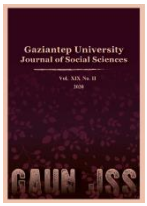

GAZİANTEP UNIVERSITY
JOURNAL OF SOCIAL SCIENCES

Journal homepage: http://dergipark.org.tr/tr/pub/jss

Araştırma Makalesi ● Research Article

The Impact of Education on Happiness and Wellbeing in a Middle-Income Country: The Case of Turkey

Orta Gelirli Bir Ülkede Eğitimin Mutluluk ve Refah Üzerindeki Etkisi

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ARTICLE INFO

Article History:
Received: September 20, 2024
Accepted: December 18, 2024

Keywords:
Turkey,
Education reform,
Happiness,
Welfare,
Difference in difference.
JEL Codes: H51; H52; I12; I26

ABSTRACT

This study analyses the causal relationship between education and subjective well-being by utilizing the 1997 educational reform in Turkey, which extended compulsory schooling from five to eight years. While the existing literature widely acknowledges the positive effects of education on employment opportunities, income levels, and health outcomes, its direct impact on subjective well-being remains a subject of debate. The central hypothesis posited is that education may elevate individuals' aspirations, thereby offsetting its positive effects on reported happiness. The research employs an instrumental variable (IV) approach, leveraging regional variations in the implementation of the reform to enable robust causal inference. The findings indicate that while education has significant positive effects on income and future expectations, its direct impact on subjective well-being is not statistically significant, particularly for women. These results suggest that the relationship between education and happiness is not straightforward but is mediated through more complex mechanisms, such as economic and social factors. The study challenges the notion that the weak link between education and happiness can be attributed solely to endogeneity or mediating variables, instead supporting the theory that elevated aspirations provide a more compelling explanation. Limitations include the reliance on self-reported happiness data and the focus on individuals directly affected by the reform, potentially constraining the generalizability of the findings. This study contributes to the literature by emphasizing that educational policies should be designed with consideration for mental and subjective well-being alongside traditional economic outcomes.

MAKALE BİLGİSİ

Makale Geçmişi:
Başvuru tarihi: 20 Eylül 2024
Kabul tarihi: 18 Aralık 2024

Anahtar Kelimeler:
Türkiye,
Eğitim reformu,
Mutluluk,
Refah,
Fark-analizi.
JEL Codes: H51; H52; I12; I26

ÖZ

Bu çalışma, Türkiye'de 1997 yılında yürürlüğe giren ve zorunlu eğitimi beş yıldan sekiz yıla çıkaran eğitim reformunu kullanarak eğitim ile mutluluk arasındaki nedensel ilişkiyi analiz etmektedir. Mevcut literatür, eğitimin iş olanakları, gelir düzeyi ve sağlık gibi alanlarda olumlu etkiler yarattığını geniş çapta desteklerken, eğitimin mutluluk üzerindeki doğrudan etkisi hâlâ tartışma konusudur. Çalışmanın temel hipotezi, eğitimin bireylerin beklentilerini yükselterek rapor edilen mutluluk üzerindeki olumlu etkilerini dengeleyebileceğidir. Araştırma, reformun bölgesel uygulanma farklılıklarını araç değişken (IV) yöntemi ile kullanarak nedensel çıkarım yapmayı amaçlamaktadır. Bulgular, eğitimin gelir ve geleceğe yönelik beklentiler üzerinde anlamlı pozitif etkiler yarattığını, ancak özellikle kadınlar için mutluluk üzerindeki doğrudan etkisinin istatistiksel olarak anlamlı olmadığını ortaya koymaktadır. Bu sonuçlar, eğitimin mutluluğa olan etkisinin doğrudan bir ilişkiyle sınırlı olmayıp ekonomik ve sosyal faktörler gibi dolaylı mekanizmalar aracılığıyla daha karmaşık bir yapıya sahip olduğunu göstermektedir. Eğitim ve mutluluk arasındaki zayıf ilişkinin yalnızca içsellik ya da ara değişkenlerle açıklanamayacağı, aksine yükselen beklentiler teorisinin daha güçlü bir açıklama sunduğu belirtilmektedir. Araştırmanın sınırlılıkları arasında, mutluluk verilerinin öz-beyanlara dayanması ve analiz kapsamının reformdan etkilenen bireylerle sınırlı olması nedeniyle bulguların genelleştirilebilirliğinin kısıtlı olması yer almaktadır. Bu çalışma, eğitim politikalarının geleneksel ekonomik çıktılarla birlikte zihinsel ve öznel iyi oluşu da dikkate alacak şekilde şekillendirilmesi gerektiğine işaret ederek literatüre önemli bir katkı sunmaktadır.

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Introduction

Education has a broad range of positive returns at the individual level: it broadens one's intellectual horizons, translates into better job-market opportunities and higher earnings, leads to better health outcomes, more and better outcomes in the marriage market, and it turns people into better and more responsible citizens (Harmon Oosterbeek and Walker, 2003; Dickson and Harmon, 2011; Lafortune, 2013; Özer and Fidrmuc, 2024; Özer et al., 2018, 2023; Özer, Fidrmuc, Mentzakis, and Özkan, 2024; Özkan, 2024). Given its positive impacts along various dimensions that are themselves important for one's quality of life, education should also translate into higher individual welfare. However, the evidence on this has been so far very mixed. The ambiguous nature of the relationship between education and wellbeing may be caused by a number of factors. First, along with an increase in education, one's aspirations and expectations of what level of wellbeing is *adequate* or *normal* may also change (see Clark, 2018, and the studies cited therein). As a result, two persons, with similar quality-of-life outcomes but with different levels of education may report different levels of happiness. Similar adjustment in reference values may be responsible for the so-called *Easterlin Paradox*, whereby people continue reporting similar levels of happiness over time even if their income is continuously growing (Easterlin, 1974, 1995; Caporale, et al., 2009). Second, the relationship between education and welfare or happiness is complex. Educated people tend to have better outcomes in the labour and marital markets and are generally in better health. Earnings, labour-market success, health and marriage are all important determinants of wellbeing. Therefore, it is possible that the positive impact of education is indirect rather than direct. Analyses that also account for these determinants of happiness may consequently find no additional impact of education, beyond what is accounted by improved outcomes in other areas. Finally, it is possible that endogeneity bias affects the relationship between education and happiness, as both may be influenced by an unobserved third factor. For example, people who are highly motivated, socially adept, and have a generally optimistic outlook at life may be both happier and also put in the time and effort required to obtain higher educational qualifications. Alternatively, both educational attainment and wellbeing (and general outlook at life) may be determined by cultural values that different people espouse. If there is endogeneity in the relationship between education and happiness, then standard regression analyses of this relationship may yield misleading findings.

