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ARTICLE

Competition and childcare quality: Evidence from Quebec

Vincent Chandler[1] and Maryam Dilmaghani[2]

[1]Department of Economics, University of Quebec at Outaouais, Gatineau, Quebec, Canada and [2]Department of Economics, Sobey School of Business, Saint Mary's University, Halifax, Nova Scotia, Canada
Corresponding author: Maryam Dilmaghani; Email: maryam.dilmaghani@smu.ca

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Abstract
Since 1997, the Canadian province of Quebec has put in place a heavily subsidized universal childcare program for all children under the school age. The present paper examines how the level of competition among individual providers associates with the quality of childcare in Quebec. The quality of childcare is measured by the number of violations and penalties recorded in the inspections conducted by the Quebec Ministry of Family Affairs. The analysis indicates that the intensity of parental competition for daycare spots, as opposed to childcare centres' competition to attract parents, negatively associates with the quality of childcare. Critically, this association is mainly driven by less affluent neighbourhoods. In addition, these associations are found to be stronger for more serious violations. The policy implications for both childcare quality and childcare equality are discussed.

Keywords: universal childcare; childcare quality; Quebec; Canada

I. Introduction

In recent decades, most OECD countries have experienced a surge in publically financed childcare, including Canada (Baker, 2011; Morgan, 2005; Gambaro, 2017). According to León et al. (2019), the expansion of childcare is situated within the Social Investment (SI) framework, characterized by the enhancement of welfare state services. Within the SI literature, the conflict between governmental efforts to expand childcare and the quality of care is increasingly examined (Baker, 2011; León et al., 2019). The concerns regarding the quality of publically financed "human services" range from the lack of qualified staff, brought about by poor working conditions or low pay, and distorted incentives. Free market incentives operate in ways that tie the employment terms, such as wages and promotion, to worker productivity. In contrast, the SI incentive patterns may reflect bureaucratic factors, varying by workplace jurisdiction and political considerations (León et al., 2019). Consequently, governmental intervention in childcare provision usually involves rationing and shortage (Del Boca and Vuri, 2007; Morgan, 2005). Accordingly,

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Baker (2011) notes that a full evaluation of publicly financed childcare requires a comparison between its simultaneous effects on quantity and quality.

In 1997, Quebec implemented a heavily subsidized, $5-a-day, universal childcare program for all parents, regardless of their labour market status and financial means. The intention of the policy was to enhance the quality of child education prior to school age (Legis Quebec, 1997). This social experiment has been examined in many papers, focusing on its impacts on formal childcare uptake (Kohen et al., 2008), female labour supply (Lefebvre and Merrigan, 2008), and children's outcomes (Baker et al., 2008, 2019; Haeck et al., 2015, 2018; Japel et al., 2005). Previous studies of the Quebec policy have inferred its impact on childcare quality from children's outcomes in the short and long run (Baker et al., 2019; Kottelenberg and Lehrer, 2013). The Quebec regime, incorporating both demand and supply financing, allows childcare providers to compete in order to attract users. Given this set-up, an unintended consequence of the Quebec system has been a differential competition level by neighbourhood, not envisaged during the policymaking process. Despite the vibrant literature, no attention has thus far been paid to the effects of competition among individual providers on childcare quality in Quebec. For other countries, to our knowledge, the Dutch study of Akgündüz and Plantenga (2013) is the only paper focused on the impact of competition on childcare quality. They find that a high density of daycares in a neighbourhood robustly predicts a higher quality. Their findings, in line with fundamental economic concepts, indicates that a reduced competition among providers is detrimental to the quality of childcare.

In this paper, we first show that the Quebec system, although often referred to as a "universal childcare", has given rise to an effective rationing. In addition, we document that the intensity of competition among parents to obtain a daycare spot, termed "market tightness", varies across Quebec neighbourhoods. Next, we assess the impact of market tightness on the quality of childcare, as measured by the number of regulation violations and penalties of Quebec daycares recorded by official inspectors. The results indicate a robust positive association, albeit small, between market tightness and the number of violations and penalties; hence, a negative association between market tightness and childcare quality. This consequence of the Quebec program has been previously overlooked in the Canadian studies. Since market tightness is responsive to a variety of policy interventions, our results have important implications. Our contributions are also significant for employing a childcare quality metric never used before, which captures both the number and the severity of violations. Our metrics present at least two advantages compared with the Dutch study of Akgündüz and Plantenga (2013), the only previous paper of the kind, which relies on the observed quality of interactions between children and educators. First, our metrics measure the critical aspects of care, failure in which may cause substantial harm to children (e.g. presence of expired food or hazardous material). Second, our metrics are largely impervious to daycare staffs' attempts to elicit more favourable evaluations from the inspectors – for example, by engaging in more educational activities in their presence than they would otherwise do. In the remainder of this study, Section II provides a brief background on the Quebec childcare system. The literature review is provided next. Section IV presents the data. The methodology is outlined in Section V, and the results are discussed in Section VI. The concluding remarks follow.

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II. Quebec Childcare Model

In 1997, the provincial government of Quebec implemented the "Quebec Educational Childcare Act" (the Act, hereafter), whose *rationale* was to improve child education prior to school age.[1] The Act entailed the universal availability of a $5-a-day childcare regardless of parental income. The goal of universal availability to parents of all circumstances distinguishes the Quebec regime from other subsidized systems, where parental characteristics are taken into account in order to implement a rationing rule (Del Boca and Vuri, 2007). The program incorporates directly funded not-for-profit centres, referred to as the CPEs (based on *Centres de la Petite Enfance* in French) as well as private for-profit daycares which also receive some direct funding (Cleveland et al., 2021). Parents using the non-CPE daycares are eligible for a capped tax refund (Revenue Quebec, 2022). Given the higher childcare quality of the CPEs (Japel et al., 2005), they are significantly more desirable with a 100% uptake (Kohen et al., 2008). Currently, the CPE spots, which are allocated through a lottery system, stand largely below the demand, and private for-profit daycares (non-CPEs) pick up the slack.

Prior to the Act, Quebec government provided small grants to daycares, and subsidies/tax credits to parents, who faced prices between $20 and $25 per day. Then, the governmental costs amounted to a small sum, compared with the post-policy expenditures, comprising tax credits to non-CPE using parents, CPE fundings, and per child subsidies to non-CPE providers. In 1997, the first year of the policy, governmental childcare costs were $288 million. By 2012, these costs rose to $2.2 billion. For the first cohort enrolled in 1997, the governmental annual costs for a single spot were $3,888, rising to $10,210 per spot in 2012 (all nominal values). The main cause of this rise in the expenditure was the negligible price hike for parents (from $5 in 1997 to $7 in 2004, and $8.35 in 2019; all nominal values), in face of substantial improvements in employment terms of child educators, who became generally unionized (Haeck et al., 2015). Staff unionization, in principle, must exercise a positive impact on childcare quality (Morgan, 2005). In Quebec's childcare context, unionization is much greater among CPE employees compared with non-CPE workers, and robust evidence exists for the higher quality of the former (Japel et al., 2005). Currently, Quebec daycares are funded according to a complex formula, accounting for children's age groups. In 2020, this formula granted daycares $54.61/day/child for children younger than 17 months, $34.43/day/child for those between 18 and 47 months, and $27.70/day/child for those between 48 and 59 months, on the top of the fees paid by parents. In addition, the formula reimburses daycares for certain operating costs, like wages and rent. Finally, it further compensates daycares operating in difficult environments. For example, daycares with at least 8% enrolment from welfare recipient families obtain a 3% increase in funding. This bonus increases up to a maximum of 11.5%, when the proportion from welfare recipient families rises (QMFA, 2020a).

