Exemption and Education:

Exploiting a Discontinuity in Compulsory Military Service Law

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Abstract

Would the fear of conscription entice the youth to get more education despite their will? This paper uses a discontinuity in the military service law in Iran to answer this question. Iranian males become eligible for military service when they reach 18. But, sole sons whose fathers' age is above 59, at the time of son's eligibility, are exempted from the service. Sole sons whose fathers' age is a bit below the threshold may stay in school until their father reaches (or passes) 59, in order to get exemption after leaving school. This study shows that, as a result of this, there is a discontinuity in education levels of sole sons at the father's age of 59. Sole sons whose fathers' age was below the threshold are five percentage points more likely to attend college than those whose fathers' age was above it.

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1 Introduction

Would the fear of the compulsory military service entice the youth to get more education despite their will? How does this affect their lifetime outcomes such as earnings? This study explores these questions using a novel setting which is caused by a discontinuity in conscription exemption laws in Iran.

In developing countries, where the threat of instability and domestic conflict is substantial and there is potential spill-over effect from neighboring countries, having a strong and yet relatively inexpensive army is critical for the state. Military service, which is mandatory in over 60 countries around the world (Chartsbin, 2011), is one of the inexpensive ways that governments use to recruit for their military forces. Yet, its compulsory nature remains controversial. The mere fact that these coercive laws exist shows that not as many people as the government needs volunteer to join armed forces. There are many who find conscription, especially at the time of peace, a waste of their resources and would go a long way to avoid the service altogether.

In Iran, like many countries, military service for males 18 and above is compulsory. But in some cases exemption is possible. For instance, certain illnesses make one eligible for exemption or students are temporarily exempted from the service as long as they study. But one particular case of exemption is that of a sole son. Up until 2011, a sole son could get exemption in order to take care of his elderly father, if his father was 59 years or older when he had reached his 18th birthday and became eligible for military service.[1] This means those sole sons whose fathers are younger may miss this opportunity. But there is hope. An 18 year-old sole son whose father's age is below but close to 59, may go to school (i.e. college) for a few years in order to postpone his eligibility. In the meantime, his father will reach (or pass) the age of 59, as a result of which he can get exemption. Therefore, those 18 year-old sole sons whose fathers' age is above 59 have less incentive to continue their education than those whose father is a bit younger than 59.

This study establishes that, in Iran, there is a discontinuity in the educational attainment of sole sons, whose fathers' age was 59 when they were 18 years old, relative to the sole sons with slightly

[1] The required age of father has increased to 65 in 2012 and then to 70 in 2014.

younger fathers. The discontinuity creates at least about five percentage points more chance of going to college and beyond. It also shows that this is not true for females. Therefore, this phenomenon can be attributed to the discontinuity in the military service exemption law. This fact may be used as an exogenous factor to estimate returns on wages to college attendance. But, it is a weak instrument for college attendance and the IV estimates are not reliable.

The rest of the paper is structured as follows. Section 2 explains the military service and its exemption laws in Iran. It also explains the identification strategy. The data are discussed in Section 3 after which the estimation and results are depicted in Section 4. At the end, there is a conclusion and policy implications for countries with military service laws.

2 Military Service in Iran

Conscription, in its modern form, was first introduced after the French Revolution to protect the country from the attack of the other European powers. Later, however, it made the French army into one of the most powerful militaries in the early 19th century. With the rise of nationalism in Europe and the rest of the world in the 19th century, this system became popular with the governments around the world to create and maintain a strong standing army. In recent decades, however, criticism from various angles (religious, philosophical, economic[2], political, and human rights grounds[3]) made conscription controversial.[4] Many states abandoned this system and began to rely on professional paid armies and volunteers.[5]

In Iran, mandatory military service for men was first introduced in 1924 by Reza Shah, the king at the time, to the Parliament and, despite some opposition, became the law.[6] This law, after the Islamic revolution of 1979, was modified in 1984, and stated that conscription consists of 30 years

[2]For a thorough discussion of economics of conscription vs. all-volunteer force, see Warner and Asch (2001). They also offer empirical evidence that the arguments for all-volunteer force in the US are substantially stronger in 2001 than they were in 1973, when conscription was abolished.

[3]One may challenge military service on other dimensions as well. For instance, using draft lottery in Argentina, Galiani et al. (2011) show that conscription increased the chance of development of criminal record.

