The Emerging College Hours Premium for Men

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Abstract

This paper uniquely documents the emerging role of education in the well known decline in U.S. male working hours. An insignificant hours difference between high school and college graduates becomes a highly significant 2 hours/week advantage for college graduates within a generation. This growing *college hours premium* is confirmed in alternate data over a longer time period. Moreover, the growing premium exists throughout the distribution and is not generated by the tails. The increasing premium persists across a wide variety of robustness checks and presents as a widespread phenomenon. The emerging college hours premium increases the overall *college earnings premium* despite recent trends in the *college wage premium*.

Keywords: Returns to education, College hours premium, Male workers

JEL Codes: J24, J30, J31

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I thank John Heywood for helpful comments on this paper. All remaining errors are my own.

1 Introduction

The returns to college have been under increasing scrutiny as the demand for skills has changed. The most common focus has been the *college wage premium*. Yet, any labor income difference depends on both relative wages and relative hours (Kuhn and Lozano, 2008). The hours worked per week by U.S. men has been declining, particularly for younger workers (Ramey and Francis, 2009). The association between education and this decline is not known. This work hopes to rectify that.

This paper uses two cohorts of the National Longitudinal Survey of Youth (NLSY) to uniquely document the emergence of a *college hours premium*. Among young male workers in the NLSY79 there exists no difference in hours by college degree status. In the NLSY97 college graduates work two hours per week more than high school graduates. The college hours premium is statistically significant and present across the entire distribution of hours worked. It is not driven by those working part-time or overtime.

The American community survey (ACS) and Current Population Survey (CPS) data confirm the results. Ten five-year birth cohorts between 1940 and 1990 show a steady increase in the college hours premium. The premium is three hours for the latest cohort in the ACS (born 1985-1990) suggesting that the trend between the NLSY cohorts continues.

This work also explores the sources of the emerging college hours premium. Macroeconomic trends including the Great Recession play only a very modest role. A slightly larger role is played by the increase in involuntary part-time employment concentrated among the less educated. While the premium for both salaried and hourly workers has grown, the growth for salaried workers is larger. Yet, the pattern of the emerging hours premium is remarkably general. It persists in the face of detailed demographic, industrial and occupational controls. While I identify several partial sources, no single and pervasive source is found.

The increasing college hours premium influences labor earnings. Increases in the college wage premium between the NLSY cohorts may have stopped or reversed (Ashworth and Ransom, 2019; Venkatesh, 2019). Yet, this paper emphasizes that the growing college hours premium dominates any slowing or reversing of the college wage premium so that the overall *college earnings premium* continues to increase.

The rest of the paper is structured as follows. Section 2 explores past research related to hours, wages and returns to education. Section 3 describes the data from the NLSY, CPS and ACS as well as empirical strategies. Section 4 presents the results. Section 5 concludes.

2 Past Research

The returns to college education have been intensely studied for several decades. Goldin and Katz (2009) use Census and CPS data to show an increasing *college wage premium* over the last century. Card and Lemieux (2001) suggest that the growth of the college wage premium reflects the meager growth in the supply of educated workers. Castex and Dechter (2014) use workers from two cohorts of the NLSY to show increasing college wage premiums for workers between 18 and 29 years old. Ashworth et al. (2017) use the NLSY to show that this increase can be attributed to differences between older and younger workers in the NLSY79, as younger workers in the NLSY79 have similar returns to education as those in the NLSY97. Ashworth and Ransom (2019) examine ages 25 to 35 finding no increase in the college wage premium between the NLSY79 and NLSY97. They confirm this in other data sources. Venkatesh (2019) finds that for ages 18 to 35, there is no change in the premium between the NLSY79 and NLSY97. Fuentes and Leamer (2019) use the ACS between 1980 and 2016 confirming that only those with advanced degrees working more than 40 hours a week have seen a wage increase.

The above research does not examine hours worked. Yet, annual labor earnings are influenced by both wages and hours worked. The hours worked per week in the US for all workers has been roughly stable since 1950. McGrattan et al. (2004) show that this hides underlying changes. The decline in hours worked by men is offset by an increase in hours worked by women. Similarly, Aguiar and Hurst (2007) examine five time use surveys between 1965 and 2003 to show a dramatic increase in the hours of leisure for men and a large reduction in hours of work.

Aguiar et al. (2017) use the CPS to show a decline in the average hours worked by men between 2000 and 2015. This decline is largest for young workers (Ages 21 to 30). They argue that innovations in leisure technology explain half the increase in leisure for young men. These innovations (largely electronic devices) increase leisure demand among young men at the cost of hours of work. They include workers not employed so combine the hours and participation decision. Instead I examine the role of education in explaining the decline in male hours among only those participating.

Even and Macpherson (2019) use CPS data to show that the ACA increased involuntary part time employment for those most affected by the mandate during 2011 to 2014. The act was passed in 2009, coincident with the Great Recession, though the insurance exchange became available only in 2013 and employers did not face fines until 2015. While not focusing on the general link between education and reduced hours, they highlight the importance of controlling both for macroeconomic conditions and for changes in involuntary part time. Despite their showing, Lalé (2016) demonstrates that between 1995 and 2015 American workers become less likely to hold multiple jobs. Thus, hours worked at the primary job increasingly captures the total hours worked.

Kuhn and Lozano (2008) focus exclusively on employees who work 30 or more hours per week. They show that these men became more likely to work 50 or more hours in the 1980s. This change is concentrated among salaried workers, and those with higher wages and education levels. They show an increase in working more than 50 hours between 1979 and 1989, but they do not find a significant change beyond 1989. I find the increase is concentrated in the heart of the hours distribution and not exclusively working long hours and find a role that persists after 1989.

As this review suggests, male working hours declined and this decline is concentrated among younger men. At the same time the likelihood of working more than 40 hours a week for salaried men has increased. The role of education in this pattern of hours has not been studied.

The more general literature on the link between wages and hours of work is extensive. Starting with the theory of labor supply, the substitution effect increases hours worked when wages increase. Yet, at higher income levels the income effect takes over, reducing labor supply as wages increase (Barzel, 1973; Moffitt, 1982, 1984). Costa (2000) confirms that for most of the 20th century high wages were associated with fewer hours. But from the 1970's high wages were no longer associated with fewer hours Costa (2000). Gicheva (2013) shows that wage growth and hours of work are positively related. This is non linear with particular increases in wage growth for those who work more than 48 hours a week. Mohanty and Golestani (2017) show that the relationship between hours worked and its relationship with wages changes over a persons life. The substitution effect is actually greater later in life conditional on working.

Following past work, I focus on the reported usual hours worked per week. Earlier research compares the reported hours to the actual hours by comparing survey responses to time use surveys and employer records. Frazis and Stewart (2004) find the reported usual hours to be similar to the actual hours. Frazis and Stewart (2010) find somewhat different magnitudes of reported hours by data source but very similar trends over time across sources.

The evidence I present of an emerging college hours premium coincides with evidence that the growth in the college wage premium may be fading. Yet, the college earnings premium continues to rise even as the wage premium may not. This increases earnings inequality and questions whether equilibrium exists in the labor market. I now turn to the data and the empirical approach used to document the emerging college hours premium.

3 Data and Empirical Approach

I use data from the National Longitudinal Survey of Youth (NLSY), the American Community Survey (ACS) and the Current Population Survey (CPS). All three data sources report usual hours worked per week. Each of the three data sets have a unique advantage. The NLSY allows controlling for cognitive ability, the CPS includes information about involuntary part time employment and the ACS provide the largest sample sizes and do so over the longest periods of time. Each of these characteristics are important when considering the US labor market, particularly the college hours premium.

