Peer effects in Dutch primary schools

Abstract
The paper researches the peer effects in the primary education system of the Netherlands. This will be accomplished by evaluating data from a cohort study in Dutch primary education 2007-2013. This data provides among other things; the social economic status, test scores and advices regarding secondary education given by teachers. The main finding regarding peer effects show that peer effects mainly work in a negative way. The findings of advices given by teachers reveals that teachers tend to give relatively higher advices to students in poor classrooms.

I
Introduction

One of the main goals of the current welfare society is to create equal opportunities for each new-born in society. Educational attainment is considered as the main source of equality within a country. Education can be seen as an investment in human capital, this human capital can be used throughout the entire life. By giving everyone equal access to the education system regardless of their social economic status, everyone should have equal changes once entering the labour force. Even though the access to the educational system is considered pretty much equal in western society, the educational outcomes are not. New-borns from a not so favoured social economic background are less likely to have good educational outcomes than new-borns from a favoured background are. Eventually this leads to new-borns from a favoured background having a better position in society later in their lives. Economist refer to this phenomena as a lack of intergenerational social mobility.

This paper focuses on the education system in the Netherlands, in particular primary education. It investigates the effect of having peers from a particular social economic status in a classroom on the test scores of an individual in that classroom. This peer effects might worsen the intergenerational social mobility since good and bad peers seem to segregate in different schools. There has been much discussion lately about segregation of classrooms and schools, both in the Netherlands and the other OECD countries. In the big cities in the Netherlands there are primary schools with more than 70% of their students from a less favoured background besides schools with almost no students from a less favoured background. The literature upon the effect of this segregation will be evaluated later in this paper. Furthermore there will be looked upon how the test scores of one's classmates influence the advice regarding secondary school given by a primary school teacher. Teachers might tend to give a lower advice to students in a 'bad classroom' just because they are in a bad classroom. However it might also work the other way around, teachers giving a higher advice to these students due to their relative performance in the classroom. The advice given by the teacher is binding in the Netherlands, making it important to both students and parents. There has been much discussion about parents complaining about the 'too low advice' given by the teacher.

Besides that segregation among students in primary school might have an effect on educational attainment of students, there might rise up more question about this segregation. Does segregation of social classes in primary school lead to segregation or at least maintain the segregation among the entire society? This phenomenon might harm the integration of immigrants. Is segregation of social classes per se a bad thing and if so, at what cost should it be appropriate for the government to fight this segregation? From a liberalism point of view it wouldn't be desirable to be restricted from choosing a primary school for your children.

In this paper there will be given little to no attention regarding the more ethical and political issues mentioned above. However the paper will try to find evidence on peer effects among students in primary school on test scores, wishing to provide useful information about the optimal allocation of classrooms and schools for policy makers. This will be done with data from COOL 5-18. It provides test results and social economic status besides other criteria of students from primary school in the Netherlands. More detailed information about the data will be given later in this paper. To give an answer to the previous mentioned research questions, regression analysis will be used.

The paper is organised as follows. Section II will give a literature review. Section III will describe the data and the methodology used. In section IV the results will be shown and discussed. Concluding remarks and policy implications will be given in section V.

II

Literature review

Research about peer effects in classrooms isn't a new phenomenon. One of the first papers that looked at this concept is a paper of Summers and Wolfe (Summers & Wolfe, 1977). This paper looked at the segregation of black students in Philadelphia in the year 1970-1971. The paper found that black and non-black students benefitted, had the largest growth in achievement, when they were in schools with a 40 to 60 percent black student body, rather than in schools that were more segregated. This paper thus suggests that desegregation of schools would be beneficial.

In 1999 Betts and Morell (Betts & Morell, 1999) published their paper about the 'determinants of undergraduate Grade Point Average (GPA)', besides some other factors they look at the socioeconomic status/environment of the high school that the undergraduates attended. The undergraduates from a relative bad school are likely to obtain a lower GPA at university, even after controlling for the high school grades of the students. This implies that a student from a bad high school with the same high school grades as a student from a better school perform worse at university. This can be seen as more long-term effects. Besides that GPA at university is also a better indicator of future wealth than high-school grades.