The reduction in parental childcare costs proceeding from the Act varied by household income. Before the Act, for a middle (high) income family, after receiving the tax refunds from both federal and provincial governments, the net childcare cost was around $11 ($16) per day (Baril et al., 2000). In the lowest income bracket, the net price was around $5 per day, while welfare recipient mothers paid only $3 a day.

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After the Act, childcare cost remained at $3 per day for the latter group, while it dropped to $5 a day for all others. Hence, the cost reduction proceeding from the Act was more important for middle and high income families (Baril et al., 2000). Evidently, this is somewhat problematic from the stand point of income redistribution (Neimanns, 2021; Lefebvre et al., 2009). Consistent with the cost reduction differences, the rise in formal childcare uptake was higher among more affluent households (Kohen et al., 2008; Lefebvre et al., 2009). Childcare uptake by more affluent households improves childcare quality, as these parents are usually more out-spoken about inadequacies of daycares and contribute to the enforcement of regulations (Kohen et al., 2008).

III. Literature Review

In recent decades, the provision of state-subsidized childcare has expanded in many OECD countries, including Canada, especially in its francophone province of Quebec. These policies aim at improving parental work-life balance and increasing gender equality by weakening the male breadwinner model (Beaujot et al., 2013; Dilmaghani and Tabvuma, 2022). The OECD countries widely differ in the extent to which they subsidize childcare. Relying on the "varieties of capitalism" (VOC) framework and examining childcare policies in France, Sweden and the US, Morgan (2005) notes the nature of workforce as a main differentiating factor among these countries. Within the VOC framework, the cross-country differences in childcare production reflect deep-seated differences in available labour force and the strength of unions. For example, social policies in Sweden and France generally utilize a high skill and high wage unionized workforce, which given its costs, requires substantial subsidies. Conversely, the US leaves many welfare services, such as childcare, to private markets that in turn, rely on a low-wage, low-skill workforce, generating a "junk job" quality in the sector (Esping-Andersen, 1990; Morgan, 2005). Workforce qualification is crucially impactful for the quality of human services. Relying on public financing, the Quebec system does not fully align with any of these previous models (Haeck et al., 2015).

The public finance burden of the Quebec system has been subject to controversial debates (Fortin, 2017; Geloso, 2015; Lefebvre and Merrigan, 2008). As the tax revenues from an increased female labour supply are presumed to mitigate or fully offset the costs of publicly financed childcare (Fortin 2017), the effects of such programs on female labour supply are especially important. Across countries, publically financed childcare is shown to have small to moderate positive effects on mothers' labour supply (Del Boca and Vuri, 2007; Gustafsson and Stafford, 1992). For Quebec, Lefebvre and Merrigan (2008) assigned a 13% (7%) increase in female labour force participation (labour supply) to the policy. But, according to some, these effects have been over-estimated (Geloso, 2015). Notably, in Quebec of 1997, female labour force participation was below the Canadian average; but, sharply increased after the implementation of the Act. A concomitant sharp rise has been observed in Atlantic Provinces, which also had lower than average female labour force participations; but did not introduce a universal childcare. If the rise in female labour force participation in Quebec was assessed using a comparison with Atlantic Provinces, the estimated policy-induced rise would have been considerably smaller (Geloso, 2015).

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The optimality of governmental childcare costs must be viewed, not only in relation to the quantitative measures such as the rise in female labour supply, but also the quality of services (Baker, 2011). Thus far, the quality of the Quebec system has only been inferred from children's outcomes, mostly documenting negative consequences for children, especially among those enrolled in non-CPE providers (Baker, 2011; Baker et al., 2008; Haeck et al., 2015; Japel et al., 2005; Kottelenberg and Lehrer, 2013). Particularly, Baker et al. (2019) find that, among the cohorts exposed to the Quebec universal childcare, the negative effects persist, with worse health and life satisfaction outcomes as well as higher crime rates later in life. But, there are also contrary opinions (Fortin, 2017), and the quality of Quebec's childcare system is still subject to debate. We contribute to this debate relying on the fundamental economic concept that the presence of market competition generally exercises a positive effect on quality, as previously reported regarding compulsory and post-secondary education (Agasisti, 2011; Akgündüz and Plantenga, 2013).

Economic theory posits that a greater market competition reduces the price, and increases the quantity and quality (Agasisti, 2011). Competition can be incorporated within a publicly funded service by giving users a choice among multiple providers in combination with compensation through tax refunds or vouchers, as done in Quebec through the non-CPEs (Lundsgaard, 2002). When providers compete to attract users, consumer preferences and demand level are often better taken into account (Noailly and Visser, 2009). Additionally, based on previous users' experiences, parents can screen out unsatisfactory providers. However, if parental choice is constrained by supply limitations, as in Quebec, this screening will not be possible. In addition, since the actual childcare users, i.e. children, have imperfect communication skills and judgment, parental quality assessment can be noisy and inaccurate (Mocan, 2007). As a result, there are important informational asymmetries in the childcare market to be exploited for profit, at the detriment of childcare quality (Cleveland and Krashinsky, 2009; Mocan, 2007; Noailly and Visser, 2009). One way to remedy this issue is the implementation of oversight to assess compliance with pre-set rules and the enforcement of penalties in case of infringement. This is the approach taken in Quebec, and such inspection data are the basis of our analysis.

For imperfectly competitive systems such as Quebec's, there are also concerns regarding childcare equality. First, if providers compete on price and cut back on quality to do so, a "race to the bottom" can happen (Akgündüz and Plantenga, 2013; Lundsgaard, 2002; Morgan, 2005). Given the sensitivity of childcare demand to the transportation costs (Cleveland and Krashinsky, 2009), this race to the bottom may be confined to the providers catering to less affluent neighbourhoods and their disadvantaged households (Noailly and Visser, 2009). In contrast, a race to the top, given that both demand and supply financing are capped, is more likely among centres serving affluent parents. Second, even within a neighbourhood, if users substantially differ in their costs to providers, the "cream skimming" problem can emerge (Pennerstorfer and Pennerstorfer, 2021), where daycares will try to attract less demanding users and reject disadvantaged children who would show a greater level of problematic behaviour (Noailly and Visser, 2009).

Owing to the lack of appropriate data, the scholarship on the impact of competition on childcare quality is limited. Relying on the Netherlands' Child Care

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Act of 2005, which opened daycare market to competition, Akgündüz and Plantenga (2013) is the only study to examine the effects of competition on childcare quality. They proxy competition level by the density of daycares in an area and childcare quality by a measure based on child-educator interaction. They find that a high density of daycares in a neighbourhood robustly, though modestly, associates with a higher childcare quality. In Quebec, a similar pattern of differential daycare density, hence market power, by neighbourhood exists. Accordingly, we hypothesize a negative relationship between the providers' market power and childcare quality. Measuring childcare quality by official records of violations/penalties of daycares, we empirically verify this hypothesis.

