower-bound slope		0.261		0.0109	1.238
Conventional p-value		0.148		0.230	0.0130
Webb wild-bootstrap p-value		0.191		0.282	0.0448
Upper-bound slope		-0.748		-0.0360	-2.0471
Conventional p-value		0.00686		0.00839	0.00364
Webb wild-bootstrap p-value		0.0247		0.0242	0.0244
Turning point		11.770		10.554	17.128
Overall Lind–Mehlum p-value		0.148		0.230	0.0130

Notes: This table reports the estimated coefficients from OLS regressions. The dependent variables are unqualified care staff (FTE) per 100 residents, qualified nursing and care staff (FTE) per 100 residents, total nursing and care staff (FTE) per 100 residents, qualified medical staff (FTE) per 1,000 resident-days, and the share of qualified care staff over total staff. All specifications include the same canton-level controls as in the baseline estimations (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT yield p.c., NB NH beds/Pop. over 80, ln population, and % urban population), as well as nursing-home-level controls (number of acute beds, total number of long-term beds, residents' mean age, and intensity of care). Robust standard errors clustered at the canton level are reported in parentheses. Lind–Mehlum tests are reported only for specifications exhibiting an inverted-U relationship. Webb wild-bootstrap p-values are based on 9,999 replications using Webb weights. The 95% Fieller interval for the turning point is $[7.5, 21.5]$ in Column (5). $^*p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.

8 Conclusion

Public services once delivered almost exclusively by not-for-profit organizations are now provided in mixed markets, and governments must decide how stringently to regulate the quality that for-profit entrants supply. This paper has shown that the answer is not a constant but a



Notes: The curve shows the parabola corresponding to the estimated coefficients of the OLS model (Table 13, Column (5)).

Figure 8: Impact of the for-profit market shares on nursing home quality

function of the market's own composition, and that the function is not monotone. Not-for-profit competition and formal standards are alternative instruments for securing observable quality: where the first operates, the second can recede; where it fails, the second must take its place. What determines which regime a market is in is what share of for-profit capacity still faces a not-for-profit alternative—and that, in turn, is what for-profit entry progressively erodes.

We test the model's predictions on Swiss nursing-home markets, developing an index of the stringency with which each canton regulates quality of life, constructed from an instrument developed independently to survey residents. Exploiting a shift-share instrument built on predetermined elderly age composition, we find that regulation is U-shaped in the for-profit share. That the two thresholds we estimate are low—regulation turning upward at a for-profit share of 8.5%, observable quality peaking at 17.1%—is the finding with the most practical bite. It implies that the substitution between competition and regulation is not a general property of mixed markets but a narrow regime, available only where not-for-profit provision remains clearly dominant.

The model's premises—prices that do not clear the market, so that providers compete on quality; capacity that is licensed or planned, so that some consumers lack an alternative; quality with both observable and unobservable dimensions; and mixed provision by not-for-profit incumbents and for-profit entrants—are satisfied well beyond nursing homes. They characterize long-term care in most European systems and in the Medicaid-financed segment of the U.S. market; hospital care under tariff regulation or capped budgets; childcare and early-years provision with regulated fees and oversubscribed places; residential care for people with disabilities; and social housing. Preserving a not-for-profit sector large enough to contest for-profit entrants in these markets is therefore not only a question of who delivers public services, but of how much regulatory capacity governments must devote to them—and of the costs that capacity entails: enforcement, compliance, and the risk that standards divert providers' effort toward the dimensions they cover.

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Appendix A Media exposure of quality-of-life related aspects in nursing homes

The platform e-newspaperarchives.ch, operated by the Swiss National Library, provides free access to the digitized archives of Swiss newspapers. It was launched in 2011 by the Swiss National Library and the Médiathèque Valais under the name *Swiss Press Online*, and has been progressively enriched since[17]. We used the platform's search engine to record the number of occurrences of selected terms over time, in French and in German.