However as Case and Katz (Case & Katz, 1991) suggest in their paper 'The company you keep' that there are peer effects outside school that might be more important to disadvantaged youths. They look at the peer effects in low-income neighbourhoods in Boston, both family peers and neighbourhood peers are looked at. They find both these peer effects substantially effect youth behaviour. This neighbourhood peer effect is problematic while trying to find school peer effects. The composition of a student's neighbourhood is likely to be highly correlated with the composition of his classroom/school. Parents from families from a high social economic are likely to live in a neighbourhood with other high social economic families. As a result the children with a favoured background are in the classroom with other favoured children. So whenever looking at school peers we have to watch out to not just capture the effect of the neighbourhood.

In Hoxby's (Hoxby, 2000) paper about peer effects she also points out that the central problem of estimating peer effects in schools is that the vast majority of cross-sectional variation in students' peers is generated by selection. Parents choose the school their children go to, this leads to children from educationally savvy parent to attend better schools. Even within a school there might be selection leading to a non-random composition of peers. School staff might put the problem students in one classroom and the smart students in the other. If you won't control for this selection the result of peer effects would be overestimated. To control for this Hoxby used random variation in the composition of a classroom. She focusses on race and gender variation between years. The strategies depend on the idea that there is some variation in adjacent cohort' peer composition within a grade within a school that is idiosyncratic and beyond the easy management of parents and schools. Parents can't predict precisely how the composition of peers of her child's cohort will be next year when choosing a school. So between two years there is some random variation in the percentage of girls, boys and different races within a grade within a school. The results showed that students are positively affected by the achievement level of their peers. Moreover she found that peer effects are stronger intra-race.

In a more recent paper from Burke (Burke, 2012) about peer effects there are given some new insights regarding in peer effects. They find peer effects are stronger on classroom-level than on the grade-level. Meaning that students are more influenced by the students in their class rather than the students in the same grade on their school. We find that the impact of peer ability depends on the student's own ability and on the relationship between own ability and peer ability—for example, for low-achieving students, having very-high-aptitude peers appears worse than having peers of average ability. This previous research together with a unique data set of primary education in the Netherlands creates a good starting point for research.

III
Data

In this section the data-set used to find the effects of peers on achievement will be described. The data used is from a cohort study started in 2007, 'Cohort Study Educational Career 5-18' (cool 5-18, 2012). Will be referred to as Cool from now on. Cool follows cohorts of students through their educational career from age 5 until 18, primary and secondary school. This paper only looks at the data of primary education. So far there have been three data collection rounds, in the years 2007, 2010 and 2013. This resulted in three separate cross-sectional data sets. However after combining the three data sets it resulted in a relative short panel data set of 3 periods. The unique student number is used as identifier to combine the data sets. The three central aspects in this data sets are:

- Cognitive development: knowledge and skills in Dutch, English and calculus/maths;
- Development of social skills;
- Social-emotional development.

The information about these aspects are collected with surveys and tests. For the purpose of this paper there will only be looked at the cognitive development of the students. Moreover data has been made available by the schools about the background of the students. Some of the things reported are: family composition, homeland of the parents and educational attainment of the parents. With this information the Cool study created a Social Economic Status variable of 6 points:

1. Student from non-western foreign parents who are both low educated[1];
2. Students from native parents who are both low educated;
3. Students from non-western foreign parents where the highest educated parent is considered middle-educated[2];
4. Students from native parents where the highest educated parent is middle-educated;
5. Students from non-western foreign parents where the highest educated parent is high educated[3];
6. Students from native parents where the highest educated parent is high educated.

Foreign parents whose homeland is western are considered native, looking at the results of these students this is the most logical thing to do. This SES_Individual variable will play a crucial role in this paper because this is the indicator of what kind of peer an individual is.

