The competitive effect of the threat of handover of small schools to non-public associations.

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Abstract

The introduction of the amendment to the Education Act 1991' in March 2009 has facilitated the process of handover of small schools to non-public associations (from local communities). Taking into consideration the competitive advantage of community schools, this increased the pressure on large public schools in Poland, however the effect on the student's performance is ambiguous. On one hand, the reduction in the number of pupils who might choose community school instead of public, means less funds. Moreover, if the local government realizes that the creation of community schools is profitable, it may consider a change of status of some public schools into non-public, even though they're not under the threat of liquidation. To prevent this, large schools' principals might want to improve the quality of education, to show that their schools are superior and saving smaller schools is pointless. On other hand, the possibility that community schools outperform public schools might exacerbate adverse selection of students and teachers into large public schools. The other possibility is that parents with kids in elementary school will concentrate on other school attributes over exam scores. Principals thus might choose to move expenditures from more human capital effective activities to those which are less effective but more visible to parents. Using a Difference-in-difference model and the introduction of the amendment as a breakthrough point, we find that the higher competition caused by the mentioned reform has negative and significant impact on the performance of large public elementary schools. We find that effect becomes bigger when we look at urban schools but it becomes insignificant once we use rural schools

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only. Moreover the effect increases substantially once we look at the urban schools which had experienced a community school in their environment. This suggests that there is heterogeneity in the impact of the higher competition among schools and those in more competitive environment (urban and with community schools) are reacting more decisively.

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Introduction

The move toward the greater cost-rationalization of the Polish local governments and the actions taken by the central Polish government to reduce the fiscal debt has forced many (mainly rural) *gminas* (NUTS 5 administration unit) to close small schools and move students into bigger and more cost-effective establishments. However, since this problem is connected mainly with less-populated areas, the distance to a new school increases dramatically, which may generate greater costs on the parental side and be very troublesome for the kids. Moreover, small schools play an extremely important role in the local communities, as they were built as grass roots initiative and are centers not only for the education but also for the cultural and political life of communities. Thus, it is not surprising that the closure of small schools causes very intensive parental protests and leads to the strong tensions between local government and the citizens.

To overcome these problems, non-public associations (i.e. parents' associations) were allowed to take control over schools which were put into the liquidation and create non-public community schools. These schools have more flexibility in management and attracting external funds (although not in setting a curriculum), which provide them with a competitive advantage over the fully public establishments. Taking into consideration the fact that in Poland pupils are allocated to schools but parents may request an alternative one, new community schools put pressure on other schools in the area.

In the following paper we check how a *possibility* of a handover of small schools influences the performance of bigger, public schools. Large public schools might be afraid of the existing and newly created community schools for three reasons.

- Firstly, the public money is stuck to the pupil, thus the decreasing number of pupils (which might go a community school) means the school will receive less funds from the government.

- Secondly, when the small school is liquidated, the bulk of pupils will be directed to a bigger school along with higher funds.
- Thirdly, if the local government realizes that the creation of community schools is profitable it may consider a change of status of some public schools that are not under the threat of liquidation into non-public - led by the associations.

Thus, the principals of public schools may want to show that their schools are superior and saving smaller schools is pointless through improving the quality of education in their own schools.

The possible negative effect appears if a takeover-ed small schools overperform the public ones, which might cause the adverse selection of students and teachers into large public schools. It also possible that due to higher competitive pressure, principals move expenditures from more human capital effective activities (which influence the exam score) to those more visible to parents and pupils (i.e. excursions).

The threat of small schools liquidation is possibly correlated with other (observable and unobservable) characteristics of *gminas* which might influence students' performance. For this reason, as an identification strategy we use the amendment to the education act 1991 which was introduced in March 2009. Using this date as a breakthrough in the Difference-in-Difference estimations we find that the higher competition caused by the mentioned reform has negative and significant impact on the performance of large public elementary schools. Since the treatment intensity is higher among rural *gminas* we run separate analyses in both urban and rural sub-samples. We find that the effect becomes bigger when we look at urban schools but it becomes insignificant once we use rural schools only. Moreover the effect increases substantially once we look at the urban schools which had experienced a community school in their environment. This suggests that there is heterogeneity in the impact of the higher competition among schools and those in more competitive environment (urban and with community schools) are reacting more decisively.

To our best knowledge, there is a lack of causal and non-causal analyses dealing with the impact of community schools[1] on the environment and the outcome (Heers et al. 2011). In the last decade, however, there appeared empirical literature which analyzes the potential impact of larger school autonomy on student's performance. Many influential works have been done

[1] As we argue in the next section, community schools in Poland are, to some extent, different from those in other countries.

to check how charter schools in the USA are effective in reducing gap between students from low and high quality environments (Fryer 2011; Hoxby and Muraka 2009; Angrist et al. 2010, 2011) and generally improving students' performance (Gleason et al. 2010; Abdulkadiroglu et al. 2009, 2011). Results are ambiguous. While charter schools (especially so called "Non excuse" schools) greatly improve educational equality (Curto et al.), the same cannot be said about schools which target high performing students (i.e. "Exam" schools). Furthermore, the impact of school's autonomy is different for developing and developed countries (Hanushek et al. 2011).

Although our paper refers to the general literature in this topic, we focus on the competitive effect which is important if one wants to analyze the impact of autonomous schools from the general equilibrium perspective. Not much has been written about the subject, the most well-known works use the UK data for the Grant Maintained schools (Clark 2007, 2009) and Academy Schools (Machin and Vernoit 2010). The only effect (small and positive) was found in Academy Schools case. Finally we refer to the well known literature concerning competition between schools and we contribute by pointing out importance of large school principals. This work shows significance of the accountabillity system in school's reaction. The recent literature dealing with the expansion of privates school sector (i.e. Bohlmark and Lindhal 2008, Figlio and Hart 2010) shows the positive impact in test scores of increased competition between schools. The other stream of research is focused on the accountability system (Dee and Jacob 2009, West and Peterson 2006, Figlio and Rouse 2006.), again they seem to have positive effect on student's performance. The negative impact of the threat competition found in our paper can be possibly mittigated by the enforcement of the accountability system. On the other hand, theoreticaly and empiricaly works (Tiebout 1956, Epple and Romano 1998, Hoxby 2000, Hsieh and Urquiola 2006) shows that competition is connected with increased segregation of students.

