Has the College Wage Premium Continued to Rise? Evidence from Multiple U.S. Surveys*

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Abstract

This paper examines trends in the college wage premium (CWP) by birth cohort across the five major household surveys in the United States: the Census/ACS, CPS, NLSY, PSID, and SIPP. We document a general flattening in the CWP for birth cohorts 1970 and onward in each survey and even a decline for birth cohorts 1980–1984 in the NLSY. We discuss potential reasons for this finding and show that the empirical discrepancy is not a function of differences in composition across surveys. Our results provide crucial context for the vast economic literatures that use these surveys to answer important policy questions about intertemporal changes in the returns to skill.

JEL Classification: I26, J30

Keywords: College Wage Premium, Returns to Education

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1 Introduction

The college wage premium (CWP) measures the wage differential between college graduates and high school graduates and is the outcome of both demand and supply factors. A well-documented and seminal point in the economic history of the United States is when the CWP suddenly rose in the 1980s and continued to rise throughout the 1990s and into the early 2000s. We investigate whether this trend has continued to hold more recently and how consistently the trend holds across commonly used surveys.

Using the five major U.S. household surveys, we document a substantial rise in the CWP in each of the surveys for birth cohorts 1950–1970. However, this was followed by a flattening thereafter. The flattening occurs for both men and women, although the CWP is noticeably higher for women than men in most birth cohorts in each of the data sets. Our findings corroborate recent studies that have documented declining employment prospects, income levels, and returns to skill among recent birth cohorts (see Beaudry, Green, and Sand (2014), Guvenen et al. (2017), Valletta (Forthcoming), and Gallipoli and Makridis (2018)). Surprisingly, we document a *decline* in the CWP in the NLSY for birth cohorts 1980–1984.

The five major household surveys we analyze are the Decennial Census 5% Public Use Micro Sample (hereafter Census) and the American Community Survey (ACS); the Current Population Survey Outgoing Rotation Groups (CPS); the 1979 and 1997 National Longitudinal Surveys of Youth (NLSY79 and NLSY97); the Panel Study of Income Dynamics (PSID);[1] and the Survey of Income and Program Participation (SIPP). In each survey and for each birth cohort, we estimate unconditional log wage regressions to calculate the CWP for full-time/full-year workers aged 25–34.[2] Ours is the first study to compare trends in the CWP across these five commonly-used household surveys.

We investigate whether our findings can be explained by differences across surveys in the levels of observed characteristics such as demographic, education, or employment variables. We find no major discrepancies. We conclude that the differences are likely due to differences in survey architecture (i.e. sample size and collection methods, or whether the survey is repeated cross-section versus longitudinal). We also examine the wage premium between graduate degree holders and college graduates (which we call the GWP) and find that this premium is gradually rising even as the CWP is flattening.

Our results have implications for the long and growing list of studies that examine cross-

[1] Given the sample size of PSID respondents, we only look at those born between 1950–1963. Thus, the PSID is not as informative to our analysis.

[2] We focus on this group because we are interested in as recent of data as possible. Analysis of other age groups is included in the online appendix, as well as Mincer (1974)-style specifications. Our results are largely unchanged.

cohort changes in the returns to skill. Many studies use the CPS or decennial Censuses for this type of research (see Goldin and Katz, 2007, and many others), but there are a growing number of studies using the NLSY (see, e.g. Altonji, Bharadwaj, and Lange, 2012; Ashworth et al., 2017; Bacolod and Hotz, 2006; Böhm, 2017; Castex and Dechter, 2014; Deming, 2017; Lee, Shin, and Lee, 2015), as well as the PSID (see Cortes, 2016; Yamaguchi, 2018, and others). To our knowledge, no studies have used the SIPP for these types of analysis.[3] Our findings suggest that researchers should not necessarily expect to see the same trends in each major survey. Furthermore, our findings serve as a stimulus to future research to quantify which specific factors are behind the flattening and decline that we find.

