Does profit-oriented ownership in the Swedish school sector affect its quality negatively – a quantitative panel study

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Abstract

A heavily discussed topic in Sweden the last year has been whether profits within the welfare sector should be allowed. In this paper we investigate how privately owned schools affect the Swedish school quality, focusing on profit-driven actors' impact. The effect is isolated in a two-stage analysis using fixed effect regressions. Firstly, the direct impact is analyzed by regressing quality on ownership types. The second stage evaluates the spillover effect that competition from private schools creates by regressing public school quality on ownership concentration. School quality is categorized into (1) Student outcome; grade point average on the national proficiency test and grade deflation/inflation and (2) Resources; number of students per teacher and share of teachers with a pedagogical education. While the economic impact is small, private schools create the same or better student outcome while using less resources, however with the downside of being prone to inflate grades. Thus, differences between ownership types are apparent but might be driven by agendas, student characteristics or model specifications. For the indirect spillover effect we find no significant result that an increased competitive environment affects public schools in neither a positive nor a negative manner. Consequently, our results indicate that the Swedish school sector is not negatively affected by the presence of private owners, even if they are profit-driven.

Keywords: Privatization, Profit-driven welfare, School, Education quality, Spillover

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1. Introduction

In January 2015 the Swedish government started an investigation intended to examine the effect of ownership structures on quality of provided services within the welfare sector, including the healthcare and school sector. Suggested actions are to be presented in March 2016 (Vänsterpartiet, 2014). More specifically, the possibility of legislating profit extractions for companies active in the welfare sector is assessed, with the main intent to exclude certain types of owners where a short-term perspective is perceived to jeopardize the quality of the provided services. This thesis aims to investigate how different types of ownerships affect the quality of the Swedish school sector through two stages of analysis. First the direct impact of ownership on school quality is estimated, separating private schools into private equity, other profit-driven and non-profit actors. Thereafter, the indirect effect, or spillover effect, on public school quality from added competition is analyzed, measured as the concentration of students attending schools with different private owner types within a county.

The topic and methodology is chosen with regards to recent discussions of privatization both politically and in media. Opponents of profits within the welfare sector are mainly worried about two aspects of the school market developments: quality and ownership. Sweden's performance on the Programme for International Student Assessment (PISA) declined steeper than any other country's between 2000 and 2012, indicating an urgency to improve the quality (OECD, 2015). Simultaneously, since 1992 the presence of private schools has increased, and in 2014 one out of four students attended a private school of which more than 60% were profit-driven (Friskolornas Riksförbund, 2014, Hartman 2011). In the debate, the two trends are commonly linked as being causal. Private equity owners have been particularly focused since they are driven by short-term profit-maximization and the question is if profits are prioritized before public welfare, implying a principal-agent problem (Wagner et al., 2015).

Simultaneously, current research on Swedish data find no support that private schools impact school quality negatively but stresses the importance of further research, particularly in Sweden and with regards to how competition affects the market (Strömberg 2014, Hartman 2011, Stattin 2014). Wikström and Wikström (2005), Sandström and Bergström (2005), wBergström and Sandstöm (2001) and Lundsten and Löfqvist (2011), among others, evaluated the effects of introducing private ownership in the Swedish school sector. Even if

findings were slightly different in the studies, the overall conclusion was that private actors do not affect public school performance negatively in Sweden. Another aspect of privatization commonly evaluated is grade inflation. The conclusions from these studies were however somewhat ambiguous. Vlachos (2010) and Wikström and Wikström (2005) found a statistically significant increase in grades while Sandström and Bergström (2005) did not see an effect caused by the introduction of independent schools but concluded on regional differences in grading practices.

Moreover, we review literature on resource usage, as private actors are more prone to save costs, which potentially could compromise student outcomes. Conclusions from previous research are however dispersed where Hedges et al. (1993) find a positive impact from small classes, while Hanushek (1997) concluded that student/teacher ratio and teacher education does not affect student outcome.

The main purpose with this study is to extend the, according to academics, much needed research on this topic in Sweden and the study mainly differs in two ways from previous research. Firstly, new data from the Swedish National Agency for Education (SNAE) is used where a higher prevalence of privately held schools are present. A holistic and wide approach is used in an attempt to provide a broad perspective on the impact of different ownership types rather than evaluating one aspect in isolation. Secondly, the ownership specification is differentiated. Rather than comparing private owners as a homogeneous group to public schools, we split them into different categories based on business agendas and conditions for access to capital.

The study looks at three education levels; primary school, defined as ninth graders for the years 2005-2014 and upper secondary school split into academic (AP) and vocational programs (VP), which is evaluated between 2012-2014. Two categories of dependent variables are analyzed; (1) Student outcome, measured as grade point average (GPA) on the national proficiency test (NPT) as well as potential grade inflation (deflation) as defined by the percentage of students receiving a higher (lower) final grade compared to the NPT grade and (2) Resources, measured by number of students per teacher and share of teachers with a pedagogical degree. These variables are collectively referred to as *quality* and are analyzed with regards to four types of owners; public, private not for profit, private for profit and private equity (PE).

All regressions are run with classical as well as clustered robust standard errors on county. Moreover, we use three model specifications to evaluate the robustness of the achieved results where *Specification 1* is the *Core regression, Specification 2* extends the data and *Specification 3* restricts it further. The *Core Regressions* is tested for further specifications to evaluate the impact of the control variables as well as the statistical difference between private actors.

Firstly, the direct effect is evaluated in a county and year fixed effect regression of *quality* on *ownership type*, controlling for socioeconomic, county and school specific characteristics. Secondly, using the same method the indirect effect, or spillover effect, is analyzed by regressing *public school quality* on *ownership concentration* (competition).

The results from the direct effect regressions indicate that students attending schools driven by private owners have a 0.2-0.4 higher grade point average on the national proficiency test, significant at the 10% level in primary school, while being insignificant for both academic and vocational programs. Generally no statistical differences between private actors are found. Furthermore, private for profit and PE owners inflate grades for 2-5 percentage points more of their students at the 1-10% significance level for both primary and upper secondary school and have about 3 more students per teacher while no significant effect is found for non-profit organizations. All private owners have 10-25 percentage points fewer teachers with a pedagogical education, a result being highly statistical significant.

The indirect effect of ownership concentration on public school quality is estimated on small and large counties respectively, with the cut-off point being 40,000 inhabitants. Even if some results are statistically significant no effects are economically relevant, a result that is applicable to all measures of quality. Thus, neither a negative nor a positive spillover effect from competition of profit-driven owners can be concluded.

The rest of the paper is organized as follows: Section 2 describes the background information on the Swedish grading system and the school choice reform as well as trends within the school sector. Section 3 reviews previous literature while Section 4 presents the data used as well as the retrieving process. In Section 5 the methodology for the empirical analysis is outlined. Section 6 summarizes the results, Section 7 discusses the result and potential issues. Lastly, Section 8 concludes final findings and considers future research.

2. Background

The Swedish school system

The school sector is divided into pre-, primary- and upper secondary school where students are graded on performance from 6th grade. However, up to 2012 grades were only distributed from 9th grade. For upper secondary school students are actively urged to choose a school by applying to either academic or vocational programs where academic programs (AP) prepare students for higher education whereas vocational programs (VP) prepare them for work (StuderaSmart, 2015).

The grading system is goal- and knowledge-based in relation to national requirements. Until 2011 the scale was G (pass), VG (pass with distinction) and MVG (pass with special distinction) for primary school whereas the upper secondary school also had IG (fail). Today, passing grades are on a five graded scale, A-E, and F for fail, where the minimum passing points has remained at 10 and the maximum at 20. See Figure 1.1 for comparison between the years. In addition to grades students take national proficiency tests (NPT) both in primary and secondary school. The tests are compulsory for all students in Swedish, English and mathematics (Skolverket, 2014).

The free choice reform

The idea of introducing competition into the public school system was initiated already in 1962 when Milton Friedman argued for separating the financing and provision of public schooling by issuing vouchers redeemable for a maximum amount per student. The rationale was that competitive markets allocate resources more efficiently than monopolistic ones, where students serve society by rational decision-making and by exercising their economic vote wisely (Friedman, 1962). This mind-set started the privatization of the Swedish school system in 1992, intended to increase the pedagogical diversity and education quality for students (Vlachos, 2010 and Hartman, 2011). The reform implied that students could choose which school to attend, even those located outside their county and that publicly funded school vouchers financed all schools, including the independent ones. The vouchers were set by each county and based on total cost per student in public schools in the county.

To start an independent school an approval from the Swedish National Agency for Education (SNAE) is needed and the school is not allowed to charge its students, nor select

them. One difference compared to public schools is however that independent schools can set an upper limit for the number of students it enrolls while public schools have a responsibility to accommodate students within its county.

Unlike industries where quality is observable and easily measured and bankruptcy is the ultimate punishment for ineffectiveness, the educational system exhibit different market conditions. The focus on social profitability and welfare and the fact that users do normally not pay at consumption characterize the market as what commonly is referred to as a quasi market (Kähkönen, 2004). Moreover, Sirgy, Lee and Yu (2011) concluded that ability, motivation and opportunity are crucial for consumer sovereignty to function properly, a problematic aspect for the education system where major information asymmetries between the customers (student) and producers (school) exist. The quality measure is also subjective to consumer preferences. Conflict of interests occur when the rational student wants high grades whereas society as a whole benefits from fair grade distribution based on high quality education. In hindsight, the reform has been criticized as it has been difficult to identify a good quality school and drawbacks such as grade inflation and segregation have been mentioned (Hartman, 2011).

Ownership trends in the school sector

Between 2000 and 2014 the shares of students attending a private school has increased from below 5% to 15% and 34%[2] for primary and upper secondary schools respectively (Friskolornas Riksförbund, 2014). Privately owned schools are usually seen as a group, but several different types of owners exist, among those private equity, other private for profit, private not for profit, foundations and religious communities. Out of the independently owned primary schools 64% and 3% are owned by profit-driven and PE, while the share is 84% and 13% for upper secondary schools in 2014[3]. The faster increase in upper secondary school is mainly due to relaxed regulations (Friskolornas Riksförbund, 2014).

The largest PE-owners in both primary and upper secondary schools are EQT through their portfolio investment in Academedia, TA Associates owning Internationella engelska skolan and Riverside owning Power Planning Systems. In addition, FNS Capital owns upper

[2] Measured as number of students attending the different schools.
[3] Measured using the categorization of PE-owned schools as defined in this study and the school definition used by SNAE in 2014, indicating that a school can only have one principal per school unit.

secondary schools through Praktiska (Lindgren & Holmström, 2014). Before the autumn term 2013, Axcel also owned John Bauer, holding both primary and upper secondary schools. When bankrupt, some of its schools were sold to other owners whereas others were shut down (Sandström, 2013 and Lindgren & Holmström, 2014).

A private equity firm's concept is generally to acquire majority stakes in companies with high improvement possibilities using high leverages. The portfolio company is usually held for a limited timespan of 4-7 years when improvements are done through active ownership before it is ideally sold for a higher price (Strömberg, 2014). PE-firms' active contributions to a company differ with specialization but usually include financial-, governance-, or operational engineering (Kaplan & Strömberg, 2009). An advantage with private equity ownership is that it effectively solves incentive problems with regards to diluted ownership (Jensen, 1989). On the other hand a principal-agent problem could be created where the owners potentially focus more on profits than on quality (Wagner et al., 2015).

Quality trends and current discussions

Private schools impact on school quality has been a heavily discussed topic since the school choice reform was introduced. Opponents fear that public schools lose "high-ability" students, as proactive parents exercise greater opportunities to transfer their children to private schools. With "high-ability" we refer to students who perform well with little external motivation or have low resource demands. The concept of certain actors targeting high-value and low-cost customers is commonly termed as "cream-skimming" and applied to the school sector, it predicts that public school peer quality decreases while the gap between high- and low-quality schools increases (Lankford & Wyckoff, 2001). Proponents, on the other hand, argue that public schools only need to worry if they are inferior. They argue that poor performance is mainly due to lack of exit opportunities, which subjects public schools to little competition. Thus, expanded opportunities for exits should create incentives for poor quality schools to improve or keep losing students and funding, improving overall quality for schools.

This debate has been fueled further as Sweden showed poor results in the 2012 PISA report, while historically having been associated with high quality education. An OECD report from this year showed that Sweden's performance declined steeper than any other

country between 2000 and 2012 (OECD, 2015). Moreover, Vlachos (2010) concluded that Sweden has experienced grade inflation during the last couple of years and that the percentage of students achieving top grades has increased. This finding would normally be deemed good, if it was not for the declining knowledge development in Sweden since the mid 1990s, including the best-performing students.

3. Literature review

School quality and competition

Previous literature has shown dispersed results from introducing private actors on the school market. Michael Marlow (2010) examined the effects of introducing private owners on school quality, measured as SAT scores, in the California school system. He provided substantial support for public school performance being inversely related to private school enrolments and found that the main reason to change from public schools was parents' dissatisfaction with the schools' academic performance. Bergström and Sandström (2001) conducted a similar study in Sweden but found the inverse relation. They concluded that the performance of students in public schools located in counties with a larger share of private schools was better, indicating a positive and significant spillover effect of privatization. Though several American studies support Marlow's results, Bergström and Sandström (2001) argued that a fundamental problem with US data is that the proportion of independent schools do not change significantly over time as it does in Sweden. Furthermore, American private schools usually have religious- or other niched agendas, decreasing the degree of competition between these and public schools, as they are unlikely to compete for the same students. Thus, Swedish data is more objective.

Due to the introduction of the free choice reform in 1992, most research in Sweden have focused on comparing independent to public schools. When defining quality previous research has evaluated different characteristics including grades (Wikström & Wikström, 2005), national proficiency tests (Björklund et al., 2004) and inputs such as students per teacher or teacher education (Fredriksson & Öckert, 2008). The most commonly used regression methods include instrumental variables- and fixed effects. Even if statistical and economic significance differ between researchers and methods, most studies in Sweden indicate that school quality has increased from introducing competition and none, to our knowledge, can conclude that the reform has impacted it negatively (Bergström & Sandström, 2001 and Sandstöm & Bergström, 2005 and Ahlin, 2003 and Vlachos, 2010).

The usage of grades as a proxy for quality has historically been common, probably since it is an observable measure. Current and future students, parents and staff see schools that have graduates with high grades as a good quality school, supported by Machin's (2011) study, providing evidence that parents pay premiums on houses located in areas with better

performing schools. However, a critique of grades as a proxy for quality is that institutions purposively inflate grades to attract students, using it as a tool to compete as schools grade students internally. Strömberg (2014) concluded that this could lead to suboptimal solutions as students and parents desire high grades while society gains from fair grading. Research on this is however dispersed. Using a fixed effect regression with several specifications, Vlachos (2010), on behalf of the Swedish Competition Authority, found a positive and statistically significant relationship between competition and grade inflation in Swedish primary and high schools, although the economic magnitudes are small. Vlachos regressed the relation between students' final grades and their national proficiency test score on private school concentration, based on number of students, number of schools and schools per student. Nonetheless, a drawback was that schools corrected the NPTs themselves, which could underestimate the true effect. Similarly, Wikström and Wikström (2005) found a statistically significant impact of independent schools inflating their grades when examining Swedish upper secondary schools in 1997. However, Sandström and Bergström (2005) concluded that independent schools do not inflate grades compared to public schools, looking at 28,000 ninth graders, but points out that regional differences in grading practice exist. The Swedish Schools Inspectorate (Skolverket, 2009) has previously flagged the lack of fairness in grading, suggesting a central grading body. However, Figlio and Loeb (2011) showed that test result manipulation cannot be fully excluded even if tests are corrected centrally.

Another important aspect on school quality is the influence of student/teacher ratios on students' academic performance, whilst teacher salaries are one of the major components of school budgets. The findings of various previous studies have been mixed where methodology has affected results. Two of the most prominent researches within this field concluded on a positive impact of smaller class sizes (Hedges, et al., 1994 and Krueger, 2003), while Hanushek (1997) stated that "The results are startlingly consistent in finding no strong evidence that teacher-student ratios, teacher education or teacher experience have an expected positive effect on student achievement". A problem with many of these studies however has been to distinguish background factors and other school inputs from influencing the results. Furthermore, school authorities may deliberately assign weaker students into smaller classes, which have further complicated the studies and could introduce biases.

Ownership

In 2009, Rouse and Barrow did one of the most extensive American studies on the effects of competition from private schools. They found that it was hard to draw any direct conclusions and that it might be misleading to assume that all private schools are the same, given their different agendas. Furthermore, when compiling previous literature two key differences between ownership types are noticed; variations in agendas and differences in ability to access capital.

Considering agendas, a positive aspect of public ownership is the protection of different interest groups such as teachers and students. This aspect is frequently compared to efficiency. According to Megginson and Netter (2001) and Waldo (2003) private actors provide superior efficiency compared to public institutions, indicating the presence of a relation between a profit-maximizing agenda and efficiencies.