IV. Data and Descriptive Statistics

In this study, we combined data from three sources to create a dataset that covers all Quebec neighbourhoods, identified by the first 3 digits of their postal codes. The first data source contains the records of daycare visits conducted by the Quebec Ministry of Family Affairs (QMFA). This dataset contains 67,071 violations/penalties noted for 3,276 Quebec daycares between 2013 and 2018. The violations were noted during visits pertaining to either a license renewal or a complaint by a parent. Regardless of the type of visit, childcare centres do not precisely know when the inspection will take place. Therefore, they are unable to prepare for it. This dataset is available online for public consultation (QMFA, 2020b). The second data source contains the characteristics of daycares, such as location and the number of available spots. Our final dataset is the 2016 Canadian Census, with information on socioeconomic characteristics of neighbourhoods, aggregated over the first 3 digits of postal codes. These characteristics comprise the number of residents by age group, proportion of residents with/without a high school diploma, and average income. These three data sources are merged with each other over the first 3 digits of postal codes, linking daycare characteristics and daycare violation/penalties with the socioeconomic characteristics of the neighbourhoods in which they are located. [2]

During a visit, an inspector verifies whether the daycare complies with the Law and Regulations on the Educational Care Services of Children. Some recorded violations are trivial, such as keeping an up-to-date paperwork on a child, while others are serious, like the presence of hazardous materials or play structures. The violations could either directly reduce quality of care, if they cause harm to children, or indirectly signal a general pattern of neglect within the centre. This neglect could be associated with other unobserved behaviour among daycare staff. In either case, more violations indicate a lower quality of childcare. As such, while our measure of quality strongly overlaps with safety measures, we believe, it is a good reflection of unobserved behaviours of the staff, which critically impact childcare quality. Table 1 provides a list of the violations noted in our dataset. As shown in Table 1, the violations range from the quality of paperwork (e.g. R123) to the qualifications of child-minders (e.g. R20). To distinguish between petty and serious violations, we differentiate between violations that do not result in fines, and those that do. We simply refer to the former as "violations", while we call the latter "penalties." Figures 1 and 2 show the distribution of violations and penalties, respectively.

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Table 1. List of Violations and Penalties

Violation	Definition	Cases (#)	Penalty
R118	The childcare provider must ensure that medication intended for a child receiving childcare is only kept and administered if its administration is authorized in writing by the parent and by a health care professional authorized by law to prescribe the medication.	8,928	Yes
R25	A permit holder must keep the following up-to-date documents at the address where the holder operates a childcare centre or, in the case of a day care centre, at the address where childcare is provided	4,150	No
R121.9	The childcare provider must ensure that toxic products and cleaning products are clearly labelled and stored out of the reach of children in a locked storage space reserved for that purpose.	4,084	Yes
R121	Despite sections 116 and 118, a childcare provider may supply, keep and administer acetaminophen to any child without the authorization of a accredited health care professional, but only in accordance with the protocol in Schedule II duly signed by the parent. However, if the acetaminophen is supplied by the parent, its container must be clearly marked with the name of the child concerned.	3,222	Yes
R112	A childcare provider other than a home childcare provider must post the weekly menu for consultation by the staff and parents and ensure that the meals and snacks served to the children conform to the menu. A home childcare provider must inform parents of the contents of the meals and snacks served to the children.	3,215	Yes
R101	A childcare provider must post near the telephone provided for in section 34 or 91, as the case may be, a list of the telephone numbers for the following organisations: (. . .)	3,143	Yes
R34	A permit holder must equip the premises of every facility operated by the permit holder with the following units: (. . .)	2,986	Yes
R122	A childcare provider must keep for each child, in accordance with section 58 of the Act, a registration card recording the following information: (. . .)	2,736	No
R121.4	A childcare provider must ensure that medication is stored in a storage space out of the reach of children and away from food, toxic products and cleaning products. The permit holder must keep the storage space locked.	2,670	Yes
R121.3	The childcare provider must keep the medication administration sheet, the administration protocols and the authorizations, if required, in a file reserved for that purpose, kept on the premises and available for consultation by a person administering medication.	2,460	Yes
R120	Despite section 118, the childcare provider may administer saline nasal drops, an oral hydration solution, diaper rash cream, lubricant jelly in single-dose packs for taking a child's temperature, moisturizing cream, lip balm, calamine lotion or sunscreen cream to a child without the authorization of an accredited health care professional.	2,082	Yes
R38	A permit holder must ensure that circulation areas, play areas and service areas are safe, clean, well maintained and free of all obstacles that may block circulation or limit their use.	2,042	Yes

(*Continued*)

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Table 1. (*Continued*)

Violation	Definition	Cases (#)	Penalty
R121.2	The childcare provider must keep a medication administration sheet for each child receiving childcare.	2,036	Yes
R123	A childcare provider must keep, in accordance with section 58 of the Act, an attendance card recording the following information: (. . .)	2,016	No
R116	A childcare provider may not keep any medication that is not in its original container or packaging, as the case may be, clearly labelled and marked with the name of the person for whom it is intended.	1,824	Yes
R4	A permit applicant or permit holder must ensure that no person of full age working in the applicant's or holder's facility during the hours when childcare services are provided, including a trainee or volunteer who is present on a regular basis, has an impediment related to the abilities and conduct required to hold a position in a childcare centre or a day care centre, unless the impediment relates to an indictable or criminal offence other than an offence listed in Schedule 2 to the Criminal Records Act (R.S.C. 1985, c. C-47) for which a pardon has been granted.	1,651	No
R35	A permit holder must have, for the children receiving childcare, (1) games and educational material relevant to the educational program and suitable to the age and number of the children; (2) a sufficient number of seats and tables of a suitable size for the children; (3) a sufficient quantity of bedding, facecloths and towels; and (4) storage within the reach of the children for games and material.	1,421	Yes
R38.1	A permit holder must ensure that all equipment, furnishings and play materials on the premises are kept clean, in good condition or repaired so that they may be used as originally intended and disinfected regularly when the children are absent. The permit holder must also ensure that they are used safely and do not present any potential dangers by reason of their nature, the place where they are used and the presence of children.	1,387	Yes
R20	A permit holder must ensure that each childcare staff member holds a certificate not older than 3 years attesting that the member has successfully completed a minimum 8-hour early childhood first aid course including a component on the management of severe allergic reactions or a minimum 6-hour refresher course updating the knowledge acquired as part of the early childhood first aid course.	1,373	No
R121.1	A permit holder must designate one or more persons, in writing, to administer medication in each facility.	1,105	Yes

Note: The data are from Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn

As shown in these figures, both distributions are non-symmetric and skewed towards the right.

The violations (penalties) are then transformed into proxies for the quality of centres. First, we sum the total number of violations (penalties) throughout the 6-year period. This measure could be biased towards larger daycares which deal with

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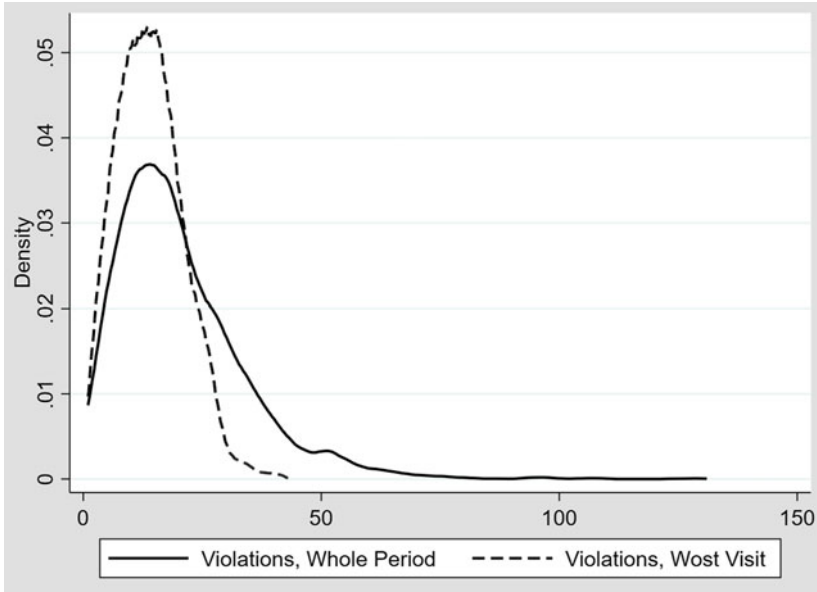


Figure 1. Distributions of Violations.
Note: The data are from the 2 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h

