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SCHOOLS' STRUCTURE AND EDUCATIONAL ACHIEVEMENTS: EVIDENCE FROM IRAN

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ABSTRACT

Parents choose the school of their children regarding the quality of education, tuition fee and accessibility. Iran's government established special schools in addition to public and private ones to provide cheap and high-quality education. In this research, we assess the educational outcomes of special schools and their effectiveness. We use data of an internet-based survey among 6178 students. We describe a propensity score matching method to compare the achievements of students in special schools with other students in public and private schools. We show that special schools increase students' Diploma score and bring better rank in the national university entrance exam, both significant in 1% level. The different structure of special schools to public ones in addition to peer effect account for the effectiveness of special schools.

JEL classification: I22, I24, I28, I38, H52, O15
KEYWORDS: *School Effectiveness, School Type, Education Quality, Education Policy, Score*

INTRODUCTION

Education is a significant determinant of growth in developing countries. It effects on human capital and influences domestic production. In Iran, there are two main types of schools which provide secondary education. Public schools are free of charge and accessible throughout the entire country. They have a central planning system stranglehold by the Government directly. Thus, every student in the country, with any level of wealth and literacy, can attend public schools easily. The second type is private schools, which are affordable only for affluent families. These schools are allowed to select their students and charge fees for enrolment. In this condition, the government established the third type of schools. We call them "special schools", which consist of SHAHED, NEMOONEH and NODET schools. These are three different special schools that work in Iran education system. All of them are initiated by the government, have a particular amount of self-authority, are free of charge or have just a few tuitions, let parents to get involved in the school programs and try to provide higher quality. We can consider special schools as a policy in order to present a better education than public schools and cheaper than private schools. At this research, we want to assess the outcome of this policy and find the most effective one among these three different special schools.

Three special schools have little differences, but we can put them all together and investigate as a certain policy. Each of them has entrance criteria. NODET is aimed to find astute students in Iran and train their talents. It has the most competitive entrance examination as the only way to get the permission for enrolment. NEMOONEH is prepared for middle-class families who care about their children education, were

not successful in NODET examination and cannot afford tuition fees in private schools. It looks at families' features beside a simple entrance examination for acceptance. Although SHAHED has no entrance examination, it has restricted criteria regarding the socio-cultural characteristics. This special school tries to provide a better education for families who had participated in Iran-Iraq war as an appreciation. However, the three schools are elements of a certain policy which seeks to support students' higher learning at a low price.

This research aims to evaluate the policy and finds how is it beneficial. The results can effect on special schools' students and students who remain in public schools. Finally, society and government could take advantage of the policy. We focus on the education outcomes of the students in special schools in order to determine the school structure which is more effective to be expanded. There are two nationwide examinations in Iran education system which indicate students' learning. We use these as tools to assess schools' performance. The first one is the rank of national university entrance exam, named Concour. More than half a million students participate in this examination each year and it demonstrates whether they are allowed to continue their education among different universities and fields for tertiary education. The other tool is their secondary school Diploma score in a year before Concour, in which the Government holds the same final exams for all student in the country. Thus, we compare the rank of Concour and the Diploma score for special schools' students with students in public and private schools.

The results provide reliable evidence for the Government to continue or stop the policy due to its outcomes. If the results show a positive impact of special schools on students' achievements, then we can define other studies to determine the factors of the success of special schools. On the contrary, if such an effect does not exist we should present new structures for special schools. In the following, we will start with some of the elements which could affect the schools' outcomes and a variety of studies about the effects of school type in the literature review. Next, we describe our data gathered through an internet-based survey and further, we demonstrate the PSM method assigned. After that, the results of the comparison would be presented, which shows the effect of the school type on the Concour's rank and Diploma score. Finally, we have a conclusion about the policy and a brief discussion about the mechanism.

LITERATURE REVIEW

We can separate the related literature into two main steps. First, we discuss the reasons which led to the establishment of special schools in different countries as Charter schools, Magnet schools, Grammar schools, and Catholic school. Each of them due to its particular objective has a specific structure and entrance procedure for students. In the second step, we investigate the impacts of special schools. In detail, we talk about different variables which indicate a school's performance, distinct causes that effect on it and approaches used for assessing the effectiveness of schools.

Why the special schools appeared and how do they absorb students? Filer and Munich (2013) assert that due to the weak performance of the public schools on the students' acceptance in universities, some other school types are established. In fact, new school types reduced and regulated the government interferences in order that it might lead to more efficiency. Each of them has some certain criteria for choosing new students. Though they want to prepare a more appropriate situation for vulnerable students, they define some specified characteristics for students or hold entrance exams for picking selected ones. At least they use some kinds of lottery or establish a time based prioritizing system (Epple et al., 2016). As a result, they gather a group of students having given specifications on which affects the schools' outcomes. Zimmer et al. (2009) among a study of the effects of Charter schools' declare that parents prefer to enroll their child at a school in which the students of their own race preponderate the distribution of students' race. They allege that the American-African students almost have graduated from the schools that this race forms the majority. Finally, they prove that although Charter schools have specific conditions for entering students, it is not like that they attract more talented students; in fact, families' preferences play the most prominent role. In an analogous conclusion, Angrist et al. (2013) claim that most of the black students enroll at Magnet schools and the majority of Charter school's students have lower educational abilities and family income. All in all, we may draw the conclusion that any special school has specific students with certain characteristics like their family status which effects on the school outcome and makes the result of the policy evaluation endogenous (Urquiola, 2016).