[1] Lower vocational education
[2] Vocational education
[3] Undergraduate/Graduate

There will be indicated three levels of peers:

- Bad peers : SES=1 or 2
- Average peers: SES=3 or 4
- Good peers: SES=5 or 6

In the tables 'bad peer' refers to the SES of that individual. The data sets gives the SES of each student and the classroom which he or she is in. Due to this information it is possible to indicate the peers of an individual student. These peers are captured in the variable SES_Classroom. This variable has three levels; bad classroom, average classroom, good classroom based on the average SES of the classroom. In the tables 'bad classroom' refers to the SES of the classroom which a student is in.

The dependent variable used in this paper is test score. The cool study provided test scores for the different years and grades. For the students in second grade the test score consist of two tests; calculus for pupils and vocabulary for pupils. For 5th grade there are three test, maths, language and reading skills. For 8th grade the CITO test (end test of primary school, maths and language) is used. However these test results are not normalised, as a result the test results of 5th grade and 8th grade are not comparable. To find the impact of peer effects the test scores are normalised. By doing this the test scores of individual X in 2007, 2010 and 2013 are comparable. Also the grades of individual X who is in 5th grade and individual y who is in 8th grade are comparable. Remember that there will be looked upon how the test scores of one's classmates influence the advice regarding secondary school given by a teacher. To do this there will again be created an indicator variable. The average normalized test score[4] of a classroom will be used as indicator of test scores of a given classroom. With this indicator there are created five groups:

1. test score lower than -0.75 (poor classroom)
2. test score between -0.75 and 0.25 (fair classroom)
3. test score between -0.25 and 0.25 (average classroom)
4. test score between 0.25 and 0.75 (good classroom)
5. test score higher than 0.75 (excellent classroom)

So the 5th group is the best group in terms of test scores and the 1st group the worst. Also the individual test scores will be based on this 5 point scale.

There are 15 possible advices the teachers can give to their students. It wouldn't be right to treat this as a continuous variable, to solve this the different advices will be grouped. There will be four groups, with each group representing around 25% of the advices given to students. So 25% of the students got advice 1, 25% advice 2 etcetera. Advice 1 representing the lowest advice and advice 4 the highest advice.

[4] Mean=0, St. dev. =1

Methodology

The methodology for finding the peer effects on test scores will be described first. After this the methodology for finding the effect of classroom test scores on advice will be described. For the peer effects there will be used three different forms or regression analyzes; Cross-section-, Delta- and Panel method.

Cross-section Peers

The first method used is a the Cross-sectional analysis. In this analysis all students where the available data is available is used. This means that all students from the cohort started in 2007, 2010 and 2013 which have data available upon their social economic status and test scores are used. There are 83.000 observations available. On this data an Ordinary Least Squares regression is performed in the following form:

$$Test\ score\ (\gamma) = \beta_1 + \beta_2 Bad\ peer + \beta_3 Good\ peer + \beta_4 Bad\ classroom + \beta_5 Good\ classroom + \beta_6 peer\#classroom + \varepsilon$$

As can be seen, the average peer and the average classroom are omitted. This makes the interpretation of β_2 : the difference between an average and bad peer in terms of Test score ceteris paribus. In the following models looking for peer effects the same omitted variables will be used. The interaction term is added to look whether the effect of the classroom has a different effect on different peers. The effect of being in a bad classroom as a bad peer might differ from the effect of being in a bad classroom as a good peer. This regression doesn't take the heterogeneity between years, grades and schools in account. Certain schools might perform better because they have more resources or better teachers. This heterogeneity might bias the results to control for this there will be added a second regression with control variables(school, year, grade).

$$Test\ score\ (\gamma) = \beta_1 + \beta_2 Bad\ peer + \beta_3 Good\ peer + \beta_4 Bad\ classroom + \beta_5 Good\ classroom + \beta_6 peer\#classroom + C + \varepsilon$$

There might arise an endogeneity problem by just looking at cross sectional data. As mentioned by the paper of Case & Katz (Case & Katz, 1991) neighborhood might play an important role in student's performance. Therefore it might occur that the student's neighborhood influence both the test scores and the classroom. In this regression this would lead to overestimated effects of the classroom. One way to control for this is to use a delta method.