However, the degree to which private companies focus on profit-maximization varies, where the two most extreme categories are private equity and private not for profit. PE-owners focus on growth, productivity and effectiveness to provide return to investors and Kaplan and Strömberg (2009) showed, based on two decades of data, that private equity owners preform better than other private companies on these measures. On the other end of the private ownership spectrum, Farsi and Filippini (2004) compared the efficiency between private non-profit and public ownership at nursing homes. They found that bureaucratic constraints in public companies create inefficiencies while non-profit organizations struggled with the capitalization of economies of scale, suggesting that further efficiency gains can be achieved through expansions. However, non-profit organizations are classified as having the lowest possibility to access external capital to fund an expansion since they are driven by sociological purposes rather than having a profit agenda. When roughly categorizing private actors, Strömberg (2014) concluded that PE-owned companies have best access to new capital, which Kaplan and Strömberg (2009) partly explained by their ability to build a good reputation with borrowers. Still, the owner with best access to capital is public institutions. If a company is having financial issues it is usually easier to inject more capital or carry losses in a public organization than in a private company.

4. Data

Collection and variable construction

The empirical analysis is based on three educational levels – primary school defined as only ninth grade, academic programs of upper secondary school (AP) and vocational programs of upper secondary school (VP) as defined in Table 1.1, over several years. The data is collected on a school basis for primary schools and on a program level for upper secondary schools, which are all publicly provided by the Swedish National Agency for Education (SNAE) via their database platform SIRIS (Skolverkets internetbaserade resultat- och kvalitetsinformationssystem). The data contains information on all dependent variables used in the analysis: grade point average on the national proficiency test (NPT) in Swedish, English and mathematics, number of students per teacher, share of teacher with a pedagogical education and share of students receiving a higher and lower final grade than on the NPT. Information regarding number of students, teachers per school and participants that took the tests are also included when weighting the final data.

For upper secondary school most measures are reported on program level, which makes it possible to distinguish between AP and VP. However, regarding teacher data i.e. student/teacher ratio and teacher educational level the data is reported on school level. The reason being that teachers often teaches subjects that are not program specific (Swedish, English and mathematics are compulsory in all programs in Sweden). Hence, these two measures are assumed to be the same for AP and VP if the school offered both programs.

The same database is used to extract socio-economic control variables on school level, such as parental education (defined as high if above upper secondary school) and student background (foreign or Swedish). On a county level, the average total cost per student is also collected. The other control variables, such as unemployment and mean income per county are collected from Statistics Sweden (SCB), from their statistical database and through requests.

The combined extracted data is classified as unbalanced panel data and contained a considerable number of missing values, which could have created a bias in the results if the unbalanced reporting is not random. Nonetheless, this is controlled for as described in section 5, Methodology. The main reason for the unbalanced data was SNAE's confidentiality policy of not revealing student's academic identity, which meant that if the result was true for less

than 10 students it was reported as missing. Moreover, some schools only reported NPT results for one or two of the subjects even if all three are compulsory.

Furthermore, the school ID that is used for tracking the panel data over the years changed in 2013 due to changes in reporting standards. This difference is however only a reporting issue and is mitigated through manually tracing school ID's using their school name in combination with their county location.

The information on ownership per 2014 of each school was provided by a representative at SNAE and was classified according to judicial type. Depending on the school's general business agenda it is re-classified into three categories: private for profit, private not for profit, and public whereas the private equity owned schools are identified through screening all of Swedish elementary and upper secondary school transactions for the past 20 years using Capital IQ and Mergermarket. An overview of the transactions used for PE owned school can be found in Figure 1.2.

The availability of data for primary and upper secondary school was different due to changes in reporting requirements to SNAE. Defining for example year 2005 as the autumn term 2004 and the spring term 2005, the analysis on primary school is conducted on data ranging between 2005-2014 as data has been collected from all schools during this period. For upper secondary school the analysis is done on the years 2012-2014 due to the previously limited availability of data[4]. The reason for using different ranges of data for the two educational levels is to not limit the primary school analysis.

Before running regressions, the dataset is further adjusted by removing schools that only has reported one year of data, as the chosen methodology is a fixed effect regression and requires at least two years of panel data. Furthermore, schools located outside of Sweden, such as Svenska skolan i Barcelona, are eliminated.

[4] In previous years the data was only collected on 100 schools, thus previous years were excluded in this study due to the possibility of biases when comparing the datasets.

Summary statistics

Descriptive statistics for the data used to analyze the direct effect of ownership is found in Table 1.2-1.3. After adjustments the set consisted of 10,893 primary schools, 1,698 AP schools and 1,583 VP schools of which about 2%, 8% and 3% of the schools are owned by PE, profit and non-profit respectively for primary school, while it is around 12%, 23% and 5% for upper secondary schools.

Two dependent variables display large differences between owner types. The share of teachers with a pedagogical education is 80% for public schools and 60-70% for private, and the student/teacher ratio is 11-12 and around 15 for public and private respectively. No significant differences between GPA on the national proficiency test can be seen. For the control variables, private owners tend to have fewer students per school, more students who's parents have a higher educational background and the schools are located in counties where the mean income is slightly higher. However, no apparent differences between share of foreign students or unemployment rate within the county where they act can be observed. These patterns are present for all educational levels. The cost per student is similar for different owners in primary schools while it is about 10,000 SEK higher for public schools compared to private in upper secondary school.

The full dataset used for analyzing the indirect effect is shown in Table 1.4-1.6. This data is split on large and small counties with the cut-off 40,000 inhabitants. The only dependent variable that seems to differ between large and small counties is the student/teacher ratio where larger counties have 3-4 more students for all educational levels. For the independent variables measuring concentration, private owners are more established in larger counties as well as in upper secondary schools compared to primary schools. In large counties the concentration range between 3.0-16.4% while the establishment rate range only 0.3-7.5% in small counties. For the control variables measured on a county level the only apparent difference is the cost per student, which is similar for primary school but around 100,000 SEK for large counties and around 125,000 SEK for small counties for upper secondary school. Moreover the control variables, measured on a school level differ somewhat with county size. The share of parents with a high educational background is slightly higher and schools have more students in larger counties. Moreover the share of students with a foreign background is

higher while being less dispersed, however this could be an effect created by the few observations recorded for small counties.

The data generally appears to have characteristics in line with a normal distribution. Skewness is low and kurtosis close to 3. What stands out is however the student/teacher data with a kurtosis of up to 649 indicating a very peaked shape compared to a normal distribution and a maximum positive skewness of 19, showing a positive asymmetry around the center point. Due to these eccentric traits winsorized data is regressed in *Model Specification 3* for the dependent variable student/teacher ratio.

5. Methodology

The FE-model

The methodology for analyzing the two-fold research question, that is both the direct and the indirect effect of private ownership on quality, follows the same approach and is illustrated in Figure 1.3.

Inspired by Björklund et al (2004) and Rouse and Barrow (2009) all regressions are run with fixed effects (FE) on county and year. Using the FE method mitigates a potential omitted variable bias for unobservable time-invariant factors by controlling for the average difference across counties and years in predictors, a methodology possible due to within-group variation.

Using fixed effects on year and county the FE-transformed model used to analyze the direct impact of ownership on quality is

$$\ddot{y}_{i,t} = \ddot{\alpha} + \ddot{x}'_{i,t}\beta + \ddot{z}'_{i,t}\varphi + \ddot{u}_{i,t} \qquad \text{(Regression 1)}$$

where $\ddot{y}_{i,t}$ represent the dependent variable *quality* for school i, observed over multiple time periods t, $\ddot{\alpha}$ the constant, $\ddot{x}'_{i,t}$ a vector of dummies for different owner types, $\ddot{z}'_{i,t}$ a vector with control variables such as socioeconomic and school factors, β and φ vectors of parameters and $\ddot{u}_{i,t}$ an idiosyncratic error term. The definition of response variables, predictors and controls are defined below. Separate regressions are run on primary school, academic programs (AP) and vocational programs (VP).

For the spillover effect, the FE-transformed model for estimating the indirect effect of ownership concentration on public school quality, using county and year fixed effects, is specified as

$$\ddot{y}_{i,t} = \ddot{\alpha} + \ddot{s}'_{i,t}\beta + \ddot{z}'_{i,t}\varphi + \ddot{u}_{i,t} \qquad \text{(Regression 2)}$$

where $\ddot{y}_{i,t}$ represent the dependent variable quality in public school i as defined below, observed over multiple time periods t, $\ddot{\alpha}$ the constant, $\ddot{s}'_{i,t}$ a vector for concentration of different private owner types within a county, $\ddot{z}'_{i,t}$ a vector with control variables such as

socioeconomic and school factors, β and φ vectors of parameters and $\ddot{u}_{i,t}$ an idiosyncratic error term.

This regression is also run on primary school, AP and VP separately. Moreover, the regression is separated on small and large counties, where a small county is defined as having a population below 40,000 inhabitants. The split is done to evaluate whether the spillover effect differs with county size. The choice to split the regressions is supported by the fact that private actors currently have a lower presence in smaller counties (SvD, 2012) and thus the coefficients from the proposed regression could vary with county size for variables such as unemployment and mean income, among others. Additionally, this is supported by the regression results, showing slight differences between control variable coefficients in large and small counties. Even if the economical significance is low there are statistical differences as seen in Table 2.3-2.5.

All regressions are run with both classical and clustered robust standards errors, as recommended by Cameron and Miller (2015), clustering on county. This controls for within-cluster correlation and heteroskedasticity, which loosens the assumption of error terms being independent and identically distributed. It also mitigates potential misspecification and measurement inaccuracies due to clustered correlations in errors, allowing a conservative analysis and mitigating the risk that specific counties drive results.

The methodology was created with two main goals; (1) to analyze several measures of quality (dependent variables) in order to provide an extensive view of how ownership affect results within the school sector and (2) to extensively test the results for robustness and consistency independent of sample definitions and assumptions, by using several different specifications.

Quality - several dependent variables

In total, five measures of quality are used as there is no uniform definition. Ladd and Loeb (2010) argued that it can be viewed in many different ways and Swedish Government Official (SOU, "Statens offentliga utredeningar") state that quality can be either objective and measurable or subjective and difficult to clearly define (SOU, 2015). This study focus on objective measures, commonly split into two sub-categories in current literature and by Swedish standards (Ladd and Loebb 2010, OECD 2015); namely student outcome and resources.

Influenced by previous research of Fredriksson and Öckert (2008), Grönqvist and Vlachos (2008) and McKinsey (2007) resources are measured by teacher educational level and the student/teacher ratio. These studies all indicate that teacher density and competence has a positive effect on student achievement. Moreover these measures are commonly used in literature and are easy to interpret, where more spending per student generally is better than less (Ladd & Loeb, 2010). A common drawback with resource measures is the negligence of price differences of quality-inputs across the country. The student/teacher ratio and the teacher education measure are however less influenced by county-specific regulations and price differences with regards to other quality inputs. The usage of county fixed effects controls for this further.

As for student outcome, recent literature has criticized grades as a measure for education quality. Wikström and Wikström (2005) did for example conclude that independent schools heavily inflate their grades. Based on this, the shares of students in a school who receive a final grade that is lower respectively higher than the grades gotten on the national proficiency tests are included as two different measures, evaluating grade inflation tendencies. Moreover, final grades are not used as a quality measure. Instead grade point average (GPA) on the national proficiency test is used as the key student outcome quality measure, which is supported by Björklund et al. (2004) who concluded that national test scores has strong explanatory power for educational attainment. Though most previous research has looked at scores on mathematics, English and Swedish separately, we use a combination of all three. We believe that since students need to pass all three subjects to attain a degree, it is essential that schools provide high quality education in all the core subjects. Therefore student outcome is a weighted measure of the GPA in all three subjects.

Summing up, the dependent variables used, referred to as *quality,* in both the direct and indirect estimations are: GPA on the national proficiency test as a measure for direct student outcome, the percentage of students with a lower respectively higher final grade from their attended school compared to the grade on the national proficiency test for evaluating the potential grade deflation/inflation issues and percentage of teachers with a pedagogical degree, as well as the student/teacher ratio for assessing school resource usage.

Independent variables

Inspired by Rouse and Barrow (2009) concluding that estimations based on private actors as a group might be misleading as owner agendas can differ and by Strömberg's (2014) reasoning that different owners have different access to new capital, four categories of owners are used; private equity, private for profit, private not for profit, and public. Each school is categorized into the groups via their ownership juridical form, defined in 2014 and is assumed to have had this ownership type historically if no transactions have been reported. For the private schools, private limited companies, economic associations, natural persons[5] and limited partnerships are classified as *private for profit*, while schools owned by non-business entities, religious communities, foundations and other communities are *private not for profit*. Schools owned by counties, county councils and state authorities are categorized as *publicly owned*. The *private equity owned* schools are identified through screening of all Swedish elementary and upper secondary school transactions for the past 20 years as well as screening of the large PE-owner school Groups.

Direct effect predictors

To estimate the direct impact of each ownership-type dummies are used in the regression for PE, private for profit and private not for profit, using public schools as the base case.

Indirect effect predictor

The impact of competition within a county is estimated by the concentration of different ownership-types, defined as share of students attending PE-owned, private for profit and private not for profit schools respectively within a county. This definition is preferred instead

[5] An assumption is made that natural persons are profit-driven even if some schools with this ownership migh be not-for-profit. However, for 2014 there were only two schools with this ownership type for primary schools and thus the effect from these observations is low.

of using concentration of schools within a county as it accounts for school size (Marlow, 2010). The variables ranges from 0 to 100 and is defined as

$$concentration_{c,y,g} = \frac{\sum_{i \in g_c} z_{i,c,y}}{\sum_{i \in \mathcal{G}_c} z_{i,c,y}} \qquad \text{(Eq. 1)}$$

where g_c is a group containing one of $\begin{cases} PE\ school \\ Private\ for\ profit\ school \\ Private\ not\ for\ profit\ school \end{cases}$

and $\mathcal{G}_c$ contains all groups of g as well as the group public schools, z is the number of students, c is a specific county and y a year.

Control variables

Inspired by Björklund et al (2004) and Vlachos (2010), to name a few, several school and county level control variables are included. The controls on a county level include unemployment measured as percentage of citizens unemployed and aged 16-64 years per county (range 0-100) and mean income as per the 31/12 each year in thousand SEK per county. These controls are included as various socio-economic backgrounds previously have shown to impact students' academic performance (Sandström & Bergström 2005 and Ahlin, 2003). Even though there are other influential socio-economic characteristics that can influence performance, these two controls are assumed to capture a majority of the effects. Moreover, a control variable for total cost spent per student per county is included, since this amount acts as a proxy for the school vouchers paid to both public and private schools within a county. The costs include facilities and inventories, meals, student care, teaching, teaching materials, equipment and other costs such as administration and skill development.

On school level, our model controls for percentage of students who's parents hold a degree above upper secondary school and percentage of students with a foreign background (including students born abroad and students born in Sweden but with a foreign background), both measures ranging between 0 and 100. Björklund et al. (2004) show that parental education and immigration background are two key factors influencing student results, while Hsieh and Lindahl (2003) conclude that students who's parents hold a university education

and students who are foreign-born are 4.5% and 3.3% more likely to attend a private school respectively. The causality between parental education and student academic performance is explained by educated parents having greater aspirations for their children from an early age and has been tested in multiple ethnicities with similar results (Spera et al., 2008).

Lastly a control for number of students at each school is included as Björklund et al (2004) and Knot Humlum and Smith (2015) highlight that class size affects both short-term and long-term student outcome. Although school size is not the same measure it still acts as a reasonable proxy given that class size data is not available.

Model specifications

Three model specifications are tested for each dependent variable, except for teacher education where only two specifications are needed. The same model specifications are used for the estimation of both the direct and the indirect ownership effect where *Specification 1* is the *Core Regression*. To test the validity of the achieved results and potential misspecifications, assumptions or selection biases *Specification 2 "Data extension"* and *3* "*Data restriction*" are run using other data specifications, as defined by their respectively sections. Moreover, *further specification tests* are run on the *Core Regression* to estimate the impact of the control variables as well as the statistical difference between private ownership variables in the regressions. The different specifications are described below.

Specification 1: Core regression

The regressions in *Specification 1* are run on observations that have values for all quality-related response variables, to create a dataset where the outcome is comparable between the dependent variables. The dependent variables used in *Specification 1* are defined below.

GPA on the national proficiency test

The GPA on the national proficiency test is estimated using results from mathematics, English and Swedish. A school should report all three subjects, but since the Swedish National Agency for Education have a confidentiality policy of not publishing results that concern ten or less students, some schools have only reported one or two test scores. If all three subjects' GPA are reported then the average GPA for the national proficiency test, *GPA(NPT)*, is calculated according to Equation 3 directly. However, if one or two subjects GPA are missing, ratios between the subjects are estimated per yearly basis where a missing

subject GPA is projected using this ratio, to avoid a bias due to missing values. This is necessary as Swedish, English and mathematics mean GPA on the NPT varies significantly as seen in Tale 1.7. Because English and Swedish display similarities in both mean and standard deviation these subjects are the base for projections and the priority of ratio-usage is English, Swedish, mathematics. As an example, when calculating the Swedish/English ratio for year *y*:

$$ratio_{,GPA_{Swe}/GPA_{Eng},y} = \frac{\frac{1}{n}\sum_{i=1}^{n} GPA_{Swe,y}}{\frac{1}{n}\sum_{i=1}^{n} GPA_{Eng,y}} \qquad \text{(Eq. 2)}$$

where *n* is the total number of schools that reported GPA for the year *y*.