3.1 Data

The NLSY79 follows 6,403 men born between 1957 and 1964, first interviewed in 1979. The most recent wave was in 2014 when respondents were between 49 and 57. The NLSY97 follows 4,599 men born between 1980 and 1984, first interviewed in 1997. The latest available data is for 2015 at which point the subjects were between 29 and 35. The sample I use includes men between 18 and 35 from 16 survey waves each for the NLSY79 and NLSY97. The survey waves are selected to make sure the individuals in the two cohorts are observed for the same amount of time and during the same ages.[1] I exclude all observations of individuals in the military, enrolled in school or self employed. I exclude women from the analysis as large structural changes occur between these cohorts for women such that their hours were increasing and not declining.[2]

The usual hours worked per week is common to both cohorts of the NLSY. Workers are also asked hours worked each week of the survey year. Where usual hours is missing, I compute an average hours worked. Individuals enrolled in school are excluded from the analysis. Educational attainment is the highest degree attained at the time of observation. For individuals with no reported degree I use years of education. I use education dummies for not completing high school (no High School diploma or fewer than 12 years of education), completing some college (an associates degree or between 13 and 16 years of education), college completion (a college degree or 16 or 17 years of education) and graduate degree completion (masters degrees, doctoral degrees, professional degrees or more than 17 years of education). This follows Castex and Dechter (2014). All estimated values are compared to high school graduates.

[1] In the last 5 years of the NLSY97, on average, 79.84% of the original respondents continue to respond. This can be compared to the 89.46% of the respondents who continue to respond in the last 5 waves of the NLSY79 I use. This difference in retention rates may influence the results in unknown ways.

[2] The pooled results for women suggest no change in the college hours premium between cohorts.

I control for cognitive ability using the Armed Forces Qualification Test (AFQT) scores.[3] This is important as cognitive ability plays a large role in college completion affecting labor market success indirectly, if not directly (Caviglia-Harris and Maier, 2020). I also control for race, region, residence in a metropolitan statistical area (MSA), age, year, birth year and marital status. All estimates apply traditional individual sampling weights.

The mean hours worked declines from 44 hours a week to 39 hours a week between cohorts.[4] This decline is consistent with previous research. Both High school and college graduates work slightly more than 44 hours a week in the NLSY79. In the NLSY97 however, a college graduate works 41 hours a week compared to 38 hours a week for high school graduates. Figure 1 shows the distribution of the usual hours worked by high school graduates and college graduates in both the NLSY79 and NLSY97 excluding those who work exactly 40 hours a week.[5] For workers in the NLSY79, the distributions of the two groups are similar. In the NLSY97, the distribution for college graduates is substantially to the right of that for high school graduates.

INSERT FIGURE 1

I combine waves of the Current Population Survey (CPS) from 1986 to 2016 choosing CPS variables that match their NLSY counterparts. I create dummies for not completing high school, some college, college graduation and graduate education in the same way as in the NLSY. Other controls include race, age, region, birth year, residence in urban area and marital status.[6] These variables are constructed to be comparable to their NLSY counterparts. Similarly, I combine waves of the American Community Survey (ACS) from 1960 to 2016. I again create dummies for not completing high school, some college, college graduation and graduate education. Other

[3] The AFQT scores in the NLSY79 and NLSY97 have been adjusted to account for type of test and age at testing using the procedures suggested by Altonji et al. (2012) as used in Castex and Dechter (2014), and all test scores are scaled to have a mean of zero and a standard deviation of one. The AFQT scores do not account for cognitive ability completely but is the only available measure.

[4] Appendix Table A1 reports the descriptive statistics for the NLSY. The additional hours of work described below may not be replicated when older workers, women and the self employed are included as suggested by BLS News Releases for 2016 and 2019

[5] Including workers who work exactly 40 hours results in large spikes at 40 masking the other differences in the distribution. Excluding them allows us to clearly see the differences in the distribution. I will however examine the pattern of those who work exactly 40 hours later.

[6] Appendix Table A2 reports the descriptive statistics for the NLSY equivalent cohorts from the CPS.

controls include race, age, region, birth year, residence in MSA and marital status.[7]

The dependent and independent variables in all three sets of data are nearly identical. Each data source has a comparative advantage. The NLSY has been the focus of much of the previous literature and contains the unique cognitive ability measure. The CPS and ACS allow examining a longer time period even as they are not cohort specific. The CPS provides unique data on whether workers view their part-time status as involuntary (they would prefer to work full time) and the ACS provides the largest sample sizes.

3.2 Empirical Approach

The empirical approach used follows those estimating the changes in hours of work and the education wage premium (Aguiar and Hurst, 2007; Kuhn and Lozano, 2008; Castex and Dechter, 2014; Ashworth et al., 2017; Ashworth and Ransom, 2019). I describe changes in the association between education and hours of work over time.

To calculate the college hours premium in the NLSY, ACS and CPS, I estimate the following model.

$$Hours = \beta_0 + \beta_1 EDU_i + \beta_k X_i + \varepsilon_i \tag{1}$$

where $Hours$ is the usual hours worked per week, EDU is the vector of dummy variables for each level of education, and X is the vector of controls.[8] The base The NLSY includes the measure of cognitive ability which I use as a control. The other controls I use include race, residence in an MSA, region of residence, marital status, birth year and year of observation.

Education is based on indicators for not graduating high school, graduating college with an associates degree or not completing college, graduating college with a bachelors degree and for obtaining post-graduate education. High school graduates are therefore the base case. The dummies for year of observation account for any macroeconomic changes that might otherwise affect

[7] Appendix Table A3 reports the descriptive statistics for the NLSY equivalent cohorts from the ACS.

[8] These controls are in the form of a dummy variable for each unique value of the above controls to account for any non-linear variation.

the dependent variables. Age is collinear due to the inclusion of year and birth year dummies. The marital status dummy is an indicator for currently being married and not divorced or widowed. Region dummies are based on Census regions North Central, South and West, the base region is the North East. The MSA variable is an indicator for residence in a metropolitan statistical area. The race controls include indicators for black and other, the base case is white.

I also create an ordinal hours variable. The variable separates working fewer than 40 hours, working exactly 40 hours and working more than 40 hour. The controls from (1) are included in the ordered probit estimates.

Quantile regression versions of (1) are estimated. These exclude individuals working exactly 40 hours. They form a large portion of the sample and of the quantiles. When included, many of the quantiles estimated provide no relevant information and hide the pattern in the rest of the distribution.[9] The quantile regression investigates the extent to which the college hours premium is observed throughout the distribution of hours. This is done to confirm that estimations at the point of means are not driven by the tails. The tails might drive the mean estimate if the only educational differences are in extreme overtime and/or in minimal part-time.

After showing that the tails are not driving the college hours premium, I consider a series of potential sources that might generate the results. These include exploring the role of the Great Recession, the difference between salaried and hourly worker, the importance of involuntary part-time work and broad industrial and occupational changes.

Finally I estimate the college earnings premium. This follows a similar structure to (1). The dependent variable is the log annual labor income. In this specification I show the role of hours by first excluding and then including it as a control variable.