To account for variation in the total volume of text published, we divide the number of occurrences of the expressions of interest by the number of occurrences of the neutral term *Switzerland*. To correct for the over-representation of French-language newspapers in the database, and to treat the two language areas symmetrically, we define our variable of interest X_t as the sum of the normalized occurrences computed separately in each language area, weighted by the respective shares λ of French- and German-speakers in the Swiss population:

$$X_t = \lambda^{FRENCH} \frac{I_t^{FRENCH}}{N_t^{FRENCH}} + \lambda^{GERMAN} \frac{I_t^{GERMAN}}{N_t^{GERMAN}} \tag{10}$$

where I_t denotes occurrences of the expressions of interest and N_t occurrences of the neutral term.

Identifying articles about nursing homes. We first identify articles referring to nursing homes, including synonyms and expressions formerly used to describe them. In French, we search for *établissement médico-social* and its abbreviation *EMS*, *maison de retraite* (retirement home), and *home*, together with the plural forms of these terms. In German, we search for *Pflegeheim* and *Altersheim*. Several exclusion terms are applied to remove false positives: *Chemie*, to avoid articles concerning the chemical company EMS-Chemie; *puériculture*, *chapelle* and *messe*, which identify articles on unrelated subjects; and *CV*, *curriculum*, *offre*, *emploi* and *candidature*, which identify job advertisements for nursing-home staff. The corresponding German exclusions are *Bewerbung* (application) and *Lebenslauf* (curriculum vitae).

Quality-of-life and quality-of-care terms. We then record the joint occurrences of these nursing-home terms with terms relating to quality of life on the one hand and to quality of medical care on the other. For quality of life, we use *respect*, *confort*, *comfortable*, *agréable* (pleasant), *animation* (leisure activities), *nourriture* (food), *égards* (consideration) and *qualité de vie* (quality of life), and the corresponding German terms *Respekt*, *Komfort*, *Bequem*, *Angenehm*, *Aktivierung*, *Ernährung* and *Lebensqualität*. For quality of medical care, we use *médecin* (physician), *qualité des soins* (quality of care), *infirmière* (nurse) and *médicament* (medication), and the corresponding German terms *Arzt*, *Pflegequalität*, *Krankenschwester* and *Arzneimittel*.

Computing X_t for each decade between 1960 and 2019 yields Figure 1, presented in Section 2.

[17] At the time our searches were conducted, the collection covered regional newspapers from seven cantons in the French- and German-speaking areas. The platform has since expanded considerably and now covers all cantons. The number of titles available in Italian and Romansh was too small at the time to be included.

Appendix B Constructing the quality-of-life regulation index

B.1 Overview and coding principle

This appendix sets out the coding protocol and reports, dimension by dimension, how cantonal norms address each of the 37 quality-of-life items, together with illustrative provisions and the number of cantons concerned.

The coding instrument follows Sommerhalder *et al.* (2015). Using an externally developed instrument, rather than one constructed for this study, is deliberate: the set of quality-of-life dimensions to be coded was fixed before any cantonal norm was examined, so the items cannot have been selected in response to what cantons happen to regulate. For each canton–item pair, we assessed whether the topic covered by the survey item is addressed in that canton's binding norms, and assigned:

- **2 points—explicitly considered.** The norms contain a provision that addresses the item through a criterion whose satisfaction can be established by inspection. This includes quantitative requirements (*"in principle at least one activity per day"*), specifications of physical provisions (*"one-bed rooms of at least 20 square metres are the standard"*; *"a telephone must be available in each room"*), and required organizational structures (*"a structure such as a residents' committee"*).
- **1 point—partially or vaguely considered.** The norms address the topic, but as a general principle rather than as a verifiable criterion (*"the private sphere of the residents is respected"*; *"autonomy and independence must be preserved in all domains of life"*), or address only one component of an item whose scope is broader (several cantons require a protocol for the prevention of bedsores, which covers part but not all of the item on discomfort from prolonged immobility).
- **0 points—not considered.** The norms contain no provision bearing on the topic.