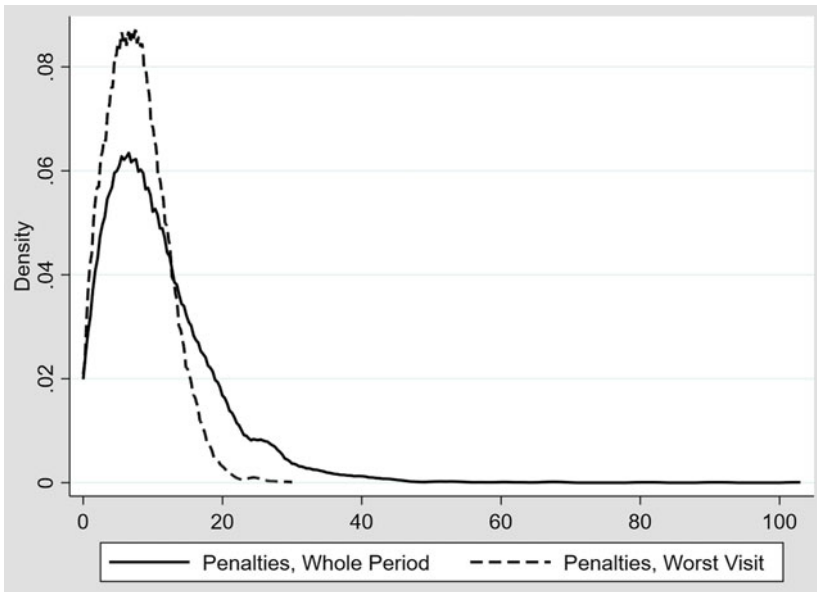


Figure 2. Distributions of Penalties.
Note: The data are from the 2 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h

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more families, thereby are likely to face more scrutiny and complaints from parents. More complains result in more inspections, and thus more recorded violations. Similarly, centers in relatively wealthy neighbourhoods are likely to face more complaints, because parents in these areas may be more demanding (Kohen et al., 2008). To remedy these issues, we use a second set of metrics which only accounts for the visit with the greatest number of violations (penalties). By only focusing on the worst visit, we level the playing field among childcare centres.

Our second dataset contains general information on each childcare centre – that is, the address, the number of spots, and the type of childcare centre (CPE or non-CPE). This dataset is also available online (QMFA, 2020c). In addition to certain pivotal characteristics of daycares, this dataset includes information on the location of centres, allowing to control for neighbourhood characteristics. Neighbourhood characteristics (e.g., income, education) and the number of young children in each neighbourhood are extracted from our third data source, the Canadian Census of 2016 (Statistics Canada, 2017). Using the first 3 digits of postal codes, we match each daycare with the socioeconomic indicators of its neighbourhood found in the Census.

Using our final dataset, we create our variable of interest: "Market Tightness." Market Tightness is formally defined as the ratio of the number of children aged 4 or below, who are the target of daycares, to the number of spots available in the neighbourhood (i.e. a given postal code). This variable, hence, indicates the extent of competition among parents to obtain a daycare spot. If the local market is very tight, many parents have to compete to obtain a spot in their neighbourhood, and individual daycares will have a lot of market power. Conversely, if the market is not tight, daycares have to court parents to fill up their centres. Our measure of "Tightness" cannot be affected by any specific centre, as no daycare can significantly increase the number of spots in a neighbourhood without a lengthy administrative process and ultimately an authorization from the provincial government.

Since Tightness scores have a distribution with a very long right tail and extreme observations could influence the regression results, we assigned a value of 10 to all daycares with a tightness score greater than 10. Figure 3 plots the distribution of Tightness scores. It shows the presence of extreme values and a bump at 10 where the values were capped. Figures 4 and 5 depict the scatterplots of Tightness scores against median income and share of adult residents with a high school diploma or below, alongside linear predictions for the relationships. As shown in Figure 4, highest values of Tightness, capped at 10, are more likely to be in neighbourhoods with a lower median income. Consistently, Figure 5 shows that Tightness is relatively higher in neighbourhoods with a lower average educational attainment. Similar patterns have been reported by Pennerstorfer and Pennerstorfer (2021). Overall, Figures 4 and 5 indicate that Tightness is uneven across Quebec neighbourhoods and sustains a negative relationship with residents' affluence.

Table 2 shows some key descriptive statistics. There are 3,271 daycares in the sample (CPEs and non-CPEs combined). As the table shows, the average daycare has 20.47 violations (10.88 penalties) over the whole period, and 14.03 violations (7.62 penalties) in the worst visit. The number of violations vary greatly from one daycare to another. The best daycare has 1 violation (no penalty) throughout the

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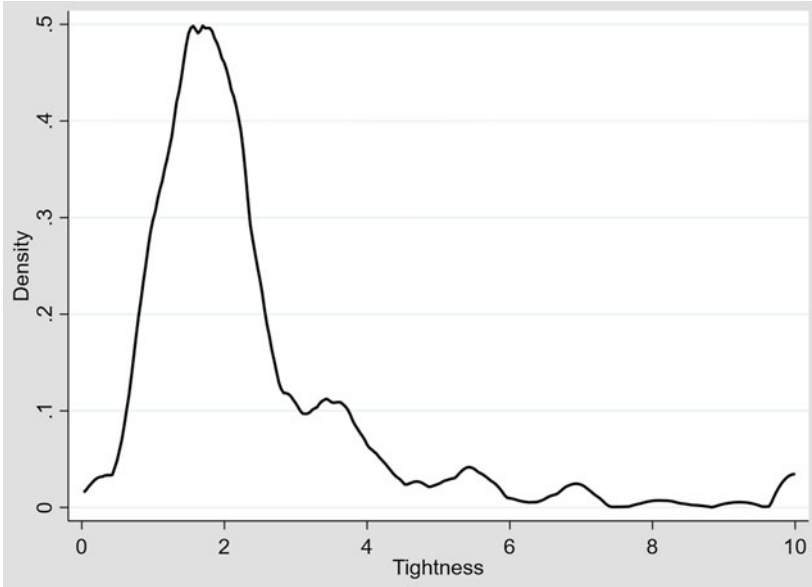


Figure 3. Distribution of Tightness.
Note: The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

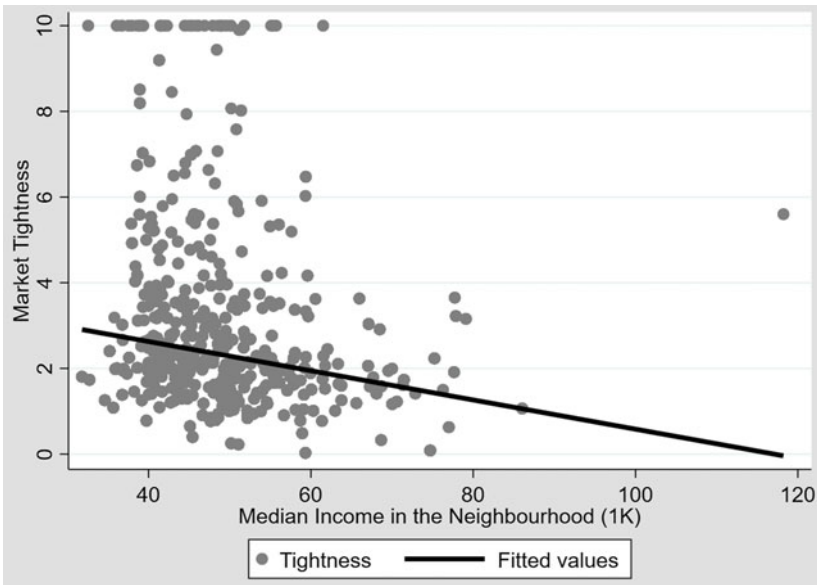


Figure 4. Tightness and Median Income.
Note: The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