In Section 1 we describe community schools and law regulations in more details. In Section 2 we describe empirical strategy and data. Descriptive statistics are presented in Section 3 and results in Section 4. Finally, we conclude.

1 Community schools: characteristics and law regulations

1.1 Community schools in Poland

Before we proceed with the discussion about community school we will briefly describe the system of financing education in Poland.

All Polish public schools and part of non-public are financed by the central government through the subsidy. In theory this amount should be sufficient to cover all expenditures on education (excluding investments and pre-school education). In practice, however, it covers only around 50-70% of the costs (Raport IBE 2011, Herbts et al. 2009) and the remaining is covered by the additional funds from the local governments' budgets.

Polish education system is considered as very decentralized (Herbst et al. 2009). This can be clearly seen in the distribution of power among different levels of government. The network and management of almost all public elementary and secondary schools (*gimnazja*) are governed by the local *gmina*'s governments and the role of central government is limited to financing education and enacting general resolutions. Local governments are able (among others) to freely open and close new schools, hire teachers, principals and redirect subsidy between schools. Since the governmental subsidy is stuck to the pupil (the money goes with her), the amount of money which is aimed for the specific school depends on its enrollment, and because of fixed costs, a smaller school yields higher cost per student. Thus, greater cost-rationalization creates motivation for local governments to merge several schools into a bigger one, which is obviously connected with the closure of some schools. As we mentioned, this might be very harmful for local communities and causes strong tensions between citizens and the government.

The alternative might be giving the control over small schools to non-public associations and creation of community schools. Such rescued establishments are also financed from the public money, but the local government does not have to finance expenditures that exceed the amount of the subsidy. Community schools are free of charge, but fairly more autonomous than the public. The most important difference is that they can hire teachers outside the teachers' collective bargaining agreements. The bulk of teachers who are employed in regular public schools sign the contract with corresponding local government but the lower bound of their wages is set by the central authority (in agreement with the teachers' unions). To the contrary, in the community school its board sets the wage as in the regular free market. Since

the wages are almost 80% of the educational spendings, community schools can manage the expenditures and the composition of a teaching body much more effectively. The second important thing is that they have more possibilities for acquiring external funds (especially from the European Union) to finance new investments and operational costs. Finally, very they are often led by parents' associations, therefore a student is at the center of attention and the principal-agent problem is much less severe. Yet they cannot set up their own curriculum and have to follow the centrally set program.

Polish community schools slightly differ from such schools in other countries. In Holland, the US and Germany, this refers to schools in which the main idea is "involving people from outside the school in the school and students to play a role in their community. The community school idea is that there are reciprocal benefits for all community members and we can assume spillover effects." (Herrs et al. 2011 p.7). While this is true for Poland, the fundamental reason for the creation of a community school is the rescue of small local school. Moreover, in the above mentioned countries community school are targeted at equalizing educational chances for disadvantaged students or providing additional high-quality child-care for families from wealthy neighborhoods. In Poland these schools operate more or less like regular schools, which makes them also similar to charters schools in the USA or other autonomous schools around the world (especially Swedish "free-schools").

1.2 Local government policy towards community schools

Local governments have several possible scenarios when the financial situation forces them to reorganize the school network. Generally the most effective solution from the financial perspective is liquidation. The *gmina* does not have to pay costs connected with a building and moving kids to a bigger entity decreases the average cost of student in this institution (because of decreasing marginal costs). This can be smaller than the subsidy which is strictly preferable from the financial perspective, however, once we introduce the social costs of this intervention and dissatisfaction of parents, the balance of gains and looses can change its sign. The protests against school's closure are always very visible in local and nation-wide media so the voyts might prefer other solutions. Two other possible moves are to phase out a small school or to liquidate only part of grades[2]. The former means that the recruitment process is stopped at some school year and not continued in the

[2]Usually grades from 4th to 6th (in case of an elementary school) are closed and students are moved to other school.

future. Both scenarios are more costly than the liquidation but only bit less controversial for the local community. Therefore the last solution - school handover - can be considered as a realistic alternative to the liquidation. It can be more costly for the budget because *gmina* still has to practically take care of the school building[3] and provide the governmental subsidy. On the other hand public support for the government's actions rises then.[4].

In general, the attitude of local governments toward community schools is ambiguous. On one hand, some local governments have realized that giving schools to associations (even when they are not under the threat of liquidation) may save them, increase their effectiveness and improve the financial condition of the *gmina* without loosing a school. An anecdotal example of this attitude might be the voyt of Lelów in the southern Poland who promised giving all public schools in his *gmina* to parental association[5]. But this is a rather extreme case. Local political leaders are often very connected with public schools' principals, teachers have strong political power and the financial aspects can be the most important, which may explain the hostility toward community schools. This happened in Bielany in the eastern Poland where the voyt and the large public school's principal were trying to block the small school handover. They did not succeed because the *gmina* council finally supported the parental association.[6] This suggests that those organizations have relatively large bargaining power (Kloc, 2012). These two effects suggest that the introduction of community schools is not neutral for many agents and even the possibility of a handover may create the competitive pressure on the existing large public school.

1.3 The Amendment

Before 2009 a school could be taken over by the association only when it had been liquidated first; a new school was created at the place of the old one. This was a quite complicated process and many activists and politicians saw the need for the improvement in the procedure. The possible solution is to allow the takeover without putting the school into liquidation, which makes things a lot easier. The first sign of possible change appeared in 2007 when PO (Civil's Platform), a party which supports the idea of community

[3]The local governments are usually renting a building to the parental association for the symbolic price, like 1 PLN.

[4]Except the teachers who are often the only loosing side.

[5]This promise was said during the Debate about Financing Education organized by the Batory Foundation in June 2011

[6]Although it was not given the subsidy for the first four months, the issue which we will discuss later in this section

school, won the parliamentary election. Half year later, around June 2008 the first official project of the amendment was created which immediately ignited public debates. Within the next half year opposition was trying to persuade public eye and to block the reform mainly using the argument that it will lead to the privatization of public education. The Teacher Union was clearly against the idea of community school (because of the liberation of the teacher's contracts in those schools) and in December 2008 organized the nation-wide campaign called „Do not let our school get ruined". The campaign was exclusively aimed at the handover reform and included the information campaign, lobbying for changing the reform and supporting families and teachers from regions where small schools had been put into closure.