4 Results

Table 1 reports the results of estimating (1) for the two NLSY cohorts. Column 1 shows that a college degree is not associated with hours of work in the NLSY79. Column 2 shows a college

[9] To make this point, Figure A1 in the appendix includes observations of exactly forty hours.

degree is associated with 2.2 more hours of work than a high school degree in the NLSY97. This college hours premium is significantly different from zero. Controls for race, age, MSA, region and marital status take statistically significant coefficients. Controlling for cognitive ability does not change the pattern of these results.[10] Column 3 shows a college degree in the NLSY79 is not associated with hours of work. Column 4 shows that in the NLSY97 a college degree is associated with 1.9 more hours of work. The 2.4 hour difference between cohorts is statistically significant (s.e.=0.338).[11] The college educated work similar hours to high school graduates in the early cohort but significantly more hours in the latter cohort, a college hours premium.[12]

INSERT TABLE 1

The ordered probit estimates the association between college education and the likelihood of working fewer than 40 hours, exactly 40 hours or more than 40 hours. Table 2 presents two rows for each education level. These are the marginal effects in the NLSY79 and the NLSY97 including the control for cognitive ability. Row 5 shows that in the NLSY79, the marginal effect of a college degree does not differ from that of a high school degree. Row 6 shows that in the NLSY97 a college degree is associated with a 10 percentage point reduction in the probability of working fewer than 40 hours a week, a 1 percentage point increase in the likelihood of working exactly 40 hours, and a 9 percentage point increase in the likelihood of working more than 40 hours. College graduates are more likely to be in the two greater hours categories than high

[10] Workers in the NLSY79 and NLSY97 have different rates of AFQT score reporting. I only include workers whose AFQT scores are reported. Table OA2 in the online appendix includes workers with missing AFQT scores and an indicator for when they are missing. The college hours premium increases 2.2 hours from -0.07 in the NLSY79 to 2.17 in the NLSY97. Controlling for cognitive ability, using the cohort mean for missing values, does not meaningfully change the results. The college hours premium increases 2.3 hours from -0.44 in the NLSY79 to 1.91 in the NLSY97.

[11] The coefficient and standard error are computed by stacking equations for the two cohorts while allowing all the independent variables and controls to vary by cohort by using cohort interaction terms. The coefficient on the college graduate variable interacted with an indicator for the NLSY97 is 2.404 (s.e.=0.338). These full results are available on request. Using alternate age ranges to account for the differences in interview ages does not significant change the estimates. For example Table OA3 of the online appendix using an age range of 21 to 31 shows the college hours premium increases 2.39 hours from -0.74 in the NLSY79 to 1.65 in the NLSY97.

[12] Following those examining college wage premia over time, I do not model either labor supply or labor demand relationships for lack of proper instruments. I did however undertake two joint estimates of hours and wages exploiting the correlated error terms between hours and wage determinants. The first uses the Table 1 controls as these determinants. This improves precision but does not influence the results in a substantial way. The second augments these controls by using the wage as a control for hours and hours as a control for the wage. These are again estimated jointly as seemingly unrelated regressions with a weighted covariance matrix showing the college hours premium moving from -0.15 to +1.45 between cohorts. These estimates are available upon request.

school graduates.

INSERT TABLE 2

As the association on exactly 40 hours is small, the college hours premium might be associated with changes in the tails of the distribution. I now test this hypothesis using a quantile regression. Using a quantile regression allows measurement of the association of a college degree at each point in the distribution of hours worked.

Figure 2 presents the results of quantile regressions of (1). The vertical axis measures the college hours premium. The top line shows the coefficient on a college degree at each integer quantile between 5 and 95 for the NLSY97 cohort. The bottom line shows the coefficient on a college degree for the same quantiles for the NLSY79 cohort. The quantiles reflect the combination of the two cohorts to allow comparison. The figure shows both the quantiles (at the top) and the hours associated with the quantiles for the combined cohort (at the bottom). In both cohorts I exclude those who work exactly 40 hours to aid interpretation.[13]

INSERT FIGURE 2

Figure 2 shows that for the NLSY79 a college degree is associated with fewer hours in the tails and essentially no difference in hours in the heart of the distribution. The NLSY97 differs dramatically. A college hours premium exists throughout the distribution and is largest for those working between 30 and 45 hours. The college hours premium in the NLSY97 is clearly not a phenomenon driven by the tails of the distribution.

A fully stacked interaction model demonstrates that the increase in the college hours premium between cohorts is statistically significant throughout the hours distribution. At the 50th

[13] Figure A1 in the appendix presents the quantile regression for the entire sample. Here over 40 of the integer quartiles are associated with working exactly 40 hours and the differences between cohorts across these quartiles are not significant. Yet, the graph confirms Figure 2 showing that both sides of 40 hours, the NLSY97 shows a significant hours premium that fades in the extreme tails.

quantile which is 42 hours, the college hours premium is -0.70 (s.e. = 0.22) for the NLSY79 and 6.71 (s.e. = 0.57) for the NLSY97 as shown in Figure 2. This large difference of 7.4 hours (s.e. = 0.85) in the college hours premium between cohorts is about three times the point of means difference between cohorts. For the 25th quantile at 34 hours the difference in the college hours premium is 6.9 hours (s.e. = 1.06) between cohorts. This difference in the college hours premium begins to narrow past the 65th percentile at 46 hours. Yet, even at the 75th percentile (50 hours) the difference in the college hours premium between the cohorts remains 5 hours (s.e. = 0.89). The largest difference in the college hours premium is clearly in the heart of the hours distribution and it fades in the tails. This is critical as it indicates that the emerging college hours premium is not driven by the college educated working extreme over-time hours or the not college educated working extremely small part-time hours.[14]

Possible Sources of the Growing College Hours Premium

I now examine a series of possible sources of the growing college hours premium. I start with the realization that the great recession affected workers in the NLSY97, but not in the NLSY79 as my observations from that cohort do not extend to 2008. While the inclusion of year dummies likely picks up any general macroeconomic effects, it is possible that the recession decreased the hours of the not college educated more than the hours of the college educated. Rinz (2019) finds that the influence of the recession on the probability of employment were largest for those who graduated in the year of 2008 and the next couple years and that the effects on employment for all workers had vanished by 2014. As a further test, I simply exclude all observations from 2008 to 2014. This would remove a differential effect of the recession on those not college educated. Yet, the results still show the emergence of a college hours premium between the cohorts of about 2.5 hours. As an addition, I also complement the year and regional dummies with a full

[14]It might be thought that the hours support for the college educated differs dramatically from that for the not college educated implying that the estimated hours premium in the tails is misleading. Yet, a quantile-quantile plot comparing the two educational groups does not fit the "S" shape characteristic of one group being far more represented in the tails (available upon request). We also note that alternative quantile estimates using non-parametric Epanechnikov kernels to identify the local average at each quartile return virtually identical results (also available upon request).

set of year by region dummies. The increase in the college hours premium remains essentially unchanged at 2.5 hours. Finally, when I later examine the college hours premium in the CPS and ACS, the growth in the college hours premium emerges well before the great recession.

The method of pay may be partially behind the emerging hours premium. Additional hours from salaried workers may remain uncompensated. College educated workers are disproportionately salaried and the hours of the salaried may have grown relative to hourly workers. This can be tested using data from the NLSY. Individuals in the NLSY report the time unit of pay when reporting income. Following Artz and Taengnoi (2019), workers reporting an hourly pay are considered hourly workers. All others are considered salaried.