The remainder of the paper is organized as follows: the next section describes in more detail the data sets and key variables we use; Section 3 presents our key results; and Section 4 offers discussions and conclusions.

2 Data

In this section we briefly describe the data sets used in our analysis. As mentioned previously, we use the five major US household surveys spanning birth cohorts 1950–1985: the 1980, 1990, and 2000 Census 5% Public Use Micro Samples and the 2001-2016 ACS (Ruggles et al., 2017); the CPS-ORG; the NLSY79 and NLSY97; the PSID; and the SIPP. In the interest of brevity and due to the well-known nature of each of these surveys, we refer the reader to the online appendix for additional details regarding the structure and mechanics of each survey.

2.1 Key variables

Here we briefly discuss our construction of the three main variables that enter our analysis: wages, educational attainment, and employment status. We restrict our attention to full-time, full-year workers in each of our analyses that follow.

We define wages as hourly earnings, which are constructed in various ways depending on the survey. In the NLSY, workers report hourly earnings even if they work at a salaried job. In the CPS and SIPP, workers who are paid by the hour report hourly earnings. For the Census/ACS and the PSID, and for salaried workers in the CPS and SIPP, we compute hourly earnings as the annual, monthly, or weekly wage income divided by the hours worked in the corresponding year, month, or week. We express all wage or income variables in \$1982-84 using the CPI-U.

[3]This may be because the SIPP is structured similarly to the CPS but has been collected over a shorter period of time, or because the SIPP is collected with the intent to more precisely measure people at the bottom of the income distribution.

Educational attainment is taken from respondent reports in each survey. We define high school graduates as those who completed exactly 12 years of schooling, who hold exactly a high school diploma, or who hold exactly a GED. We define college graduates as those who completed exactly 16 years of schooling or who hold exactly a bachelor's degree. We define graduate-degree holders as those who have at least 17 years of schooling or hold an advanced degree.

Employment status is defined as full-time, part-time, or not employed. To the extent possible, we attempt to focus on full-time, full-year workers. This classification slightly differs by dataset. In the CPS, workers report working full-time but not full-year because they are surveyed about only a recent workweek. In the PSID, full-time workers work more than 1500 hours during the year. In the Census/ACS and NLSY, full-time workers work at least 35 hours per week and at least 40 weeks in the past year. In the SIPP they work at least 30 hours per week in at least 90% of the observed non-school months.

Additional details on each of our three main variables are available in the online appendix.

3 Methodology & Results

This section briefly introduces our methodology and reports and discusses our main findings.

3.1 Methodology

To estimate unconditional wage premia, we estimate weighted regression models of the following form for individuals aged 25–34, separately for each birth cohort c and for each survey s:[4]

$$\ln w_{isc} = \alpha_{0sc} + \alpha_{1sc} gradHS_{isc} + \alpha_{2sc} grad4yr_{isc} + \alpha_{3sc} graduateDeg_{isc} + \varepsilon_{isc} \tag{3.1}$$

where w_{isc} is the log hourly wage for individual i in birth cohort c in survey s, and the right-hand side variables are indicators for cumulative educational attainment: $gradHS_{isc}$ for a high school diploma (or GED), $grad4yr_{isc}$ for a bachelor's degree, and $graduateDeg_{isc}$ for a graduate degree.[5] Given these definitions, α_{0sc} measures the *average log wage* of high

[4]Each regression is weighted by the individual sampling weights of each survey. We also explore other age ranges (reported in the online appendix). The trends are similar, although as we consider higher age ranges, we lose the ability to measure wages for later birth cohorts.

[5]Those who complete some college but do not receive a bachelor's degree are not included in this analysis.

school dropouts, α_{1sc} the *wage premium* for holding exactly a high school diploma (relative to not completing high school), and α_{2sc} the *wage premium* for holding exactly a bachelor's degree (relative to completing high school), i.e. the CWP.[6] Finally, α_{3sc} measures the *wage premium* for holding a graduate degree (relative to a bachelor's degree).

We present and discuss estimates of (3.1) in the following subsection.

