Raising Aspirations and Higher Education: Lessons from the UK Widening Participation Policies*

[- Preliminary -]

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Abstract

While the proportion of the population accessing higher education in the UK has been steadily increasing since the late '80s, such increase has been disproportionately concentrated among the most affluent families. The resulting imbalances have eventually been set at the heart of the educational policies in the late '90s with the introduction of "Widening Participation" (WP).

A key objective of WP is to boost participation to higher education by raising the aspirations of the youths from low Socio Economic Status (SES); this is done, for example, by introducing them to succesful role models.

This paper examines the effects that WP has had on the attitudes and schooling choices of English youths.

The theoretical framework introduced by Ray (2004) and Genicot and Ray (2010) is used to interpret the empirical results and disentangle the effect of the policy on aspirations and that of the latter on educational choices.

A Sharp Regression Discontinuity design is employed to retrieve the *causal* effect of the policy on higher education aspirations and college enrollment of targeted students (*Intention To Treat*). The results show a significant increase in aspirations, measured as the stated likelihood of applying to college, of targeted students below 18; this translates into an increase in the probability of staying on in full time education after the compulsory school leaving age of 16 but not in an increase of actual enrollments to college at age 18.

Such failure is likely due to the fact that the policy does not act on the students' preparation; indeed estimates from administrative data show no effect of the WP policies on students' performance, which suggests that, despite being motivated to go to college, targeted students from low SES would lack the academic requirements to compete with the others and gain admission to college. The paper therefore concludes that, while policies that act on aspirations have the potential to increase the educational levels of students from low SES, these should be coupled with policies that enhance their preparation in order to truly *enable* such students to get a higher education degree.

Keywords: Human Capital, Tertiary Education, Evaluation of Education Reform.
JEL: J24, H52, I23.

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1 Introduction

Educational attainment and access to college have risen dramatically in the last 30 years: Deming and Dynarski (2009) estimate that in the US the percentage of 23 year old going to college has risen from 36% in 1968 to 58% in 2005.

This trend has been common to most OECD countries (OECD, 2012) but varied in timing and intensity. In the UK, in particular, the acceleration of enrollments to college took place from the late '80s when a number of reforms to the educational system were embraced[1].

Such enlargement of the students' body, nevertheless, has not been uniform across the population but rather concentrated among youths at the top of the income distribution as documented, among others, by Deming and Dynarski (2009) and Belley and Lochner (2007) for the US and by Blanden and Machin (2004) and Machin and Vignoles (2004) in the UK.

The desire to enlarge the student body so as to bring in those generally left behind has animated the action of policy makers around the world in the past fifty years: in the US the Higher Education Act of 1965 introduced for the first time grants and low interest loans for low and middle income college students, while European Governments traditionally opted for a fully state funded higher education system for all students[2] coupled with the institution of small grants for the most disadvantaged ones.

Still neither the absence of tuition costs, nor the allocation of means-tested grants proved sufficient to relax the credit constraints some students would face so that the disparities in access to college were not eliminated through such policies. Kane (1995), for instance, reports "no disproportionate growth in enrollment by low income youth" after the introduction of the Pell Grant in the US in 1972[3]; Dynarski (2000) analyzed the impact of the 1993 Georgia HOPE programme of scholarships for outstanding students and found that it mostly benefited medium and high income students; while for the UK Dearden et al. (2011) estimated that a £1,000 grant would currenlty increase participation to higher education by only 2.6 percentage points.

To what extent credit constraints are responsible for these imbalances remains an open question: Acemoglu and Pischke (2001), for instance, argue that in the presence of imperfect credit markets "family income, rather than other factors related to family background, explains 27 percentage points of the 36 percentage

[1] See Wyness (2010).

[2] England, for instance, first introduced tuition fees in 1998.

[3] Hansen (1983) as well had found no effect of the introduction of the grant on college enrollment.

points difference in enrollment rates of children from the bottom and top quartiles in 1992 in the US"[4], on the other hand Heckman and Carneiro (2003) estimate that at most 8% of the population may be prevented from going to college by short run credit constraints and suggest that the gap in educational achievements would rather result from the scarce accumulation of abilities that poorer children have experienced since they were born.

The recent economic literature has thus moved in both directions: on the one hand the evaluation of policies that act on the financial barriers (Deming and Dynarski, 2009), on the other hand the exploration of the role of accumulated cognitive and non cognitive abilities.
This paper will fall in the latter category and analyze the impact on college enrolments of a british policy intervention based on the stimulation of some non cognitive traits, namely aspirations and motivation.
Indeed the governments of Tony Blair first and Gordon Brown later (the so called "New Labour Government") were especially keen on raising education and career aspirations of youths from disadvantaged backgrounds; Gordon Brown, in particular, made the issue of equality of access to higher education a cornerstone of his political action: in October 2007 he pronounced a speech at the Greenwich University where he argued that poverty of aspiration is what lies at the heart of the failure of the British education system to be world beating claiming that "the great failure is not the child who does not reach the stars, but the child who has no stars to reach for" (Brown, 2007).

From an economic perspective then, the stimulation of adolsecents' aspirations is justified by the findings of Heckman (1999), who provided evidence that, while cognitive abilities are essentially set by age 8, non cognitive abilities are still malleable in adolescent years. This would suggest policy makers to act on young children's stimulation of cognitive abilities while focusing on non cognitive traits, such as ambition and motivation, for adolescents (Cunha and Heckman (2007) and Cunha et al. (2010)).
Moreover psychologists and sociologists have long stressed the link between ambitions and educational achievemtns showing that children with higher aspirations put more effort in school and thus achieve higher outcomes (Gutman and Akerman, 2008) than children with lower ambitions.
This argument has also appeared in the most recent economic literature: Ray (2004), Heifetz and Minelli (2006) , Mookherjee et al. (2010) have set the theoretical basis for the study of the role of aspirations, whereas Nguyen (2008), Macours and Vakis (2009), Chiapa et al. (2010) have provided interesting empirical

[4] The major role of credit constraints as barrier to entry into higher education has also been stressed by Card (1999), Card (2000) and Kane (2001), as well as Kane (1995) and Kane (2003).

evidence on the link between aspirations and educational achievements.

While these papers focus on least developed countries and analyze the impact of role models on primary education achievements, some evidence has also been provided that mentoring and motivational programs targeted towards the disadvantaged teenagers can effectively improve their educational outcomes (Tierney et al. (2000) on the US *Big Brother Big Sister* programme, and Hahn et al. (1994) on the *Quantum Opportunity Program*).

The present paper intends to contribute to this literature by exploring the effects that Widening Participation (WP) policies have had on English pupils' aspirations and actual enrollment to university in order to establish a robust causal relationship between the two.

Differently from the above cited contributions, this paper will analyze the link between aspirations and education in a non-developing country setting and for higher education choices providing evidence on the effects of a national scale programme.

The paper is structured as follows: section 2 introduces the WP policy, its political background and its design; section 3 provides the theoretical framework to interpret the empirical results; section 4 describes the estimation strategy ; section 5 introduces the datasets that will be employed and provides some descriptive statistics; section 6 is dedicated to the results; finally section 7 provides a discussion of the results and concludes.

2 The Widening Participation Policies

It is estimated that until the '70s participation rates in post-compulsory education in the UK did not reach 20% of school leavers while by the end of the '90s this rate had almost reached 70% (Gleeson, 1996). In the same way higher education expanded significantly: if in the '50s no more than 5% of students were entering a higher education institution, today that is estimated to be around 36% (HEFCE, 2010).

Still, as mentioned above, such increase in participation was not uniform across the population but disproportionately favored those groups which were already accessing higher education: in 1990 students from social class 1-3(non manual) exhibited a rate of participation to higher education of 36.7%, while those from social class 3(manual)-5 a rate of 10.3% (Robertson and Hillman, 1997); by 1997 both numbers had increased substantially but the difference between the two had widened up, with a 49% participation rate among students from social class 1-3(non manual) and a 18.4% among youths from lower social class (Connor and Regan, 1999).

On such premises the Kennedy (1997) and the Dearing (1997) reports, commissioned by the government in preparation for a reform of the higher education system[5], set the issue of "Widening Participation" to higher education at the centre of the national political agenda establishing that "participation should be *widened* rather than just increased" (Kennedy, 1997) and that public funds should be distributed so as to reward "institutions which can demonstrate a commitment to *widening participation*" (Dearing, 1997).

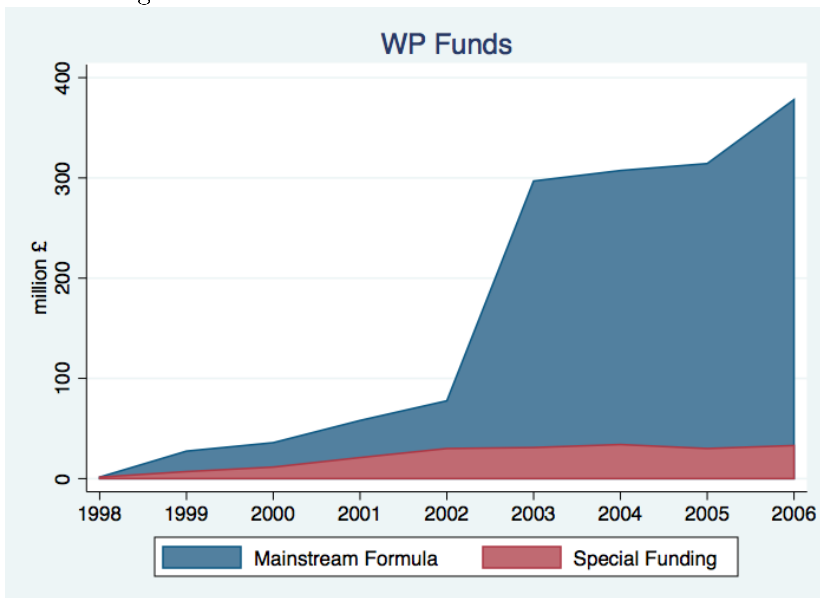
Such reccomendations found a quick translation into policy: in 1998 the Higher Education Funding Council for England (HEFCE) started to distribute funds to Higher Education Institutions based on their capacity to recruit and retain students from under-represented groups: students from low socio-economic background as well as ethnic minorities and children in care.
Initially, though, such funds were allocated on a regional basis to sponsor specific programmes proposed by Higher Education Institutions (e.g. "Special Funding"). From 1999 then the Special Funding scheme has been coupled with a more structured method of allocation, the so called "mainstream formula" in the Teaching Grant. The latter is the largest source of funding of Higher Education Institutions[6] and is proportional to the number of (full time equivalent) students enrolled. In order to promote the recruitment and retention of students from disadvantaged background by Higher Education Institutions, HEFCE modified the mainstream formula so as to give a higher weight to WP target students in the computation of the Teaching Grant. The mainstream formula has then become, from 2003/2004 the main means of funding WP activities (figure 1).

