Geographical constraints in track choices: a French study using high school openings

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Abstract

In this paper we study the effect of opening a new high school on pupils' schooling at the end of lower secondary education. We use high school openings to highlight the constraint local school supply exerts on individual schooling decisions. Our working sample covers all pupils enrolled in 9th grade between the school year 2007-2008 and the school year 2010-2011 in France. Our estimation strategy (a generalized difference in differences) takes advantage of the variation in time and space of the openings of high schools to estimate the causal effect of an increase in school supply on the allocation of pupils at the end of 9th grade. We show that, when a new vocational high school appears in the neighborhood of a middle school, the probability for pupils to continue in high school increases significantly. This increase is due to a larger proportion of pupils going to the vocational track. The effect seems to be mainly driven by low achieving students.

Keywords: Education, Track choice, School openings, Difference in differences
JEL classification: I21, I22, C23

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Introduction

Over the recent years, there has been an increasing demand for liberalization of schooling decisions, in the sense that households have been asking for more freedom in their choice of schools and curricula. This demand has been met by public policies such as the distribution of vouchers allowing to pay for a school different from the catchment area one, or for a private school; school choice reforms aiming at giving parents more liberty in the choice of school for their child(ren); or the development of alternative pedagogical methods, such as Montessori, or Waldorf education. The essential rationale behind these policies would be that individuals are constrained in their schooling decisions by catchment area systems, financial constraints, information costs, or geographical constraints. But little is known about how such constraints influence schooling decisions.

What is known is that distance to school matters. A first group of papers studies the link between schooling supply and enrollment rate. They show that the probability of going to school increases significantly when new schools are built and when the distance to school decreases (Burde and Linden, 2013; Duflo, 2001; Handa, 2002; Filmer, 2007). A second group of papers focus on the link between school accessibility and pupils' performance. They identify a negative impact of distance to school on academic achievement (Burde and Linden, 2013; Falch et al., 2013). Finally, a third group of papers points out that the local school supply is key to explain whether or not individuals pursue in higher education (Dickerson and McIntosh, 2013; Frenette, 2009; Gibbons and Vignoles, 2012; Griffith and Rothstein, 2009; Spiess and Wrohlich, 2010). The literature also shows that, to a certain extent, individuals are better off if they can choose their school. In the French context, Fack and Grenet (2012) showed that the catchment area system reform had no effect on school choice in the sense that it did not significantly increase the number of pupils asking for another school than their catchment area one. In the United States, although the context is very different, Hastings et al. (2009) find that a school choice plan in North Carolina had a significant impact on school choice but ambiguous effects on academic outcomes, and Deming et al. (2014) find that attending a first-choice school increases college attainment. Studying a Tel-Aviv school choice program, Lavy (2010) shows that choice reduces the drop-out rate and increases high school achievement. The author also finds long-term positive effects on post-secondary enrollment and earnings (Lavy, 2015). The Swedish school choice reform proved to have small but positive short-term effects on academic achievement, but no effect on long-run outcomes (Wondratschek et al., 2013).

In this paper, we try to assess how opening a new high school may alleviate constraints on pupils' schooling. Our question comprises three parts. First, are individuals constrained by local school supply? To answer this, we ask whether opening a new high school is effective in making more individuals continue in higher secondary education. Second, how local school supply shapes schooling decisions? To answer this, we analyze whether pupils' allocation change when the local supply of schooling is increased by the opening of a new high school. More precisely, we analyze pupils' allocation in different tracks at the end of lower secondary education in France. Third, who are those pupils who are constrained by the local school supply? To answer this, we look at heterogenous effects with respect to pupils pre-opening results.

The main challenge is that the relationship between school supply and schooling decisions is complex, and isolating the impact of the former on the latter is not an easy task. The reason is that pupils are not randomly located relative to schools. First, schools are not evenly distributed on the territory. In France, at the beginning of the 2013 school year, there was an average of 8 high schools for every 10 000 pupils enrolled in secondary schooling. There were 13 for 10 000 pupils in the Paris district, and more than twice less in the neighboring Versailles school district. Second, households pay attention to the school supply in the neighbourhood when choosing a house (Epple and Romano, 2003; Barrow, 2002; Chumacero et al., 2011; Bayer et al., 2007; Fack and Grenet, 2010). Unobserved characteristics of households may explain both their location (and thus the school supply they face), and their schooling decisions. For example parents with high preferences for academic achievement are expected to locate in neighbourhoods where the school supply in abundant and of good quality, and are also those with children who have the best academic outcomes, and study the longest. Then the quantity, and quality of local school supply is not exogenous from schooling preferences.

Our contribution to the literature is twofold. First, the literature on school supply and schooling decisions mainly focuses on primary education, or higher education. Little is known about schooling decisions at the secondary level. We do think that looking at decisions at the end of middle school is important, especially in the case of France, where pupils make an important choice at the end of 9th grade. They can choose between vocational and general track, and this is also the first moment when they may drop out from school. This choice has long run consequences on both achieved level of schooling and labor market outcomes. Goux et al. (2015) show that getting more low achieving pupils to follow a vocational track after middle school leads to a significant and important reduction in grade repetition and high-school drop out for those at-the-margin students. Second, exogenous shocks in local school supply are rare, and difficult to observe. We rely on high school openings to highlight the constraint local school supply exerts on pupils' schooling decisions. We use exhaustive data on 9th grade pupils from 2007 to 2013. As we are able to precisely locate middle and high schools, we are able to observe whether a high school opened in the neighborhood of a given middle school a given year. A generalized difference in differences estimation allows us to make use of the variation in time and space of high school openings to identify the causal effect of a change in local school supply on the allocation of pupils at the end of middle school.

Our results show that opening a new high school significantly increases the probability to continue in higher secondary education, and reduces the probability of dropping out. The constrained pupils seem to be pupils who would like to follow a vocational track, and who are at-the-margin of passing the end-of-9th-grade exam.

The paper is organized as follows. We first describe the institutional context of track choices at the end of 9th grade, and the administrative process of opening a new high school. We then describe the data and the estimation strategy. Another section presents some descriptive statistics. Estimation results come in the last section and we conclude with a discussion.

1 Institutional Context

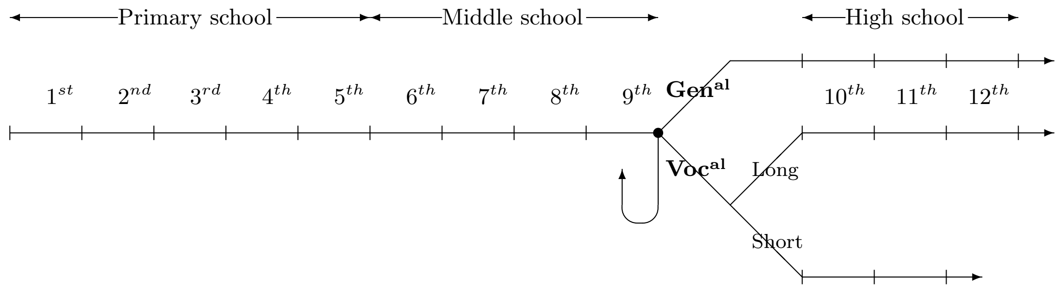
1.1 Track choice at the end of 9th grade

Education is compulsory in France from age 6 to age 16. Primary education lasts 5 years (from age 6 to age 10). Secondary education is divided between 4 years of lower secondary (from age 11 to age 14) in *collèges*, which are equivalent to middle schools, and 3 years of upper secondary (from age 15 to age 17) in *lycées*, equivalent to high schools.

At the end of middle school, pupils have to choose whether they would like to continue in a general or a vocational track (see Figure 1). In the general track, pupils study academic and technical subjects during three years to prepare for a general national exam (called *Baccalaurát*). The general *Baccalauréat* gives access to higher education. The vocational track provides a professional training. There are two types of vocational track. A two year track prepares for a professional certificate and a direct entry into the labor market as a skilled worker. A three year track prepares for a vocational *Baccalauréat* which gives access to highly qualified professions or to higher education.[1] At the end of middle school, pupils may also choose to drop out, or

[1]Both vocational tracks may be completed through a work-based training (apprenticeship).

Figure 1: Illustration of the French school system



to repeat 9th grade if their results are not sufficient to continue in high school.

The track choice procedure starts in January of 9th grade. Families have to choose between general track, vocational track, or repetition. At the end of the second term, the teaching staff responds to families' choices by providing temporary propositions of allocation. Before the end of the third and last term, families are asked to make a final choice. If their choice matches the school recommendation, the pupil is officially allocated to this track. If the school and the family disagree on the allocation, a meeting with the school headmaster is organised. If no agreement is reached at the end of the meeting, the family may resort to an appeal board. The decision of this board is final. However, whatever the decision, pupils are always free to choose to repeat 9th grade and go through the process again the next year.

After a decision about the track is made, pupils are allocated to high schools on the basis of a catchment area system. Each pupil has priority in the public general high school of her district according to where she lives. Pupils can go to another public high school through a special dispensation. If the number of dispensations exceeds the number of places in a given high school, the priority order is determined by the local education authority (*académie*) director. Allocation to a vocational high school is not based on the catchment area system, but on pupils' academic achievement. Another option is to go to a private high school, which is not subject to the catchment area system either.

