Is Child Labor Harmful?
The Impact of Working as a Child on Adult Earnings

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Abstract

This paper explores the question: is working as young laborer harmful to an individual in terms of adult outcomes in income? This question is explored through the utilization of a unique set of instruments that control for the decision to work as a child *and* the decision of how much schooling to acquire. These instruments are combined with two large household survey data sets from Brazil that include retrospective information on the child labor and schooling of working-age adults: the 1988 and 1996 PNAD. Estimations of the reduced form earnings model are performed first by using OLS without controlling for the potential endogeneity of child labor and schooling, and then by using a GMM estimation of instrumental variables models that include the set of instruments for child labor and schooling. The findings of the empirical investigations show that child labor has large negative impact on adult earnings for both male and female children even when controlling for schooling. In addition, the negative impact of starting to work as a child reverses at around age 14. Finally, different child labor activities are examined to determine if some are beneficial while others harmful with the finding that working in agriculture as a child appears to have no negative impact over and above the loss of education.

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I. Introduction

Child labor is widespread in today's world; the International Labour Organization estimates that 246 million of the world's children, or 16 percent, are child laborers, most living in developing countries.[1] Recently, there has been a renewed interest in child labor issues, and this renewed interest has led to a series of studies that aim to understand the causes and consequences of child labor in order to guide appropriate policy responses (see Basu (1999), for a useful survey of the theoretical and empirical literature). Among the policy options discussed are banning child labor and/or sanctioning countries that allow the practice. These types of policy responses have been widely debated among economists (see e.g., Emerson and Knabb, 2004; Basu, 2002; Dessy and Pallage, 2001; Baland and Robinson, 2000; Dessy, 2000; Basu and Van, 1998). Most of these studies emphasize the trade-off between child labor and human capital accumulation to justify policy interventions, arguing that there are large negative consequences from child labor. Child labor, however, is a catch-all term that encompasses a diversity of activities and working conditions, thus the belief that child labor is detrimental to human capital accumulation, may or may not be *generally* true, and, if so, at what age does this adverse effect cease to exist, and does the initial occupation matter, are open questions.[2]

[1] Child labor was also common in developed countries until fairly recently, see, e.g., Kruse and Mahony, 2000.

[2] It should be noted that there are some forms of child labor the are unequivocally bad: those that are detrimental to a child's health and well-being, those that involve indentured servitude or deny children their basic human rights, and those that involve psychological distress, to identify but a few. Some of these activities may not be detrimental to the adult earnings of the individual, but are indefensible nonetheless and we do not wish to suggest otherwise.

Studying and providing robust estimates of the effects of starting to work as a child on adult earnings will allow future studies of child labor, and discussions of appropriate policy responses, to be informed by these efforts.

Despite the fact that there is a large and growing literature on child labor, this one fundamental question remains unanswered: does child labor harm participants? Though it has been assumed to be detrimental, the potential effects of child labor on adult earnings are twofold. On one hand, child labor can be detrimental through the hindering of the acquisition of formal education, both quantitatively and qualitatively, and causing irreparable damage to health, reputation or other things that effect adult human capital, which could lead to lower wages in the adult labor market. On the other hand, there are many reasons why one might expect that there can be positive pecuniary benefits to young labor: vocational training, learning by doing, general workplace experience as well as the potential for making contacts, learning job market strategies, etc. In other words, there are many reasons to expect that a young laborer can gain some human capital from their workplace experience (e.g., Horn, 1994). Thus the net effect of starting to work as a child is an empirical issue. Though virtually all studies of child labor assume it is harmful, there is as yet no reliable measure of the effects of working as a child on adult outcomes.

These effects will also likely depend on the particular type of labor the child undertakes because some jobs may lead to the acquisition of job specific human capital while others may not. For example it could be that a child that works as manual laborer in agriculture does not learn many skills that the adult labor market values. However, a child that works as a manual laborer in a blacksmith shop, say, may learn many skills of

the blacksmith trade that are valuable on the adult labor market. For instance, French (2002) finds that child workers in shoe manufacturing industries in Brazil have positive attitudes toward their jobs if their work is associated with more autonomous and self-directed tasks. Furthermore, child labor could be a way to finance education that an individual would not otherwise have access to, which, in turn, could lead to better outcomes for older child or adolescent workers (see, e.g., Akabayashi and Psacharopoulos, 1999; Psacharopoulos, 1997).

Thus there is a startling gap between what is known about the causes of child labor and what is known about the consequences of child labor.[3] This paper seeks to fill this gap by providing a detailed analysis of two large survey datasets that contain retrospective information on the child labor of subjects and current information on their incomes.

This study analyzes the effects of starting to work as a child on the adult earnings of working age Brazilian men. Specifically, there are three main questions we will seek to answer: One, what is the effect on adult earnings of starting to work as a child both including the effect on educational attainment and the effect over and above the impact on schooling? Two, when does the negative effect of working as a child (if there is one) cease and positive effects commence? Third, are there differences in these effects depending on which child labor occupations, or types of work, a child enters when first starting to work?

[3] Some important exceptions are Emerson and Portela Souza (2003) who find that adult earnings are negatively related to the age the individual entered the labor force in Brazil. Ilahim, Orazem and Sedlacek (2000) find that child labor reduces the educational attainment and expected adult earnings in Brazil, however their study is constrained by lack of good instruments. Beegle, et. al., (2004) find that child labor hampers educational attainment observed 5 years later. Others also argue that adolescent workers are more likely to end up in dead-end jobs that hamper their human capital development (Spindel, 1985).

There are two main reasons for the lack of prior studies of this type: the paucity of good data and the confounding effects of potentially endogenous variables. The present study is able to overcome both limitations.

The first limitation is particular to developing countries where data of a high enough quality and a proper set of variables are hard to find. The Brazilian government, however, has been a pioneer in the collection and dissemination of data and thus Brazil presents a source of data that is adequate to address this complex relationship. The data utilized in this paper come from two rounds of a very large household survey from Brazil that includes information on current working-age adults' attributes and incomes as well as retrospective information on the age at which they first started to work and the number of years they attended school. Importantly, these data sets also include information on the educational attainment of the *parents* of the current working-age adults allowing controls for the family background of the subject individuals to be controlled for. These two data sets provide a very large and rich dataset from which to perform the analysis.

The second limitation is common to all studies that try and estimate the human capital - earnings relationship, which can be traced back to the seminal research of Becker and Chiswick (1966), Chiswick (1974) and Mincer (1974). Because of the strong likelihood that there are unobserved attributes (e.g. ability) that effect both the schooling choice of an individual and the individual's adult earnings, estimates that do not attempt to address this issue are considered unreliable. Recent research into this relationship using US data has relied on the use of instrumental variables to overcome the confounding effects of these unobserved attributes (Cameron and Taber, 2004; Carneiro and Heckman, 2002; Card, 2001; Card, 1995a; Card 1995b). The main drawback of this

type of approach is that it demands a robust set of instruments for the schooling choice of an individual. What makes this approach particularly challenging in the context of child labor is that schooling and child labor are likely jointly determined, so a set of suitable instruments must include instruments for *both* choices. To assemble a rich enough set of instruments, data on the number of primary, secondary and college-level schools in each Brazilian state for each year from 1933 to 1976 was collected, along with the number of teachers per school in each state and year. These institutional variables are hypothesized to be correlated with the work and schooling decisions of children (regardless of who made these choices), yet uncorrelated with adult incomes (when netting out state and other confounding effects). Statistical tests confirm the validity of these instruments.

With these two obstacles overcome, it is possible to provide a very detailed and robust estimation of the effects of child labor on adult incomes both including the effect of lost education and the effect over-and-above the effect on education. These results should be of vital interest to researchers of child labor in their quest to understand both the causes and consequences of child labor. This study then proceeds to test for differences in these observed effects of starting to work as a child by the occupation choice the person made when they first started to work.

The rest of this paper is organized as follows. Section 2 describes the data utilized in this study. Section 3 discusses the empirical strategy employed to explore the central questions of the paper. Section 4 presents the results of the empirical estimations. Section 5 discusses the results and implications.