After almost a year of ongoing debate, the amendment to the education act 1991 was finally introduced in March 2009. It allows the takeover of schools without putting them into liquidation[7] by a natural or legal person other than a public authority, *when the school's enrollment is smaller than 70 pupils*.[8]Not all the difficulties have been solved. The main remaining problem (it was also present before the amendment) is that in order to get the governmental money for the first four months of operation, a non-public association has to inform the authority about planned take-over around 11 months before the first day of operation. If an association does not manage to do this, the government can still give this money but then it is completely up to them. Note however that this problem also arises when the handover is done using the old procedure.

Beside the fact that the amendment has not completely resolved the legal problems faced by the associations (the new amendments are being discussed currently) it is considered a very important step toward the full introduction of community schools into the Polish education system. Unfortunately we do not know the exact number of schools which have been taken over by the local communities using the amendment (since 2000 around 300 public schools were transformed into non-public ones). The Figure 1 shows the number of newly created elementary schools led by the non-public associations divided by the number of public elementary schools from 2002 to 2011. This is an over-estimation of the rate of hand-over since some community schools were created from scratch. As we can see the graph peaks in a school year 2009/2010 - first year which was influenced by the amendment. [9]Next year

[7]The old way of hand-over (through liquidation) was left as an option, though.

[8]Number 70 was chosen rather ad hoc. Even during the parliamentary debates in 2008 some amendment opponents were pointing out the meaninglessnes of this number - feature which is cruciall for us in the identification strategy.

[9]Please note that this are actual schools creations and liquidations. All schools which

the ratio backs to the pre-amendment maximum value and jumps again in 2011/12. Although one has to be careful with the strong statements, the graph suggests that the amendment had relatively large impact on the ratio of taken over schools. Unfortunately we do not have separate data for municipalities with small and big share of public elementary schools below 70 students.

2 Empirical Strategy and Data

The existence of small schools (which captures the possibility of small schools liquidation) is most likely correlated with unobservable characteristics of gminas and therefore simple regression of outcome on the proportion of small schools might be biased. As a consequence the identification strategy is needed to ensure proper estimation of the competitive effect of the handover of small schools on public entities.

We exploit the introduction of the amendment to the Education Act 1991 from March 2009 as a breakthrough point and Difference-in-Difference methodology to overcome identification difficulties. The underlying thought experiment is following. There are *gminas* with high and small number of schools below 70 students in their environment. Public elementary schools in both of them share different threats of bigger competition (caused by the small schools handover), however the trend is the same. In 2009 the amendment made the process of handover easier only for schools below 70 students. This increased the threat of bigger competition only for those schools which were surrounded by high number of schools below 70 students. Therefore we claim that the situation which happened in the schools with low exposure (and thus almost unchanged threat of higher competition) is counterfactual to those schools with higher exposure to the reform.

One can still argue that schools from gminas with low exposure to the reform (although to smaller extent than with the higher exposure) were facing some increase in the threat of higher competition. This would underestimate the absolute value of the impact of the amendment and therefore the results of this analysis can be seen as a lower bound.

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were put into the liquidation process in the year 2008/09 (from September 2008 to August 2009) and are under the influence of the amendment appeared as liquidated in the next school year - 2009/10. This is because a school can not be liquidated in a school year when it was put into liquidation process. Similarly a school can be opened only at the beginning of a school year. In other words: value for a specific school year reflects the stock of schools on September 1st.

We follow Card (1992) and use the panel fixed effect estimator to estimate the following model:

$$S_{git} = \beta_1(T_g \times After) + \beta_2 After + \delta X_{gt} + \mu_g + \mu_t + \mu_{gi} + \epsilon_{git}$$

where S_{git} is the average of the exam test score in the large public elementary school i located in the *gmina* g at the time t, T_g is a measure of the pre-treatment (in 2008) fraction of students in *gmina* g attending to elementary public schools with less than 70 pupils (excluding non-public schools with tuitions). This variable captures the intensity of treatment. Bigger value says that large schools in specific *gmina* were potentially been facing bigger threat of community schools appearance and/or turnover after the introduction of the amendment.

The time-dummy *After* switches on for observations after the introduction of the amendment: 2009 - 2011 (and before is for the period 2005-2008), μ_t are year specific effects, X_{gt} are time-variant characteristics of *gminas,* $\mu_g$and $\mu_{gi}$are unobserved time-invariant gmina's and school's characteristics, finally ϵ_{git} is the error term.

The fixed effect panel data estimator allows us to control for the unobservable characteristics of gminas, schools and the time trend (the key assumption here is that both groups have the same time trends in outcome). The parameter of interest is β_1 which captures the difference before and after the introduction of the amendment of differences in outcome between *gminas* characterized by the treatment intensity variable T_g.

Since the introduction of the amendment facilitates the process of the schools' takeover with enrollment smaller than 70 students, one should expect that public schools have been facing more competitive pressure since 2009. The main hypothesis is that the parameter of interest β_1 is positive. This is because the public money is stuck to the pupil, thus decreasing the number of pupils (which might go to a community school) or taking away chances for bigger enrollment (from liquidated schools) means that a given school will receive less funds from the government. Moreover if the local government realizes that the creation of community schools is profitable it may consider a change of status of some public schools that are not under the threat of liquidation into non-public - through the liquidation.

The alternative hypothesis, that the parameter of interest β_1 is negative, is supported by the possibility that the takeover-ed community schools overperform the public ones, which might cause the adverse selection of students and teachers into public schools. The other possibility is that parents with

kids in an elementary school do not really take into consideration the exam scores but other school's attributes like: investments in building condition, new gym, school trips, security, transportation possibilities etc. Principals thus might choose to move expenditures from more human capital effective activities (i.e. teacher trainings, individual classes, counselor care, class size) to those which more visible to parents.

One should expect that the effect is heterogeneous in different sub-samples. In particular, there are substantial differences in the operation of schools between rural and urban areas (Jakubowski & Kozińska 2006) To account for this we run additional separate analysis for both.

Our sample consists of publicly funded elementary schools with enrollment above 70 (further robustness checks restrict sample to bigger entities) students[10]. The data on the results of the exam at the end of an elementary school (ISCED 1) from years 2005-2011 is from *Centralna Komisja Egzaminacyjna* (the Central Examination Commission) – a database which contains results of all high-stake exams in all schools in Poland. The exam score is generally irrelevant for the further education, [11]however, it is obligatory for almost all pupils and is considered by the local authority in the school evaluation process. Students are examined in reading, writing skills, logical reasoning and usage of knowledge in practical problems. The maximum score is 40 points. The exam is not standardized across years, although the year specific effects capture this.