3.2 Results

Our main findings are graphically reported in Figure 1. This figure plots a smoothed version of the α_2 vector in (3.1) across birth cohorts (on the x-axis) and surveys (separate lines).[7] Smoothing is done using local linear regression (LOWESS).[8] The main finding is that, while all five surveys show a steep increase in the CWP for birth cohorts 1950 through about 1965, there is a distinct flattening beginning around birth cohort 1970. We even observe a decline in the CWP for birth cohorts 1980–1984 in the NLSY. To visualize the amount of uncertainty in our estimates, we include a 95% confidence band around the NLSY estimates. These do not intersect with the ACS or CPS lines for the later birth cohorts in question. There is some further suggestive evidence that there is a decline in the CWP for the SIPP. However, given that the last SIPP panel ends 3–4 years before the other data sets, we interpret its results with caution.

The flattening of the CWP happens to both men and women in each of these surveys, though women have a higher CWP in any given birth cohort across most data sets. This finding ties in with recent work on women's educational attainment and marriage markets (Chiappori, Iyigun, and Weiss, 2009; Becker, Hubbard, and Murphy, 2010; Chiappori, Salanié, and Weiss, 2017).

Our results of a flattening CWP are generally consistent with various recent studies. Beaudry, Green, and Sand (2014) use the CPS to show that cognitive occupations experienced declines in the probability of obtaining a job, the starting wage, and the growth of wages beginning in 2000; Valletta (Forthcoming) uses the CPS to analyze the CWP and finds that it flattens beginning in 2010; and Guvenen et al. (2017) find declining lifetime income for more recent birth cohorts in the CPS and Social Security Administration data. Cortes

[6] In results not reported, but available upon request, we analyze an alternative form of (3.1) where we group college dropouts in with high school graduates and graduate degree holders in with college graduates. We find similar trends in the CWP, although the magnitudes are different. We also investigate estimates adjusting for labor market experience in a Mincer (1974)-type model and see patterns similar to our main specification.

[7] The PSID line disappears after the 1960s due to sample sizes by birth cohort that become unreliably small.

[8] The unsmoothed version of Figure 1 is reported in the online appendix.

(2016) uses the PSID and finds small changes in wages for cognitive work with relatively large decreases for routine work, while Yamaguchi (2018) uses the PSID between 1980 to 2010 and finds a relatively steady return to cognitive skills, a decrease in the return to motor skills, and an increase in the return to general skills.

Our study is the first to document the apparent decline in the CWP for recent cohorts the NLSY, though Ashworth et al. (2017) indirectly document this decline.[9] This is somewhat in contrast to Castex and Dechter (2014), who find an increase in the CWP across NLSY panels but a decrease in the return to measured ability, as well as Böhm (2017), who also finds a small increase in the CWP across NLSY panels, though he drops the two youngest birth cohorts of the NLSY97.

We also examine the GWP (graduate wage premium), which is reported in Figure 2.[10] This figure shows that the GWP has continued to gradually increase over the birth cohorts we study, consistent with findings in Goldin and Katz (2007). Furthermore, the figure shows that the NLSY again has odd patterns relative to the other surveys. As it relates to the flattening of the CWP, some of the decline in the CWP could be explained by selection of the most able college graduates going on to graduate school.

One remaining question is whether these surveys consistently measure education, wages, employment, and demographics. We present graphical evidence that they do, in fact, consistently measure these outcomes among the population of full-time, full-year workers. Figures 3, 4, 5, and 6 respectively show cohort-specific average rates of college graduation, graduate degree holding, high school graduation, and full-time work. Similar figures for demographics can be found in the online appendix.

We assess the robustness of our findings by examining alternate age ranges, dropping imputed earnings in the CPS (Hirsch and Schumacher, 2004; Bollinger and Hirsch, 2006, 2013), and using log earnings instead of log wages for the ACS (Baum-Snow and Neal, 2009). These results are reported in the online appendix or available from the authors upon request. None of our findings is meaningfully affected.