Delta Method Peers

In the cross section analysis there was an endogeneity problem. With a delta analysis, this problem will be at least reduced. In this section the outcome variable will be the difference in test scores of an individual between years. One of the independent variable is the difference in Classroom peers.

$$\Delta Test\ score = Test\ score_T - Test\ score_{T-1}$$

$$\Delta Classroom = Classroom_T - Classroom_{T-1}$$

Idealistically $\Delta Classroom$ would be a categorical variable indicating a change from an average classroom to an bad classroom or from an average classroom to a good classroom. However due to the relatively small variation in the Classroom of an individual this won't work. This means that there are not enough observations which move from an average classroom to a good classroom etcetera. By treating classroom as an continuous variable for this analysis it is possible to capture the difference of classroom composition intra categorical [5].

The delta analysis controls for individual characteristics. The observation at T-1 of one's test score is a result of each individuals characteristics and background, so including neighborhood and family effects. There will be used 4 regressions with different specifications. The first two just looks at the effect of a change in classroom composition influence test score. The most basic form of this regression would looks like this.

$$\Delta Test\ score = \beta_1 + \beta_2 \Delta Classroom + \varepsilon$$

β_2 Indicates the effect of a change in classroom peer composition on test score. However it doesn't indicate how a change in the classroom influence the different peers. Meaning while β_2 is overall negative, implying that moving to a better classroom has negative effects on average for all peers, moving to a better classroom as a bad peer has positive effects. This would lead to other conclusion and eventually other policy implications. To look for these different effects across peers and classroom there will be added interaction variables. Then again the regression will be done with and without control variables[6].

$$\Delta Test\ score = \beta_1 + \beta_2 \Delta Classroom + \beta_3 peer\#\Delta Classroom + \beta_4 Classroom\#\Delta Classroom + C + \varepsilon$$

β_3, the coefficient of the interaction term between peer and ΔClassroom, indicates the effects of a change of classroom composition on different peers. It might be the case

[5] The change of classroom composition between years but in the same classroom category(i.e. bad, average and good classroom)
[6] School, Grade, Year

that a bad peer is more influenced by his or her classroom than an average or good peer.

Delta Main Effects

In a regular delta analysis researchers only look at how the difference in an independent variable influences the difference in the dependent variable. However in this analysis it seems appropriate to add a variable representing the main effect of being a bad peer/ being in a bad classroom. Adding a dummy variable for the different peers captures the main effect[7] of being a particular peer on the growth of one's test score. For example it might be the case that good peers always tend to have a positive growth in test score, regardless of the change of their classroom peer composition. To look for this effect there will be added a delta analysis with the main effects.

$$\begin{aligned}\Delta Test\ score\ &= \beta_1 + \beta_2 \Delta Classroom + \beta_3 peer\#\Delta Classroom \\ &+ \beta_4 Classroom\#\Delta Classroom + \beta_5 Bad\ peer + \beta_6 Good\ peer \\ &+ \beta_7 Bad\ classroom + \beta_8 Good\ classroom + C + \varepsilon\end{aligned}$$

Panel method peers

The endogeinity problem arises because of the omitted variables in the model. In a book of Woolridge (Woolridge, Econometric analysis of cross section and panel data, 2010) the problem of omitted variables is addressed by using panel data. Panel data consist of several observations from a specific individual across time. From nature panel data controls for heterogeneity between observations, students in this data. Woolridge also notes the difference between fixed effects panel data and random effects panel data. Random effect panel data assumes there is no correlation between the independent variables and the omitted variables. This could be the case if ability is the omitted variable. Ability is not likely to be correlated with SES since students are born with their ability to learn and this doesn't dependent on the SES of parents. Fixed effects panel data relaxes this assumption, it is allowed to have correlation between the independent variables and the omitted variables. This data does not observe neighborhood characteristics as a dependent variable so it is a omitted variable. Neighborhood is likely to be correlated with SES so from that point of view it seems more appropriate to treat the data as fixed effects panel data. However in this paper both strategies will be used. Note that the regression looks the same in both strategies, there are just different assumptions.