We construct the treatment variable using data for the schools' type and enrollment for 2008 (before the amendment) from *System Informacji Oświatowej* (the System of Educational Information) – the registry database about all schools in Poland. The registry contains rich set of other schools' characteristics, unfortunately we could access this data only for one year[12]. The main problem with this database is that the identification variable which is crucial for merging this data with the exam score is present only in around 70% of observations. Therefore we could not include all schools in our sample and we do not know whether the lack of this variable is systematically correlated with other characteristics (we do not have access to data for schools without the exam id). Since this information is not used in any process done by the local authority we guess that the lack of the id is just the result of a

[10]Typical elementary school in Poland has six grades and children start education at the age of 7

[11]The secondary school (*gimnazjum*) is obligatory and pupil has to be accepted in the school which corresponds to her living area. However some non-public schools might take into consideration the score in the admission process.

[12]Except for some basic characteristics, the database has very poor quality

school's administration neglect. This of course might be the source of some sample selection bias.

Additional set of *gminas'* characteristics for 2005-2011 comes from the *Główny Urząd Statystyczny* (Central Statistical Office of Poland).

3 Descriptive Statistics

For the purpose of illustration in this section we arbitrarily split the sample into the treatment and control group. Treatment group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students above 15%. This is around the top 15% of the sample (923 schools). Control group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students below 15% (5940 schools). This division allows us to do the simple comparison of the schools which were the most exposed to the reform with the rest of the sample. Please note that in the main analysis we do not use these groups, our main variable is the intensity of the treatment.

Table 1 presents the averages of school's and *gmina*'s characteristics of the treatment group in juxtaposition with the control group using the data for 2009. At the school level, the significant differences are in the number of students, number of computers with the broadband access to the Internet, students per teacher ratios and the students per classroom ratio. It appears that public schools from the treatment sub-sample have smaller enrollment by over 99 students, with almost 2 students less per classroom and have smaller student/teacher ratio than schools from the control group. This suggests that pupils from the former group have marginally better school conditions.

Different picture emerges when we look at the *gmina*'s characteristics where almost all of them are better in the control sub-sample. This in turn points that students in this group are facing much better conditions from the outside-school environment. Therefore *gminas* with the high fraction of small schools' students are considerably more disadvantaged. The gminas' expenditures on education per students are bigger in the treatment group. This is not surprising since, as we argued, smaller school are on average more costly.

Obviously areas with higher number of small public schools (thus with higher exposure to the reform) are probably located in more rural areas, which can explain the differences between the treatment and the control groups. We believe that this is the case here, while in the whole sample

40% of schools are from urban areas, in the treatment group only 9% (in the control 44%). Similarly there is a huge difference in the average population, the typical gmina in the treatment sample has 6785 people while in the control the number is 19091. This might problematic if the time trends are different in cites and outside of cities, because the estimation of our parameter of interest will be biased. We account for this heterogeneity in the robustness analysis section by splitting the sample into urban and rural sub-samples.

Table 2 panel A presents average exam score from 2005 to 2011 for the treatment and the control sub-samples.[13]It is clearly visible that at each year schools from the later group outperform those from the former. The last row in the table and Figure 2 shows the differences between the groups. It is important here to remember about the timing. The 6th grade exam usually takes place at the beginning of April, therefore all points on the graph refer to a given year's April. The red lines in the figure mark the announcement (June 2008) and the introduction (March 2009) of the amendment. The point here is that the schools' principals knew about the reform at least few months after the 2008 exam. One can argue, that at that time it was very likely that the amendment will be introduced within a year. In September 2008 the public debate was already sound and the ruling party determined to push forward the amendment[14] . Therefore we assume that at that time the principals could react and the exam score from April 2009 was influenced by the reform.

The gap between the treatment and control group is especially huge in 2009 and 2010, so just after the introduction of the amendment. Compare to the previous years, the absolute value of difference increases by 0.2 point (which is around 0.1 of the standard deviation). This might suggest a rather negative impact of the higher competition caused by the amendment (and thus negative sign of our parameter of interest). However, the difference comes back to the pre-reform level in 2011. We explain this pattern and check it more rigorously in the next section.

[13]Please note, that since the exam taken after the elementary school is not standardized across years, one should only compare scores between two groups at given year.

[14]It had also required majority of votes.

4 Results

4.1 Main Results

The first column of Table 3 shows main results from the panel fixed effect estimations of the baseline model, controlling for the year-specific effects but without the additional covariates. Because the estimator is exploiting the *within* variation of an observation, the unobservable and observable time-invariant characteristics of schools and *gminas* cancel out. The impact of the variable of interest is negative and significant, which means that the higher competitive effect of the threat of handover of small elementary schools into non-public associations have a detrimental effect on the performance of publicly founded elementary schools. Ten percentage points increase in the exposure to the amendment (which makes easier the process of small schools' handover) after its introduction causes a drop in the exam score on average by 0.05 point (0.02σ of exam score from 2008). All the year-specific effects and the time-dummy *After* have significant impact on the results, but this reflects the fact that the exam is not standardized across years.

The magnitude and significance practically does not change after the introduction of additional time-variant *gmina*'s characteristics. The second column of Table 3 shows estimations with covariates describing the general economic condition of a *gmina*: number of population, unemployment rate and total expenditures per capita. [15]The number of population is significant, the increase of population by 1000 is connected with the test score increase on average by .02 (around 0.01σ). The third column of Table 3 presents results with covariates reflecting the educational condition of a *gmina*: gross enrollment in pre-education, secondary-education ratios and expenditures on education per capita. Only gross enrollment in secondary education ratio is significant. Ten percentage point increase in the ratio decreases the score on average by 0.05. Once we include all covariates (the last column in Table 3), the coefficients basically do not change.

We can observe the negative effect of the higher competition caused by the introduction of the amendment on the performance of large public schools in Poland. The impact is rather modest. There are two possible explanations.

According to our hypotheses, there might be a positive effect of the higher competition, however, just after the introduction of the amendment adverse

[15]Because we do not have a data for all *gminas*, 7 schools are dropped from the regression with the educational covariates and 23 for the regression with the full set of covariates. Additionally we don't have balanced panel for some of those covariates.

selection to public schools prevails. As we can see from Table 2, in 2011 the difference in outcomes between the groups is smaller, therefore it might take some time for those schools to adjust to a new situation. Because the end of the time horizon is just two years after the reform, when the reaction of school principals is delayed we might be not able to capture it at this time.