The WP funds distributed by HEFCE to Higher Education Institutions are spent mainly on "outreach" activities which range from the provision of mentors to the organization of open days and summer schools, all activities that are meant to introduce secondary school students to the world of higher education and raise their aspirations. The idea that the lack of aspirations is the main barrier to entering higher education has been central in the British political debate over the last fifteen years. The governments of Tony Blair first and Gordon Brown later (the so called "New Labour Government") were especially keen on raising education

[5]Following the recommendations of the Dearing report, in 1998 the government introduced for the first time up-front tuition fees to be paid by all UK and EU students (Wyness, 2010).

[6]Aprroximately 65% of higher instituions' total resources come through the Teaching Grant, 20% come from the Research Grant and the remaining from students' tution fees (HEFCE Recurrent Grants Publication, 1999-2006).

Figure 1: Mode of allocation of WP funds. HEFCE.



and career aspirations of youths from disadvantaged backgrounds; in 2001, indeed, the government implemented the "Aimhigher: Excellence Change" programme which comprised not only outreach activities with the pupils but also support for parents in order to make the latter more willing and confident in engaging in their children's learning.

Gordon Brown then made the issue of equality of access to higher education a cornerstone of his political action: in October 2007 he pronounced a speech at the Greenwich University where he argued that poverty of aspiration is what lies at the heart of the failure of the British education system to be world beating claiming that "The great failure is not the child who does not reach the stars, but the child who has no stars to reach for" (Brown, 2007).

Higher Education Institutions, on their part, on top of receiving funds from HEFCE to deliver such outreach activities, make their commitment to widening participation a point of pride; their commitment is recognized by a series of awards, such as the "London Education Partnership Awards"[7], and also substantially attracts further funds from private donors. Moreover the Higher Education Statistics Agency (HESA) publishes every year detailed data on the intake of students from under-represented groups by each Higher Education Institution in England[8].

[7] The London Education Partnership Awards recognize and build on a well-established tradition among London's education providers in offering higher education opportunities to a wide range of learners raising the aspirations of young people to help them achieve their full potential. `www.lepawards.org.uk`

[8] `www.hesa.ac.uk/index.php?option=com_content&task=view&id=2060&Itemid=141`

3 Theoretical Framework

In order to evaluate the impact of the WP policies, it is useful to frame the interventions into an economic model where raising youths' aspirations may lead to an actual change in their schooling choices.
The belief, conveyed in the above quoted words of Gordon Brown, that the lack of aspirations is what prevents some youths from accessing higher education, translates into the (behavioral) economic concept of *complacency*: people may maximize their utility function at a level of consumption that is below the maximum achievable one.

For example Camerer et al. (1997) provide evidence about the behavior of NY cab drivers: the authors argue that these are motivated to earn a daily target return. Indeed on hot summer days, when many New Yorkers prefer to take a walk, they earn less per hour and make long hours to reach their target, whereas on rainy, busy, days, while their earnings per hour are very high, they go home early (complacency).
Formally, cmplacency translates into a modification of the traditional form of utility functions with the introduction of non continuous utility functions.
In particular, I will follow Ray (2004) to introduce an *aspiration gap* into preferences; this is defined as follows:

$$g(a,s) \equiv \max\left\{\frac{a-s}{a}, 0\right\} \tag{1}$$

where s is the current standard of living of the individual and a the aspired one. The individual will want to minimize the difference between her actual status and her aspired one rather than just maximize the first. This definition of aspiration gap moreover does not allow for negative gaps, therefore an individual who has reached his desired target will not put any more effort to achieve a higher level.

The way the individual will raise her standard of living towards the aspired one is through some (costly) investment i. A function $\sigma(\cdot)$ that depends on the amount of investment and on the standard of living at time t will determine the standard of living in the following period.
The model thus predicts that the agent will want to minimize the (perhaps weighted) sum of the gap and the cost of the investment, subject to a "a standard of living production function", as follows:

$$\begin{aligned} \min_{i_t} \quad & g(a_t, s_{t+1}) + c(i_t) \\ s.t. \quad & s_{t+1} = \sigma(i_t, s_t) \end{aligned} \tag{2}$$

where the cost of investment, $c(i)$ is an increasing and concave function.

A similar model yields two types of predictions:

1. In the short run people will invest more in education if the aspiration gap is not too large.
2. In the long run people who will accumulate more investment are those who at $t = 0$ were neither too far from their aspiration level (these never invest because the target would be unachievable anyway) nor too close (these will invest in the first few periods and then will be satisfied and stop investing).

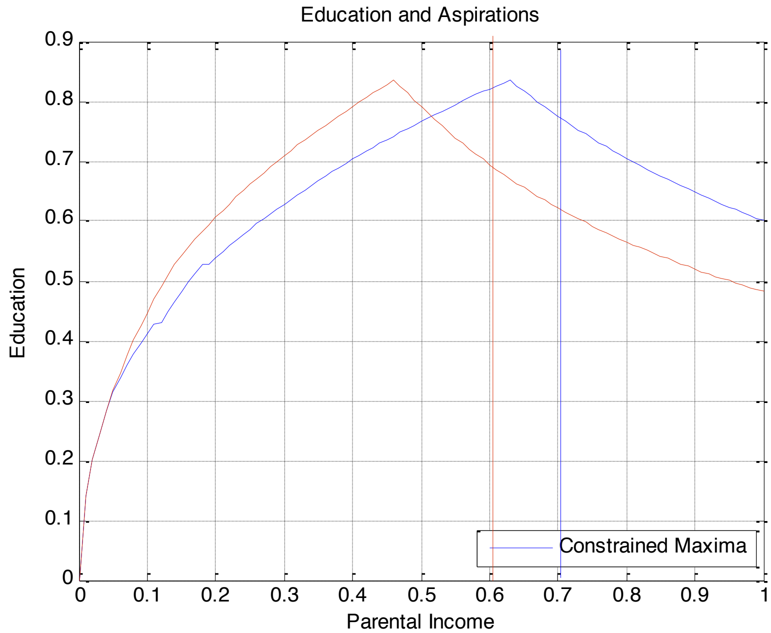
I adapt the model of Ray described above to the choice of schooling. The individual wishes to minimize the sum of her aspiration gap, defined as the difference between the level of income she currently aspires to and her current level of income (presumably the parents' one in the case of teenagers), and the cost of investing in education, knowing that her future income will (positively) depend on her education, her current income and a number of unobservable factors (including her ability):

$$\begin{aligned} \min_{edu_{it}} \quad & \max\left\{\frac{y^a_{it} - y_{it+1}}{y^a_{it}}, 0\right\} + c(edu_{it}) \\ s.t. \quad & y_{it+1} = f(edu_{it}, y_{it}, \epsilon_{it}) \end{aligned} \tag{3}$$

The resulting level of education will be increasing in the level of current (parental) income up to the point in which the aspiration level is reached and then will decrease at a decreasing rate.

Figure 2, for example, shows the optimal level of education to accumulate (vertical axis), given the level of parental income (horizontal axis) and the aspired one (the two vertical lines at 0.6 and 0.7). The cost function assumed is a quadratic one, while the "standard of living production function" is a Cobb Douglas. This simple simulation exercise shows two main features of the model: first, educational investment is highest for those who aspire to a level of income above their parents' but not too far from that; indeed, those who start off from a very low parental income do not invest much in education because they feel that would never allow them to fill the very wide gap between their current status and the aspired one; on the other hand, those whose parents have a level of income above their aspired one will also invest little in education as a consequence of complacency.
Secondly, the simulation shows what happens if aspirations raise: when the aspired level of income shifts from the red to the blue vertical line those with very low parental income invest less in education, while those with middle to high parental income invest more, the increase being maximum for those with middle

Figure 2: Simulated results for two different aspiration levels



parental income and decreasing as parental income grows.

A policy like WP is designed with the purpose of raising pupils' aspirations: psychologists believe that this can be best achieved by introducing pupils to older peers with succesfull educational and professional careers.

This intuition is easily translated in economic terms using the concept, introduced by Ray (2004) of *aspiration window*. This is essentially the reference group with which the individual compares her standard of living: an individual draws her aspirations from the lives, achievements and ideals of those who exist in her aspiration window which will be formed from her cognitive zone, her zone of "similar", "attainable" individuals. This type of aspirations has been defined by Genicot and Ray (2010) as *Local Aspirations With Population Neighborhoods*. For instance, when choosing how much education to obtain, an individual may compare her current and future status only to that of those with a similar family background and thus pose weight only on the surrounding d parental income percentiles of the population; hence j will belong to i's aspiration window only if $|F(y_{jt}) - F(y_{it})| \leq d$, so that:

$$y^a_{it} = \frac{1}{d}\int_{L(y_{it})}^{H(y_{it})} y_{t+1}\ dF(y_{t+1}) \tag{4}$$

where L(y) and H(y) are the appropriately defined edges of the cognitive window for i which depend on i's parental income (y_{it}) and $F(\cdot)$ is the cumulative distribution function of income[9].

Moreover j will fall into i's aspiration window only if i *knows* him, which happens with probability $p(\cdot) < 1$: this further restricts i's aspiration window to a smaller fraction of people with a "close enough" parental background.

$$y_{it}^{a} = \frac{1}{d} \int_{L(y_{it})}^{H(y_{it})} y_{t+1} \; p(y_{t+1}) \; dF(y_{t+1}) \tag{5}$$

When introducing the pupil with a successful role model, i.e. an older student with a similar family background but with a successful schooling and professional career, the policy does not affect the boundaries of the pupil's aspiration window but increases the probability of knowing someone with high income within the window.

In conclusion we expect that a policy like WP, by introducing successful (but similar) role models into the aspiration window of the pupil, shifts the level of aspirations up. This will have an overall positive effect on the schooling choices of targeted youths: a small negative effect on those with very low parental income, a large positive effect on those with middle income and a small positive effect on those with high parental income.

4 Empirical Strategy

As mentioned in section 2, starting from 1999, HEFCE has been allocating WP funds to Higher Education Institutions through the "mainstream formula": funds are distributed pro rata depending on the number of (full time equivalent) students admitted each year and students who are "WP targets" are given a higher weight.

The definition of "WP target students" has changed over time but has always been based on geo-demographic criteria such that students living in the most disadvantaged neighbourhoods would be recipients of the policies aimed at raising their participation to higher education.