Research on estimating schools' effect is one of the major fields in the economics of education studies. Coleman et al. (1982) and Coleman and Hoffer (1987), after normalizing exams among a variety of schools, have proved that the students of Catholic schools have attained higher scores. Many critics revealed further, like Card and Krueger (1992) and Hanushek et al. (1992), that claim score is not a proper variable because it has no impact on the future income. Also, Evans and Schwab (1995) have the same idea and explain that not only score is not correlated with the future job and income of the students but also race, sex and culture could affect that. Albeit some recent studies like Booker et al. (2014) use other variables

than score. They mention that students of Charter schools are between 7 to 13 percent more than other students graduated from secondary school, enrolled in college and had an appropriate performance there. Moreover, their income between 10 to 12 years after enrolling Charter school is 12 percent higher than other students.

However, there are many factors rather than school structure that effect on the students' performance. Different family characteristics may affect both school selection and students' grades. In addition, all of the schools in the same type are not identical and may reveal different outcomes. These are some specs which lead to a bias in the results (Binelli and Rubio-Codina, 2013). Dronkers and Robert (2008) claim that some families have the financial ability for affording expensive tuitions of private schools and prefer to spend money on their child's education. Subsequently, students with similar socio-economic characteristics gather in a particular school. In addition, Neal (1997) shows that the effect of private schools on students who do not access to a proper public school is higher than others. Therefore, the school's achievement depends on the students' type rather than school type.

Many different methods have been presented to solve this problem. In addition to randomized experiments, Anand et al. (2009) used propensity score matching to solve the sample selection bias. They studied a policy in Chile in which the Government offers a scholarship to some low-income families in order to enroll their children in a private school rather than a public one. They defined a logit model by students, families and schools' characteristics to present a matched sample for the treatment group. Finally, they approve that the private school has a little positive significant impact on students' score. In this research, we use a similar model which is elaborated further.

DATA

Veasl and Tavakkoli (2017) have held a survey among the applicants of the national university entrance exam in 2010. The total number of the applicants exceeds 456000 students, however, a text message has been sent to 130000 participants, who had enrolled in an educational institute to simulate their rank and its corresponded available major of study at university. The researchers asked the participants to fill the internet-based questionnaire. As a result, 6178 participants, equal to 2.8 percent of the whole population, took part in the survey. Moreover, they have compared the summary statistics of the sample with the total population and proved the reliability of the data. The questionnaire is based on Assaad et al. (2017) and comprised of four sectors of their personal and family information, growing conditions, educational data, and job status.

As Table 1 indicates, 256 students, equal to 4.17 percent of the sample, have studied their primary education at a special school. Accordingly, 964 students as 15.7 percent and 1297 students as 21.11 percent of the sample have attained respectively lower secondary and secondary school at a special school. For obtaining the outcome of each school type, we measure the Diploma score and the rank of the national university entrance exam for students in three mentioned categories due to their school type as public, private, or special. The averages of these two variables are shown in Table 2. It reveals that students of special schools had better achievements compared to the other students. In addition, figures 1 and 2 represent the distribution and density of each type in the defined variables. The score varies between 0 to 20 in which 20 means the highest score. The university entrance exam holds annually and is the only path to get admission to a university for bachelor studies. There are four main fields in the Iranian's secondary schools of mathematics and physics, natural sciences, humanities, and technical and vocational. Each of them has a separated national university entrance exam.

On Table 3, general explanatory factors related to students' achievement and school choice are summarized in three categories of the families' demographic condition, the financial status of the family at the last two years before the time of Concour, and the facilities accessible for the student at the mentioned time. The parents' socio-economic characteristics could explain the differences among students' achievements in the school significantly. The two major factors of the parents' income and the parents' education are represented in Table 4. The table shows the whole sample, however, studying at a special school is defined as a dummy variable and the last column reveals the correlation between the respective variable and enrolling in a special school.

Table 1: The number of observations in each type of school by grades

Lower Secondary School		Special			Private			Public		
Secondary school		Special	Private	Public	Special	Private	Public	Special	Private	Public
Primary School	Special	104	20	18	14	25	8	12	7	48
		(1.69)	(0.33)	(0.29)	(0.23)	(0.41)	(0.13)	(0.20)	(0.11)	(0.78)
	Private	93	19	13	39	175	36	21	16	65
		(1.51)	(0.31)	(0.21)	(0.63)	(2.85)	(0.59)	(0.34)	(0.26)	(1.06)
	Public	480	54	163	67	199	95	467	239	3645
		(7.82)	(0.88)	(2.65)	(1.09)	(3.24)	(1.55)	(7.60)	(3.89)	(59.35)

Notes: The parentheses show the percentage of each school according to the total sample.

Table 2: The average of the score and rank of the sample due to the school type

	Public	Private	Special	Aggregate
Score	15.56	16.66	17.21	16.06
	(2.33)	(2.24)	(1.89)	(2.34)
Rank	22942	18307	11561	19821
	(26832)	(22909)	(15035)	(24653)

Notes: The parentheses indicate standard deviation.