The other explanation is that principals react to the higher competition in a way that harms the performance of students (measured by the test score). This might happen when parents do not take into consideration factors, which are raising test scores in the most effective way and according to that, principals are adjusting their allocation of a budget. We found one anecdotal evidence that this is the possible mechanism. The report about social tensions emerging during a handover of a school, published by *Ośrodek Rozwoju Edukacji* (Centre for Educational Development) documents reaction of a large public elementary's principal from Kożuchowo. A local small school was planned to be liquidated however local parental organizations opposed it and proposed the handover of the school to an non-public association. The principal of the large public school (which would takeover students from the small school) was trying to persuade parents that his school is better than the possible handover: " [...] for the parents of students [from the small school] he organized attractive and competitive curriculum. Additional sport and language classes, after-class activities, school trips, cafeteria, bus transportation of students, safety were the main points. This offer was passed over to all parents [of the students from the small school]" (Kloc 2012).

Unfortunately, because of the lack of detailed data on the school expenditures, we cannot check whether this was common behavior of large schools' principals.

4.2 Robustness

Rural vs. Urban

The crucial assumption for our identification strategy says that *gminas* with different intensities of the treatment share the same time trend in outcome. This of course does not have to be true. As we could see in Table 1, there are significant differences between the groups at the *gmina* level. Moreover, the arbitrarily created treatment group mainly consists of rural schools - those areas in Poland are usually poorer and more underdeveloped than the urban ones. This might cause a heterogeneity in the contractual time trend and therefore evaluation of the impact of bigger school autonomy on student's outcome (Hanushek et al. 2011) and environment.

To check for this possibility we repeat the analysis from the section 4.1 for the rural and urban sub-samples separately. In both groups there are respectively 2697 and 4717 schools. The first two columns in Table 4 report estimations for the rural sub-sample, for the panel fixed effect regressions without and with all covariates. Results show that the parameter of interest is much smaller and statistically not different from zero in both settings, however, when we look at next two columns - the urban sub-sample, the effect is over three times bigger than in the baseline and significant at the 1% level. Now, ten percentage points increase in the exposure to the amendment causes a drop in the exam score on average by .17 (0.07σ of exam score from 2008). These indeed points out that the effect of the higher competition is heterogeneous. All other covariates, excluding the number of population and log of expenditures on education per capita are insignificant.

This result suggests that the introduction of the amendment created the competitive pressure only among schools from urban areas. Moreover, the effect can be considered as relatively large. This might be explained by the fact that parents from cities are on average better educated and therefore they might be more involved in finding better school for their kids. Moreover, distances between schools are much smaller in those areas than in rural areas, which also makes schools more accessible for kids.

Pre-reform existence of community schools

The other possible source of heterogeneity in the time trend might be the pre-treatment existence of community schools among schools which were more exposed to the reform. Since there are possible direct spillovers of the community schools on the performance of other schools, the contractual time trend might be different from the less exposed schools. Also public schools which had experienced activity of community schools can be more aware about the impact of the amendment. Therefore as an additional robustness check we limit our sample only to public elementary schools which were located in *gminas* where there was at least one community elementary school in 2008. This setting emphasizes situation when large public schools in both groups experienced the existence of community schools and therefore the introduction of the amendment might have different impact.

This construction decreases the sample to 1767 schools. Panel B in Table 4 shows differences in the average test score between the arbitrarily determined treatment (the fraction of students from schools with less than 70 students is above 15%) and the control groups. Although the gap is bigger than in the baseline sample, the time pattern of changes is similar. Table 5

shows results for the panel fixed effect regression using reduced sample accounting for possible heterogeneity in the rural vs. urban subgroups. First column reports the results for the whole limited sample (in all cases we report results after controlling for all covariates). Compare to the baseline results the parameter of interest doubles its size but becomes insignificant. The situation changes dramatically once we look at the rural and urban subsamples. The results from the previous robustness check are now even more dramatic. Again the parameter of interest among rural schools is statistically not different from zero (second column) but the coefficient in case of the urban sub-sample is eight times bigger in comparison with the baseline results (forth column). Ten percentage points increase in the exposure to the amendment causes a drop in the exam score on average by .39 (0.16σ of exam score from 2008) All other covariates, except the number of population, are also insignificant. The existence of a community school is therefore a possible source of a heterogeneity, the impact is larger but appears only among urban schools.

Our explanation is that public schools which are in the more competitive environment (city) and had experienced the existence of a community school were more conscious about the impact of the amendment. They knew possible threats caused by the creation of new community schools and the bigger exposure to the amendment caused more purposive reaction.

Bigger schools sample

Our main sample consists of public elementary schools with enrollment bigger than 70 students in 2008. For those schools the possibility of school handover was not influenced by the amendment since the reform made the process easier only for public schools below this number. There is still a concern that relatively small schools (with the enrollment just above 70 students) will face the bigger probability of take over during and after the reform due to the sound debate about the amendment.This might cause specific reaction of those schools (although one could rather expect an increase in exam scores) or actions taken by municipalities who were attracted by the community school idea (for example limiting support). Since there is a negative correlation between a sample's school size and the treatment intensity, our results can be driven by this effect. Also the mechanisms through which we explain our main results are probably more reliable in case of bigger public schools.

To deal with these concerns we limit the sample only to public elementary schools which were bigger than 150 students (this number is close to

the median) [16] and 300 students (around 75th percentile). This decreases observation to 3817 and 1912 schools respectively. The coefficient of interest becomes marginally insignificant in case of schools over 150 students and its size is the same as in the baseline result. The larger and significant effect appears for the biggest schools. Ten percentage points increase in the exposure to the amendment causes a drop in the exam score on average by .127 (0.05σ of exam score from 2008).

These results suggest that if anything, small schools in the baseline sample were driving the results toward zero. It additionally support the idea that the negative impact of the amendment was caused by the negative selection or by the harmful for the academic performance behavior of principals.

Compositional Changes

Closer look at the data concerning the number of liquidated schools between 2005 and 2011 reveals that in a school year 2008/09 (stock of schools on the 1st of September) - 299 public elementary were liquidated, while year after in 2009/10 this number was 138. It is possible that relatively large number of school liquidation caused inflow of students to large public elementary. Assuming that students from smaller schools are disadvantaged and that in region with more schools below 70 students liquidation were more frequent, this inflow of students could change the composition of students and explain our results. We believe that this is not the case.