In this example, this ratio is used to project the missing GPA for Swedish, using reported GPA for English as the base. This method is applied to all missing values using the ratios as shown in Table 1.7, for all subjects. Thereafter the average GPA per school is calculated as:

$$GPA(NPT)_{i,y} = \frac{\sum_{i=1}^{G} GPA_{g,i,y} \times p_{g,i,y}}{\sum_{i=1}^{G} p_{g,i,y}} \qquad \text{(Eq. 3)}$$

where *g* is a group of either $\begin{cases} Mathemathics \\ Swedish \\ English \end{cases}$

and *G* contains all *g*, *i* indicate school, *y* the year and *p* the number of participants for the specified test.

A drawback with this predictive method is that not all schools follow the cross-country mean pattern. This correction method converges the GPA towards the data mean, which could reduce an effect. However, as not correcting for missing values would generate a larger bias and within-differences in the data this method is assumed appropriate. Furthermore, *Specification 2* tests for potential assumption biases.

The GPA measure range from 0 to 20, where the values for the different grades can be found in Figure 1.1 where 10 points are a passing grade and a grade increase is represented by a 2.5 point increase up to a total of 20 points.

Grade deflation/inflation

The measurement for grade deflation/inflation is defined as the share of students at a school who receiving a final grade that is at least one step lower/higher than what they got on the national proficiency test. Our final measure includes an average for Swedish, English and mathematics. If a school has reported data for all three subjects Equation 5 or 6 is used directly for calculating the share. However, if one or two subjects are missing the average share of students with a higher respectively lower grade per subject and year is calculated, as the shares differ significantly between subjects. Each subject's average is used to calculate between-subject ratios on a yearly basis, to predict missing values. Equation 4 shows the concept of the calculation and the values are reported in Table 1.8-1.9. As an example, the ratio for the percentage of students who received a lower grade in Swedish compared to in English is calculated as

$$ratio_{,\%\ lower\ swe/\%\ lower\ eng,y} = \frac{\frac{1}{N}\sum_{n=1}^{N} \%\ lower\ _{swe,n,y}}{\frac{1}{N}\sum_{n=1}^{N} \%\ lower\ _{eng,n\ y}} \qquad \text{(Eq. 4)}$$

where *n* represents schools and *y* year. The order of ratio-usage is English, Swedish and mathematics. Having ratios for all subjects, the average percentage of students with a higher respectively lower final grade is calculated as:

$$\%\ lower\ than\ NPT_{i,y} = \frac{\sum_{i=1}^{G} \%\ lower\ _{g,i,y} \times p_{g,i,y}}{\sum_{i=1}^{G} p_{g,i,y}} \qquad \text{(Eq. 5)}$$

$$\%\ higher\ than\ NPT_{i,y} = \frac{\sum_{i=1}^{G} \%\ higher\ _{g,i,y} \times p_{g,i,y}}{\sum_{i=1}^{G} p_{g,i,y}} \qquad \text{(Eq. 6)}$$

where *g* is a group containing either $\begin{cases} Mathemathics \\ Swedish \\ English \end{cases}$

and *G* is a group containing all, *i* represent school, *y* year and the variable is reported as ranging between 0 and 100.

Student/teacher ratio
Reported as integers according to

$$student/teacher_{i,y} = \frac{z_{i,y}}{T_{i,y}} \qquad \text{(Eq. 7)}$$

where z is number of students, T number of teachers, i represents school and y year.

Share teachers with pedagogical education
The variable for percentage of teachers with a pedagogical degree ranges from 0 to 100 and is specified as

$$teacher\ pedagogical\ education_{i,y} = \frac{t_{i,y}}{T_{i,y}} \qquad \text{(Eq. 8)}$$

where t is number of teachers with a pedagogical degree, T total number of teachers, i school and y year.

Further specification testing
For *Specification 1*, the *Core Regression*, further tests are done to validate the model used and to test for statistical differences between private owners.

To test the model validity the *Core Regression* results are compared to a regression without any control variables. The regressions are run with clustered robust standard errors on county for both the direct and the indirect effect.

Furthermore, to test whether results for private owners are statistically different from each other, the Wald test is used. A F-test is run of the linear restriction to test the significance of the null hypothesis (Stata, 2013 and Kodde & Palm, 1986)

$$H_0: \beta_i = \beta_j \text{ against } H_1: \beta_i \neq \beta_j \qquad \text{where } i \neq \text{j}$$

and β is the sample estimator of the parameters and i and j are groups

containing either $\begin{cases} PE \\ Private\ for\ profit \\ Private\ not\ profit \end{cases}$

Specification 2: Data Extension Regression

The regressions in *Specification 2* are run on as many observations as possible for each individual response variable, given the first limitations of the dataset as described under the *Data* section. Thus, the number of observations varies for the different dependent variable regressions. All variables are defined as in *Specification 1*. This specification is run to evaluate if potential selection biases affect the achieved results.

Specification 3: Data Restriction Regression

Just like *Specification 1*, *Specification 3* is based on observations where all dependent variables are non-missing. However, the data is restricted in other aspects. Previous ratio predicting assumptions on GPA and grade deflation/inflation are loosened and the data for student/teacher ratio is adjusted to become closer to a normal distribution

as we noticed outliers that potentially could disrupt the results. Therefore *Specification 3* is used for all dependent variables except for teacher education and are explained below:

GPA on the national proficiency test

To test if the ratio-predictive assumption used previously distorts results, this regression is run only on schools that report GPA on the National proficiency test for all three subjects. Thus, all schools where missing values previously were predicted by the ratio-estimation are excluded and the average GPA is calculated as in Equation 3. Even though a potential reporting bias is introduced the robustness of the previous assumptions can be tested.

Grade deflation/inflation

Following the same logic as for the GPA measure, only schools that have reported the share of students with a lower/higher final grade compared to the NPT for all three subjects are used. The calculation is described in Equation 5 and 6.

Student/teacher ratio

When analyzing the summary statistics as shown in Table 1.2 and Table 1.4, the student/teacher ratio displayed high skewness and kurtosis. Hence, *Specification 3* tests the robustness of the results by applying winsorising. The regression results will be robust to spurious outliers and the data display characteristics closer to a normal distribution. A 98% winsorisation is used, implying that the 1% most extreme values in each tail are replaced with data in the 1^{st} and 99^{th} percentile respectively. Mean, standard deviation, maximum and

minimum values as well as skewness and kurtosis before and after the adjustment are reported in Table 1.10. No other changes are done compared to *Specification 1*.

Share teachers with pedagogical education

As the data for teacher education do not display any directly worrying characteristics or is not subject to any manipulation, a third specification is not tested.

6. Results

The analysis of the results is split into the direct and the indirect impact. Each part is further divided into *Student outcome*, defined as GPA on the national proficiency test and grade deflation/inflation and *Resources* measured as student/teacher ratio and share of teachers with a pedagogical degree. Similarities as well as differences between educational levels and ownership types are addressed.

Specification 1 is used as the *Core regression* to interpret the results since this allows comparison between dependent variables. The findings for all dependent variables for this specification using clustered robust standard errors on county are reported. The direct impact results are found in Table 2.1.a for student outcome and 2.2.a for resources while the indirect impact results are shown in Table 2.3 for GPA, Table 2.4 for grade deflation/inflation and Table 2.5 for resources. These tables provide an overview of our results and Section 3 of the appendix - *Robustness tests* - are used in the extensive analysis and should be seen as a tool for testing the validity of these outcomes.

The results are analyzed to assess how private schools compare to public, both as a group and each ownership type separately. Moreover, the statistical difference between private owner-type results from the *Core Regression* is analyzed for the direct impact using the Wald test as shown in Table 2.1.b and 2.2.b. This analysis in not performed on the indirect impact regressions since the *Core Regression* results are neither statistically nor economically significant. However, the impact of the control variables is commented on for both the direct and the indirect impact by comparing the *Core regression* with regressions run without controls. The direct impact results are shown in Table 3.1-3.5 while the results for the indirect impact are reported in Table 3.6-3.15.

Model Specification 2 and *3* are used to analyze the robustness of the results and these extended results and comparison between different specifications for each dependent variable are shown in Table 3.1-3.5 for the direct impact and Table 3.6-3.15 for the indirect impact. The economic significance is discussed with reference to all *Model Specifications*. It should be noted that the time period of the analyzed data of primary and upper secondary school differ.

Direct effect

The following analysis is based on results reported in Table 2.1-2.2 in combination with the extensive results for all three different Model Specifications and standard error controls, split on the dependent variables and presented in Table 3.1 - 3.5.

Student outcome

Examining the regression results for *Specification 1*, a general null or positive effect is observed when comparing GPA on the national proficiency test (NPT) for private schools compared to public. Contrasting the results for the three different educational levels, results are however only statistically significant for primary school at the 1% level for profit and non-profit and at the 10% level for PE-owners. For upper secondary school results are statistically insignificant. However, AP schools run by non-profit owners show a higher GPA at the 5% significance level. These results are robust to different standard error controls as well as over model specifications, concluding that no significant selection bias is present in the assumptions made in *Specification 1*.

In concurrence with previous literature the economical significance remains low even for the private non-profit schools where the ownership type exert a maximum grade increase of around 0.5 GPA out of a maximum of 20, where an increase of 2.5 is needed to get a higher grade.

Using public schools as the base, non-profit organizations appears to be the most effective owner for all educational levels, while PE-owners are least effective for primary school and other profit owners for upper secondary programs. However, the Wald estimates in Table 2.1b indicate that private actors are statistically indifferent with the exception of non-profit schools having higher GPA than profit-driven schools for academic programs at the 5% significance level. The within- private effect is thus generally insignificant.

Within primary school, no grade deflation occurs for private schools compared to public schools, significant at the 10% level for all types of private owners. These results are robust to both clustered errors and model specifications and no within-private differences are apparent. The results for academic programs are similar while it can be concluded that for schools with vocational programs, owned by non-profit organizations, 3 percentage points fewer students would receive a lower final grade compared to public schools with a 5% significance level for both *Specification 1* and *3* taking clustered robustness into account. This

would imply that fewer private not for profit schools underestimates their students compared to public schools, assuming that the national proficiency test acknowledges the students' true ability. The results for PE-owned schools with VP imply that around 2 percentage points more students, compared to those in public schools, receive a grade lower than the attained score at the national proficiency test. The result is significant at the 5% level for *Specification 1*, suggesting a potential deflation of grades for students at PE-schools, but is not robust over model specifications. Furthermore, the results for non-profit schools are statistically different from both PE and profit-driven schools while the deflation in PE and profit-driven schools cannot be significantly differentiated.

The more apparent and more significant effect is however that grade inflation among private actors occurs and seems to be rising the higher up you climb the educational level. Private owners with a profit agenda show grade inflation ranging between 1-5 percentage points higher compared to public schools with high significance. The significance is highest for primary school and lowest for VP while the magnitude of the inflation is the inverse. The results are only slightly affected by clustered robust standard error corrections. PE-owned schools give 2, 3 and 5 percentage points more students higher grades for primary school, AP and VP respectively at a 5% significance level while the inflation rates are around 2 percentage points higher for other profit-driven institutions and significant for primary school and AP while being insignificant for VP. Private-not-for-profit schools do not indicate any significant differences in grading to public schools. These results are robust over different model specifications indicating that the data is not affected by any major biases. The significance of differences between private actors varies with educational level. For primary school PE and profit-driven actors inflate grades statistically more than non-profit owners while there is no statistical difference between profit-driven actors. Looking at upper secondary school, only PE schools inflate grades statistically different from non-profit organizations at the 1% significance level for AP, while inflating grades more than profit-driven schools at the 5% significance level for VP.

To validate the impact of the control variables the regression for *Specification 1* is run without controls as reported in Table 3.1-3.5. The conclusion from these results is that the combined controls impact the coefficients for all quality measures significantly and thus are relevant for the model.

Resources

The results for student/teacher ratio as well as teacher educational level point unanimously towards greater cost savings in private schools compared to public ones for all levels of education; primary school, AP and VP as seen in Table 2.2. The results are highly significant for profit- and PE-owners even when using the conservative clustered robust standard errors. For non-profit schools, the teacher pedagogical educational is significantly lower while the student/teacher ratio not is significantly different from public schools, a conclusion that is robust over model specifications.

PE schools have on average around three more students per teacher compared to public schools and other profit-driven schools have around two. Interestingly the results for VP differs, where the ratio for PE is two and thus slightly more similar to public schools while no significant difference for other private actors compared to public schools can be seen. For non-profit driven schools the results are not statistically significant for any educational level. Whether the economical impact of the results is large or small can only be determined in context with factors such as student resource demands. Generally, the statistical significance between private actors is strong, indicating that PE has slightly more students per teachers compared to other private actors while non-profit owners have the least.

Regarding share of teachers with a pedagogical education, primary school and vocational programs displays the lowest shares compared to public schools. This might be due to the lower academic requirements that are necessary compared to academic programs. PE together with profit-driven schools have the lowest share of educated teachers. For primary school and academic programs PE-schools have the lowest share with 19 and 15 percentage points fewer teachers with a pedagogical degree compared to public schools. These results are also statistically different from profit and non-profit owners at a 5% significance level. For vocational programs other profit-driven schools display the largest difference compared to public schools, with around 23 percentage points fewer teachers having a pedagogical degree. However, this is not statistically different from the share of teachers in PE schools. Even the smallest difference for private owners compared to public schools is around 8 percentage points below, and thus the economical impact is high. The results are solid both in terms of clustered- and specification robustness. An interesting

observation is that though non-profit schools indicates no big difference of student/teacher ratio compared to public schools, they do differ with regards to teacher education level.

The validity of the control variables is assumed low for regressions run with these two dependent variables. We see that coefficients for the regression with and without controls are of the same magnitude and similar significance in Table 3.4-3.5. The reason for choosing the same controls was to be able to compare results between ownership types, where student outcome was the focus. These results indicate either that other controls could potentially be more relevant for a model evaluating the impact of ownership on resources, or that ownership type in itself is a strong predictor for variation in usage of resources.

Indirect effect – spillover

The regression results for concentration of ownership within a county on public school quality are reported for all the dependent variables using *Specification 1* and county clustered robust standard errors in Tables 2.3 – 2.5. Results are reported per educational level and split on small respectively large counties. The detailed results for all model-, and standard error specifications for the indirect effect are reported in Tables 3.6 – 3.15.

Student outcome

The statistical significance of changes in concentration levels for all types of ownership on student outcome is low and the economical significance is close to zero, implying that public school's GPA on the national proficiency test is not affected in an influential way by competition from private schools, neither positive nor negative.

Moreover, no influential differences between small and large counties can be found for primary schools and academic programs. No results are significant for both the classical and the county clustered robust standard errors over all three model-specifications. However, for vocational programs the effect changes with county size. The negative impact of about two percentage points on public school performance from a one percentage point increase in non-profit school concentration in a small county is significant at the 1% level using both classical and county clustered robust standard errors, while competition does not seem to affect public schools in large counties. The difference in small counties could however be an effect of a small data sample. As the general trend for the indirect impact is both statistically and economically low, the statistical difference between private actors is not evaluated.

Generally, no significant impact on grade inflation and deflation for public schools is seen from a change in competition. For primary school no result is significant over all model specifications and standard error controls, indicating that public school grading is not influenced by the concentration of private actors in a county. For academic programs in small counties the result worth notice is that a one percentage point increase of PE-school concentration would deflate grades with 0.1 percentage points while the same increase in profit-driven school concentration would generate a 0.3 percentage point deflation, at the 5% significance level, consistent over model specifications. Thus, if any effect should be discussed for academic programs, it should be a grade deflation trend. The results for vocational programs are similar. The effects are highly insignificant in large counties with a grade deflation tendency from an increased PE-concentration in small counties. No significant indication of grade inflation in profit-driven schools is seen. However, the non-profit schools are once again demonstrating extreme values, this time with a high inflation trend, which could be explained by the limited data sample as few non-profit schools are situated in small counties. Overall, as most results are insignificant and the economic impact is low the conclusion is that public school grade inflation not is affected by competition from private actors, especially not profit-driven.

Moreover, when running the regression in *Specification 1* without any controls, the coefficients for the student outcome variables are similar and close to zero while significance levels change somewhat as seen in Table 3.6-3.11. This could imply that the model used is not correctly specified or that the true effect on public school performance from increased competition is close to zero.

Resources

Public school's resources are generally unaffected by the presence of private schools independent of ownership type and county size. Even if some results are statistically significant at the 1% level only one result would indicate any economical significance: the 3 percentage point increase of share of teachers with a pedagogical degree if the concentration of non-profit schools within small counties would increase with 1 percentage points for VP. This result varies however with model specifications. Thus, neither of the resources measures for public schools are significantly affected by competition, taking both the statistical and the economical impact into account.