The coding was carried out independently by two of the authors, working from the same protocol and the same corpus of legal sources. Discrepancies arose almost exclusively at the boundary between enforceable criteria and general principles rather than over whether an item was addressed at all, and were resolved jointly by returning to the underlying provision.

Two conventions govern borderline cases.

(i) One provision, several items. A single provision may cover more than one item, in which case each covered item receives its score. For example, a provision requiring that daily routines follow residents' prior habits was coded as addressing items 20–22 (rising time, bedtime, choice of clothing).

(ii) Generic provisions. A provision expressing a general principle that could be read as covering many items was not coded as covering all of them. It was scored 1 on the items it names or plainly implies, and 0 elsewhere.

Three features of the procedure limit the scope for coder discretion to affect the results. *First*, the items were fixed in advance by an external instrument. *Second*, the cross-cantonal variation in the index comes entirely from items on which cantons differ, and these are the items admitting verifiable criteria; ten items are addressed by no canton at all and therefore contribute no variation. *Third*, because the raw dimension scores are bounded counts with many zeros, we re-estimate the baseline specification as a Poisson and a negative binomial model on the non-standardized scores, including dimension fixed effects to absorb differences in the number of items per dimension. This makes no cardinality assumption about the standardization.

B.2 Dimension-by-dimension discussion

Dimension of comfort. This dimension encompasses pain management (items 1 and 2), temperature in the rooms (item 3), and laundry services (items 4 and 5).

Pain management is treated in few cantons, and only in a very vague way. Regarding physical pain in general, only two cantons (Graubünden and Thurgau) impose a pain management concept, without any precise indicator. Seven cantons mention the issue of bedsores (for example Vaud: *"The protocol for the prevention and treatment of bedsores is applied in an appropriate way"*), which partly covers item 2. None of the cantons deals with comfort related to temperature, and neither of the two questions related to laundry services is considered.

Dimension of day-to-day living. This dimension encompasses leisure activities, meals, the ability to influence the life of the institution, and noise.

Leisure activities are covered in items 6 and 7. Such activities are a standard in all nursing homes, but only 15 cantons mention them in their regulations. In most of these cantons, the rules require a minimum quantity of leisure activities (for example at least one per day) and/or minimal staff requirements. Valais, for instance, states that *"a weekly leisure program must be proposed to the residents. In principle, this program must comprise at least one activity per day. Nursing homes must hire employees with an adequate training. The person in charge of the animation must have at least a 20% workload"*. By contrast, no canton has adopted norms regarding leisure activities during the weekend, although in practice many nursing homes offer them only on weekdays.

The participative approach (item 8) exists in only five cantons. It may take the form of a residents' committee, as in Fribourg: *"The institution offers the residents a structure (e.g. a residents' committee) that gives them the opportunity to make propositions and express wishes related to the life in the institution"*.

The quality of meals (items 9, 10 and 11) is often addressed through criteria such as staff qualifications and dietetic quality. Some cantons refer to the quality standards of restaurants. Item 9 is covered by 12 cantons. Regarding the possibility of eating one's favourite meal (item 10), covered by 10 cantons, we consider the criterion fulfilled when the norms mention at least the existence of a choice (St. Gallen). Lucerne goes one step further, requiring that residents have the opportunity to participate in menu planning. By contrast, only one canton (Appenzell Ausserrhoden) partially addresses the atmosphere during meals: *"The eating culture in the common rooms is oriented towards the social and cultural customs"*. Noise, covered by item 12, is treated by no canton.

Dimension of privacy. In community housing such as nursing homes, the protection of privacy is an essential component of quality of life. The possibility of being alone whenever one wants (item 13) is most often guaranteed through single rooms: *"One-bed rooms of at least 20 square metres are the standard"* (St. Gallen). We considered this topic partially treated when the cantonal norms mention privacy only in a general way, as in Vaud (*"The private sphere of the residents is respected"*). Overall, this item is fully covered by seven cantons and partially covered by one. The same criteria apply to privacy during visits (item 15). Private telephone conversations (item 14) are guaranteed where the norms require a telephone in each room, as five cantons do (AR, LU, NE, SZ, UR).