$$\begin{aligned}Test\ score_{it}\ (\gamma) = \ &\beta_1 + \beta_2 Bad\ peer_{it} + \beta_3 Good\ peer_{it} + \beta_4 Bad\ classroom_{it} + \\ &\beta_5 Good\ classroom_{it} + \ \beta_6 peer\#classroom_{it} + \varepsilon\end{aligned}$$

[7] An effect independently from a change in classroom peer composition

In this equation i indicates the individual and t the time. So $Test\ score_{20,2010}$ indicates the test score of student 20 in the year 2010. Furthermore the regression will be done again with the control variables; school, year and grade.

Cross-section Advice

For finding the effect of classroom test scores on advice, cross-section data will be used. Due to the simple fact that each student only gets advice once in their educational career, it is not possible to perform a regression with delta and panel data. In this regression there won't be given attention to bad and good peers in terms of their SES. There will be just looked at the test scores of the peers, which is probably correlated with SES. The regression will have dummy variables indicating the average normalized test score of the classroom.

$$Advice(y) = \beta_1 + \beta_2 Testscore + \beta_3 Poor\_classroom + \beta_4 Fair\_classroom + \beta_5 Good\_classroom + \beta_6 Excellent\_classroom + \varepsilon$$

β_3 Indicates the effect of being in a poor classroom on advice after controlling for own test score. If β_3 is positive it means that if there are two students, one in a poor classroom and one in an average classroom with the same test score, the student in the poor classroom gets a higher advice on average.

IV
Results

The results of the previous explained methodology will now be presented in the same order as in the methodology. So starting with the different methods of finding peer effects and then the cross-section on advice.

Cross-section Peers

The results of both the regression with and without control variables are available in table 1. Almost all of the coefficients found are significant. The coefficients of social economic status and social economic of the classroom can't be described as surprising. Being a bad peer and being in a bad classroom both have a negative effect on test scores and being a good peer and being in a good classroom both have a positive effect. After controlling for schools the classroom effects weakens, might be due to the correlation between SES of a school and the SES of a classroom. More interesting are the findings due to the interaction term. The negative sign of the interaction term between Bad Peer and Good Classroom implies that there are some negative effects for a bad student being surrounded by good students. The allocation based on skill of students in classrooms by teachers might be explanation of this phenomenon. Teachers are likely to put all the good students in one class and the slightly worse students in the other. In this way they can give the good classroom more challenging education in good classrooms.

An negative externality might be that the education given is too challenging for a bad student placed in a good classroom.

Table 1

TEST_SCORE	No controls	Controls
SES_Individual[1]		
Bad Peer	-0,295***	-0,263***
	(0,010)	(0,010)
Good peer	0,252**	0,269**
	(0,013)	(0,013)
SES_Clasroom[2]		
Bad classroom	-0,269**	-0,151**
	(0,032)	(0,036)
Good classroom	0,177***	0,039**
	(0,009)	(0,015)
SES_Individual#SES_Clasroom		
Bad Peer # Bad Classroom	0,136**	0,077**
	(0,037)	(0,036)
Bad Peer # Good Classroom	-0,034**	-0,067**
	(0,017)	(0,017)
Good peer # Bad Classroom	0,010*	-0,040*
	(0,070)	(0,068)
Good peer # Good Classroom	0,058**	0,042**
	(0,015)	(0,015)
Constant	-0,136***	-0,093*
	(0,007)	(0,085)
Controls[3]	**no**	**yes**
Number of obs	**83182**	**83182**
R-squared	**0,104**	**0,162**

[1] Average peer omitted

[2]Average classroom omitted

[3] School, Grade, Year
Dependent variable: Normalized test score
Note: *,** and *** indicates significance at 0.1, 0.05 and 0.01 respectively