7. Discussion of results and potential issues

Direct effect

The general observed trend is that private schools achieve the same or better student outcomes compared to public schools. Though the economic significance is low, the effect is positive. Moreover, profit-driven actors show grade inflation tendencies while all private actors over all educational levels use significantly fewer resources compared to public schools.

A common argument against profits in the welfare sector is that quality is compromised for cost reductions, such as increasing the student per teacher ratio in private schools (Vänsterpartiet, 2015). Opponents argue that every penny extracted from schools as profits could do better by being reinvested into the school, money that is particularly valuable since the school sector is funded through tax money. Our results show that profit-driven schools have around 2-3 more students per teacher compared to public schools and a lower share of teachers with a pedagogical education, which could indicate lower teaching salaries. These results are in line with the cost and lean management focus that many private equity and profit-driven firms enact. Deciding whether the education quality is compromised due to the cost savings these results, needs however to be put in relation to student performances. Assuming scores on the national proficiency test is a good proxy for student knowledge our results imply that opponents for profits within the welfare sector do not need to worry since the test results are better or equal to public schools. Moreover, our results show no significant differences for GPA among private actors while they all have a lower share of teachers with a pedagogical degree than public schools. Nonetheless, it should be noted that teachers that has not yet collected their degree, teachers currently in training and teachers with foreign pedagogical degree are not accounted for in the statistics, indicating underestimated values (Dunér, 2006). However, assuming that this effect is similar over different types of owners this should not affect the final conclusion. As for student/teacher ratio non-profit organizations stand out among private owners, as they are the only actor who have a similar ratio as public owners. Thus, since these two resource measures are not unanimous among private owners, it indicates that factors beyond resources affect student outcome and that the optimal resource allocation for high quality education depends on several school and student characteristics.

With regards to grade inflation PE schools have historically been criticized in Swedish media for inflating grades to attract students (Dagens arena, 2013). According to our results this seems true, given that PE schools have the highest share of students receiving a higher final grade compared to what they got on the national proficiency test. This result indicates that private schools use grades to attract and retain students as well as a mean to compete, which in turn could create unfairness in grades and affect students' future (Strömberg, 2014). However, the economical significance of around 2-5 percentage points more students in private schools getting a higher grade than students in public schools indicates an exaggeration of the discussion. On the other hand, a caveat with the used data is that schools correct the national proficiency test themselves and thus there is a risk that the predicted inflation rate is underestimated.

To add to this, there are further possible drawbacks in the used model that could have affected the results. One issues is the omitted variable bias. Even though the included controls on parent education and student background previously have been shown to influence student's academic achievement, no direct controls for students' internal motivation or demand for resources are included in our model. Hence, private schools superior performance could be a result of less resource-demanding or more highly motivated students. This issue could have been mitigated by using school fixed effects in the regression, as done by Lundsten and Löfqvist (2011) and Humlum and Smith (2015). However, due to our narrow definition of ownership (splitting private owners into several categories) this approach was not possible as the number of ownership changes were limited, generating too few observations. On the other hand, this enhances the risk for unobserved heterogeneity, which somewhat limits the validity of the result.

Furthermore, the construction of our model also assumes that school choice is random and that students with specific characteristics do not tend to choose private over public schools. This assumption holds better for primary school since students originally are allocated based on location even if they could change. Moreover, using only ninth graders mitigates the choice problem as students who went through seventh and eighth grade in one school are assumed less keen on changing school their last year of primary school (Lundsten & Löfqvist, 2011). In addition, and in accordance with regulations, schools are not allowed to select its students. Spots should generally be filled on a first come first serve basis and only

when a private school is full rejection of students is allowed, which should lead to heterogeneous classes. Despite this, Swedish media (SVT, 2013) revealed that this rule is not fully obeyed in practice. They showed that some private schools actively reject troublesome students while accepting disciplined ones. Given that this phenomenon occurs across Swedish private schools, a bias in the results would be present. Moreover, for upper secondary school, students are argued to actively choose a school or at least a program specification. As students start to scrutinize and compare the quality of schools, students with certain characteristics might be attracted to different types of schools. Additionally, schools at this level can accept students based on previous grade merits (mertivärde) and therefore the student ability at different schools probably varies with program offer and school brand. Therefore the bias for the achieved results is assumed larger in upper secondary school compared to primary school.

In conclusion differences between ownership types are apparent but might be driven by owner agenda, student characteristics or model specifications. Nonetheless, assuming the model is correctly specified, the results from this study indicate that schools owned by profit-driven actors create the same or better student outcome while using less resources, but also create a grade inflation effect. Non-profit schools on the other hand are the most optimal choice of ownership, since their academic performances are in line with other private schools but unlike profit-driven schools show no tendencies of grade inflation. However, since it would be unrealistic for non-profit school to have enough capabilities to run all schools in Sweden, and profit-driven schools have the same or better student outcome with fewer resources compared to public schools, we find no support for limiting this type of ownership format. Using Leete's (2000) argument that the main difference between non-profit and profit-driven organizations is their motivation of intrinsic vs. extrinsic factors combined with our results that profit-driven schools create better or the same student outcome with less resources, the critical point in the privatization debate should not be on abolishing private schools. Rather it should center on the trade-off between owner motivation and profits, to determine what amounts of profits that should be allowed in the welfare sector to motivate quality improvements.

Indirect effect – spillover

Due to the low statistical and economical significance on most of the results, it seems that increased competition has no significant impact on either public school performance or their operational behavior, a conclusion that is true across all three educational levels. The intended effect of the school choice reform in 1992 to raise the public school quality through competition does therefore seem to have failed.

Conversely, neither can the results confirm that students in public schools are negatively affected by increased competition, which is in line with previous research in Sweden.

In media (UR, 2011), the school reform has been criticized for creating segregations, or cream-skimming, where only "high ability" students provided with good opportunities attend private schools whereas public schools are left with students who need extra help, have less motivation or come from a disadvantaged background (Walsh, 2009). Still, the regression results does not support a segregation of students as a significant negative impact on public schools' student outcomes would be expected to support this hypothesis. Instead, most of the results are close to zero independent of county size and ownership type concentration. However, Walsh (2009) concluded in his research on cream-skimming in the US that given the heterogeneity in a class "… peer effects would have to be unrealistically strong to give cream-skimming any bite.", implying that the phenomenon could occur even if we do not see a strong effect in our results. Moreover, analyzing the summary statistics for all educational levels in Table 1.4 – 1.6, it becomes apparent that private schools differ in certain aspects. They have a slightly higher share of students who's parent have a high educational degree and the mean income where private schools operate range 247-308 thousand SEK instead of 237-270 thousand SEK for public schools. As a result, cream-skimming could still be present, causing a bias in the results since no direct controls for student ability are included. Given the assumption that cream-skimming occurs, the results could be interpreted as public school quality improving under the increased competition, but due to the increased share of "low ability" students that public schools have been left with, they have only been able to show a null result in our study.

When it comes to grade inflation and deflation there is no major economic significance in public schools when introducing competition. This indicates that public schools do not have the incentive to increase grades in order to attract students. The

hypothesis could indicate that public schools do not benefit from attracting more students and sometimes getting too many students might even cause inconveniences. Furthermore, teachers working in public schools might also be more fair in their grading because of less pressure from the owners. It is not unlikely that public school owners put less pressure on teachers since they do not sense the same urgency of survival as private schools that continuously have students receiving bad grades.

Similarly, looking at resources no significant changes could be detected due to increased competition. This result indicates that public schools do not try to compete with private schools using resources, which could have several origins. Public schools might not feel the same need to save costs or the required incentive to reduce resources. Furthermore, public schools could reason that it is disadvantageous to increase the student/teacher ratio or lower the share of teachers with a pedagogical degree, affecting the student outcome negatively. Another alternative, assuming that cream-skimming occurs, is that public schools might have a need to keep the current low number of students per teacher to accommodate the increased "lower-ability" student needs, and thus cannot decrease these resource inputs.

On a different note, when testing the model with and without the control variables, coefficients for the concentration variables are similar. This could either be due to our model being incorrectly specified, or that private school competition has in fact no effect on public schools. The possibility that our model has no omitted variable bias can never be rejected, but when comparing our model to previous research, such as Bergström and Sandström (2011), who find an impact from private school competition on public schools in Sweden, no major difference in control variables are identified. Thus, we assume our model is not incorrectly specified and that the similarities in coefficients between the regressions indicate that private school competition has indeed no effect on public schools, given the five dependent variables that we measure. Another important aspect is that the number of observations used in the regression with controls is about 50% smaller compared to without controls for upper secondary school while this effect not is present for primary school. This significant difference is due to SNAE's decision to not report values when less than 10 students are concerned. As academic and vocational program data is reported per program per school and thus have significantly smaller classes compared to primary school many of the control variables have missing values.

Another limitation of the study is that the initiation of competition might not be endogenously decided. Potentially, private schools are established in counties with specific characteristics. Such features could include differences in school voucher amounts, quality of existing schools and other regulatory differences. Using fixed effects on county mitigates this problem but might not account for all effects.

In conclusion, no positive spillover effect can be identified from increased competition and the reason for the low significance of results could be numerous. Neither can it be established that public schools are negatively affected by competition from private actors, independent on the size of the county.

8. Conclusion and future research

While the effect, significance and economic impact differ somewhat between educational levels the only negative effect worth mentioning from introducing private actors is grade inflation. This effect is present for private for profit and PE schools but no inflation spillover effect can be found. While private owners generate the same or better student outcomes by using fewer resources, no negative or positive spillover effect on student outcome or usage of resources from competition can be established.

Conceptually, the optimal owner would be a non-profit organization as they have the best student outcomes compared to public schools without any signs of grade inflation. However, as these organizations generally are restricted in access to capital and investors in general do not want to invest in a non-profit business, having a society where all schools are run by private non-profit organizations is an utopia. The results further indicate that owner agendas and motivation might drive results. The general conclusion from this study is thus that motivation for efficiencies and increased student outcome is important, be it sociological or profit-driven. However, every penny taken out as profits for profit-driven actors could instead be reinvested in the school to improve the quality further. The question thus becomes: what amounts of profits should be allowed within the welfare sector to have good and motivated school owners, and at what point the better academic outcome outweighs the value of profit extractions. The fact that grade inflation occurs and that there is a possibility of cream-skimming indicates that the view on the school market changed when opening up for private actors. Even if the economical significance is low this indicate that both owners and consumers, including students and parents, have started to evaluate which schools offer high-quality educations using observable proxies such as grades. The grade inflation problem can nevertheless be mitigated by for example using centralized grading systems.

It could be criticized that the quantitative measures used to measure quality in this study are somewhat one-sided, focusing only on the quantifiable results and neglecting actual learning experience, which also is an important factor when determining the quality of schools. Thus, for future research it would be interesting to incorporate student, parent and teacher satisfaction with schools at a more qualitative level. These qualitative measures could either be evaluated for satisfaction or used as controls in a similar regression. Moreover, for future research it would be encouraged to include measures controlling for student ability,

learning requirements and motivations to exclude potential impacts from cream-skimming and private schools selecting students. For future reference, many of these unobserved school time-invariant factors could be mitigated if the model is regressed on school fixed effects. We were unable to conduct school fixed effect given the limited ownership changes according to our classification since SNAE only started to track school ownership on this detailed level in 2013. However, in a few years time this would be possible.

In conclusion, our results find that profit-driven actors generate grade inflation, the same or better student outcome while using resources more efficient and that neither a positive nor a negative spillover effect is present in any of the quality measures. Thus, we cannot find strong support for regulating profit-driven ownership within the school sector but recognize the potential need to limit possibilities of segregation as well as instituting controls for fair grading between different institutions.

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10. Appendix

Figures

Figure 1.1: Grading system changes

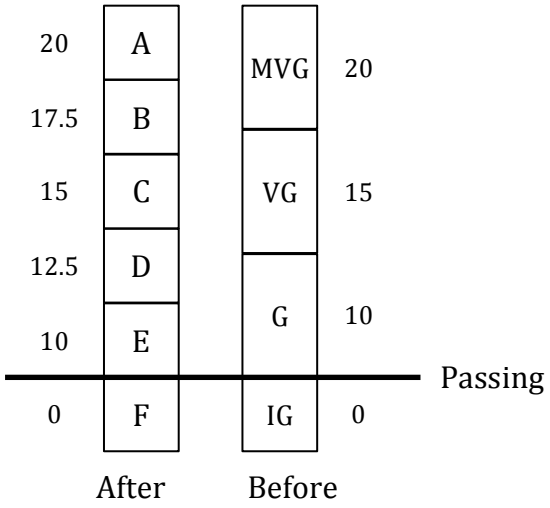


Figure comparing grading scales before and after the reform in 2011. Source (Skolverket 2014)

Figure 1.2: PE ownership of schools over time

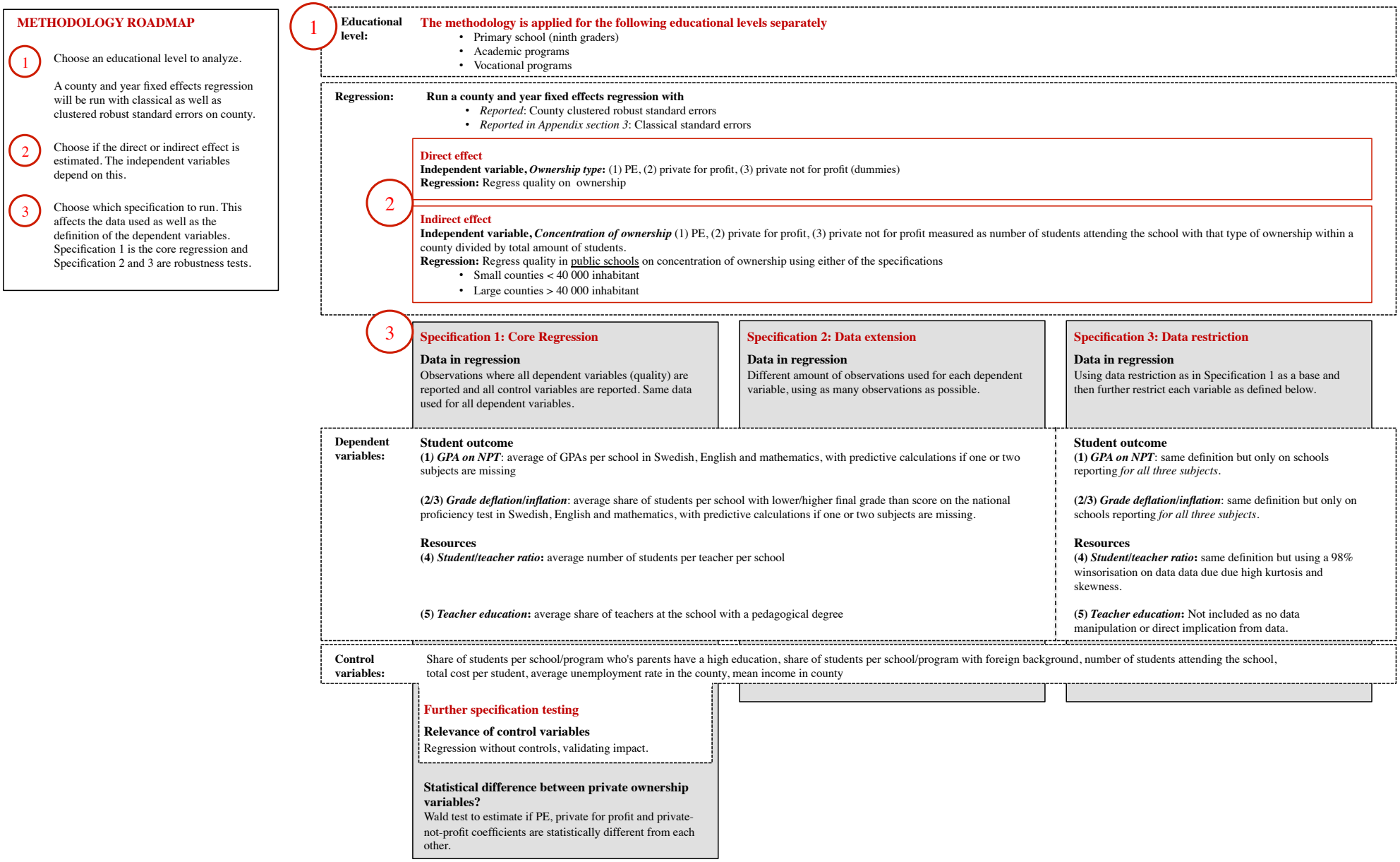
Year	P	AP	VP	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Vittra	X			Bure Equity acquired Vittra in 1996			AcadeMedia (EQT)						
AcadeMedia	X	X	X				Bure Equity		EQT				
John Bauergymnasiet*	X		X				Axcel						*
Pysslingen	X							Polaris		AcadeMedia (EQT)			
Power Planning System	X	X	X							Riverside			
Internationella engelska Skolan	X	X	X								TA Associates		

*JB declares bankrupcy in 2013

Private Equity Ownership

Transactions for PE-owned schools between 2005-2014 according to Capital IQ and Mergermarket.