1.2 Building new high schools

In France, the State and the three local authorities (*régions*, *départements*, and municipalities) share the responsibility for education. The State is responsible for defining the national curricula, delivering degrees, recruiting and paying teachers. *Régions* are responsible for high schools, meaning that they are responsible for the building, maintaining and functioning of high schools. *Départements* are responsible for middle schools. And municipalities are responsible for primary schools.

Deciding to build a new high school is a long process reflecting the sharing of responsibilities between these different entities. First, on a regular basis, regions have to plan their needs in terms of middle schools and high schools, based on the demographic situation in the region and the expected number of future pupils. Second, the representative of the State at the region level approves of the region's project. If a high school needs to be built, the regional assembly then votes to allow the building. The whole building process (from selecting a service provider to realization) often takes many years. The mean duration between the regional assembly vote and the delivery of a new high school is 5 years and the cost is between 20 and 60 million euros.

The process may be slightly different in the private sector since anyone can open a new private high school, though with prior notification to the local education officer (*recteur d'académie*). However, in France, almost all private schools are publicly-funded. They follow exactly the same national curriculum as public schools (except for religious education[2]) and prepare for the same national exams, their teachers are employed by the State and local authorities are in charge of their functioning, in the exact same way as for public schools. About 20% of secondary education pupils are enrolled in a private school. 98% of them go to a publicly-funded school.

2 Data

To analyze the effect of opening a new high school on pupils' school choice and academic achievement, we use exhaustive micro-level data provided by the statistical service of the French Ministry of Education, both at the pupil and school levels.

We use annual exhaustive individual data sets of French secondary education pupils (called "*fichiers anonymisés d'élèves pour la recherche et les études*" or FAERE). These annual databases are composed of every pupil enrolled in a secondary school every year[3]. In every cohort from 2007-2008 to 2013-2014 we focus on the 9th grade pupils enrolled in a middle school in France. Each of these pupils are observed in year t (the year of their 9th grade), and up to year t+4[4]. The data provide the school and track of each pupil, each year. We

[2]Most private schools (more than 95%) are Catholic schools.

[3]Until 2006, the data sets included only schools supervised by the ministry of Education. Since the ministry of Education is not responsible for apprenticeship, we do not observe apprentices before 2007. We nevertheless use the data sets before 2007 to identify new high schools.

[4]We follow pupils of the cohorts 2007 to 2010 for 4 years. The cohorts 2011 to 2013 could not be followed for that long. We so do not use them for the regressions as long term

know whether they are enrolled in a private or in a public school, whether it is a middle school or a high school, and whether it is a general or a vocational high school. For each pupil, we observe some socio-demographic characteristics: sex, age, origin, the family background through parents' occupations, and whether or not she benefit from a scholarship. Pupils' scores at the end of middle school national exam (*Brevet*) are also observed. In addition, each year we know whether the pupil graduates.

A second source of data comes from an exhaustive school-level panel data set, which provides information on every French school. Their postal address is known, so that we can observe their exact geographic location. The exact administrative date when they opened (and, if they ceased to exist, the date when they closed) is also observed.

Working with exhaustive data sets, we are able to identify, every year, high schools that appear for the first time in the data. For a given year t, a high school is considered as a new high school if some pupils are enrolled in that high school in year t while no pupil were enrolled in there the previous years. We also check that this year corresponds to the administrative date of opening. Moreover, a high school that appears only one year in the data set is not considered as an opening. As consequence, the last cohort of the data (2013) is excluded from the working sample because we cannot know if the openings observed that year are permanent or not.

A pupil is then considered as treated if a high school opened in her middle school's neighborhood the year of her 9th grade. The treatment is thus defined at the middle school level. We tried different definitions of whether a middle school is treated or not. First, only the closest middle school to each opening high school is considered as treated. Then treated schools are extended to the two closest - and the five closest - schools to each opening high school. Second, we used an alternative definition in which treated middle schools are those which neighborhood contains an opening high school. The neighborhood of a middle school is defined as the circle of radius r centered in the middle school, where r is equal to the median distance between the middle school and all high schools, weighted by the proportion of pupils going to each high school.

All these treatments are computed separately for different types of high schools. In France there are three types of high schools; those preparing for general tracks (*lycées généraux et technologiques* or LGT), those offering vocational tracks (*lycées professionnels* or LPR), and those providing both general and vocational tracks (called *lycées polyvalents*, hereafter LPO). Vocational

outcomes are missing.

high schools are less numerous and have a larger area of influence. Pupils going to a vocational high school have an average distance from middle school to high school of about 20 km, compared to 14 km for pupils attending a general high school. Thus we need to compute separate distances and treatments.

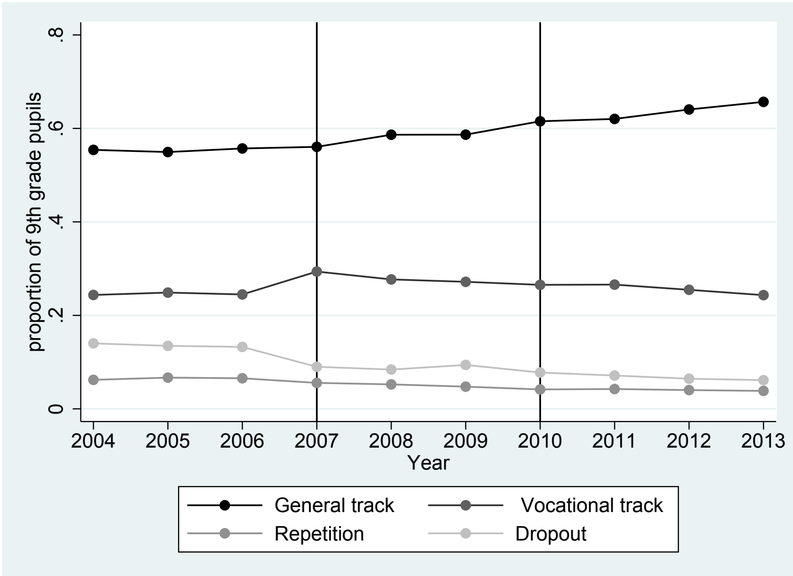
These definitions may be ranked from the more conservative (i.e. only the closest school is treated) to the less conservative (i.e. all schools with a new high school within their radius are treated). According to the first definition, there are as much treated middle schools as opening high schools; with the second definition, there are two treated schools for every new high school; with the third definition, there are five treated schools for every new high school; in the last case, there are about 22 treated schools for every new high school on average.

3 Descriptive Statistics

The main sample consists of more than 3 million 9th grade pupils, in about 8 000 middle schools, evenly distributed over the 4 cohorts (2007 to 2010). Among them, 57% continue in the general track, 29% go to the vocational track and 5% repeat 9th grade. The remaining 9% dropout. The share of pupils who follow the general track is slightly increasing from 2007 to 2010 (Figure 2). The share of pupils repeating 9th grade or dropping out is stable over the same period while the share of students pursuing a vocational track is slightly decreased.

67 new high schools opened in France over the period (Table 1). They represent about 2% of almost 4 000 high schools. 39 were public schools and 28 were private schools. 25 were general high schools, 15 were vocational high schools and 27 were high schools providing both vocational and general tracks. On average, around 8 new high schools opened every year over the period. Figure 3 shows the locations of these new high schools. They are located in municipalities with about 160 000 inhabitants on average, compared to municipalities with an average of 180 000 inhabitants for pre-existing high schools. According to Table 2, 5 new high schools are located in rural municipalities, they represent 8% of new high schools, compared to 2% of pre-existing high schools being in rural areas. 24 new high schools opened in large cities with more than 200 000 but less than 2 million inhabitants, it represents 37% of opening high schools, compared to 26% of pre-existing high schools. Thus, with respect to pre-existing high schools, new high schools seem to open more often in very small or very big municipalities. To control for this, we will use the panel nature of the data. As explained later, because schools are observed at many points in time, we do not need high schools to appear randomly on

Figure 2: Tracks followed by students the year after 9th grade



Source: FAERE data set, 9th grade pupils cohorts from 2004-2005 to 2012-2013.

the territory.

On average, between 9 and 179 middle schools are treated each year, depending on the definition of treatment (Table 3). The first column of Table 3 shows that there are one more closest treated middle schools than opening high schools, because tow middle schools are located at the exact same distance to a new high school[5].

In the 2007 to 2010 cohorts, about 33 000 pupils are enrolled in a new high school, that is, about 1.3% of pupils. Within treated middle schools, the share of pupils enrolling in a new high school the year when it opens varies between 8% on average, if we consider the median radius treated schools, and 30% on average, if we consider the closest treated schools (Figure 4). On average every year, the 9th grade pupils of a given middle school will end up in 15 different high schools. We would then expect a new high school to attract on average 7% of a cohort.

[5]These schools belong to a *cité scolaire*, i.e. a unit consisting of at least two public schools, which share the same premises.