[4]There have been many studies on the impact of conscription. Those that use draft lottery in various countries, such as Angrist (1990), Angrist et al. (2011), Angrist and Chen (2011), Siminski and Ville (2011), Conley and Heerwig (2011), and Card and Cardoso (2012), are among the important ones.

[5]For a review of studies on recruitment, retention, military experience and productivity in the all-volunteer force (AVF) era in the United States, please see Warner and Asch (1995).

[6]From 1906 to the revolution of 1979, Iran had had a constitutional monarchy with a parliament.

and is divided into four periods: First, a two-year period in which every male whose 18th year of life is completed (is in her 19th year of life) has to participate in military training and activities. The training lasted for three months and the other twenty one months were spent in service to the armed forces (military and police). After that, comes three consecutive 'reserve' periods: an eight-year period, called 'priority reserve' followed by two ten-year periods, 'first reserve' and 'second reserve'. In these reserve periods, those who finished the two-year military training and service are on reserve and would be called to service if needs arise (for example, if the country goes to war). The priority would be given to those who are on the 'priority reserve,' and then the 'first' and 'second' reserves.

The two-year training and service period has recently changed to 21 months. But the compulsory military service remains a cumbersome activity that many try to avoid at great expense. According to law, those who are medically not fit for the service are exempted. Tertiary level students are also exempted from the military service as long as they attend undergraduate or graduate schools. But upon leaving the tertiary education, they need to go to the military service. Another group is men who are the only son of their parents and whose father are over 59 years old[7] at the time of conscription. The argument is that the elderly father may need his sole son's assistance in the old age. This assistance is particularly pronounced in rural areas and where manual labor requires youth strength.[8] This paper uses a combination of the sole son and student exemptions laws to identify a discontinutity in educational attainment.

2.1 Exemption and Education

Consider a male who is 18 years old and is the only son but his father is 55 - just four years before the threshhold needed for exemption by the law. But if the son stays in school and goes to college for four years, he can get student exemption as long as he studies. After he finishes his four year college, his father becomes 59 and he becomes eligible for the exemption. Compare him with

[7] 59 was the threshold for father's age until 2012. It has changed to 65 in 2012 and then to 70 in 2014.

[8] There are other exemptions as well: 1) men who are the sole child of their parents, 2) men who are the sole caregiver of a physically or mentally disabled parent, sibling, or second line family members, 3) doctors, firefighters, and other emergency workers whose military service may jeopardize health and emergency services, 4) workers of important governmental agencies that directly or indirectly assist the military are exempt at the time of war, 5) workers of business that work with the military are exempt from service at the time of war, 6) prisoners.

someone who is 18 years old and is the only son of a father who is older than 59. This second man does not need to stay in school in order to get exemption. Therefore, those sole sons whose fathers' age is below the threshold, when they are 18, have more incentive to go to college and those whose fathers' age is above have less.

This may provide a discontinuity in educational attainment for the sole sons whose fathers are below and above 59 years old. This discontinuity is an exogenous factor to the educational attainment and can be used as an instrument to estimate various returns to education such as the return on wages. In fact, one reason that was officially mentioned in 2011 for raising the father's age threshold for this law from 59 to 65 (and later to 70) was that non-eligible sole sons were extending their education to get exemptions when their fathers reach 59.[9]

3 Data

Statistical Center of Iran (SCI) is the main organization in charge of gathering micro datasets in Iran in the past six decades. These relatively large datasets provide various statistics for policy makers as well as the general public. In this study, I use the Household Expenditure and Income Surveys (HEIS) which are a series of cross-sectional surveys conducted annually.

These annual surveys have been collected since 1963 in rural areas and 1968 in urban areas. They contain basic demographic information, ownership of assets, dis-aggregated expenditure, and income. Over the years, these surveys became richer with longer questionnaires. For instance, since 2006, hours worked per day and days worked per week were collected as part of these surveys. These are necessary variables to estimate return to education and fortunately available in HEIS 2006 through 2010 – the last year for which the HEIS data sets are digitized and accessible.