INSERT TABLE 3

Table 3 demonstrates that the relative growth in hours for the college educated exists for both salaried and hourly workers. Columns 1 and 2 show the college hours premium for salaried workers increasing to 1.9 hours a week in the NLSY97 from negative 1.25 hours in the NLSY79. This increase of 3.15 hours is statistically significant. Columns 3 and 4 show the college hours premium for hourly workers increasing to negative 0.8 from negative 2.4 hours a week. This 1.6 hour increase between the two cohorts is half that for salaried workers but also statistically significant. Among hourly workers, what was an hours disadvantage for the college educated, grows to rough equality. Among salaried workers, what was an hours disadvantage for the college educated grows to a very large advantage. The result I show is more general than simply salaried workers becoming more likely to work more than 50 hours (Kuhn and Lozano, 2008).

It is possible that critical interactions may misleadingly generate the appearance of the hours premium. Education and AFQT interact in wage equations and the exact causal relationship between education and AFQT has been debated (Cascio and Lewis, 2006). To examine this, I add interactions of the education dummies with the AFQT. The college hours premium, calculated using the coefficient on college added to the coefficient on the interaction evaluated at the mean of cognitive ability, increases from negative 0.75 hours to positive 2 hours confirming the general pattern. Alternatively, I include interaction terms between education and experience (also known to interact in wage equations). The college hours premium, the coefficient on college added to the coefficient on the interaction evaluated at the mean of experience again increases, this time by even more than 3 hours.

A changing pattern of industry and occupational affiliation might explain the rising college hours. Acemoglu and Autor (2011) confirm that employment shares across occupations have changed over the last several decades and that these changes are associated with education level. To account for the potential role of these changes on the hours premium I include industry and occupation dummies as regressors added to each of the estimates in Table 1. When accounting for industry and occupation, the college premium increases from -0.419 in the NLSY79 to 1.725 in the NLSY97. This increase of 2.15 hours roughly matches the increase without industry and occupational controls.

Yet, broad industry and occupational controls stand as only one of many excluded controls that might differ between cohorts. To test for this, I include 2-digit industry and 2-digit occupation dummies (a sum of 68) for each of the estimates. I also exploit the depth of the NLSY to include dummies for the highest grade completed by the worker's mother. I include the number of children, non-cognitive abilities, and a measure of motivation.[15] As shown in the online appendix Table OA1, the college hours premium increases from -0.421 in the NLSY79 to 1.665 in the NLSY97. This increase of 2.1 hours roughly matches that without these controls. Consequently, I continue to focus on the basic and more parsimonious specification.[16]

It is possible that involuntary part-time work drives the emerging hours premium. In this view those without a college education are increasingly unable to work the hours they want.

[15] Non-cognitive ability is captured by a standardized measure of each of the "big 5" personality traits, extroversion, agreeableness, conscientiousness, neuroticism and openness (Almlund et al., 2011). Following Segal (2012) motivation is measured by the coding speed section of the ASVAB.

[16] Individual fixed effect estimates can control for worker heterogeneity. However, a college degree often marks entrance into the labor force not just a change in hours. Moreover, following earlier research, my hours measure includes only those not enrolled in college or school. Thus, a fixed estimate in my sample reflects the relatively few individuals who are observed as employed both before entering college and after college graduation. While it shows a large growth in the college hours premium between cohorts, sibling fixed effects may be more useful in standardizing for background and some genetic influences. The college hours premium increases by 2.9 hours between the NLSY79 and NLSY97 when sibling fixed effects are included. This is based on a much smaller sample (but larger than would happen randomly because of the NLSY sampling strategy). Identification comes from brothers that have variation in completion of college.

Employers reduce hours to improve flexibility or keep hours below those required for health insurance. The CPS uniquely identifies involuntary part time employment and allows examining a longer period.

I create five-year birth cohorts beginning in 1960 - 1965 and ending with 1985 - 1990. To match the NLSY I limit the sample to non-students between 18 and 35 at the time of observation. Thus, for example the 1960 to 1965 cohort is examined in the labor market in the CPS surveys of 1978 to 2000.

The top line of Figure 3 presents the estimated college hours premium for each five - year birth cohort. In the first cohort (centered on 1963) the premium for the college educated is 0.533 hours. This rises to a 1.164 hour college premium for the 1985-1990 birth cohort. The graph shows a clear increase in the college hours premium over time, but the ultimate size of the hours premium emerges as smaller than in the NLSY or than will be shown in the ACS.

INSERT FIGURE 3

In order to examine the role of involuntary part-time employment, it is included as a regressor in the hours equation for each birth cohort. In every birth cohort it takes a negative and statistically significant coefficient. Those reporting involuntary part-time employment tend to work approximately 11 hours less than would otherwise be predicted. The college educated are less likely to report involuntary part-time work. The bottom line of Figure 3 illustrates the consequence of these facts by showing the college hours premium after holding controlling for involuntary part-time work. The hours premium for the college educated is reduced but not dramatically. It is now 0.495 in the first cohort and 0.957 in the final cohort. Thus, while accounting for involuntary part-time work reduces the size of the college hours premium, it neither eliminates it nor changes its pattern of growth over time.[17]

I now use the CPS to briefly return to the possibility that macroeconomic cycles could influ-

[17] While the CPS measure identifies those working involuntarily part-time, there might also be those working more hours than they desire as well as working less hours than they desire.

ence the pattern of hours. A full set of year by state dummies (38 x 51) are created and used as independent variables in the cohort regressions. This vector should capture geographic variation in macroeconomic trends as it captures the cycle for each state. The addition of this vector causes virtually no change in the results as the college hours premium increases from 0.491 for the 1960 to 1965 birth cohort to 1.112 for the 1985 to 1990 birth cohort.

American Community Survey (ACS)

While the NLSY has superior controls, particularly cognitive ability, the ACS covers a period longer than either the CPS or NLSY.[18] The ACS is also not limited by the cohorts considered by the NLSY. Workers born before, after and between the two NLSY birth cohorts can be observed.

I create five year birth cohorts beginning in 1940 and ending in 1990.[19] Once again I limit the sample to non-students between the ages of 18 and 35 at the time of observation to match the NLSY. The results of estimating the college hours premium for each cohort are presented in Figure 4. The vertical axis measures the college hours premium. The horizontal axis is the middle year of each 5 year birth cohort. For example, the college hours premium for the 1951 to 1955 birth cohort is 1.13 hours and plotted at the year 1953.

INSERT FIGURE 4

The college hours premium increases across the birth cohorts in the ACS. This steady increase shows a long term phenomenon. The earliest birth cohort (1940-1945) has a college hours premium of 0.93 hours, this increases more than three times to a 3.4 hours in the last birth cohort (1986-1990). The 2.5 hours increase in the college hours premium between these cohorts is statistically significantly.

[18] The ACS data includes workers surveyed in the 1960, 1980, 1990, 2000, and 2010 Census waves and annual waves of the ACS between 2001 and 2016.

[19] The first few birth cohorts (before 1980) the individuals included come primarily from Census waves rather than the ACS. The latter cohorts include individuals surveyed in both the Census and ACS.

I once again turn to quantile regressions to examine whether this longer term phenomenon is driven by changes in the tails of the distribution. Figure 5 presents the quantile regressions for the 1976-1980 and 1986-1990 birth cohorts from the ACS.[20]

INSERT FIGURE 5

The results differ from the NLSY in one way but confirm it in two others. The primary difference is the steady decline with lower hours premiums at the top of the distribution. This is true of all of the ACS birth cohorts. Despite this difference the ACS results confirm that the 1986-1990 birth cohort has a higher college hours premium than the 1976-1980 birth cohort throughout the distribution.[21] Moreover the largest difference in the college hours premium remains in the heart of the distribution not in the tails. For example at the 10th quantile the college hours premium is 14.6 hours in the 1986-1990 birth cohort compared to 11.9 hours in the 1976-1980 birth cohort. This is a 2.7 hour increase in the college hours premium. At the 50th quantile, around 45 hours, a college degree is associated with a 6.5 hours premium over high school graduates in the 1986-1990 birth cohort and 1.9 hours in the 1976-1980 birth cohort. This is a 4.6 hour increase in the college hours premium. At the 80th percentile the college hours premium for the 1986-1990 birth cohort is 3.5 hours and in the 1976-1980 birth cohort the college hours premium is 1.4 hours. There is a 1.1 hour increase in the college hours premium at this point in the distribution between cohorts.