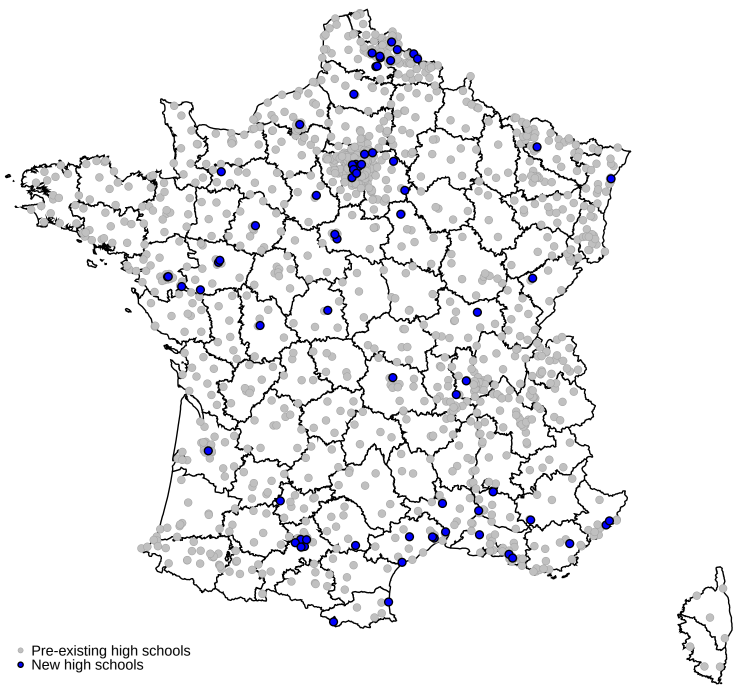
Table 1: High schools openings in the sample by year and type

		Number of opening high schools				
	Total	Public	Private	LGT	LPO	LPR
2007	10	8	2	4	3	3
2008	11	8	3	2	7	2
2009	12	5	7	7	2	3
2010	8	5	3	5	2	1
2011	13	6	7	6	5	2
2012	13	7	6	1	8	4
Total	67	39	28	25	27	15
Mean over the period	11	7	5	4	5	3

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2012-2013.

Note: LGT stands for general high schools, LP for vocational high schools and LPO are high schools that provide both vocational and general tracks.

Figure 3: High school openings in mainland France and Corsica (2007-2012)



Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2012-2013.

Note: Only mainland France and Corsica are shown on the map although the analysis also includes overseas departments.

Table 2: Types of municipalities where high schools are located

New high school	0		1	
	Freq	%	Freq	%
Municipality size				
Rural	84	2.1	5	7.7
< 5 000	163	4.1	2	3.1
< 10 000	306	7.8	5	7.7
< 20 000	402	10.2	6	9.2
< 50 000	497	12.6	6	9.2
< 100 000	471	11.9	7	10.8
< 200 000	369	9.4	3	4.6
< 2 million	1,041	26.4	24	36.9
Paris	613	15.5	7	10.8

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2012-2013.

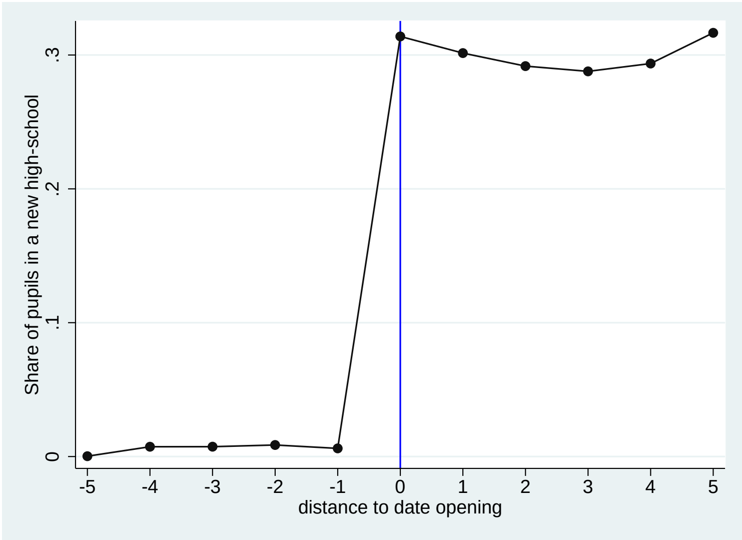
Note: Mayotte is excluded from this table which explain a smaller number of openings than in Table 1.

Table 3: Treated middle schools in the sample by year and definition of treatment

	Number of treated middle schools			
	1st closest	2 closest	5 closest	Median
2007	11	21	51	239
2008	11	22	55	241
2009	12	24	60	192
2010	8	16	40	116
2011	13	26	66	349
2012	13	26	65	318
Total	68	135	337	1,455
Mean over the period	11	23	55	238

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2012-2013.

Figure 4: Share of pupils entering a new high school



Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2012-2013.

4 Estimation strategy

We consider a model of repeated cross sections in which successive cohorts of 9th grade pupils are observed every year from 2007 to 2010 in S middle schools. Let Y_{ist} be the outcome for pupil i enrolled in middle school s in year t. Y can be the track pupil i is following in year $t+1$. We consider the following equation:

$$Y_{ist} = \alpha + \beta T_s \times \mathbb{1}\{t \geq t_s\} + \gamma' X_{it} + \sum_{t=2007}^{2009} \delta_t \mathbb{1}_t + \sum_{s=1}^{S-1} \mu_s \mathbb{1}_s + \varepsilon_{ist} \qquad (1)$$

T_s is the treatment variable with value 1 if middle school s is treated and 0 otherwise. $\mathbb{1}\{t \geq t_s\}$ equals 1 for the years following the first year a new high school opened in the neighborhood of middle school s and 0 otherwise[6]. X_{it} is a vector of pupil i's characteristics. The model includes year fixed effects, $\mathbb{1}_t$, that account for the evolution in time of track choices over the period 2007 to 2010. The middle school fixed effects control for the heterogeneity in ability and preferences across schools. The parameter of interest is β. It measures the effect of opening a new high school in the neighborhood on pupils' chosen track

[6]For the treatment definition based on the median of distance, some middle schools are treated twice over the observational period. In that case, we excluded observations from the year of the second opening, i.e. for these schools, $\mathbb{1}\{t \geq t_s\}$ equals 0 for the years before the first opening, 1 after the first opening, and missing starting form the year of the second opening.

(and additional outcomes) at the end of 9th grade. Note that the parameters β do not depend on t, meaning that we suppose the effect of the treatment to be the same whatever the date when it intervenes.

The β parameter is estimated by ordinary least squares in equation (1). This estimator is equivalent to the generalized difference in differences estimator (Bertrand et al., 2004; Hansen, 2007). It uses both the time and school dimensions and so accounts for potential selection into the treatment and for time trend. The middle school fixed effects control for the possibility that treated schools have unobserved characteristics correlated with high school openings. This means that high school openings need not to be exogenous events. The year fixed effects control, for instance, for the increase in the share of pupils following a general track over the period of observation.

Let us clarify what are the treated and control groups in our analysis. We consider treated every pupil enrolled in a middle school that is treated over the period 2007 to 2010. As discussed in section 2, we have 4 different definitions of treatment. Our main one being to consider as treated only the middle school closest to the newly opened high school. The control group is composed of pupils in middle schools that are not treated in 2007 to 2010 but will be treated in the period 2011 to 2013. We choose this control group because we believe 'treated to be' middle schools to be more comparable to treated middle school than middle schools that are not to be treated before a long time.

The difference in differences estimator relies on the assumption of common trend between the treated and the control groups. This assumption means that, if no high school opening had occurred, pupils' track choices would have evolved in the same way in treated middle schools and in non treated ones. This hypothesis cannot be tested directly, but the observation of the evolution in track choices in both treated and control schools before the treatment is informative. Indeed, if pupils' track choices in both groups followed a common trend before the treatment, then assuming they would have continue to evolve in similar ways if the treatment had not occurred is a credible assumption.

In our case, the period before (or after) treatment is not the same for every middle school, since new high schools may open each year. Thus, we cannot compare the treated and control groups before treatment. But we can divide the treated group (i.e schools such that $T_s = 1$) into sub-groups, according to the year of treatment. Note that we use the more conservative definition of the treatment (only the closest middle school to a newly opened high school is treated). For every possible year t of treatment, Figure 5 presents the evolution in the proportion of pupils allocated to the vocational track and the evolution of the proportion of pupils dropping out of school at the end of 9th grade until that date, both in the control and treatment groups. Overall, the graphs

Table 4: Heterogeneous trend test

Variable	F-test p-value
In a new high school	0.160
Go to high school	0.261
General Track	0.456
Vocational Track	0.456
Repetition	0.148
Dropout	0.889
Get a diploma later (Brevet included)	0.000
Get a diploma later (Brevet excluded)	0.000

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2012-2013.

are inconclusive with wide confidence intervals. We thus decided to make an additional test by including heterogeneous trends in the model: a trend for each group of treated middle schools, each group being characterized by the date of treatment. The model becomes:

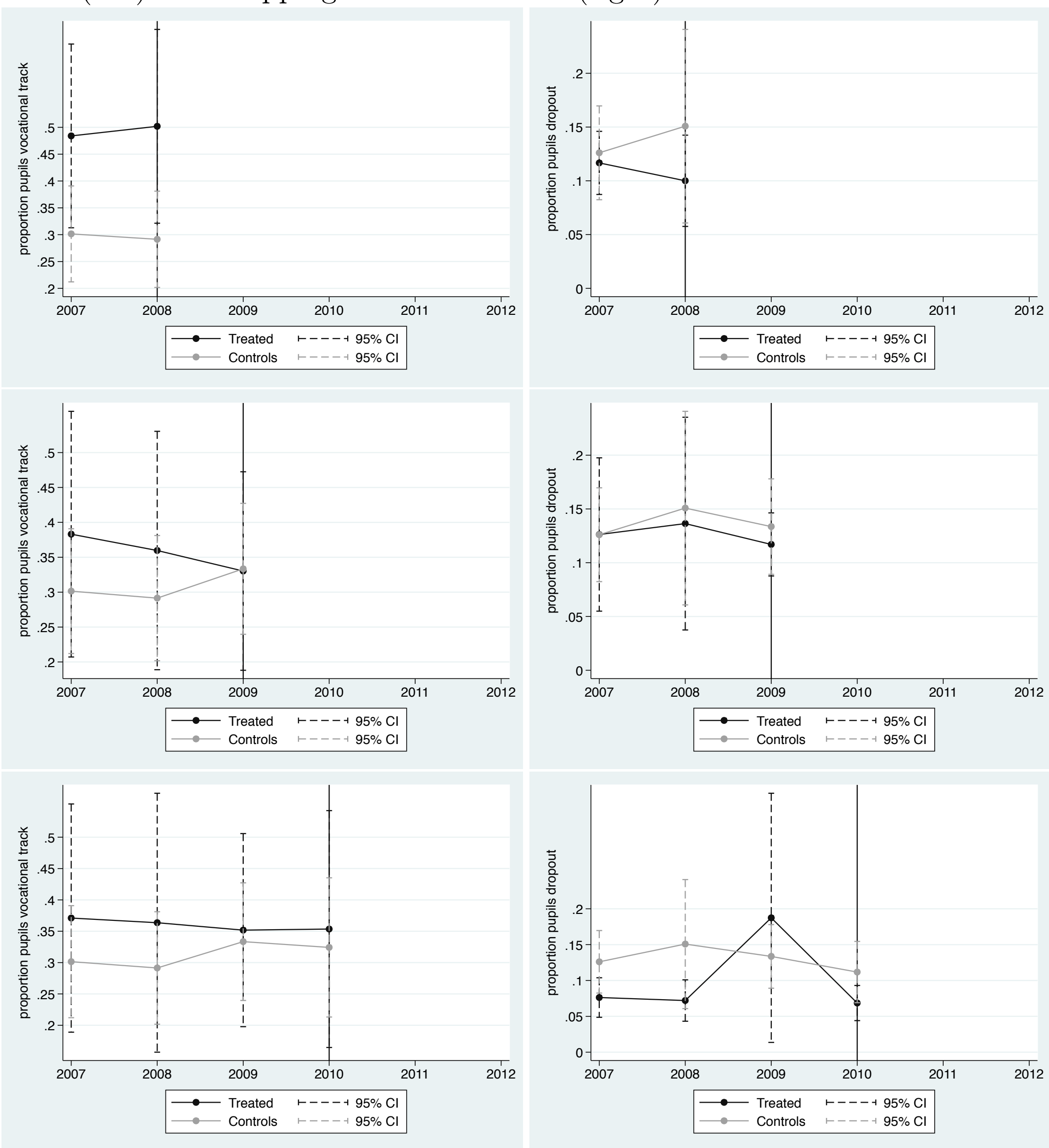
$$Y_{ist} = \alpha + \beta T_s \times \mathbb{1}\{t \geq t_s\} + \gamma' X_{it} + \sum_{t=2007}^{2008} \delta_t \mathbb{1}_t + \sum_{s=1}^{S-1} \mu_s \mathbb{1}_s + \sum_{g=2007}^{2009} \eta_g t + \varepsilon_{ist} \quad (2)$$

with g representing a specific group of treated middle schools (those treated in 2007, 2008, or 2009). A necessary condition for the common trend to hold is that a F-test should not reject the joint nullity of η_g's. Table 4 shows the result of the F-test for each outcome. The common trend assumption does not seem to hold for the longer term outcome (completing a degree in the 4 years following the observation year). Specification (2) is thus our favored specification.

Another source of bias may be due to changes in the composition of the neighborhood just before treatment, that are due to treatment. First, it could be that some parents anticipated the opening of a new high school and had their child change middle school just before the opening. If such children have unobserved characteristics correlated to preferences over tracks, then we would observe a discontinuity in allocations just before the treatment (Ashenfelter *dip*) and the common trend assumption would not hold. Second, regions may anticipate a change in pupils' preferences and decide to open a new high school to satisfy the new preferences. As we have seen, the process of opening a new high school is a long one, so that the two situations discussed here are very unlikely. As a test, we can compare the composition of schools just before and after the date of opening. Figure 6 presents the evolution of treated schools 9th grade cohorts composition, before and after the treatment, with respect to observable characteristics in the data, namely the proportion of boys, the proportion of each parental occupation, the proportion of pupils born in France and the proportion of pupils benefiting from a scholarship. There is no significant discontinuity in the composition of 9th grade cohorts around the date of treatment.[7]

[7] For a more formal test of a change in treated middle schools' composition the year of the treatment, see Section 5.2.

Figure 5: Evolution of the proportion of pupils allocated to the vocational track (left) and dropping out of education (right)

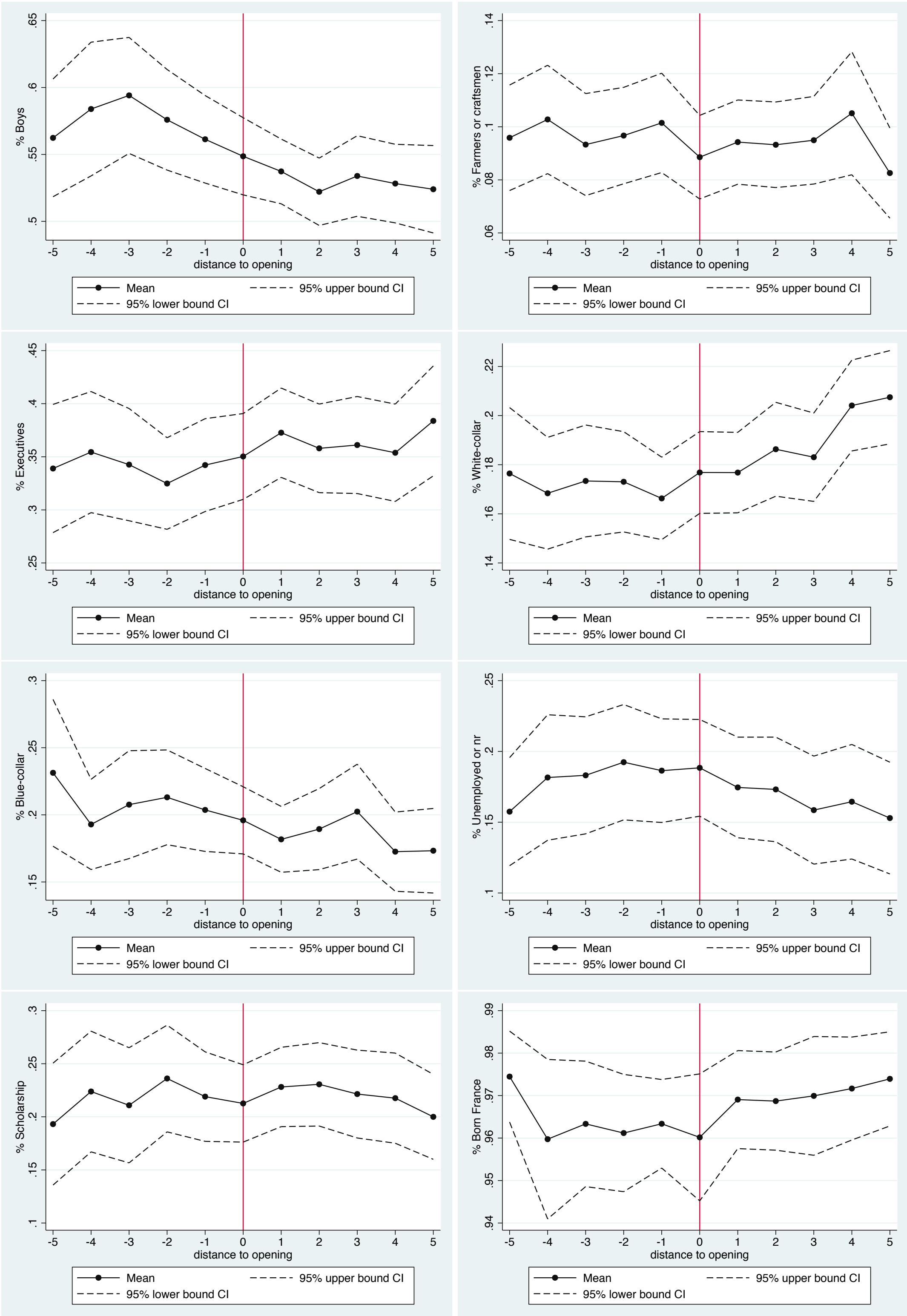


Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: Dashed lines represent 95% confidence intervals.

Lecture: Each graph plots the proportion of pupils going to the vocational track (left column) or dropping out of school (right column) in treated middle schools (in black), and in non treated middle schools (in gray).

Figure 6: Evolution of the composition of treated schools before and after an opening



Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Lecture: The first graph gives, on the y-axis, the proportion of boys every year in treated middle schools, with respect to the distance to treatment on the x-axis.