Dimension of personal autonomy. Personal autonomy is twofold. First, it encompasses freedom of movement. The ease of moving alone (item 16) is considered only by St. Gallen (*"A sufficient space is necessary so that the residents can move easily with a rollator or a wheelchair"*), whereas the questions related to easy access to personal items (items 17 and 18) received no attention.

The second component concerns residents' ability to make decisions about their day-to-day living. Eight cantons partially consider items 19 to 22. In Valais, for instance, personal autonomy is addressed only in general terms (*"Autonomy and independence must be preserved in all domains of life"*). Other cantons provide more specific provisions for one or several of

these aspects. Lucerne explicitly states that *"the residents can furnish their room with their own furniture and pictures"* (item 19), and that *"the day-to-day living is as much as possible adapted to the previous lifestyle habits of the residents"* (items 20–22). Consequently, items 19 to 22 are fully covered in two cantons. Items 23 and 24 are considered by no canton.

Dimension of individual's dignity. This dimension comprises several components. The first four items (items 25 to 28) relate to residents' dignity and respect *per se*. Items 25 and 26 are partially covered by seven cantons. These are instances of convention (i) above: a single provision covers both items, since a norm requiring respectful treatment speaks to whether residents are treated with respect (item 25) and to whether staff are polite (item 26) without distinguishing them. Lucerne, for example, states that *"the institution promotes a climate of mutual respect"*, while Valais refers to dignity (*"The dignity and personality of the residents is respected"*). Five cantons partially consider item 27, on residents being handled gently, as in Fribourg (*"Principles of comfort, dignity and safety are observed when the residents are handled, when medicines are administered, and during the meals"*). Respect for residents' modesty is likewise only partially covered, by eight cantons; in Vaud, for example, *"during medical care, the staff pays attention to preserve the habits and the modesty of the residents"*. All these norms establish general principles rather than precise, observable criteria, and items 25 to 28 are therefore coded as only partially covered.

The second component (items 29 to 31) relates to security, including both personal security and the security of personal belongings. Uri is the only canton to address general personal security explicitly, stating that *"the residents are protected by adequate means against physical and psychical violence"*. The possibility of receiving help when needed is another component of personal security: eight cantons require the presence of a nurse call system, a precise way of ensuring that residents receive appropriate help when necessary. Regarding the security of personal belongings, three cantons prescribe that rooms can be locked, which directly addresses item 31.

Dimension "human being at the center". This last dimension emphasizes the importance of human contact. Items 32 to 34 relate to the extent to which staff know residents well and are aware of their individual preferences. Three cantons cover this topic only partially, by prescribing a "life story"; St. Gallen, for example, requires that *"the resident's records encompass the following documents: [. . .] a biography"*. Five cantons provide more specific provisions. Neuchâtel requires that the life story be properly reflected in the resident's care (*"The former lifestyle habits, the abilities as well as the wishes and interests of the resident are mentioned in the individual record. These data are taken into account to elaborate a support or life project"*), and Vaud that *"the resident's personal record encompasses a life-story, and observations that contribute to the support project"*.

The possibility of chatting with employees (item 35) is never considered in the cantonal regulations. By contrast, the existence of a trusted person in whom residents can confide (item 36) is partially covered in five cantons. Uri, for example, states that *"every resident knows how and to whom he or she can express wishes and complaints"*. Only Bern provides a more specific provision, requiring that the nursing home establish a body, independent of management, to receive complaints. Cantonal complaint bodies, which exist in most cantons, are not considered to satisfy this item.