The vast majority of analyses of the relationship between education and happiness are correlational and do not attempt to account for the possible endogeneity bias inherent in this relationship. A recent exception is Dursun and Cesur (2016). They use people, who were influenced by the mandatory schooling reform in Turkey in 1997, which lengthened the mandatory schooling period from five years to eight years. Instrumenting educational attainments with exposure to this reform, they conclude that education translates into significantly higher happiness among Turkish women. However, among men, the relationship is reverse: more educated men report lower happiness (although this finding is less consistent and only weakly significant). In this paper, we revisit the findings of Dursun and Cesur (2016). Duflo (2001) argues that in less developed countries, the *intensity* of the implementation of educational reform often varies significantly across regions. Duflo (2001) argues that it is therefore important to account for the regional differences in the reform's implementation to construct the instrument to address the endogenity of schooling. Otherwise, the results can be misleading and unreliable due to misallocation of the instrumental variable. Dursun and Cesur (2016) instrument education using an indicator whether the individual in question was affected by the reform based on year of birth. As such, the instrument does not account for the regional variation in the intensity of reform. This methodological weakness in their study might undermine the reliability of their findings. To address this potential fault, in our research, we

diverge from Cesur and Mocan's methodology and combine the date of birth with the reform intensity over time and across various Turkish provinces. This expanded methodological framework allows us to capture not only the reform's immediate effects on specific birth cohorts but also to account for the dynamic evolution of educational resources across different time periods and regions. By including these temporal and provincial variations, our study effectively considers the wide disparities in educational quality and access throughout Turkey. This approach offers a more nuanced and comprehensive understanding of how the reform influences happiness through its impact on education, presenting insights that are particularly relevant for discussions in the field of educational economics. In comparision to Dursun and Cesur (2016) results, it is found that the influence of reform on schooling of people changes, and schooling effects on the happiness of women vanishes when the paper accounts for the regional dimension (we are unable to estimate the impact for men as the educational reform is only weakly associated with higher educational attainments among men in our analysis). This finding does not depend on whether we control for other potential determinants of happiness or not. Therefore, our results offer little support for two of the explanations for the weak and mixed findings on the relationship between education happiness: that the absence of an effect is due to endogeneity bias, or because education affects happiness only indirectly, via other factors. Consequently, it appears that the raised-aspirations story is indeed the reason for the absence of a clear and positive effect.

In the next section, we briefly describe the education reform that constitutes the basis for our IV strategy. Sections 3 and 4 introduce the data used and outline our methodology. Section 5 presents our findings and the final section offers some concluding remarks.

The 1997 Reform of Compulsory Education (CER) in Turkey

The parliamentary election in December 1995 resulted in the victory by the Welfare Party, a political wing of the Islamists. This party subsequently formed a government during the following year. This was the first instance in modern Turkish history where an openly Islamist party took the lead in forming the government. The National Security Council, in which the army predominates, concluded in February 1997 that the government was not compatible with the secular character of modern Turkey and forced it to resign. In addition, the Council suggested that mandatory schooling would be eight years.[1] The officially-mentioned reasons for the CER was the need to improve education so as to facilitate Turkey’s accession to the Customs Union with the European Union. However, an important (partial if not main) motivation for this decision was to ensure that children follow the state-approved curriculum rather than attend religious schools (see the discussion in Dulger, 2004; Özer and Fidrmuc, 2024; 2023; Özer, Fidrmuc, Mentzakis, and Özkan, 2024; Özkan, 2024). Only state schools were endorsed by the reform, and attending a religious school was not considered compatible with fulfilling the requirement of compulsory education. There were also changes in the university entrance rules at the time of the CER: graduates of specialized (vocational or religious) high schools could only apply to university departments offering education in the same subject: this further reduced the attractiveness of religious education by restricting the options that graduates of such schools had for further study.

The CER was implemented very quickly: the law was formally adopted by the Turkish Grand National Assembly in August 1997, just a few months after it was announced. The reform entered into force from the 1997-98 school year. Specifically, those born in 1986 and in

[1] The reform thus mandated that children were required to complete not only the primary school education (years 1-5) but also the lower secondary school (years 6-8).

subsequent years (11 years old or younger in 1997) were subject to the CER. Given the short amount of time in which the CER was implemented, the quality of education was not affected. Instead, the government focused its effort on increasing the capacity of schools (Dulger, 2004). Thus, the net registration rate to sixth grade is raised from 86 percent in 1997 to 96 percent in 2002 (Figure 2), and more than 70,000 new elementary school teachers were hired to teach grades 1 to 8. There was also a significant investment in expanding existing school and classroom capacity: about 104,000 new elementary schools were built, creating additional capacity for more than three million pupils.

The discussion above indicates that the reform itself was primarily motivated by political factors rather than by the state of education in Turkey at the time, making it a policy change that can serve to identify exogenous variation in educational attainment. We can therefore use the CER as an exogenous instrument for educational attainment of the affected individuals.