Each year, new samples are drawn from the population. The samples are nationally representative and stratified at the urban and rural areas of each province. Sample selection follows a two-stage sampling method which has remained the same over the years. In the first stage, based

[9]Interview of *Khabar-online* with General Kamali, vice president of human resources for armed forces, on changes to military service conscriptions laws, (January 12, 2012), http://khabaronline.ir/detail/193772/ accessed on October 17, 2015.

on the most recent census, the total number of primary sampling units (PSUs) in each geographical block (rural or urban areas in each province) are determined, which is equal to the population in the block divided by five.[10]

In the second stage, a number of PSUs in each block are chosen to be surveyed. This number depends on the population and variance of some variables of interest, such as food expenditure, in that block. Hence, households have different probability of selection. For instance, more rural households have been selected. The number of households for years 1990 through 2006 varies from 12,763 in 1993 to 36,579 in 1998 and averages at about 22,000. Data gathering process is done uniformly throughout the year so that $\frac{1}{12}$ of the sample are surveyed each month.

To identify the discontinuity in education levels at the father's age threshold of 59, we need to have the sample of sole sons whose father's age was between 50 and 68 when they were 18. This is a rare phenomenon and requires large population samples to identify. Therefore, I use all annual HEIS data sets from 1992 to 2010.

One issue with these surveys is that they only record people who were living in the household at the time of the survey. Hence, if sons do not live with the household anymore, they will not be recorded in the surveys. Therefore, the number of sons in the survey for a household does not necessarily show the actual number of sons the household had. For instance, a household that seems to have no son, may have a son who left the household, or a household that seems to have only one son may have more. Therefore, one needs to create a sample of sole sons who are less likely to be selected and contaminated. This is not easy to achieve, since the demographic information in the data set is very basic. One simple way to mitigate this problem is to only consider the sample of sole sons who are young and less likely to leave the household. Therefore, For the rest of this paper, our sample only includes sole sons whose age is between 18 and 24.[11] One can also argue that it is similarly likely for sons to leave the household on the left and right side of the threshhold. Therefore, inaccurate identification of sole sons happens on both sides of the threshold and should not bias the results. Nevertheless, this measurement error in identification of sole sons creates not only a noisy estimate but an under-estimation of the true effect of the military service law.

[10]Each PSU corresponds to a census track and consists of five households.
[11]The results are robust to changing 24 to 20, 22, 26, 28, and 30.

Another source of under-estimation of the true effects is measurement error in father's age. Since we are interested in discontinuity close to a threshold of father's age, measurement error in age close to threshold can easily take an observation from one side to the other side. This increases the standard error of the estimate and also produces an under-estimation of the true effect. Education in the data is coded in aggregated ways. It is easy for one to infer the level of education from it. But the years of education cannot be deduced, since some grades have similar codes. In this paper, whether an individual is a student at tertiary level (college and above) or has attended these schools in the past is the education outcome variable. Table 1 reports the summary statistics of the variables in the sample.

4 Estimation and Results

Figures 1 and 2 documents the discontinuity in college attendance of the sole sons and their sisters between ages 18 and 24 in urban areas whose father's age was between 50 and 68 when they were 18 years old. Each of these figures has three subfigures showing linear, quadratic, and polynomial fit of data. In Figure 1, the horizontal axis shows the age of father when his sole son is 18 and the vertical axis is the share of 18 to 24 year-old sole sons who attended college and above. The horizontal axis in Figure 2 depicts the age of a father who has a sole son when his daughter (sole son's sister) was 18 and the vertical axis is the share of 18 to 24 year-old sole sons' sisters who attended college and above. The solid black lines are the fitted lines and the light gray lines show the 95% confidence interval. The dots represent the average college attendance rate at each father's age. The figures support the hypothesis that sole sons whose fathers' age when they were 18 was less than 59 have more incentive to go to college than those whose fathers' age was above 59 at age 18.

This is represented more clearly in regressions in Table 2 which reports the results for following set of regressions:

$$Y_i = \alpha + \tau D_i + \sum_{k=1}^{l} \gamma_k (p_i - 59)^k + \sum_{k=1}^{l} \delta_k D_i (p_i - 59)^k + u_i, \qquad l = 1, 2, 3 \tag{1}$$

in which Y_i is the college attendance for individual i which is a dummy equal to one if the individual attended (or is attending) college or higher levels of education and zero otherwise. D_i is a dummy equal to one if individual i's father was between 50 and 58 when he/she was 18 and zero if the father's age was between 59 and 68. The father's age when individual i was 18 is represented by p_i.[12] Individual is a sole son (the left panel of Table 2) and a sole son's sister (the right panel of Table 2). The regressions contain a polynomial of $(p_i - 59)$ of degree l. l is equal to one, two, and three. The Local Average Treatment Effect (LATE) is τ.