That residents know one another (item 37) is never explicitly considered, although it is partially covered in three cantons. Some cantons have norms aimed at fostering interaction among residents. Lucerne, for example, states that *"the institution promotes people-to-people contacts and organizes events that reinforce the cohesion between residents. The common rooms are furnished in a way that promotes the interactions between residents"*.

B.3 Main legal sources

For each of the 26 cantons we collected the body of binding norms governing the operation of nursing homes: cantonal health acts, ordinances, licensing directives, quality guidelines, and inspection frameworks in force at the time of coding. The complete list of legal sources, with titles and years, is given in the following Table A1. Sources were consulted in their original language (German, French, or Italian). Only norms that nursing homes are required to respect were coded—that is, provisions whose violation can in principle affect the operating authorization. Non-binding recommendations, guidance documents without regulatory force, and non-binding professional association charters were excluded.

Table A1: Main legal sources used to code the quality-of-life regulation index

Canton	Code	Main legal source	Year
Aargau	AG	Nachweis der Qualitäts- und Leistungsfähigkeit der stationären Lang-zeitpflege im Kanton Aargau (Proof of Quality and Performance of inpatient long-term care in the canton of Aargau)	2016
Appenzell Innerrhoden	AI	Gesundheitsgesetz (Health Act)	2018
Appenzell Ausserrhoden	AR	Richtlinien zur Basisqualität : Beilage 1 (Guidelines on basic quality: Appendix 1)	2016
Bern	BE	Grundlagen zur Betriebsbewilligung im Bereich der stationären Alterspflege (Fundamentals for operating authorization in the area of residential care for elderly people); Mesures limitatives de liberté en institution : normes de qualité, Recommandations de la Direction de la santé publique et de la prévoyance sociale du canton de Berne (Restrictive measures of freedom in institutions: quality standards, Reccomendations of the Directorate of Public Health and Social Welfare of the Canton of Bern); Respect des exigences liées à l'autorisation d'exploiter - Prise en charge en mode résidentiel des personnes âgées tributaires de soins (Compliance with operating permit requirements - Residential care for elderly people dependent on care)	2013; 2014; 2013
Basel-Landschaft	BL	Qualivista 2013 (Quality assessment framework for nursing homes)	2013
Basel-Stadt	BS	Qualivista 2013 (Quality assessment framework for nursing homes)	2013
Fribourg	FR	Document cantonal de référence pour l'évaluation des établissements de soins pour personnes âgées: Formulaire de visite d'inspection (Cantonal reference document for the evaluation of care facilities for the elderly: inspection visit form)	2018
Geneva	GE	Loi sur la gestion des établissements pour personnes âgées (Act on the management of elderly care facilities)	2016
Glarus	GL	Richtlinien für die Erteilung von Betriebsbewilligungen für stationäre Einrichtungen (Guidelines for the granting of operating licenses for inpatient facilities)	2019
Grisons	GR	Qualitätsvorgaben für die Erteilung von Betriebsbewilligungen im stationären Langzeitbereich; Indikatorenliste (Quality standards for granting operating licenses in inpatient long-term care; List of indicators)	2018
Jura	JU	Ordonnance sur l'organisation gérontologique (Ordinance on the organization of geriatric care)	2014
Lucerne	LU	Leitfaden Q_2016 zu Q_2008 (Q_2016 Guidelines for the Q_2008 Quality Framework)	2016
Neuchâtel	NE	Rapport de visite relatif aux établissements médico-sociaux (Inspection report for nursing homes)	2013
Nidwalden	NW	Richtlinie - Mindestanforderungen an Alters- und Pflegeheime in Bezug auf Einstufungskategorien (Guideline - Minimum requirements for retirement and nursing homes with regard to classification categories)	2016
Obwalden	OW	Gesundheitsgesetz (Health Act)	2015
St. Gallen	SG	Richtlinien zu den Qualitätsanforderungen an Pflege und Betreuung in stationären Einrichtungen für Betagte (Guidelines on quality requirements for nursing and care in residential facilities for the elderly)	2015
Schaffhausen	SH	Altersbetreuungs- und Pflegegesetz (Elderly Care and Nursing Act)	2013
Solothurn	SO	Qualivista 2013 (Quality assessment framework for nursing homes)	2013
Schwyz	SZ	Qualitätsrichtlinien in Alters- und Pflegeheimen (Quality guidelines for Residential care and nursing homes)	2014
Thurgau	TG	Weisungen des Departementes für Finanzen und Soziales betreffend die Bewilligung und den Betrieb von Einrichtungen für pflegebedürftige Menschen (Pflegeheime) (Directives of the Department of Finance and Social Affairs concerning the licensing and operation of facilities for people in need of care (nursing homes))	2016
Ticino	TI	Sistema di promozione e controllo di qualità e Bientraitance (Promotion and quality control system and Bientraitance - respectful care)	2020
Uri	UR	Urner Qualitätssystem der stationären Betreuung und Pflege Struktur (Uri quality system for residential care and nursing - structural standards)	2014
Vaud	VD	Explicatif des inspections ciblées en établissement médico-social et division C d'hôpital (Guidance on targeted inspections in nursing homes and division C hospital)	2019
Valais	VS	Directives du Département de la Santé, des Affaires Sociales et de la Culture concernant l'autorisation d'exploiter un établissement médico-social (Directives of the Department of Health, Social Affairs and Culture on the authorization to operate a nursing home)	2017
Zug	ZG	Richtlinien für stationäre Pflegeinstitutionen (Guidelines for residential nursing care institutions)	2016
Zurich	ZH	Merkblatt Betriebsbewilligung für eine Pflegeinstitution (Alters- und Pflegeheim, Pflegeheim, Pflegewohnung) (Guidance note on operating licenses for care facilities - retirement and nursing homes, nursing homes, assisted living apartments)	2017

