1. Introduction

There is a rich discussion regarding the relevance of market incentives in the field of educational policies. Since Friedman published his seminal work in 1962 (Friedman, 1962), promoters of these policies have argued that competition for enrollment among schools, and for subsidies when there is a voucher system, would put pressure on schools to make an effort to improve their educational quality. The Chilean case has attracted special interest because, since the early 1980s, the country has maintained an educational system in which, by design, market dynamics play a key role in the assurance of educational quality.

As we present in the next section, the literature on Chile and other countries does not have a consensus regarding the effects of school competition on educational achievement. However, all of these studies define educational quality in terms of standardized test results. Although some studies have considered the effects on other aspects such as school segregation (Hsieh and Urquiola, 2006) or the increase in school coverage (Bravo et al., 2010), the literature with a quantitative focus has not addressed the effect of market dynamics on other aspects of educational quality and the possible tension between these aspects and standardized tests.

The goal of this article is to contribute towards filling this gap. Specifically, we address the effect of competition among schools, measured as the percentage of schools in each district that are subsidized private schools, on a wide range of educational quality indicators. As in the literature that focuses on the impact of competition on standardized tests, our empirical strategy addresses the potential bias in the estimates due to the endogeneity of the level of competition among schools, using a set of instrumental variables that are related to the size of the potential demand that the schools face in each district. Failing to correct for this endogeneity could lead us to confuse the effect of competition on all these aspects of educational quality with the effect of unobserved variables — such as parent involvement — on those aspects.
measurements.

Having a broader and more diverse approach to defining educational quality is especially important when the various measurements of educational quality are not highly correlated with one another. Otherwise, there would be no issue with focused our analysis on one aspect of quality, as the current literature does. Table 1 shows the correlation between the various measures of educational quality that we use in this article. As we can see, although all of these indicators present a positive correlation, standardized tests overall (in the case of Chile, the SIMCE tests) have a high correlation and a minor correlation with other measures, particularly with healthy lifestyle habits and civic participation. Given these correlation levels, educational policy should anticipate that, if its incentives are mainly focused on improved standardized test performance, this will not necessarily imply improvements in the other indicators. In fact, as we will show in this article, there is evidence that the improvements on those tests may come at a cost for the other aspects of educational quality.

Our empirical strategy is implemented using census data for Chilean fourth grade students in 2013. The results of our estimates, which combine simple linear regressions and least square estimates in two stages, show a clear difference between the impact of competition based on standardized tests and the impact of competition on other measurements of educational quality. In the case of our most reliable estimates (using instrumental variable approach), an increase in competition by one standard deviation could increase SIMCE results by 0.06 of a standard deviation, which is consistent with the literature. However, the results also show that competition reduces all other quality indicators: the academic self-esteem and school motivation indicators decrease by 0.02 of a standard deviation, the school climate indicator by 0.1 of a standard deviation, the civic participation indicators by between 0.06 and 0.09 of a standard deviation, and the healthy lifestyle habit indicator by between 0.08 and 0.16 of a standard deviation.

The main contribution of this article is that, to the best of our knowledge, it is the first quantitative study of the impact of competition among schools on aspects of educational quality outside of standardized tests. It is worth noting that the research is conducted in the Chilean context, which represents a case study that is extremely interesting because it implemented market logic in the educational field three decades ago. Our results are consistent with the qualitative evidence available for Chile, which also find a tension between improving standardized tests and promoting more comprehensive student development (Falabella and Opazo, 2014).

This article is structured as follows. Section 2 reviews the literature. Section 3 offers a discussion of the role of standardized tests and their impact on the incentives faced by schools. In Section 4, we describe our database. Section 5 develops the empirical strategy implemented in this study. In Section 6, we discuss the main results of this research. In Section 7, we show that the results are consistent across different specifications, and finally, in Section 8, we present our conclusions.

2. Literature review

This paper is related to different strands in the academic literature. To start with, our paper is closely related to the literature that studies the effect of school competition on standardized test scores. In fact, our empirical strategy is based on the instrumental variable approach commonly used in that literature. In this context, our contribution consists of considering other measures of school quality that could be affected by school competition.

Regarding this literature and specifically for the case of Chile, there are articles that state that competition does not have an effect other than zero (McEwan and Carnoy, 2008; Hsieh and Urquiola, 2003, 2006). Others state that it would have a statistically significant and positive effect of moderate magnitudes (Gallego, 2002, 2006; Auguste and Valenzuela, 2005). Regarding evidence for other countries, Bettinger (2011) is noteworthy, reviewing comparative evidence among Colombia, Chile and Sweden, concluding that there is mixed evidence that strongly depends on the institutional specificities of each nation. For the case of Colombia, it is worth noting a few articles (Angrist et al. 2002, 2006) that identify a positive effect on standardized tests from the implementation of a voucher program focused on an at-risk sector of Colombian students (around 10% of enrollment).

Overall, as Epple et al. (2017) emphasize, this literature is characterized by mixed evidence, which explain why they argue that the evidence to date is not sufficient to warrant recommending that vouchers (i.e. school competition) be adopted on a widespread basis.

About statistical methodology, the main challenge of these studies is the endogenous nature of competition. To solve that problem the literature takes advantage of experiments, quasiexperiments, instrumental variables and panel data. Since the Chilean voucher system was implemented nationwide and simultaneously, studies addressing it only consider the last two strategies to deal with endogeneity. In particular, they consider the following instrumental variables: the (logarithm of) total enrollment of the district (Gallego, 2002); the (logarithm of) total population of the district (Hsieh and Urquiola, 2003), and the urbanization rate of the district (Auguste and Valenzuela, 2005; Gallego, 2002; Hsieh and Urquiola, 2003). In Section 5 we discuss the soundness of these instruments. Our paper uses all of them. As a robustness check and following Hsieh and Urquiola (2003), we also estimate panel data model. As opposed of them, due to data limitations, we do so by estimating a short panel model, using districts as the unit of analysis.

Depending on the period of study and certain methodological trade-offs, the models estimated in this literature have considered different units of analysis: students (Gallego, 2006); schools (McEwan and Carnoy, 2000; Gallego, 2002); and districts (Hsieh and Urquiola, 2003; Auguste and Valenzuela, 2005). While using individual or school data is better for controlling for potential confounder factors, using districts as the unit of analysis has the advantage of better dealing with the sorting of students across schools, a relevant feature in the Chilean case. Regarding this methodological discussion, we take an agnostic approach and consider all three units of analysis in the estimation of our model.

Secondly, our paper is related to the literature that discusses the nature of school quality. In this regard, Tikly and Barrett (2011) provide a useful starting point for re-conceptualizing education quality and how it can be evaluated.

The Education Quality Agency of Chile proposed a set of quality

| Table 1 | Statistical correlation between SIMCE results and other quality indicators. |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Self-esteem and motivation | School climate | Citizen Participation | Healthy lifestyle habits | Mathematics SIMCE | Language SIMCE |
| Self-esteem and motivation | 1 | | | | |
| School climate | 0.29 | 1 | | | |
| Citizen Participation | 0.26 | 0.59 | 1 | | |
| Healthy lifestyle habits | 0.25 | 0.38 | 0.41 | 1 | |
| Mathematics SIMCE | 0.24 | 0.26 | 0.11 | 0.05 | 1 |
| Language SIMCE | 0.23 | 0.26 | 0.1 | 0.04 | 0.69 | 1 |

Source: Generated by the authors based on 2013 SIMCE results and data from the 2013 Quality and Context of Education Survey given to fourth grade students, and their teachers, parents, and guardians.
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