Figure 1.3: Illustration of methodology



Tables

1. Analysis

Table 1.1. Academic & Vocational Program Classifications

AP	VP
Ekonomiprogrammet	Barn- och Fritidsprogrammet
Estetiska programmet	Bygg- och Anläggningsprogrammet
Handel- och Administrationsprogrammet	El- och Energiprogrammet
Humanistiska programmet	Fordon- och Transportprogrammet
International Baccalaureate	Handel- och Administrationsprogrammet
Naturvetenskapsprogrammet	Hantverksprogrammet
Samhällsvetenskapsprogrammet	Hotell- och Turismprogrammet
Teknikprogrammet	Individuellt program
Waldorf	Industritekniska programmet
	Introduktionsprogrammet
	Medieprogrammet
	Naturbruksprogrammet
	Restaurang- och Livsmedelsprogrammet
	RX- utbildningar
	VVS- och Fastighetsprogrammet
	Vård- och Omsorgsprogrammet

Source: StuderaSmart (2015)

Table 1.2. Summary Statistics, Dependent Variables (Direct Regression)

		Primary					AP					VP				
		N	Mean	St. Dev.	Skew.	Kurt.	N	Mean	St. Dev.	Skew.	Kurt.	N	Mean	St. Dev.	Skew.	Kurt.
GPA NPT	PE	246	13.86	1.48	-0.14	3.40	272	11.96	1.82	-0.41	5.56	196	9.99	1.64	-0.29	4.38
	Profit	864	13.77	1.49	-0.21	3.62	383	11.97	2.24	-0.71	4.94	374	10.23	1.96	0.59	6.05
	Non-profit	302	14.62	1.52	-0.37	3.19	115	13.59	1.98	-0.02	2.33	33	10.95	2.39	0.84	6.40
	Public	9,481	12.47	1.35	-0.16	4.57	928	12.56	1.61	-0.33	6.41	980	9.92	1.65	0.27	6.51
Grade deflation	PE	246	6.84	5.71	1.54	6.02	272	8.71	5.79	0.98	4.12	196	9.32	5.82	0.97	3.89
	Profit	864	7.04	6.02	1.93	8.66	383	7.59	5.34	1.11	4.85	374	8.03	6.11	1.38	6.03
	Non-profit	302	7.26	6.35	1.48	5.70	115	6.86	6.26	3.29	20.80	33	6.28	4.05	1.57	7.02
	Public	9,481	5.96	4.43	1.78	7.64	928	7.13	4.55	4.68	59.96	980	7.33	4.71	1.93	10.28
Grade inflation	PE	246	18.81	8.53	1.05	4.80	272	27.12	10.04	0.39	3.55	196	27.83	10.35	0.57	3.54
	Profit	864	18.17	8.69	0.61	3.34	383	24.77	11.08	0.34	3.08	374	24.99	12.04	0.59	3.56
	Non-profit	302	16.13	8.56	1.17	4.97	115	21.60	9.73	0.53	4.29	33	25.31	10.84	1.69	7.41
	Public	9,481	17.40	7.03	0.98	6.10	928	22.83	7.27	0.57	4.31	980	23.60	8.30	0.77	5.23
Students / teacher	PE	246	16	5	3.08	21.36	272	16	4	0.49	3.88	196	15	3	0.11	3.25
	Profit	864	15	4	3.81	54.54	383	15	4	0.29	4.37	374	13	4	2.51	18.57
	Non-profit	302	13	3	2.68	25.08	115	13	4	-0.34	3.84	33	14	3	-0.27	2.08
	Public	9,481	12	3	19.16	649.57	928	12	3	4.09	44.99	980	11	3	4.78	60.86
Teacher pedagog. education	PE	246	67.29	15.68	-0.22	2.50	272	65.77	15.08	-0.15	2.34	196	61.27	14.25	0.13	2.54
	Profit	864	71.74	15.99	-0.72	3.31	383	70.03	17.20	-0.46	2.67	374	58.72	17.95	0.16	2.19
	Non-profit	302	73.71	13.48	-0.70	3.09	115	71.18	15.19	-0.43	2.85	33	68.85	14.15	-0.42	2.93
	Public	9,481	84.40	8.94	-0.75	3.99	928	81.58	9.31	-0.80	3.49	980	78.30	11.70	-0.96	3.93

The data included in the table is shown according to *model specification 1*, i.e. observations where all the dependent variables are non-missing. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. GPA NPT is average grade point average (GPA) for a school on the national proficiency test (NPT) and is weighted on participating students in each subject; Swedish, English and mathematics. Grade deflation/inflation is estimated as share of students who received at least one lower/higher final grade from the school compared to the grade the student got on the national proficiency test. This measure is also weighted on participating students in Swedish, English and mathematics. Students/teacher measures average number of students per teacher per school. Teacher pedagog. education is share of teachers per school with a pedagogical degree. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 1.3. Summary Statistics, Control Variables (Direct Regression)

		Primary					AP					VP				
		N	Mean	St. Dev.	Skew.	Kurt.	N	Mean	St. Dev.	Skew.	Kurt.	N	Mean	St. Dev.	Skew.	Kurt.
Parent high education	PE	246	63.24	12.12	-0.15	2.85	240	53.99	11.27	0.01	2.74	179	38.37	9.03	0.31	3.03
	Profit	864	62.09	14.98	-0.21	2.68	320	57.83	10.82	0.39	3.27	274	39.82	12.17	0.82	3.79
	Non-profit	302	72.26	13.21	-0.59	2.97	112	67.87	14.73	-0.10	2.26	28	45.22	8.65	-0.15	2.26
	Public	9,481	45.83	14.64	0.59	3.03	870	58.34	10.90	0.20	3.39	856	37.53	10.77	1.39	6.19
Student foreign backg.	PE	246	16.61	13.89	1.09	3.71	138	32.82	19.99	0.96	3.21	102	30.50	17.06	1.39	5.20
	Profit	864	15.27	15.91	1.89	6.58	214	29.45	18.37	1.37	4.67	123	27.76	16.73	1.15	3.79
	Non-profit	302	15.71	13.64	2.05	8.16	74	22.86	16.37	1.94	6.80	13	27.63	25.89	1.22	2.60
	Public	9,481	14.85	15.36	2.17	8.47	635	25.28	15.76	1.88	7.28	699	48.91	24.84	0.31	2.10
County unempl.	PE	246	5.73	2.16	0.23	2.36	272	6.79	1.92	0.20	2.34	196	6.81	1.85	0.14	2.39
	Profit	864	5.69	2.28	0.59	2.87	383	6.44	1.98	0.12	2.98	374	6.67	2.09	0.45	2.99
	Non-profit	302	5.43	1.86	0.63	3.37	115	6.61	2.35	0.70	2.81	33	6.92	2.14	0.49	2.22
	Public	9,481	5.62	2.01	0.53	3.01	928	6.70	2.02	0.21	2.68	980	6.81	1.93	0.21	2.78
Mean income	PE	246	273.62	43.57	1.02	3.81	272	270.10	32.02	1.12	3.93	196	267.18	29.66	1.09	4.06
	Profit	864	264.58	42.01	1.10	3.86	383	277.81	43.12	2.21	9.35	374	271.78	37.16	2.34	11.75
	Non-profit	302	269.48	46.09	2.15	10.12	115	277.07	45.14	2.63	12.98	33	266.00	26.56	0.39	2.66
	Public	9,481	245.43	36.25	1.45	6.82	928	260.94	33.06	2.24	12.06	980	257.73	27.28	1.70	9.42
Number of students per school	PE	246	55	31	2.00	8.00	272	173	149	1.58	4.97	196	158	98	0.98	3.44
	Profit	864	6	34	1.07	3.67	380	19	181	2.00	9.03	370	125	71	1.00	4.06
	Non-profit	302	54	39	1.86	6.27	115	215	150	0.78	2.70	32	148	105	1.45	6.14
	Public	9,481	92	4	0.76	3.63	923	415	351	1.38	5.14	977	332	258	1.74	6.90
Costs per student	PE	246	87.05	10.53	0.11	3.34	265	101.64	11.01	0.61	3.00	191	101.94	10.70	0.68	3.33
	Profit	864	87.34	10.28	0.23	3.22	353	102.30	13.47	1.49	6.73	343	105.18	19.27	4.62	37.50
	Non-profit	302	89.78	10.93	-0.10	2.44	113	102.93	12.28	0.64	3.59	30	106.37	13.57	0.70	3.19
	Public	9,481	83.96	11.09	0.64	7.18	874	112.24	21.61	1.53	8.17	910	113.27	23.32	1.58	9.75

The data included in the table is shown according to *model specification 1*, i.e. observations where all the dependent variables are non-missing. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Parent high education is share of students per school who's parents have attended a minimum of upper secondary school. Student foreign backg. refer to share of students who are not Swedish as defined both by birthplace and parents' citizenship. County unempl. is average unemployment rate measured per county. Mean income is per county and measured in thousand SEK. Number of students refer to average size per school and Costs per student is total cost per student. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 1.4. Summary Statistics, Dependent and Independent Variables on County Level (Indirect Regression)

		Primary					AP					VP				
		N	Mean	St.Dev	Skew.	Kurt.	N	Mean	St.Dev	Skew.	Kurt.	N	Mean	St.Dev	Skew.	Kurt.
GPA NPT	Large	6,516	12.94	1.53	-0.10	4.21	1,205	12.31	1.99	-0.39	4.41	1,032	10.02	1.78	0.40	6.54
	Small	4,377	12.25	1.26	-0.05	4.46	493	12.61	1.54	-0.87	13.28	551	10.03	1.70	0.44	6.31
Grade deflation	Large	6,516	6.19	4.77	1.78	7.65	1,205	7.75	5.36	2.97	28.24	1,032	8.12	5.40	1.57	7.50
	Small	4,377	5.97	4.54	2.00	9.51	493	6.80	4.36	1.63	7.67	551	6.97	4.86	1.76	8.08
Grade inflation	Large	6,516	17.34	7.34	1.03	6.47	1,205	24.01	9.41	0.58	4.01	1,032	24.73	9.98	0.77	4.39
	Small	4,377	17.63	7.16	0.84	4.41	493	23.54	8.07	0.47	3.92	551	24.03	9.17	0.79	5.39
Students / teacher	Large	6,516	13	4	14.62	412.90	1,205	14	4	1.93	18.09	1,032	13	4	3.24	30.49
	Small	4,377	12	2	12.96	374.24	493	10	2	0.50	3.98	551	10	2	0.59	3.92
Teach, peda. edu.	Large	6,516	82.66	11.83	-1.40	6.05	1,205	75.47	15.49	-0.87	3.12	1,032	69.97	17.70	-0.54	2.29
	Small	4,377	82.79	9.51	-0.85	4.04	493	76.40	11.55	-0.93	4.82	551	73.98	13.39	-0.85	3.75
Conc. PE	Large	6,516	3.04	4.77	2.14	7.80	1,205	12.82	7.20	0.03	3.25	1,032	12.41	7.53	0.47	4.62
	Small	4,377	0.36	2.29	7.79	73.00	493	0.33	2.21	7.03	54.52	550	0.32	2.13	7.17	56.92
Conc. profit	Large	6,516	9.10	7.96	1.65	9.00	1,205	16.38	8.74	0.94	7.28	1,032	15.28	8.66	0.74	5.97
	Small	4,377	2.62	6.94	3.52	17.46	493	6.40	14.66	3.91	22.18	550	7.53	17.48	3.53	16.68
Conc. N.profit	Large	6,516	3.22	3.94	1.37	6.38	1,205	4.27	4.89	1.07	3.28	1,032	3.81	4.71	1.12	3.27
	Small	4,377	0.62	3.41	7.78	73.45	493	1.72	9.31	6.81	54.48	550	1.16	8.78	9.24	95.31

The data included in the table is shown according to *model specification 1*, i.e. observations where all the dependent variables are non-missing. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. GPA NPT is average grade point average (GPA) for a school on the national proficiency test (NPT) and is weighted on participating students in each subject; Swedish, English and mathematics. Grade deflation/inflation is estimated as share of students in a school who received at least one lower/higher final grade from the school compared to the grade the student got on the national proficiency test. This measure is also weighted on participating students in Swedish, English and mathematics. Students/teacher measures average number of students per teacher per school. Teacher peda. edu. is share of teachers per school with a pedagogical degree. Conc PE/Conc. profit/Conc. N.profit is concentration of different owners within a county, measured by number of students attending a school with this ownership (private equity, other profit-driven actors and not-for-profit schools). Large and Small refer to county size with a cut-off at 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 1.5. Summary Statistics, Control Variables on School Level (Indirect Regression) (1/2)

			Primary					AP					VP				
			N	Mean	St. Dev	Skew.	Kurt.	N	Mean	St. Dev	Skew.	Kurt.	N	Mean	St. Dev	Skew	Kurt.
Mean county income	Large county	PE	222	273.59	44.62	1.06	3.79	267	270.36	32.24	1.09	3.86	190	267.57	30.02	1.05	3.93
		Profit	710	265.42	42.89	1.13	3.91	338	277.36	36.75	1.47	4.83	311	272.62	32.63	1.37	4.81
		N. profit	261	264.42	31.49	0.27	2.49	103	273.50	29.42	0.32	2.13	27	270.28	26.00	0.39	2.56
		Public	5,323	252.04	36.12	1.21	5.05	497	270.44	31.94	1.67	6.80	504	267.02	26.41	1.46	6.24
	Small county	PE	24	273.91	33.00	-0.03	1.79	5	256.10	8.67	-0.46	2.07	6	254.89	8.30	-0.07	1.83
		Profit	154	260.72	37.57	0.76	2.79	45	281.22	76.06	2.14	6.13	63	267.64	54.47	3.16	13.23
		N. profit	41	301.68	91.15	1.05	2.56	12	307.73	109.29	1.10	2.31	6	246.71	21.30	0.02	1.21
		Public	4,158	236.98	34.63	1.97	10.95	431	249.98	30.89	3.73	26.34	476	247.89	24.62	2.68	19.88
County unemployment	Large county	PE	222	5.79	2.12	0.19	2.31	267	6.80	1.93	0.19	2.32	190	6.81	1.87	0.13	2.36
		Profit	710	5.67	2.29	0.69	3.02	338	6.42	1.94	0.31	3.05	311	6.77	2.11	0.52	2.93
		N. profit	261	5.54	1.75	0.86	3.53	103	6.69	2.22	0.92	2.85	27	6.98	2.27	0.47	2.08
		Public	5,323	5.61	1.97	0.66	3.26	497	6.66	2.10	0.44	2.85	504	6.82	1.99	0.44	3.02
	Small county	PE	24	5.26	2.51	0.63	2.81	5	6.48	0.98	1.44	3.18	6	6.82	1.20	0.70	1.54
		Profit	154	5.76	2.20	0.11	2.08	45	6.56	2.25	-0.85	2.73	63	6.16	1.96	-0.02	2.71
		N. profit	41	4.74	2.36	0.45	2.43	12	5.95	3.31	0.33	1.95	6	6.67	1.57	-0.05	1.13
		Public	4,158	5.64	2.06	0.38	2.74	431	6.75	1.93	-0.12	2.40	476	6.81	1.86	-0.09	2.40
Cost per student	Large county	PE	222	87.42	10.68	0.09	3.35	262	101.60	11.07	0.62	2.98	187	101.85	10.79	0.70	3.31
		Profit	710	87.03	10.39	0.19	2.78	324	100.75	10.13	0.59	2.94	297	101.97	10.00	0.57	3.07
		N. profit	261	91.26	10.50	-0.17	2.59	101	101.81	10.35	0.44	2.93	27	104.37	12.50	0.91	4.09
		Public	5,323	84.31	10.27	0.21	2.87	477	102.42	10.76	0.70	4.08	481	103.09	11.15	0.97	5.06
	Small county	PE	24	83.61	8.50	-0.19	1.94	3	105.07	2.70	0.37	1.50	4	105.93	2.79	-0.18	1.28
		Profit	154	88.76	9.66	0.56	5.72	29	119.61	27.54	-0.03	1.85	46	125.92	40.70	2.12	8.49
		N. profit	41	80.36	8.78	0.24	2.17	12	112.40	21.24	-0.32	2.11	3	124.33	10.02	0,65	1.50
		Public	4,158	83.52	12.04	1.01	9.96	397	124.04	25.19	0.88	6.47	429	124.68	27.72	0.88	7.68

The data included in the table is shown according to *model specification 1*, i.e. observations where all the dependent variables are non-missing. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Mean county income is average yearly income per county and measured in thousand SEK. County unemployment is average unemployment rate measured per county and Costs per student is total cost per student. Large and Small refer to county size with a cut-off at 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 1.6. Summary Statistics, Control Variables on School Level (Indirect Regression) (2/2)