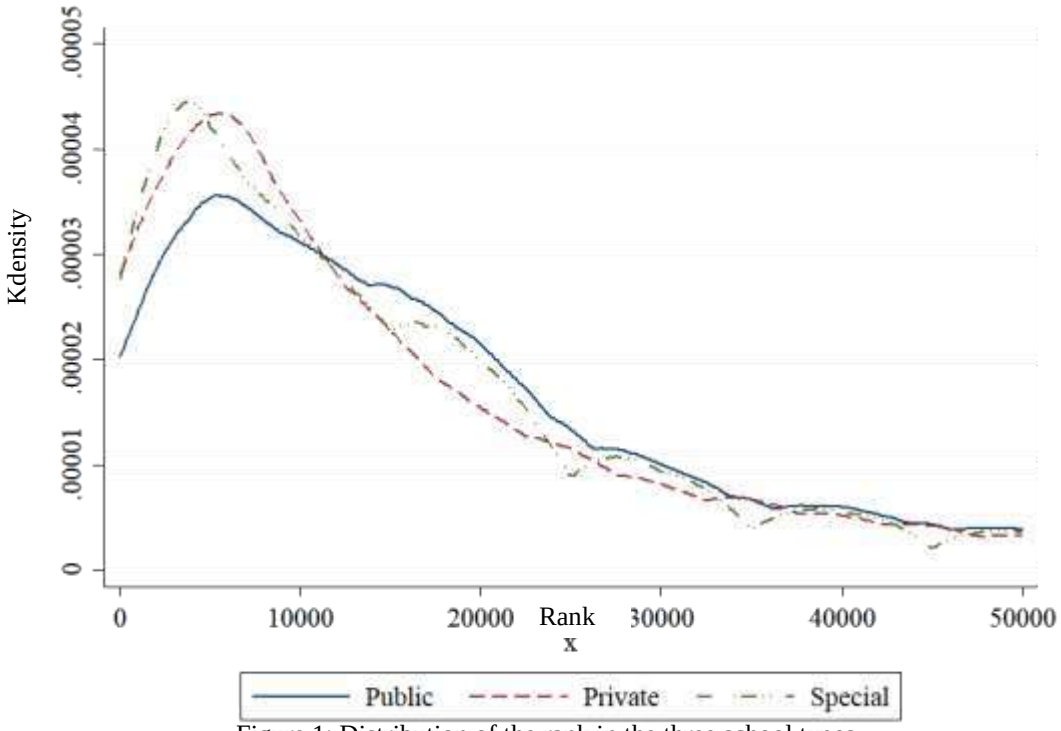

Figure 1: Distribution of the rank in the three school types

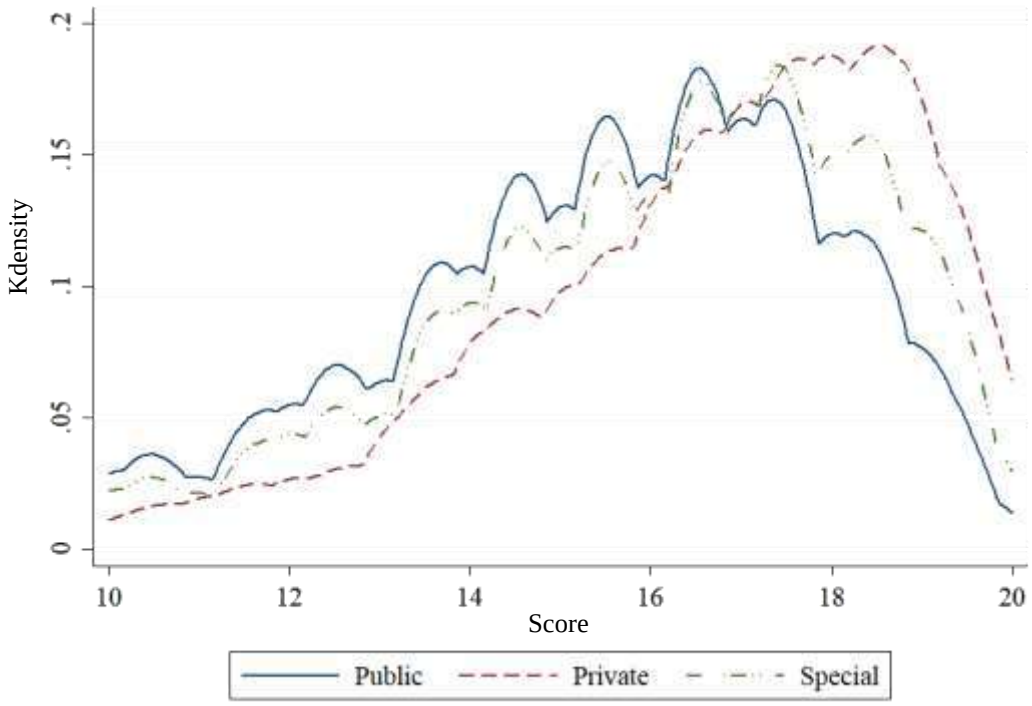

Figure 2: Distribution of the score in the three school types

Table 3: Summary statistics of general explanatory factors

Variable	Numbers	Average	Standard deviation	Min.	Max.	Correlation with educating in a special school
Father birth year	6105	1959	7.66	1910	1984	0.0630
Mother birth year	6108	1965	6.80	1922	1986	0.0595
Other child's number	6143	2.93	1.89	1	15	-0.1014
Border	6143	2.55	1.62	1	6	-0.0877
Preschool participation	6143	0.38	0.49	0	1	0.1487
Years of preschool	2331	1.57	0.94	1	4	0.1816
Residence ownership	5974	0.79	0.40	0	1	0.1141
Urban residence	6143	0.90	0.28	0	1	0.1650
Real state ownership of the family	6143	0.32	0.47	0	1	0.1571
Car ownership of the family	6143	0.78	0.53	0	1	0.1683
Personal room	6143	0.46	0.50	0	1	0.1372
Parents involvement in homework	6143	0.26	0.44	0	1	0.0762
Access to home library	6143	0.29	0.45	0	1	0.1593
Access to local library	6143	0.59	0.49	0	1	-0.0030
Access to personal computer	6143	0.71	0.45	0	1	0.1228
Access to Internet	6143	0.54	0.50	0	1	0.1539
Access to personal cellphone	6143	0.51	0.50	0	1	0.0643
Access to magazines	6143	0.77	0.42	0	1	0.0614

Notes: Preschool is related to childish therefore assigned to the first category of the variables. Also financial category is linked to the time of the national university entrance exam.

