



Published in final edited form as:

Soc Sci Res. 2016 May ; 57: 233–252. doi:10.1016/j.ssresearch.2015.12.014.

THE VALUE OF EDUCATIONAL DEGREES IN TURBULENT ECONOMIC TIMES: EVIDENCE FROM THE YOUTH DEVELOPMENT STUDY

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Abstract

Rising costs of higher education have prompted debate about the value of college degrees. Using mixed effects panel models of data from the Youth Development Study (ages 31–37), we compare occupational outcomes (i.e., weekly hours worked, earnings, employment status, career attainment, and job security) between educational attainment categories within year, and within categories across years, from 2005 to 2011, capturing the period before, during, and in the aftermath of the Great Recession. Our findings demonstrate the long-term value of post-secondary degrees. Bachelor's and Associate's degree recipients, while experiencing setbacks at the height of recession, were significantly better off than those with some or no college attendance. Vocational-Technical degree holders followed a unique trajectory: pre-recession, they are mostly on par with Associate's and Bachelor's recipients, but they are hit particularly hard by the recession and then rebound somewhat afterwards. Our findings highlight the perils of starting but not finishing post-secondary educational programs.

Keywords

Great Recession; employment; college dropout; Associate's degrees; Bachelor's degrees

1. Introduction

The recent “Great Recession” in Europe and North America had particularly severe consequences, with skyrocketing unemployment rates for young workers (Norris 2012), a

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lowering of sights (Johnson, Sage, and Mortimer 2012), diminished savings and wealth along with increased mortgage defaults and home foreclosures (Garson 2013), and the prospect of future “scarring” with respect to career advancement and income (Blossfeld, Buchholz, Bukodi, and Kurz 2008; Kahn 2010). Workers who retained their jobs suffered along with those who lost them. Rather than terminating their employees during hard economic times and incurring future costs of replacement and training, employers often reduce the hours of existing staff, diminishing workers’ paychecks and living standards. But even in the worst recessions, some individuals suffer great losses while others remain relatively unscathed (Grusky, Western, and Wimer 2011). Achieved characteristics, such as educational attainment, are likely to have pronounced effects on economic outcomes in both stable and recessionary periods.

In this article, we examine changes in five occupational outcomes (weekly hours worked, earnings, employment status, subjective career attainment, and job security) by educational attainment through the years surrounding the Great Recession. Using data from the longitudinal Youth Development Study (YDS), we are able to parse out differences both between educational attainment categories (Bachelor’s, Associate’s, Vocational-Technical, some college but no degree, high school completion) within a given year, as well as within categories across years from 2005 to 2011 (ages 31–37). Thus, we capture the changes in the period before, during, and in the aftermath of the official recession in a cohort of young adults who completed their school-to-work transition during relatively stable economic times.

1.1. Educational credentials and occupational outcomes

Social scientists have had a long-term interest in the economic outcomes of educational degrees, known as the “sheep skin effect” (Spence 1973; Bilkic, Gries, and Pilichowski 2012). Given the lack of full information about job candidates’ productivity, employers use educational qualifications as signals, indicating prospective employees’ skills and abilities. Educational degrees may also serve as indicators of “non-cognitive skills,” such as perseverance, self-regulation, and ability to learn. In light of their presumed greater productivity, employers attract degree holders by offering higher wages. As a result, signaling theory predicts that completers of secondary and higher educational programs will have higher entry wages than dropouts, even when they have equivalent years of schooling (Park 1999). In the absence of information about degrees obtained, some scholars examine occupational outcomes in relation to particular years of education considered as proxies for degree attainment. Taking this approach, Belman and Heywood (1991) find distinct sheep skin effects on earnings by gender and race. Interestingly, while white men enjoy a significant sheep skin bonus from years of education indicating graduation from college (that is, 16 years), white women’s wages show a sheep skin effect with years of education indicating high school graduation (12) and post-graduate degrees (17 or 18). Minority men and women obtain large earnings gains with years of education indicating advanced degrees.

In this article, we ask the question, to what extent do educational degrees distinguish earnings and other key occupational outcomes (i.e., employment status, number of hours worked, job security, and subjective career attainment) in recessionary periods?

Commentators speak of the “lost generation” of young people who have the misfortune of entering the labor market under conditions of high unemployment generally, and even higher youth unemployment rates. A central concern is whether such young people eventually recover, or if “labor market scarring” persists throughout their careers. Much scholarly attention has thus been directed to measuring the effects of entering the labor market during economic downturns on wages years later (Altonji, Kahn, and Speer 2014; Kahn 2010; Oreopoulos, von Wachter, and Heisz 2012).