			Primary					AP					VP				
			N	Mean	St. Dev	Skew.	Kurt.	N	Mean	St. Dev	Skew.	Kurt.	N	Mean	St. Dev	Skew	Kurt.
Parent high education	Large county	PE	222	63.77	12.33	-0.21	2.85	239	54.02	11.28	0.01	2.74	174	38.54	9.08	0.28	3.01
		Profit	710	62.93	14.84	-0.20	2.72	280	57.66	10.67	0.47	3.52	225	38.85	11.71	1.04	4.49
		N. profit	261	72.17	12.89	-0.68	3.20	100	66.93	14.72	-0.08	2.24	23	44.56	9.24	0.02	2.08
		Public	5,323	50.08	15.20	0.29	2.64	485	60.28	12.31	-0.14	2.92	493	37.44	11.30	1.55	6.50
	Small county	PE	24	58.33	8.70	-0.17	2.30	1	46.63	NA	NA	NA	5	32.33	4.14	0.00	1.38
		Profit	154	58.25	15.08	-0.24	2.44	40	59.01	11.85	-0.03	2.15	49	44.25	13.36	0.03	2.67
		N. profit	41	72.85	15.28	-0.26	1.95	12	75.68	12.81	0.00	1.66	5	48.24	4.61	-0.11	1.33
		Public	4,158	40.38	11.84	0.93	4.63	385	55.89	8.19	0.53	5.01	363	37.65	10.01	1.08	5.29
Student foreign backg	Large county	PE	222	17.68	14.11	0.98	3.47	138	32.82	19.99	0.96	3.21	101	30.57	17.13	1.37	5.14
		Profit	710	17.13	16.78	1.68	5.60	204	30.01	18.61	1.31	4.47	113	28.49	16.82	1.10	3.72
		N. profit	261	16.85	14.12	1.95	7.50	70	23.60	16.52	1.89	6.56	13	27.63	25.89	1.22	2.60
		Public	5,323	18.65	18.35	1.65	5.60	442	27.08	17.76	1,62	5.70	394	40.05	22.36	0.66	2.58
	Small county	PE	24	6.71	5.22	1.06	3.48	0	NA	NA	NA	NA	1	23.39	NA	NA	NA
		Profit	154	6.69	5.62	1.95	9.39	10	18.10	4.82	0.42	2.47	10	19.50	13.77	2.03	6.21
		N. profit	41	8.46	6.40	1.30	5.20	4	9.89	2.80	-0.67	2.04	0	NA	NA	NA	NA
		Public	4,158	9.99	8.07	1.92	8.88	193	21.17	8.44	0.76	3.15	305	60.37	23.16	-0.04	2.12
Number of students per school	Large county	PE	222	57	3	1.88	7.36	267	175	150	1.56	4.90	190	157	99	0.99	3.41
		Profit	710	7	39	0.91	3.28	335	205	187	1.91	8.42	309	125	70	1.05	4.39
		N. profit	261	52	35	1.95	7.34	103	217	147	0.77	2.82	26	146	108	1.67	6.88
		Public	5,323	94	44	0.82	3.78	493	552	386	0.94	3.89	502	411	298	1.42	5.24
	Small county	PE	24	41	11	-0.10	2.18	5	49	36	0.95	2.45	6	174	57	0.73	2.79
		Profit	154	40	20	1.38	5.13	45	109	87	1.16	3.82	61	126	75	0.77	2.68
		N. profit	41	63	55	1.19	2.77	12	196	183	0.89	2.14	6	155	101	0.01	1.05
		Public	4,158	90	42	0.67	3.34	430	258	219	1.96	9.14	475	250	173	1.39	5.16

The data included in the table is shown according to *model specification 1*, i.e. observations where all the dependent variables are non-missing. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Parent high education is share of students per school who's parents have attended a minimum of upper secondary school. Student foreign backg. refer to share of students who are not Swedish as defined both by birthplace and parents' citizenship. Number of students refers to average size per school. Large and Small refer to county size with a cut-off at 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 1.7. GPA on the National Proficiency Test

Primary School

	Mean GPA			Ratio GPA					
Year	Mathematics	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2005	10.9	12.7	13.6	0.80	0.86	0.93	1.17	1.25	1.07
2006	11.1	13.3	13.6	0.81	0.83	0.98	1.20	1.23	1.02
2007	10.2	12.9	13.6	0.75	0.79	0.94	1.26	1.33	1.06
2008	10.6	13.4	13.9	0.76	0.79	0.97	1.27	1.31	1.04
2009	11.0	13.2	13.8	0.80	0.84	0.95	1.19	1.25	1.05
2010	10.6	12.5	14.0	0.76	0.85	0.89	1.18	1.32	1.12
2011	10.4	13.6	14.4	0.72	0.77	0.94	1.31	1.39	1.06
2012	10.5	13.5	14.4	0.73	0.78	0.94	1.29	1.37	1.06
2013	12.3	13.4	14.9	0.82	0.92	0.90	1.09	1.22	1.12
2014	11.5	13.6	15.0	0.76	0.84	0.90	1.19	1.31	1.11

AP

	Mean GPA			Ratio GPA					
Year	Mathematics	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2012	8.8	13.3	13.8	0.63	0.66	0.96	1.51	1.58	1.04
2013	10.7	13.2	14.4	0.74	0.81	0.92	1.24	1.34	1.09
2014	9.4	13.4	14.5	0.65	0.70	0.93	1.42	1.53	1.08

VP

	Mean GPA			Ratio GPA					
Year	Mathematics	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2012	6.0	10.6	11.5	0.52	0.56	0.92	1.78	1.93	1.08
2013	9.5	10.2	11.8	0.81	0.93	0.86	1.07	1.24	1.16
2014	7.8	10.9	12.0	0.65	0.72	0.91	1.40	1.54	1.10

Mean grade point average (GPA) on the national proficiency test (NPT) for all schools per year for all three subjects, split on educational level. Primary is defined as students attending ninth grade. AP and VP are academic and vocational programs respectively.
Yearly ratio for the different subjects, used to project missing values.

Table 1.8. Relation GPA Final Grade vs. GPA on the National Proficiency Test - Deflation

Primary School

	Mean GPA Relation			Ratio GPA					
Year	Math.	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2005	9.1	23.4	18.6	2.58	1.26	2.05	0.79	0.39	0.49
2006	9.5	22.7	14.5	2.38	1.57	1.52	0.64	0.42	0.66
2007	10.3	28.3	18.0	2.76	1.57	1.76	0.64	0.36	0.57
2008	8.7	24.6	15.5	2.82	1.58	1.79	0.63	0.35	0.56
2009	10.8	21.4	18.5	1.98	1.16	1.71	0.86	0.50	0.58
2010	9.2	26.5	22.8	2.88	1.16	2.48	0.86	0.35	0.40
2011	6.9	27.3	15.6	3.97	1.74	2.28	0.57	0.25	0.44
2012	7.6	25.5	14.4	3.37	1.77	1.91	0.57	0.30	0.52
2013	7.8	20.6	22.5	2.64	0.92	2.88	1.09	0.38	0.35
2014	8.9	30.3	22.7	3.38	1.33	2.54	0.75	0.30	0.39

AP

	Mean GPA			Ratio GPA					
Year	Math.	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2012	8.5	1.4	10.8	0.17	0.13	1.26	7.65	6.05	0.79
2013	11.8	2.5	7.2	0.22	0.35	0.61	2.83	4.63	1.64
2014	13.0	1.4	11.6	0.11	0.12	0.90	8.46	9.45	1.12

VP

	Mean GPA			Ratio GPA					
Year	Math.	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2012	9.1	1.5	10.9	0.17	0.14	1.21	7.26	6.02	0.83
2013	12.0	2.9	7.1	0.24	0.41	0.59	2.41	4.09	1.69
2014	13.4	1.6	11.4	0.12	0.14	0.85	6.93	8.14	1.18

Mean share of students getting at least one notch lower on their final grade compared to grade gotten on the national proficiency test (NPT) per subject and year for the different educational levels. Yearly ratios for the different subjects, used to project missing values. Primary is defined as students attending ninth grade. AP and VP are academic and vocational programs respectively.

Table 1.9. Relation GPA Final Grade vs. GPA on the National Proficiency Test - Inflation

Primary School

	Mean GPA Relation			Ratio GPA					
Year	Math.	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2005	8.8	2.0	4.9	0.23	0.40	0.56	2.47	4.42	1.79
2006	8.2	1.9	6.4	0.24	0.31	0.78	3.27	4.21	1.29
2007	7.8	1.2	4.9	0.15	0.24	0.63	4.17	6.66	1.60
2008	7.2	1.6	6.1	0.22	0.27	0.84	3.76	4.50	1.20
2009	5.9	1.6	4.4	0.27	0.36	0.75	2.80	3.73	1.33
2010	6.5	1.1	3.1	0.17	0.35	0.48	2.87	6.01	2.09
2011	8.3	1.0	6.5	0.12	0.16	0.78	6.29	8.07	1.28
2012	6.3	0.7	6.2	0.11	0.12	0.98	8.56	8.75	1.02
2013	18.3	5.1	10.5	0.28	0.48	0.57	2.08	3.62	1.74
2014	17.8	2.4	11.4	0.13	0.21	0.64	4.80	7.52	1.57

AP

	Mean GPA			Ratio GPA					
Year	Math.	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2012	16.8	33.1	21.2	1.97	1.56	1.27	0.64	0.51	0.79
2013	16.0	24.4	28.3	1.52	0.86	1.77	1.16	0.66	0.57
2014	16.3	30.8	29.2	1.89	1.06	1.79	0.95	0.53	0.56

VP

	Mean GPA			Ratio GPA					
Year	Math.	Swedish	English	Mat/Eng	Mat/Swe	Swe/Eng	Swe/Mat	Eng/Mat	Eng/Swe
2012	16.9	35.7	21.7	2.11	1.65	1.28	0.61	0.47	0.78
2013	15.9	23.8	27.7	1.50	0.86	1.75	1.16	0.67	0.57
2014	15.9	31.4	27.8	1.97	1.13	1.75	0.89	0.51	0.57

Mean share of students getting at least one notch higher on their final grade compared to grade gotten on the national proficiency test (NPT) per subject and year for the different educational levels. Yearly ratios for the different subjects, used to project missing values. Primary is defined as students attending ninth grade. AP and VP are academic and vocational programs respectively.

Table 1.10 Descriptive Statistics Before and After Winsorizing Student/Teacher Ratio

Direct effect

			Primary						**AP**						**VP**					
			Mean	SD	Max	Min	Skew.	Kurt.	Mean	SD	Max	Min	Skew.	Kurt.	Mean	SD	Max	Min	Skew.	Kurt.
Students/ Teacher		Before	12.50	3.36	136.90	0.90	14.41	432.62	13.10	3.92	52.10	1.20	1.72	15.16	12.01	3.61	52.10	4.00	2.84	27.39
		After	12.42	2.23	20.30	7.70	0.87	4.62	13.05	3.56	23.70	6.00	0.52	3.01	11.94	3.11	21.40	5.90	0.59	3.23

Indirect effect

Students/ Teacher	Small	Before	11.59	2.39	94.30	3.10	14.71	443.62	10.07	1.91	17.45	4.40	0.22	3.74	9.85	1.98	19.30	5.10	0.40	4.22
		After	11.55	1.59	17.90	8.00	0.45	4.10	10.07	1.90	17.45	6.00	0.27	3.67	9.85	1.98	19.30	5.90	0.43	4.21
	Large	Before	12.63	3.53	136.90	2.50	19.90	629.74	13.24	3.77	52.10	3.92	4.91	49.02	12.32	3.54	52.10	4.30	5.76	64.72
		After	12.52	1.91	17.90	8.00	0.17	3.24	13.09	2.67	21.10	6.00	0.59	3.98	12.18	2.44	19.30	5.90	0.34	3.66

Winsorizing the dependent variable student/teacher according to *model specification 3* at the 98% level. The data shown is for both the direct effect and indirect effect regression before and after winsorizing. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and is measured for2012-2014.

2. Regression results

Direct effect

Table 2.1.a Results From Regressing Student Outcome on Ownership

	GPA NPT			**Deflation**			**Inflation**		
Ind. variables	Primary	AP	VP	Primary	AP	VP	Primary	AP	VP
PE	0.19*	0.28	-0.12	-0.21	0.69	1.93**	2.26***	3.32**	4.94***
Profit	0.30***	0.12	0.02	0.47	-0.36	1.10	1.43***	2.05*	0.89
Non-profit	0.40***	0.51**	-0.48	0.20	-0.32	-3.03**	-0.06	0.09	2.36
Parent high education	0.05***	0.11***	0.08***	0.01*	-0.08***	0.01	-0.07***	-0.22***	-0.20***
Student foreign backg.	-0.01***	-0.01***	-0.01**	-0.01***	-0.04***	-0.02**	0.04***	0.01	0.00
County unemployment	0.02	0.09	0.20	-0.12*	-0.67	-0.94**	0.00	0.69	-0.37
Mean income	0.00	-0.01	-0.02	-0.03	0.07	0.00**	0.01	-0.06	-0.02*
No. of students/school	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Costs per student	0.00	0.00	*-0.02***	*-0.02*	*0.00*	*0.05***	*-0.02*	*-0.02*	*0.06**
N	10,893	1,011	813	10,893	1,011	813	10,893	1,011	813
R^2-adj. (County)	0.45	0.64	0.34	0.35	0.07	0.07	0.08	0.17	0.12

Table 2.1.b Wald Test for Coefficient Statistical Differences

α	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit
Profit	•	-	•	-	•	-	•	-	**	-	•	-	•	-	•	-	**	-
Non-Profit	•	•	•	**	•	•	•	•	•	•	***	***	***	***	***	•	•	•

• Insignificant result, *** Significance at 1%, ** Significance at 5%, * Significance at 10%. Note that the statistical significance are normally distributed in the upper table and F-distributed in the bottom table. Results reported for FE-regression on county and year with county clustered robust standard errors. The dependent variables as specified in *Model Specification 1* that are shown in this table are; *GPA NPT* which is measured as average grade point average (GPA) for a school on the national proficiency test (NPT) and is weighted on participating students in each subject; Swedish, English and mathematics. *Grade deflation/inflation* is estimated as share of students in a school who receive at least one lower/higher final grade from the school compared to the grade the student got on the national proficiency test. This measure is also weighted on participating students in Swedish, English and mathematics. Independent variables are the owner types private equity (PE), other profit-driven and not-for-profit as compared to public schools. Control variables include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated 2005-2014. AP and VP are academic and vocational programs respectively and is measured 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 2.2.a Results From Regressing Resources on Ownership

	Students/Teacher			Teacher Pedagogical Education		
Ind. variables	Primary	AP	VP	Primary	AP	VP
PE	3.32***	3.22***	2.43***	-18.59***	-14.83***	-18.61***
Profit	1.95***	2.68***	-0.53	-14.07***	-7.84***	-23.09***
Non-profit	-0.29	0.16	0.58	-12.05***	-10.09***	-8.74*
Parent high education	0.02***	0.00	0.03	0.03*	0.07	0.32***
Student foreign Backg.	-0.04***	-0.01	0.01	-0.07***	0.01	0.12***
County unemployment	0.08*	0.07	-0.08	0.17	-2.82***	-0.91
Mean income	0.02***	-0.06**	0.01	0.02	0.03	-0.35
No. of students/school	0.00***	0.00***	0.00***	-0.02***	0.01***	0.00
Costs per student	-0.04***	-0.02**	-0.01	-0.02	-0.02	-0.04
N	10,893	1,011	813	10,893	1,011	813
R^2-adj. (County)	0.10	0.12	0.10	0.26	0.30	0.44

Table 2.2.b Wald Test for Coefficient Statistical Differences

α	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit	PE	Profit
Profit	***	-	•	-	***	-	***	-	***	-	•	-
Non-Profit	***	***	***	***	*	•	***	•	**	•	*	**

• Insignificant result, *** Significance at 1%, ** Significance at 5%, * Significance at 10%. Note that the statistical significance are normally distributed in the upper table and F-distributed in the bottom table. Results reported for FE-regression on county and year with county clustered robust standard errors. The dependent variables as specified in *Model* Specification 1 that are shown in this table are; *Student/teacher* which is average number of students per teacher per school and Teacher pedagogical education which is share of teachers with a pedagogical degree. Independent variables are the owner types private equity (PE), other profit-driven and not-for-profit as compared to public schools. Control variables include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and is measured for 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Indirect effect

Table 2.3. Results From Regressing GPA NPT on Ownership Concentration (Competition)

Dep. variable	Inde. variables	Primary		AP		VP	
		Small	Large	Small	Large	Small	Large
	Conc. PE	0.00	-0.01	0.00	-0.01	-0.03*	0.00
	Conc. profit	0.00	0.01*	-0.02	0.00	*0.05**	*0.04*
	Conc. N-profit	0.00	0.00	0.19*	-0.07	*-1.87***	*0.07*
	Parent high education	0.04***	0.05***	0.05	0.10***	0.01	0.08***
GPA NPT	Student foreign backg.	-0.01***	-0.01***	0.02	0.00	0.01	0.00
	County unemployment	-0.02	0.02	0.03	0.38	0.60***	0.25
	Mean income	0.00	0.00	-0.06	0.11*	0.01	0.11
	No. of students/school	0.00***	0.00**	0.00	0.00***	0.00**	0.00
	Costs per student	0.00	0.00	-0.01	0.01	-0.01	0.00
	N	4,158	5,323	178	424	214	379
	R^2-adj.	0.27	0.48	*0.40*	*0.65*	*0.53*	*0.25*