5 Results

5.1 Main Results

Table 5 presents the estimates of the generalized difference in differences model presented in equation (2) on eight outcomes: going to a newly opened high school, going to high school, either by attending a general track, or by attending a vocational track; repeating 9th grade; dropping out and getting a degree in the four year following the first observational year (*Brevet* included then excluded). $T(t \geq t_s)$ represents the treatment dummy, and the corresponding estimated coefficient measures the average effect of opening a new high school in treated middle schools' neighborhoods. The treatment is differentiated according to the type of high school. For the moment, we present the results only for the closest treated middle schools.

Note that we only consider the opening of public high schools here. Because the opening of a private school may be a very specific process, identifying assumptions are less likely to hold in that case. The appendix in section 8 looks at the openings of private high schools, and shows that the results are inconclusive and call for more investigations.

The opening of a new general high school (LGT) has little significant effect on the allocation of pupils of the closest middle school with a 0.04 significant decrease in the probability for pupils to drop out after 9th grade. Opening a high school providing both general and vocational tracks (LPO) has a similar effect to opening LGT. The probability of dropping out is significantly reduced by 0.03. Opening a vocational high school (LPR) however significantly impacts pupils allocation. The probability of going to high school is significantly increased by 7 percentage points from 84% to 92%. This comes with a significant decrease in the probability of dropping out from 0.11 to 0.04. These results are driven by a significant increase of 11 percentage points (from a starting point of 34%) in the probability for pupils to continue in a vocational track. No type of high school opening seems to significantly have a long term impact as the effect on the probability to complete a degree after middle school is insignificant for the three types of high school. The main specification accounts for the following controls: sex, parents' occupation, scholarship status and achievement at the Brevet exam. The effects discussed above hold when covariates are excluded with one exception. In the regression without covariates, the opening of vocational high schools (LPR) has a significant positive impact on the probability of completing a degree after the first year of observation (see Table 6).

To consolidate these findings, we test for the validity of the results with respect to the definition of treated middle schools. Tables 11 and 12 in the appendix section 7 give the results when the two - respectively five - closest middle schools are considered as treated. Reassuringly, the effects are qualitatively exactly similar. Only the effects are less significant. As expected, the less conservative the definition of treatment, the smaller the average treatment effects. Significant effects remain for vocational high schools opening, confirming the general message we get from the results in Table 5. To go further, Table 13 presents the results when the median distance from middle schools to high schools is used to define treatment. The results are very similar to those we observed on the closest middle school to the newly opened high school when it is a LPO or a LPR. Surprisingly, newly opened LGT have a significant negative impact on students of treated middle schools in this specification. The probability of going to high school is reduced, the probability of dropping out is increased and the probability of completing a degree is decreased.

To sum up, our results first show that opening a new high school reduces the probability for pupils to drop out of school. This suggests that individuals are constrained by local school supply, and that they would continue in higher secondary education if this constraints was alleviated. A second and very robust result is that the effect is driven by pupils who follow a vocational track, meaning that the pupils who are constrained are those who would follow a vocational track, but repeat or drop out instead. Alleviating a supply constraint by opening a new high school allows these pupils to continue in high school.

The affected pupils thus seem to be those pupils who do not perform well enough to access the general track but may continue in the vocational track if offered a place that matches their preferences. The observed effects may then be explained by three different mechanisms. First, opening a new high school may result in a quantitative increase in the number of vocational track positions offered. The number of pupils offered a position in vocational track will then increase and as some of them will accept the position, the probability for a pupil to continue in secondary education increases too. Second, opening a new high school may introduce new specialties of vocational studies in the neighborhood of the pupils. Some pupils who may not have been interested in vocational studies before may then find interest in the curriculum. Third, the opening of a new high school that offers vocational tracks is likely to significantly reduce the distance between the pupils and the institution offering them a vocational track. This may result in more pupils accepting to join a vocational program. We plan on investigating those different scenarios by looking at the impact of opening a new high school on both the distance to the closest high school offering a vocational track and the theoretical number of vocational places available in high schools.

If the local school supply matters for schooling decisions such as track choices, then opening a new high school is likely to have differentiated effects depending on the *ex-ante* school supply size.

To see whether the effect differs with respect to the size of local high school supply, we constructed a variable approximating each middle school's "potential" supply. More precisely, for every middle school, and every year, we computed the number of high schools (excluding new high schools), weighted by the distance to the middle school. This was calculated separately for each type of high school, so that every middle school has a measure of private high school potential supply, general high school potential supply, vocational high school potential supply, etc. Then the treatment variable was interacted with a dummy which equals one if the treated school lies within the top half of the distribution of potential supply, and zero otherwise. The idea is to analyze whether the impact of opening a new high school is higher in neighborhoods where the supply is relatively low (i.e. below the median).

Table 7 gives the results of the effect of opening a new high school interacted with the private high school potential supply measure. First notice that, as there is only one vocational high school opening in an area with a high density of private schools, we are not able to recover a coefficient for that type of openings. The opening of a new LPO high school is not affected by the size of local private supply. The effect of opening a new general school (LGT), on the other hand, differs with respect to the number of potential private high schools. Opening a new LGT high school has a positive impact when in neighborhood with few private schools. In those neighborhoods, the probability of accessing high school is increased by 12 percentage points. The probability of dropping out is reduced, and in a smaller measure is the probability of repetition. The probability of completing a degree in the four years following the first of observation are also increased. Surprisingly pupils following vocational tracks seem to be those driving the effects (at least on short term outcomes) as the effect on the probability of continuing in a vocational track is significantly positive as opposed to the probability of continuing in a general track that remains unaffected. As for the impact of opening an LGT on neighborhoods with an important supply of private high school, it is all the reverse: drop out is increased, access to high schools is decreased no matter the track and the probability of degree completion is also reduced. Both opposite dynamics on the two subgroups result in the non significant results observed in Table 5.

Because the *Ile de France* region is characterized by a larger and more diverse school supply than other regions, we estimated separate effects for this particular region. Over the 67 new high schools, 10 opened in *Ile de France* over the period, among them, 5 were public high schools. Note that no public vocational high school opened in *Ile de France* over the period, so that we cannot identify an effect. Table 8 presents the results distinguishing openings that occurred in *Ile de France* (idf=1) from other high school openings.

The effects are robust to the exclusion of *Ile de France*. While hardly significant elsewhere, the opening of LPO has a positive impact on pupils from *Ile de France*. Their probability of continuing in high school is increased, their probability of dropping out or of repeating are decreased, and they are more likely to complete a degree in the four years following the first year of observation. Public high school openings in *Ile de France* seems slightly more effective in reducing drop outs than elsewhere. However, the number of openings in *Ile de France* being very small, we should be cautious about those results.

To test for the assumption that the affected pupils are those who do not perform well enough to access the general track but may continue in the vocational track if offered a place that matches their preferences, we divide 9th grade pupils into 6 groups, depending on their situation relative to the end of middle school exam or *Brevet*. The first group is composed of those pupils that did not register for the exam. Pupils who failed the exam form the second group. The last groups are composed of pupils who passed the exam, separated by score: those with less than 12/20, those with 12 to 14, those with 14 to 16, those with 16 or more. Tables 9 and 10 present the heterogeneous effects of opening new high schools by pupils' test scores. Unsurprisingly, the bottom part of Table 9 shows that higher achieving pupils are more likely to follow a general track and to complete a higher degree that *Brevet*. Less able pupils on the other hand are less likely to follow a general track, more likely to go into vocational studies and less likely to get a degree later.

The remaining of the tables shows that the opening of vocational programs is still the most effective in changing students allocation and achievement. More interestingly, the effect is mainly focused on less achieving students. The results are thus in line with our comments made earlier.

5.2 Robustness

The common trend assumption requires that, in the absence of treatment, treated schools would not have evolved differently from control schools. Although this hypothesis is impossible to test directly, we can check the robustness of our results to some changes in the specification of the model.

We tested for a change in the social composition of treated schools at the exact date of the opening of a new high school. As explained earlier, we need the school composition to have not change just before the treatment, so that we would not be able to separate the treatment effect from a modification of the treated population. To formally test this, we regressed equation (2) on the observable social characteristics: sex; parents' occupation; birthplace and scholarship status. Table 15 in the appendix gives the results. Overall, we see no discontinuity in the social composition of treated schools the year of the treatment. There only is a significant increase in the share of boys, and a significant decrease in the share of pupils with a scholarship for vocational high school openings.