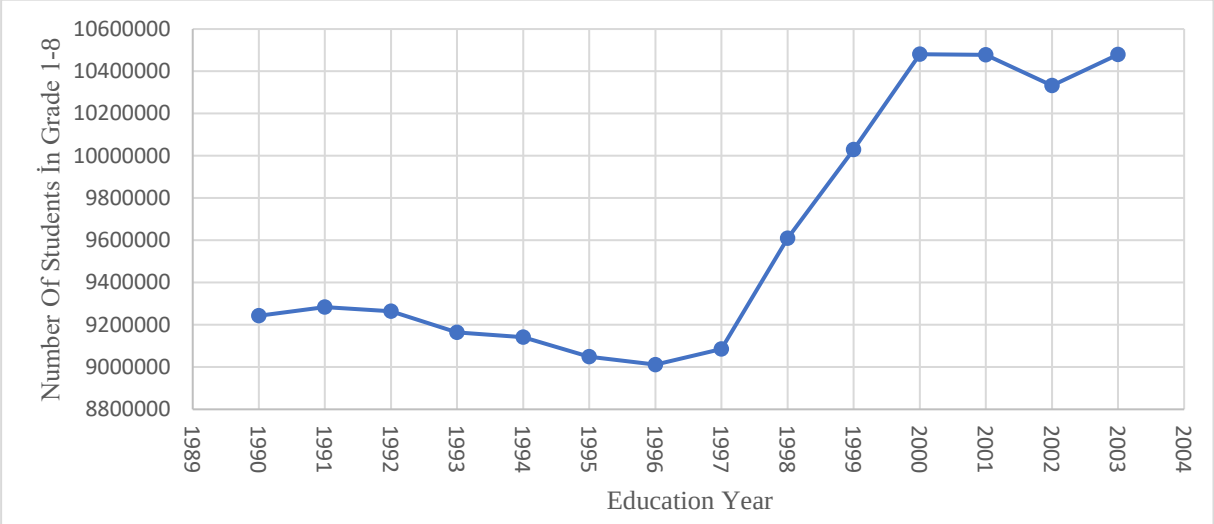

Figure 1: Number of students in grade 1-8, from 1990-91 to 2003-04

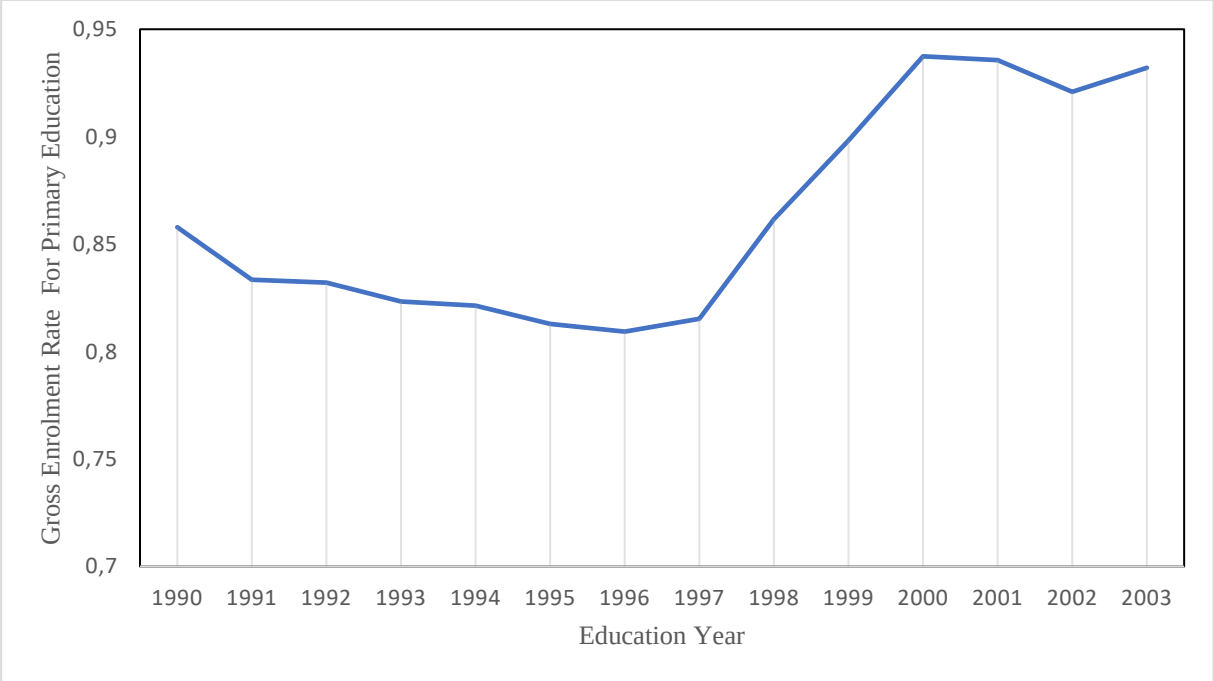

Figure 2: Gross enrolment rates in grades 1-8.

Data

This paper employs the Household Life Satisfaction Survey carried out in 2013 by the Turkish Statistical Institute. This is the merely survey wave detailing the provinces of the respondents, which are necessary for our IV strategy. The dataset also includes demographic details such as education, gender, age, marital status, birth year, labour market status, and region of residence. We use individuals born between 1980 and 1992: those born before 1986 constitute the control group, while those born later are the treatment sample. The weak enforcement of the age cut-off has created uncertainty about the position of those born in 1986, as they might have been influenced by the reform or not. To avoid possible misclassification issues, we excluded the birth year 1986 from our dataset. In further robustness analyses, we explore the effects of incorporating people whose birth year is 1986, treating these people alternately as members of either the treated or controlled groups to understand the potential impact of this inclusion. The data does not report the years of schooling. Instead, there is an education level variable. The education level is categorized as follows: no formal education, incomplete 5-year primary education, completed primary education, finished lower secondary school (8 year of education altogether), completed senior high school, and undergraduate degree or above. The reform in 1997 increased the compulsory education from 5 to 8 years, in other words, junior high school become compulsory for those born in or after 1986.

The happiness variable used in this study is based on the following question: "How happy are you when you consider your life as a whole?" The possible answers are: 1 Very happy, 2 Happy, 3 Moderate, 4 Unhappy, and 5 Very unhappy. A dummy variable is constructed from this variable, coding the very happy and happy categories as one, the other categories being coded as zero. Other questions related to life satisfactions are: "Are you satisfied with your health?", "Are you satisfied with your marriage?", "Are you satisfied with your residence?", "Are you satisfied with the neighbourhood you live in?", "Are you satisfied with your job?", "Are you satisfied with the income from your job?", "Are you satisfied with your monthly household income?", "Are you satisfied with your relationship with your relatives?", and "Are you satisfied with your relationship with your friends?". The possible answers to these questions are: 1 Very satisfied, 2 Satisfied, 3 Moderate, 4 Dissatisfied and 5 Not satisfied at all. Again, we created dummy variables by assigning the value of one to the very satisfied and satisfied answers, and value of zero to all other categories. Then, these 9 variables were added up to create a composite index of life satisfaction. This index was normalized by dividing the value of the index by 9, so that the maximum value that the index can attain is 1.

A number of variables could potentially affect life satisfaction through education and therefore we use them as potential mechanisms. These are: income, labour market status, being hopeful about future, marital status, subjective economic wellbeing, being able to make ends meet, and anticipating an improvement in their situation in the coming year. Although wages are the main indicator of earnings, the survey did not collect wage information. Instead, household income variable which varies from 1 (very poor) to 5 (very rich) is used. This variable is normalized to have a mean of zero and standard deviation of one. Labour market status variable is a dummy variable which takes the value of one if the respondent works and zero otherwise. The marital status variable is also a dummy variable and takes a value of one for married individuals and zero in all other cases. As a long-term expectation variable, "How hopeful are you about your own future?" is used. Potential answers to this question are: 1 "very hopeful" 2 "hopeful" 3 "hopeless" 4 "very hopeless". This was transformed into a binary variable assigned a value of 1 for the very hopeful and hopeful responses, and zero for hopeless and very hopeless answers.

To assess subjective wellbeing, we use the question "When you consider the welfare level of people living in Turkey as "0" being the lowest level and "10" the highest level, at what level do you see yourself?" This question was also normalized to have a mean zero and the standard error of one. “Can make ends meet” question is “To what extent can you meet the basic needs of your household with this income?”. The possible answers are: 1 Very easy, 2 Easy, 3 Medium, 4 Difficult, and 5 Very difficult. To construct the dummy, very easy and easy categories are merged to take the value of one and other categories are zero. In order to control for the regional socio-economic differences, we included dummy variables for the 26 regions of residence in the model. In the data set, there is no areas classified as rural or urban variable. We additionally incorporate binary variables for each birth year to account for the effects of the changes in economic and social policies over time, and any other time-related effects.

Previous studies on Turkey suggest that the CER impact was higher in provinces with low gross enrolment in junior high school (grades 6-8) before the reform (Özer et al., 2018). For this reason, we control for the interaction of the gross enrolment rate in the province of residence in the 1996-1997 school year and the treatment dummy (Duflo, 2001) as well as the gross enrolment rate in the 1996-1997 education year. The 1996-1997 school year is the year just before the reform was implemented. This interaction term, therefore, captures the variation in the intensity of compulsory education reform by province and birth year. Most studies on the effects of the CER in Turkey use only one reform intensity variable (see Baltagi et al., 2019; Dincer et al., 2014; Günes, 2015; Özer et al., 2018). In contrast, we use two alternative variables to construct two different regressions of the effects of education on happiness. The first is the ratio of teacher (for grades 1 to 8) per child aged 6-13 at the level of the provinces and birth years. The second reform intensity variable is the change in monetary investment on educational infrastructure per thousand children aged 6 to 13 during the 1997-98 and 1996-97 academic years, measured at the level of provinces[2]. It is important to note that the denominator of both reform indicators is the number of children of the relevant age rather than the number of pupils enrolled in school. Therefore, only the numerator is affected by the reform while the dominator reflects the demographics of Turkey 6-13 years prior to the reform.