Table 4: Summary statistics of the income and education of the parents in the sample

Variable	Numbers	Distribution						Correlation with educating in a special school
		Monthly Income (Ten thousands Rials)						
		0	<750	750-1500	1500-3000	3000-5000	>5000	
Father income	5446	14.19	7.99	41.70	28.35	5.51	2.26	0.2026
Mother income	5966	83.18	1.81	8.9	5.41	0.50	0.20	0.2630
		Education						
		Illiterate	Less than Diploma	Diploma	Up to Bachelor	Up to PhD	Seminary	
Father education	6178	5.89	34.70	28.20	24.67	6.07	0.47	0.2628
Mother education	6178	11.57	42.70	29.20	14.17	2.17	0.19	0.2998

Notes: Educating at a special school is defined as a dummy variable.

EMPIRICAL METHOD

There are many unobservable factors that affect simultaneously or separately both the school choice process and the students' achievements. These factors make any regular estimation endogenous; therefore, we use the Propensity Score Matching method to fix the sample selection bias. Dehejia and Wahba (1999) used this method to assess the accomplishment of different labor policies in the U.S. By using this method, we try to parcel out the effects of unobservable factors on the students' score and rank. We compare observable factors of the students in each school type. There are two main assumptions for the validity of the method. The first one, as is shown in

(1) $0 < \mathrm{P}(D_i = 1|x_i) < 1$

(2) $\mathrm{y_{0i}}.\mathrm{y_{1i}} \perp \mathrm{D_i}|\mathrm{x_i}$

Equation 1, is overlap condition that assumes for each vector of X variables, there is a positive probability of not belonging to the treatment group; consequently, according to X, there is an observation in the control group that could be matched by another one in the treatment group. As a result, it is plausible that unobservable factors do not affect the assignment of the members, and evidently, do not affect the estimated results. Equation 2 represents the conditional independence assumption. It illustrates that any different in the target variable between two observations in the treatment and control group with the same explanatory variables is related to the treatment program. By using the observable variables, we can define the X vector to estimate the effect of the treatment (Cameron and Trivedi, 2005). In this research, studying in a special school is considered as the treatment.

The main challenges are sample selection bias and non-attainable counterfactual. Just in a randomized experiment we may claim that there is no other difference between the treatment and control group but receiving the treatment. In non-experimental studies, we obtain Equation 3 as the impact of the treatment, which consists of three separated elements. D_i=1 explains that i belongs to the treatment group, and D_i=0 shows the opposite. Moreover, y_{1i} is the representative of the outcome of person i, when receives the treatment. Also, y_{0i} shows the outcome for i when does not receive the treatment. The first term at the right hand of the equation is exactly the effect of the treatment. Indeed, it demonstrates the difference in the outcome for the member i in the situation that belongs to the treatment group, rather than the control group. Nevertheless, it is not pure at the right side and the second and third terms appear as the sample selection bias. In fact, this is the deviation of the members of the two groups, which in a randomized experiment equals to zero. The measurement of this bias in this research is impossible, yet we use the matching method to shift it toward zero.

(3) $$E[y_{1i}|D_i = 1] - E[y_{0i}|D_i = 0] = E[y_{1i} - y_{0i}|D_i = 1] + \{E[y_{0i}|D_i = 1] - E[y_{0i}|D_i = 0]\}$$

There are two ways for implementing the matching method. The exact matching is affordable in the situation that covariance vectors are discrete and available observations for each x_i are present. On the contrary, we use the propensity score, which is the probability for each person to be involved in the treatment group, defined by the

observable variables. Finally, any person with the same score in different groups, according to the x vector, are compared with each other due to a particular weight (Rosenbaum and Rubin, 1983). The probability for the person i to be in the treatment group is defined by $\Pr[D_i = 1|x_i]$. This is the score in which x_i represents the vector of observable variables for i. The more closeness the estimated score, the more reliable the comparison. In general,

$$\tau_{ATT}^{PSM} = E_{p(x_i)|D_i=1}\{E[y_{1i}|D_i = 1.p(x_i)] - E[y_{0i}|D_i = 1.p(x_i)]\} \quad (4)$$