II. The Data

The main sources of data utilized in this study are two rounds of the *Pesquisa Nacional por Amostragem a Domicílio* (PNAD), from *Instituto Brasileiro de Geografia e Estatística* (IBGE), the Brazilian census bureau: 1988 and 1996. The PNAD is a yearly and nationally representative household survey (excepting the rural Amazon region) similar to the Current Population Survey in the U.S. It covers close to one hundred thousand households and includes information on the demographic and labor market characteristics of the households. Additionally, and of particular utility for the present study, the 1988 and 1996 surveys obtain retrospective information from the household head and the spouse about the age they entered the labor market, their first occupation, the educational attainment of their parents as well as the occupation of their fathers when they (head and spouse) first entered the labor market, the state in which they were born and the state they currently reside in. If the two states were different, a follow-up question was asked about the number of years the individual had lived in the current state. This information was coded 1 through 10+ years.

Additional data on the number of primary schools, secondary schools and colleges by state and year come from the IBGE Historical Series, 2003. Data on the number of teachers per state per year were also collected from the IBGE. In order to match each individual with the number of schools in their state for each year that they were school aged (and later the number of teachers per school as well) we followed the following procedure. If the individual was a current resident of the same state in which they were born, we assume that they have not migrated and give them the number of schools associated with that state. If they list a birth state different from they state in which they

were current residents of and the migration information does not allow us to determine exactly when they moved, we give them the national average number of schools for each year they were of school age. Finally, if there is enough information to determine exactly when migration occurred, we give the individual the appropriate instruments for the state or states in which the resided during their school-aged years.

Our sample consists of all adult males who are between 25 and 55 years of age at each survey year. We exclude younger and older men in an attempt to avoid potential selectivity bias of labor participation decisions. We also exclude females for three reasons: first, there is a large selection issue relating to the women who choose to work (less than 50% of women in the 1988 and 1996 PNADs were listed as currently employed); second, many girls work in the household rather than for wages leading to under-measurement of female child labor; and third, fertility issues complicate the school and work decisions of females. Because of these three concerns, females are excluded from the current study though their outcomes are no less important. Hopefully future research will be conducted that will focus on females. Unlike women, most of these prime age male workers are likely to work in the labor market (over 95% work). We perform all analyses on three samples: the 1988 and 1996 PNADs and a combined sample of both in which we control for cohort effects. The combined sample consists of approximately 72,000 complete observations for men. The basic statistics of the combined sample are presented in Table A1 of the Appendix.

Before discussing the regression analysis, it is informative to show the distribution of the age started to work, the schooling attainment, and the log-earnings of the combined sample. The first column of Table 1 shows the distribution of the age

started to work for males. We divide the age started to work into four groups: those that reported age started to work at nine years old or below, between ten and thirteen years old, between fourteen and seventeen years old, and those at eighteen years old or above. Around twenty percent of prime age male workers reported that they started to work at nine years old or below for both surveys and around forty percent of them started to work between ten and thirteen years old. Around twelve to fifteen percent of male workers started to work at age eighteen or above.

Table 1 also shows the distribution of schooling attainment and log-earnings by each age-started-to-work group. We divide individuals into five educational attainment groups: illiterates, some primary or completed primary education, some secondary or completed secondary education, some high school or completed high school education, and some college or completed college education. Table 1 reveals that individuals who started to work earlier in life have lower educational attainments and lower earnings as adults. For educational attainment, for instance, 26 percent of all prime-age males that started to work at age nine or below are illiterate and two percent of them have some college or completed college education in 1988. Conversely, five percent of all prime-age males that started to work at eighteen years old or above are illiterates and 33 percent of them have some college or completed education in 1988. Thus, Table 1 appears to show that there is a direct relationship between the age and individual starts working and their educational attainment and adult earnings. If a causal relationship between age-started-to-work and adult earnings exists, its effect could be indirect (through education), direct (through experience), or both. The next section presents the empirical strategy employed to identify these effects and estimate their magnitudes.

III. Empirical Strategy

In the typical Micerian framework of the effect of schooling on adult earnings in the high income country context, the discussion of the empirical issues usually begins with a presentation of a standard two equation system that describes schooling (S_i) and log wages ($\ln Y_i$), for an individual i:

$$(1) \qquad S_i = X_i\delta + \nu_i ,$$

$$(2) \qquad \ln Y_i = X_i\gamma + S_i\beta + \upsilon_i .$$

In this case X_i is a vector of observed attributes of the individual and ν_i and υ_i are the random error terms that are assumed to be uncorrelated with X_i. The coefficient β is a measure of the 'returns to education,' or average returns to education if this varies across individuals if ν_i and υ_i are uncorrelated.

It is quite likely that schooling is correlated with the unobserved component of the log earnings equation, however, due to ability bias (see, e.g. Griliches (1977)), measurement error in schooling, or a systematic variation in the returns to schooling based on years of schooling (higher marginal returns in earlier years of schooling, see Card (1995), for example).[4] Ability bias arises when individuals of high ability both acquire higher levels of schooling (because the returns are higher and/or the costs are lower) and earn higher wages in the adult labor market. If this is true for our sample, an estimation of the β coefficient will be biased upwards. Measurement error in schooling can also bias the results if it induces a negative correlation between the errors of the

[4] See Card (1999) for an excellent overview of the issues and evidence concerning estimating the causal effect of education on earnings.

observed schooling and earnings, which would bias the estimate of β downward. Finally, if individuals with lower levels of schooling have systematically higher returns to schooling (due to diminishing marginal returns to schooling in general) then estimates of β will also be downward biased.

The context of a low income country in which child labor is widespread presents another confounding effect: child labor itself. The decision to work as a child is likely correlated with the schooling decision and is also likely correlated with adult earnings. Fortunately, one aspect of child labor is observed: the age at which individuals first started to work. Therefore, in the low income country context, where child labor is widespread the schooling and child labor decision are both likely to effect adult returns to education and are likely correlated, a description of this process would involve a three equation system for and individual i:

$$(1) \qquad S_i = X_i\delta + \nu_i ,$$

$$(2) \qquad CL_i = X_i\alpha + \psi_i ,$$

$$(3) \qquad \ln Y_i = X_i\gamma + S_i\beta + CL_i\phi + \upsilon_i .$$

Where CL_i is the age at which the individual first started to work, and ψ_i is the unobserved random error term. In order for ϕ to be a measure of the effect of starting to work at a certain age (or average if it varies across individuals), ψ_i and υ_i must be uncorrelated.

These error terms are likely correlated because of the same ability bias that causes high ability individuals to choose more schooling may cause those individuals to choose to start to work at an older age (biasing the coefficient estimate upward) or they may choose to start working at a younger age because ability may pay off in the child labor

market as well as the adult labor market (biasing the coefficient estimate downward). Measurement error is another source of potential bias.

In this case, consistent estimates for the return to education and the effect of starting to work as a child can be obtained if there is a set of regressors, Z_i, that can be added to the vector X_i that affect schooling but do not affect the unexplained component of earnings, and that affect the age an individual starts to work but not the unexplained component of earnings. This set of regressors must be sufficiently correlated with both schooling and the age started to work (i.e. have enough separate correlation with both variables that is separate from the correlation among the two variables), and sufficiently uncorrelated with the unexplained variation in adult earnings that they can be legitimately excluded from the earnings equation.

One set of variables that may fulfill this requirement are the number of primary schools, secondary schools and colleges per capita in the individual's state in the year that they are of the appropriate age to attend these schools. The presence of more schools in the same state as the individual lowers the cost of attending school as travel costs are reduced and students are more likely to be able to live at home and attend school. Lower cost of education should increase investments in education, and cause delay in starting to work. These are the instruments employed in the first set of regressions. Because schools vary in size, the number of schools may not be adequate. For this reason the number of teacher per school for each state and year are also employed in later estimations.