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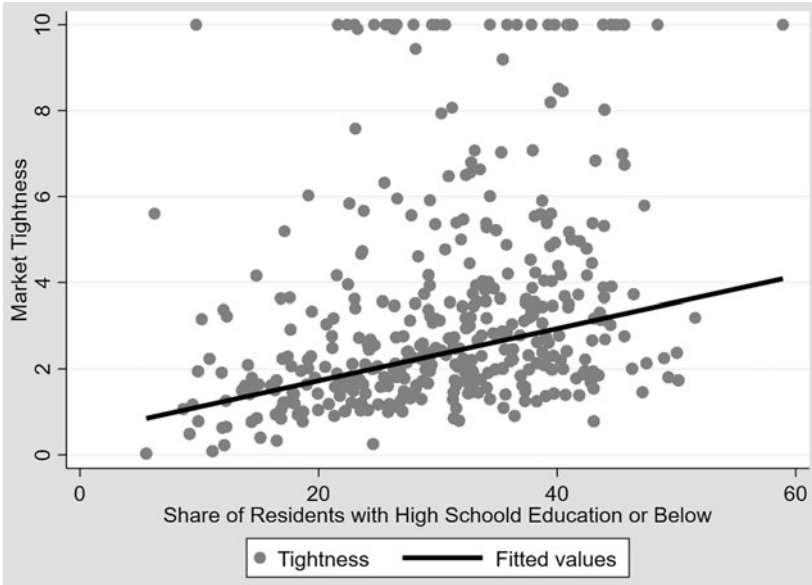


Figure 5. Tightness and Education.
Note: The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

period, while the worst one has 131 violations (103 penalties). The average daycare size is 59.5 spots and the average number of spots in a neighbourhood is 486. As reported in the table, just above 37% of Quebec daycares are CPEs. At the individual level, the median income in the sample is $48,000, and just above 30% of adult residents have an educational attainment at high school diploma or below. Wealthy (poor) neighbourhoods are defined as those with top (bottom) 10% of mean income. Using these definitions, 12.1% and 8.4% of daycares are in poor and wealthy neighbourhoods, respectively. Finally, 9.69% of the daycares are in rural areas.

V. Methodology

Using our dataset, we estimated the equation below:

$$Y_i^j = \beta_0 + \beta_1 Tightness_i + \beta_2 CPE_i + \sum_{\alpha=1}^{2} \beta_{2+\alpha} Spots_i^{\alpha} + X_i\delta + u_i \quad \mathbf{j} = 1, \ldots, 4$$

We employ 4 different dependent variables denoted by Y_i^j. First, we use the total number of violations during the period. This indicator also comprises inspections in response to a complaint and its follow-up visits – therefore, it is affected by parental propensity to complain. Second, we use the number of violations during the visit with the largest number of violations (Worst Visit), usually related to the license renewal every 5 years. This dependent variable is less sensitive to daycare

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Table 2. Descriptive Statistics

Variable	Mean	Variance
Number of violations, whole period	20.47	187.57
Number of violations, worst visit	14.03	49.5
Number of penalties, whole period	10.88	8.45
Number of penalties, worst visit	7.62	19.31
Tightness	2.3	2.4
CPE (%)	37.1	23.3
Number of spots/Daycare per daycare	59.5	416.5
Located in Poor neighbourhoods (%)†	12.1	10.6
Located in Wealthy neighbourhoods (%)††	8.4	7.7
Median income ('000)	48.355	70.93
Unemployment rate (%)	4.75	2.07
Share with only high school diploma or less (%)	30.18	82.08
Rural (%)	9.69	8.75
Observations	3,271	—

Note: The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

†Poor neighbourhoods are defined as those with bottom 10% of mean income.
††Wealthy neighbourhoods are defined as those with top 10% of mean income.

characteristics, such as size and parental socioeconomic status. In our third and fourth dependent variables, we proxy the "seriousness" of violations by the number of penalties over the entire period and during the worst visit, respectively. We estimate all the equations by Ordinary Least Squares (OLS).

Our variable of interest ($Tightness_i$) is defined as the ratio of the number of children aged 0-4 and the number of childcare spots in a given neighbourhood. Hence, $Tightness_i$ is a continuous indicator capturing the market power of daycare *i*. Our conception of *Tightness* as an indicator of market power relies on two assumptions. First, we assume that children go to a daycare close to their homes, as surmised in the past literature (Akgündüz and Plantenga, 2013; Cleveland and Krashinsky, 2009; Geloso, 2015; Lundsgaard, 2002). Particularly, in childcare context, the transportation costs can amount to a large portion of the total service costs to parents, confining the competition to restricted areas (Cleveland and Krashinsky, 2009). The alternative of the closeness of childcare centre to the worksite of one of the parents, according to the past literature, is less accurate. However, our assumption is clearly not true when daycares are located in postal codes without residents, i.e. large worksites, such as Montreal's International Airport, and Place-Ville-Marie (comprising four office buildings and an underground shopping plaza). Overall, five daycares are excluded for this reason. Our sensitivity tests, shown in the Appendix, further demonstrate the reliability of this assumption. Second, we

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assume that parental propensity to send a child to daycare does not meaningfully vary across neighbourhoods. To strengthen the accuracy of this assumption, we control for a variety of socioeconomic factors, included in matrix X_i.

Particularly, we include five variables to control for socioeconomic characteristics of the neighbourhoods. First, we account for income in three ways: (i) a dummy variable for daycares located in the poorest 10% of neighbourhoods; (ii) a dummy for the daycares located in the wealthiest 10%; (iii) average household income in the neighbourhood. Second, we include unemployment rate and share of adult residents with a high school diploma or below within neighbourhoods. These two variables control for the affluence of the neighbourhood in which the daycare is located. Finally, we include a dummy variable for rural postal codes, as rural areas may differ from urban or semi-urban neighbourhoods in certain unobserved characteristics. In addition, the equation controls for the CPEs using a dummy. Owing to the economies of scale, large centers likely have more streamlined processes than medium and small ones. To account for the proceeding from nonlinearities, we control for the number of spots in a daycare, denoted by $Spots_i$ and its squared form. The term u_i is the idiosyncratic error. Heteroscedasticity robust standard errors are employed in all the regressions.

VI. Results and Discussion

Table 3 presents the regression results using the first dependent variable, the total number of violations over the period. The controls are sequentially added to the equation, to demonstrate how much of the zero-order coefficient is explained away by them. To this effect, we bundle correlated variables (e.g. neighbourhood unemployment rate and average income) together. As such, the set of variables added in each column concerns a given channel of impact. Accordingly, Column (1) includes no covariate, aside from the variable of interest "Tightness." Column (2) controls for daycare type by including a dummy for the CPEs. Column (3) accounts for daycare size, by including number of spots and its squared form. Finally, Column (4) adds variables pertaining to neighbourhood affluence and a dummy for rural areas. As shown in Column (1), at the zero-order, Tightness has a highly statistically significant and positive coefficient of the magnitude 0.574, indicating that an increase in Tightness is associated with a rise in the total number of violations. With Columns (2) and (3) inclusion of daycare characteristics, this coefficient non-negligibly grows. The Column (4) inclusion of neighbourhood characteristics reduces the coefficient of Tightness back to somewhat above the zero-order coefficient, at 0.614. The coefficient for CPEs is negative and sizable, indicating their lower number of violations than the non-CPEs, congruent with their documented higher quality (Japel et al., 2005). The controls pertaining to neighbourhood affluence have sensible implications. Namely, a higher median income (higher affluence) is positively associated with the outcome, which might be due to greater parental complaints. In addition, a higher unemployment rate and a greater share of low education residents (lower affluence) are positively associated with the outcome, indicating the negative correlation of neighbourhood affluence with this childcare quality indicator.