The present study builds on this literature in three ways. First, most investigations of the sheep skin effect have been restricted to the work-related variables of great interest to labor economists, i.e, unemployment, wages, and hours of work. This study assesses these dimensions of work but also considers less tangible elements of the quality of work – a worker’s sense of job insecurity and evaluation of the current job as the desired career. As unemployment rates increase, workers may worry about the security of their own jobs, and if they do lose their jobs, they may have to move outside their chosen career fields to maintain a continuing income stream.

Second, we examine a panel of youth who left high school or college and entered the labor force in relatively good economic times – during the decade of the 1990s. Unlike earlier concerns with the long-term effects of *entering* the labor force during recessions, we assess the impacts of educational degrees among workers in their thirties. We examine differences in the effects of their educational achievements on both objective and subjective occupational indicators in the relatively good and poor economic times of the early 21st century: before, during, and after the most recent recession.

Third, we extend beyond the more common interest in high school diplomas and four-year college degrees (Bilkic et al. 2012) to examine the implications of two educational qualifications in between these accomplishments. It is well known that four-year college degree holders, irrespective of their age, suffer less unemployment during a recession than less educated workers, though the most recent financial crisis hit them harder because of its widespread consequences across industries (Altonji et al. 2014). But little attention has been given to the implications of the two sub-baccalaureate achievements of interest, the Associates’ degree and vocational-technical degrees or certification, for employment, earnings, hours, or job quality in good and bad labor markets. While these are often combined with those who enter but do not complete post-secondary programs in a category labeled “some college,” their consequences for employment outcomes, both tangible and subjective, may be different. Associates’ Degrees and Vo-tech certification may both have “sheep skin” potential, but their signals to the employer are likely distinct. The Associates’ Degree implies “non-cognitive skills” of perseverance and follow-through, and depending on the Associates’ program may also certify job-relevant skills (e.g., dental assistant, electrician). Vocational-technical certification signals quite specific training and skills. While workers with such certification may be laid off when their industries are hard-hit, they may also be the first to be employed, in light of their occupation-specific credentials, when conditions improve. In contrast, when presenting themselves to employers, those with only “some college”, without a degree, may signal to the employer a lack of ability as well as a lack of motivation and perseverance.

Moreover, better educated workers are also more likely to have obtained “good jobs” in the primary labor market, with internal job ladders and expectations of long tenure with a firm, as well as higher wages and better working conditions (Kalleberg 2011). Less educated workers are more likely to be found in the secondary labor market, with short-term or otherwise non-standard employment contracts. They are likely to be more quickly laid off when the labor market deteriorates. Those with “sheep skins” may, if they do become unemployed, also find new jobs more quickly because they engage in more active job search. They have more incentive to do so than those without educational qualifications since they can expect higher wage offers and better job conditions (Altonji et al. 2014).

1.2. The Value of “Intermediate” Degrees

The impacts of the “Great Recession” on four-year college graduates have attracted considerable attention in the media, given that young people with four-year degrees have experienced historically high rates of unemployment, their wages have stagnated, and, in the absence of better alternatives, many have had to take unpaid or poorly paid internships in hopes that they may be steppingstones to good jobs. Although the recession officially ended in June 2009, young four-year college graduates continued to experience difficulties in the labor market, leading to a lively public debate about whether a college degree is still “worth it” (U.S. News and World Report 2011). Critics point out that many colleges do not do a good job of imparting critical knowledge and skills, leaving many college graduates functionally illiterate (Arum and Roksa 2011). High tuition, rising student debt, stagnant wages, and the scarcity of “good jobs” (Kalleberg, Reskin and Hudson 2000; Kalleberg 2011) with health and other benefits have led many Bachelor’s degree recipients to take jobs previously filled by those without college degrees (Fogg and Harrington 2011). Moreover, in the more precarious “new economy,” knowledge and skills learned in college may become quickly outmoded by technological advances, overseas outsourcing, and changing consumer preferences. Adding fuel to the fire are prominent cultural icons who dropped out of college only to become enormously successful (e.g., Bill Gates, Steve Jobs, Mark Zuckerberg). As a result, many youth, along with their parents, wonder whether a four-year college is still the route to career attainment, economic stability, and a middle-class life style.

Countering the critics, proponents of higher education note that four-year college graduates have much greater lifetime earnings than high school graduates, and that even in recessionary times, college graduates have higher rates of employment, less unemployment, and find jobs more quickly than those without college degrees (Hout 2012). Drawing from a recent national poll and Current Population Survey data, the Pew Research Center (2014) reports that in 2012 young (age 25–32) Bachelor’s degree recipients’ annual earnings were \$45,500, 62% more than those of high school graduates (\$28,000). Moreover, the Pew report shows that the economic advantages of college have been increasing across cohorts since the mid-sixties, when college graduates earned 24% more than high school graduates. In 2012, young college graduates were more likely to be employed, less likely to live in poverty, and more likely to consider their jobs as “careers.” Among the two-thirds of Bachelor’s recipients who borrowed money to attend college, 86% said their degrees were worth it or that they expected that they would be so in the future.