4 Discussion & Conclusions

The most plausible explanation for our finding that the NLSY differs from the CPS and ACS with respect to measuring the CWP has to do with survey architecture. The NLSY is

[9] The main contribution of Ashworth et al. (2017) is to document in the NLSY the role of unobserved heterogeneity on the cross-panel change in the returns to experience and schooling, as well as to provide a decomposition of the changes in these skills into price and composition effects.

[10] We have entirely dropped the PSID estimates due to sample-size issues.

a longitudinal study, whereas the ACS and CPS are repeated cross sections.[11] The goals of each survey are sufficiently different that the surveys might end up with different measures of wages and hence different measures of the CWP. Furthermore, longitudinal surveys are subject to non-random attrition.[12] This could explain some of the discrepancies, although we argue that if non-random attrition were problematic, it would show up in significant differences of key observable variables. Furthermore, attrition tends to be negatively selected, which would imply—if anything—an *upward* bias in the CWP for these surveys.

Another potential, though less plausible, explanation is the Great Recession. This recession impacted post-1977 birth cohorts most strongly, which can be seen in Figure 6 as a steep decline in male full-time employment rates for those cohorts. What is puzzling, and what makes this explanation less plausible, is that there does not seem to be any explanation for why the Great Recession would affect the NLSY any differently than the ACS or CPS.

We hope our findings stimulate further research as to why the CWP has flattened while the GWP has continued to gradually grow. The trends we document could be due to a variety of factors, such as increasing job polarization (Cortes, 2016), changes in supply (Katz and Murphy, 1992), declining labor force participation (see Figure 6), a persistent decline in demand starting with the 2001 recession (Altonji, Kahn, and Speer, 2016), or declining business dynamism (Decker et al., 2014). We leave to future work a more detailed accounting of these and other potential channels.

The main implication of our findings is that researchers should not necessarily expect the NLSY to look the same as the CPS and ACS in terms of CWP dynamics. Thus, whether the "correct" CWP is the one measured by the ACS, the CPS, or some other survey, is an open question. It behooves researchers to take note of the differences across surveys and to choose the appropriate data for the research question at hand.

[11] While the SIPP is also a longitudinal survey, as meniontedd, its final panel ends 3–4 years before the other studies.

[12] See the online appendix for a comparison of attrition rates in the NLSY79 and NLSY97.

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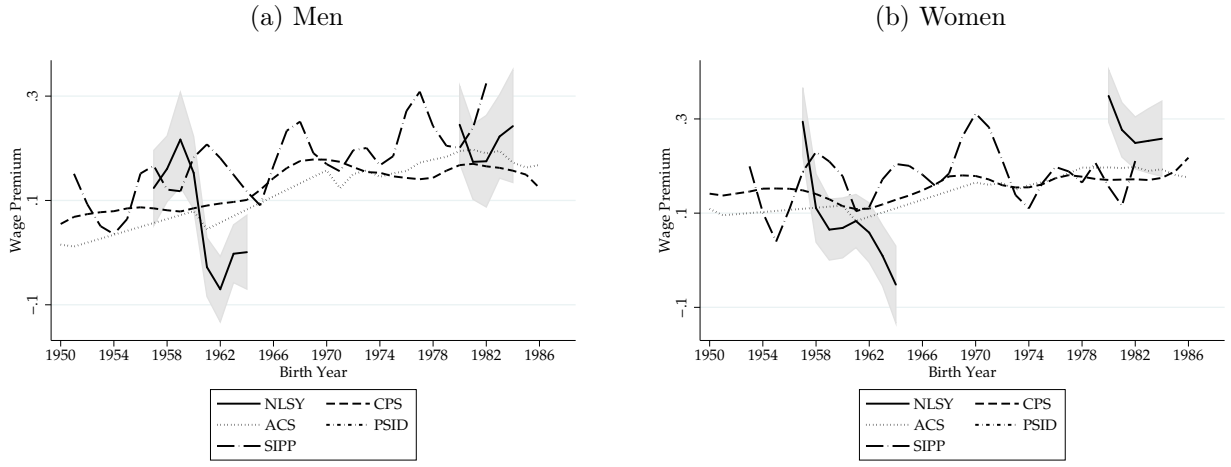
Figures and Tables