Our first argument is that similar number of liquidation happened also in 2005/06 - 243, moreover in 2004/05 this number was 640! Once we look again at the Figure 2 we can see that in the following years there were no increases in that gap between thetreatment and control groups. If this explanation was right we would observe gaps in 2005 and 2006, but we observe only in 2009 and 2010.

Additionally we also look at the parameter of interest for schools which had experienced positive and negative enrollment growth between September 2008 and 2009. Following the alternative explanation one can expect huge and significant effect among schools with positive growth and no effect for the others. Table 8 present the results for these two sub samples. Although the magnitude is bigger for schools with positive growth, in both cases the effect is statistically not different from zero. This is another evidence that the main results are not driven by the changes in the students composition.

[16] Other justification of this is number is observation made by Jakubowski (2004) that the marginal costs of additional students becomes flat after 150 students. This might suggests that closing school above this size be less profitable for the local governments.

Robustness analyses show that the negative impact of the higher competition effect caused by the introduction of the amendment appears among schools from urban areas and in the sub-sample limited to those schools which experienced the existence of any community school in 2008. Moreover, the size of the impact increases dramatically. These results suggest that the spillovers caused by the bigger autonomy can have different effects in different environments (this is in line with recent findings from Hanushek et al. 2011). Low density of a school network, less educated parents and general smaller social-economic development may cause the competition effects to disappear, which might be paradoxically beneficial for a *gmina*.

5 Conclusions

The introduction of the amendment to the Education Act 1991' in March 2009 have changed competitive pressure faced by large public schools in Poland. Using the panel fixed effect estimator to estimate a Difference-in-difference model, we find that the higher competition caused by the mentioned reform has negative and significant impact on the performance of large public elementary schools. Since the treatment intensity is higher among rural *gminas* we run separate analyzes in both urban and rural sub-samples. We find that effect becomes bigger when we look at urban schools but it becomes insignificant once we use rural schools only. Moreover the effect increases substantially once we look at the urban schools which had experienced a community school in their environment. This suggests that there is heterogeneity in the impact of the higher competition among schools and paradoxically lower development may diminish its negative impact.

This might be caused by an adverse selection of students and teachers into large public schools. It is also possible that due to the higher competitive pressure, principals of public schools move expenditures from exam score oriented tasks to those aimed at attracting parents (e.g. free excursions). Furthermore, we cannot exclude possibility that the reform caused diminishing of competition pressure. This might happen if the competition between schools is based mainly on the access to local government money.

The main contribution of our research is the evidence that the competitive effects caused by more autonomous schools are significant and appears mainly in urban areas. However since our data set is limited, more research is needed to investigate the sources of the negative impact. This is crucial if one wants to formulate policy implications. Especially important are the development of the accountability system and the promotion of the rank-

ings in the parental educational choices. As an example, if principals shifts expenditures toward less exam score oriented tasks, promotion of the accountability system among parents and local governors might decrease the negative impact of the competition.

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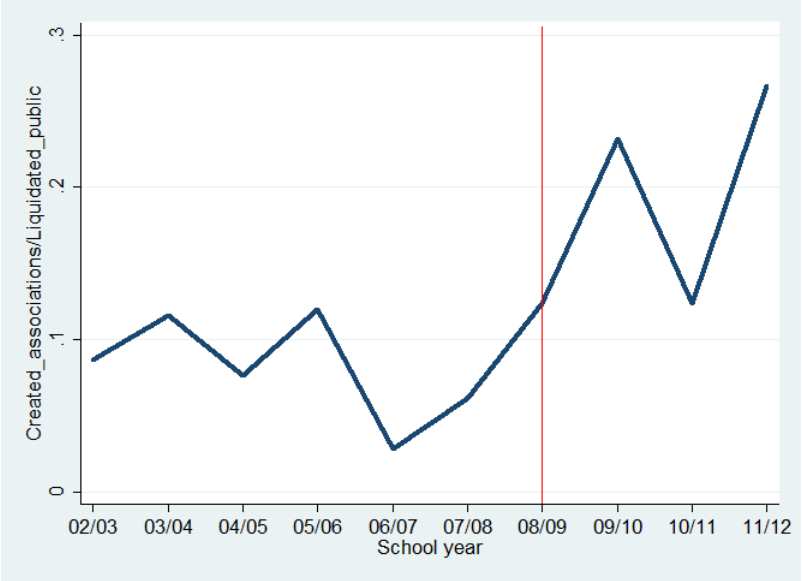
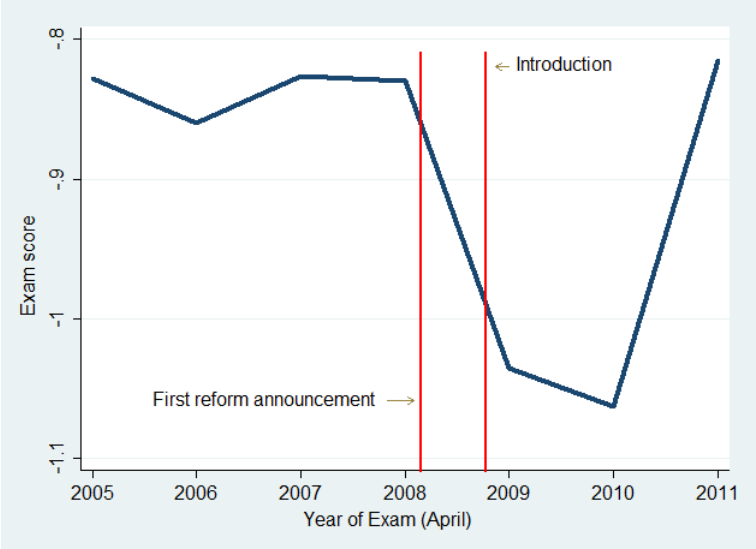
Figure 1: Ratio of newly created elementary schools led by the associations and liquidated eleentary public schools



Note: Red line marks the reform year. This are actual schools creations and liquidations. All schools which were put into the liquidation process in the year 2008/09 (from September 2008 to August 2009) and are under the influence of the amendment appeared as liquidated in the next school year - 2009/10. This is because a school can not be liquidated in a school year when it was put into liquidation process. Similarly a school can be opened only at the begining of a school year. In other words: value for a specific school year reflects the stock of schools on September 1st. Source: own calculations based on Central Statistical Office of Poland.