Table 5: DID estimates of the effect of opening a new high school on track choice - Main specification

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.229	0.021	-0.011	0.032	0.020	-0.041**	-0.011	-0.012
	(0.142)	(0.023)	(0.035)	(0.022)	(0.015)	(0.019)	(0.023)	(0.020)
T(t >= ts) LPO	0.374***	0.028	0.001	0.027	0.001	-0.029**	0.023	0.027
	(0.084)	(0.017)	(0.017)	(0.021)	(0.013)	(0.012)	(0.022)	(0.022)
T(t >= ts) LPR	0.182***	0.072***	-0.037	0.109***	-0.009	-0.064***	0.007	0.013
	(0.056)	(0.020)	(0.029)	(0.017)	(0.014)	(0.014)	(0.014)	(0.013)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.44	0.12	0.46	0.30	0.06	0.10	0.17	0.18
Nbr obs	11,842	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 6: DID estimates of the effect of opening a new high school on track choice - without covariates

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.230	0.025	-0.008	0.033	0.021	-0.046**	-0.006	-0.008
	(0.141)	(0.021)	(0.035)	(0.023)	(0.015)	(0.019)	(0.023)	(0.022)
T(t >= ts) LPO	0.376***	0.034*	0.017	0.017	-0.001	-0.033**	0.034	0.038
	(0.085)	(0.018)	(0.024)	(0.023)	(0.013)	(0.013)	(0.023)	(0.024)
T(t >= ts) LPR	0.191***	0.091***	0.017	0.074***	-0.017	-0.074***	0.036*	0.047**
	(0.057)	(0.017)	(0.022)	(0.018)	(0.013)	(0.012)	(0.021)	(0.020)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.43	0.03	0.10	0.12	0.01	0.03	0.05	0.05
Nbr obs	11,842	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 7: DID estimates of the effect of opening a new high school depending on local private supply

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.638***	0.116***	0.027	0.089***	0.028*	-0.143***	0.095***	0.077***
	(0.082)	(0.026)	(0.032)	(0.031)	(0.015)	(0.017)	(0.018)	(0.018)
T(t >= ts) LPO	0.540***	0.034	0.019	0.015	0.004	-0.038**	0.024	0.029
	(0.088)	(0.021)	(0.023)	(0.031)	(0.013)	(0.018)	(0.031)	(0.032)
T(t >= ts) LPR	0.195***	0.072***	-0.035	0.107***	-0.009	-0.063***	0.005	0.011
	(0.066)	(0.022)	(0.030)	(0.018)	(0.014)	(0.015)	(0.014)	(0.013)
T(t >= ts) LGT × MP Pri high	-0.474***	-0.117***	-0.045***	-0.072***	-0.010	0.127***	-0.131***	-0.111***
	(0.077)	(0.020)	(0.016)	(0.018)	(0.010)	(0.013)	(0.014)	(0.014)
T(t >= ts) LPO × MP Pri high	-0.342*	-0.011	-0.038	0.027	-0.006	0.017	0.000	-0.002
	(0.194)	(0.029)	(0.029)	(0.028)	(0.015)	(0.023)	(0.025)	(0.027)
T(t >= ts) LPR × MP Pri high	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.46	0.12	0.46	0.30	0.06	0.11	0.17	0.18
Nbr obs	11,842	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 8: Separate estimates of the effect of opening a new high school for Ile de France

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.261*	0.016	-0.014	0.029	0.019	-0.035	-0.012	-0.014
	(0.151)	(0.025)	(0.038)	(0.023)	(0.016)	(0.021)	(0.025)	(0.022)
T(t >= ts) LPO	0.397***	0.020	-0.003	0.023	0.005	-0.025	0.018	0.022
	(0.098)	(0.016)	(0.015)	(0.023)	(0.011)	(0.015)	(0.024)	(0.024)
T(t >= ts) LPR	0.179***	0.071***	-0.038	0.109***	-0.007	-0.064***	0.005	0.011
	(0.061)	(0.019)	(0.028)	(0.018)	(0.013)	(0.015)	(0.015)	(0.014)
T(t >= ts) LGT × IdF	-0.346*	0.058*	0.027	0.030	0.002	-0.060**	0.021	0.025
	(0.177)	(0.031)	(0.037)	(0.024)	(0.016)	(0.027)	(0.026)	(0.025)
T(t >= ts) LPO × IdF	-0.193	0.066***	0.037**	0.029*	-0.027**	-0.038**	0.045**	0.042**
	(0.140)	(0.024)	(0.017)	(0.017)	(0.011)	(0.018)	(0.018)	(0.017)
T(t >= ts) LPR × IdF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.44	0.12	0.46	0.30	0.06	0.10	0.17	0.18
Nbr obs	11,842	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 9: Separate estimates of the effect of opening by level of achievement at the *Brevet* exam

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT × 16/20 or more	0.364**	0.057	0.011	0.046	-0.001	-0.057	-0.025	-0.026
	(0.161)	(0.036)	(0.057)	(0.032)	(0.016)	(0.039)	(0.030)	(0.029)
T(t >= ts) LGT × 14 to 16/20	0.405**	0.057**	0.047	0.010	-0.001	-0.056***	-0.006	-0.005
	(0.163)	(0.024)	(0.036)	(0.022)	(0.017)	(0.021)	(0.028)	(0.028)
T(t >= ts) LGT × 12 to 14/20	0.352**	0.023	0.045	-0.022	0.004	-0.027	-0.032	-0.031
	(0.162)	(0.023)	(0.043)	(0.032)	(0.015)	(0.019)	(0.024)	(0.023)
T(t >= ts) LGT × 10 to 12/20	0.125	-0.020	-0.088*	0.068**	0.055***	-0.035	-0.012	-0.015
	(0.130)	(0.034)	(0.047)	(0.026)	(0.020)	(0.023)	(0.024)	(0.024)
T(t >= ts) LGT × Fail	-0.164	0.025	-0.013	0.038	0.003	-0.028	0.033	0.023
	(0.120)	(0.038)	(0.055)	(0.041)	(0.026)	(0.035)	(0.037)	(0.026)
T(t >= ts) LGT × Not registered	0.038	0.122**	0.104*	0.018	-0.021	-0.101*	0.021	0.028
	(0.145)	(0.057)	(0.057)	(0.059)	(0.022)	(0.053)	(0.100)	(0.098)
16/20 or more	-0.004	0.093***	0.432***	-0.339***	-0.065***	-0.028	0.220***	0.226***
	(0.010)	(0.020)	(0.039)	(0.028)	(0.007)	(0.018)	(0.021)	(0.020)
14 to 16/20	-0.006	0.103***	0.412***	-0.309***	-0.064***	-0.039***	0.212***	0.216***
	(0.009)	(0.016)	(0.031)	(0.024)	(0.007)	(0.013)	(0.020)	(0.020)
12 to 14/20	-0.002	0.091***	0.319***	-0.228***	-0.058***	-0.033***	0.155***	0.158***
	(0.006)	(0.014)	(0.031)	(0.028)	(0.006)	(0.012)	(0.015)	(0.015)
10 to 12/20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Fail	-0.004	-0.194***	-0.407***	0.213***	0.089***	0.105***	-0.208***	-0.251***
	(0.006)	(0.014)	(0.027)	(0.027)	(0.009)	(0.011)	(0.019)	(0.017)
Not registered	-0.021	-0.258***	-0.267***	0.009	-0.015	0.273***	-0.284***	-0.287***
	(0.016)	(0.035)	(0.050)	(0.038)	(0.011)	(0.035)	(0.029)	(0.029)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.48	0.13	0.46	0.30	0.07	0.11	0.17	0.18
Nbr obs	11,842	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.
Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 10: Separate estimates of the effect of opening by level of achievement at the *Brevet* exam (continued)

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LPO × 16/20 or more	0.421***	0.021	0.019	0.002	0.012	-0.033	0.042	0.042
	(0.117)	(0.025)	(0.046)	(0.032)	(0.015)	(0.020)	(0.029)	(0.030)
T(t >= ts) LPO × 14 to 16/20	0.458***	0.003	-0.022	0.024	0.019	-0.021	0.017	0.017
	(0.106)	(0.022)	(0.026)	(0.032)	(0.015)	(0.018)	(0.025)	(0.025)
T(t >= ts) LPO × 12 to 14/20	0.456***	-0.010	-0.034	0.023	0.019	-0.008	0.016	0.016
	(0.094)	(0.026)	(0.029)	(0.037)	(0.014)	(0.020)	(0.025)	(0.026)
T(t >= ts) LPO × 10 to 12/20	0.370***	0.010	0.027	-0.017	0.004	-0.013	0.012	0.013
	(0.086)	(0.022)	(0.028)	(0.032)	(0.014)	(0.016)	(0.024)	(0.023)
T(t >= ts) LPO × Fail	0.278***	0.090***	0.036	0.054	-0.037*	-0.054***	0.040	0.058*
	(0.099)	(0.028)	(0.035)	(0.043)	(0.020)	(0.017)	(0.030)	(0.032)
T(t >= ts) LPO × Not registered	0.172**	0.089**	-0.057	0.146***	0.007	-0.096***	0.043	0.049
	(0.084)	(0.040)	(0.045)	(0.044)	(0.021)	(0.031)	(0.056)	(0.056)
T(t >= ts) LPR × 16/20 or more	-0.014	0.062*	-0.047	0.109*	-0.024	-0.038	-0.043	-0.041
	(0.068)	(0.036)	(0.055)	(0.057)	(0.022)	(0.025)	(0.041)	(0.040)
T(t >= ts) LPR × 14 to 16/20	0.013	0.006	-0.067	0.073	-0.012	0.006	-0.071*	-0.069**
	(0.059)	(0.052)	(0.059)	(0.065)	(0.030)	(0.032)	(0.036)	(0.034)
T(t >= ts) LPR × 12 to 14/20	-0.025	0.019	-0.047	0.066	0.005	-0.024	-0.022	-0.029
	(0.061)	(0.053)	(0.079)	(0.092)	(0.032)	(0.033)	(0.038)	(0.037)
T(t >= ts) LPR × 10 to 12/20	0.139***	0.067***	-0.019	0.086**	0.004	-0.071***	0.012	0.010
	(0.051)	(0.020)	(0.041)	(0.034)	(0.015)	(0.017)	(0.020)	(0.021)
T(t >= ts) LPR × Fail	0.344***	0.137***	0.012	0.125***	-0.049***	-0.087***	0.034	0.063***
	(0.066)	(0.028)	(0.041)	(0.035)	(0.016)	(0.021)	(0.022)	(0.019)
T(t >= ts) LPR × Not registered	0.402***	-0.013	-0.173***	0.160**	0.019	-0.005	-0.046*	-0.048*
	(0.065)	(0.047)	(0.049)	(0.067)	(0.016)	(0.044)	(0.025)	(0.025)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.48	0.13	0.46	0.30	0.07	0.11	0.17	0.18
Nbr obs	11,842	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.
Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

6 Conclusion

This paper aims at analyzing the causal effect of a change in local school supply on pupils track choice at the end of lower secondary education. We take advantage of high school openings to highlight the constraint school supply exerts on individual schooling choices. We use an exceptionally rich data set in which we observe every pupil enrolled in 9th grade in mainland France every year from 2004 to 2013. From the data, we recover the information about new high schools each school year. A model of generalized difference in differences makes use of the variation in time and location of opening high schools to identify the causal effect of a change in local school supply on the allocation of pupils at the end of middle school.