[9]To simplify the notation I am implicitly assuming that the distribution of income $F(\cdot)$ is constant across time. Therefore i will aspire to some average of the income (y_{jt+1}) of those whose parents had an income (y_{jt}) close to that of i's parents (y_{it}).

The first geo-demographic partition employed has been a commercial product called "Super-Profiles"[10], which grouped the 1991 census wards into 160 (40 in 1999/2000) clusters based on a wide range of population characteristics. Such clusters were then ranked on the basis of the rate of participation to Higher Education of youths. Those clusters of wards which had a youth participation rate below the national average (32% in 1999) were the "WP target" areas.

From 2004/2005 (until 2007/2008) HEFCE has relied on a different geo-demographic classification, the POLAR (Participation Of Local Areas) system. This was based on the youth participation rate of the 2001 Census wards; England counts 8850 of them with an average adult population size of 4250 people per ward. For each ward HEFCE computed a local youth participation rate referred to the students aged 18-21 in 1997-1999 (HEFCE, 2010); the method of allocation of funds was then based on the quintiles derived from the distribution of such rate across the wards: students living in wards with a local youth participation rate within the two lowest quintiles were assigned a positive weight in the mainstream formula, those living in wards falling in the three highest quintiles would instead receive a weight of zero. This system induces a lot of geographical heterogeneity in the distribution of WP funds within England, figure 3, for example, shows the target areas in London, distinguishing those falling in the lowest quintile from those falling in the second one.

Aim of this paper is to estimate the effect of the WP policies on the schooling choices of the targeted youths (β):

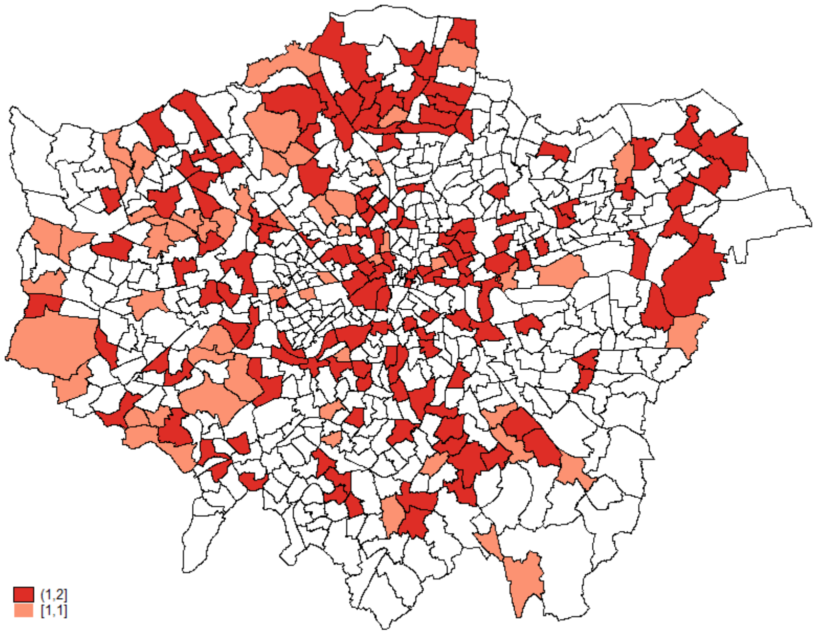
$$S_i = f(YPR_i) + \beta \, WP_i + u_i \tag{6}$$

where S_i is participation to higher education, YPR_i is the local ward youth participation rate computed by HEFCE, $f(\cdot)$ is a continuous function of the youth participation rate, and WP_i is the policy treatment variable.
Although YPR_i will proxy for a lot of individual unobserved heterogeneity, we cannot rule out that the remaining of it is not related to the assignment of treatment, which would thus bias the estimate of β in equation 6.

To get over this endogeneity problem, I will exploit the geographical variation generated by the policy setting to employ a *Sharp Regression Discontinuity Design* (Thistlethwaite and Campbell, 1960) based on the measure of youth participation rate that HEFCE uses to rank the wards and define the target areas.

[10] See HEFCE (2010) for a detailed explanation of the classification.

Figure 3: London Target Areas. 2001 Census wards, by youth participation rate. HEFCE.



Having defined Q_2 as the (upper bound of the) second quintile, the design of the HEFCE funding scheme is such that:

$$WP_i = \mathbb{1}\{YPR_i \leq Q_2\} \tag{7}$$

All students living in a Census ward with a youth participation rate (YPR) *below or equal to* Q_2 will be assigned to the treatment group and all those with a ward youth participation rate *above* such threshold will be assigned to the control group.

The discontinuity in the conditional expectation of the outcome given the covariate will return the *average causal effect of the treatment* at the discontinuity point Q_2.

$$\hat{\beta}_{SRP} = \lim_{YPR \to Q_2^+} E\left(Y_i | YPR_i = ypr\right) \quad - \lim_{YPR \to Q_2^-} E\left(Y_i | YPR_i = ypr\right) \tag{8}$$

The estimates obtained, nevertheless, will need to be interpreted as an *Intention To Treat* effect. Indeed while we have exact information on the criteria which rule the assignment to treatment, we know very little about the actual treatment "subministration". Anecdotal evidence seems to suggest the existence of a lot of heterogeneity in the way Higher Education Institutions choose their target students: some institutions stick to the HEFCE POLAR criterion, while others just target the schools in the closest poorest neighborhoods. Such imperfect compliance does not allow the researcher to estimate the actual effect of the treatment, but only that of the *assignment to treatment*, which gives particularly precious information to policy makers on the effectiveness of the policy design.

In order for the Sharp Regression Discontinuity Design to yield consistent estimates we require the counterfactual conditional distribution of the outcome variable to be smooth in the covariate YPR, i.e. the probability of enrolling into higher education is "continuously" related to the youth participation rate of the census ward of residence. This is not only the reasoning on which the policy design is based, but is also consistent with all the economic literature on mobility and geographical segregation (Kremer, 1997); moreover the wards we analyze are so small that homogeneity within the ward is easily satisfied.
At the same time the covariates need to be orthogonal to the assignment threshold, i.e. it is only the assignment to treatment that "jumps" at the point of discontinuity, while all the other covariates are smooth across the threshold (figures 6 and 8).
Finally there must be no sorting into treatment; this is trivially satisfied in this setting because treatment is defined on the basis of the behavior of older cohorts and the threshold is set at an arbitrary point which cuts the distribution of the population in an explicit manner (figures 7, 9 and 10).

Although I will always show estimates of equation 6 based on both a parametric functional form (for different orders of polynomial) and a non parametric one, the latter will be my most preferred one: I will use a triangular kernel as this has been proved to be optimal for estimating local linear regressions at the boundary (Fan and Gijbels, 1996) and thus returns more precise estimates at the cutoff point.
The bandwidth chosen will be the optimal one derived by Imbens and Kalyanaraman (2010) through cross validation methods and, for robustness, results will always be showed for a bandwidth equal to half and twice the optimal one too. Moreover a graphical analysis will be used to explore the sensitivity of the estimated coefficeint to the bandwidth chosen.

5 Data and descriptive statistics

This paper exploits a wide range of data to test the impact of the WP initiatives, combining information about the supply side, in particular the funding received by the higher education institutions and their activities aimed at recruiting students from low socio economic background, with information about the demand side, such as students' family background and schooling decisions.

The first batch of data comes from HEFCE and provides the youth participation rate for the 1997-1999 cohorts (YPR) and the POLAR partition of the 2001 Census wards computed accordingly.

The HEFCE data are then merged with a number of individual datasets on the basis of the 2001 Census ward where the individual lives. The first individual dataset used is the UK Quarterly Labour Force Survey (QLFS[11]). This contains a large sample of UK households with detailed information on the household's composition, activities and assets.

I build a sample of individuals who have been in secondary school between 2004 and 2008 and are older than 18 at the time of survey, these will be students born after September 1986 and before 1992. For these students I build a measure of whether they have dropped out of education at age 16 (compulsory schooling age) and an indicator of whether they have further on enrolled to a higher education institution at age 18. I also keep some information on the household's characteristics, such as the level of parental income and education.

Table 1 provides some descriptive statistics about this sample of individuals and compares the treatment with the control group: as expected the treatment group is composed of families which are less affluent and less educated and their pupils have lower education and worse achievements than those in the control group. On the other hand, as mentioned in section 4, the assumption on which the Regression Discontinuity Design hinges is not that the two groups are similar, but that their differences are continous across the threshold. In figure 6 I show the distribution of two key observable characteristics, parental income and mother's education, across the threshold; it is clear that while both variables are strongly positively related to the forcing variable (YPR), their distribution remain smooth at the discontinuity point.

Finally figure 7 plots the distribution of the forcing variable in the sample: the smoothness of this histogram confirms that there is no sorting into treatment.

A second source of data is then the Longitudinal Study of Young People in England (LSYPE[12]), a panel dataset managed by the Department for Education (DfE), which follows a (sample of a) cohort of pupils from the age of 13 until 20 (so far). Despite being smaller than the QLFS and covering a single cohort of students, the LSYPE brings a number of advantages to the researcher as it contains very detailed information about the pupils' family background, their schooling achievements, including grades, and their attitudes and aspirations. This last piece of information is particularly precious for this study as the channel through

[11] Office for National Statistics (2012)

[12] Department for Education and National Centre for Social Research (2012)

which the policy analyzed should act is exactly that of raising youths' aspirations and through these their schooling achievements.

The LSYPE further allows us to track progression in education of pupils at age 16 and 18 as the QLFS does, thus providing scope for a test of robustness of the results obtained with the QLFS.

As for the QLFS, the LSYPE is merged with the HEFCE data through the home address of the child's family linking each household to the corresponding Census ward and hence youth participation rate and treatment or control group.

Table 2 reports some descriptive statistics about the LSYPE sample highlighting the main differences between the treatment and the control group: as for the QLFS in table 1, it is clear that students in the treatment group come from low SES, with significantly less educated and poorer parents. Moreover it appears that they mainly come from urban, non London, areas which is consistent with the sociological literature that identifies in the industrial cities of the northern part of the country the main origin of the most disadvantaged youths. Finally the table highlights that pupils in the treatment group have lower aspirations, measured as stated likelihood of applying to a higher education institution on a 4 points scale.

In order to ensure that the assignment to the WP policy is the only observable characteristics that "jumps" at the discontinuity point, I again plot the distribution of parental income and of mother's education across the threshold (figure 8); while figure 9 provides evidence that there is no sorting into treatment among the sampled individuals.