The ACS largely confirms the NLSY results. The ACS shows a long term trend of an increasing college hours premium beginning with those born in 1940 until those born in 1990. Quantile regressions comparing these cohorts again show that the increase in the college hours premium happens throughout the distribution of hours but is greatest in the heart of the distribution. The growth of a college hours premium and its effect across the distribution are not specific to the

[20] Again, I do not include those who work exactly 40 hours a week as that creates large un-interpretable horizontal lines in the middle of the distribution.

[21] For any two five year cohorts, the latter cohort has a larger college hours premium throughout the distribution.

NLSY.

The influence of a college degree on annual labor earnings is based on both the influence of a college degree on the wage and the association between college and hours of work.[22] To make this point I examine the college earnings premium in each of the 5 year cohorts. The analysis replaces hours with log earnings in (1). Two college earnings premiums are presented for each five year birth cohort in Figure 6. One controls for hours worked and the other does not. These are plotted at the middle year of each birth cohort. For example, the college earnings premium for the 1961-1965 birth cohort is plotted at 1963 but reflects the entire five year cohort.

INSERT FIGURE 6

The upper line plots the college earnings premium when not controlling for hours of work. The lower line plots the college earnings premium when controlling for usual hours worked each week. The distance between the two lines reflects the effect of hours of work on the earnings premium. Controlling for hours of work in the early cohorts leaves the earnings premiums essentially unchanged. For the first cohort (born 1940 to 1945) the college earnings premium is reduced from 0.34 to 0.31 when controlling for hours of work. This difference is not statistically significant. Over time the difference grows. By the 1961 to 1965 birth cohort the college earnings premium is 0.57 and is reduced to 0.43 when controlling for hours worked. The difference for this cohort is a statistically significant 25% of the college earnings premium. The growing gap in hours becomes increasingly important. In the final cohort (born 1986 to 1990), the college earning premium is 0.81, which reduces to 0.48 when controlling for hours worked. Thus, the hours difference increasingly drives the earnings difference.[23]

Without a control for hours there exists a clear trend of an increasing college earnings pre-

[22] The earnings here includes all earnings in that year from wages, salaries, commissions, cash bonuses, tips, and other money income received from an employer.

[23] While the results in the ACS are the most dramatic, the other data used in the paper point the same direction. The college earnings premium increases from 0.341 in the NLSY79 to 0.377 in the NLSY9 without controlling for hours. When controlling for hours, the earnings premium shrinks modestly from 0.348 in the NLSY79 to 0.323 in the NLSY97. In the CPS, the college earnings premium is 0.333 in the rough equivalent of the NLSY79 birth cohort rising to 0.475 in the rough equivalent of the NLSY97 cohort. Controlling for hours reduces both estimates but shows a smaller increase between cohorts: 0.287 to 0.408.

mium. When controlling for hours worked, those born after the 1970's see no increase in the college earnings premium. It remains stable or actually declines during this period. This again points to the importance of the growing college hours premium. Failure to account for this growing premium generates a misleading trend in the college earnings premium. This emphasizes the growing college income premium despite a slowdown in the growth of the college wage premium.

5 Conclusion

The *college wage premium* has risen for much of the last century. However, recent evidence suggests the growth may have stopped. At the same time there has been a decline in hours worked per week by men. I show this decline is concentrated among those without a college degree. Thus the growth of the college hours premium is reflected in the *college earnings premium*.

The NLSY allows a comparison of men from two birth cohorts. The distribution of hours worked is similar for both college graduates and high school graduates in the first cohort. However, in the second cohort college graduates work more hours than high school graduates. The increase in the college hours premium exists throughout the hours distribution. Yet, the increase in the hours premium is largest in the center of the distribution, as much as 8 hours. This is more than 3 times the mean increase of the college hours premium between cohorts.

I also demonstrate a long term trend of increasing college hours premiums between 1940 and 1990 using the ACS. The ACS data mirrors the NLSY by showing that this increase in the college hours premium happens across the entire hours distribution and is largest in the heart of the distribution.

Only the smallest portion of the increase in the college hours premium can be attributed to macroeconomic trends including the great recession. There does exist an increase in involuntary part time employment among the less educated. Yet, this explains only a modest portion of the emerging college hours premium. The increase in the college hours premium is substantially larger among salaried workers than among hourly workers. The premium is not explained away by a wide set of controls for demographics, detailed industry, and detailed occupation. There appears to be no single source for the premium and it clearly remains widespread.

The data also allows examination of the *college earnings premium*. The five year ACS birth cohorts show increasing college earnings premiums. Re-examining this college earnings premium when controlling for hours worked shows that the college earnings premium stops growing for those born in the 1970s and after. This confirms a clear increase in the influence of hours worked on the college earnings premium. Particularly for the later birth cohorts more than a third of the college earnings premium is driven by the college hours premium.

The education wage premium is not the only channel through which education affects income. The education hours premium is of increasing importance. Thus, education may still drive income inequality, but now based on a growing education hours premium. An increasing college hours premium, particularly one generated by a reduction in hours worked by those without a college degree, may further increase inequality if it the reduces the likelihood of formal full time employment and the associated fringe benefits of health insurance and pensions.

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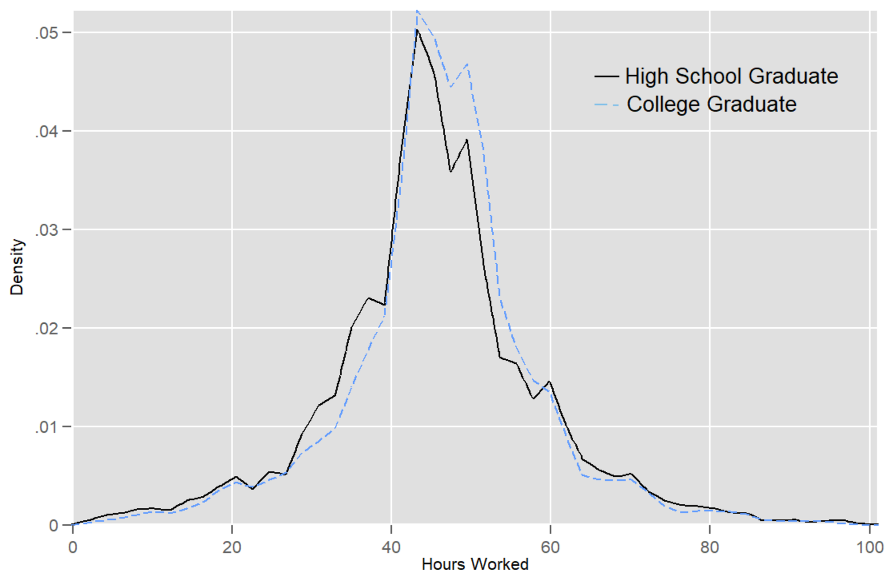
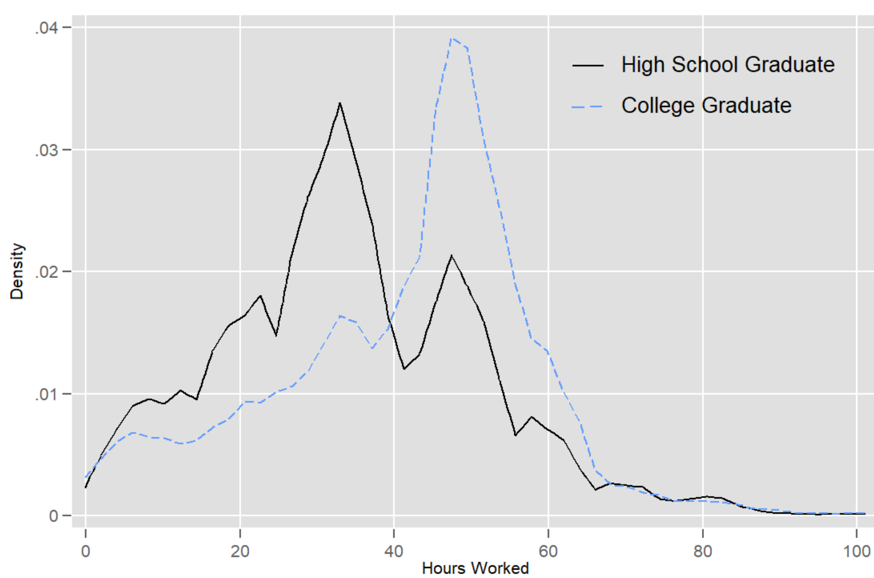
Figures