We show that pupils are constrained by the local school supply since opening a new high school increases the proportion of pupils who continue in upper secondary education. This is due to pupils who go to a vocational track. The effect is driven by the opening of vocational high schools that induce in increase of around 7 percentage point in the probability to continue in high school. This increase comes with a decrease in the share of dropouts. Those results are robust to various definitions of the treated group. They do not depend on the availability of private high schools in the neighborhood of the middle school. They also seem to be driven by low achieving pupils. Following the results of Goux et al. (2015), our findings suggest that opening new high school that offer vocational tracks may improve pupils' achievement for at-the-margin pupils.

The magnitude of the effect seems important but is not easy to compare to the existing literature. First, the effect of opening a new school varies a lot across studies and countries. For instance, building a new school increases the primary education enrollment rate by 0.3 percentage point in Mozambique (Handa, 2002) and by 35 to 52 percentage points in Afghanistan (Burde and Linden, 2013). Furthermore, the expected magnitude is of course not to be the same in developing and in developed countries. Second, we don't expect to find the same magnitude in primary and in secondary education. Third, to our knowledge, there is no pre-existing study of the effect of opening a new school on enrollment in upper secondary education. Dickerson and McIntosh (2013) setting is very similar to ours, although they look at the effect of distance to education institutions on post-compulsory secondary education, and not that of the opening of a new school.

These preliminary results call for further investigation of the type of constraint pupils are facing. We would like to look first at the impact of the new openings on the distance to high school and more specifically the distance to high schools offering a vocational program. We anticipate a significant reduction of those distances and would like to look at the effect of these reductions on the allocation of students. In this work we focused on public openings but we intend to investigate private openings in future version. A preliminary look at the impact of opening private high school shows their impact differs from that of opening public high school.

References

Barrow, L. (2002). School choice through relocation: evidence from the washington, dc area. *Journal of Public Economics 86*(2), 155–189.

Bayer, P., F. Ferreira, and R. McMillan (2007). A Unified Framework for Measuring Preferences for Schools and Neighborhoods. *Journal of Political Economy 115*(4), 588–638.

Bertrand, M., E. Duflo, and S. Mullainathan (2004, Feb). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics 119*(1), 249–275.

Burde, D. and L. Linden (2013). "Bringing Education to Afghan Girls: A Randomized Controlled Trial of Village-Based Schools". *American Economic Journal: Applied Economics 5*(3), 27–40.

Chumacero, R. A., D. Gómez, and R. D. Paredes (2011). I would walk 500 miles (if it paid): Vouchers and school choice in chile. *Economics of Education Review 30*(5), 1103–1114.

Deming, D. J., J. S. Hastings, T. J. Kane, and D. O. Staiger (2014). School choice, school quality, and postsecondary attainment. *American Economic Review 104*(3), 991–1013.

Dickerson, A. and S. McIntosh (2013). "The Impact of Distance to Nearest Education Institution on the Post-compulsory Education Participation Decision". *Urban Studies 50*(4), 742–758.

Duflo, E. (2001, Sep). Schooling and labor market consequences of school construction in Indonesia: Evidence from an unusual policy experiment. *American Economic Review 91*(4), 795–813.

Epple, D. N. and R. Romano (2003, January). *Neighborhood Schools, Choice, and the Distribution of Educational Benefits*, pp. 227–286. University of Chicago Press.

Fack, G. and J. Grenet (2010). When do better schools raise housing prices? Evidence from Paris public and private schools. *Journal of Public Economics 94*(1), 59–77.

Fack, G. and J. Grenet (2012). Rapport d'évaluation de l'assouplissement de la carte scolaire. Technical report, Centre pour la recherche économique et ses applications.

Falch, T., P. Lujala, and B. Strøm (2013). Geographical constraints and educational attainment. *Regional Science and Urban Economics 43*(1), 164–176.

Filmer, D. (2007). "If you build it, will they come? School availability and school enrolment in 21 poor countries". *Journal of Development Studies 43*(5), 901–928.

Frenette, M. (2009). Do universities benefit local youth? evidence from the creation of new universities. *Economics of Education Review 28*(3), 318–328.

Gibbons, S. and A. Vignoles (2012). Geography, choice and participation in higher education in england. *Regional Science and Urban Economics 42*(1-2), 98 – 113.

Goux, D., M. Gurgand, and E. Maurin (2015). Adjusting your dreams? high-school plans and dropout behaviour. *Economic Journal*, forthcoming.

Griffith, A. and D. Rothstein (2009). "Can't get there from here: The decision to apply to a selective college". *Economics of Education Review 28*(5), 620–628.

Handa, S. (2002). "Raising primary school enrolment in developing countries: The relative importance of supply and demand". *Journal of Development Economics 69*(1), 103–128.

Hansen, C. B. (2007, Oct). Generalized least squares inference in panel and multilevel models with serial correlation and fixed effects. *Journal of Econometrics 140*(2), 670–694.

Hastings, J., T. Kane, and D. Staiger (2009). Heterogeneous preferences and the efficacy of public school choice. *unpublished working paper*.

Lavy, V. (2010). Effects of free choice among public schools. *The Review of Economic Studies 77*(3), 1164–1191.

Lavy, V. (2015, January). Long run effects of free school choice: College attainment, employment, earnings, and social outcomes at adulthood. Working Paper 20843, National Bureau of Economic Research.

Spiess, C. and K. Wrohlich (2010). "Does distance determine who attends a university in Germany?". *Economics of Education Review 29*(3), 470–479.

Wondratschek, V., K. Edmark, and M. Frölich (2013). The Short- and Long-term Effects of Scool Choice on Student Outcomes. Evidence from a School Choice Reform in Sweden. *Annales d'Economie et de Statistique* (111-112), 4.

7 Appendix 1

Table 11: DID estimates of the effect of opening a new high school - Two closest schools

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.157*	0.004	-0.009	0.013	0.009	-0.012	-0.012	-0.012
	(0.083)	(0.015)	(0.021)	(0.020)	(0.011)	(0.013)	(0.017)	(0.017)
T(t >= ts) LPO	0.300***	-0.013	-0.018	0.005	0.014	-0.001	-0.003	0.000
	(0.062)	(0.018)	(0.015)	(0.020)	(0.011)	(0.012)	(0.018)	(0.018)
T(t >= ts) LPR	0.124***	0.046	-0.037	0.084**	-0.015	-0.032	-0.005	0.009
	(0.046)	(0.029)	(0.024)	(0.035)	(0.020)	(0.024)	(0.019)	(0.015)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.40	0.13	0.49	0.31	0.06	0.10	0.17	0.19
Nbr obs	25,727	30,136	30,136	30,136	30,136	30,136	30,136	30,136
Nbr clusters	76	76	76	76	76	76	76	76

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 12: DID estimates of the effect of opening a new high school - Five closest schools

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.056	-0.008	-0.008	0.000	0.002	0.006	-0.032**	-0.030*
	(0.036)	(0.016)	(0.018)	(0.010)	(0.006)	(0.015)	(0.016)	(0.016)
T(t >= ts) LPO	0.184***	0.004	-0.007	0.011	0.005	-0.009	0.008	0.008
	(0.036)	(0.009)	(0.012)	(0.011)	(0.006)	(0.007)	(0.010)	(0.010)
T(t >= ts) LPR	0.076*	0.016	-0.048***	0.065***	-0.016	-0.000	0.005	0.012
	(0.039)	(0.019)	(0.018)	(0.021)	(0.014)	(0.014)	(0.016)	(0.014)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.34	0.14	0.49	0.32	0.07	0.11	0.18	0.19
Nbr obs	63,471	74,357	74,357	74,357	74,357	74,357	74,357	74,357
Nbr clusters	176	176	176	176	176	176	176	176

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 13: DID estimates of the effect of opening a new high school - Median radius

