How a Change in Compulsory Attendance Law for Primary Education Increased High School Enrollment in Turkey*

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Abstract

Turkey changed its compulsory attendance law in 1997-1998 academic year. The required level of education increased from five years of primary education to eight years of primary education. After the law change, there is an abrupt increase in the high school enrollment rate. This is despite the fact that the law does not cover high school education. By using the 2003 household budget survey and differences in differences methodology, we find that a typical student is four percent more likely to have HS education if he is subject to the new law. The largest increase in likelihood of having HS education is attained by the group of students who would drop out after completing the first five years of primary education if the law did not change. This can be explained by the maturity effect. After the law change, the students can drop out at age fourteen instead of age eleven. The decisions given when the students are mature prolong their education life beyond the required level.

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1 Introduction

Turkey changed its compulsory attendance law (CAL) in 1997-1998 academic year. Before the CAL change, students could drop out after completing the first five years of primary education (PE5). Following the change, they are required to attend eight years of primary education (PE8). The CAL change was rather abrupt and unexpected.[1] The government had to levy extraordinary taxes in order to build new schools to meet the need.

Table 1 lays out the enrollment numbers by using the Ministry of Education data. First note that the change in CAL had a considerable impact. Before the change, less than 75 percent of the children (around 9 million students) enrolled in PE8. The ratio increased to 90 percent after the change (around 10 million students).[2] Second, note that the high school (HS) attendance increased significantly after the change although the CAL does not cover HS education. The ratio was 38 percent in 1997-1998 academic year (around 2.1 million students) and it increased to 57 percent in 2005-2006 (around 3.25 million students).

We believe that the change in HS enrollment is mainly caused by the change in CAL. Turkey is a developing country and there is an upward trend in HS enrollment throughout its history. But the trend before the CAL change is very different from the trend after the CAL change. Turkey was experiencing an economic slowdown at the CAL change period. So it is unlikely that the growing economy caused this abrupt change.

In this paper, we want to answer the question of why a change in the CAL that targeted PE increased HS enrollment rates in Turkey. This is a surprising effect because the change in CAL does not cover HS education. By using the 2003 household budget survey and differences in differences methodology, we find that a typical student is four percent more likely to have HS education if he is subject to the new law.

Next, we find the group of students who increase their likelihood of having HS education under

[1] Ari (2002) states that the change in CAL has long been considered. It has been discussed as a policy question in the National Meeting for Education in 1946. The necessary change in the law has been enacted in 1961 but could not be enforced due to the financial burden. Two pilot programmes have been tried in 1971 and 1981.

[2] Note that the CAL could never be strictly enforced. Historically, around ten percent of the students did not attend the PE5. Recent data reveal similar rates of skippage under the PE8. In some rural parts of Turkey, students do not have access to schools because they live in distant small villages. Students are pulled out of school by their parents for economic or religious reasons in some cases.

the new law. To do this, we predict the level of education of the students under the presumption that the old version of the law is in effect. Then, we divide students into groups in terms of their predicted level of education. There are four levels of education. The students who are not expected to get any formal education belong to the first group. Second and third groups involve students who would drop out after completing PE5 and PE8 respectively. The students in the last group are expected to have HS education.

The only group of students where the law change directly affects are the students who would drop out after completing PE5 if the law did not change. These students are forced to pursue their education for three more years under the new law. Following the literature, we call these students as the directly affected students. Since the directly affected students complete PE8 under the new law, the ability pool of PE8 graduates changes. This may alter the behavior of students who would drop out after completing PE8 if the law did not change. Since these students are indirectly affected by the change in the law, they are labelled as the indirectly affected students.

The students who would not get any formal education under the old law were not enforced by the old law so we do not expect them to be bound by the new law either. We cannot think of any reason of why a student who would have HS education under the old law alters his educational attainment under the new law. Therefore, we expect these two groups of students to be neither directly nor indirectly affected by the law change.

After dividing the students into groups, we find that the largest increase in likelihood of having HS education comes from the directly affected students. These students are forced to complete three additional years of schooling under the new law. Therefore, they are more mature when they decide whether or not to pursue HS education. They may have more bargaining power over family resources or they may understand the virtues of education better when they are mature. Because of this, they may prolong their education beyond the required level. We call this effect the "maturity" effect. Neither the human capital nor the sorting models predict that the directly affected students pursue their studies beyond the required level. We will explain why this is the case in the next section.