Figure 1: Raw (smoothed) college wage premium (25–34 year olds) by birth cohort across five U.S. surveys

Notes: The above figures plot the difference in log wages between (exactly) college graduates and (exactly) high school graduates by birth cohort, smoothed using local linear regression (LOWESS). The shaded regions indicate the 95% confidence interval surrounding the NLSY estimates. Sample includes only those who are working full-time, full-year and who are between the ages of 25–34. Each point on each line requires an underlying sample of $N \geq 400$. All statistics are computed using the sampling weights provided by each survey. The ACS series is restricted to birth cohorts 1950 and 1951 for the 1980 Census, 1960 and 1961 for the 1990 Census, and 1970 and 1971 for the 2000 Census. For additional details regarding construction of the data, see the online appendix.

Figure 2: Raw (smoothed) graduate wage premium (25–34 year olds) by birth cohort across five U.S. surveys

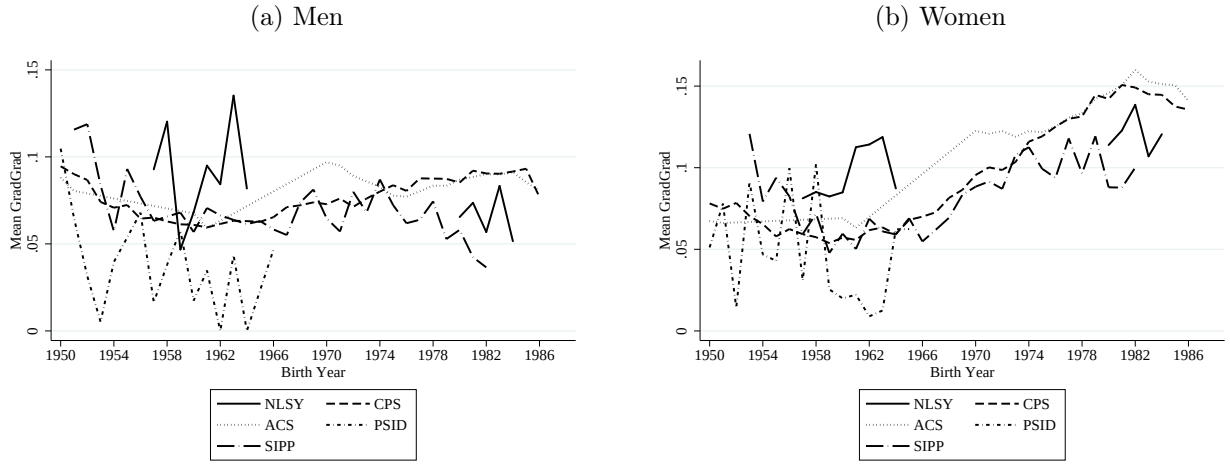


Notes: The above figures plot the difference in log wages between (exactly) graduate degree holders and (exactly) college graduates by birth cohort, smoothed using local linear regression (LOWESS). We exclude the PSID because of small cell sizes. See note to Figure 1.

Figure 3: Raw college graduation rates (25–34 year olds) by birth cohort across five U.S. surveys