The descriptive statistics are reported in Table 1. For all the education categories we use, men tend to be ahead of women. For example, the rate of completing 8 years of education in the pre-reform period for women was 44 percent, and 71 percent for men. Correspondingly, the impact of the CER was stronger for women than for men. The rate of junior high school (JHS) completion increased by 70 percent for women (0.752 in the experimental group versus 0.443 in the reference group). For men, corresponding increase in JHS completion rate is 29 percent (0.914 vs 0.708). Much smaller gains were registered for other educational outcomes: senior high school (SHS) and university completion. This is not surprising, as the CER did not affect these educational levels. With respect to happiness and life satisfaction, small gains appear to accrue to the treatment group relative to the control cohort. The expectations about the future do not differ significantly. The rate of marriage in the control group for women and

[2] The information on the number of educators in a province and in a particular year was gathered from the statistical yearbooks of the Turkish Ministry of Education. The missing values were interpolated using the exponential function method. Spending data were drawn from the annual statistical reports published by the Turkish Ministry of Development and were adjusted for inflation. Yearbooks for education statistics and expenditures enable precise categorization based on the number of teachers, expenditures and year. However, compiling the data from these sources necessitates going through each yearbook and manually adding up the teachers' and expenditure numbers at the provincial level. The censuses taken in 1985, 1990, and 2000 provide data regarding the count of children aged 6 to 13. For the years in between the censuses that were not counted, the exponential growth model was utilized to estimate the figures for the years with unavailable data.

men is higher compared to the treatment group: this reflects the fact that the individuals in the control group are slightly older. Similarly, the control groups (men and women) display higher employment rates than the treatment groups. Nevertheless, the percentages of respondents who say that they can meet their daily needs easily are similar for men and women in the treatment and control groups.

Empirical Strategy

This paper uses an instrumental variable (IV) approach because education and happiness or life satisfaction may have an endogenous relationship. Turkey's education reform of 1997 extended the mandatory education duration from 5 to 8 years, established new educational institutions for grades 1 to 8, and integrated the previously mandatory primary education (grades 1 to 5) with the formerly optional secondary education (grades 5 to 8). The reform itself was primarily motivated by political factors rather than by the state of education in Turkey at the time, making it a policy change that can as a factor providing external variation in educational attainment in Turkey.

Duflo (2001) argues that in less developed countries such as Turkey, the differences among provinces in terms of education and socio-cultural outcomes are high. Instruments based only on the year of birth, without considering the regional intensity of education reform, may fail to remove the endogeneity bias completely (Duflo, 2001). Dursun and Cesur (2016) also examine the effect of education on happiness, but their instrument is based on birth years and does not account for the regional variation in the intensity of education reform. Therefore, their instrument suffers from this aforementioned bias, which possibly undermines the reliability of their results. To take account of Duflo's (2001) criticism, instead of using a dummy variable indicating whether a particular individual was affected by the reform given their year of birth, our instruments are the interaction of this treatment dummy variable with the reform intensity variables. We construct two instruments that we use as alternative measures of reform intensity. We estimate the following regression equations, using the two alternative measures of intensity described above:

$$S_{ipc} = \beta_0^S + \beta_1^S(Teacher_{pc} * T_i) + \beta_2^S Teacher_{pc} + \beta_3^S(Genrol96_p * T_i) + \mu_p^S + \theta_c^S + \varepsilon_{ipc}^S \quad (1)$$

$$S_{ipc} = \gamma_0^S + \gamma_1^S(\Delta Spend_p * T_i) + \gamma_2^S \Delta Spend_p + \gamma_3^S(Genrol96_p * T_i) + \mu_p^S + \theta_c^S + \varepsilon_{ipc}^S \quad (2)$$

where S_{ipc} is the educational attainment of person i, who resides in province p and was born in year c. We estimate two different equations for schooling because we use two different reform intensity measures to construct the instruments. The first instrument is the interaction of $Teacher_{pc}$ and T_i. $Teacher_{pc}$ is obtained by dividing the total number of teachers at primary and lower secondary school levels (classes 1 through 8) by the population of children in the age group between 6 and 13 (these are ages corresponding to primary and junior secondary schools, i.e. grades 1 to 8) in year *c* and province *p*. The second instrument is the interaction of $\Delta Spend_p$ and T_i. $\Delta Spend_p$ is the difference in expenditure for classroom construction at primary and lower secondary levels between the 1997-1998 and 1996-1997 academic years, in province *p*. T_i, the treatment variable is coded as 1 for individuals born between 1987 and 1992, who finished 8 years of mandatory schooling due to the educational reform, and as 0 for those born between 1980 and 1985, who were not influenced by this reform. Both instruments thus combine the exposure to the reform with the local measure of reform intensity. Correspondingly, β_1^S in model 1 and γ_1^S in equation 2 show the influence of the education reform on the treated group.

To account for province-specific effects, we add also the interaction of $Genrol96_p$, the total enrollment figure for the sixth level of education during the 1996-97 school year just

before the education reform, and T_i, the treatment dummy. Finally, μ_p and θ_c are the fixed effects of the province of residence and the year of birth[3], respectively.

The main aim of this study is to analyze the effect of education on happiness. The following OLS model can be used to analyze this relationship:

$$H_{ipc} = \beta_0^H + \beta_1^H S_{ipc} + \beta_2^H Teacher_{pc} + \beta_3^H (Genrol96_p * T_i) + \mu_p^H + \theta_c^H + \varepsilon_{ipc}^H \quad (3)$$

$$H_{ipc} = \gamma_0^H + \gamma_1^H S_{ipc} + \gamma_2^H \Delta Spend_p + \gamma_3^H (Genrol96_p * T_i) + \mu_p^H + \theta_c^H + \varepsilon_{ipc}^H \quad (4)$$

H_{ipc} is the happiness or life satisfaction of person *i* who lives in province *p* and belongs to the cohort of birth *c*. The meaning of the other variables is as described previously. The relationship between education and these variables may be endogenous, as mentioned earlier, therefore we use 2SLS:

$$H_{ipc} = \beta_0^H + \beta_1^H \hat{S}_{ipc} + \beta_2^H Teacher_{pc} + \beta_3^H (Genrol96_p * T_i) + \mu_p^H + \theta_c^H + \varepsilon_{ipc}^H \quad (5)$$

$$H_{ipc} = \gamma_0^H + \gamma_1^H \hat{S}_{ipc} + \gamma_2^H \Delta Spend_p + \gamma_3^H (Genrol96_p * T_i) + \mu_p^H + \theta_c^H + \varepsilon_{ipc}^H \quad (6)$$

$\hat{S}_{ipc}$ in model 5 and 6 is the predicted value of educational attainment. [4] In the second stage of our regression, we include the same control variables as in the stage estimating educational attainment. The determination of the coefficient for the estimated level of education in this second stage depends entirely on leaving out the interaction term from the regression equation. If we assume that the teacher-to-child ratio in primary schools ($Teacher_{pc}$) and $\Delta Spend_p$ influence child health solely through its impact on schooling, then the Two-Stage Least Squares (2SLS) model's estimation is expected to give the causal effect of schooling on religiosity. To estimate the causal impact of education on happiness and life satisfaction, we use linear 2SLS models. IV probit and logit could be used to estimate the regressions as the dependent variables and the instruments are binary. However, Angrist (1991) and Angrist (2001) suggest that linear 2SLS is more robust to estimate the marginal effects than non-linear models when the dependent variable and the instrument are all binary variables (Angrist and Pischke, 2009, pp. 197–198).

In Turkey, the age at which one starts school depends on the birth year. Therefore, standard errors of the individuals in the same birth year might be correlated, and ignoring this possibility might invalidate the inference from the regressions. One can solve this problem by clustering at the appropriate level (i.e. birth year). However, there are only 12 birth years, 6 of which are in the control group and 6 of them are in the treatment group. Similarly, the standard errors of individuals living in the same region may be correlated. Therefore, the errors can be clustered at the NUTS-1 region of residence and birth year. Thus, we have 144 (12*12) clusters.[5]

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[3] Since our regressions include fixed effects for the years of birth, we do not include the treatment dummy, Ti, in the regressions as it would be collinear with the year-of-birth dummies.

[4] To clarify, we do not implement IV-2SLS manual as this would produce incorrect standard errors. We use STATA to run IV-2SLS methodology automatically.