If these variables are proxying for other things that affect adult earnings that are unexplained by the covariates in the earnings equation, like school quality for instance or the returns to education in a locally segmented labor market, then they will not serve as

adequate instruments for the schooling choice and age at which the individual started to work. It is important to note, however, that the education of the mother and father are included as controls in the earnings equations. As parental education is, in general, a very good proxy for family income and wealth, they are likely to be strong correlates of school quality, local labor market conditions, etc.[5]

To test the model presented above, we estimate a series of OLS regressions and a series of GMM IV regressions in order to capture the effect of being an adolescent laborer on adult earnings. The first set of regressions will estimate the direct impact of being a young laborer on adult earnings. The second set of regressions will identify the first job occupations that are associated with higher or lower earnings conditional on having been an adolescent laborer. The third set of regressions will add the effect of having the same first job occupation and the father's occupation.

IV Estimation and Results

4.1 The Effect of Starting to Work as a Child

In order to estimate the effect of having been a child worker on current adult earnings, we start by estimating two separate earnings equations that include the age the individual first started to work variable and its square, the age of the individual and its square, indicator variables that equal one if the individual is classified as black and another if the individual is classified as 'pardo,' or mixed race. Included in all estimations are measures of the father's and mother's education levels. For both, these are indicators for each level of education completed: lower primary, upper primary,

[5] Parental education and family income and wealth are highly correlated in Brazil. See, e.g., Emerson and Souza (2003).

secondary and college. For these estimations, an indicator variable that equals one if the individual resides in a rural area is included, as well as indicators for the regions of Brazil the individual currently resides in. The difference in the two separate earnings equations is that in the first estimations the years of schooling of the individual are not included and in the second set, the years of schooling are included.

We begin by estimating the earnings model for the two survey years separately and estimate each first by OLS and then using the set of instruments described above in a GMM IV framework (excluding, for the moment, the number of teachers per school). The first set of regressions does not control for the individual's educational attainment. The fact that an individual worked during childhood or adolescence will likely mean that individual will have attained less education than a similar individual that did not work. So, as a first step, the coefficients of the young labor indicator variables when not controlling for education capture the expected forgone adult earnings of a young worker.

Table 2 presents the results for the 1988 sample. The first and fifth columns of each table show the coefficient estimates of the OLS and the second-stage of the IV regressions, respectively, when the individual's schooling variables *are not* included.[6] First, as we are interested in the young laborer status of the individual and its impact on his adult earnings, the coefficient estimates show that the older the individual enters the labor market, the higher are his earnings (including the effect of the loss of education). For the IV estimation, the squared term is negative and significant, suggesting that this negative effect ceases at around age 14. Thus, there is a negative and significant impact on adult earnings if a male individual started to work as a child at or below the age of 14, but that effect becomes positive for individuals who started to work at age 15 or above.

The third and seventh columns of Table 2 present the coefficient estimates of the OLS and second-stage IV regressions, respectively, when the individual's schooling variables *are* included. Thus the coefficients estimates of the young laborer indicator variables reflect the effect on adult income of having been a young laborer over-and-above the loss of education. Here, the age started to work coefficient estimate is still positive for both and its square is positive again for the IV estimation.

For all four estimations, the other coefficient estimates have the expected signs. Older individuals have higher earnings but this increases at a decreasing rate, black and pardo individuals have systematically lower earnings than white individuals, individuals in rural areas have lower earnings, and, the more educated the parents are, the greater the earnings of the individuals.

Table 3 presents the same estimations for the 1996 survey year with qualitatively the same results. The IV estimates are again above the OLS estimates for the return to schooling and the negative effect of starting to work holding schooling constant ceases around age 15.

Table 4 presents the estimates for these same models for a pooled sample that includes an indicator for the 1988 survey year and indicators for cohorts: one for individuals born in the years 1933 to 1945, and another for individuals born in 1946-1958. The pooled sample estimations follow the same pattern of results as the preceding estimations. The '46-'58 cohort indicator variable estimate is positive and significant in all cases and, interestingly, individuals from the earlier sample, 1988, have systematically lower earnings, perhaps reflecting the growth of the Brazilian economy over the intervening years.

[6] All first-stage regression results are presented in the appendix.

Together, these results suggest that there is indeed a negative impact of being a child labor both including the effect on educational attainment and over and above the impact on education. However, this effect seems to subside and turn positive at around age 13-14. Figure 1 presents an 'iso-earnings' curve the represents the trade-off between education and child labor based on the estimated coefficients from Table 4. While the magnitude of the impacts may be imprecisely estimated for reasons stated above, there seems to be no reason, a priori, that the turning point of the effect of child labor on adult earnings to be biased. From these exercises the picture that emerges is that though there is an important impact of adolescent labor on adult earnings through the trade-off with schooling, there is a strong impact over and above the effect on educational attainment and that this impact turns positive around age 13-14.

Like similar studies of the education – earnings relationship in the United States and elsewhere, the IV regression coefficient estimates on the schooling variable are systematically higher than the OLS coefficient estimates. This may seem counter-intuitive if one believes that we are correcting for ability bias, something that should bias the OLS estimates upward. However, as Griliches (1977) and others have pointed out, measurement error in the schooling variable can lead to a downward attenuation bias in the OLS estimate, something that IV, as long as the instruments are not correlated with the measurement error, corrects for. In addition, as Card (1999) points out, if the individuals for whom school location is most important in determining their education (perhaps due to credit constraints) are also the ones who have the highest marginal impact from schooling, then school location as an instrument will emphasize their contribution to the overall effect. As measurement error and credit constraints may be more severe in

developing countries, this may explain the higher estimates of the return to schooling than those from the US and other developed countries.

Table 5 presents OLS and IV estimates using the 1996 sample but with the number of teachers per school for each state and year included as additional instruments for the child labor and schooling decisions. In order to use a more parsimonious set of instruments we have restricted the number of schools and number of teachers per school to just the ages 7 through 12. The results of this estimation are given in Table 5. Compared to the 1996 results without the teacher instruments the coefficient estimates on the age started to work variables, and the schooling variable, have increased. The turning point for the iso-earnings curve is at age 13.1, relatively consistent with the previous results.

4.2 The Role of Different Child Labor Activities

Since some activities that children may engage in when they work may have good vocational or other job training aspects to them, we next attempt to identify any particular activities that appear to have positive human capital. The distribution of first job occupations for the pooled sample is given in Table 6. We construct five occupational categories from the three-digit occupation categories available in PNAD.[7] These categories are somewhat arbitrary at the margins since there do not exist very clear boundaries between the many occupations, but for the most part, capture the occupations generally associated with these activities. As Table 6 shows, the bulk of male child labor was devoted to agricultural activities. Between the two survey years there is a decrease in the percentage of child laborers in agriculture and an increase in the percentage of

[7] We are unable to estimate with enough precision, point estimates of more finely parsed occupation categories.

child laborers in civil construction and manufacturing. This trend may reflect the increase in the urbanization in Brazil during that time period.

In order to estimate the impact of these specific child labor occupations on adult earnings, we estimate a series of IV models, similar to those presented previously that included schooling, but for each first job occupation separately. Also included are an indicator variable that equals one if the first job occupation of the individual was the same as the fathers occupation, and an interaction of this variable with age started to work. The coefficient estimates from these estimations are presented in Table 7. The key results here are that the effect of age started to work are similar to those not separated by occupation for commerce and transport and for services and others: positive and significant coefficient estimates for age started to work and negative and significant estimates for its square. Significant estimates are not obtained for the other three categories. This is not surprising for manufacturing and civil construction as they represent less than 10 percent and 5 percent of the sample, respectively. However the fact that the sign of the point estimate for the age started to work variable for the agricultural regression is negative, and the fact that agriculture accounts for almost 40% of the sample is intriguing. This suggests that there may be no adverse effect from starting to work as a child, over and above the impact on schooling, for those that undertake agricultural activities. This is a particularly important result when one considers the fact that worldwide, 70 percent of child workers are estimated by the ILO to work in agriculture and related activities.

Thus there appears to be evidence that in some occupations entering as a child worker may not have adverse effects over and above the loss of education.

V. Conclusion

In this paper, we investigated the effect of starting to work as a child laborer on an individual's adult earnings. We find that child labor is associated with lower adult earnings, partly due to the trade-off associated with educational attainment and partly due to the effect over and above the impact on educational attainment, but that this negative effect appears to reverse in the age rage of 13-15.