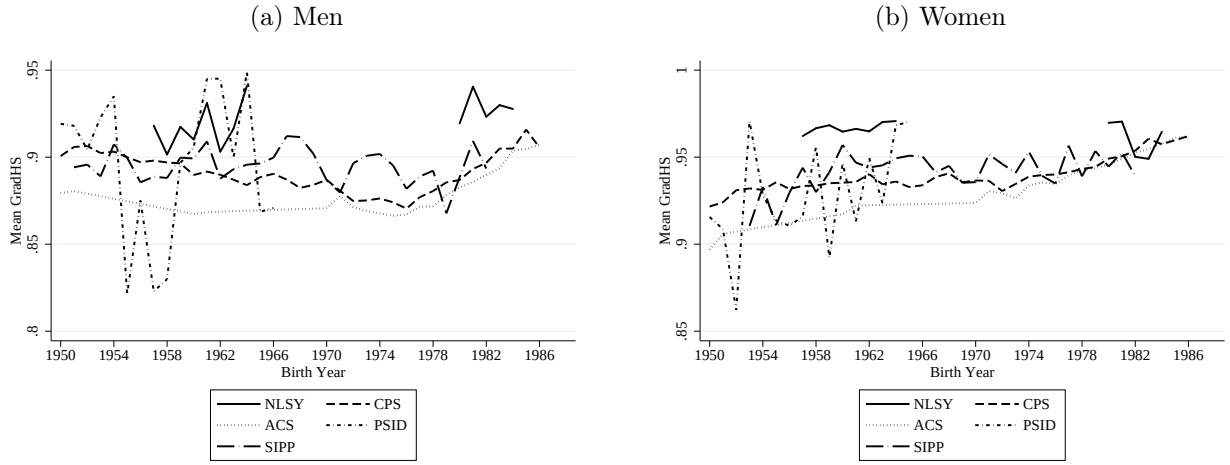
Notes: The above figures plot the proportion of the population that are college graduates by birth cohort. See note to Figure 1.

Figure 4: Raw graduate school graduation rates (25–34 year olds) by birth cohort across five U.S. surveys



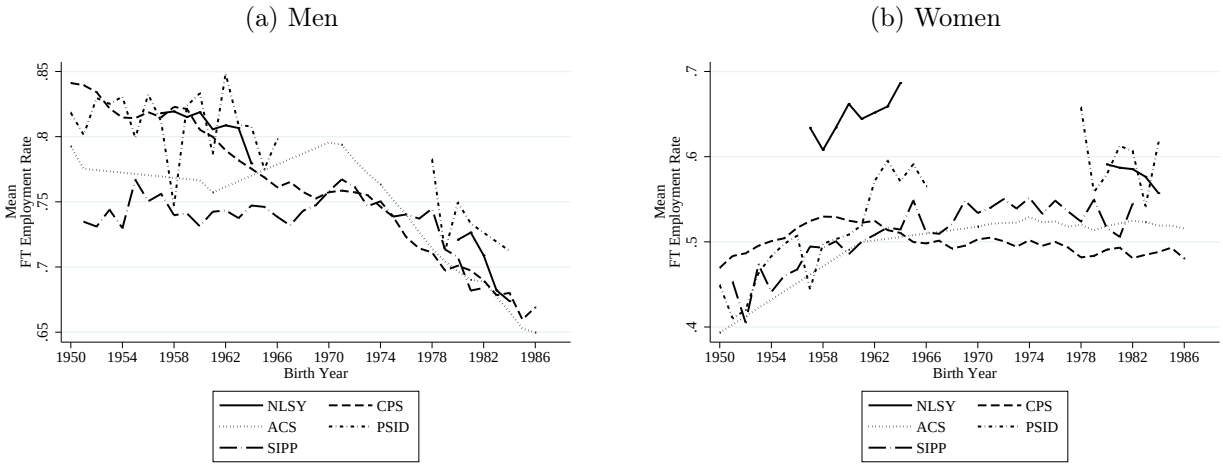
Notes: The above figures plot the proportion of the population that hold graduate-level degrees by birth cohort. See note to Figure 1.

Figure 5: Raw high school graduation rates (25–34 year olds) by birth cohort across five U.S. surveys



Notes: The above figures plot the proportion of the population that are high school graduates by birth cohort. See note to Figure 1.

Figure 6: Raw full-time, full-year employment rates (25–34 year olds) by birth cohort across five U.S. surveys



Notes: The above figures plot the proportion of the population that are employed full-time, full-year by birth cohort. See note to Figure 1.