All the regressions correct for robust heteroskedastic standard errors and correlation inside clusters. The clusters are counties in each province in a survey year. The first column of the Table explores college attendance for sole sons in a linear setting. The coefficient of D is positive and significant showing that sole sons whose fathers' age was 58 and slightly below when they were 18, have about 3 percentage point more chance of attending college than those whose fathers' age was 59 and slightly more.

Splitting the sample into rural and urban areas, it turns out that this discontinuity is only pronounced in urban areas. Columns (2) through (4) report the coefficient of discontinuity in linear, quadratic and third-degree polynomial settings. It is statistically significant for the linear and third-degree polynomial but its p-value for the quadratic regression is about 0.24 (it goes down to 0.14 when one includes survey year fixed-effects). The size of the coefficient for the linear model shows that the effect of the exemption law has been an increase of about 5 percentage points for sole sons in urban areas. Given the fact that attendance rates are about 25 percentage points for sole sons at the threshold (Figure 1), this increase is about 25% rise in attendance rate. Because of attenuation bias in measurement error in identifying the sole sons especially on the right side of the threshold, this is most likely a lower-bound for the effect.

For robustness check, one can run similar regressions for sole sons' sisters. The results are reported on the right panel of Table 2. All showing that there is no discontinuity in college attendance for them. This indeed confirms that the discontinuity is something attributed to boys and therefore related to the compulsory military service exemption. As another robustness check, I look at other

[12] p is the first letter of the Latin word *pater* and the Persian word *pedar* meaning father.

houeshold level variables such as number of children and find no discontinuity at the threshold for them.

Since the discontinuity for sole sons does not exit for their sisters, one can use Difference-in-Discontinuity method to estimate the effect of the exemption law using both sole sons and their sisters. In other words, we can estimate

$$\begin{aligned} Y_i &= \alpha + \beta D_i + \sum_{k=1}^{l} \gamma_k (p_i - 59)^k + \sum_{k=1}^{l} \delta_k D_i (p_i - 59)^k + \\ & S_i \{\alpha_s + \tau D_i + \sum_{k=1}^{l} \gamma_{ks} (p_i - 59)^k + \sum_{k=1}^{l} \delta_{ks} D_i (p_i - 59)^k\} + u_i, \qquad l = 1, 2, 3 \end{aligned} \tag{2}$$

in which S_i is a dummy variable equal to one if individual i is a sole son and zero if she is his sister. τ represents the Local Average Treatment Effect (LATE). Columns (1), (2), and (3) of Table 3 report τ in linear, quadratic, and third-degree polynomial settings respectively. LATE for the linear model depicts 7 percentage points increase in college attendance caused by the existence of the exemption law. Given the fact that attendance rates are about 25 percentage points for sole sons at the threshold (Figure 1), this increasr is about 30% rise in attendance rates.

One may be able to use this discontinuity in college attendance as an instrument for college education and estimate returns to college on wages. But, the adjusted R-squareds in both Tables 2 and 3 are too low and show that this instrument will be weak and lead to biased estimates.

5 Conclusion

This study, for the first time, documents that a discontinuity in law for military exemption has created a wedge in education levels of sole sons. Since there are measurement errors involved in identifying sole sons, the estimates are noisy and five percentage points is a lower bound for this wedge. But they, nevertheless, show that military service is not favored by the sole sons. Entering college especially until late 2000s has been very competitive and challenging as the supply of college seats has been a fraction of demand. It required the individual to be ranked at the top 20% in

the national college entrance examinations. Sole sons showed that they are willing to take this challenging path to avoid military service (even) at peace times.

If we could identify sole sons more accurately in the data, we can measure the effect more precisely and use it as an instrument to estimate returns to college education. Further research may open horizons to do so.