Appendix C Tables

Table A2: 2SLS first-stage regression results

Dep. Var.	(1) % of for-profit NHs	(2) (% of for-profit NHs)^2
Shift-share (Bartik) instrument	-5.120**	-71.37
	(2.216)	(66.89)
(Shift-share (Bartik) instrument)^2	6.944***	207.8***
	(1.639)	(48.74)
Baseline canton-level controls	Yes	Yes
Population 65+ controls (share and growth)	Yes	Yes
Observations	156	156
R-squared	0.682	0.724
Sanderson–Windmeijer F statistic	21.05	14.33
Kleibergen–Paap rk Wald F statistic	5.099	

Notes: This table reports the first-stage regressions from the two-stage least squares estimation. The dependent variables are the share of for-profit nursing homes (Column 1) and its square (Column 2). The excluded instruments are the standardized shift-share (Bartik) instrument and its square. Both regressions include the same canton-level control variables as the second-stage specification (right-wing, German, % Protestants, ln GDP p.c., ln public debt p.c., ln FDT yield p.c., NB NH beds/Pop. over 80, ln population, % urban population, share of the population aged 65 and over in 2012 and its growth between 1990 and 2012). Robust standard errors clustered at the canton level are reported in parentheses. The Sanderson–Windmeijer statistic tests the strength of identification of each endogenous regressor conditional on the other; the Kleibergen–Paap statistic tests the joint strength of the two instruments for both endogenous regressors. $^*p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.