[5] Note that while we use 12 NUTS-1 regions for our clustering strategy, the intensity of reform is computed at the level of provinces (NUTS-3) of which Turkey has 81. Using NUTS-1 regions of residence and birth years to cluster standard errors, we have 144 clusters, and around 195 observations in each cluster. The cluster of standard errors can be at the province of residence and year of birth. However, the drawback of this clustering is that the estimates would be based on much smaller sample sizes in each cluster: we would have 876 clusters (12*73), and 32 observations in each cluster. Angrist and Pischke (2009) and Bertrand et al. (2004) suggest that it is enough to

Results

The results of the first stage analysis for women and men are given in Table 2. The first row gives the result obtained with the instrument constructed as the interaction of the treatment dummy and the change in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97. The second row presents findings with the instrument being the interaction of the treatment dummy and the ratio of educators (for classes 1 to 8) for each child aged 6 to 13, categorized by province and year. Both models show that the CER positively and significantly affected JHS completion (8 years of schooling) of women only: those born in 1987 and later received, on average, more education. The F-statistic, which shows the strength of the instrument used, is greater than 10, indicating that both instruments are strongly influencing the probability of women completing the JHS. However, the CER did not affect the women's probability of completing senior high school or university education: given that the CER extended compulsory education only through to the JHS level, it is not surprising that it had little impact on attaining higher qualifications. Finally, the F-statistic is below 10 for each educational outcome of males: a possible explanation is that a large share of males were attaining the JHS qualifications already before the reform. Since the CER did not seem to affect the education of men, we will continue only with the education of women when we analyse the causality between education and happiness.[6]

The findings for the influence of schooling on women's happiness are reported in Table 3. We first consider OLS regressions, which suggest that completing JHS positively and importantly affects happiness levels and most of the other life satisfaction variables (except being satisfied with neighbourhood). In contrast, most of the IV coefficients are statistically insignificant, regardless of the instrument used. These results suggest that when we construct the instrument based on the interaction of policy intensity variable and the treatment dummy, the positive impact of education on happiness and life satisfaction, as reported by Dursun and Cesur (2016), vanishes.

As emphasized in the Introduction, a plausible explanation of the insignificant relationship between education and happiness rests on education impacting other factors of happiness, so that it impacts happiness indirectly rather than directly. To explore this possibility, we regress a number of such potential mediator variables on our CER measures: we consider self-reported position on subjective economic ladder, income, and a range of expectation to be better off next year, being married, having hope, being able to make ends meet easily, and being employed. The results, reported in Table 4, suggest that the exposure to the CER has a significantly positive impact only on income and the expectation to be better off next year: this is not surprising, given the obvious relevance of education for labour-market outcomes. When controlling for these possible channels of happiness, the effect of education on the happiness of Turkish women remains mainly insignificant (Table 5). Thus, the insignificant finding does not depend on whether we control for the potential channels of happiness or not.[7]

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have around 42 and 50 clusters to have reliable standard errors.

[6] The reliability of the construction of treated and controlled populations can be tested. To do this, we replaced the instruments with 12 separate two-way interaction dummy variables, representing the interactions of each year of birth and the reform intensity. The results, reported in the Appendix, Table A1, are as expected: the coefficients of the interactions are statistically significant for the treated year of births 1987-1992 but not for the cohorts not influenced by the reform. This confirms that the women in the treatment group were indeed significantly more likely to graduate from JHS so that the treatment and control groups are constructed correctly.

[7] Note that is the indirect effect of education on happiness is important, we would expect to find a significant effect when omitting the channel variables, i.e. in our baseline set of results, and not when including the mediators of happiness.

Table 1: Summary Statistics: Dependent and Education Variables

	Control (81-85 cohort)		Treatment (87-91 cohort)		Control (81-85 cohort)		Treatment (87-91 cohort)	
A. Dependent Variables	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean
JHS	15443	0.443567	12689	0.751990	10132	0.7083498	8362	0.9141354
SHS	15443	0.340348	12689	0.469068	10132	0.5433281	8362	0.6285578
UCD	15443	0.169138	12689	0.219166	10132	0.2719108	8362	0.2554413
Happiness	15443	0.639772	12689	0.680747	10132	0.5737268	8362	0.5931595
Happy with health	15443	0.772000	12689	0.852234	10132	0.8569878	8362	0.8857929
Happy with marriage	13358	0.929181	7274	0.948034	7716	0.9729134	2000	0.969
Happy with housing	15443	0.731140	12689	0.75648	10132	0.7815831	8362	0.8080603
Happy with neighborhood	15443	0.807227	12689	0.793286	10132	0.817805	8362	0.8098541
Happy with job	3723	0.795058	2696	0.774852	8620	0.7763341	5070	0.7836292
Happy with earning	3513	0.499573	2574	0.520591	8587	0.4716432	5010	0.5187625
Happy with income	15443	0.415140	12689	0.466309	10132	0.4440387	8362	0.4997608
Happy with relatives	15443	0.867837	12689	0.861612	10132	0.819088	8362	0.8234872
Happy with friends	15443	0.913877	12689	0.9129167	10132	0.8982432	8362	0.9153313
Composite life satisfaction index	13358	0.779512	7274	0.8039593	7716	0.7981189	2000	0.8150714
Subjective economic ladder	15443	-0.02750	12689	0.027634	10132	-0.01959	8362	0.02043
Income	15443	-0.02226	12689	0.027088	10132	-0.17853	8362	-0.14888
Expected to be better of next year	15443	0.372013	12689	0.46363	10132	0.39775	8362	0.478355
Married	15443	0.864987	12689	0.573252	10132	0.761548	8362	0.239177
Hopeful	15443	0.774331	12689	0.814012	10132	0.737466	8362	0.793351
Can make endless needs easily	15443	0.12776	12689	0.129482	10132	0.159988	8362	0.13657
Employed	15443	0.24108	12689	0.212468	10132	0.85077	8362	0.606314

Notes: JHS=Junior high school (8 years of compulsory education); SHS=Senior high school, UCD=university.

Table 2: The Effect of the education policy reform on Educational attainments (First Stage)

	Females			Males		
	JHS	SHS	UEDC	JHS	SHS	UEDC
IV with Spend	0.000159***	0.000130**	0.0000118	0.0000177	0.000155***	-0.00000055
(Spend*T)	(0.0000345)	(0.0000603)	(0.0000422)	(0.0000282)	(0.0000504)	(0.0000487)
F statistics	21.11	4.64	0.08	0.39	9.50	0.00
IV with Teacher	5.946***	2.292**	0.369	0.671	1.955*	1.746**
(Teacher*T)	(0.859)	(1.129)	(0.809)	(0.690)	(1.110)	(0.819)
F statistics	47.96	4.12	0.21	0.95	3.10	4.55
Observations	28,132	28,132	28,132	18,494	18,494	18,494

Notes: Standard errors, adjusted for clustering based on the region of residence and birth year, are included in parentheses. The significance thresholds are marked as follows: *** for p<0.01, ** for p<0.05, and * for p<0.1. Each regression model includes fixed effects corresponding to birth years, interactions between the treatment variable and the gross enrolment figures from the 1996-97 academic year, as well as fixed effects for all 73 provinces of residence. The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with the number of teachers includes educators (for levels 1 through 8) for each child between the ages of 6 and 13, categorized by province and year., and the instrument (the interaction of treatment and educators for levels 1 through 8 for each child between the ages 6 and 13 according to province and year).