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Figure 1: Discontinuity in College Attendance of Sole Sons in Urban Areas

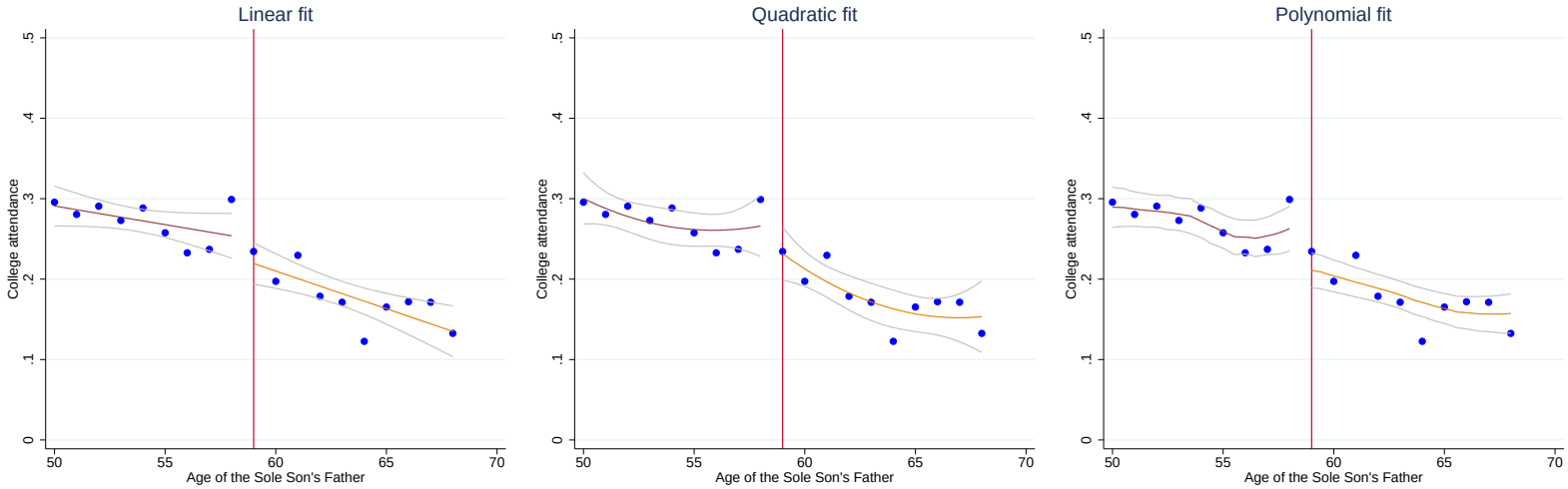

Figure 2: Discontinuity in College Attendance of Sole Sons' Sisters in Urban Areas