We find that the increase in the likelihood of having HS education of the indirectly affected students is insignificant.[3] According to Lang and Kropp (1986), the enrollment decisions of the

[3]The maturity effect is not relevant for the indirectly affected students because they are not forced to drop out at

indirectly affected students serve as a natural experiment to test the sorting model versus the human capital model.[4] They argue that the CAL change would not alter the educational attainment of the indirectly affected students if one uses the human capital model. However, the sorting model implies that the indirectly affected students increase their educational attainment when the CAL changes.[5] They use the census data to test the human capital model versus the sorting model. They exploit the fact that the CALs are different for different states in the US. They find that the CALs affect both directly and indirectly affected students. This is evidence in support of the sorting model. Contrary to their study, our finding of no significant effect to the indirectly affected students is in line with the human capital model.

Bedard (2001) also tests the human capital and the sorting models. She looks at the HS dropout rates of students with and without access to university education. In the locations where there is no access to the university, high ability students who are constrained in entering the university are high school graduates. There is a higher payoff from pooling with high school graduates if the average ability of the high school graduates are higher. Because of this, high school drop out rates are lower in locations where there is no access to university. Human capital model does not have such a prediction. Bedard uses NLSY and finds evidence in favor of the sorting model.

Section 2 discusses the implications of the change in CAL for the human capital and sorting models. The data is introduced in section 3. Section 4 explains the empirical methodology and lays out the results. Section 5 concludes.

2 Human Capital and Sorting Model

2.1 Implications for the Directly Affected Students

The directly affected students are the ones who would drop out after completing PE5 if there was no change in CAL. The new CAL enforces these students to complete PE8. Neither the standard human capital model nor the sorting model would predict that these students will continue their studies beyond PE8 after the CAL change. We follow Lang and Kropp (1986) to explain why this

a later age by the change in the CAL.

[4] The implications of the human capital and sorting models are similiar. Both predict that high ability individuals attain more education and have higher earnings. So it is not possible to differentiate these models with a simple regression analysis.

[5] More details are provided in the next section.

is the case.

Let's consider the fully separating equilibrium. In this equilibrium, the lowest ability group complete the minimum level of education. This is the case for both versions of the law. Under the old law, the directly affected students are the ones with the minimum level of education.[6] So they belong to the lowest ability group. After the law change, the standard for minimum level of education is set as PE8. Then, the directly affected students will only complete PE8 and not continue HS after the CAL change because they belong to the lowest ability group.

The human capital model also implies that the directly affected students will drop out after completing PE8 after the CAL change. In this model, the change in CAL will affect the supply of workers in different education and experience levels. The change in supply will affect the factor prices. In spite of this, Lang and Kropp provide examples which show that the change in the factor prices will have a negligible effect on the desired level of education of the students. Hence, the optimal level of education that the students desire will not be affected by the CAL change. Then, the directly affected students whose optimal level of education is below the weaker CAL rules will also find their optimal level of education bound by the stronger CAL rules. Hence, the human capital model also predicts that the directly affected students only complete PE8 and not continue HS after the CAL change.

2.2 Implications for the Indirectly Affected Students

Now, we consider the group of students who are indirectly affected by the CAL change. These are the students who would drop out after completing PE8 under the old law. The human capital model predicts that the indirectly affected students will not alter their educational attainment because of the law change. By contrast, the sorting model implies that the educational attainment of these students will increase as a consequence of the law change. We again follow Lang and Kropp (1986) for the discussion.

Let's consider the fully separating equilibrium in the sorting model. In this equilibrium, the lowest ability students complete the minimum level of education. Then, the directly affected students belong to the lowest ability level group. Since the change in CAL forces these students to

[6] Of course, there are students who do not get any formal education and they are lower ability than the directly affected students. But as we mentioned in the introduction, we do not expect that they change their educational attainment with the new law so we keep them outside of this analysis.

graduate from PE8, the average ability level of PE8 graduates decreases. Because of this, the benefit of continuing to HS increases. Then, some of the indirectly affected students will choose to attend HS in order to get this additional benefit.