Delta method

With this method there is looked at the effect of a change of classroom peer composition on test score. The results, shown in table 2, shows that a positive change in classroom composition has a significant positive effect on test score. Especially for students who are in a bad classroom a positive change in composition make their test scores better. If the average composition of a student's classroom who is in a bad classroom would rise, it would have more affect than when the student was in an average classroom. Meaning it might be efficient to focus on improving the bad classroom in terms of SES. However the results also shows us that bad peers are negative influenced by a positive change of classroom composition. The opposite signs of 'SES_Classroom#Δ Classroom' and 'SES_Individual#Δ Classroom' might be a result of the collinearity. These two variables are likely to be highly correlated since there are many bad peers in a bad classroom. As a result there are two opposite signs while the actual correlation is averaged between these two opposite coefficients. Moreover the

model with main effects shows that the test scores of good students tend to rise more over time than those of average and bad students.

Table 2

	Without main effect		With main effect	
Δ Test Score	**No controls**	**Controls**	**No controls**	**Controls**
Δ Classroom	0,115***	0,103**	0,138***	0,107**
	(0,038)	(0,042)	(0,038)	(0,043)
SES_Classroom#Δ Classroom[1]				
Bad classroom	0,230***	0,152	0,155	0,034
	(0,087)	(0,104)	(0,099)	(0,122)
Good classroom	-0,078*	-0,073	-0,059	-0,056
	(0,043)	(0,050)	(0,044)	(0,050)
SES_Individual#Δ Classroom[2]				
Bad peer	-0,180***	-0,144***	-0,181***	-0,138***
	(0,052)	(0,052)	(0,052)	(0,052)
Good peer	0,053	0,067	-0,026	-0,001
	(0,045)	(0,045)	(0,046)	(0,045)
SES_Individual[2]				
Bad peer			-0,039*	-0,067***
			(0,021)	(0,021)
Good peer			0,150***	0,137***
			(0,018)	(0,018)
SES_Classroom[1]				
Bad classroom			-0,031	-0,100
			(0,051)	(0,073)
Good classroom			-0,061***	0,000
			(0,018)	(0,038)
Constant	-0,095***	-0,071	-0,102***	-0,128
	(0,008)	(0,182)	(0,016)	(0,184)
Controls	**no**	**yes**	**no**	**Yes**
R-squared	**0,003**	**0,125**	**0,010**	**0,132**
Observations	**11999**	**11999**	**11999**	**11999**

[1] Average classroom omitted
[2]Average peer omitted
[3] School, Grade, Year
Dependent variable: Normalized test score
Note: *,** and *** indicates significance at 0.1, 0.05 and 0.01 respectively

Panel

Random effect panel

The next results are obtained by using panel data. Starting with the random effect assumption, table 3. Once again the expected coefficients are found for the peers and classrooms. Just like in the cross section analysis the coefficients of the classroom effects are weaker after using the control variables. Especially the positive effect of being in a good classroom faints in both methods. As mentioned before it might be due to the correlation of SES of the school and SES of the classroom. However this wouldn't explain why controlling for schools has more impact on the effect of good classrooms than bad classrooms. One possible explanation could be that relatively good school have less variation in the quality of classrooms than bad schools. Good schools have overall better students so less need to segregate the bad and the good peers. One other explanation is

that peer effects only work in a negative way. Meaning that average students don't get motivated by good student while on the other hand they get demotivated by bad students. Moreover the positive coefficient of the interaction term between a bad peer and a bad classroom indicates that there are some positive effects of being surrounded by students with the same ability.

Fixed effect panel

In this model, table 3, the same results are found regarding the SES of an individual. More surprising in this method is that it confirms the finding of only negative peer effects rather than positive peer effects even before using control variables. The coefficients of the interaction term in this model are rather small and not significant, so there won't be given an interpretation of these coefficients.