PSM estimates the effect by Equation 4, in which $p(x_i)$ indicates the score for each person.
First of all, we draw the explanatory variables and its attributed function by using the likelihood ratio. This

$$T = h(x_i) + e \quad (5)$$

is shown in Equation 5. There is the dummy variable of receiving the treatment (studying at a special school) on the left hand; also the right hand uses a linear first order function h(.) by using some of the observed variables x_i that has a rational correlation by school choice.
Furthermore, we regress the probability of receiving the treatment on the $h(x_i)$. It will be estimated by assigning the

$$p = \Pr[D_i = 1|x_i] = F(h(x_i)) \quad (6)$$

logit probability density function F(.) in Equation 6. At this point, the score is acquired for each member.
The next stage is matching the members of the treatment group by the control group, that is mandatory to define which person be compared with whom. There is a variety of methods for this step, however, we use the nearest neighbor approach. As is shown in Equation 7, the person i in the treatment group is matched to the person j in the

$$A_j(p(x)) = \{p_j|min_j||p_i - p_j||\} \quad (7)$$

control group who have the least difference in their scores; therefore, the comparison group would be prepared002E
Finally, the effect of the treatment is obtained by Equation 8. N_T is the number of observations in the treatment group, y_{1i} indicates the score or rank of the person i in the treatment group while y_{0j} shows these outcomes for the person j of the control group matched by i. w(i,j) is the assigned weight for the pair i and j difference in outcomes. In

$$\tau = \frac{1}{N_T}\sum_{i\epsilon\{D=1\}}[y_{1i} - \sum_j w(i.j)y_{0j}] \quad (8)$$

$$w(i.j) = 1/N_i^c \quad (9)$$

fact, $\sum_j w(i.j) = 1$ and $0 < w(i.j) \leq 1$, which is calculated by Equation 9.

There are one implement and two tests for improving and assessing the validity of the matching. The first one is the support condition in which we identify the lowest and the highest score in each group of treatment and control; subsequently, we omit all the observation below the bigger minimum score and above the lower maximum score. There is the overlapping test that compares the distribution of p(x) in the treatment and control group to assure that the members are scattered similarly. The second one is the balance test. For all (i,j)s in each comparison group, it compares the average of all the explanatory factors to find any significant difference. If this, we must change the h(x) function or variables.

As described, the dependent variable y is the score and the rank for each person, whereas the independent variables x vector comprises most of the observational factors in the survey. Indeed, at the first iterate of Equation 5 the vector X is composed of the parents' income, education, and olds and the students' birthplace (urban or rural), sex, bordering, citizenship, disabilities, residence status, house size, house ownership, real state ownership, car ownership, parents' involvement in homework, access to facilities, foreign language class involvement, preschool involvement, and skipped grades. For estimating the effect of the policy, the students who studied at a special secondary school as the treatment group are being compared by the students of the public, private, or both secondary schools as the control group.

RESULTS

We present the results of the research in Table 5. The first five columns demonstrate the effect of studying in a special school on the rank of the national university entrance exam, and the effect on the Diploma score is presented in the second five columns. In the columns 1 to 3 and 6 to 8, aggregate

students in both public and private schools are defined as the control group. While in columns 4 and 9 the control group consists of public schools' students solely, students of private schools comprise the control group in columns 5 and 10. The results in columns 1 and 6 are estimated by OLS, and the policy effect is significant at 1% level. The columns 2 and 7 estimate the average treatment effect (ATE) without any matching. Again the effect is significant at 1% level. The average treatment effect on treated (ATT) in the columns 3 to 5 and 8 to 10 are estimated by the described PSM method. Studying in a special school leads to achieve 8248 lower rank and 0.82 higher diploma score than a student not attained a special school, both significant at 1% level. The effect is greater in comparison with the students of public schools alone. A special school provides 9345 better rank and 0.99 higher score than a public school, all significant at 1% level. The magnitude and significance of the treatment are lower in the comparison by private schools' students. The policy improves the rank of the treatment group 7734 units against the students of private schools, only at 10% significant level. However, it has 0.81 units positive effect on the score at 1% level. All in all, the ATT is significant generally and is in the direction of improving the students' educational achievements. The magnitude of the effect on the treatment group is greater versus the public schools rather than the private ones.

In Table 6 and Table 7 we distinguished the students by their field of study. Table 6 shows the results for mathematics and physics students alone. The description of the table structure is like Table 5. It demonstrates that special schools have improved the rank of the mathematics and physics students 8785 units and increased their score 0.77 units in comparison with the students who did not study at special schools, both significant at 1% level. In addition, the treatment group has achieved 9285 lower rank and 1.02 higher score versus the students in the public schools. Consequently, we may conclude that the effect of special schools in the mathematics and physics field is greater in comparison with public schools than private ones. On the other hand, as Table 7 shows, a special school has led to 4563 lower rank in 5% significant level and 0.92 higher score in 1% significant level for natural science students. These amounts in the comparison with public schools are respectively 8946 and 0.68 units both significant at 5% level.

Table 5: Policy effect

	Dependent variable: Rank					Dependent variable: Score				
	(1) OLS	(2) ATE	(3) ATT	(4) ATT (Pub.)	(5) ATT (Pri.)	(6) OLS	(7) ATE	(8) ATT	(9) ATT (Pub.)	(10) ATT (Pri.)
Special Schools	-8146***	-10258***	-8248***	-9345***	-7734*	0.9500***	14590***	0.8157***	0.9859***	0.7081***
	(865)	(834)	(1114)	(1348)	(1687)	(0.0759)	(0.0789)	(0.1096)	(0.1246)	(0.1739)
Number of observations	4897	4823	4823	4185	1678	5084	5006	5006	4355	1706
Number of control group			3782	3144	638			3950	3299	651
Number of treatment group			1041	1041	1040			1056	1056	1055
R-squared	0.0923	0.1018	0.014	0.014	0.033	0.2289	0.1049	0.011	0.020	0.029