Second, although there appears to be some decrease in adult earnings in general from child work beyond schooling, we find that for agricultural activities there appears to be no adverse effect. Particularly important for females is domestic work, which does not seem to harm the adolescent worker. Finally, we find that there are no gains for male workers associated with starting to work in the same occupations as their fathers.

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Table 1: Schooling Distribution and Mean Log-Earnings by Age Started to Work
25 to 55 Year-Old Males

Age Started to Work	% Sample	Illiterate	Primary	Secondary	High School	College	Log-Earnings
				1988			
9 and Below	19.43	0.26	0.49	0.16	0.07	0.03	5.27
10 to 13	39.37	0.24	0.43	0.19	0.10	0.04	5.34
14 to 17	27.78	0.10	0.33	0.26	0.19	0.12	5.78
18 and Above	13.41	0.05	0.19	0.19	0.24	0.33	6.25
				1996			
9 and Below	18.68	0.23	0.42	0.23	0.09	0.03	5.64
10 to 13	36.44	0.19	0.37	0.26	0.13	0.05	5.75
14 to 17	30.04	0.07	0.25	0.32	0.25	0.12	6.12
18 and Above	14.83	0.04	0.13	0.23	0.30	0.30	6.37

Table 2:

OLS and IV Estimates of Log-Earnings: 25-55 Year-Old Males 1988

Dependent Variables	OLS		OLS		IV 3		IV 4	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Age Started to Work	0.033 ***	0.009	0.021 ***	0.006	1.495 ***	0.334	1.460 ***	0.322
Age Started to Work Squared	0.000	0.000	0.000 *	0.000	-0.045 ***	0.012	-0.050 ***	0.011
Years of Scholing			0.112 ***	0.002			0.205 **	0.082
Age	0.115 ***	0.010	0.102 ***	0.008	0.152 ***	0.020	0.131 ***	0.020
Age Squared	-0.001 ***	0.000	-0.001 ***	0.000	-0.002 ***	0.000	-0.001 ***	0.000
Back	-0.390 ***	0.022	-0.246 ***	0.020	-0.489 ***	0.046	-0.236 **	0.118
Pardo	-0.290 ***	0.013	-0.189 ***	0.012	-0.346 ***	0.031	-0.185 **	0.075
Father's Education								
Lower Primary	0.233 ***	0.012	0.062 ***	0.011	0.053	0.062	-0.188	0.098
Upper Primary	0.535 ***	0.033	0.155 ***	0.030	0.129	0.169	-0.333	0.216
Secondary	0.673 ***	0.033	0.192 ***	0.031	0.304	0.251	-0.228	0.294
College	0.767 ***	0.042	0.255 ***	0.041	0.507	0.381	0.069	0.375
Mother's Education								
Lower Primary	0.309 ***	0.012	0.116 ***	0.011	0.078	0.077	-0.160	0.107
Upper Primary	0.595 ***	0.034	0.219 ***	0.031	0.341 *	0.200	-0.075	0.238
Secondary	0.744 ***	0.034	0.320 ***	0.032	0.466 **	0.236	-0.010	0.273
College	0.796 ***	0.057	0.381 ***	0.055	0.603 **	0.290	0.220	0.307
Rural	-0.629 ***	0.014	-0.399 ***	0.014	-0.316 ***	0.123	-0.065	0.129
North	-0.225 ***	0.028	-0.162 ***	0.025	-0.312 ***	0.086	-0.124	0.111
Northeast	-0.300 ***	0.022	-0.213 ***	0.018	-0.301 ***	0.043	-0.121	0.085
South	-0.075 ***	0.026	-0.049 **	0.022	-0.045	0.035	-0.040	0.029
Center-West	-0.019	0.025	-0.032	0.020	0.181 ***	0.060	0.082	0.064
Constant	2.896 ***	0.193	2.744 ***	0.162	-8.434 ***	2.507	-7.917 ***	2.394
# Obs.	32,650		32,641		32,142		32,133	
R-Squared	0.366		0.481					
Hansen's J-Statistics					20.960		19.982	
Chi-Squared (P-value)					0.074		0.067	

Note: (1) *** statistically significant at 1%;** statistically significant at 5%;* statistically significant at 10%.

(2) The instruments are the nubmer of school by state and year.

Table 3:

IV Estimates of Log-Earnings: 25-55 Year-Old Males 1996

Dependent Variables	OLS		OLS		IV 3		IV 4	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Age Started to Work	0.034 ***	0.007	0.021 ***	0.006	1.349 **	0.574	1.327 **	0.538
Age Started to Work Squared	0.000	0.000	-0.001 ***	0.000	-0.041 *	0.023	-0.042 **	0.021
Years of Scholing			0.105 ***	0.001			0.096	0.084
Age	0.105 ***	0.010	0.076 ***	0.008	0.123 ***	0.019	0.099 ***	0.030
Age Squared	-0.001 ***	0.000	-0.001 ***	0.000	-0.001 ***	0.000	-0.001 **	0.000
Back	-0.383 ***	0.020	-0.257 ***	0.018	-0.469 ***	0.050	-0.352 ***	0.118
Pardo	-0.311 ***	0.012	-0.211 ***	0.010	-0.324 ***	0.046	-0.239 ***	0.091
Father's Education								
Lower Primary	0.250 ***	0.012	0.078 ***	0.011	0.059	0.064	-0.068	0.134
Upper Primary	0.409 ***	0.023	0.096 ***	0.020	0.020	0.238	-0.187	0.304
Secondary	0.593 ***	0.029	0.199 ***	0.028	0.154	0.316	-0.101	0.392
College	0.858 ***	0.035	0.404 ***	0.031	0.595	0.623	0.332	0.647
Mother's Education								
Lower Primary	0.240 ***	0.011	0.081 ***	0.010	0.062	0.062	-0.060	0.125
Upper Primary	0.472 ***	0.024	0.169 ***	0.023	0.220	0.174	-0.006	0.270
Secondary	0.640 ***	0.030	0.259 ***	0.027	0.396	0.312	0.130	0.397
College	0.648 ***	0.044	0.229 ***	0.041	0.393	0.302	0.095	0.410
Rural	-0.619 ***	0.014	-0.407 ***	0.013	-0.206 *	0.119	-0.068	0.169
North	-0.209 ***	0.033	-0.141 ***	0.029	-0.220 ***	0.077	-0.146	0.092
Northeast	-0.298 ***	0.021	-0.212 ***	0.017	-0.273 ***	0.082	-0.182 *	0.101
South	-0.057 **	0.025	-0.025	0.020	0.046	0.058	0.059	0.055
Center-West	-0.030	0.025	-0.035	0.021	0.169 ***	0.049	0.145 ***	0.049
Constant	3.381 ***	0.191	3.595 ***	0.159	-6.610 *	3.666	-6.198 *	3.490
# Obs.	31,725		31,646		31,495		31,416	
R-Squared	0.376		0.489					
Hansen's J-Statistics					12.153		12.243	
Chi-Squared (P-value)					0.515		0.426	

Note: (1) *** statistically significant at 1%;** statistically significant at 5%;* statistically significant at 10%.

(2) The instruments are the nubmer of school by state and year.