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Table 3. Total Number of Violations, Whole Period

	No Control (1)	+Type (2)	+Size (3)	+Affluence (4)
Tightness	0.574***	0.678***	0.780***	0.614***
	(0.182)	(0.188)	(0.191)	(0.222)
CPE	—	−1.690***	−2.074***	−1.763***
		(0.504)	(0.506)	(0.508)
Number of spots/Daycare	—	—	0.205***	0.172***
			(0.054)	(0.055)
Number of spots/Daycare squared	—	—	−0.0014***	−0.0012**
			(0.0005)	(0.0005)
Poor neighbourhoods†	—	—	—	−1.159
				(0.933)
Wealthy neighbourhoods††	—	—	—	0.747
				(1.257)
Median income ('000)	—	—	—	0.174***
				(0.064)
Unemployment rate	—	—	—	−0.435*
				(0.228)
Population share with High School	—	—	—	0.229***
or below				(0.041)
Rural neighbourhoods	—	—	—	−1.101
				(1.032)
Constant	19.13***	19.52***	12.77***	1.177
	(0.456)	(0.476)	(1.424)	(4.640)
R-squared	0.006	0.009	0.018	0.033
Sample size	3,271	3,271	3,271	3,271

Note: Robust standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01. The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

†Poor neighbourhoods are defined as those with bottom 10% of mean income.
††Wealthy neighbourhoods are defined as those with top 10% of mean income.

Table 4 proceeds in the same manner as Table 3, but changes the dependent variable to the number of violations during the worst visit, usually pertaining to a licence renewal. This dependent variable is less sensitive to daycare size and parental propensity to complain. The patterns are largely similar to Table 3. But, the associations are smaller in magnitude. As shown in Column (4) of Table 4, where all

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Table 4. Number of Violations, Worst Visit

	No Control (1)	+Type (2)	+Size (3)	+Affluence (4)
Tightness	0.326***	0.446***	0.475***	0.360***
	(0.0781)	(0.0873)	(0.088)	(0.095)
CPE	—	−1.952***	−2.064***	−1.938***
		(0.247)	(0.251)	(0.252)
Number of spots/Daycare	—	—	0.0621**	0.043
			(0.030)	(0.029)
Number of spots/Daycare squared	—	—	−0.0004	−0.0003
			(0.0003)	(0.0003)
Poor neighbourhoods†	—	—	—	−0.540
				(0.461)
Wealthy neighbourhoods††	—	—	—	−0.387
				(0.640)
Median income ('000)	—	—	—	0.075**
				(0.033)
Unemployment rate	—	—	—	−0.475***
				(0.114)
Population share with High School	—	—	—	0.095***
or below				(0.021)
Rural neighbourhoods	—	—	—	−0.223
				(0.491)
Constant	13.27***	13.72***	11.71***	8.516***
	(0.217)	(0.237)	(0.815)	(2.363)
R-squared	0.007	0.024	0.027	0.045
Sample size	3,271	3,271	3,271	3,271

Note: Robust standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01. The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

†Poor neighbourhoods are defined as those with bottom 10% of mean income.
††Wealthy neighbourhoods are defined as those with top 10% of mean income.

the covariates are accounted for, the coefficient for Tightness is highly statistically significant and positive at 0.360. The sharp fall in the coefficient for "median income" (from 0.174 to 0.075) confirms the conjecture that the positive association found in Table 3 is largely due to a greater number of parental complaints, which is less influential with the dependent variable used in Column (4).

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Table 5. Total Number of Penalties, Whole Period

	No Control (1)	+Type (2)	+Size (3)	+Affluence (4)
Tightness	0.441***	0.407***	0.469***	0.376**
	(0.131)	(0.131)	(0.132)	(0.159)
CPE	—	0.566*	0.330	0.514
		(0.323)	(0.323)	(0.325)
Number of spots/Daycare	—	—	0.128***	0.108***
			(0.033)	(0.033)
Number of spots/Daycare squared	—	—	−0.0009***	−0.0008***
			(0.0003)	(0.0003)
Poor neighbourhoods†	—	—	—	−0.658
				(0.593)
Wealthy neighbourhoods††	—	—	—	0.782
				(0.764)
Median income ('000)	—	—	—	0.078**
				(0.0384)
Unemployment rate	—	—	—	−0.379***
				(0.147)
Population share with High School	—	—	—	0.132***
or below				(0.026)
Rural neighbourhoods	—	—	—	−0.953
				(0.685)
Constant	9.848***	9.719***	5.529***	0.578
	(0.311)	(0.309)	(0.852)	(2.853)
R-squared	0.009	0.010	0.019	0.034
Sample size	3,271	3,271	3,271	3,271

Note: Robust standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01. The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

†Poor neighbourhoods are defined as those with bottom 10% of mean income.
††Wealthy neighbourhoods are defined as those with top 10% of mean income.

Tables 5 and 6 switch the dependent variables to the number of penalties in the entire period and in the worst visit, respectively. These dependent variables are focused on more severe violations of daycares. The coefficients for Tightness, remaining highly statistically significant and positive, show the same pattern of growing in Columns (2) and (3) and slightly shrinking in Column (4). At the

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Table 6. Number of Penalties, Worst Visit

	No Control (1)	+Type (2)	+Size (3)	+Affluence (4)
Tightness	0.218***	0.242***	0.270***	0.197***
	(0.058)	(0.061)	(0.062)	(0.070)
CPE	—	−0.396**	−0.495***	−0.413**
		(0.160)	(0.162)	(0.162)
Number of spots/Daycare	—	—	0.049***	0.036**
			(0.017)	(0.016)
Number of spots/Daycare squared	—	—	−0.00032**	−0.00024*
			(0.0002)	(0.0001)
Poor neighbourhoods†	—	—	—	−0.294
				(0.298)
Wealthy neighbourhoods††	—	—	—	−0.085
				(0.394)
Median income ('000)	—	—	—	0.0381*
				(0.020)
Unemployment rate	—	—	—	−0.349***
				(0.074)
Population share with High School	—	—	—	0.0617***
or below				(0.013)
Rural neighbourhoods	—	—	—	−0.304
				(0.323)
Constant	7.112***	7.202***	5.520***	4.142***
	(0.150)	(0.156)	(0.478)	(1.456)
R-squared	0.008	0.010	0.016	0.036
Sample size	3,271	3,271	3,271	3,271

Note: Robust standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01. The data are from the 3 sources of (i) Inspections in childcare centres (CPE) and day care centres, available at: https://tinyurl.com/npbruwkn; (ii) Répertoires des services de garde par région administrative, available at: https://tinyurl.com/caknr74h; and (iii) Statistics Canada, Census Profile of 2016 Census, available at: https://tinyurl.com/scj2f2sv

†Poor neighbourhoods are defined as those with bottom 10% of mean income.
††Wealthy neighbourhoods are defined as those with top 10% of mean income.

zero-order, as shown in Column (1) of these tables, the coefficients for Tightness are 0.441 for the whole period and 0.218 during the worst visit. With Column (4) inclusion of all controls, the coefficients for Tightness become 0.376 for the whole period and 0.197 during the worst visit. Regarding the controls, one pattern of note is that in Table 5, where the total number of penalties is the dependent variable, the coefficient for CPEs is not statistically significant. Still, this coefficient is positive,

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Table 7. Results by Neighbourhood Characteristics