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, the number of observations in the treatment and control group is reported after matching, (pub.) means that the control group is consisted only of public schools, (pri.) means that the control group is consisted only of private schools, and other columns use all the students out of special schools as the control group.
***p<0.01, **p<0.05, *p<0.1

Table 6: Policy effect for the mathematics and physics students

	Dependent variable: Rank				Dependent variable: Score			
	(1) OLS	(2) ATE	(3) ATT	(4) ATT (Pub.)	(5) OLS	(6) ATE	(7) ATT	(8) ATT (Pub.)
Mathematics and physics special schools	-7625*** (999)	-9495*** (980)	-8785*** (1331)	-9285*** (1499)	0.9107*** (0.0999)	1.2124*** (0.1018)	0.7702*** (0.1357)	1.0203*** (0.1729)
Number of observations	2511	2510	2510	2077	2589	2588	2588	2145
Number of control group			1863	1430			1935	1492
Number of treatment group			647	647			653	653
R-squared	0.0967	0.0702	0.015	0.020	0.1784	0.0718	0.013	0.017

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, the number of observations in the treatment and control group is reported after matching, (pub.) means that the control group is consisted only of public schools, and other columns use all the students out of special schools as the control group.
***p<0.01, **p<0.05, *p<0.1

Table 7: Policy effect for the natural science students

	Dependent variable: Rank				Dependent variable: Score			
	(1) OLS	(2) ATE	(3) ATT	(4) ATT (Pub.)	(5) OLS	(6) ATE	(7) ATT	(8) ATT (Pub.)
Natural science special schools	-7667*** (1718)	-11192*** (1622)	-4563** (1931)	-8946** (3228)	0.8891*** (0.1347)	1.4608*** (0.1397)	0.9248*** (0.2155)	0.6808** (0.2181)
Number of observations	1653	1645	1645	1467	1729	1721	1721	1541
Number of control group			1323	1147			1392	1214
Number of treatment group			322	320			329	327
R-squared	0.1124	0.1481	0.038	0.057	0.2874	0.1528	0.044	0.048

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, the number of observations in the treatment and control group is reported after matching, (pub.) means that the control group is consisted only of public schools, and other columns use all the students out of special schools as the control group.
***p<0.01, **p<0.05, *p<0.1

We have implemented the balance and overlapping tests for columns 3 and 8 of Table 5 to prove the validity of the matching model. Column 1 of Table 8 shows the corresponding chi-squared test statistic of the balance test in matching the ranks of the students in the special schools and the students out of them. The null hypothesis is rejected; thus, there is no significant difference between the averages of the variables among the treatment and control groups. Column 2 shows the test statistic for the matching of the Diploma scores. Again, the null hypothesis is refuted. Consequently, the results confirm the balance condition. For overlapping test, we consider whether the distribution of the propensity scores is similar in the treatment and control group. Figure 3 shows the distribution, which approves the overlapping condition because the outlier scores are omitted, and each cohort of the score has almost the same quantity.

Table 8: Balance test

	(1)	(2)
p>chi2	0.978	0.977

Note: Column 1 and 2 are respectively the test statistic for rank and score.

method, we have dropped some of the observations.