Figure 1: Distribution of hours worked in the NLSY79 and NLSY97 for male workers with a high school education and college education.

(a) NLSY79

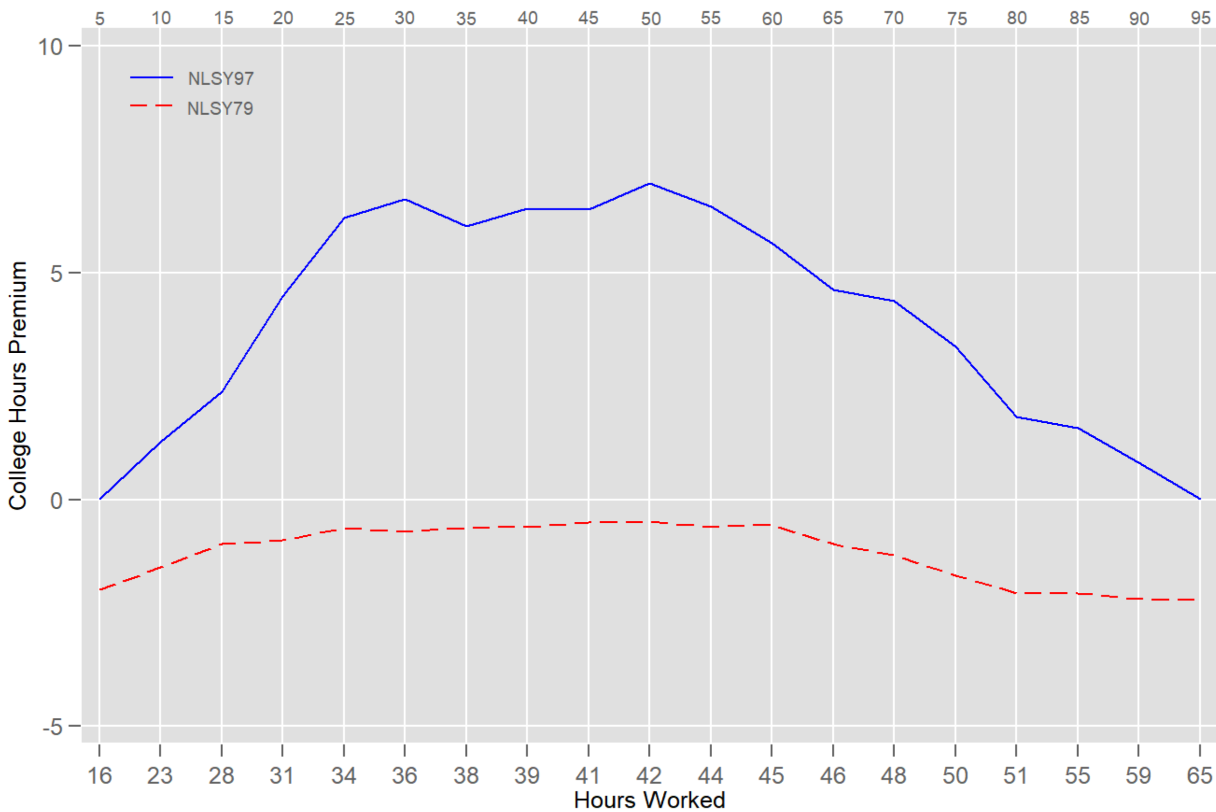


(b) NLSY97



Workers who work exactly 40 hours are excluded from this distribution. They form a large portion of workers and therefore mask changes to the rest of the distribution if included. The distributions including workers who work exactly 40 hours are available on request.

Figure 2: Quantile regression estimates of the college hours premium for men in the NLSY79 and in the NLSY97.



The vertical axis measures the college hours premium estimated separately for the two NLSY cohorts by quantile regression at each integer quantile from 5 to 95 percent. The top of the figure displays those quantiles from the sample of the combined cohorts while the bottom displays the hours of work that correspond to the quantiles.

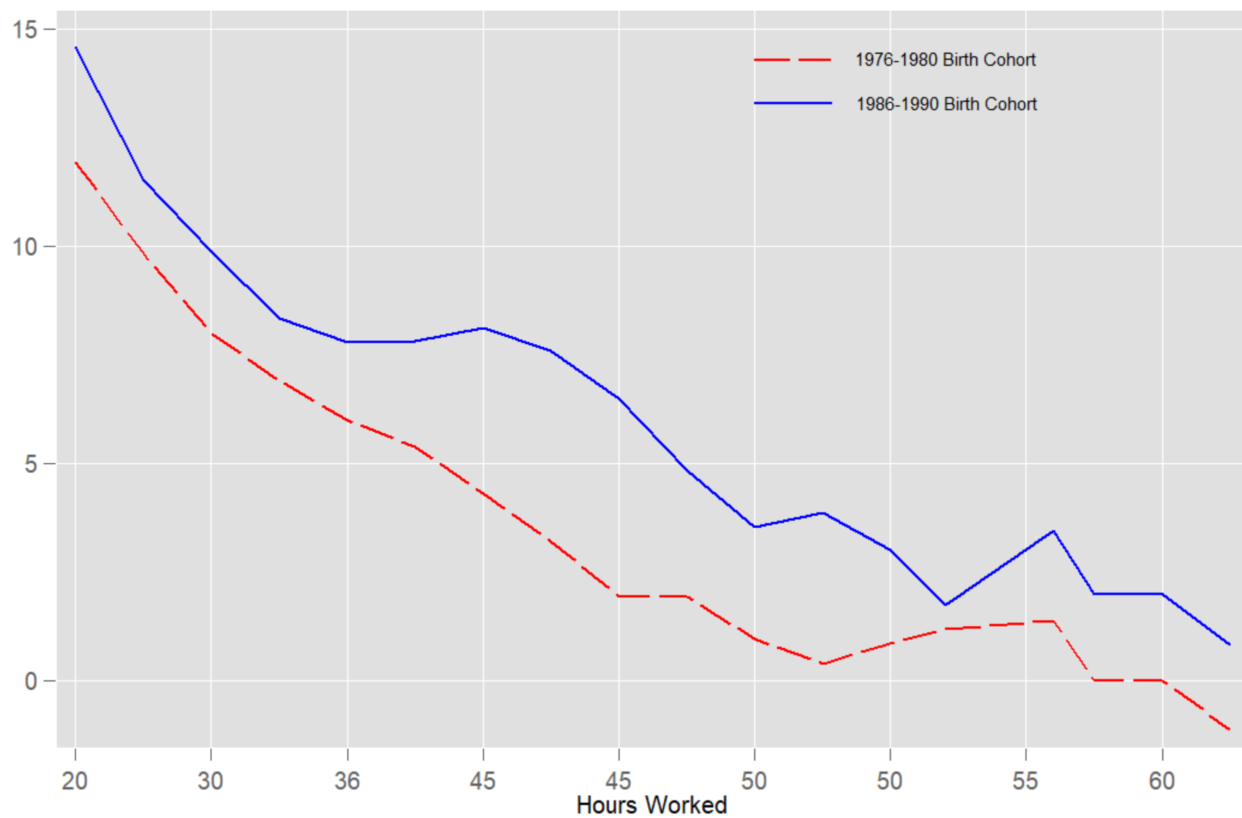
Figure 3: CPS cohort estimates of the college hours premium controlling for involuntary part-time employment