Finally, I use data from the National Pupil Database (NPD[13]) to estimate whether the policy further had an impact on pupils achievements at Key Stage 4 (age 16) and Key Stage 5 (age 18). The advantage of the NPD is that it covers the full population[14] thus giving us very robust results. On the other hand, these data do not contain any background information about the pupil's household but only a detailed record of her educational achievements.

Some descriptive statistics from the NPD sample employed are reported in table 3. Once again they confirm that targeted students are poorer (there is indeed a higher share among them of free school meal eligible children) and obtain lower grades throughout all their school career. Figure 10 confirms that assignment to treatment is exogenously imposed and individuals have no ability to manipulate it.

[13]Department for Education (2012)

[14]I have the data related to the cohort born in 1989/1990, the same from which a sample has been followed in the LSYPE.

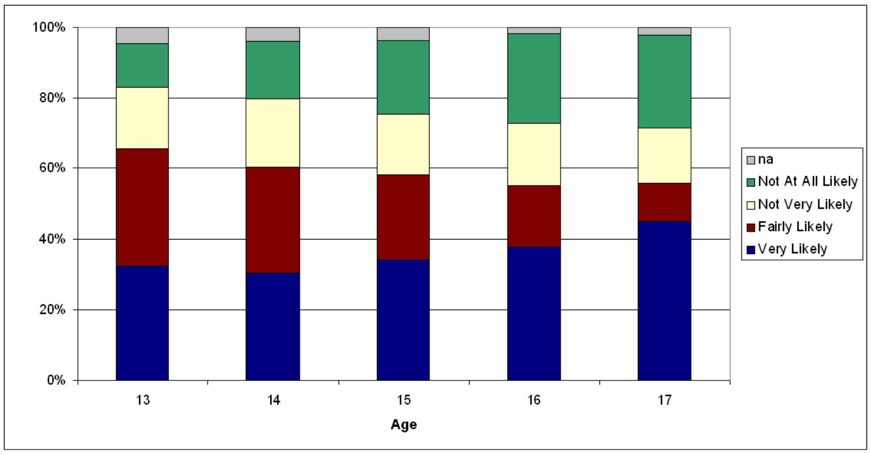
6 Results

6.1 Aspirations

The first variable of interest is a proxy for aspirations. In each wave of the LSYPE, youths are asked to state how likely they are of applying to university; they are given four options: "very likely", "fairly likely", "not very likely" and "not at all likely".

This question is asked to the pupils every year until they reach age 18 and their answers show a good variability over time, getting more polarized as the youths grow older (figure 4).

Figure 4: Likelihood of applying to university at age 18. LSYPE waves 1-5.



In order to estimate equation 6, I reshape this "aspirations" variable as a dichotomous one, giving value one if the pupil states she is either very or fairly likely to apply and 0 if she says she is not very or not at all likely to apply. Observations are pooled over time for the same individual and standard errors are clustered at the individual level.

Figure 11 shows the jump at the discontinuity in the probability of stating to be likely to apply to university of about 4.5 percenatege points over a baseline probability of 63.5%.

Detailed results are reported in table 4, these are robust to functional form specification (order of polynomial and non parametric specification) and magnitude of the bandwidth. Indeed the results reported in table 11 employ an optimal bandwidth computed as in Imbens and Kalyanaraman (2010) together with its half and its double and figure 12 shows the sensitivity of the result to the choice of the bandwidth, revealing how a small bandwidth returns more imprecise, yet less biased, estimates.

6.2 Drop out at 16

The crucial point of the policy though is to assess whether such improved aspirations translate into an effective increase in the share of pupils continuing education to university. I thus first estimate whether there is an increase in the probability of staying on in education after the compulsory school leaving age of 16. After 16, having passed the GCSE examinations, students can stay in education and obtain the A-levels which will allow them to get into university, obtain a degree of further education, or drop out of full time education.
I thus estimate a version of equation 6 in which the outcome is a binary variable that equals one if the student stays on in full time education after age 16 and 0 if he drops out. Such indicator is built from both the QLFS data and the LSYPE and presents a similar distribution in the two datasets (tables 1 and 2).

The estimate of the effect of the WP policies obtained through regression discontinuity reveals a positive significant increase in the probability of staying on in education after age 16; as shown in the two panels of figure 13 this jump is slightly lower in the QLFS sample than in the LSYPE one, tables 5 and 6 confirming that the effect amounts to 3.2 percentage points in the QLFS and 4.5 percentage points in the LSYPE, from a baseline of respectively 68.6% and 64.2% and is robust to the various specification checks.

6.3 Higher Education Participation

The final outcome of interest, the target of the WP policies, is then participation to full time higher education, i.e. college and university. I use again both the data from the QLFS and those from the LSYPE to estimate the effect of the treatment on the probability of enrolling to university.
As shown in figure 15, the jump generated by the policy is not anymore significant, neither with the QLFS nor with the LSYPE data. Such jump is estimated to be around 0.6 to 0.7 percentage points on both datasets (respectively from a baseline of 39.1% and 41.6%).

This finding casts a shadow on the efficacy of the WP policies: it shows that increased aspirations may well translate into a lower rate of drop out at age 16, but do not automatically generate an increase in participation to university. It is therefore reasonable to expect there to be other factors hampering the participation to higher education of pupils from low socio economic background.

6.4 Grades

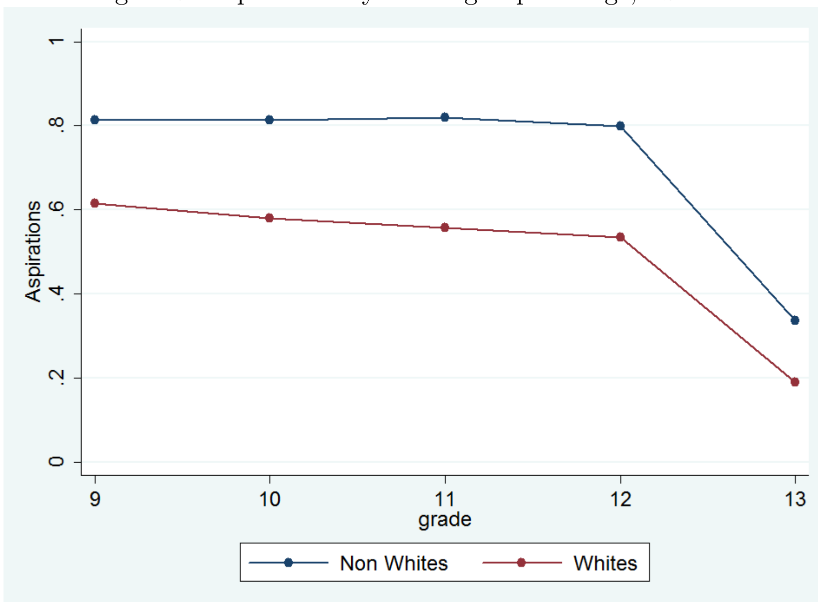
The finding for which the increased desire to go to university induced by the WP policies does not translate into an increased rate of actual enrollment suggests that there may be factors, other than the lack of aspirations, which prevent pupils from low socio economic background from entering university.
A widespread idea is that neither aspirations nor credit constraints are the main obstacles to participation to higher education. This would rather be caused by accumulated deficiencies in human capital development; as mentioned in section 1, it is widely recognized that cognitive abilities are entirely developed before teenagehood (Heckman, 1999). To the extent that non cognitive abilities, such as ambition and motivation, cannot fully substitute for cognitive ability and preparation, then it is hard to imagine that an intervention focused on the first ones may actually generate a significant change.

Many scholars in the UK, argue that participation to higher education will not be *widened* unless universities losen the criteria on which they select their students; such criteria would be set so high that students from low socio economic background, who have been exposed to a poor cultural environment from the earliest childhood, would not gain the sufficient requirements to be admitted.
If the raise of aspirations and injection of motivation induced by the WP policies does not improve the performance of targeted students, then these would just not get into university.
I investigate this hypothesis through the analysis of the NPD data: estimating the treatment effect on pupils' achievements, I find that the policy did neither increase the probability of getting 5 or more A*-C grades at GCSE, which is the formal requirement for getting into university, nor the number of A-levels obtained by age 18. The results are illustrated in figures 17 and 18 and detailed in table 9.

6.5 Heterogeneous Effects

Heterogeneous effects are first investigated with respect to the student's ethnicity. The idea for which WP policies should target under-represented groups turns out to be at odds with that of targeting ethnic minorities. Indeed numerous studies in the UK have showed that the most severely under represented group in higher education in the UK is that of white boys.
All the results showed in the paper have thus been re estimated splitting the sample between white and non-white students (table 10). The estimates reveal that indeed the largest effect of the WP policies is observed on white students. This is consistent with the descriptive evidence from the LSYPE which clearly show that white students have lower aspirations than non white students (figure 5).

Figure 5: Aspirations by ethnic group and age, LSYPE.



When looking at the distribution of the effects depending on parental income, I find that the increase in aspirations and continuation rates at age 16 is concentarted among pupils belonging to middle income familes (thise in the second and third quantiles of the parental income distribution[15]). This result is very much in line with the predictions of the model sketched in section 3 which predicted that the raise of aspirations would mostly increase scooling for those belonging to middle income families who will be neither too much below the aspired standard of living, therefore giving up their aspirations, nor too close, therefore being quickly satisfied.

On the other hand, the results on participation to higher education at age 18 reveal a positive significant effect only on those pupils who belong to high income familes (7 percentage points more likely to enroll to university from a baseline of 33.2% in the QLFS and 12 percentage points from a baseline of 45.7% in the LSYPE): this result seems to point at the existence of credit constraints which do bind for a fraction of the population (those with middle income, whose aspirations are raised by the policy, but still do not continue to higher education when 18).

[15]The distribution of parental income in the LSYPE cannot be split in more than for quantiles because income is top coded and the highest bin contains about a quarter of the population.

7 Conclusions

This paper has exploited a natural experiment to implement a sharp regression discontinuity design and identify the effects of the "Widening Participation" policies on the aspirations and eventual schooling choices of english teenagers. The policy aims at raising the aspirations of pupils from under represented groups in order to encourage their participation to higher education.

The empirical analysis is coupled with a theoretical model, designed on the grounds of Ray (2004) and Genicot and Ray (2010) which explains the effect of aspirations on schooling choices and the way the policy can shape such aspirations: individuals wish to minimize the "aspiration gap", i.e. the difference between their status and that they aspire to. The latter comes from their reference group, or "aspiration window". The meetings with mentors from university or the visits of pupils to university campuses introduce in such windows new successful models. This mechanism leads to the modification of the aspiration window and consequently of their behavior.