Table A3: Description and source of the variables

Variable	Definition	Source	Year
Shift-share (Bartik) instrument	Share-weighted average of national age-group growth rates between 1990 and 2012, weighted by the canton's 1990 population shares of six elderly age groups (65–69, 70–74, 75–79, 80–84, 85–89, 90+) relative to its population aged 65 and over. Standardized to mean zero and unit standard deviation before estimation.	Swiss Federal Statistical Office	1990, 2012
% Protestants	Percentage of Protestants in the canton	Swiss Federal Statistical Office	2012
% Urban population	Percentage of the population living in an urban area or suburban area	Swiss Federal Statistical Office	2012
German	Dummy taking the value 1 for German-speaking cantons and multilingual cantons with a majority of German speakers	Swiss Federal Statistical Office	2012
FDT Yield p.c.	Log of the per capita yield of the Federal Direct Tax (FDT) in the Canton (income and asset tax on natural persons)	Swiss Federal Tax Administration	2012
Ln GDP p.c.	Cantonal Ln GDP p.c.	Swiss Federal Statistical Office	2012
Ln Population	Log of the total cantonal population	Swiss Federal Statistical Office	2012
Ln public debt p.c.	Log of the per capita debt of public administrations (canton and municipalities)	Swiss Federal Statistical Office	2012
NH beds per 100 pop. 80+	Number of nursing home beds per hundred inhabitants aged 80 and over	Swiss Federal Office of Public Health	2012
Right-wing	Average score of the ideology of all the Canton's representatives in the National Council based on their roll-call votes.	Parlarating	2011
% Population 65+	Percentage of the cantonal population aged 65 and above	Swiss Federal Statistical Office	2012
% Growth in population 65+ (1990–2012)	Change of the cantonal population aged 65 and above between 1990 and 2012	Swiss Federal Statistical Office	2012

Table A4: Descriptive statistics of the nursing-home level variables used in the mechanism analysis

	Mean	**Std. Dev.**	**Min.**	**Max.**	**Source of the data**
Unqualified care staff (Full time equivalent - FTE) per 100 residents	9.482	3.447	2.716	16.731	Swiss Federal Office of Public Health
Qualified nursing and care staff (FTE) per 100 residents	24.317	4.638	13.608	34.457	Swiss Federal Office of Public Health
Total nursing and care staff (FTE) per 100 residents	33.799	3.925	22.285	45.559	Swiss Federal Office of Public Health
Medical staff per 100 days	0.925	0.420	0.2	7.9	Swiss Federal Office of Public Health
Share of qualified care staff(%)	57.539	16.625	14	100	Swiss Federal Office of Public Health
Number of acute beds	0.102	1.018	0	15	Swiss Federal Office of Public Health
Number of long-term beds	66.436	40.347	9	331	Swiss Federal Office of Public Health
Average age of residents	82.248	2.983	59.2	90.2	Swiss Federal Office of Public Health
Intensity of care	5.788	1.646	1.726	11.391	Swiss Federal Office of Public Health

Table A5: Description and source of the variables used in the mechanism analysis

Variable	Definition	Source	Year
Unqualified care staff (FTE) per 100 residents	Care staff (FTE – full-time equivalent) per 100 residents without formal qualification	Swiss Health Observatory	2012
Qualified nursing and care staff (FTE) per 100 residents	Nursing and care staff (FTE) per 100 residents with a tertiary or upper-secondary vocational qualification	Swiss Health Observatory	2012
Total nursing and care staff (FTE) per 100 residents	Total nursing and care staff (FTE) per 100 residents	Swiss Health Observatory	2012
Medical staff per 1,000 days	Number of full-time equivalent qualified medical staff (doctors and qualified nurses) per 1,000 resident-days	Swiss Federal Office of Public Health (FOPH)	2012
Share of qualified care staff (%)	Share of total staff employed as qualified nursing and care personnel	Swiss Federal Office of Public Health (FOPH)	2012
Nb of acute beds	Number of beds devoted to residents requiring medical care in a hospitalization phase	Swiss Federal Office of Public Health (FOPH)	2012
Nb of long-term beds	Total number of beds	Swiss Federal Office of Public Health (FOPH)	2012
Resident's mean age	Mean age of residents at the time of the study	Swiss Federal Office of Public Health (FOPH)	2012
Intensity of care	Measure of residents' medical-care needs. The scale ranges from 1 for residents requiring up to 20 minutes of care per day to 12 for residents requiring more than 220 minutes of care per day	Swiss Federal Office of Public Health (FOPH)	2012