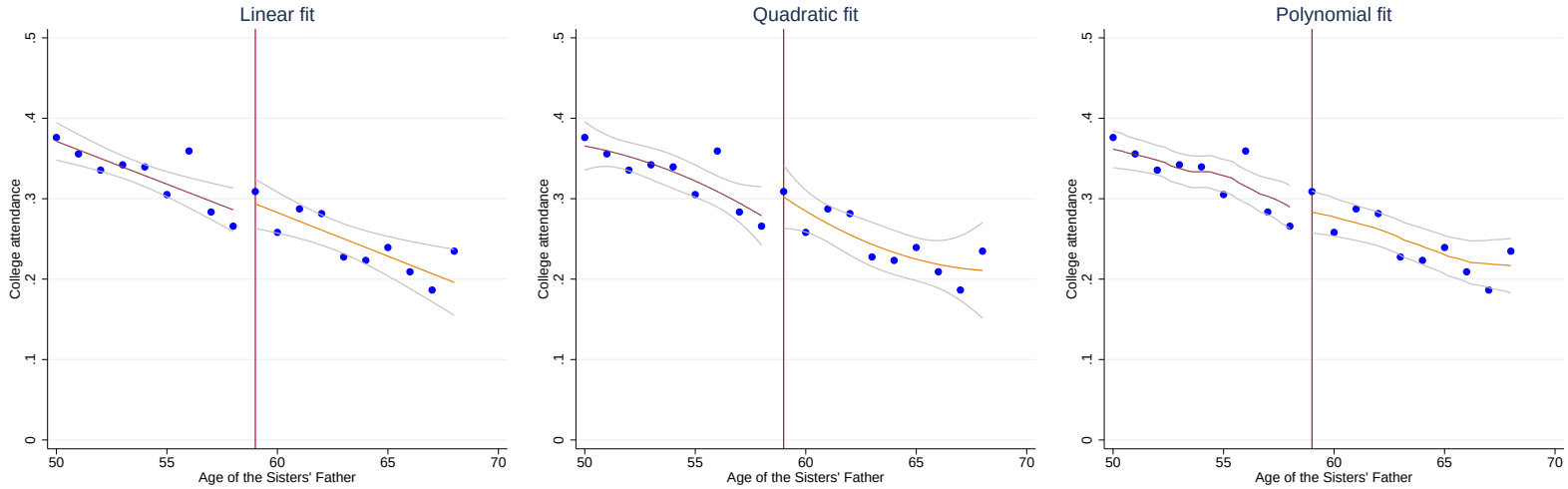

Table 1: Summary Statistics

Sole Sons	Mean	Std. Dev.	Min.	Max.	N
Father's age at 18*	58.2	5.3	50	68	13212
Age	21.0	2.0	18	24	13212
Urban	0.5	0.5	0	1	13212
College attendance	0.15	0.36	0	1	13207
Sole Sons' Sisters					
Father's age at 18*	57.3	5.2	50	68	14388
Age	20.4	1.9	18	24	14388
Urban	0.5	0.5	0	1	14388
College attendance	0.19	0.39	0	1	14387

Note: Father's age at 18 is the age of father of an individual when he/she was 18. Age is the age of the individual at the time of survey. Urban is a dummy equal to one if the individual lives in an urban area and zero otherwise. College attendance is a dummy variable equal to one if the individual attended college or higher levels of education and zero otherwise.

Table 2: Discontinuity in College Education

	Sole Sons				Sole Sons' Sisters			
	All	Urban			All	Urban		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D	0.036**	0.046*	0.051	0.136**	0.014	-0.027	-0.053	-0.079
	(0.017)	(0.027)	(0.043)	(0.069)	(0.015)	(0.028)	(0.045)	(0.068)
$p-59$	-0.005**	-0.010***	-0.028**	-0.019	-0.007***	-0.012***	-0.014	0.007
	(0.002)	(0.004)	(0.012)	(0.028)	(0.002)	(0.004)	(0.015)	(0.031)
$(p-59)^2 \times 10^{-1}$			0.021	-0.009			0.002	-0.064
			(0.014)	(0.076)			(0.017)	(0.085)
$(p-59)^3 \times 10^{-4}$				2.301				5.076
				(5.602)				(6.352)
$D(p-59)$	0.000	0.010*	0.041**	0.105**	-0.001	0.003	-0.008	-0.062
	(0.003)	(0.005)	(0.019)	(0.051)	(0.003)	(0.006)	(0.021)	(0.056)
$D(p-59)^2 \times 10^{-1}$			-0.009	0.192			-0.014	-0.025
			(0.021)	(0.132)			(0.022)	(0.130)
$D(p-59)^3 \times 10^{-4}$				8.848				-10.091
				(7.904)				(9.151)
Constant	0.147***	0.252***	0.272***	0.267***	0.184***	0.345***	0.347***	0.337***
	(0.011)	(0.019)	(0.023)	(0.027)	(0.012)	(0.022)	(0.027)	(0.029)
R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
N	9540	4598	4598	4598	10774	5058	5058	5058

Note: Sample used in regression in the left panel only includes sole sons whose father's age when they were 18 was between 50 and 68. Sample of the regressions in the right panel includes sisters of sole sons whose father's age when the sister was 18 was between 50 and 68. Dependent variable is college attendance explained in notes for Table 1. D is a dummy equal to 1 if the father's age of a sole son is less than 59 when the son was 18 years old and zero otherwise. p is father's age. Robust-heteroskedastic standard errors corrected for correlation inside year-county clusters are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

Table 3: Discontinuity in College Attendance of Sole Sons in Urban Areas

	(1)	(2)	(3)
$D \times S$	0.073*	0.104*	0.216**
	(0.039)	(0.063)	(0.093)
Polynomial controls	Linear	Quadratic	Third-degree
R^2	0.02	0.02	0.02
N	9656	9656	9656

Note: Regressions are based on Equation (2). See notes for Table 2 for more information on variables. Coefficient of $D \times S$ shows the Local Average Treatment Effect from a Diff-in-Disc regression. Robust-heteroskedastic standard errors in parentheses.
* p<0.10, ** p<0.05, *** p<0.01