	Income			Education		Urbanity	
	Poor (1)	Average (2)	Wealthy (3)	Low (4)	High (5)	Rural (6)	Urban (7)
A. Total Number of Violations – Whole Period							
Tightness	0.738**	0.884***	0.547	0.746***	0.350	0.732	0.826***
	(0.355)	(0.240)	(0.595)	(0.248)	(0.228)	(0.454)	(0.258)
R-Squared	0.026	0.019	0.009	0.020	0.020	0.034	0.017
Sample size	393	2,602	276	1,705	1,566	317	2,954
B. Number of Violations – Worst Visit							
Tightness	0.380**	0.589***	0.0511	0.420***	0.356**	0.361*	0.497***
	(0.152)	(0.115)	(0.289)	(0.106)	(0.147)	(0.206)	(0.120)
R-squared	0.035	0.030	0.017	0.023	0.036	0.026	0.026
Sample size	393	2,602	276	1,705	1,566	317	2,954
C. Total Number of Penalties - Whole Period							
Tightness	0.461*	0.515***	0.397	0.434***	0.232	0.431	0.533***
	(0.265)	(0.153)	(0.340)	(0.171)	(0.169)	(0.271)	(0.196)
R-squared	0.035	0.019	0.008	0.025	0.012	0.056	0.016
Sample size	393	2,602	276	1,705	1,566	317	2,954
D. Number of Penalties - Worst Visit							
Tightness	0.201*	0.326***	0.125	0.226***	0.199*	0.198	0.299***
	(0.108)	(0.0799)	(0.197)	(0.0700)	(0.120)	(0.123)	(0.0936)
R-squared	0.023	0.018	0.007	0.016	0.017	0.031	0.014
Sample size	393	2,602	276	1,705	1,566	317	2,954

Note: Robust standard errors in parentheses; * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The controls (Dummy for CPEs, Number of spots/Daycare, Number of spots/Daycare Squared) are suppressed to save space. Column (1) only includes daycares in the 10% poorest neighbourhoods. Column (2) only includes daycares that are neither in the poorest 10% nor wealthiest 10% of the areas. Column (3) restricts the sample to daycares situated in the wealthiest 10% of the neighbourhoods. Column (4) restricts the sample to daycares in neighbourhoods where more than 30% of households have no post-secondary education. Column (5) includes daycares in neighbourhoods where at least 30% of households have some post-secondary education. Column (6) only includes daycares in rural areas. Column (7) restricts the sample to daycares in urban areas.

congruent with the higher quality of the CPEs compared with the non-CPEs (Japel et al., 2005).

In Table 7, the uncovered patterns are further explored, by splitting the sample across three criteria of income, education, and urbanity. The results with our 4 outcomes are shown in the 4 successive panels of A, B, C, and D. Since the sample-splitting criteria account for affluence and urbanity, the controls are reduced to daycare type (CPE or non-CPE) and the second degree polynomial for the number of spots. They are suppressed to save space. In Columns (1) to (3), the sample is split by household income into poor (10% lowest income), wealthy (10% highest

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income), and average neighbourhoods. Here, the results indicate that the association of Tightness and childcare quality is only present in poor and average neighbourhoods, at the exclusion of wealthy areas. This pattern is confirmed in Columns (4) and (5), where the sample is split by education, as the association is shown to be driven by areas with a lower average educational attainment. These findings are compatible with the incidence of a race to the bottom, noted in the past literature (Akgündüz and Plantenga, 2013; Lundsgaard, 2002; Noailly and Visser, 2009). Note that our results are not sensitive to the cut-off point of 10%, and hold with similar cut-offs.

Finally, in Columns (6) and (7) of Table 7, the sample is split into two segments of urban and rural. Here, we must note that rural areas of our sample substantially differ from each other in terms of their distance to larger urban centres and population density. These variations likely cause a differential market "thickness" (i.e. demand intensity) across rural areas, which matters for childcare quality (Cleveland and Krashinsky, 2009). However, given the small sample, we cannot further break down observations pertaining to rural areas. As shown in Columns (6) and (7), these regressions indicate a mixed pattern, and some evidence for an overall stronger association in urban areas. The root-causes of these mixed patterns are not immediately clear, and must be further explored in future scholarship, as there is evidence that geographic attributes impact the relationship between competition and childcare quality (Cleveland and Krashinsky, 2009).

In Table 8, we divide the violations in 3 categories by severity. This investigation complements our analyses of "penalties" (as opposed to mere violations), providing further evidence on the associations by seriousness of violations. The first category covers violations related to management of medications and toxins, deemed the most serious. The second category is about the quality of infrastructure, less severe than the previous category. The third category captures violations that result from incomplete documentation, least severe of all. We construct 3 new dependent variables that only count daycare violations within each category. The results are shown in Table 8, comprising 6 sets of regressions (3 sets for the Whole Period and 3 sets for the Worst Visit). To save space, the dependent variables are indicated in rows and only the coefficient of "Tightness" is shown. The results confirm the same pattern of a positive association between Tightness and Violations for Category 1 and 2. The exception pertains to the least serious set of violations (Category 3), dealing with incomplete documentation. The coefficients for Category 3 also have the expected sign; but, they are only significant at 15%. However, this pattern does not undermine our general conclusion of an inverse relationship between Tightness and childcare quality, since these violations are less consequential for daycare quality, and slipping up on them does not critically endanger or harm children.

In the sensitivity tests, we restrict the sample to neighbourhoods with limited business activities to demonstrate the robustness of the results. These tests ensure that the assumption made regarding parental propensity to use daycares close to home is accurate. More precisely, we limited our sample to the postal codes with at least 500 children, as reported in Census 2016. None of our conclusions were altered in these additional regressions. Appendix Tables show some of these sensitivity tests. The remainder of the tests are available upon request.

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Table 8. Tightness Coefficients by Violation Category†

	No Control (1)	+Type (2)	+Size (3)	+Affluence (4)
A. Number of Violations by Category - Whole Period				
1: Medications/Toxins	0.438***	0.353***	0.411***	0.309***
	(0.073)	(0.069)	(0.071)	(0.077)
2: Quality of Infrastructure	0.092	0.120**	0.142**	0.140*
	(0.056)	(0.058)	(0.058)	(0.074)
3: Incomplete Documentation	−0.045	0.058	0.064	0.070
	(0.041)	(0.041)	(0.042)	(0.049)
B. Number of Violations by Category - Worst Visit				
1: Medications/Toxins	0.246***	0.222***	0.265***	0.190***
	(0.045)	(0.045)	(0.046)	(0.047)
2: Quality of Infrastructure	0.022	0.050**	0.058***	0.051**
	(0.019)	(0.021)	(0.021)	(0.026)
3: Incomplete Documentation	−0.026	0.051**	0.042*	0.048
	(0.024)	(0.025)	(0.025)	(0.030)

Note: Robust standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01. All regressions have 3,271 observations. The controls, identical to those used in Tables 3-6, are suppressed to save space.

†In each Panel (A and B), 3 sets of sequential regressions are shown and the only reported coefficient belongs to "Tightness." The row titles indicate the type of dependent variable. The dependent variable in each category is defined as follows:

Category 1: Medication/Toxins covers the number of violations titled R118, R121, R121.1, R121.2, R121.3, R121.4, R121.9, R116.
Category 2: Quality of Infrastructure covers the number of violations titled R4, R34, R35, R38, R38.1, R120.
Category 3: Incomplete Documentation covers the number of violations titled R20, R25, R101, R112, R122, R123.

In sum, we conclude that the virtual lack of competition among Quebec daycares, their subsequent market power, and an effective rationing of childcare predict a lower overall quality as well as childcare inequality in Quebec (Akgündüz and Plantenga, 2013; Lundsgaard, 2002). When there is more competition among daycares (hence, individual daycares have a lower market power), providers have an incentive to pay more attention to quality, and employ a staff with higher skills (Morgan, 2005). While daycare evaluations are available online, the extent to which Quebec parents can account for this information in their decisions is not known. But, it is fair to assume that parental attention to these evaluations is positively associated with parental affluence. This observation reiterates the importance of our findings for childcare "equality" as well as "quality", both noted as aims of the Act (Legis Quebec, 1997). The coefficients indicate that even a relatively modest increase in number of spots could positively impact quality. In particular, with a reduction in market tightness, daycares may initially increase their quality to attract and retain more desirable parents and facilitate their operations (Dilmaghani and Tabvuma, 2022). However, over time and with increased competition, daycares will have

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less latitude in choosing children from desirable families with whom they will have less trouble, bringing about a greater childcare equality as well (Prentice and White, 2019).