Figure 2: Difference in the average test score between the Treatment and Control groups



Note: The graph shows the difference between the average 6th grade exam score between the Treatment and Control Groups (T-C). Red lines mark the first announcement about reform (around June 2008) and the introduction of the amedment (March 2009). All exams took place around beginning of April every year. Treatment group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students above 15%. Control group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students below 15%.Own elaboration based on Central Examination Commision database.

Table 1: Descriptive Statistics for the Treatment and the Control groups for 2008

	Treatment	Control	Difference (C-T)
Number of students	148	247	99**
No. of computers with the Internet access per student	.12	.1	-.02**
Total area of classrooms (in m^2) per student	3.15	3.4	.2
Students per classroom	18	19.7	1.76**
Share of students with Special Educational Needs	.004	.0036	-.0003
Share of students with grade retention	.008	.009	.0009
Student per regular teacher ratio	21	22.7	1.57**
Student per qualified teacher ratio	58	63	4.9*
Total school expenditure per student (in PLN)	5131	5094	27
Total school expenditure on salaries per student (in PLN)	3260	3108	-151
Number of schools	923	5940	

Unemployment rate	10.6	9.8	-.812**
Number of population	6785	19091	12305**
Total *gmina*'s expenditure per capita.	920.6	902.5	-18**
Gross enrollment in pre-education ratio	44.6	59.9	15.2**
Gross enrollment in primary-education ratio	95.45	97.63	2.18**
Gmina's expenditure on education per capita	526.5	460.24	-66.23**
Share of urban *gminas*.	.11	.30	
Number of *gminas*	490	1595	

Note: Treatment group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students above 15%. Control group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students below 15%. First eleven rows are averages of school characteristics in corresponding groups. Own elaboration based on The System of Educational Information database. Next eight rows are averages of gmina characteristics in corresponding groups. Own elaboration based on Central Statistical Office datatbase. Difference column denotes differences between the control and the treatment groups calculated using t-test. * denotes significance at 0.05 level, ** denotes significance at 0.01 level.

Table 2: Differences in the average test score for 2005-2011

Panel A - full sample

	2005	2006	2007	2008	2009	2010	2011
Treatment	28.37	24.2	25.44	24.68	21.29	23.23	24.15
Control	29.2	25.07	26.23	25.51	22.32	24.29	24.96
Difference (C-T)	.83**	.86**	.83**	.83**	1.04**	1.06**	.82**

Panel B - limited sample

	2005	2006	2007	2008	2009	2010	2011
Treatment	28.3	24.18	25.46	24.89	21.11	23.22	23.92
Control	30.26	26.05	27.25	26.5	23.48	25.42	25.87
Difference (C-T)	1.96**	1.87**	1.78**	1.61**	2.37**	2.2**	1.96**

Note: Treatment group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students above 15%. Control group consists of schools which are located in gminas with the fraction of students from schools with less than 70 students below 15%.Own elaboration based on Central Examination Commision database. Panel A refers to full sample of public elemenetary schools (over 70 students), while Panel B only to public elementary schools which were located in gminas where there was at least one community elementary school in 2008. Please note that the exam scores are not standardized across years. Difference row denotes differences between the control and the treatment groups calculated using t-test.** denotes significance at 0.01 level.

Table 4: The panel fixed effect estimation of the baseline model

	Excluding Covariates	Including General Covariates	Including Educational Covariates	Including All Covariates
$Treatment \times After$ (β_1)	-.532*	-.575*	-.516*	-.544*
	(.255)	(.255)	(.254)	(.253)
$After$ (β_2)	-6.875**	-6.96**	-6.908**	-6.959**
	(.043)	(.066)	(.06)	(.074)
Unemployment ratio	-	-.001	-	-.002
		(.0008)		(.001)
Population in thousands	-	.02*	-	.019*
		(.0096)		(.0091)
Log of total *gmina*'s expenditure per capita.	-	-.007	-	-.048
		(.093		(.098)
Gross enrollment in pre-education ratio	-	-	-.0003	-.001
			(.002)	(.002)
Gross enrollment in secondary education ratio	-	-	-.005**	-.005*
			(.002)	(.002)
Log of *Gmina*'s expenditure on education per capita	-	-	.11	-.144
			(.112)	(.118)
Intercept	29.08	27.41	28.89	27.31
	(.024)	(1.26)	(.755)	(1.35)
Number of schools	6868	6868	6861	6843
Number of schools×time periods	47715	47535	47468	47414
Within R-squared	0.57	0.57	0.57	0.57
Year-specific effects	Yes	Yes	Yes	Yes

Note: Numbers in parentheses are robust standard errors clustered at *gmina* level. The variable $Treatment \times After$ is an interaction term between variables *After* and *Treatment*. The *Treatment* variable is a measure of the pre-treatment (in 2008) fraction of students in *gmina g* attending to elementary public schools with less than 70 pupils (excluding non-public schools with tuitions). The variable *After* denotes observation for 2009, 2010 and 2011. * denotes significance at 0.05 level, ** denotes significance at 0.01 level.

Table 5: The panel fixed effect estimation for urban and rural subsamples

	Rural Subsample		Urban Subsample	
	Excluding Covariates	Including All Covariates	Excluding Covariates	Including All Covariates
$Treatment \times After$ (β_1)	-.4 (.29)	-.246 (.289)	-1.783** (.585)	-1.721** (.592)
$After$ (β_2)	-6.875** (.052)	-4.257** (.112)	-6.863** (.07)	-4.379** (.121)
Unemployment ratio	-	-.002* (.001)	-	.001 (.001)
Population in thousands	-	.1** (.04)	-	.014* (.0068)
Log of total *gmina*'s expenditure per capita.	-	.005 (.121)	-	-.145 (.158)
Gross enrollment in pre-education ratio	-	-.001 (.002)	-	-.001 (.003)
Gross enrollment in secondary education ratio	-	-.005* (.003)	-	-.001 (.002)
Log of *gmina*'s expenditure on education per capita	-	.157 (.143)	-	.11 (.18)
Intercept	28.46 (.03)	27.05 (1.16)	30.05 (.04)	27.36 (2.31)
Number of schools	4171	4149	2697	2694
Number of schools×time periods	29053	28790	18662	18624
Within R-squared	0.52	0.52	0.69	0.69
Year-specific effects	Yes	Yes	Yes	Yes

Note: Numbers in parentheses are robust standard errors clustered at *gmina* level. The status of *gmina* (rural or urban) has been defined by Central Examination Commision. The variable $Treatment \times After$ is an interaction term between variables *After* and *Treatment*. The *Treatment* variable is a measure of the pre-treatment (in 2008) fraction of students in *gmina g* attending to elementary public schools with less than 70 pupils (excluding non-public schools with tuitions). The variable *After* denotes observation for 2009, 2010 and 2011. * denotes significance at 0.05 level, ** denotes significance at 0.01 level.