Table 3

	Random effect		Fixed effect	
TEST_SCORE	**No controls**	**Controls**	**No controls**	**Controls**
SES_Individual[1]				
Bad Peer	-0,254***	-0,208***	-0,173***	-0,189***
	(0,018)	(0,018)	(0,039)	(0,039)
Good peer	0,202***	0,222***	0,126***	0,122***
	(0,023)	(0,022)	(0,042)	(0,041)
SES_Clasroom[2]				
Bad classroom	-0,288***	-0,150**	-0,199***	-0,197***
	(0,057)	(0,060)	(0,076)	(0,076)
Good classroom	0,136***	-0,005	-0,010	0,007
	(0,016)	(0,022)	(0,030)	(0,030)
SES_Individual#SES_Clasroom				
Bad Peer # Bad Classroom	0,136*	0,026	0,046	0,047
	(0,065)	(0,065)	(0,086)	(0,086)
Bad Peer # Good Classroom	0,000	-0,032	0,098*	0,085
	(0,030)	(0,030)	(0,056)	(0,056)
Good peer # Bad Classroom	-0,049	-0,108	0,146	0,128
	(0,124)	(0,122)	(0,159)	(0,158)
Good peer # Good Classroom	0,053**	0,040	0,059	0,069
	(0,026)	(0,026)	(0,045)	(0,045)
Constant	-0,035***	-0,022	0,049**	0,103***
	(0,012)	(0,142)	(0,022)	(0,025)
Controls[3]	**no**	**Yes**	**no**	**yes**
R-sq: within	**0,006**	**0,019**	**0,007**	**0,020**
between	**0,109**	**0,196**	**0,101**	**0,006**
overall	**0,087**	**0,159**	**0,079**	**0,005**
Number of obs	**26523**	**26523**	**26523**	**26523**
Number of groups	**14517**	**14517**	**14517**	**14517**

[1] Average peer ommited

[2] Average classroom ommited

[3] School, Grade, Year

Dependent variable: Normalized test score

Note: *,** and *** indicates significance at 0.1, 0.05 and 0.01 respectively

Advice Cross-section

All of the results of the peer effects has been discussed by now. The results regarding the effect of the average classroom test scores on advice given by the teacher will now be discussed and shown in table 5. First of all we see that the individual test score is highly correlated with advice. The outcome variable advice is on a 4 point scale and the dependent variable, test score, is on a 5 point scale. The coefficient is just lower than one, taking into account the slightly different scale of the two variables there is a close to one on one relationship. Test score seems to be a real good predictor for the advice given by a teacher. However this paper tries to find the effect of being in a classroom with a particular average test score. The findings are pretty surprising, the coefficients of the relative bad classrooms are all positive while the coefficients of the relatively better classrooms are negative. Meaning that if two students have the same test score, one in a poor classroom and the other in an excellent classroom, the one in poor classroom gets an higher advice on average. The student might because of this, attain a 'higher' level of secondary school. After controlling for year and school this effect is even stronger. This means that the advice given is in fact due to the classroom rather than just some schools given higher advices than others. An explanation of teachers given higher advices might be found in the relative performance of the students. An average test score is relatively better in a poor classroom than in an excellent classroom. This findings give us some insights about how advices are given. Yet is doesn't provide us with causality. It might be the case that all the 'nice teachers' who tend to give higher advices are placed in the bad classroom. However in this data it is not possible to control for teacher fixed effects. Moreover the findings does not provide the reason why poor classrooms get higher advices than their test scores would indicate, it does indicate they get higher advices. Which is a good starting point for further research.