Table 4:

OLS and IV Estimates of Log-Earnings: 25-55 Year-Old Males Pooled 1988 and 1996

Dependent Variables	OLS		OLS		IV 3		IV 4	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Age Started to Work	0.032 ***	0.006	0.020 ***	0.004	1.937 ***	0.415	2.248 ***	0.411
Age Started to Work Squared	0.000	0.000	0.000 ***	0.000	-0.066 ***	0.017	-0.083 ***	0.018
Years of Scholing			0.109 ***	0.001			0.165 **	0.079
Age	0.085 ***	0.007	0.073 ***	0.006	0.115 ***	0.015	0.108 ***	0.017
Age Squared	-0.001 ***	0.000	-0.001 ***	0.000	-0.001 ***	0.000	-0.001 ***	0.000
Back	-0.386 ***	0.015	-0.251 ***	0.013	-0.509 ***	0.041	-0.327 ***	0.103
Pardo	-0.301 ***	0.010	-0.200 ***	0.008	-0.383 ***	0.038	-0.277 ***	0.065
Father's Education								
Lower Primary	0.240 ***	0.009	0.069 ***	0.008	0.113 *	0.061	-0.059	0.091
Upper Primary	0.449 ***	0.019	0.110 ***	0.016	0.305	0.204	0.094	0.201
Secondary	0.624 ***	0.022	0.191 ***	0.022	0.588 **	0.292	0.384	0.278
College	0.815 ***	0.028	0.333 ***	0.026	1.255 **	0.515	1.286 ***	0.481
Mother's Education								
Lower Primary	0.276 ***	0.008	0.099 ***	0.008	0.151 **	0.067	-0.012	0.091
Upper Primary	0.519 ***	0.020	0.187 ***	0.019	0.504 ***	0.189	0.286	0.199
Secondary	0.689 ***	0.023	0.286 ***	0.021	0.819 ***	0.279	0.619 **	0.272
College	0.708 ***	0.034	0.288 ***	0.032	0.881 ***	0.306	0.698 **	0.309
Rural	-0.627 ***	0.011	-0.404 ***	0.010	-0.406 ***	0.124	-0.261 **	0.120
Cohort 1933-45	0.005	0.055	0.044	0.044	-0.062	0.071	-0.015	0.072
Cohort 1946-58	0.071 **	0.032	0.063 **	0.025	0.080 **	0.039	0.076 **	0.037
Year 1988	-0.366 ***	0.017	-0.315 ***	0.014	-0.324 ***	0.033	-0.212 ***	0.060
North	-0.215 ***	0.023	-0.150 ***	0.021	-0.177 **	0.083	0.021	0.130
Northeast	-0.300 ***	0.019	-0.213 ***	0.015	-0.229 ***	0.057	-0.033	0.112
South	-0.066 ***	0.022	-0.036 *	0.019	-0.053	0.044	-0.071 *	0.042
Center-West	-0.025	0.020	-0.033 **	0.016	0.135 ***	0.047	0.058	0.061
Constant	3.771 ***	0.147	3.632 ***	0.122	-9.666 ***	2.652	-11.402 ***	2.583
# Obs.	64,375		64,287		63,637		63,549	
R-Squared	0.395		0.505					
Hansen's J-Statistics					14.286		10.464	
Chi-Squared (P-value)					0.354		0.575	

Note: (1) *** statistically significant at 1%;** statistically significant at 5%;* statistically significant at 10%.

(2) The instruments are the nubmer of school by state and year.

Table 5:

IV Estimates of Log-Earnings with Ave. Number of Teachers Per School: 25-55 Year-Old Males 1996

Dependent Variables	IV 3		IV 4	
	Coeff.	Std. Error	Coeff.	Std. Error
Age Started to Work	2.155 ***	0.559	1.673 ***	0.486
Age Started to Work Squared	-0.079 ***	0.022	-0.064 ***	0.019
Years of Scholing			0.192 **	0.091
Age	0.147 ***	0.021	0.086 ***	0.033
Age Squared	-0.002 ***	0.000	-0.001 *	0.000
Back	-0.520 ***	0.071	-0.254 *	0.139
Pardo	-0.414 ***	0.047	-0.218 **	0.099
Father's Education				
Lower Primary	0.214 ***	0.054	-0.064	0.140
Upper Primary	0.615 ***	0.204	0.078	0.302
Secondary	0.922 ***	0.274	0.237	0.387
College	2.009 ***	0.555	1.079 *	0.608
Mother's Education				
Lower Primary	0.194 ***	0.055	-0.059	0.125
Upper Primary	0.613 ***	0.167	0.098	0.272
Secondary	1.140 ***	0.293	0.419	0.403
College	1.057 ***	0.301	0.335	0.417
Rural	-0.506	0.093	-0.204	0.159
North	-0.011	0.121	0.053	0.102
Northeast	-0.038	0.119	0.048	0.103
South	0.087	0.054	0.043	0.049
Center-West	0.164 ***	0.060	0.064	0.067
Constant	-10.994 ***	3.626	-7.287 **	3.287
# Obs.	31725		31646	
R-Squared				
Hansen's J-Statistics	8.64		7.95	
Chi-Squared (P-value)	0.57		0.54	

Note: (1) *** statistically significant at 1%;** statistically significant at 5%;* statistically significant at 10%.

(2) The instruments are the nubmer of school by state and year.

Table 6:

Distribution of First Job Occupation if Started to Work 14 Years Old or Below		
First Job Occupation	**# OBS**	**Percent**
Agriculture	24,978	39.35
Manufacturing	5,910	9.31
Civil Construction	3,109	4.90
Commerce and Transport	6,416	10.11
Services and others	23,059	36.33
Total	63,472	100.00

Table 7:

IV Estimates of Log-Earnings: 25-55 Year-Old Males Pooled 1988 and 1996 - By First Job Occupation Categories

Dependent Variables	Agriculture		Manufacturing		Civil Construction		Commerce and Transport		Services and others	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Age Started to Work	-2.142	2.319	0.830	0.666	0.775	0.495	0.937 ***	0.298	1.075 **	0.428
Age Started to Work Squared	0.114	0.100	-0.023	0.026	-0.033	0.020	-0.033 ***	0.012	-0.036 **	0.015
Years of Scholing	0.280	0.187	0.147 **	0.066	0.133	0.091	0.147 ***	0.071	-0.083	0.130
Same Father's Occupation	6.775	5.227	-1.061	4.042	-2.260	4.888	-5.188 *	3.009	-4.575	5.775
Interaction Age Sarted to Work and Same Father's Occupation	-0.321	0.471	0.084	0.378	-0.013	0.395	0.448 **	0.209	0.440	0.462
Age	0.055	0.036	0.085 ***	0.020	0.122 **	0.048	0.067 ***	0.029	0.188 ***	0.056
Age Squared	0.000	0.000	-0.001 ***	0.000	-0.001 **	0.001	-0.001	0.000	-0.002 ***	0.001
Back	-0.361	0.329	-0.346 ***	0.072	-0.193 **	0.094	-0.203	0.138	-0.651 ***	0.249
Pardo	-0.132	0.185	-0.131 ***	0.044	-0.211 ***	0.064	-0.095	0.066	-0.542 ***	0.171
Lower Primary	0.000	0.203	-0.118	0.095	0.095	0.125	-0.122	0.127	0.405	0.292
Upper Primary	-0.373	0.450	-0.255	0.157	0.170	0.297	-0.137	0.225	0.697	0.496
Secondary	-1.167	0.907	-0.355	0.218	0.399	0.344	-0.079	0.308	0.971	0.598
College	-2.457 *	1.485	-0.270	0.331	0.502	0.806	0.063	0.401	1.406 **	0.698
Lower Primary	-0.036	0.164	-0.047	0.083	-0.024	0.114	-0.035	0.124	0.408	0.277
Upper Primary	-0.346	0.503	-0.085	0.175	0.200	0.372	0.013	0.225	0.877 *	0.471
Secondary	-0.375	0.709	-0.099	0.196	0.371	0.420	0.043	0.255	1.170 **	0.574
College	-0.344	1.373	-0.054	0.279	-0.006	0.683	0.045	0.284	1.206 **	0.591
Rural	0.199	0.226	-0.035	0.142	-0.287 **	0.129	-0.006	0.183	-0.682 *	0.366
Cohort 1933-45	0.062	0.131	0.008	0.113	0.003	0.212	0.081	0.118	-0.052	0.125
Cohort 1946-58	0.045	0.085	0.059	0.067	0.039	0.106	0.069	0.055	0.033	0.057
Year 1988	-0.362 *	0.205	-0.453 ***	0.105	-0.175	0.185	-0.246 ***	0.055	-0.013	0.183
North	0.211	0.436	-0.118	0.206	0.120	0.181	-0.305 ***	0.071	-0.091	0.127
Northeast	0.577 **	0.264	-0.198	0.165	-0.049	0.116	-0.176 ***	0.067	-0.201 *	0.120
South	1.075 **	0.448	-0.116 **	0.058	-0.066	0.108	-0.013	0.051	-0.115 **	0.048
Center-West	0.238 *	0.128	0.112	0.092	-0.217	0.147	0.042	0.075	0.147	0.099
Constant	10.407	12.877	-3.163	4.342	-1.269	3.250	-2.585	2.179	-4.959	3.147
# Obs.	22,130		6,819		3,451		7,635		23,514	
Hansen's J-Statistics	4.866		9.844		9.756		12.324		2.134	
Chi-Squared (P-value)	0.900		0.454		0.462		0.264		0.995	

Note: (1) *** statistically significant at 1%;** statistically significant at 5%;* statistically significant at 10%.
(2) The instruments are the nubmer of school by state and year.