Table 6: The panel fixed effect estimation for the sample of *gminas* with at least one community school in 2008

	Rural + Urban	Rural Subsample	Urban Subsample
$Treatment \times After$ (β_1)	-1.207 (.64)	-.374 (.792)	-3.944** (1.475)
$After$ (β_2)	-4.243** (.178)	-4.291** (.36)	-4.016** (.227)
Unemployment ratio	.001 (.002)	-.002 (.003)	.004 (.002)
Population in thousands	.017* (.0085)	.229 (.12)	.012 (.007)
Log of total *gmina*'s expenditure per capita.	-.183 (.228)	-.142 (.374)	-.175 (.293)
Gross enrollment in pre-education ratio	.002 (.004)	.001 (.006)	-.001 (.006)
Gross enrollment in secondary education ratio	-.002 (.004)	-.001 (.006)	-.002 (.007)
Log of *gmina*'s expenditure on education per capita	-.077 (.291)	.308 (.403)	-.514 (.375)
Intercept	26.97 (3.8)	25.7 (4.65)	30.26 (4.86)
Number of schools	1864	549	1315
Number of schools×time periods	12835	3795	9040
Within R-squared	0.63	0.53	0.69
Year-specific effects	Yes	Yes	Yes

Note: Numbers in parentheses are robust standard errors clustered at *gmina* level. The sample has been limited only to schools which were located in gminas where there was at least one community elementary school in 2008. The status of *gmina* (rural or urban) has been defined by Central Examination Commision. The variable $Treatment \times After$ is an interaction term between variables *After* and *Treatment*. The *Treatment* variable is a measure of the pre-treatment (in 2008) fraction of students in *gmina g* attending to elementary public schools with less than 70 pupils (excluding non-public schools with tuitions). The variable *After* denotes observation for 2009, 2010 and 2011. * denotes significance at 0.1 level, ** denotes significance at 0.01 level

Table 7: The panel fixed effect estimation for large public elementary schools

	Schools over 150 students		Schools over 300 students	
	Excluding Covariates	Including All Covariates	Excluding Covariates	Including All Covariates
$Treatment \times After$ (β_1)	-.585 (.354)	-.626 (.356)	-1.447* (.617)	-1.271* (.621)
$After$ (β_2)	-6.87** (.053)	-4.352** (.092)	-6.857** (.069)	-6.717** (.122)
Unemployment ratio	-	.0001 (.001)	-	.002 (.001)
Population in thousands	-	.016 (.01)	-	.018* (.008)
Log of total *gmina*'s expenditure per capita.	-	-.199 (.116)	-	-.266 (.155)
Gross enrollment in pre-education ratio	-	.001 (.002)	-	-.002 (.003)
Gross enrollment in secondary education ratio	-	-.003 (.003)	-	.003 (.003)
Log of *gmina*'s expenditure on education per capita	-	.193 (.14)	-	.155 (.186)
Intercept	29.6 (.029)	27.5 (2.11)	30.16 (.04)	23.43 (1.94)
Number of schools	3817	3810	1912	1908
Number of schools×time periods	26168	26075	12975	12932
Within R-squared	0.68	0.68	0.75	0.75
Year-specific effects	Yes	Yes	Yes	Yes

Note: Numbers in parentheses are robust standard errors clustered at *gmina* level. The sample has been limited to either public elementary schools with enrollment above 150 ((1) and (2) columns) or 300 ((3) and (4) columns) students in 2008. The variable $Treatment \times After$ is an interaction term between variables *After* and *Treatment*. The *Treatment* variable is a measure of the pre-treatment (in 2008) fraction of students in *gmina* g attending to elementary public schools with less than 70 pupils (excluding non-public schools with tuitions). The variable *After* denotes observation for 2009, 2010 and 2011. * denotes significance at 0.05 level, ** denotes significance at 0.01 level.

Table 8: The panel fixed effect estimation for schools with positive and negative enrollment growth between 2008 and 2009

	Positive enrollment growth		Negative enrollment growth	
	Excluding Covariates	Including All Covariates	Excluding Covariates	Including All Covariates
$Treatment \times After$ (β_1)	-.854 (.518)	-.871. (.524)	-.408 (.282)	-.41 (.28)
$After$ (β_2)	-6.653** (.78)	-4.227** (.152)	-6.956** (.044)	-7.044** (.083)
Unemployment ratio	-	-.002 (.002)	-	.002 (.001)
Population in thousands	-	.012 (.01)	-	.021* (.01)
Log of total *gmina*'s expenditure per capita.	-	-.122 (.191)	-	-.019 (.109)
Gross enrollment in pre-education ratio	-	-.001 (.003)	-	-.0002 (.002)
Gross enrollment in secondary education ratio	-	.002 (.004)	-	-.007** (.002)
Log of *gmina*'s expenditure on education per capita	-	.165 (.221)	-	.134 (.139)
Intercept	29.45 (.044)	27.5 (2.45)	28.94 (.026)	27.41 (1.43)
Number of schools	1838	1830	5030	5013
Number of schools×time periods	12702	12629	35013	34785
Within R-squared	0.55	0.55	0.58	0.58
Year-specific effects	Yes	Yes	Yes	Yes

Note: Numbers in parentheses are robust standard errors clustered at *gmina* level. The sample has been limited to either those schools which experienced positive enrollment growth between 2008 and 2009 ((1) and (2) columns) or those which experience negative enrollment ((3) and (4) columns). The variable $Treatment \times After$ is an interaction term between variables *After* and *Treatment*. The *Treatment* variable is a measure of the pre-treatment (in 2008) fraction of students in *gmina* g attending to elementary public schools with less than 70 pupils (excluding non-public schools with tuitions). The variable *After* denotes observation for 2009, 2010 and 2011. * denotes significance at 0.05 level, ** denotes significance at 0.01 level.