The results obtained have shown that a policy like WP proves succesful at raising the aspirations of the targeted pupils, who consequently, increasingly tend to remain in full time education after the compulsory school leaving age of 16. Still this effect does not translate into an effective increase in participation to higher education (university) at age 18.

Such "failure" would mainly be due to the insufficient accumulation of abilities of students from low SES: the gap generated during childhood tends to widen up during teenagehood; as a consequence, pupils from disadvantaged family backgrounds do not manage to compete with other students to gain admission to higher education institutions. As a matter of facts, the results obtained from the administrative data (NPD) show that the Widening Particpation policies had no impact on the preparation of the targeted students thus not reducing the ability gap between low and high SES students.

Finally the result that the policy only increases university enrollment for pupils from more affluent families points at the existence of credit constraints, whose relaxation must complement the raise of aspirations in order to truly achieve a widening of participation into higher education.

The results of this paper naturally have limited external validity because of the estimation strategy employed which does give very precise estimates, but only of a *local* effect (on individuals around the discontinuity point).

Still this paper provides very meaningful and new insights on the mechanisms which rule individuals' schooling choices being the first to test the impact of a nation wide programme that aims at increasing education by acting on pupils' non cognitive traits, such as aspirations and motivation. The inclusion of these elements in a model of schooling choice seems to have been too long neglected by economists in contrast with the primary role that politicians have been assigning to them. The significant effects found in this paper confirm the need to put more attention on the role of non cognitive abilities and show that there is scope for policy makers to increase participation to higher education among teenages from disdvantaged background by "manipulating" their non cognitive traits.

8 Tables and Figures

Table 1: Descriptive Statistics for QLFS sample.

	Full Sample	Treatment	Control	T-C
Female	0.494	0.500	0.492	0.008 **
	(0.500)	(0.500)	(0.500)	
White share	0.846	0.843	0.847	-0.004
	(0.361)	(0.364)	(0.360)	
London	0.103	0.0680	0.119	-0.051 ***
	(0.304)	(0.252)	(0.323)	
Post 16 education	0.682	0.625	0.725	-0.1 ***
	(0.466)	(0.484)	(0.447)	
Higher Education	0.339	0.337	0.341	-0.004
	(0.473)	(0.473)	(0.474)	
GCSE grade A-C or equivalent	0.00869	0.00474	0.0104	-0.00566 ***
	(0.0928)	(0.0687)	(0.101)	
Log parental income	5.888	5.806	5.918	-0.111 ***
	(0.778)	(0.724)	(0.794)	
Father post-16 education	0.371	0.261	0.412	-0.151 ***
	(0.483)	(0.439)	(0.492)	
Mother post-16 education	0.420	0.296	0.464	-0.168 ***
	(0.494)	(0.456)	(0.499)	

Mean Coefficients. Standard Deviations in parentheses

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Figure 6: Distribution of main covariates across the discontinuity threshold. QLFS.

Figure 7: Distribution of the forcing variable in the sample. QLFS.

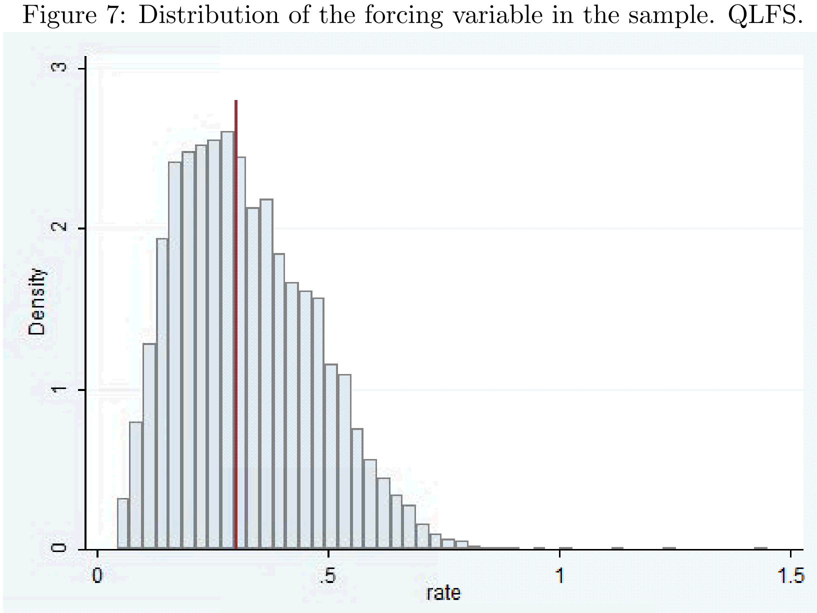


Table 2: Descriptive Statistics for LSYPE sample.

	Full Sample	Treatment	Control	T-C
Female	0.485	0.489	0.480	0.0134 *
	(0.500)	(0.500)	(0.500)	
White	0.877	0.878	0.876	0.002
	(0.328)	(0.328)	(0.329)	
Urban	0.796	0.907	0.69	0.217 ***
	(0.403)	(0.29)	(0.463)	
London	0.106	0.0721	0.139	-0.0669 ***
	(0.308)	(0.259)	(0.346)	
English Firts Language	0.941	0.944	0.939	0.005
	(0.235)	(0.23)	(0.239)	
Size of Household	4.315	4.327	4.304	0.023
	(1.25)	(1.333)	(1.165)	
Likelihood of applying to university	2.876	2.718	3.023	-0.305 ***
	(1.013)	(1.033)	(0.971)	
Post-16 Education	0.641	0.540	0.732	-0.192 ***
	(0.480	(0.498)	(0.443)	
Higher Education	0.399	0.284	0.499	-0.214 ***
	(0.490)	(0.450)	(0.451)	
log Parental Income	3.053	2.976	3.123	-0.147 ***
	(0.541)	(0.55)	(0.523)	
Father Post-16 Education	0.443	0.331	0.537	-0.206 ***
	(0.497)	(0.471)	(0.499)	
Mother Post-16 Education	0.369	0.273	0.46	-0.187 ***
	(0.482)	(0.445)	(0.498)	

Mean Coefficients. Standard Deviations in parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Figure 8: Distribution of main covariates across the discontinuity threshold. LSYPE.

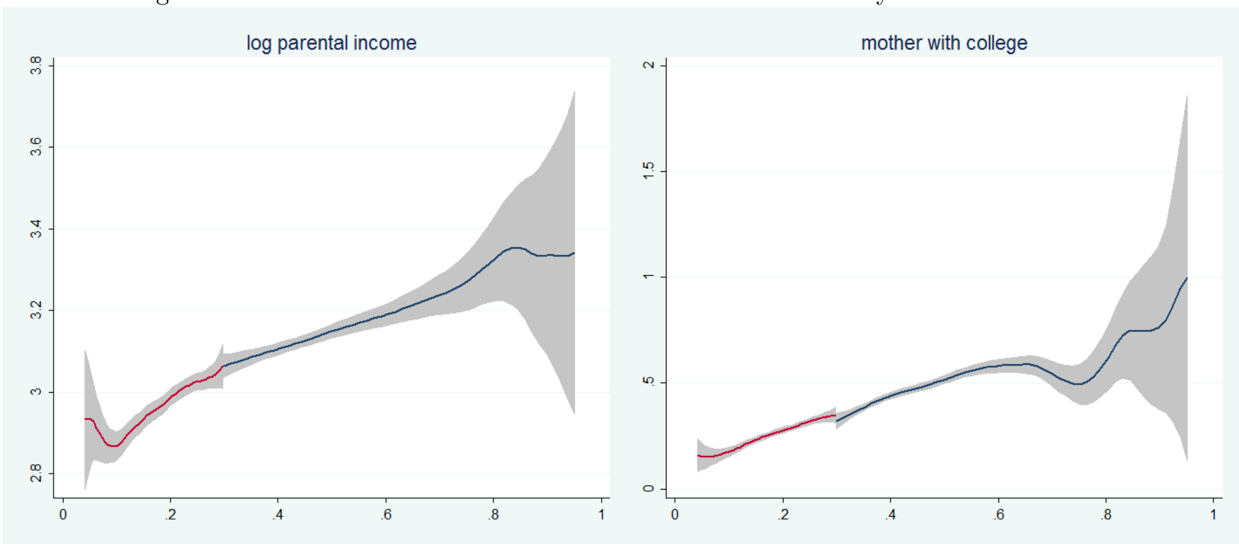


Figure 9: Distribution of the forcing variable in the sample. LSYPE.

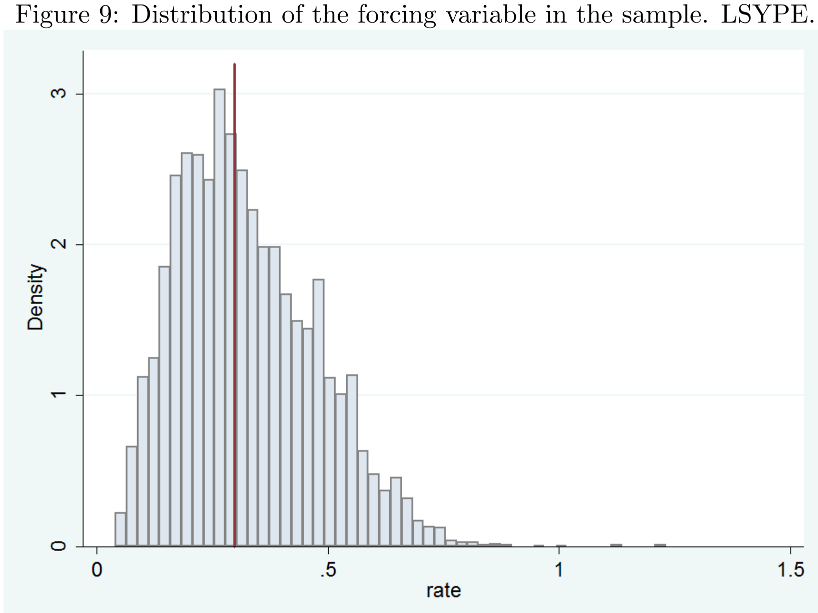


Table 3: Descriptive Statistics for NPD sample.

	Full Sample	Treatment	Control	T-C
N	661,265	315,843	345,422	
Female share	0.486 (0.500)	0.488 (0.500)	0.485 (0.500)	0.003**
White	0.806 (0.395)	0.819 (0.385)	0.792 (0.406)	0.026***
Free School Meal Eligibility	0.160 (0.367)	0.219 (0.413)	0.0976 (0.297)	0.118***
Number of A levels	2.722 (1.606)	2.306 (1.667)	2.886 (1.526)	-0.58***
Key Stage 4 A*	0.388 (1.298)	0.168 (0.858)	1.213 (1.606)	-0.362***
Key Stage 3 total points (of 141)	97.925 (27.10)	91.702 (27.37)	103.084 (25.69)	-11.382***
Key Stage 2 English mark	59.93 (14.47)	57.01 (14.58)	62.56 (13.86)	-5.56***

Mean Coefficients. Standard Deviations in parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Figure 10: Distribution of the sample across the discontinuity threshold. NPD.