VII. Concluding Remarks

Before concluding the paper, the limitations of this study must be noted. First, we cannot make any causal claim and our results reflect partial correlations. The terms effect or impact, if used, are only meant to streamline the expositions. Second, our measure of quality is mainly safety oriented. But, to the extent that ignoring daycare administration regulations reflects unobserved factors related to the quality of care, our measure is a sound proxy for the overall childcare quality. Third, the public provision of childcare has a dynamic impact on childcare demand and supply, and their determinants – such as female labour supply and the propensity to uptake formal childcare (Lefebvre et al., 2009; Noailly and Visser, 2009). However, our cross-sectional dataset (dependent on the Canadian censuses which are not available on a yearly basis) did not allow for making any dynamic consideration. Finally, given the sample size limitation, we could not make fine distinctions across rural areas, whose substantial heterogeneity is likely impactful for the relationship between competition and childcare quality (Cleveland and Krashinsky, 2009).

In the past two decades, an active literature examined the impact of Quebec's Universal Childcare Program on childcare quality and children's outcomes (Baker, 2011; Baker et al., 2019; Japel et al., 2005; Kottelenberg and Lehrer, 2013). The present study contributes to this literature by examining how market power among daycares (i.e. market tightness) associates with childcare quality. Childcare quality is measured by the number of violations and penalties recorded for Quebec daycares during their periodic inspections. These metrics are largely impervious to staff manipulation and other inaccuracies. The results indicate that market tightness positively predicts the number of violations/penalties; hence, negatively predicts childcare quality. The effect size is modest, but non-negligible. Additionally, the associations were stronger among daycares catering to less affluent households, indicating that a greater market competition may also increase childcare equality. Finally, the associations were driven by more serious violations, showcasing the importance of our results. The findings are in-line with the fundamental economic assumption that competition improves quality and efficiency (Akgündüz and Plantenga, 2013; Lundsgaard, 2002). Moreover, our results are compatible with previous studies, suggesting that competition positively, although modestly, impacts the quality of human services provided by post-secondary institutions (Agasisti, 2011). The implications of our findings are important since market tightness is responsive to a menu of policy interventions.

Public funding for human services related to health and education, inclusive of early childhood education, is necessary to promote uptake across populations (Morgan, 2005). Among these services, childcare provision, given its impact on female labour supply, gender equality, and children's outcomes, is very important. Yet, there are concerns regarding efficiency of public provision of such services, compared with the market solution (Fortin, 2017; Lundsgaard, 2002). The main

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concerns are taxpayer costs, lack of competition and its associated inefficiency, and the distorted incentives for public sector employees, limiting efforts in implementing innovative approaches towards a high quality service (Lundsgaard, 2002).

The mix of providers in Quebec lends itself to potential competition. It is hence curious to see that the directly funded childcare centres (CPEs) provide a higher quality service than the private ones (non-CPEs), which, in principle, should be more concerned about the negative effects of reputational loss on their bottom line. In light of our results, this curious case seems the consequence of a lack of viable alternatives for parents, who face an effective rationing due to the inadequate funding of the Quebec's Universal Childcare. We robustly document that the greater the gap between available daycare spots and the demand, the higher the number of violations, hence, the lower the quality of childcare. The negative relationship between market tightness and childcare quality documented here accords with fundamental economic principles and past literature (Agasisti, 2011; Akgündüz and Plantenga, 2013; Lundsgaard, 2002). In addition, we find evidence that the shortage of childcare spots (market tightness) more strongly affects childcare quality as the neighbourhood affluence falls (Figures 4-5, Table 7), and is stronger for more serious violations (Table 8).

The differential daycare market tightness across Quebec neighbourhoods may reflect the emergence of "cream skimming" and/or "race to the bottom" patterns. If true, a feedback mechanism might be at work where childcare providers choose to locate in more affluent neighbourhoods with a greater parental willingness to pay and fewer children with problematic behaviour (Dilmaghani and Tabvuma, 2022). The relative scarcity of daycares in less affluent neighbourhoods, in turn, undermines parental ability to screen out unsatisfactory providers and allows daycares to be less vigilant, widening the quality gap. Moreover, disadvantaged parents are likely to be less equipped to detect a low quality service and subsequently complain to the authorities (Mocan, 2007). These conjectures are supported by our finding that childcare quality is more sensitive to market competition in less affluent neighbourhoods (Table 7). Taken together with Table 8 results on the stronger associations regarding more serious violations, this situation is alarming as it can lead to entrenched inequalities in early childhood education. Particularly, a critically lower childcare quality in less affluent neighbourhoods, where parents have a lower socioeconomic status and financial means, suggests that these children may face a dim prospect for intergenerational mobility, despite the *rationale* of the Act (improved child education and educational equality). The obvious solution would be more funding for the childcare sector, and even the implementation of targeted programs, as recently proposed (Fortier, 2019).

However, such solutions will prove costly to the taxpayers, and hence, controversial. The Quebec childcare program has been in place for a quarter of a century. Over the course of these decades, labour market participation rate and labour supply of mothers in Quebec have arguably reached their upper limits (Geloso, 2015; Haeck et al., 2015). Therefore, a publicly funded childcare expansion will no longer be accompanied with considerable tax revenue rises, from a greater labour market involvement of mothers. Consequently, the entire burden of financing the system will be on governmental tax revenues from other sources. Implementing such solution will, hence, be politically controversial. An increase in childcare price might be less controversial and more effective, especially since, upon its inception, the program was

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financially more beneficial to middle and high income households than households in lower socioeconomic strata who already paid reduced prices. An incremental increase in price, say to $11 per day, from its current price of $8.35 raises the revenues of the CPEs by 32%, and reduces the governmental contribution they require. This price increase will also give a greater latitude to private centres to raise their prices, provide a higher quality service, and employ higher skilled staff. In fact, a federal universal childcare priced at about $15 per day has been proposed by the New Democratic Party of Canada during the 2015 Federal Election, and is still floated around in political circles (Geloso, 2015). Measures such as a greater oversight of existing centres and subsidized training programs for child educators may also improve upon the status quo. Additionally, facilitating private entry in the market, especially in neighbourhoods with great shortage, can provide incentives for existing centres to improve their quality in response to a greater effective or potential competition. This type of policy interventions can simultaneously address the overall quality and the inherent inequality of the Quebec system, which can have far-reaching negative consequences (Fortier, 2019; Prentice and White, 2019).

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Data availability statement. The data are available upon request.

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Competing interests. None.

Notes

1 The *rationale* for this program is stated in the legislation as follows: "The object of this Act is to enhance the quality of the educational services intended for children before their admission to school so as to ensure the health and safety of the children to whom childcare services are provided, particularly those with special needs or who live in a precarious socio-economic situation, foster their development, educational success and well-being and provide them with equality of opportunity" (Legis Quebec, 1997).

2 The alternative would be to merge the data by census tract. However, the use of census tracts would be less desirable for two reasons. First, census tracts are only defined for urban areas (Statistics Canada, 2018). Second, as our daycare data are by postal code, it would be extremely difficult to merge our datasets. In particular, we would need to overlay the map of census tracts over the map of postal codes to reconcile both systems. Given those difficulties, we decided to match daycares with the Census 2016 data through the 3-digit postal codes.

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