The human capital model does not predict any change in the attendance levels of the indirectly affected students. The argument that we had for the directly affected students is also correct for the indirectly affected students. That is, the factor prices change as a consequence of the CAL change but the desired education level of the indirectly affected students does not change. Hence, the human capital model predicts that the indirectly affected students will not change their attendance behavior after the CAL change.

3 Data

We use the 2003 household budget survey in our analysis. The collection period of the survey is from January 1st to December 31 of 2003. There are 25,764 households and 107,614 people in the 2003 survey. We only consider the children of the household head because we do not have the parental information of the other children. We refer to all our observations as "students" regardless of whether they enroll in school at the survey time. Age 18 is a border age where some of the students are subject to the new law and some are subject to the old law so we exclude them from our analysis. We include sixteen and seventeen year olds who are subject to the new law and nineteen and twenty year olds who are subject to the old law. There are 7,341 students in these age cohorts. We cannot include younger cohorts because their HS enrollment status is not yet clear. We cannot include older cohorts because many of them do not reside with their parents.[7]

Table 2 gives the summary statistics for the survey. In the introduction, we pointed out that the enrollment rates obtained from Ministry of Education data show an abrupt increase after the CAL change. The improvement is apparent in the sample data as well. The level of education in this analysis refers to the highest level of education that the student currently enrolls in or graduates

[7] The sample selection is a serious issue for the ages we include as well. We cannot include the students who left home for college, work, marriage or any other reason. Nineteen and twenty year olds are more likely to leave home than the younger cohorts.

from.[8] The percentage of the students who have an education level less than PE8 is 34.2 percent for the cohorts that are subject to the old law and 8.7 percent for the cohorts that are subject to the new law. Although the law does not cover HS, the percentage of the students who have a HS education increases after the law change. 55.2 percent of the students who are subject to the old CAL have HS education whereas this rate is 60.9 percent for the students who are subject to the new CAL.[9]

The socioeconomic background of the younger and older observations are similar. Higher portion of the younger cohorts are boys and reside in the city.[10] The parents of the younger cohorts are better educated but they are more likely to be in a rented apartment and have lower income.

4 Methodology and Results

In the previous section, we observe that the students who are subject to the new law are more likely to have HS education. This is despite the fact that the CAL does not cover HS education. However, this result might be driven by the fact that the younger cohorts have better socioeconomic backgrounds. To control for this, we run the following differences in differences regression:

$$Y_i = \alpha + I_i N + X_i \beta + \epsilon_i$$

The dependent variable is the probability that the student has HS education. α is the constant and I_i is equal to one if the student is subject to the new CAL. X_i contains socioeconomic variables.

We run the equation using OLS.[11] The results are shown in Table 3. The students who are subject to the new CAL are four percent more likely to have HS education.[12] Students with better

[8] This definition of level of education inflates the level of education for the younger cohorts. For instance, say a student is enrolled in HS when he is sixteen but drops out before he is nineteen. Then his level of education will be HS when he is sixteen years old but only PE8 when he is nineteen years old.

[9] The difference in HS enrollment rates is more pronounced in the national data. The selection issues aforementioned might be responsible for this.

[10] These differences may reflect the selection bias. For instance, the higher portion of the boys among young cohorts may reflect the fact that girls marry early and leave home.

[11] We plan to run also a probit regression in the later drafts.

[12] In the previous footnotes, we mentioned selection bias regarding the ages of the students. As a robustness check, we compare nineteen year olds in the 2003 with the nineteen year olds in the 2005 survey. Since 2005 survey is of a much lower scale, we have only 2,136 students. For these students, the change in CAL increase the probability of having a HS education by five percent.

economic conditions and better educated parents are more likely to have HS education.[13]

Next, we find the group of students who increase their likelihood of having a HS education. To do this, we divide students into groups by asking the following hypothetical question: If the CAL did not change, what would be the level of education that the students would have? To answer this question, we use the conditions of the pre-change period. The presumption here is that nothing would have changed in terms of attendance behavior if the CAL did not change. If there was no change in the law, then the pre-change period conditions would also be valid for the post-change period students.