*** Significance at 1%, ** 5%, * 10%. Results for FE-regression on county and year with county clustered robust standard errors. The dependent variable as specified in *Specification 1* is GPA NPT measured as average grade point average for a school on the national proficiency test and is weighted on participating students in each subject; Swedish, English and mathematics. Independent core variables are the concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that owner over total number of students within a county. Control variables include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated 2005-2014. AP and VP are academic and vocational programs respectively and is measured 2012-2014. Large and Small refer to county size with a cut-off at 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 2.4. Results From Regressing Grade Deflation & Inflation on Ownership Concentration (Competition)

Dep. variables	Inde. variables	Primary		AP		VP	
		Small	Large	Small	Large	Small	Large
Deflation	Conc. PE	-0.04	-0.04	0.14***	0.01	0.17***	-0.03
	Conc. profit	-0.02	-0.04**	-0.05	-0.03	*-0.03*	*0.11*
	Conc. N-profit	-0.04	0.01	0.96*	0.07	*0.78*	*0.38*
	Parent high education	0.01	0.01	-0.04	-0.02	0.06	0.00
	Student foreign backg.	-0.01	-0.02***	0.04	-0.05***	-0.02	-0.03***
	County unemployment	0.05	-0.22***	0.20	0.27	1.02	-1.77**
	Mean Income	0.01	-0.03	0.31	0.47	0.09	-0.37
	No. of students/school	0.00	0.00	-0.01**	0.00**	0.01**	0.00
	Costs per student	-0.02	-0.01	-0.01	0.06	*0.07**	*0.04*
	N	4,158	5,323	178	424	214	379
	R^2-adj.	0.41	0.35	*0.14*	*0.06*	*0.25*	*0.05*
Inflation	Conc. PE	0.18	0.05	-0.15	0.09	-0.13	-0.06
	Conc. profit	0.04	0.01	-0.31**	0.12	*-0.09*	*0.09*
	Conc. N-profit	-0.03	-0.07	-1.58	0.49	*8.73****	*0.08*
	Parent high education	-0.05***	-0.06***	0.06	-0.17***	-0.16***	-0.13**
	Student foreign backg.	0.02	0.04***	-0.25***	0.04*	0.03*	-0.01
	County unemployment	-0.28*	0.24	-3.56**	-0.60	-3.12	2.32
	Mean income	0.02	-0.03	0.30	-0.27	0.27	0.57**
	No. of students/school	0.00	0.00	0.01	0.00	0.00	0.00
	Costs per student	-0.03	0.00	0.16***	-0.09	*0.00*	*0.03*
	N	4,158	5,323	178	424	214	379
	R^2-adj.	0.08	0.10	*0.29*	*0.18*	*0.26*	*0.05*

*** Significance at 1%, ** 5%, * 10%. Results for FE-regression on county and year with county clustered robust standard errors. The dependent variables as specified in *Specification 1* are Grade deflation & inflation which are estimated as share of students in a school who receive at least one lower/higher final grade from the school compared to the grade the student got on the national proficiency test. This measure is also weighted on participating students in Swedish, English and mathematics. Independent core variables are the concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that owner over total number of students within a county. Control variables include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated 2005-2014. AP and VP are academic and vocational programs respectively and is measured 2012-2014. Large and Small refer to county size with a cut-off at 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 2.5. Results From Regressing Resources on Ownership Concentration (Competition)

Dep. variables	Inde. variables	Primary		AP		VP	
		Small	Large	Small	Large	Small	Large
Students / Teacher	PE	-0.02	0.02	0.03	-0.04	0.00	0.02
	Profit	0.02	0.03*	0.04***	-0.07	*-0.02*	*-0.04*
	Non-profit	-0.08	0.00	-0.55	-0.05	*0.60**	*-0.26**
	Parent high education	0.02***	0.03***	0.07***	0.03	-0.01	0.08***
	Student foreign backg.	-0.04***	-0.04***	-0.01	0.03	0.01	0.04
	County unemployment	0.04	0.07	-0.20	0.40	-0.28	0.23
	Mean income	0.01*	0.02	-0.10	0.10	-0.13	0.18
	No. of students/school	0.01***	0.00	0.01	0.00***	0.00	0.00**
	Costs per student	-0.04***	-0.05***	-0.01	-0.01	*-0.01*	*-0.03*
	N	4,158	5,323	178	424	214	379
	R^2-adj.	*0.05*	*0.06*	*0.10*	*0.02*	*0.06*	*0.07*
Teacher pedagogical education	PE	0.06*	0.07	0.06	-0.14**	-0.05	-0.15
	Profit	-0.05	0.05	0.22**	0.03	*0.00*	*-0.28***
	Non-profit	0.18	0.03	0.11	0.07	*2.75****	*-0.61*
	Parent high education	0.05**	0.03	0.18	0.17**	-0.06	0.41***
	Student foreign backg.	-0.09**	-0.04*	0.03	0.15***	0.04*	0.16***
	County unemployment	0.01	0.24	-0.10	0.86	0.68	-2.48*
	Mean income	-0.04	0.06	-0.18	0.10	0.00	-0.37
	No. of students/school	-0.02**	-0.01***	0.01	0.00	-0.01	0.00
	Costs per student	-0.02	0.01	0.02	0.04	*0.03*	*-0.15**
	N	4,158	5,323	178	424	214	379
	R^2-adj.	*0.12*	*0.10*	*0.07*	*0.12*	*0.11*	*0.14*

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results reported for FE-regression on county and year with county clustered robust standard errors. The dependent variables as specified in *Model Specification 1* are *Resources*; Student/teacher is average number of students per teacher per school and Teacher pedagogical education is share of teachers with a pedagogical degree. Independent core variables are the concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that owner over total number of students within a county. Control variables include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and is measured 2012-2014Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

3. Robustness tests

Direct effect

Table 3.1 Results From Regressing GPA on the NPT on Ownership

	GPA NPT								
	With control variables								
	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
PE	0.19*	0.41***	0.41***	0.28	0.29	0.29	-0.12	0.29	0.09
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.04)*	*(0.09)*	*(0.04)*	*(0.52)*	*(0.43)*	*(0.65)*
Profit	0.30***	0.31***	0.35***	0.12	0.05	0.24**	0.02	0.06	0.11
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.30)*	*(0.67)*	*(0.05)*	*(0.92)*	*(0.76)*	*(0.61)*
Non-profit	0.40***	0.42***	0.43***	0.51**	0.49**	0.51**	-0.48	-0.30	0.52*
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.24)*	*(0.46)*	*(0.24)*
N	10,893	11,001	5,361	1,011	1,062	736	813	865	531
R^2-*adj.*	*0.43*	*0.44*	*0.52*	*0.58*	*0.57*	*0.67*	*0.18*	*0.18*	*0.21*
R^2-*adj. (county)*	*0.45*	*0.45*	*0.55*	*0.64*	*0.63*	*0.73*	*0.34*	*0.33*	*0.43*
	Without control variables								
PE	0.81***			-0.62***			-0.05		
Profit	0.97***			-0.80***			0.06		
Non-profit	1.52***	*NA*	*NA*	1.05***	*NA*	*NA*	1.01*	*NA*	*NA*
N	10,893			1,698			1,583		
R^2-*adj. (county)*	*0.21*			*0.11*			*0.10*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. GPA NPT measured as average grade point average for a school on the national proficiency test, weighted on participating students in each subject; Swedish, English and mathematics. Independent core variables are owner types private equity (PE), other profit-driven and not-for-profit as compared to a public owner. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.2 Results From Regressing Share of Students with Lower Final Grade than NPT Score on Ownership

Deflation

With control variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
PE	-0.21	0.06	-0.22	0.69	1.02	0.54	1.93**	1.43*	1.51
p-value	*(0.41)*	*(0.80)*	*(0.39)*	*(0.21)*	*(0.06)*	*(0.24)*	*(0.00)*	*(0.03)*	*(0.01)*
Profit	0.47	0.36	0.47	-0.36	-0.18	-0.16	1.10	0.38	0.36
p-value	*(0.00)*	*(0.01)*	*(0.00)*	*(0.47)*	*(0.71)*	*(0.69)*	*(0.09)*	*(0.58)*	*(0.58)*
Non-profit	0.20	0.48	0.20	-0.32	-0.22	-0.51	-3.03**	-2.11	-3.40***
p-value	*(0.40)*	*(0.02)*	*(0.40)*	*(0.66)*	*(0.76)*	*(0.40)*	*(0.02)*	*(0.13)*	*(0.01)*
N	10,893	12,822	10,890	1,011	1,052	928	813	924	744
R^2-*adj.*	*0.33*	*0.31*	*0.33*	*-0.08*	*-0.07*	*-0.04*	*-0.15*	*-0.14*	*-0.18*
R^2-*adj. (county)*	*0.35*	*0.33*	*0.35*	*0.07*	*0.08*	*0.12*	*0.07*	*0.06*	*0.07*

Without control variables

PE	0.04			1.51***			1.69***		
Profit	0.72***			0.36			0.60		
Non-profit	0.65	*NA*	*NA*	-0.71	*NA*	*NA*	-2.63***	*NA*	*NA*
N	10,893			1,698			1,583		
R^2-*adj. (county)*	*0.34*			*0.04*			*0.04*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Grade deflation is estimated as share of students in a school who receive at least one lower final grade from the school compared to the grade the student got on the national proficiency test, weighted on participating students in Swedish, English and mathematics. Independent core variables are owner types private equity (PE), other profit-driven and not-for-profit as compared to a public owner. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.3 Results From Regressing Share of Students with Higher Final Grade than NPT Score on Ownership

Inflation

With control variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
PE	2.26***	2.18***	2.27***	3.32**	4.03***	4.82***	4.94***	4.67***	5.28***
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
Profit	1.43***	1.00**	1.43***	2.05*	2.14*	3.44***	0.89	0.77	1.62
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.01)*	*(0.01)*	*(0.00)*	*(0.42)*	*(0.46)*	*(0.14)*
Non-profit	-0.06	-0.19	-0.07	0.09	0.05	2.06	2.36	-0.51	3.11*
p-value	*(0.88)*	*(0.60)*	*(0.88)*	*(0.94)*	*(0.96)*	*(0.07)*	*(0.30)*	*(0.81)*	*(0.15)*
N	10,893	12,822	10,890	1,011	1,052	928	813	924	744
R^2-*adj.*	*0.06*	*0.05*	*0.06*	*0.04*	*0.04*	*0.08*	*-0.09*	*-0.09*	*-0.10*
R^2-*adj. (county)*	*0.08*	*0.07*	*0.08*	*0.17*	*0.17*	*0.22*	*0.12*	*0.10*	*0.13*

Without control variables

PE	1.34*			4.59***			4.57***		
Profit	0.41			2.57***			1.85**		
Non-profit	-1.79***	*NA*	*NA*	-1.13	*NA*	*NA*	1.46	*NA*	*NA*
N	10,893			1,698			1,583		
R^2-*adj. (county)*	*0.06*			*0.05*			*0.04*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Grade inflation is estimated as share of students in a school who receive at least one higher final grade from the school compared to the grade the student got on the national proficiency test, weighted on participating students in Swedish, English and mathematics. Independent core variables are owner types private equity (PE), other profit-driven and not-for-profit as compared to a public owner. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.4 Results From Regressing Student/Teacher Ratio on Ownership

Students / Teacher

With control variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
PE	3.32***	3.44***	2.87***	3.22***	3.33***	3.49***	2.43***	2.93***	2.55****
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
Profit	1.95***	1.30***	1.93***	2.68***	2.77***	2.98***	-0.53	-0.43	-0.64
p-value	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.25)*	*(0.34)*	*(0.05)*
Non-profit	-0.29	-0.99**	-0.25	0.16	0.18	0.24	0.58	-0.24	0.39
p-value	*(0.14)*	*(0.01)*	*(0.03)*	*(0.74)*	*(0.70)*	*(0.51)*	*(0.55)*	*(0.78)*	*(0.56)*
N	10,893	12,752	10,893	1,011	1,071	1,011	813	963	813
R^2-*adj.*	*0.07*	*0.00*	*0.22*	*-0.03*	*-0.01*	*0.09*	*-0.11*	*-0.04*	*0.03*
R^2-*adj. (county)*	*0.10*	*0.02*	*0.25*	*0.12*	*0.13*	*0.22*	*0.10*	*0.13*	*0.22*

Without control variables

PE	3.55***			2.08***			2.80***		
Profit	2.23***			1.12***			0.28		
Non-profit	0.27	*NA*	*NA*	-0.90**	*NA*	*NA*	1.30**	*NA*	*NA*
N	10,893			1,698			1,583		
R^2-*adj. (county)*	*0.06*			*0.07*			*0.09*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Student/teacher is average number of students per teacher per school. Independent core variables are owner types private equity (PE), other profit-driven and not-for-profit as compared to a public owner. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.5 Results From Regressing Share of Teachers with Pedagogical Degree on Ownership

	Teacher Pedagogical Education								
	With control variables								
	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
PE	-18.59***	-18.61***		-14.83***	-15.17***		-18.61***	-18.81***	
p-value	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*	
Profit	-14.07***	-13.97***	NA	-7.84***	-7.86***	NA	-23.09***	-22.35***	NA
p-value	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*	
Non-profit	-12.05***	-11.86***		-10.09***	-10.58***		-8.74*	-11.74***	
p-value	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*		*(0.01)*	*(0.00)*	
N	10,893	12,688		1,011	1,059		813	945	
R^2-*adj.*	*0.24*	*0.24*	NA	*0.18*	*0.19*	NA	*0.30*	*0.34*	NA
R^2-*adj. (county)*	*0.26*	*0.26*		*0.30*	*0.30*		*0.44*	*0.45*	
	Without control variables								
PE	-17.45***			-18.65***			-19.75***		
Profit	-12.88***			-15.00***			-22.17***		
Non-profit	-10.07***	*NA*	*NA*	-12.78***	*NA*	*NA*	-5.01	*NA*	*NA*
N	10,893			1,698			1,583		
R^2-*adj. (county)*	*0.24*			*0.28*			*0.35*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1* and *Specification 2*. Teacher pedagogical education is share of teachers with a pedagogical degree. Independent core variables are owner types private equity (PE), other profit-driven and not-for-profit as compared to a public owner. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Indirect effect

Table 3.6 Results From Regressing GPA on the NPT on Ownership Concentration for Small Counties

	GPA NPT – Small Counties *With Control Variables*								
	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	0.00	0.00	0.00	0.00	0.00	0.00	-0.03*	-0.03**	-0.04**
p-value	*(0.78)*	*(0.78)*	*(0.94)*	*(0.94)*	*(0.94)*	*(1.00)*	*(0.51)*	*(0.47)*	*(0.34)*
Conc. Profit	0.00	0.01	0.01***	-0.02	-0.02	-0.02	0.05*	0.05*	0.08***
p-value	*(0.30)*	*(0.26)*	*(0.03)*	*(0.56)*	*(0.55)*	*(0.63)*	*(0.16)*	*(0.16)*	*(0.04)*
Conc. Non-profit	0.00	0.00	0.00	0.19*	0.19*	0.19	-1.87***	-1.74***	(omitted)
p-value	*(0.96)*	*(1.00)*	*(0.85)*	*(0.38)*	*(0.38)*	*(0.39)*	*(0.01)*	*(0.01)*	-
N	4,158	4,175	1,894	178	180	148	214	219	150
R^2-*adj.*	*0.23*	*0.23*	*0.30*	*-0.13*	*-0.12*	*-0.21*	*0.11*	*0.10*	*-0.20*
R^2-*adj. (county)*	*0.27*	*0.27*	*0.38*	*0.40*	*0.40*	*0.47*	*0.53*	*0.52*	*0.53*
	Without Control Variables								
PE	0.00			-0.01			-0.03		
Profit	0.00			0.03			0.02		
Non-profit	0.00	*NA*	*NA*	-0.02	*NA*	*NA*	0.03	*NA*	*NA*
N	4,158			431			475		
R^2-*adj. (county)*	*0.12*			*-0.38*			*-0.01*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. GPA NPT measured as average grade point average for a school on the national proficiency test, weighted on participating students in each subject; Swedish, English and mathematics. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Small county refers to a county with less than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.7 Results From Regressing GPA on the NPT on Ownership Concentration for Large Counties