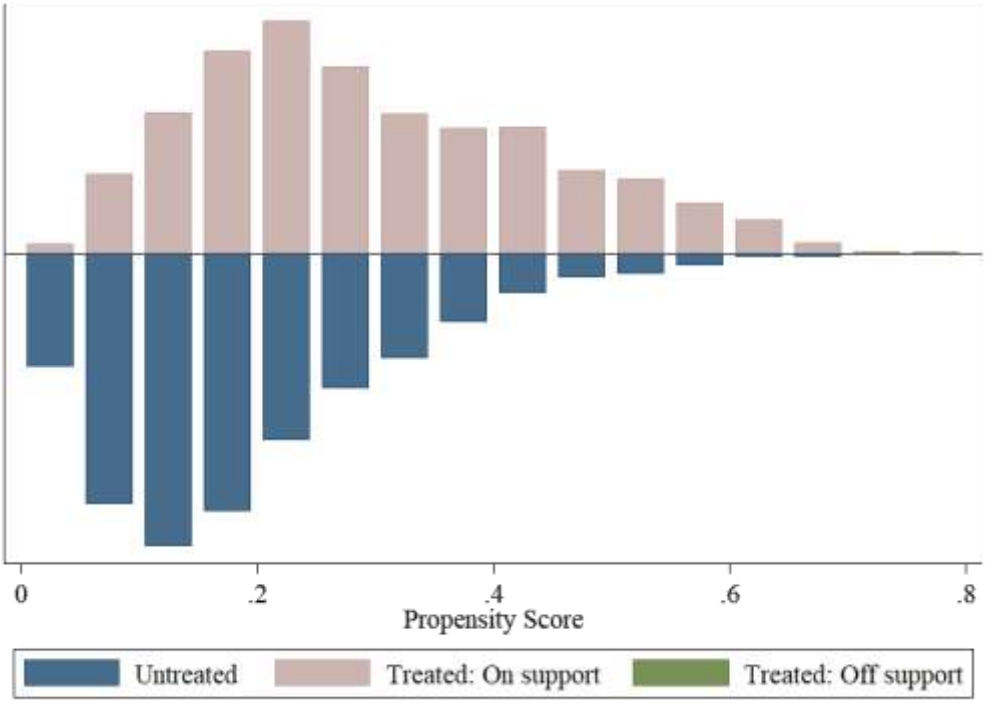

Figure 3: Overlapping condition of PSM

There are three robustness tests to verify the results of Table 5. They are implemented to estimate the effect of the treatment on the students' rank compared to the students out of the special school (column 3 of Table 5). Table 9 presents the results in which the control group consists of all the students in the public and private schools. In column 1, the students who attained both lower secondary and secondary school in a special school are defined as the treatment group. It demonstrates that the rank of the treatment group is improved 8241 units in 5% significant level. It is approximately as same as the previously obtained effect (8248) in Table 5. Next, in column 2, we have used Kernel method rather than nearest neighbor as matching approach. It shows exactly the same improvement of 8248 units in students' rank, just like Table 5. For the third Iran's ministry of education has classified the country to 3 distinct zones. The five greatest cities are the first zone, other middle cities are in the second zone, and small cities plus to rural areas are in the third zone. This classification is analogous to people income such that the wealth of people in the first zone is larger than people in the other zones. For column 3, we omitted the schools in the first zone to determine the policy effect for people with lower income. In fact, this is one of the main objects of the policy to provide high-quality education for people who cannot afford private schools. The effect is calculated of 9334 units improvement on the rank compared with the control group. Again its similar to prior result. Therefore, we may conclude that the results of the PSM model are consistent.

Table 9: Robustness

	Dependent variable: Rank		
	(1)	(2)	(3)
Special Schools	-8241**	-8248***	-9334**
	(2838)	(1114)	(1351)
Number of observations	785	4823	3131
Number of control group	215	3782	2437
Number of treatment group	570	1041	694
R-squared	0.049	0.014	0.035

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, and the number of observations in the treatment and control group is reported after matching.
***p<0.01, **p<0.05, *p<0.1

As far as Figure 3 is right skewed, it is essential to trim some observations by low or high propensity scores. We have used three methods for trimming, and Table 10 presents the results. The control group consists of both public and private schools. In the first method, we dropped all the observations with lower than 0.25 and higher than 0.75 propensity score, then ran the PSM and trimmed 25% observations in the treatment group, which had the lowest propensity score density in their corresponding control group. The further distribution of propensity scores is shown in figure 4, and the ATT is calculated in column 1 of Table 10. It shows 5740 improvements in the rank in 1% significant level. For the second method, we separated each quarter of propensity scores, then used the identification in Equation 10. y represents the rank, x is the dummy variable of studying in a special school, q_1, q_2 and q_3 are dummy variables which show respectively belonging to the first, second or third quarter of the propensity score. As column 2 presents, the ATT is 9665 units and significant in 1% level. For the third method, we dropped all the observations in the control group with lower than 0.25 propensity score and estimated the ATT again. As column 3 shows, it still has 5469 units improvement on the rank of the students in the treatment group.

(10) $$y = \alpha + \beta x + \beta_1 q_1 + \beta_2 q_2 + \beta_3 q_3 + \varepsilon$$

Table 10: Trimming

	Dependent variable: Rank		
	(1)	(2)	(3)
Special Schools	-5740***	-9665***	-5469***
	(1536)	(780)	(1311)
q_1=1		-57	
		(849)	
q_2=1		-4079***	
		(797)	
q_3=1		-5453**	
		(1816)	

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, and the number of observations in the treatment and control group is reported after matching.

***p<0.01, **p<0.05, *p<0.1

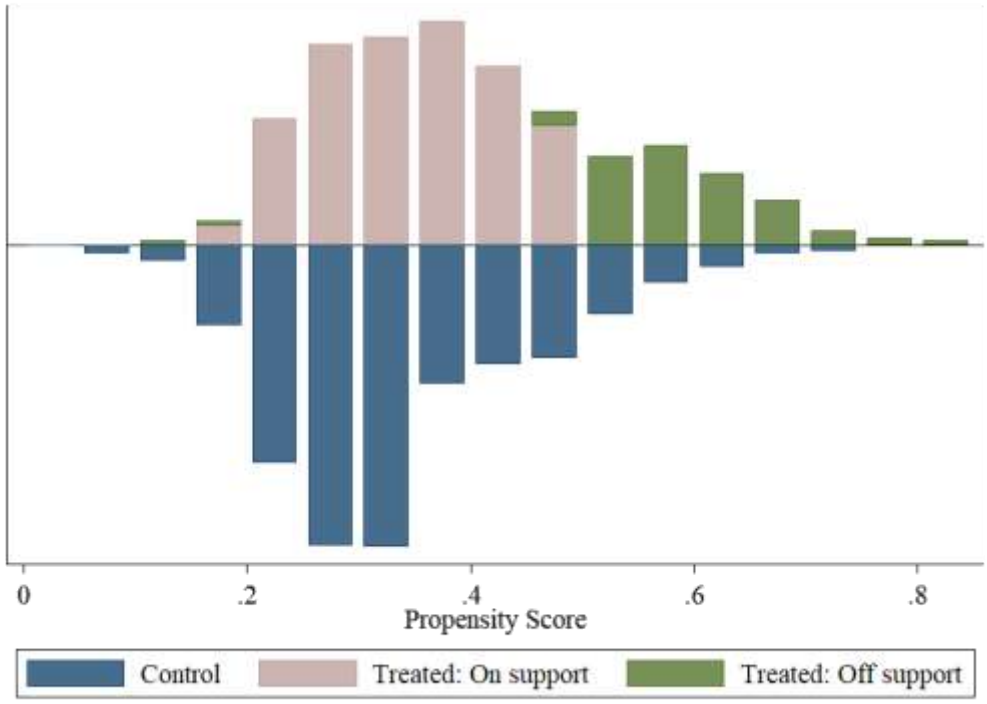

Figure 4: Overlapping condition after trimming

After showing the effectiveness of the policy, we need to find the most effective special school. In Table 11, 12 and 13 we estimate the outcome for SHAHED, NEMOONEH and NODET schools respectively. All of them have significant impact on rank and score. As columns 3 and 6 in three tables show, the magnitude of effects is greater for NODET and SHAHED has the smallest effects. Hence, NODET schools are the most effective special schools. In the next part, we would discuss the conclusion and explain mechanisms which led to these results.