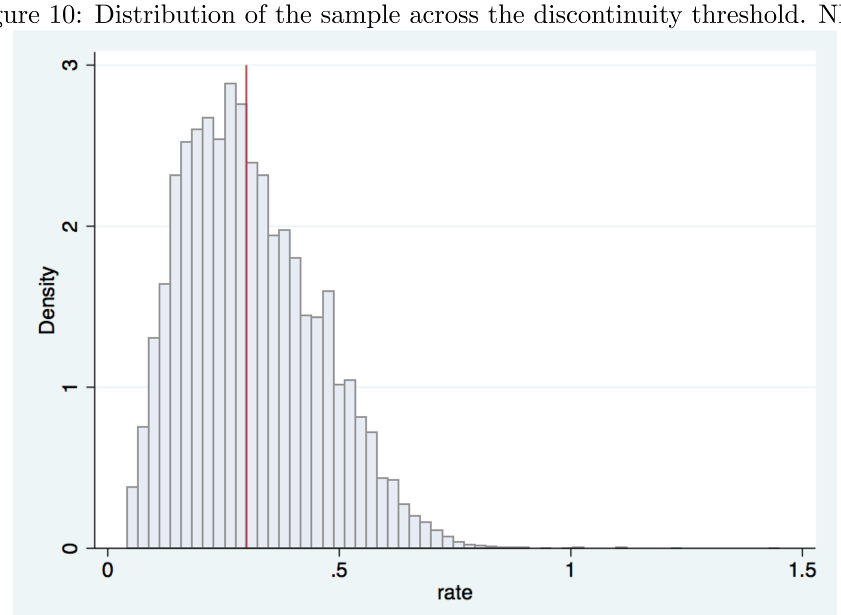


Figure 11: Aspirations: probability of stating to be likely to apply to university.

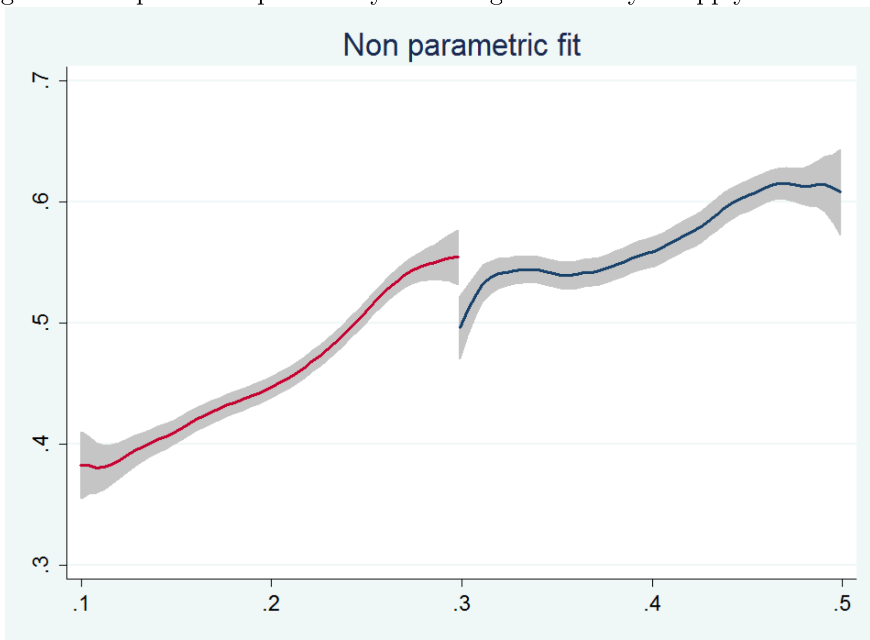


Figure 12: Aspirations: estimate of the WP effect depending on the choice of the bandwidth.

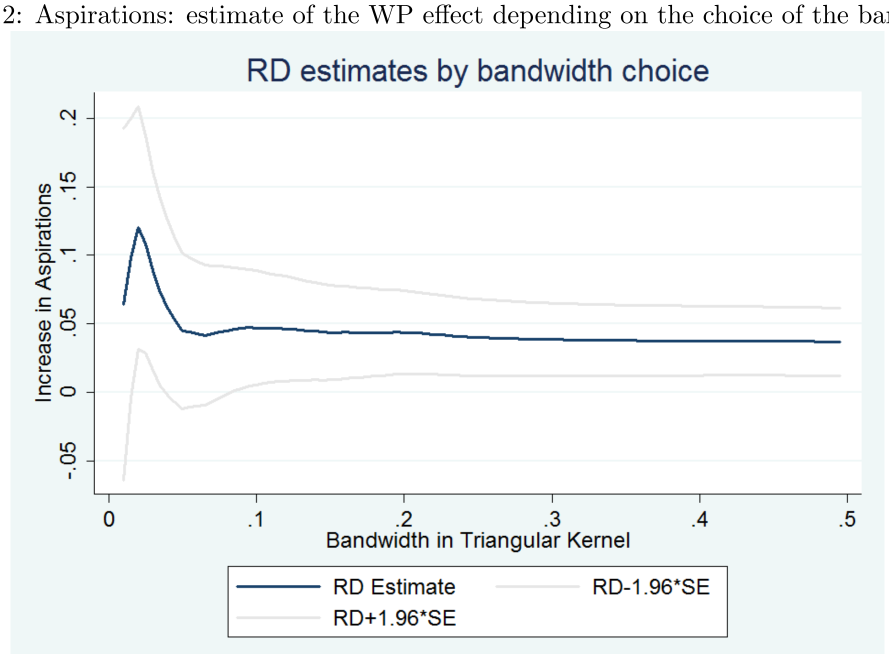


Table 4: Aspirations: probability of stating to be likely to apply to university.

	Parametric specification			Non parametric specification		
	First Order Polynomial	Second Order Polynomial	Third Order Polynomial	Optimal Bandwidth	1/2 Optimal Bandwidth	2 Optimal Bandwidth
WP	0.050***	0.048***	0.044***	0.0439**	0.0436*	0.0387**
	(0.007)	(0.010)	(0.014)	(0.0175)	(0.0243)	(0.0134)
YPR	0.336***	0.048	-0.200			
	(0.035)	(0.127)	(0.301)			
WP × YPR	0.737***	1.301***	1.642***			
	(0.057)	(0.204)	(0.487)			
YPR^2		1.079**	3.362			
		(0.457)	(2.554)			
$WP \times YPR^2$		0.205	-1.041			
		(0.848)	(4.681)			
YPR^3			-5.464			
			(6.012)			
$WP \times YPR^3$			8.498			
			(12.786)			
Observations	60452	60452	60452	63338	63338	63338
Bandwidth				0.146	0.073	0.292
R-squared	0.0192	0.0194	0.0194			

* Standard Errors in parentheses. Non parametric spcification isa triangular Kernel weighted local polynomial smoothing. Optimal bandwidth is computed according to Imbens and Kalyanaraman (2010).

Figure 13: Probability of staying on in full time education at age 16, QLFS and LSYPE.

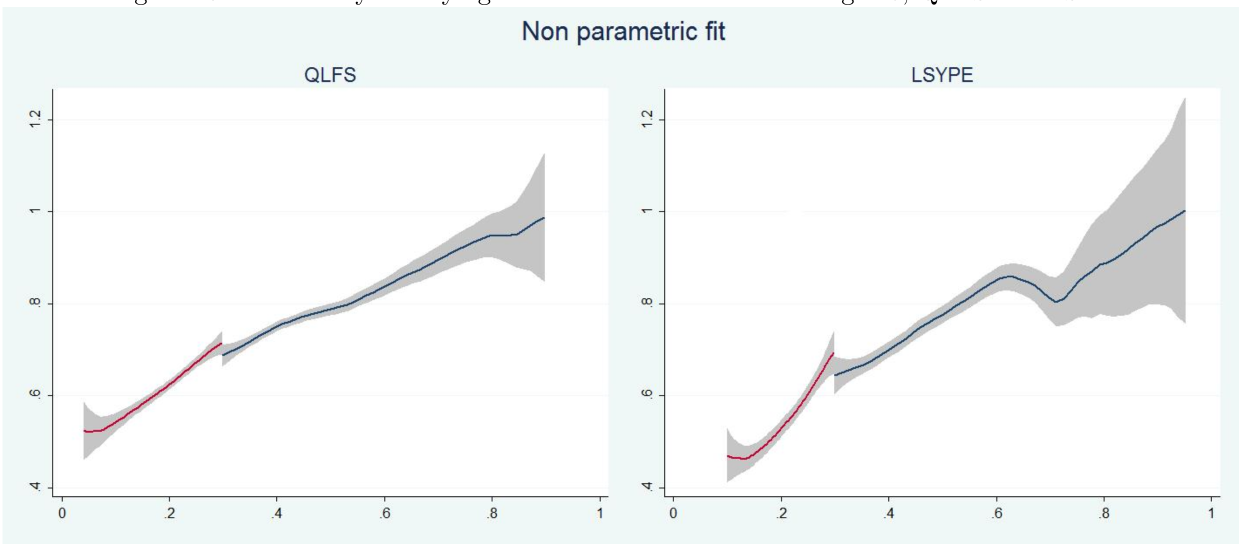


Figure 14: Probability of staying on in full time education at age 16: estimate of the WP effect depending on the choice of the bandwidth, QLFS and LSYPE.