Table 3: The Effect of Education on Happiness and Life Satisfaction Measures

	Happy	Satisfied with Health	Satisfied with Marriage	Satisfied with Housing	Satisfied with Neighbourhood	Satisfied with Job	Satisfied with Earning	Satisfied with Income	Satisfied with Family Relations	Satisfied with Friends	Composite life satisfaction index
OLS with spending	0.034***	0.046***	0.019***	0.043***	-0.033***	0.044***	0.070***	0.124***	-0.031***	-0.006	0.024***
	(0.008)	(0.007)	(0.005)	(0.009)	(0.007)	(0.016)	(0.024)	(0.008)	(0.005)	(0.004)	(0.004)
IV with spending	0.136	0.052	-0.123	0.417*	0.679***	-0.190	0.909	0.404	-0.089	-0.126	0.217
	(0.290)	(0.176)	(0.165)	(0.215)	(0.210)	(0.615)	(1.571)	(0.311)	(0.222)	(0.227)	(0.136)
OLS with Teacher	0.034***	0.046***	0.018***	0.043***	-0.033***	0.044***	0.071***	0.124***	-0.031***	-0.006	0.024***
	(0.008)	(0.007)	(0.005)	(0.009)	(0.007)	(0.016)	(0.024)	(0.008)	(0.005)	(0.004)	(0.004)
IV with teacher	-0.008	0.196*	-0.029	0.016	0.253**	0.216	0.648	0.168	-0.097	-0.066	0.015
	(0.126)	(0.110)	(0.071)	(0.112)	(0.100)	(0.329)	(0.446)	(0.135)	(0.097)	(0.077)	(0.053)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632

Notes: Standard errors, adjusted for clustering based on the region of residence and birth year, are included in parentheses. The significance thresholds are marked as follows: *** for p<0.01, ** for p<0.05, and * for p<0.1. Each regression model includes fixed effects corresponding to birth years, interactions between the treatment variable and the gross enrollment figures from the 1996-97 academic year, as well as fixed effects for all 73 provinces of residence. The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with the number of teachers includes educators (for levels 1 through 8) for each child between the ages of 6 and 13, categorized by province and year., and the instrument (the interaction of treatment and educators for levels 1 through 8 for each child between the ages 6 and 13 according to)

Table 4: The Effect of Education on Potential Mechanisms

	Subjective Economic Ladder	Income	Expected to better off next year	Married	Hope	Can make endless need easily	Employed
IV with spending ratio	0.508	0.049	0.288	-0.001	-0.408	0.137	0.012
	(0.616)	(0.655)	(0.350)	(0.336)	(0.295)	(0.180)	(0.269)
IV with teacher ratio	0.178	0.774**	0.363**	0.013	-0.107	-0.013	-0.141
	(0.283)	(0.353)	(0.171)	(0.138)	(0.117)	(0.119)	(0.147)
Observations	28,132	28,132	28,132	28,132	28,132	28,132	28,132

The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with the number of teachers includes educators (for levels 1 through 8) for each child between the ages of 6 and 13, categorized by province and year., and the instrument (the interaction of treatment and educators for levels 1 through 8 for each child between the ages 6 and 13 by province and year)

Table 5: The Effect of Education on Happiness and Life Satisfaction Measures controlling for mechanisms

	Happy	Satisfied with Health	Satisfied with Marriage	Satisfied with Housing	Satisfied with Neighbourhood	Satisfied with Job	Satisfied with Earning	Satisfied with Income	Satisfied with Family Relations	Satisfied with Friends	Composite life satisfaction index
					Controlling for subjective economic ladder						
IV spend	0.096	0.031	-0.161	0.402*	0.700***	-0.172	0.953	0.355	-0.105	-0.144	0.192
	(0.292)	(0.172)	(0.177)	(0.226)	(0.215)	(0.582)	(1.375)	(0.313)	(0.225)	(0.228)	(0.144)
IV teacher	-0.024	0.191*	-0.042	0.004	0.253**	0.176	0.591	0.148	-0.103	-0.072	-0.006
	(0.127)	(0.110)	(0.074)	(0.111)	(0.101)	(0.357)	(0.477)	(0.131)	(0.098)	(0.078)	(0.057)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632
					Controlling for income						
IV spend	0.137	0.053	-0.150	0.415*	0.674***	-0.156	0.785	0.408	-0.088	-0.125	0.220
	(0.288)	(0.172)	(0.174)	(0.214)	(0.204)	(0.523)	(1.156)	(0.286)	(0.214)	(0.219)	(0.157)
IV teacher	0.025	0.194**	-0.029	0.045	0.227**	0.217	0.650	0.251**	-0.086	-0.055	0.014
	(0.111)	(0.097)	(0.070)	(0.099)	(0.089)	(0.319)	(0.453)	(0.116)	(0.085)	(0.067)	(0.051)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632
					Controlling for expected to be better of next year						
IV spend	0.108	0.037	-0.145	0.416*	0.698***	-0.126	1.012	0.369	-0.097	-0.136	0.202
	(0.288)	(0.180)	(0.170)	(0.223)	(0.217)	(0.583)	(1.442)	(0.302)	(0.226)	(0.231)	(0.140)
IV teacher	-0.050	0.183	-0.036	-0.004	0.258**	0.185	0.599	0.113	-0.108	-0.077	0.004
	(0.131)	(0.114)	(0.072)	(0.118)	(0.105)	(0.343)	(0.451)	(0.147)	(0.102)	(0.081)	(0.054)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632
					Controlling for being married						
IV spend	0.136	0.052	-0.123	0.417*	0.679***	-0.231	0.767	0.404	-0.089	-0.126	0.217
	(0.258)	(0.176)	(0.165)	(0.214)	(0.210)	(0.593)	(1.449)	(0.310)	(0.226)	(0.227)	(0.136)
IV teacher	-0.010	0.195*	-0.029	0.016	0.252**	0.174	0.598	0.168	-0.098	-0.067	0.015
	(0.124)	(0.110)	(0.071)	(0.112)	(0.099)	(0.319)	(0.426)	(0.134)	(0.097)	(0.077)	(0.053)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632

Table 5: The Effect of Education on Happiness and Life Satisfaction Measures controlling for mechanisms (continued)

					Controlling for hope						
IV spend	0.273	0.115	-0.111	0.480**	0.709***	-0.045	1.236	0.496*	-0.042	-0.089	0.230*
	(0.264)	(0.169)	(0.157)	(0.216)	(0.212)	(0.554)	(1.557)	(0.275)	(0.199)	(0.208)	(0.120)
IV teacher	0.029	0.212*	-0.021	0.035	0.263***	0.199	0.611	0.194	-0.085	-0.057	0.026
	(0.123)	(0.112)	(0.070)	(0.108)	(0.101)	(0.324)	(0.437)	(0.130)	(0.094)	(0.075)	(0.051)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632
					Controlling for being able to make ends meet						
IV spend	0.117	0.043	-0.133	0.416*	0.697***	-0.219	0.862	0.359	-0.095	-0.132	0.211
	(0.301)	(0.183)	(0.168)	(0.222)	(0.219)	(0.617)	(1.696)	(0.317)	(0.226)	(0.234)	(0.138)
IV teacher	-0.006	0.196*	-0.029	0.017	0.253**	0.238	0.693	0.173	-0.097	-0.066	0.015
	(0.125)	(0.110)	(0.071)	(0.112)	(0.100)	(0.308)	(0.423)	(0.137)	(0.097)	(0.076)	(0.051)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632
					Controlling for being employed						
IV spend	0.137	0.052	-0.131	0.418**	0.681***	-0.190	0.909	0.404	-0.089	-0.126	0.226
	(0.291)	(0.176)	(0.176)	(0.212)	(0.206)	(0.615)	(1.571)	(0.312)	(0.222)	(0.228)	(0.142)
IV teacher	-0.009	0.192*	-0.031	0.018	0.243**	0.216	0.648	0.174	-0.098	-0.064	0.014
	(0.122)	(0.106)	(0.073)	(0.108)	(0.096)	(0.329)	(0.446)	(0.129)	(0.093)	(0.074)	(0.054)
N	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632