Table 11: Policy effect for SHAHED schools

	Dependent variable: Rank			Dependent variable: Score		
	(1) OLS	(2) ATE	(3) ATT (Pub.)	(4) OLS	(5) ATE	(6) ATT (Pub.)
SHAHED	-6090*** (1570)	-8732*** (1473)	-7064*** (1955)	0.5506*** (0.1304)	1.1408*** (0.1325)	0.4066** (0.1921)
Number of observations	3541	3458	3458	3708	3619	3619
Number of control group			3130			3283
Number of treatment group			328			336
R-squared	0.0757	0.2099	0.034	0.1956	0.2125	0.040

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, the number of observations in the treatment and control group is reported after matching and the control group is consisted only of public

schools.
***p<0.01, **p<0.05, *p<0.1

Table 12: Policy effect for NEMOONEH schools

	Dependent variable: Rank			Dependent variable: Score		
	(1) OLS	(2) ATE	(3) ATT (Pub.)	(4) OLS	(5) ATE	(6) ATT (Pub.)
NEMOONEH	-9783*** (1312)	-11807*** (1274)	-11059*** (1611)	1.3355*** (0.1099)	1.7730*** (0.1156)	1.1596*** (0.1560)
Number of observations	3657	3578	3578	3819	3735	3735
Number of control group			3133			3287
Number of treatment group			445			448
R-squared	0.0880	0.1051	0.027	0.2263	0.1053	0.020

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, the number of observations in the treatment and control group is reported after matching and the control group is consisted only of public schools.
***p<0.01, **p<0.05, *p<0.1

Table 13: Policy effect for NODET schools

	Dependent variable: Rank			Dependent variable: Score		
	(1) OLS	(2) ATE	(3) ATT (Pub.)	(4) OLS	(5) ATE	(6) ATT (Pub.)
NODET	-13891*** (2157)	-15632*** (1942)	-13083*** (3058)	1.8959*** (0.1779)	2.4871*** (0.1771)	1.7513*** (0.2842)
Number of observations	3384	3181	3181	3543	3317	3317
Number of control group			3009			3145
Number of treatment group			172			172
R-squared	0.0863	0.3010	0.067	0.2288	0.3020	0.061

Notes: The parentheses show the standard errors, studying in a special school is defined as a dummy variable, the number of observations in the treatment and control group is reported after matching and the control group is consisted only of public schools.
***p<0.01, **p<0.05, *p<0.1

CONCLUSIONIn recent years many debates and conflicts toward the presence of the special schools have risen in Iran. Some proponents claim that this policy provides an opportunity for low-income families to enroll their children in a high-quality school, whereas there are opponents who argue that the special schools do not have a significant educational advantage to the public ones. However, this policy has huge financial costs for the Government, imposes more administrative works on the ministry of education, and makes a competition between families to recruit their children there. Therefore, estimating the effects of special schools and finding the most effective one have a crucial role in future policies. In this research, we showed the positive impact of the special schools on the students' educational achievements. According to the structure of education system in Iran, the rank of students among the national university entrance exam at the end of secondary school and the Diploma score in the previous year are the most significant outcomes of a school. Hence, we compared these two between special, public and private schools in Iran. Due to the described PSM method, we obtained that studying in a special school leads to 0.334 S.D. lower rank in the national university entrance exam. Moreover, it draws 0.349 S.D. higher Diploma score. All of the students in the sample who have studied in a public or private school have been considered as the control group; however, both effects would be greater in comparison with public schools solely. Consequently, we conclude that the policy is effective and has provided an opportunity for students to attain higher quality education without paying significant tuition. In addition, among three kinds of special schools in Iran, NODET has the most effectiveness. There are three main explanations for the outcome of special schools. First one is the structure of the school. As we described, special schools have more cooperation with families and more independence from the ministry of education to plan curriculum. This is exactly what we tried to find. We proved that the structure of NODET schools draws better educational outcomes. Nevertheless, NEMOONEH and SHAHED schools have positive impacts on students' achievements. Two other processes, sample selection bias and peer effect, might determine the results. By taking advantage of PSM, we tried to create a comparison group of the students in the control group for each member of the treatment group. Because of the acceptable results of the balance test and overlapping test, we are allowed to claim that the observable variables for compared students are similar. In addition, by using the weighting function, we outweighed the difference between students with more similarity. Moreover, we used parents' education and income as a proxy to control the students' talent. Therefore, we established compatible comparison groups to control selection bias. Distinguishing the role of school structure and peer effect is not plausible at this research. However, it does not interfere with our conclusion. Our goal was to conduct some evidence to understand whether the policy of special schools is beneficial or not. Further researches could provide more details about the causes of better outcomes for special schools. This is crucial to define subsequent researches for finding the causes of the difference in the students rank and score in order that it might lead to explaining part of a mechanism that determines the most effective factors on the students learning.

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