The vertical axis measures the college hours premium for each five-year birth cohort for the ages 18 to 35. These are centered in the middle of each cohort on the horizontal axis.The lower estimates include a control for involuntary part-time employment in addition to controls for race, birth year, year, region, msa status and marital status.

Figure 4: The college hours premium for 5 year birth cohorts of men in the ACS.

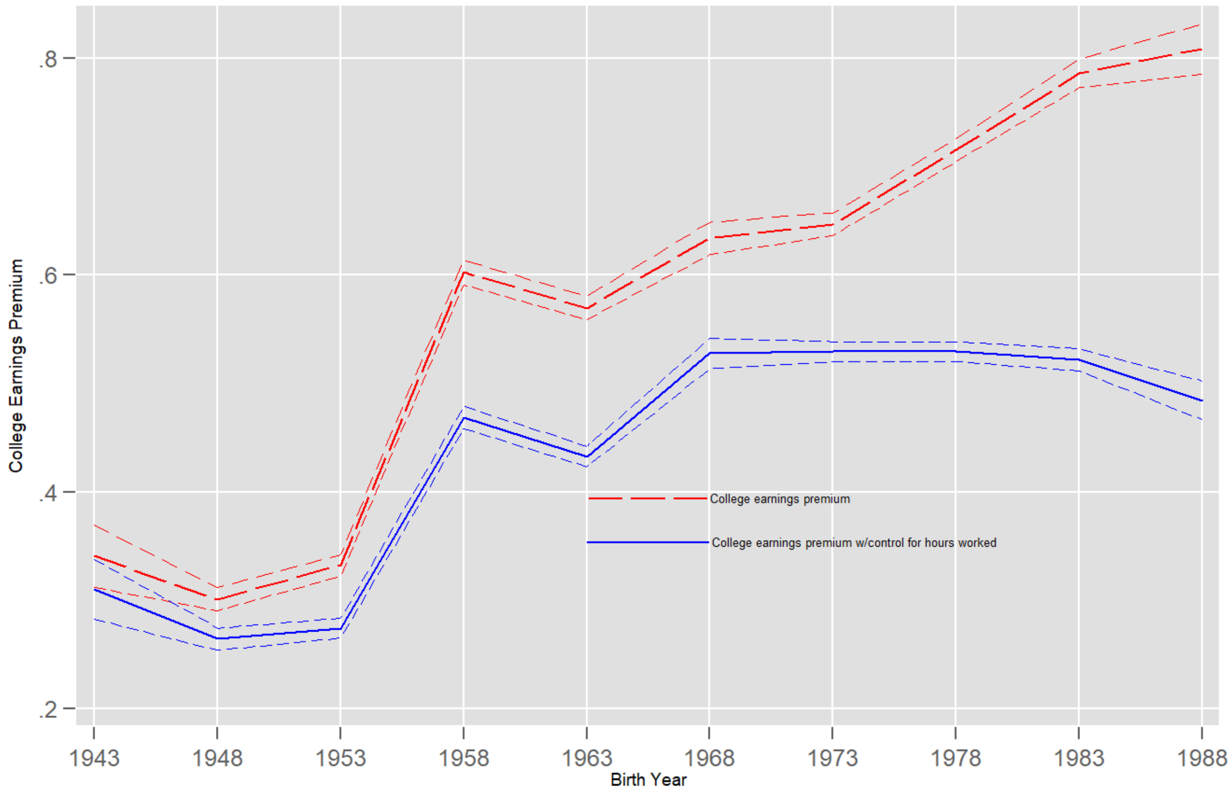
The horizontal axis logs the birth year with each 5 year birth cohort plotted at the middle year. The controls include race, birth year, year, region, msa status and marital status to match the NLSY.

Figure 5: The college hours premium across the distribution of hours worked by men in the ACS.



The vertical axis represents the college hours premium. The horizontal axis logs hours associated with quantiles of the hours distribution. Workers who work exactly 40 hours are excluded from this distribution. The difference between the two cohorts is statistically significant for the entire distribution. The difference is calculated by a stacked equation with a dummy variable for a cohort and interaction term between the dummy variable and all the dependent variables.

Figure 6: The college earnings premium for men for each 5 year cohort in the ACS with and without a control for hours worked.



The vertical axis represents the college earnings premium. The horizontal axis logs the birth year with each 5 year birth cohort plotted at the middle year. The thin lines to either side of the main lines in the legend represent the 95% confidence interval for the estimate.

Tables

Table 1: Estimates of the college hours premium for male workers in the NLSY79 and NLSY97.

Hours Worked/Week in the	(1) NLSY79	(2) NLSY97	(3) NLSY79	(4) NLSY97
No diploma	-0.497	-0.578	-0.150	-0.284
	(0.342)	(0.484)	(0.372)	(0.523)
Some College	-0.0901	0.0481	-0.306	-0.0146
	(0.334)	(0.775)	(0.342)	(0.772)
College Degree	-0.0958	2.215***	-0.506	1.898***
	(0.365)	(0.460)	(0.401)	(0.480)
Graduate Degree	0.784	4.292***	0.275	3.919***
	(0.550)	(1.043)	(0.577)	(1.049)
Cognitive Ability			0.434**	0.383*
			(0.181)	(0.214)
N	49058	19425	49058	19425

All estimates include controls for race, birth year, year, region, msa status and marital status. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Estimated marginal effects using an ordered probit to examine the effect of a college education on working fewer than 40 hours, 40 hours and more than 40 hours a week for male workers in the NLSY79 and NLSY97.