The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with the number of teachers includes educators (for levels 1 through 8) for each child between the ages of 6 and 13, categorized by province and year., and the instrument (the interaction of treatment and educators for levels 1 through 8 for each child between the ages 6 and 13 by province and year)

We implement a number of robustness checks to probe our insignificant findings further. In the main results, we exclude the person whose birth date was 1986 as these people can be either influenced or not influenced by the reform. Including them either in the control or treatment group makes little difference to our findings (Tables A2 and A3 in the Appendix). Instead of adjusting standard errors for clustering according to the geographic area of residence and the year of birth (resulting in 12*12 or 144 clusters), we cluster them at the level of year of birth only (12 clusters, see Tables A2 and A4 and A5 in the Appendix). Again, the results change little. We then restrict the sample used by using a narrower window around the threshold birth year affected by the CER: instead of 1980-1992, we use 1981-1991, 1982-1990, and 1983-1989. Next, we drop individual with education beyond the level affected by the CER: university graduates, and both university and SHS graduates. Restricting the sample in these ways does not affect our results substantially (see Tables A6 and A7 in the Appendix).

Conclusions

We revisit the relationship between education and happiness, given that the previous literature has yielded mixed results. We argue that this can be for three basic reasons: (1) receiving more education leads people to also raise their aspirations and expectations so that the impact of increased education on happiness is insignificant despite improved objective outcomes, (2) education impacts happiness through mediator factors such as earnings and health so that the effect is indirect rather than direct, and (3) the relationship is plagued by endogeneity bias. We build on the previous work of Dursun and Cesur (2016) by utilizing the 1997 education reform increasing compulsory schooling from five to eight years as an instrument for education so as to obtain a causal effect of education on happiness rather than mere correlation. Unlike Dursun and Cesur (2016), however, we recognize that in a less-developed country such as Turkey, the implementation of the education reform is likely to vary across regions. Therefore, compared to their findings, our instrument accounts for the provincial intensity of reform and provides reliable estimates.

Our findings suggest that the positive effect of education on happiness of Turkish women, found by Dursun and Cesur (2016) who used an instrument based on solely on birth years, vanishes when, as suggested by Duflo (2001), we construct the instrument as the interaction of the provincial-level variation in the implementation of the reform and birth years. The insignificant estimates are obtained regardless of whether we account for potential mediator factors or not. Therefore, our results suggest that raised aspirations constitute the most likely explanation for the absence of a relationship between education and happiness reported elsewhere in the literature and confirmed by our causal analysis. We should be careful when drawing conclusions about the general level of happiness and life satisfaction in Turkish society because our measures of life satisfaction and happiness outcome are self-reported and subjective. This is especially crucial given that the causal estimation relies on the complier average causal effects pertinent to those affected by the educational reform rather than the average person (Imbens and Angrist, 1994).

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Appendix: Additional Results and Robustness Checks

Table A1: PROBIT estimation of the impact of CER on completing junior high school according to two intensity measures

	Spending	Teacher
1981	-0.0000724	1.062876
	(0.0000706)	(2.044945)
1982	.0000599	2.457692
	(.0000787)	(1.891031)
1983	.0000555	-.3080096
	(.0000694)	(1.479452)
1984	.0000779	-.2796194
	(.0000838)	(1.583127)
1985	-.0000275	1.28775
	(.0001401)	(1.703919)
1987	.0003352**	3.532495**
	(.000132)	(1.802438)
1988	.0000903	7.425172***
	(.0000829)	(2.113623)
1989	.0002713*	7.131988***
	(.000155)	(2.353008)
1990	.0002554**	8.319632***
	(.0001088)	(2.469985)
1991	.0003012***	8.674075***
	(.0001103)	(1.912673)
1992	0.0004497**	5.876439**
	(0.0001777)	(2.390225)
Chi2(5) value of joint Significance of 1987-1991	27.06	26.84
P value	0.0001	0.0002
Observations	28,132	28,132

Notes: 1980 birth year is the reference category. Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996-97, gross enrolment rate in 1996-97, fixed effects of 73 province of residence. The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with number of teachers includes teachers for grades 1 to 8 per child aged 6-13 by province and year and the instrument (the interaction of treatment and teachers for grades 1 to 8 per child aged 6-13 by province and year).

Table A2: The Effect of CER on Completing Junior High School when 1986 birth cohort in treatment and control group (First Stage)

	1986 in Treatment		1986 in Control	
	Spending	Teacher	Spending	Teacher
Instrument	0.000121***	4.923***	0.000170***	5.451***
	(0.0000402)	(0.922)	(0.0000345)	(0.799)
F statistics	9.12	28.54	24.28	46.5
Observations	30,440	30,440	30,440	30,440

The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with number of teachers includes teachers for grades 1 to 8 per child aged 6-13 by province and year and the instrument (the interaction of treatment and teachers for grades 1 to 8 per child aged 6-13 by province and year).

Table A3: The Effect of Education on Happiness and Life Satisfaction Measures with including 1986

	Happy	Satisfied with Health	Satisfied with Marriage	Satisfied with Housing	Satisfied with Neighborhood	Satisfied with Job	Satisfied with Earning	Satisfied with Income	Satisfied with Family Relations	Satisfied with Friends	Composite life satisfaction index
					1986 in Treatment Group						
IV with spending ratio	0.334	0.127	-0.085	0.564**	0.865**	0.446	4.285	0.714*	-0.096	-0.076	0.300*
	(0.363)	(0.222)	(0.190)	(0.284)	(0.377)	(1.234)	(9.388)	(0.434)	(0.273)	(0.262)	(0.172)
IV with teacher ratio	-0.057	0.121	-0.040	0.052	0.273**	0.326	0.477	0.198	-0.105	-0.098	0.003
	(0.146)	(0.131)	(0.077)	(0.133)	(0.131)	(0.390)	(0.470)	(0.170)	(0.114)	(0.091)	(0.064)
					1986 in Control Group						
IV with spending ratio	0.083	0.062	-0.114	0.401**	0.641***	-0.292	0.996	0.356	-0.071	-0.099	0.209
	(0.268)	(0.167)	(0.154)	(0.201)	(0.193)	(0.603)	(1.758)	(0.290)	(0.205)	(0.210)	(0.127)
IV with teacher ratio	-0.010	0.251**	-0.026	-0.017	0.232**	0.169	0.665	0.178	-0.111	-0.058	0.022
	(0.126)	(0.110)	(0.069)	(0.109)	(0.099)	(0.322)	(0.448)	(0.133)	(0.094)	(0.074)	(0.052)
Observations	30,440	30,440	22,449	30,440	30,440	6,981	6,618	30,440	30,440	30,440	22,449

The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with number of teachers includes teachers for grades 1 to 8 per child aged 6-13 by province and year and the instrument (the interaction of treatment and teachers for grades 1 to 8 per child aged 6-13 by province and year).