First we run the following equation by using only the students who are subject to the old CAL.

$$E_i = \alpha + X_i\beta + \epsilon_i$$

where E_i represents the years of education that corresponds to the level of education the student has. No formal education is represented by zero. PE5, PE8 and HS are represented by 5, 8 and 11 respectively. The results of this regression is given in Table 4. As in the high school enrollment regression, the more educated parents have more educated children and the better economic conditions lead to a higher educational attainment.

Second, we find the predicted level of education for the students who are subject to the old CAL. To do this, we sort the students via their predicted years of education. Students with the highest predicted years of education are predicted to have HS education. We continue to assign students to this level until the number of students who actually have HS education are equal to the number of students who are predicted to have HS education. We repeat this procedure for other levels of education. At the end, we derive threshold predicted values above which the student is assigned to a higher level of education. The threshold values are given below:

Student i's education level is:

HS if $\hat{E}_i \geq 8.15$

PE8 if $\hat{E}_i \geq 7.64$

PE5 if $\hat{E}_i \geq 5.29$

[13] There is one surprising effect. The presence of dad at the household decreases the likelihood of having HS education.

Third, we find the predicted level of education for the students who are subject to new CAL by using the conditions of the pre-change period. We compute the predicted years of education for these students by using the coefficients from table 4. In other words, we use the coefficients of the pre-change period regression in order to find the predicted years of education for the post-change period students. The next step is to divide students in groups in terms of their predicted level of education. We again use the same threshold values that are valid for the pre-change period students. For instance, we predict students to have HS education if their predicted years of education is more than 8.15.

Lastly, we run a separate differences in differences regression for HS education for each of the groups. Table 5 lays out the results for the four different groups of students. Note that, none of the groups, except for the directly affected students have a significant difference in likelihood of having HS education because of the law change. The directly affected students are nine percent more likely to have HS education if they are subject to the new law.[14] The increased likelihood of the indirectly students are of a lower value and insignificant.

The results support the maturity hypothesis. The students can drop out at age eleven before the CAL change. When the students who would drop out at eleven are forced to study until age fourteen, they pursue their studies towards HS. The maturity involved in educational decision prolong their study beyond the required level.

The results support the human capital hypothesis against the sorting hypothesis. The human capital hypothesis predict no change in the enrollment behavior of the indirectly affected students because of the law change whereas sorting hypothesis predicts an improvement. Since we find no significant effect for the indirectly affected students, this is in support of the human capital model.

5 Conclusion

The HS enrollment rate increased in Turkey after the CAL change. This is surprising because the law only covers the PE. We find that a student is four percent more likely to have HS education if he is subject to the new law. Next, we search for the source of improvement. We find that the

[14] We repeat the same exercise for the nineteen year old cohorts for the 2003 and 2005 surveys. Although the number of observations are much less, the results are similar. The increased likelihood of HS attendance of directly affected students are eight percent.

students who would drop out after completing PE5 if the law did not change are the only group of students who significantly increase their likelihood of having HS education.We explain this by the maturity effect. The law enforces these students to drop out at a later age. The maturity obtained by this additional education makes students pursue their studies beyond the required level.

References

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Table 1: Enrollment

	Enrollment Rates:			Total Enrollment (in millions)		
Year:	PE5	PE8	HS	PE5	PE8	HS
94--95	89	75	37	6.47	9.14	2.05
95--96	89	74	39	6.40	9.05	2.16
96--97	89	74	39	6.39	9.01	2.14
97--98	----------	85	38			2.13
98--99	----------	89	39			2.28
99--00	----------	94	40		10.23	2.32
00--01	----------	95	44		10.48	2.36
01--02	----------	92	48		10.48	2.58
02--03	----------	91	51		10.33	3.02
03--04	----------	90	53		10.48	3.01
04--05	----------	90	55		10.57	3.05
05--06	----------	90	57		10.67	3.26

Source: National Education Statistics Yearbooks available at http://sgb.meb.gov.tr/istatistik/main2.htm and authors' calculations
Note: The ratios are the number of students over the population for the age interval that belongs to that education level. These age intervals are: 6-10 for PE5, 6-13 for PE8 and 14-16 for HS.