Table 4

Advice	**No control**	**Controls**
Testscore	0,969***	0,971***
	(0,005)	(0,004)
Testscore classroom[1]		
Poor classroom	0,228***	0,359***
	(0,020)	(0,031)
Fair classroom	0,066***	0,166***
	(0,012)	(0,020)
Good classroom	-0,065***	-0,124***
	(0,011)	(0,019)
Excellent classroom	-0,040***	-0,147***
	(0,022)	(0,037)
Constant	2,469***	2,402***
	(0,007)	(0,119)
Controls	**no**	**Yes**
R-squared	**0,715**	**0,761**
Number of observations	**19680**	**19680**

[1] Average classroom omitted
Dependent variable: Advice on a 4-point scale
Note: *,** and *** indicates significance at 0.1, 0.05 and 0.01 respectively

V
Conclusion

First there will be given some concluding remarks on the results, after that the policy implications and further research suggestion will be discussed.

The aim of this paper is to look at whether or not there exist peer effects in a classroom level. This might influence the optimal allocation of resources and policies. As the results clearly shows social economic status matters when it comes to the performance of students. In all different methods of finding peer effect the paper found that the SES of an individual had a positive effect on test scores, meaning how higher a students' SES the higher the test scores of this student are. However students are born with their SES and can therefore not be changed by policymakers.

More interesting are the peer effects, since these are manageable by schools, municipality and policy makers. The cross-section analysis found that being in a bad classroom has a negative effect on test scores. Moreover it showed that this negative effect of a bad classroom has more impact on average- and good student than on bad students. The delta and panel models are more exogenous than the cross section model. With this models the findings are pretty consistent, the effects sizes stay almost the same. One more interesting finding is that there are found positive peer effects in the models without control variables but after controlling for year, grade and school these positive effects seem to faint. This implies that negative peer effect are more present than positive peer effects on a classroom level. The positive peer effects found are probably due to the self-selection into schools.

The cross-section analysis regarding the advice given about secondary education gave some insights about advices that are given. It seems that teachers tend to give advices on the relative performance of students in a classroom rather than on their absolute performance.

Policy implications

From a welfare society point of view where everyone should have equal chances, these findings are worrying. It is clear that the SES you are born with, does influence your chances. This can be the result of many factors; lack of motivating parents, relatives, neighborhood, resources and so on. As a policy maker it is hard to address all these problems which are likely to be corresponding with the SES of a student. Policy makers can't influence the environment a student grows up in as easy as the environment on schools. The results as do several other papers show us that peer effects exist in classrooms. The findings of the negative peers rather than the positive peers are in line with the findings of Zimmer and Toma (Zimmer & Toma, 2000), their research was conducted across countries rather than just one country. In this paper there are found negative peer effects in the primary education of the Netherlands. For policy makers it is

good to know that the problem of peer effects really exist in their country and not just in other countries.

In the Netherlands there has already been attention for schools with a high percentage of students from a low SES. This attention was founded on the scores of these schools on a standardized test in eighth grade, the one also used in this paper. The schools beyond a threshold of 70% disadvantaged students (students with a low SES) received extra funding. The effect of this extra funding got evaluated by Leuven, Lindahl, Oosterbeek and Webbink (Leuven, Lindahl, Oosterbeek, & Webbink, 2007) and they didn't find a positive effect of the extra funding. So if extra funding doesn't seem to work, it might be logical to consider changing the peer composition of schools and classrooms.

Some municipalities in the Netherlands also tried this with a 'zip code policy' which should weaken the segregation of bad and good students in different schools. This policy restricts parents to send their children to schools out of their zip code area. Making it harder for parents with a high SES to send their children to a relative better school out of their zip code. This policy has been criticized often since it harms the freedom of school choice. However from a policy point of view the policy makes sense and it is important to do research upon the effect of this policy.

The finding that teachers tend to give advice on secondary education based on relative performance rather than on absolute performance is also interesting for policy makers. Due to recent policy reforms in the Netherlands teachers have to give their advice prior to the test scores of eight grade evaluated in this paper. After the test scores teacher are only allowed to rethink the advice to give a higher advice. They are not allowed to give a lower advice due to the test scores. There is no clear reason for this except that parents won't like it if their child gets a lower advice based on the performance of only one test. However they do like it if their child gets a higher advice based on the performance of only one test. Based on the finding that some students indeed get a higher advice than their test scores would suggest, policy makers should rethink this new policy.

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