APPENDIX

Table A1: Summary Statistics for Pooled Sample 1988-1996 - Males Only

Variable	Obs	Mean	Std. Dev.	Min	Max
Log Earnings	95307	5.739453	1.057806	-1.906	10.82
Age Started to Work	94511	12.96044	3.985493	4	48
Years of Schooling	108002	5.886919	4.536432	0	17
Age	108198	37.46757	8.476078	25	55
Black	108186	0.0612556	0.2397997	0	1
Pardo	108186	0.3949679	0.4888461	0	1
Rural	108198	0.1903455	0.3925755	0	1
Father's Education					
Illiterate	73138	0.3716399	0.4832462	0	1
Lower Primary	73138	0.5151084	0.4997751	0	1
Upper Primary	73138	0.047677	0.2130834	0	1
Secondary	73138	0.038106	0.1914536	0	1
College	73138	0.0274686	0.1634456	0	1
Mother's Education					
Illiterate	77225	0.4415798	0.4965786	0	1
Lower Primary	77225	0.4581936	0.4982524	0	1
Upper Primary	77225	0.0483781	0.2145653	0	1
Secondary	77225	0.0409712	0.1982248	0	1
College	77225	0.0108773	0.1037262	0	1
North	108198	0.0245476	0.1547425	0	1
Northeast	108198	0.252574	0.4344906	0	1
Southeast	108198	0.3594983	0.4798556	0	1
South	108198	0.2299858	0.4208253	0	1
Midwest	108198	0.1291336	0.3353493	0	1

Table A2:

First-Stage Regression of the IV estimates From Table 2: 25-55 Male 1988

	IV 3				IV 4					
Dependent Variables	**Age Started to Work**		**Age Started to Work 2**		**Age Started to Work**		**Age Started to Work 2**		**Schooling**	
	Coeff.	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**
Age	0.016	0.025	1.329	0.734	0.016	0.025	1.328	0.734	0.116	0.024
Age-Squared	0.000	0.000	-0.021	0.010	0.000	0.000	-0.021	0.010	-0.002	0.000
Back	0.073	0.096	-0.023	2.783	0.072	0.096	-0.035	2.783	-1.260	0.092
Pardo	-0.104	0.048	-4.614	1.385	-0.105	0.048	-4.645	1.385	-0.916	0.046
Father's Education										
Lower Primary	0.698	0.053	18.595	1.535	0.698	0.053	18.601	1.535	1.687	0.050
Upper Primary	1.949	0.133	53.710	3.883	1.949	0.133	53.710	3.883	3.855	0.128
Secondary	2.766	0.140	80.632	4.079	2.765	0.140	80.631	4.079	4.998	0.134
College	3.948	0.166	120.874	4.839	3.948	0.166	120.873	4.840	5.632	0.159
Mother's Education										
Lower Primary	0.884	0.051	23.626	1.499	0.884	0.051	23.628	1.499	1.933	0.049
Upper Primary	2.078	0.135	61.926	3.943	2.078	0.135	61.925	3.943	3.902	0.130
Secondary	2.528	0.139	75.432	4.053	2.528	0.139	75.429	4.054	4.520	0.133
College	2.773	0.249	85.620	7.250	2.773	0.249	85.617	7.251	4.483	0.238
Rural	-1.432	0.051	-39.289	1.479	-1.431	0.051	-39.286	1.479	-2.381	0.049
North	0.892	0.095	25.110	2.775	0.893	0.095	25.162	2.776	-0.259	0.091
Northeast	0.412	0.057	11.454	1.673	0.413	0.057	11.488	1.674	-0.555	0.055
South	0.022	0.069	-0.810	2.001	0.023	0.069	-0.799	2.001	-0.053	0.066
Center-West	-0.518	0.090	-13.185	2.611	-0.517	0.090	-13.169	2.612	0.025	0.086
Instruments										
# of Schools at 6	-0.045	0.055	-1.386	1.600	-0.045	0.055	-1.384	1.600	-0.022	0.053
# of Schools at 7	0.112	0.120	1.943	3.488	0.111	0.120	1.937	3.488	0.185	0.115
# of Schools at 8	-0.265	0.170	-4.901	4.944	-0.265	0.170	-4.889	4.944	-0.438	0.163
# of Schools at 9	0.256	0.172	6.635	5.015	0.256	0.172	6.623	5.015	0.340	0.165
# of Schools at 10	-0.387	0.176	-11.905	5.137	-0.386	0.176	-11.887	5.138	-0.471	0.169
# of Schools at 11	0.154	0.171	3.762	4.984	0.154	0.171	3.756	4.984	0.478	0.164
# of Schools at 12	0.060	0.172	2.390	5.008	0.060	0.172	2.373	5.009	-0.175	0.165
# of Schools at 13	0.173	0.161	5.252	4.684	0.174	0.161	5.272	4.685	-0.073	0.154
# of Schools at 14	-0.166	0.149	-4.990	4.340	-0.167	0.149	-5.028	4.341	0.012	0.143
# of Schools at 15	0.042	0.147	-0.220	4.282	0.044	0.147	-0.185	4.283	0.167	0.141
# of Schools at 16	0.099	0.137	2.749	4.000	0.099	0.137	2.745	4.001	-0.130	0.132
# of Schools at 17	-0.029	0.124	1.484	3.611	-0.029	0.124	1.481	3.612	0.243	0.119
# of Schools at 18	-0.288	0.104	-7.398	3.034	-0.288	0.104	-7.395	3.035	-0.368	0.100
# of Schools at 19	0.659	0.244	19.842	7.096	0.658	0.244	19.801	7.097	0.610	0.233
# of School at 20	0.013	0.056	0.288	1.620	0.012	0.056	0.272	1.620	-0.041	0.053
Constant	11.276	0.635	112.561	18.499	11.280	0.635	112.679	18.501	2.660	0.608
Obs.	32142		32142		32133		32133		32133	
Test of excluded Instruments										
F(15, OBS-K)	3.480		2.850		3.480		2.850		4.920	
Prob > F	0.000		0.000		0.000		0.000		0.000	
Partial R-squared of Excuded Instruments										
	0.002		0.001		0.002		0.001		0.002	
Shea's Partial R-Squared										
	0.002		0.001		0.001		0.001		0.001	

Table A3:

First-Stage Regression of the IV estimates From Table 3: 25-55 Male 1996

	IV 3				IV 4					
Dependent Variables	**Age Started to Work**		**Age Started to Work 2**		**Age Started to Work**		**Age Started to Work 2**		**Schooling**	
	Coeff.	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**
Age	0.060	0.033	1.933	0.955	0.059	0.033	1.912	0.956	0.271	0.032
Age-Squared	-0.001	0.000	-0.031	0.012	-0.001	0.000	-0.031	0.012	-0.004	0.000
Back	0.055	0.088	-0.127	2.546	0.057	0.088	-0.041	2.551	-1.210	0.085
Pardo	-0.169	0.048	-5.915	1.377	-0.169	0.048	-5.907	1.379	-0.999	0.046
Father's Education										
Lower Primary	0.783	0.052	20.745	1.498	0.776	0.052	20.550	1.500	1.823	0.050
Upper Primary	2.253	0.101	63.482	2.932	2.256	0.102	63.606	2.936	3.539	0.098
Secondary	2.818	0.120	80.423	3.478	2.807	0.120	80.159	3.481	4.444	0.117
College	3.984	0.147	122.355	4.236	3.968	0.147	121.943	4.238	5.305	0.142
Mother's Education										
Lower Primary	0.767	0.051	20.354	1.463	0.772	0.051	20.469	1.465	1.691	0.049
Upper Primary	1.582	0.100	44.882	2.891	1.589	0.100	45.069	2.894	3.266	0.097
Secondary	2.302	0.121	68.490	3.484	2.330	0.121	69.240	3.491	4.227	0.117
College	2.255	0.194	66.740	5.608	2.275	0.194	67.338	5.612	4.522	0.188
Rural	-1.593	0.054	-41.769	1.551	-1.595	0.054	-41.814	1.552	-2.376	0.052
North	0.537	0.113	15.540	3.260	0.544	0.113	15.768	3.266	-0.398	0.109
Northeast	0.608	0.061	17.889	1.772	0.606	0.061	17.855	1.773	-0.525	0.059
South	-0.273	0.065	-8.472	1.877	-0.274	0.065	-8.479	1.880	-0.248	0.063
Center-West	-0.593	0.084	-15.000	2.424	-0.596	0.084	-15.073	2.426	-0.062	0.081
Instruments										
# of School at 6	-0.029	0.103	-0.317	2.982	-0.025	0.103	-0.214	2.987	-0.265	0.100
# of School at 7	0.064	0.151	1.109	4.355	0.065	0.151	1.131	4.361	0.152	0.146
# of School at 8	-0.099	0.143	-2.905	4.118	-0.114	0.143	-3.282	4.124	-0.016	0.138
# of School at 9	0.057	0.139	1.491	4.003	0.072	0.139	1.939	4.010	-0.022	0.134
# of School at 10	0.009	0.137	1.000	3.967	0.011	0.137	1.038	3.970	0.124	0.133
# of School at 11	-0.110	0.129	-3.738	3.723	-0.114	0.129	-3.839	3.724	0.051	0.125
# of School at 12	0.019	0.078	0.395	2.253	0.014	0.078	0.257	2.255	0.039	0.076
# of School at 13	-0.003	0.052	0.120	1.515	-0.001	0.052	0.155	1.515	-0.012	0.051
# of School at 14	-0.022	0.045	-0.574	1.292	-0.022	0.045	-0.581	1.292	-0.077	0.043
# of School at 15	-0.063	0.053	-1.156	1.526	-0.064	0.053	-1.173	1.527	-0.045	0.051
# of School at 16	-0.054	0.041	-1.377	1.188	-0.054	0.041	-1.379	1.188	-0.025	0.040
# of School at 17	-0.063	0.046	-1.516	1.322	-0.063	0.046	-1.502	1.322	-0.016	0.044
# of School at 18	-0.078	0.052	-1.797	1.510	-0.077	0.052	-1.774	1.510	-0.116	0.051
# of School at 19	0.020	0.158	1.065	4.559	0.031	0.158	1.354	4.565	0.315	0.153
# of School at 20	-0.012	0.044	-0.094	1.264	-0.012	0.044	-0.074	1.264	-0.033	0.042
Constant	11.706	0.530	136.390	15.330	11.704	0.531	136.338	15.352	0.207	0.514
Obs.	31495		31495		31416		31416		31416	
Test of excluded Instruments										
F(15, OBS-K)	5.170		3.700		5.130		3.680		3.570	
Prob > F	0.000		0.000		0.000		0.000		0.000	
Partial R-squared of Excuded Instruments										
	0.003		0.002		0.002		0.002		0.002	
Shea's Partial R-Squared										
	0.000		0.000		0.000		0.000		0.001	

Table A4:

First-Stage Regression of the IV estimates From Table 4: 25-55 Male Pooled 1988 and 1996

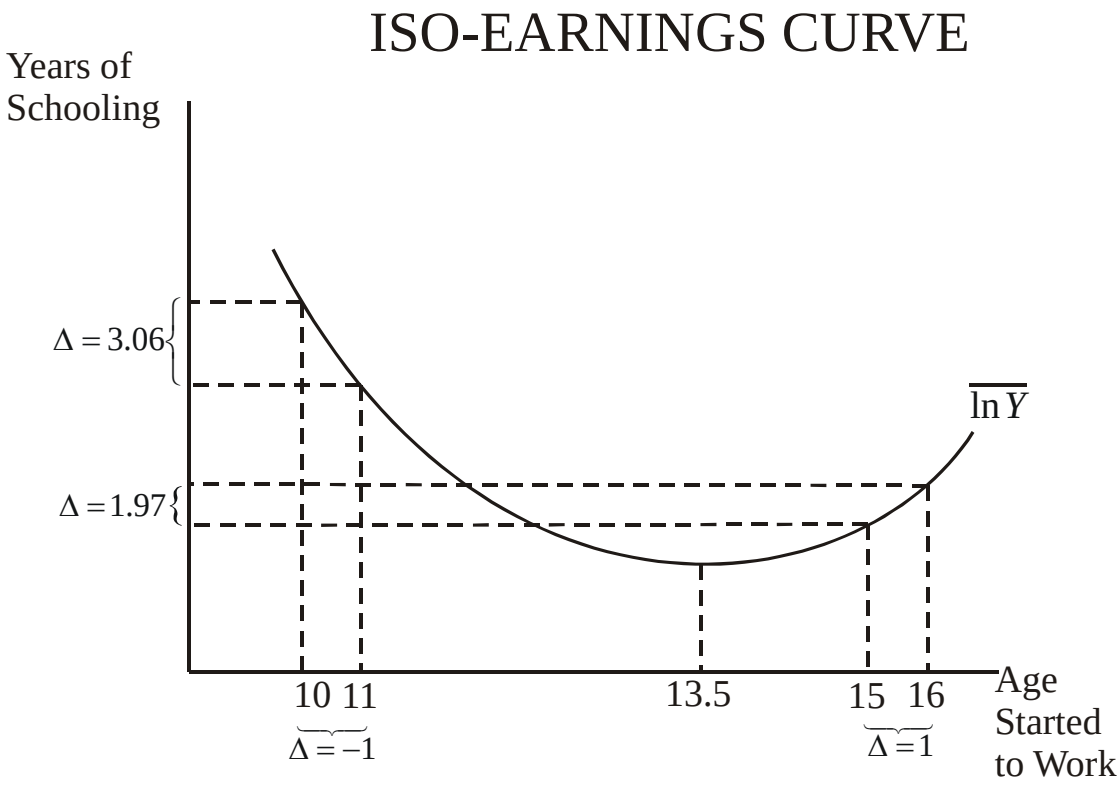
	IV 1				IV 2					
Dependent Variables	**Age Started to Work**		**Age Started to Work 2**		**Age Started to Work**		**Age Started to Work 2**		**Schooling**	
	Coeff.	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**
Age	-0.012	0.022	0.153	0.642	-0.011	0.022	0.169	0.642	0.067	0.021
Age-Squared	0.000	0.000	-0.008	0.008	0.000	0.000	-0.008	0.008	-0.001	0.000
Back	0.071	0.065	0.141	1.881	0.072	0.065	0.185	1.883	-1.229	0.063
Pardo	-0.139	0.034	-5.342	0.976	-0.139	0.034	-5.350	0.977	-0.960	0.032
Father's Education										
Lower Primary	0.743	0.037	19.719	1.072	0.740	0.037	19.627	1.073	1.751	0.036
Upper Primary	2.147	0.081	60.047	2.340	2.150	0.081	60.149	2.343	3.649	0.078
Secondary	2.802	0.091	80.673	2.651	2.797	0.091	80.536	2.653	4.682	0.088
Mother's Education										
College	3.984	0.110	122.231	3.191	3.975	0.110	122.012	3.192	5.461	0.106
Lower Primary	0.822	0.036	21.895	1.047	0.824	0.036	21.955	1.048	1.816	0.035
Upper Primary	1.760	0.080	50.903	2.332	1.764	0.080	51.010	2.333	3.493	0.077
Secondary	2.398	0.091	71.390	2.646	2.413	0.091	71.817	2.649	4.355	0.088
College	2.455	0.153	73.891	4.445	2.466	0.153	74.245	4.447	4.491	0.148
Rural	-1.513	0.037	-40.653	1.068	-1.514	0.037	-40.667	1.069	-2.391	0.035
Cohort 1933-45	0.029	0.102	-0.004	2.950	0.029	0.102	0.030	2.952	-0.245	0.098
Cohort 1946-58	0.068	0.058	1.897	1.681	0.065	0.058	1.849	1.683	0.111	0.056
Year 1988	0.126	0.040	4.357	1.164	0.126	0.040	4.347	1.164	-0.437	0.039
North	0.730	0.072	20.814	2.102	0.735	0.073	20.948	2.104	-0.330	0.070
Northeast	0.475	0.041	13.685	1.200	0.475	0.041	13.691	1.201	-0.577	0.040
South	-0.150	0.047	-5.369	1.352	-0.149	0.047	-5.350	1.353	-0.185	0.045
Center-West	-0.564	0.061	-14.345	1.777	-0.565	0.061	-14.372	1.778	-0.033	0.059
Instruments										
# of School at 6	-0.038	0.047	-1.064	1.366	-0.038	0.047	-1.058	1.366	-0.042	0.045
# of School at 7	0.049	0.088	0.715	2.558	0.052	0.088	0.791	2.559	0.023	0.085
# of School at 8	-0.151	0.108	-2.971	3.134	-0.160	0.108	-3.215	3.136	-0.114	0.104
# of School at 9	0.107	0.105	2.759	3.039	0.115	0.105	2.997	3.042	0.100	0.101
# of School at 10	-0.155	0.105	-4.451	3.037	-0.154	0.105	-4.455	3.040	-0.153	0.101
# of School at 11	0.021	0.094	-0.007	2.738	0.020	0.094	-0.024	2.739	0.144	0.091
# of School at 12	0.097	0.067	2.691	1.955	0.093	0.067	2.590	1.956	0.039	0.065
# of School at 13	0.035	0.048	1.105	1.382	0.037	0.048	1.150	1.382	-0.029	0.046
# of School at 14	-0.004	0.041	-0.290	1.197	-0.004	0.041	-0.293	1.197	-0.053	0.040
# of School at 15	-0.033	0.047	-0.730	1.354	-0.033	0.047	-0.721	1.354	-0.011	0.045
# of School at 16	-0.024	0.038	-0.568	1.111	-0.024	0.038	-0.570	1.111	-0.003	0.037
# of School at 17	-0.055	0.042	-1.044	1.210	-0.055	0.042	-1.033	1.210	0.026	0.040
# of School at 18	-0.128	0.046	-2.849	1.326	-0.128	0.046	-2.843	1.326	-0.152	0.044
# of School at 19	0.283	0.114	8.091	3.296	0.288	0.114	8.214	3.299	0.899	0.110
# of School at 20	-0.018	0.033	-0.290	0.967	-0.018	0.033	-0.294	0.967	-0.012	0.032
Constant	12.428	0.420	153.072	12.202	12.408	0.421	152.599	12.214	3.116	0.406
Obs.	63637		63637		63549		63549		63549	
Test of excluded Instruments										
F(15, OBS-K)	6.810		4.690		6.790		4.680		8.680	
Prob > F	0.000		0.000		0.000		0.000		0.000	
Partial R-squared of Excuded Instruments										
	0.002		0.001		0.002		0.001		0.002	
Shea's Partial R-Squared										
	0.001		0.000		0.000		0.000		0.001	