Table A4: The Effect of Education on Happiness and Life Satisfaction Measures with clustering at birth year level

	Happy	Satisfied with Health	Satisfied with Marriage	Satisfied with Housing	Satisfied with Neighborhood	Satisfied with Job	Satisfied with Earning	Satisfied with Income	Satisfied with Family Relations	Satisfied with Friends	Composite life satisfaction index
IV with spending ratio	0.136	0.052	-0.123**	0.417**	0.679***	-0.190	0.909	0.404	-0.089	-0.126	0.217***
	(0.299)	(0.191)	(0.061)	(0.173)	(0.117)	(0.556)	(1.441)	(0.354)	(0.257)	(0.237)	(0.058)
IV with teacher ratio	-0.008	0.196**	-0.029	0.016	0.253**	0.216	0.648*	0.168	-0.097	-0.066	0.015
	(0.126)	(0.098)	(0.068)	(0.066)	(0.106)	(0.324)	(0.372)	(0.111)	(0.091)	(0.081)	(0.040)
Observations	28,132	28,132	20,632	28,132	28,132	6,419	6,087	28,132	28,132	28,132	20,632

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996-97, gross enrolment rate in 1996-97, fixed effects of 73 province of residence, or province level spending ratio difference between 1997-98 and 1996-97 education year and teacher ratio by province and year , and the instrument (the interaction of treatment and Teacher ratio by province and year or province level spending ratio difference between 1997-98 and 1996-97 education year).

Table A5: The Effect of CER on Completing Junior High School with clustering at birth year level

	Spending	Teacher
Instrument	0.000159***	5.946***
	(0.0000343)	(0.777)
F statistics	21.31	28.54
Observations	28,132	28,132

The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with number of teachers includes teachers for grades 1 to 8 per child aged 6-13 by province and year and the instrument (the interaction of treatment and teachers for grades 1 to 8 per child aged 6-13 by province and year).

Table A6: The Effect of the education policy reform on educational attainments with various sample restrictions (First Stage)

Reform Intensity	High school graduates only	Only junior high school graduates	1981-91 sample	1982-1990 sample	1983-1989 sample
Spending ratio	0.000195***	0.000229***	0.000161***	0.000160***	0.000177***
	(0.00004)	(0.0000614)	(0.0000393)	(0.0000449)	(0.0000556)
F statistics	23.7	13.96	16.82	12.73	10.14
Teacher ratio	7.654***	11.004***	6.184***	5.793***	6.332***
	(1.014)	(1.342)	(0.950)	(1.081)	(1.193)
F statistics	57	67.26	42.37	28.69	28.19
Observations	22,739	16,924	23,565	18,770	14,182

The model with spending includes the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year, and the instrument (the interaction of treatment and the difference in province level spending per thousand children aged 6-13 between 1997-98 and 1996-97 education year. The other model with number of teachers includes teachers for grades 1 to 8 per child aged 6-13 by province and year and the instrument (the interaction of treatment and teachers for grades 1 to 8 per child aged 6-13 by province and year).

Table A7: The Effect of Education on Happiness and Life Satisfaction Measures with alternative sample specifications

	Happy	Satisfied with Health	Satisfied with Marriage	Satisfied with Housing	Satisfied with Neighborhood	Satisfied with Job	Satisfied with Earning	Satisfied with Income	Satisfied with Family Relations	Satisfied with Friends	Composite life satisfaction index
					1981-1991 sample						
IV spending ratio	-0.029	-0.048	-0.109	0.381*	0.688***	-0.209	0.993	0.601*	0.067	-0.211	0.214
	(0.312)	(0.182)	(0.179)	(0.220)	(0.216)	(0.618)	(1.436)	(0.312)	(0.216)	(0.258)	(0.136)
IV teacher ratio	-0.022	0.171	-0.040	-0.015	0.329***	0.225	0.790	0.219	-0.136	-0.061	0.039
	(0.129)	(0.105)	(0.071)	(0.111)	(0.109)	(0.356)	(0.525)	(0.149)	(0.107)	(0.083)	(0.051)
Observations	23,565	23,565	17,483	23,565	23,565	5,443	5,176	23,565	23,565	23,565	17,483
					1982-1990 sample						
IV spending ratio	-0.137	0.031	-0.073	0.511**	0.693***	0.066	1.594	0.676**	0.178	-0.076	0.241*
	(0.360)	(0.189)	(0.181)	(0.259)	(0.247)	(0.743)	(2.022)	(0.345)	(0.200)	(0.261)	(0.143)
IV teacher ratio	0.070	0.224*	-0.019	-0.007	0.258**	0.607	0.922	0.237	-0.092	-0.044	0.044
	(0.171)	(0.122)	(0.083)	(0.142)	(0.128)	(0.447)	(0.719)	(0.162)	(0.129)	(0.102)	(0.058)
Observations	18,770	18,770	14,123	18,770	18,770	4,432	4,220	18,770	18,770	18,770	14,123
					1983-1989 sample						
IV spending ratio	-0.092	0.043	-0.015	0.508*	0.645**	0.367	1.302	0.669**	0.222	-0.075	0.246
	(0.369)	(0.201)	(0.197)	(0.284)	(0.264)	(0.771)	(1.731)	(0.327)	(0.162)	(0.285)	(0.152)
IV teacher ratio	0.125	0.211*	0.017	0.016	0.290**	0.413	0.312	0.368**	-0.237*	-0.177	0.066
	(0.187)	(0.128)	(0.083)	(0.136)	(0.133)	(0.309)	(0.440)	(0.178)	(0.137)	(0.115)	(0.058)
Observations	14,182	14,182	10,868	14,182	14,182	3,384	3,230	14,182	14,182	14,182	10,868
					Without university graduates						
IV spending ratio	0.195	0.068	-0.176	0.292	0.360**	-0.300	0.058	0.451	-0.157	-0.098	0.181
	(0.233)	(0.210)	(0.166)	(0.216)	(0.177)	(0.432)	(0.565)	(0.294)	(0.184)	(0.186)	(0.136)
IV teacher ratio	-0.029	0.064	-0.032	-0.029	0.130	-0.132	-0.063	0.036	-0.138	-0.086	-0.009
	(0.103)	(0.101)	(0.068)	(0.111)	(0.099)	(0.202)	(0.301)	(0.110)	(0.087)	(0.071)	(0.052)
Observations	22,739	22,739	17,874	22,739	22,739	3,365	3,042	22,739	22,739	22,739	17,874
					Without high school and university graduates						
IV spending ratio	0.268	-0.177	-0.168	0.348	0.377	-1.099	0.236	0.619**	-0.285	-0.206	0.121
	(0.300)	(0.247)	(0.204)	(0.229)	(0.237)	(0.825)	(1.278)	(0.315)	(0.251)	(0.217)	(0.135)
IV teacher ratio	-0.017	0.056	-0.000	0.025	0.093	-0.410	-0.196	0.054	-0.105*	-0.104	-0.041
	(0.099)	(0.088)	(0.066)	(0.106)	(0.090)	(0.275)	(0.396)	(0.110)	(0.062)	(0.065)	(0.058)
Observations	16,924	16,924	14,084	16,924	16,924	1,976	1,673	16,924	16,924	16,924	14,084

Notes: Robust standard errors clustered at the region of residence by-birth year are reported in parenthesis. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for fixed effects of birth year, the interaction of treatment variable and gross enrolment rate in 1996-97, gross enrolment rate in 1996-97, fixed effects of 73 province of residence, or province level spending ratio difference between 1997-98 and 1996-97 education year and teacher ratio by province and year , and the instrument (the interaction of treatment and Teacher ratio by province and year or province level spending ratio difference between 1997-98 and 1996-97 education year).