Table 2: Summary Table

	19 and 20 year olds		16 and 17 year olds	
Age:	19.486	0.500	16.511	0.500
No Education	0.059	0.236	0.087	0.282
PE5	0.283	0.451	0.001	0.026
PE8	0.106	0.308	0.303	0.460
HS	0.552	0.497	0.609	0.488
Boy=1	0.465	0.499	0.497	0.500
City=1	0.679	0.467	0.697	0.460
Dad Home	0.918	0.274	0.919	0.273
Mom Home	0.989	0.105	0.991	0.093
Dad Years of Education	6.031	3.763	6.365	3.732
Mom Years of Education	3.724	3.464	4.067	3.565
# of people in the household	5.611	2.434	5.631	2.331
# of children in the household	3.267	1.959	3.376	1.867
Home Rent=1	0.158	0.365	0.189	0.392
Income (billions of 2003 TL)	11.02	10.73	10.40	13.00
# of observations	2950		4391	

Notes: 1-) Levels of education given in the table refers to the highest level of education that the students currently enroll in or graduate from
2-) Parent's years of education is only available if the parent is at the household.

Table 3: The effect in CAL on the HS education.

Dependent Variable: Probability of having HS education		
Constant	0.362	0.055
New CAL=1	0.040	0.010
Boy=1	0.113	0.010
City=1	0.215	0.011
Dad Home	-0.111	0.021
Mom Home	0.035	0.051
Dad Years of Education	0.027	0.002
Mom Years of Education	0.017	0.002
# of people in the household	-0.017	0.005
# of children in the household	-0.023	0.006
Home Rent=1	-0.014	0.013
Income (billions of 2003 TL)	0.002	0.000
R_square, adjusted R_square	0.259	0.258
# of observations		7341

Notes: 1-) Levels of education given in the table refers to the highest level of education that the students enroll in or graduate from
2-) Parent's years of education is only available if the parent is at the household.

Table 4: Determinants of Years of Education for the Students Subject to Old CAL.

Dependent Variable: Years of Education (=5 for PE5, =8 for PE8 and =11 for HS)		
Constant	6.339	0.532
Boy=1	0.841	0.103
City=1	1.332	0.116
Dad Home	-0.470	0.217
Mom Home	1.013	0.492
Dad Years of Education	0.192	0.018
Mom Years of Education	0.134	0.019
# of people in the household	-0.149	0.046
# of children in the household	-0.223	0.056
Home Rent=1	-0.053	0.143
Income (billions of 2003 TL)	0.013	0.005
R_square, adjusted R_square	0.316	0.314
# of observations		2950

Notes: 1-) Levels of education given in the table refers to the highest level of education that the students enroll in or graduate from
2-) Parent's years of education is only available if the parent is at the household.

Table 5: The effect in CAL on the HS attendance for Students with Different Predicted Levels of Education:

Dependent Variable: Probability of having HS education

	Predicted Level of Education:							
	No Education		**PE5**		**PE8**		**HS**	
Constant	0.235	0.093	0.224	0.087	0.877	0.413	0.429	0.125
New CAL=1	0.035	0.027	0.090	0.021	0.019	0.037	0.019	0.013
Boy=1	0.091	0.032	0.209	0.025	0.083	0.115	0.023	0.013
City=1	0.007	0.042	0.137	0.029	0.127	0.175	0.135	0.022
Dad Home	-0.215	0.064	-0.077	0.037	-0.205	0.102	-0.105	0.032
Mom Home	-0.092	0.061	-0.074	0.080	-0.384	0.378	0.242	0.122
Dad Years of Education (**)	-0.006	0.006	0.023	0.005	0.039	0.028	0.022	0.002
Mom Years of Education	0.020	0.017	0.023	0.005	0.001	0.018	0.010	0.002
# of people in the household	0.005	0.006	-0.016	0.008	-0.010	0.029	-0.045	0.012
# of children in the household	0.001	0.008	-0.006	0.010	-0.036	0.036	0.017	0.014
Home Rent=1	-0.066	0.071	0.050	0.033	0.070	0.049	-0.041	0.015
Income (billions of 2003 TL)	0.005	0.003	0.009	0.002	0.003	0.003	0.001	0.000
R_square, adjusted R_square	0.081	0.055	0.071	0.066	0.016	0.002	0.081	0.078
# of observations		401		1990		772		4178

Notes: 1-) Levels of education given in the table refers to the highest level of education that the students enroll in or graduate from

2-) Parent's years of education is only available if the parent is at the household.