GPA NPT – Large Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	-0.01	-0.01	0.00	-0.01	-0.02	-0.01	0.00	0.01	0.00
p-value	*(0.11)*	*(0.11)*	*(0.91)*	*(0.59)*	*(0.33)*	*(0.60)*	*(0.93)*	*(0.73)*	*(0.94)*
Conc. Profit	0.01*	0.01*	0.01	0.00	-0.01	0.00	0.04	0.06*	0.01
p-value	*(0.07)*	*(0.06)*	*(0.14)*	*(0.91)*	*(0.70)*	*(0.98)*	*(0.44)*	*(0.17)*	*(0.86)*
Conc. Non-profit	0.00	0.00	0.01	-0.07	-0.05	-0.17**	0.07	0.05	0.09
p-value	*(0.65)*	*(0.69)*	*(0.12)*	*(0.64)*	*(0.73)*	*(0.24)*	*(0.76)*	*(0.81)*	*(0.69)*
N	5,323	5,345	2,703	424	446	322	379	400	246
R^2-*adj.*	*0.5*	*0.47*	*0.55*	*0.60*	*0.57*	*0.69*	*0.11*	*0.12*	*0.20*
R^2-*adj. (county)*	*0.48*	*0.48*	*0.56*	*0.65*	*0.63*	*0.75*	*0.25*	*0.25*	*0.39*

Without Control Variables

PE	-0.01**			0.00			0.00		
Profit	0.00			-0.03			0.03		
Non-profit	-0.01	*NA*	*NA*	-0.05	*NA*	*NA*	0.13	*NA*	*NA*
N	5,323			497			504		
R^2-*adj. (county)*	*0.09*			*-0.10*			*-0.05*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. GPA NPT measured as average grade point average for a school on the national proficiency test, weighted on participating students in each subject; Swedish, English and mathematics. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Large county refers to a county with more than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.8 Results From Regressing Share of Students with Lower Final Grade than NPT Score on Ownership Concentration for Small Counties

Deflation – Small Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	-0.04	-0.04	-0.04	0.14***	0.13***	0.14***	0.17***	0.15***	0.17***
p-value	*(0.38)*	*(0.32)*	*(0.38)*	*(0.32)*	*(0.32)*	*(0.21)*	*(0.21)*	*(0.27)*	*(0.19)*
Conc. Profit	-0.02	-0.02	-0.02	-0.05	-0.05	-0.06	-0.03	-0.04	-0.04
p-value	*(0.31)*	*(0.23)*	*(0.32)*	*(0.72)*	*(0.72)*	*(0.60)*	*(0.74)*	*(0.70)*	*(0.70)*
Conc. Non-profit	-0.04	-0.02	-0.04	0.96*	0.98*	0.49	0.78	0.90**	(omitted)
p-value	*(0.45)*	*(0.67)*	*(0.45)*	*(0.24)*	*(0.23)*	*(0.51)*	*(0.68)*	*(0.44)*	-
N	4,158	4,844	4,157	178	180	172	214	223	204
R^2-*adj.*	*0.37*	*0.36*	*0.37*	*-0.59*	*-0.59*	*-0.50*	*-0.41*	*-0.44*	*-0.42*
R^2-*adj. (county)*	*0.41*	*0.39*	*0.41*	*0.14*	*0.15*	*0.22*	*0.25*	*0.21*	*0.27*

Without Control Variables

PE	-0.03			0.16			0.17		
Profit	-0.02			-0.05			0.02		
Non-profit	-0.03	*NA*	*NA*	-0.11	*NA*	*NA*	-0.15	*NA*	*NA*
N	4,158			431			475		
R^2-*adj. (county)*	*0.37*			*-0.40*			*-0.40*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Grade deflation is estimated as share of students in a school who receive at least one lower final grade from the school compared to the grade the student got on the national proficiency test, weighted on participating students in Swedish, English and mathematics. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Small county refers to a county with less than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.9 Results From Regressing Share of Students with Lower Final Grade Than NPT Score on Ownership Concentration for Large Counties

Deflation – Large Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	-0.04	-0.04	-0.04	0.01	0.02	-0.01	-0.03	0.00	0.00
p-value	*(0.06)*	*(0.04)*	*(0.04)*	*(0.92)*	*(0.85)*	*(0.84)*	*(0.76)*	*(0.99)*	*(0.99)*
Conc. Profit	-0.04**	-0.04**	-0.04**	-0.03	-0.01	0.01	*0.11*	*0.05*	*0.12*
p-value	*(0.01)*	*(0.01)*	*(0.01)*	*(0.82)*	*(0.92)*	*(0.92)*	*(0.40)*	*(0.78)*	*(0.32)*
Conc. Non-profit	0.01	0.01	0.01	0.07	-0.04	0.02	*0.38*	*0.13*	*0.23*
p-value	*(0.87)*	*(0.88)*	*(0.88)*	*(0.92)*	*(0.95)*	*(0.96)*	*(0.53)*	*(0.87)*	*(0.66)*
N	5,323	5,957	5,322	424	441	400	379	448	351
R^2-*adj.*	*0.35*	*0.33*	*0.35*	*-0.10*	*-0.09*	*0.01*	*-0.14*	*-0.11*	*-0.15*
R^2-*adj. (county)*	*0.35*	*0.34*	*0.35*	*0.06*	*0.05*	*0.16*	*0.05*	*0.04*	*0.05*

Without Control Variables

PE	-0.03*			0.02			-0.05		
Profit	-0.04***			-0.01			0.19*		
Non-profit	0.01	*NA*	*NA*	0.25	*NA*	*NA*	0.07	*NA*	*NA*
N	5,323			497			504		
R^2-*adj. (county)*	*0.34*			*-0.11*			*-0.11*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Grade deflation is estimated as share of students in a school who receive at least one lower final grade from the school compared to the grade the student got on the national proficiency test, weighted on participating students in Swedish, English and mathematics. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Large county refers to a county with more than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.10 Results From Regressing Share of Students with Higher Final Grade than NPT Score on Ownership Concentration for Small Counties

Inflation- Small Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	0.18	0.15	0.18	-0.15	-0.15	-0.14	-0.13	-0.11	-0.15
p-value	*(0.02)*	*(0.05)*	*(0.02)*	*(0.49)*	*(0.49)*	*(0.51)*	*(0.59)*	*(0.68)*	*(0.51)*
Conc. Profit	0.04	0.06*	0.04	-0.31**	-0.31**	-0.33**	-0.09	-0.10	-0.09
p-value	*(0.23)*	*(0.05)*	*(0.23)*	*(0.15)*	*(0.15)*	*(0.10)*	*(0.64)*	*(0.63)*	*(0.59)*
Conc. Non-profit	-0.03	-0.02	-0.03	-1.58	-1.58	-2.32**	8.73***	4.04***	(omitted)
p-value	*(0.75)*	*(0.85)*	*(0.75)*	*(0.24)*	*(0.24)*	*(0.09)*	*(0.02)*	*(0.08)*	-
N	4,158	4,844	4,157	178	180	172	214	223	204
R^2-*adj.*	*0.02*	*0.03*	*0.02*	*-0.33*	*-0.32*	*-0.23*	*-0.40*	*-0.42*	*-0.38*
R^2-*adj. (county)*	*0.08*	*0.07*	*0.08*	*0.29*	*0.29*	*0.36*	*0.26*	*0.22*	*0.29*

Without Control Variables

PE	0.19***			-0.21			-0.24		
Profit	0.04			0.00			0.00		
Non-profit	-0.01	*NA*	*NA*	0.90	*NA*	*NA*	0.81	*NA*	*NA*
N	4,158			431			475		
R^2-*adj. (county)*	*0.02*			*-0.42*			*-0.44*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Grade inflation is estimated as share of students in a school who receive at least one higher final grade from the school compared to the grade the student got on the national proficiency test, weighted on participating students in Swedish, English and mathematics. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Small county refers to a county with less than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.11 Results From Regressing Share of Students with Higher Final Grade Than NPT Score on Ownership Concentration for Large Counties

Inflation- Large Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	0.05	0.04	0.05	0.09	0.07	0.02	-0.06	-0.02	-0.07
p-value	*(0.16)*	*(0.24)*	*(0.13)*	*(0.48)*	*(0.57)*	*(0.87)*	*(0.69)*	*(0.90)*	*(0.64)*
Conc. Profit	0.01	0.01	0.01	0.12	0.16	0.06	0.09	0.24	0.06
p-value	*(0.63)*	*(0.61)*	*(0.59)*	*(0.44)*	*(0.31)*	*(0.70)*	*(0.66)*	*(0.24)*	*(0.75)*
Conc. Non-profit	-0.07	-0.06	-0.07	0.49	0.57	0.25	0.08	0.42	0.19
p-value	*(0.31)*	*(0.38)*	*(0.31)*	*(0.57)*	*(0.49)*	*(0.75)*	*(0.94)*	*(0.66)*	*(0.83)*
N	5,323	5,957	5,322	424	441	400	379	448	351
R^2-*adj.*	*0.09*	*0.08*	*0.09*	*0.04*	*0.05*	*0.07*	*-0.13*	*-0.10*	*-0.15*
R^2-*adj. (county)*	*0.10*	*0.09*	*0.10*	*0.18*	*0.18*	*0.21*	*0.05*	*0.05*	*0.05*

Without Control Variables

PE	0.06*			0.00			-0.01		
Profit	0.03			0.03			-0.02		
Non-profit	-0.06	*NA*	*NA*	0.54	*NA*	*NA*	-0.02	*NA*	*NA*
N	5,323			497			504		
R^2-*adj. (county)*	*0.05*			*-0.12*			*-0.11*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Grade inflation is estimated as share of students in a school who receive at least one higher final grade from the school compared to the grade the student got on the national proficiency test, weighted on participating students in Swedish, English and mathematics. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Large county refers to a county with more than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.12 Results From Regressing Student/teacher Ratio on Ownership Concentration for Small Counties

Students / Teacher - Small Counties

With control variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	-0.02	-0.01	-0.01	0.03	0.03	0.03	0.00	0.00	0.00
p-value	*(0.46)*	*(0.60)*	*(0.36)*	*(0.59)*	*(0.57)*	*(0.59)*	*(1.00)*	*(0.95)*	*(1.00)*
Conc. Profit	0.02	0.02**	0.01	0.04***	0.04**	0.04***	-0.02	-0.03	-0.02
p-value	*(0.08)*	*(0.02)*	*(0.04)*	*(0.43)*	*(0.45)*	*(0.43)*	*(0.54)*	*(0.44)*	*(0.54)*
Conc. Non-profit	-0.08	-0.06	-0.02	-0.55	-0.58	-0.55	0.60*	0.10	0.60*
p-value	*(0.02)*	*(0.03)*	*(0.38)*	*(0.09)*	*(0.07)*	*(0.09)*	*(0.41)*	*(0.83)*	*(0.41)*
N	4,158	4,828	4,158	178	183	178	214	224	214
R^2-*adj.*	*0.00*	*0.01*	*0.09*	*-0.67*	*-0.66*	*-0.67*	*-0.78*	*-0.72*	*-0.78*
R^2-*adj. (county)*	*0.05*	*0.05*	*0.14*	*0.10*	*0.11*	*0.10*	*0.06*	*0.06*	*0.06*

Without control variables

PE	-0.01			0.00			0.00		
Profit	0.02*			-0.01			-0.02		
Non-profit	-0.07**	*NA*	*NA*	0.04	*NA*	*NA*	0.14	*NA*	*NA*
N	4,158			431			475		
R^2-*adj. (county)*	*-0.04*			*-0.44*			*-0.44*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Student/Teacher is average number of students per teacher in a class. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Small county refers to a county with less than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.13 Results From Regressing Student/Teacher Ratio on Ownership Concentration for Large Counties

Students / Teacher - Large Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	0.02	0.03*	0.03**	-0.04	-0.02	-0.03	0.02	-0.01	0.01
p-value	*(0.18)*	*(0.52)*	*(0.00)*	*(0.61)*	*(0.82)*	*(0.55)*	*(0.78)*	*(0.86)*	*(0.90)*
Conc. Profit	0.03*	0.06**	0.03***	-0.07	-0.07	-0.04	-0.04	-0.07	-0.03
p-value	*(0.07)*	*(0.14)*	*(0.00)*	*(0.51)*	*(0.52)*	*(0.52)*	*(0.71)*	*(0.52)*	*(0.60)*
Conc. Non-profit	0.00	-0.06	0.00	-0.05	-0.20	-0.09	-0.26*	-0.22	-0.34***
p-value	*(0.94)*	*(0.58)*	*(0.79)*	*(0.92)*	*(0.71)*	*(0.77)*	*(0.62)*	*(0.66)*	*(0.23)*
N	5,323	5,934	5,323	424	449	424	379	479	379
R^2-*adj.*	*0.05*	*0.00*	*0.24*	*-0.14*	*-0.13*	*0.04*	*-0.11*	*-0.01*	*0.07*
R^2-*adj. (county)*	*0.06*	*0.01*	*0.24*	*0.02*	*0.02*	*0.18*	*0.07*	*0.11*	*0.22*

Without Control Variables

PE	0.02			-0.01			0.03		
Profit	0.02			-0.07			-0.05		
Non-profit	0.00	*NA*	*NA*	-0.08	*NA*	*NA*	-0.32	*NA*	*NA*
N	5,323			497			504		
R^2-*adj. (county)*	*-0.01*			*-0.15*			*-0.15*		

***Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1*, *Specification 2* and *Specification 3* respectively. Student/Teacher is average number of students per teacher in a class. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Large county refers to a county with more than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.14 Results From Regressing Share of Teacher with a Pedagogical Degree on Ownership Concentration for Small Counties

Teacher Pedagogical Education – Small Counties

With control variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	0.06*	0.07		0.06	0.05		-0.05	-0.04	
p-value	*(0.45)*	*(0.41)*		*(0.70)*	*(0.72)*		*(0.75)*	*(0.82)*	
Conc. Profit	-0.05	-0.05	NA	0.22**	0.23**	NA	0.00	0.00	NA
p-value	*(0.12)*	*(0.11)*		*(0.12)*	*(0.10)*		*(0.99)*	*(0.99)*	
Conc. Non-profit	0.18	0.13		0.11	0.18		2.75***	1.32	
p-value	*(0.09)*	*(0.15)*		*(0.90)*	*(0.84)*		*(0.20)*	*(0.35)*	
N	4,158	4,826		178	184		214	225	
R^2-*adj.*	*0.07*	*0.07*	NA	*-0.73*	*-0.73*	NA	*-0.68*	*-0.69*	NA
R^2-*adj. (county)*	*0.12*	*0.11*		*0.07*	*0.07*		*0.11*	*0.07*	

Without control variables

PE	0.07			0.01			-0.02		
Profit	-0.07**			0.31***			0.17		
Non-profit	0.17*	*NA*	*NA*	0.24	*NA*	*NA*	-0.88	*NA*	*NA*
N	4,158			431			475		
R^2-*adj. (county)*	*0.05*			*-0.45*			*-0.48*		

*** Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1* and *Specification 2*. Teacher pedagogical education refers to share of teachers with a pedagogical degree. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Small county refers to a county with less than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.

Table 3.15 Results From Regressing Share of Teacher With a Pedagogical Degree on Ownership Concentration for Large Counties

Teacher Pedagogical Education – Large Counties

With Control Variables

	Primary			AP			VP		
	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3	Spec. 1	Spec. 2	Spec. 3
Conc. PE	0.07	0.06		-0.14**	-0.12**		-0.15	-0.10	
p-value	*(0.07)*	*(0.09)*		*(0.28)*	*(0.39)*		*(0.50)*	*(0.62)*	
Conc. Profit	0.05	0.07*	NA	0.03	-0.02	NA	-0.28**	-0.13	NA
p-value	*(0.11)*	*(0.04)*		*(0.87)*	*(0.93)*		*(0.34)*	*(0.64)*	
Conc. Non-profit	0.03	0.07		0.07	-0.18		-0.61	-1.39***	
p-value	*(0.69)*	*(0.37)*		*(0.94)*	*(0.85)*		*(0.65)*	*(0.27)*	
N	5,323	5,933		424	449		379	479	
R^2-*adj.*	*0.09*	*0.09*	NA	*-0.02*	*-0.06*	NA	*-0.03*	*0.00*	NA
R^2-*adj. (County)*	*0.10*	*0.10*		*0.12*	*0.08*		*0.14*	*0.13*	

Without Control Variables

PE	0.07*			-0.21			-0.13		
Profit	0.06*			-0.09			-0.02		
Non-profit	0.02	*NA*	*NA*	-0.14	*NA*	*NA*	-0.65	*NA*	*NA*
N	5,323			497			504		
R^2-*adj. (county)*	*0.08*			*-0.15*			*-0.15*		

*** Significance at 1%, ** Significance at 5%, * Significance at 10%. Results for FE-regression on county and year with classical standard errors (p-value) and county clustered robust standard errors (County, shown with stars). Dependent variable as specified in *Specification 1* and *Specification 2*. Teacher pedagogical education refers to share of teachers with a pedagogical degree. Independent core variables are concentration of owner types private equity (PE), other profit-driven and not-for-profit within a county, measured as number of students attending a school with that ownership over total number of students within a county. Control variables for the upper half table include parent educational level, student background, number of students per school, cost per student, county unemployment and county mean income. Primary is defined as students attending ninth grade and is estimated for 2005-2014. AP and VP are academic and vocational programs respectively and are measured for 2012-2014. Large county refers to a county with more than 40,000 inhabitants. Note that N is total number of observations over the years used and thus varies between primary and upper secondary school.