	(1) Hours<40	(2) Hours=40	(3) Hours>40
No Diploma			
NLSY79	0.0027	0.0019	-0.005
	(0.004)	(0.003)	(0.007)
NLSY97	0.0109	-0.001	-0.01
	(0.009)	(0.001)	(0.008)
Some College			
NLSY79	0.01***	0.0069***	-0.0169***
	(0.004)	(0.003)	(0.007)
NLSY97	0.006	-0.001	-0.006
	(0.012)	(0.001)	(0.011)
College Degree			
NLSY79	0.00008	-0.00006	0.00014
	(0.0053)	(0.0037)	(0.009)
NLSY97	-0.098***	0.01***	0.088***
	(0.008)	(0.001)	(0.007)
Graduate Degree			
NLSY79	-0.009	-0.006	0.015
	(0.008)	(0.006)	(0.014)
NLSY97	-0.157***	0.016***	0.141***
	(0.017)	(0.002)	(0.015)

The NLSY79 sample includes 49,058 observations and the NLSY97 sample includes 19,425 observations. All estimates include controls for race, birth year, year, region, msa status and marital status. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Estimates of the college hours premium for male workers separated by worker type in the NLSY79 and NLSY97.

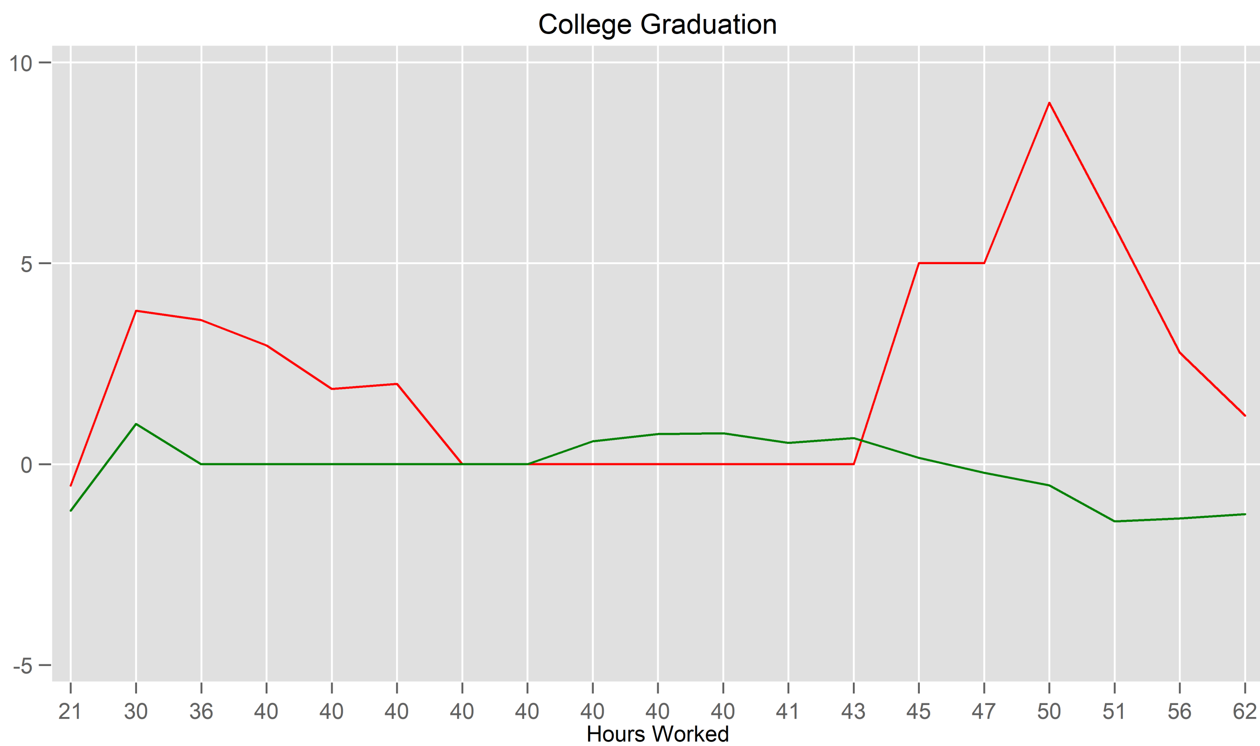
	(1)	(2)	(3)	(4)
	Salaried Workers		Hourly Workers	
Hours Worked/Week in the	NLSY79	NLSY97	NLSY79	NLSY97
No diploma	-0.867	-0.569	0.447	0.114
	(0.535)	(0.753)	(0.345)	(0.432)
Some College	-0.578	-0.367	-0.690*	0.959
	(0.432)	(0.900)	(0.356)	(0.748)
College Degree	-1.259***	1.921***	-2.368***	-0.840
	(0.464)	(0.549)	(0.588)	(0.544)
Graduate Degree	-0.164	4.342***	-4.888***	-7.888***
	(0.635)	(1.100)	(1.004)	(1.896)
Cognitive Ability	0.337	0.569**	0.302*	-0.120
	(0.239)	(0.258)	(0.180)	(0.205)
N	27766	13842	21292	5583

All estimates include controls for race, birth year, year, region, msa status and marital status. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix

Figures

Figure A1: Estimates of the quantile regression of college graduation on hours worked by men in the NLSY79 and NLSY97.



The vertical axis represents the college hours premium. The horizontal axis logs hours associated with each 5th quantile of the hours distribution. Since a large number of workers report working 40 hours a week, it represents a large portion of the distribution in both cohorts. The difference between the two cohorts is statistically significant for the entire distribution. The difference is calculated by a stacked equation with a dummy variable for a cohort and interaction term between the dummy variable and all the dependent variables.

Tables

Table A1: Descriptive statistics for men in the NLSY79 and NLSY97

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		College Graduates		High School Graduates	
	NLSY79	NLSY97	NLSY79	NLSY97	NLSY79	NLSY97
High School	0.483	0.611				
Some College	0.175	0.057				
College Degree	0.132	0.198				
Graduate Degree	0.056	0.045				
Hours Worked/Wk	44.417	38.70	44.886	40.86	44.328	37.887
Black	0.13	0.147	0.075	0.084	0.141	0.172
Other	0.024	0.115	0.011	0.106	0.020	0.113
Msa	0.781	0.917	0.872	0.97	0.750	0.9
Age	27.33	25.62	28.3	26.87	26.93	25.09
Paid hourly	0.462	0.345	0.221	0.201	0.538	0.389
Cognitive Ab.	0.052	0.015	0.789	0.744	-0.206	-0.152
N	49,058	19,425	5,045	3,230	23,613	12,332

The last four columns are sub-samples of workers with a high school degree or an undergraduate degree. Individuals between the ages of 18 and 35 are included in the sample. Hourly pay may not capture everyone who is not salaried it is based on pay-rate reported. An equal number of waves of both the NLSY79 and NLSY97 are included in the sample. Sample weights are used to calculate means.

Table A2: Descriptive statistics for the NLSY79 and NLSY97 male birth cohort equivalents in the CPS.

	(1) 79 Birth Cohort	(2) 97 Birth Cohort
High School	0.379	0.356
Some College	0.242	0.255
College Degree	0.194	0.199
Graduate Degree	0.074	0.065
Hours Worked	43.30	41.47
Black	0.11	0.10
Other	0.04	0.08
Msa	0.75	0.86
N	47,599	92,833

Individuals between the ages of 18 and 35 are included in the sample.
Sample weights are used to calculate means.

Table A3: Descriptive statistics for the NLSY79 and NLSY97 male birth cohort equivalents in the ACS.

	(1) 79 Birth Cohort	(2) 97 Birth Cohort
High School	0.377	0.37
Some College	0.274	0.219
College Degree	0.168	0.215
Graduate Degree	0.058	0.078
Hours Worked	43.13	41.14
Black	0.10	0.11
Other	0.08	0.17
Msa	0.77	0.88
N	689,246	548,869

Individuals between the ages of 18 and 35 are included in the sample.

Sample weights are used to calculate means.