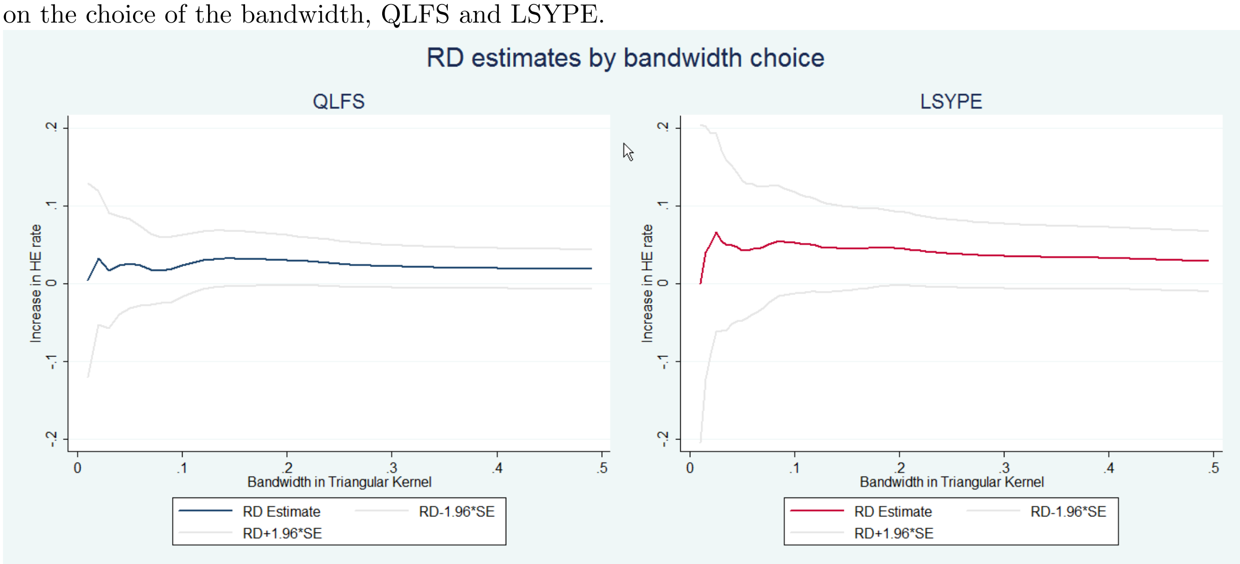


Table 5: Probability of staying on in full time education at age 16, QLFS.

	Parametric specification			Non parametric specification		
	First Order Polynomial	Second Order Polynomial	Third Order Polynomial	Optimal Bandwidth	1/2 Optimal Bandwidth	2 Optimal Bandwidth
WP	0.016	0.040***	0.037*	0.032**	0.018	0.021*
	(0.011)	(0.015)	(0.020)	(0.014)	(0.019)	(0.011)
YPR	0.451***	0.837***	0.903*			
	(0.055)	(0.196)	(0.466)			
WP × YPR	0.425***	0.280	-0.060			
	(0.084)	(0.298)	(0.716)			
YPR^2		-1.488**	-2.050			
		(0.707)	(3.938)			
$WP \times YPR^2$		2.545**	0.182			
		(1.212)	(6.714)			
YPR^3			1.436			
			(9.241)			
$WP \times YPR^3$			-9.947			
			(17.917)			
Observations	20364	20364	20364	25365	25365	25365
Bandwidth				0.164	0.082	0.328
R-squared	0.0283	0.0285	0.0285			

* Standard Errors in parentheses. Non parametric spcification isa triangular Kernel weighted local polynomial smoothing. Optimal bandwidth is computed according to Imbens and Kalyanaraman (2010).

Table 6: Probability of staying on in full time education at age 16, LSYPE.

	Parametric specification			Non parametric specification		
	First Order Polynomial	Second Order Polynomial	Third Order Polynomial	Optimal Bandwidth	1/2 Optimal Bandwidth	2 Optimal Bandwidth
WP	0.034**	0.054**	0.063**	0.0452*	0.0499	0.0356*
	(0.016)	(0.023)	(0.030)	(0.027)	(0.038)	(0.021)
YPR	0.553***	0.427	0.303			
	(0.077)	(0.280)	(0.665)			
WP × YPR	0.603***	1.452***	2.154**			
	(0.128)	(0.455)	(1.087)			
YPR^2		0.469	1.608			
		(1.003)	(5.619)			
$WP \times YPR^2$		2.912	8.164			
		(1.895)	(10.431)			
YPR^3			-2.719			
			(13.197)			
$WP \times YPR^3$			21.428			
			(28.257)			
Observations	10543	10543	10543	11071	11071	11071
Bandwidth				0.149	0.074	0.298
R-squared	0.0401	0.0406	0.0406			

* Standard Errors in parentheses. Non parametric spcification isa triangular Kernel weighted local polynomial smoothing. Optimal bandwidth is computed according to Imbens and Kalyanaraman (2010).

Figure 15: Probability of enrolling to a Higher Education Institution, QLFS and LSYPE.

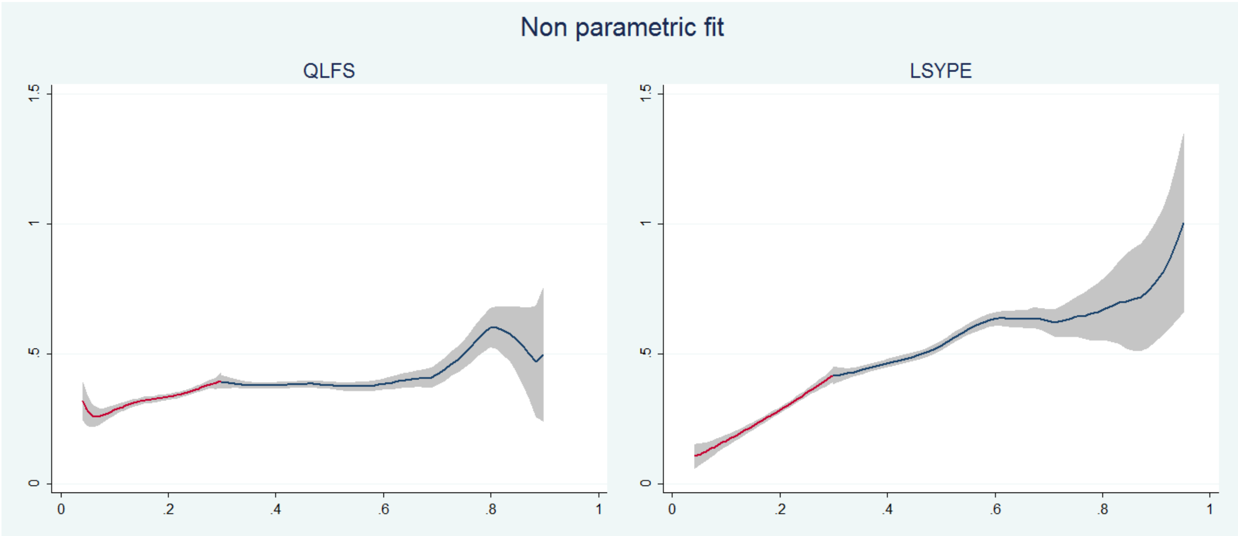


Figure 16: Probability of enrolling to a Higher Education Institution: estimate of the WP effect depending on the choice of the bandwidth, QLFS and LSYPE.

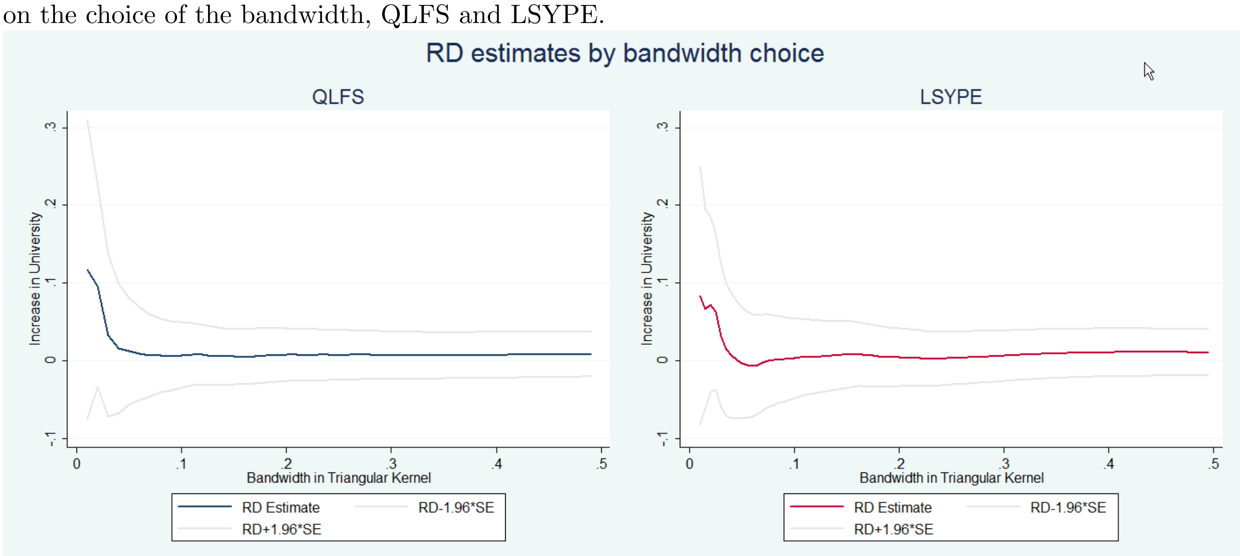


Table 7: Probability of enrolling to a Higher Education Institution at age 18, QLFS.

	Parametric specification			Non parametric specification		
	First Order Polynomial	Second Order Polynomial	Third Order Polynomial	Optimal Bandwidth	1/2 Optimal Bandwidth	2 Optimal Bandwidth
WP	0.002	0.010	-0.003	0.006	0.007	0.007
	(0.011)	(0.015)	(0.020)	(0.015)	(0.022)	(0.012)
YPR	-0.058	0.073	-0.783			
	(0.052)	(0.187)	(0.446)			
WP × YPR	0.559***	0.495*	1.671**			
	(0.082)	(0.291)	(0.698)			
YPR^2		-0.485	7.285*			
		(0.667)	(3.739)			
$WP \times YPR^2$		0.792	-3.506			
		(1.185)	(6.559)			
YPR^3			-18.420**			
			(8.723)			
$WP \times YPR^3$			28.415			
			(17.574)			
Observations	27968	27968	27968	29210	29210	29210
Bandwidth				0.131	0.06	0.328
R-squared	0.0042	0.0042	0.0042			

* Standard Errors in parentheses. Non parametric spcification isa triangular Kernel weighted local polynomial smoothing. Optimal bandwidth is computed according to Imbens and Kalyanaraman (2010).

Table 8: Probability of enrolling to a Higher Education Institution at age 18, LSYPE.