Table A5:

First-Stage Regression of the IV estimates From Table 5: 25-55 Male 1996

	IV 3				IV 4					
Dependent Variabl	**Age Started to Work**		**Age Started to Work 2**		**Age Started to Work**		**Age Started to Work 2**		**Schooling**	
	Coeff.	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**	**Coeff.**	**Std. Error**
Age	0.049	0.026	1.720	0.738	0.049	0.026	1.720	0.739	0.316	0.025
Age-Squared	-0.001	0.000	-0.021	0.009	-0.001	0.000	-0.021	0.009	-0.004	0.000
Back	0.054	0.088	-0.129	2.538	0.057	0.088	-0.048	2.543	-1.199	0.085
Pardo	-0.160	0.047	-5.710	1.372	-0.160	0.048	-5.709	1.373	-0.988	0.046
Father's Education										
Lower Primary	0.785	0.052	20.786	1.489	0.778	0.052	20.594	1.491	1.817	0.050
Upper Primary	2.243	0.101	63.251	2.919	2.246	0.101	63.378	2.923	3.532	0.098
Secondary	2.812	0.120	80.377	3.466	2.801	0.120	80.107	3.469	4.442	0.116
College	3.956	0.146	121.662	4.219	3.941	0.146	121.259	4.222	5.293	0.142
Mother's Education										
Lower Primary	0.757	0.050	20.052	1.455	0.761	0.050	20.167	1.457	1.699	0.049
Upper Primary	1.566	0.100	44.458	2.879	1.572	0.100	44.641	2.882	3.265	0.097
Secondary	2.299	0.120	68.464	3.469	2.326	0.120	69.210	3.475	4.243	0.117
College	2.244	0.193	66.359	5.587	2.263	0.193	66.954	5.592	4.537	0.188
Rural	-1.581	0.053	-41.455	1.538	-1.583	0.053	-41.508	1.540	-2.373	0.052
North	1.015	0.120	29.501	3.454	1.019	0.120	29.648	3.460	-0.050	0.116
Northeast	1.013	0.066	30.028	1.905	1.009	0.066	29.933	1.907	-0.218	0.064
South	0.280	0.064	8.955	1.862	0.279	0.065	8.933	1.865	0.259	0.063
Center-West	-0.133	0.095	-1.474	2.731	-0.139	0.095	-1.616	2.735	0.288	0.092
Instruments										
# of Schools at 7	0.854	0.474	25.581	13.697	0.862	0.475	25.795	13.716	0.066	0.460
# of Schools at 8	-0.921	0.891	-30.641	25.752	-0.969	0.892	-31.927	25.786	-0.536	0.865
# of Schools at 9	-0.352	0.893	-3.756	25.813	-0.288	0.894	-1.992	25.844	0.796	0.867
# of Schools at 10	0.892	0.868	23.608	25.076	0.853	0.868	22.661	25.091	-0.482	0.842
# of Schools at 11	-0.196	0.870	-11.566	25.150	-0.189	0.871	-11.461	25.175	1.124	0.844
# of Schools at 12	-0.216	0.460	-0.818	13.304	-0.212	0.461	-0.740	13.318	-1.022	0.447
# of Teachers at 7	0.051	0.100	1.119	2.882	0.049	0.100	1.062	2.885	-0.128	0.097
# of Teachers at 8	0.191	0.197	6.553	5.685	0.199	0.197	6.754	5.693	0.367	0.191
# of Teachers at 9	-0.357	0.215	-11.206	6.203	-0.365	0.215	-11.416	6.213	-0.336	0.208
# of Teachers at 10	0.380	0.202	10.877	5.840	0.380	0.202	10.899	5.846	0.166	0.196
# of Teachers at 11	-0.178	0.171	-4.735	4.944	-0.175	0.171	-4.714	4.948	-0.197	0.166
# of Teachers at 12	0.017	0.081	0.096	2.330	0.016	0.081	0.097	2.333	0.166	0.078
Constant	9.907	0.536	86.881	15.482	9.927	0.537	87.368	15.509	-1.139	0.520
Obs.	31725		31725		31646		31646		31646	
Test of excluded Instruments										
F(15, OBS-K)	12.63		9.59		12.45		9.46		5.38	
Prob > F	0.000		0.000		0.00		0.00		0.00	
Partial R-squared of Excuded Instruments										
	0.0048		0.0036		0.0047		0.0036		0.0020	
Shea's Partial R-Squared										
	0.0006		0.0004		0.0004		0.0004		0.0007	

Figure 1:



Source: Pooled 1988-1996 sample IV4 results.