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.036	-0.015**	-0.017*	0.003	0.001	0.014**	-0.024***	-0.024***
	(0.024)	(0.007)	(0.010)	(0.008)	(0.004)	(0.006)	(0.008)	(0.008)
T(t >= ts) LPO	0.115***	-0.003	-0.001	-0.002	0.002	0.001	-0.000	-0.002
	(0.018)	(0.006)	(0.006)	(0.006)	(0.004)	(0.005)	(0.006)	(0.006)
T(t >= ts) LPR	0.165***	0.025*	-0.025	0.050**	-0.019**	-0.006	0.023	0.027*
	(0.043)	(0.013)	(0.016)	(0.021)	(0.009)	(0.010)	(0.015)	(0.014)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.30	0.12	0.50	0.33	0.07	0.09	0.17	0.18
Nbr obs	180,287	209,126	209,126	209,126	209,126	209,126	209,126	209,126
Nbr clusters	555	555	555	555	555	555	555	555

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 14: DID estimates of the effect of opening a new high school on school social composition - Closest middle school

	Boys	Born France	Scholarship	Farmers, craftsmen	Executives	White-collar	Blue-collar	Unemployed or nr
T(t >= ts) LGT	0.003	0.000	0.063*	0.012	-0.011	0.008	-0.025	0.015
	(0.029)	(0.011)	(0.033)	(0.025)	(0.038)	(0.034)	(0.018)	(0.014)
T(t >= ts) LPO	0.000	-0.014	-0.015	-0.007	-0.023	0.021	0.007	0.002
	(0.022)	(0.010)	(0.018)	(0.009)	(0.016)	(0.018)	(0.027)	(0.019)
T(t >= ts) LPR	0.060***	-0.025	-0.131***	-0.007	-0.003	0.031	-0.036	0.015
	(0.015)	(0.015)	(0.019)	(0.011)	(0.027)	(0.019)	(0.048)	(0.032)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.03	0.12	0.21	0.04	0.09	0.05	0.06	0.28
Nbr obs	14,019	14,019	14,019	14,019	14,019	14,019	14,019	14,019
Nbr clusters	39	39	39	39	39	39	39	39

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 15: DID estimates of the effect of opening a new high school on school social composition - Within median radius

	gender	Born France	Scholarship	Farmers, craftsmen	Executives	White-collar	Blue-collar	Unemployed or nr
T(t >= ts) LGT	-0.013*	0.000	0.005	-0.006	-0.013	0.015	-0.003	0.006
	(0.008)	(0.004)	(0.010)	(0.006)	(0.010)	(0.009)	(0.008)	(0.007)
T(t >= ts) LPO	0.015**	-0.004	0.001	0.001	-0.002	0.004	-0.000	-0.002
	(0.007)	(0.004)	(0.006)	(0.004)	(0.007)	(0.005)	(0.006)	(0.005)
T(t >= ts) LPR	0.022	0.004	-0.016	-0.009	0.025**	-0.008	-0.012	0.004
	(0.014)	(0.013)	(0.015)	(0.007)	(0.010)	(0.008)	(0.007)	(0.008)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.02	0.09	0.16	0.04	0.15	0.03	0.09	0.13
Nbr obs	209,126	209,126	209,126	209,126	209,126	209,126	209,126	209,126
Nbr clusters	555	555	555	555	555	555	555	555

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

8 Appendix 2

Table 16 presents the effect of opening a new high school by sector: public and private on the pupils of the closest middle school. New openings from the private sector seem to increase the probability of dropping out. Except for that results nothing is significant at for the private sector. For the public sector we find the same main results observed in section 5. The opening of a new public high school significantly increases the probability for treated pupils to continue in a vocational track and significantly reduces their probability to drop out.

Table 17 to 20 present the impact of opening a new private high school by type of high school and by type of treatment definition. Results are highly inconsistent from one treatment to the other. When only pupils from the closest are considered treated, the opening of private LGT induce an increase in the probability of repeating 9th grade while an opening of LPR induce a decrease in the probability of following a vocational track. Both are puzzling result. When the two closest middle schools are considered treated the results are the same but when the five closest are treated, private opening seems to significantly increase the probability of following a vocational track when a LGT is opened and a general track when a LPR is opened. Opening of LPOS is the most effective when considering the median radius definition of treated middle school. A newly opened LPO impact pupils' outcomes positively: it increases the probability of following a general track and reduces repetition and dropout.

The inconsistency of the results with respect to the definition of the treatment calls for further investigation. In this preliminary work we choose to exclude private high school from the analysis.

Table 16: DID estimates of the effect of opening a new high school by sector - closest school

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) public	0.318***	0.077	0.041	0.036**	0.003	-0.081*	-0.012	-0.010
	(0.073)	(0.049)	(0.051)	(0.014)	(0.010)	(0.048)	(0.033)	(0.032)
T(t >= ts) private	0.154	0.060	0.064	-0.004	0.031**	-0.091	0.044	0.042
	(0.106)	(0.083)	(0.081)	(0.017)	(0.013)	(0.084)	(0.028)	(0.029)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.47	0.13	0.46	0.32	0.07	0.11	0.17	0.19
Nbr obs	20,222	24,902	24,902	24,902	24,902	24,902	24,902	24,902
Nbr clusters	67	67	67	67	67	67	67	67

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 17: DID estimates of the effect of opening a new private high school - closest middle school

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.184*	0.156	0.142	0.014	0.046**	-0.203	-0.021	-0.028
	(0.094)	(0.170)	(0.168)	(0.010)	(0.017)	(0.171)	(0.062)	(0.062)
T(t >= ts) LPO	0.502***	0.006	0.004	0.002	0.015	-0.021	0.074**	0.078**
	(0.028)	(0.035)	(0.038)	(0.025)	(0.011)	(0.033)	(0.029)	(0.029)
T(t >= ts) LPR	0.042	0.090	0.157	-0.067***	0.005	-0.095	0.072	0.072
	(0.052)	(0.105)	(0.106)	(0.021)	(0.020)	(0.108)	(0.049)	(0.055)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.56	0.16	0.46	0.32	0.09	0.13	0.19	0.20
Nbr obs	9,327	10,883	10,883	10,883	10,883	10,883	10,883	10,883
Nbr clusters	28	28	28	28	28	28	28	28

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 18: DID estimates of the effect of opening a new private high school - Two closest middle schools

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.120**	0.119	0.111	0.009	0.021*	-0.140	-0.036	-0.043
	(0.050)	(0.099)	(0.098)	(0.011)	(0.012)	(0.099)	(0.032)	(0.032)
T(t >= ts) LPO	0.348***	0.051	0.035	0.017	0.004	-0.055	0.011	0.016
	(0.046)	(0.043)	(0.043)	(0.017)	(0.015)	(0.039)	(0.035)	(0.035)
T(t >= ts) LPR	0.053	0.074	0.115*	-0.041***	0.005	-0.079	0.040	0.040
	(0.033)	(0.068)	(0.069)	(0.014)	(0.011)	(0.068)	(0.037)	(0.040)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.48	0.16	0.49	0.33	0.08	0.13	0.18	0.20
Nbr obs	20,516	23,845	23,845	23,845	23,845	23,845	23,845	23,845
Nbr clusters	56	56	56	56	56	56	56	56

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 19: DID estimates of the effect of opening a new private high school - Five closest middle schools

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.063**	0.053	0.036	0.016*	0.002	-0.055	-0.005	-0.009
	(0.025)	(0.044)	(0.045)	(0.009)	(0.007)	(0.045)	(0.015)	(0.016)
T(t >= ts) LPO	0.071	0.050	0.028	0.021	-0.015	-0.035	0.003	0.000
	(0.062)	(0.036)	(0.049)	(0.024)	(0.021)	(0.026)	(0.023)	(0.024)
T(t >= ts) LPR	0.008	0.039	0.056*	-0.017	-0.011	-0.027	0.017	0.019
	(0.019)	(0.032)	(0.033)	(0.013)	(0.007)	(0.032)	(0.023)	(0.024)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.38	0.15	0.52	0.35	0.07	0.12	0.19	0.21
Nbr obs	48,386	55,504	55,504	55,504	55,504	55,504	55,504	55,504
Nbr clusters	129	129	129	129	129	129	129	129

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.

Table 20: DID estimates of the effect of opening a new private high school - Median radius

	In new HS	High school			Repetition	Dropout	Get a diploma	
		All tracks	General	Vocational			Brevet included	Brevet excluded
T(t >= ts) LGT	0.018**	0.012	0.013	-0.001	0.002	-0.015	0.002	0.002
	(0.008)	(0.015)	(0.015)	(0.007)	(0.003)	(0.015)	(0.010)	(0.010)
T(t >= ts) LPO	0.010	0.030***	0.030***	-0.000	-0.016**	-0.014*	0.005	0.007
	(0.008)	(0.011)	(0.011)	(0.009)	(0.006)	(0.008)	(0.009)	(0.009)
T(t >= ts) LPR	0.008*	0.001	0.001	0.000	0.002	-0.003	-0.004	-0.001
	(0.005)	(0.010)	(0.012)	(0.008)	(0.004)	(0.010)	(0.014)	(0.014)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fe.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hetero. Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.32	0.14	0.52	0.36	0.07	0.11	0.18	0.19
Nbr obs	175,875	204,342	204,342	204,342	204,342	204,342	204,342	204,342
Nbr clusters	533	533	533	533	533	533	533	533

Source: FAERE data set, 9th grade pupils cohorts from 2007-2008 to 2010-2011.

Note: *** p-value<0.001, ** p-value<0.05, * p-value<0.1. All estimations use year and middle school fixed effects. Standard errors in parenthesis account for the autocorrelation of the residuals between observations of the same middle school.