	Parametric specification			Non parametric specification		
	First Order Polynomial	Second Order Polynomial	Third Order Polynomial	Optimal Bandwidth	1/2 Optimal Bandwidth	2 Optimal Bandwidth
WP	0.034**	0.002	0.035	0.007	-0.002	0.005
	(0.011)	(0.015)	(0.020)	(0.015)	(0.022)	(0.017)
YPR	0.585***	-0.184	1.090			
	(0.065)	(0.238)	(0.567)			
WP × YPR	0.824***	1.580***	0.610			
	(0.112)	(0.398)	(0.953)			
YPR^2		2.852***	-8.753*			
		(0.849)	(4.761)			
$WP \times YPR^2$		-2.917*	12.097			
		(1.680)	(9.275)			
YPR^3			27.583**			
			(11.136)			
$WP \times YPR^3$			-17.482			
			(25.719)			
Observations	16241	16241	16241	17116	17116	17116
Bandwidth				0.138	0.069	0.276
R-squared	0.0468	0.0474	0.0478			

* Standard Errors in parentheses. Non parametric spcification isa triangular Kernel weighted local polynomial smoothing. Optimal bandwidth is computed according to Imbens and Kalyanaraman (2010).

Figure 17: Effect om achievements. NPD.

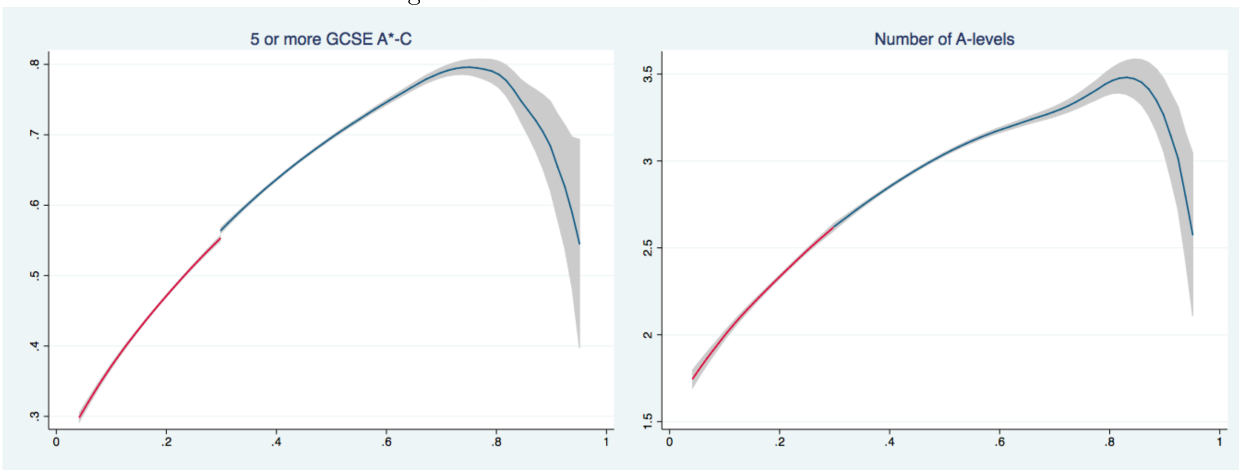


Figure 18: Academic achievements: estimate of the WP effect depending on the choice of the bandwidth.

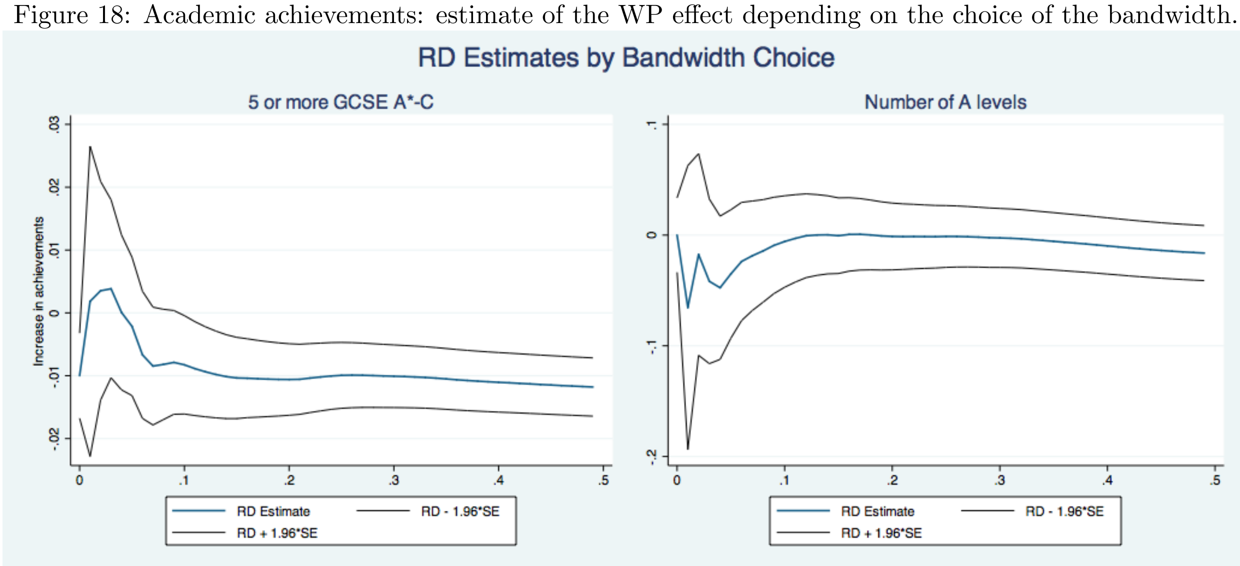


Table 9: Achievements: probability of getting 5 or more GCSE A*-C and number of A-levels passed. NPD.

	Parametric specification			Non parametric specification		
A. 5 or more GCSE A*-C	First Order Polynomial	Second Order Polynomial	Third Order Polynomial	Optimal Bandwidth	1/2 Optimal Bandwidth	2 Optimal Bandwidth
WP	-0.010***	-0.017***	-0.008*	-0.00999***	-0.00831*	-0.00993***
	(0.002)	(0.003)	(0.004)	(0.00339)	(0.00476)	(0.00256)
YPR	0.624***	0.849***	1.029***			
	(0.012)	(0.042)	(0.100)			
$WP \times YPR$	0.309***	-0.356***	-0.268*			
	(0.018)	(0.064)	(0.154)			
YPR^2		-0.841***	-2.489***			
		(0.152)	(0.847)			
$WP \times YPR^2$		-1.165***	3.393**			
		(0.261)	(1.442)			
YPR^3			3.930**			
			(1.988)			
$WP \times YPR^3$			4.417			
			(3.846)			
Observations	588,361	588,361	588,361	608690	608690	608690
Bandwidth				0.136	0.068	0.272
R-squared	0.0436	0.0437	0.0438			
B. Number of A-levels						
WP	-0.003	-0.021	0.010	1.15e-05	0.0160	0.00294
	(0.012)	(0.018)	(0.023)	(0.0168)	(0.0235)	(0.0132)
YPR	2.028***	2.568***	3.143***			
	(0.054)	(0.202)	(0.488)			
$WP \times YPR$	1.124***	-0.714**	-0.261			
	(0.104)	(0.362)	(0.851)			
YPR^2		-1.955***	-7.046*			
		(0.702)	(3.999)			
$WP \times YPR^2$		-4.451***	12.551			
		(1.582)	(8.429)			
YPR^3			11.894			
			(9.198)			
$WP \times YPR^3$			24.193			
			(23.906)			
Observations	223,132	223,132	223,132	236,283	236,283	236,283
Bandwidth				0.155	0.077	0.310
R-squared	0.0379	0.0380	0.0380			

* Standard Errors in parentheses. Non parametric spcification isa triangular Kernel weighted local polynomial smoothing. Optimal bandwidth is computed according to Imbens and Kalyanaraman (2010).

Table 10: Heterogeneous effects by ethnicity.

	Non parametric specification		
	All	White	Non White
Likely to apply to university (LSYPE)	0.0439**	0.0361*	0.0455
	(0.0175)	(0.0201)	(0.0328)
	[0.146]	[0.143]	[0.095]
	63338	*43280*	*19720*
Continue Education at age 16 (QLFS)	0.0345*	0.0320**	-0.009
	(0.014)	(0.018)	(0.037)
	[0.164]	[0.116]	[0.101]
	25364	*21861*	*3504*
Continue Education at age 16 (LSYPE)	0.0452*	0.0443	0.001
	(0.027)	(0.032)	(0.054)
	[0.149]	[0.141]	[0.095]
	11071	*7708*	*3344*
Enrolled to University at age 18 (QLFS)	0.006	0.018	-0.059*
	(0.015)	(0.020)	(0.032)
	[0.131]	[0.130]	[0.200]
	29210	*25164*	*4046*
Enrolled to University at age 18 (LSYPE)	0.007	-0.013	0.051
	(0.022)	(0.024)	(0.063)
	[0.138]	[0.138]	[0.077]
	17116	*12080*	*5015*
5 or more GCSE A*-C (NPD)	-0.00999***	-0.0123***	0.00365
	(0.00339)	(0.00410)	(0.00914)
	0.136	0.118	0.0814
	608690	*490753*	*117937*
Number of A-levels (NPD)	1.15e-0.5	-0.0110	0.0807
	(0.0168)	(0.0218)	(0.0493)
	[0.155]	[0.123]	[0.0647]
	236283	*187096*	*49187*

* Standard Errors in parentheses; optimal bandwidth computed according to Imbens and Kalyanaraman (2010) in brackets; number of observations in italics.

Table 11: Heterogeneous effects by income quantile.

	Non parametric specification				
	Q1	Q2	Q3	Q4	Q5
Likely to apply to university (LSYPE)	0.0325 (0.038) [0.177] *12120*	0.0647* (0.036) [0.103] *12397*	0.0565* (0.034) [0.122] *13245*	0.0407 (0.038) [0.120] *10255*	
Continue Education at age 16 (QLFS)	0.0246 (0.067) [0.108] *1727*	0.0340 (0.063) [0.127] *1720*	0.138** (0.065) [0.116] *1667*	-0.001 (0.045) [0.221] *1883*	0.0422 (0.044) [0.151] *2254*
Continue Education at age 16 (LSYPE)	0.033 (0.058) [0.231] *2040*	0.096* (0.047) [0.180] *1888*	0.021 (0.048) [0.145] *2299*	0.028 (0.045) [0.162] *2267*	
Enrolled to University at age 18 (QLFS)	-0.011 (0.050) [0.202] *2076*	-0.045 (0.043) [0.284] *2064*	-0.039 (0.055) [0.142] *2023*	-0.036 (0.057) [0.111] *2319*	0.074* (0.043) [0.195] *2909*
Enrolled to University at age 18 (LSYPE)	-0.01 (0.056) [0.111] *2951*	0.059 (0.049) [0.128] *3186*	-0.003 (0.044) [0.138] *3824*	0.123* (0.063) [0.100] *3251*	

* Standard Errors in parentheses; optimal bandwidth computed according to Imbens and Kalyanaraman (2010) in brackets; number of observations in italics.

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