While much of the debate surrounds the value of four-year college degrees, increasing numbers of students are attending two-year colleges, where they can pursue various educational programs leading to four-year college entrance, vocationally relevant education and training, and occupational certification (Snyder and Dillow 2012). While many youth hope that community college will be a more affordable way of getting a four-year college degree, few who attend community colleges eventually do so. Historically, community college and vocational certification programs have been underrated (Kerckhoff and Bell 1998), though this perception may be changing with increasing public concern about the need for highly skilled workers, the recognition that a four-year college may not be the right choice “for all” (Rosenbaum 2001; 2011; Goyette 2008), concern about the U.S. falling behind internationally in higher education, and increasing public investment in community college education (White House 2014).

In addition, recent research shows considerable economic returns to Associate’s degree recipients in comparison to high school graduates without additional degrees (De Alva and Schneider 2013; Zaback, Carlson, and Crellin 2012). Though inhibiting four-year college attendance and the odds of employment in managerial and professional positions relative to college graduates, even vocational education at the secondary school level reduces risks of unemployment and increases chances of employment as skilled workers (Arum and Shavit 1995). The limited economic research on those attempting college and those earning Associate’s degrees shows substantial payoffs for completing college degrees, with those having some college (without degree receipt) receiving more limited wage returns, near-equivalent for those who attended four-year or community colleges (Kane and Rouse 1995). Beyond wages, those students who go into high levels of debt are the least likely to complete a college degree, creating long-term individual-level economic risks and vulnerabilities (Dwyer, McCloud, and Hodson 2012). Drawing on data from the National Educational Longitudinal Study and using a sophisticated propensity score matching procedure, Kalogrides and Grodsky (2011) compare the early incomes of students who dropped out of college and those who transferred from a four-year to a two-year school. Seven years after their scheduled high school graduation, respondents received similar income returns to credits from four-year and community colleges. The authors argue that community college transfer students will do better economically than college dropouts in the long run because they accumulate more such credits, especially after their initial disadvantage, from spending less time in the labor force, evens out.

1.3. The Great Recession, education, and occupational outcomes

During the recent Great Recession, individuals and families experienced higher unemployment, more erratic work patterns, decreased home values, lowered income and net worth, and higher indebtedness and bankruptcy rates (Carruthers and Kim 2011). In response to these events, many individuals altered their work values in light of lowered expectations (Johnson, Sage, and Mortimer 2012). Those who adjusted past educational expectations to the reality of their situations (a group with a propensity to shift from Bachelor’s degree aspirations to Associate’s or Vo-Tech degrees) fared well in terms of income and employment during the recession (Vuolo, Staff, and Mortimer 2012). As the recession continued, many former workers dropped out of the labor force altogether (U.S.

Bureau of Labor Statistics 2012). For workers up to age 34, recession-induced economic outcomes such as unemployment or decreased wages have often meant relying on their parents to a greater degree, often returning to their parents' homes (Qian 2012).

Some characteristics helped individuals to weather the downturn to lesser or greater extents (Grusky et al. 2011). The Great Recession resulted in an increase in poverty, especially among young, unskilled men (Smeeding et al. 2011). Partially due to the concentration of job loss in particular sectors, men have faced higher job separation, lower chances of finding new positions, and higher unemployment rates, leading some researchers to refer to the recession as a “mancession” (Sierminska and Takhtamanova 2011; Berthoud and Sosa 2011; Hout, Levanon, and Cumberworth 2011). Within families, wives have shared the burden by entering the labor force or increasing their work hours (Mattingly and Smith 2010). Race is another predictor of negative economic outcomes. The foreclosure crisis has been highly racialized, with those residing in segregated African American neighborhoods most likely to have received subprime mortgages and to have faced foreclosure (Rugh and Massey 2010). At the individual-level, African Americans have experienced greater losses in terms of mortgage delinquencies, home equity loss, foreclosures, and personal bankruptcies (Wolff et al. 2011; Kuebler and Rugh 2013). Notably, Mexican immigrant men in the United States had significantly lower unemployment relative to native-born white men throughout the period around the recession (Laird 2015)

Although unemployment increased across all educational levels during the Great Recession, job loss was greater among those with only a high school education (Hout et al. 2011). Despite the importance of higher education for work-related outcomes, a thorough consideration of the impacts of various postsecondary attainments (or lack thereof) has not yet been accomplished in the emerging research literature on the Great Recession. Almost all the extant research has focused on income and other economic outcomes, with little attention directed to worker perceptions of the quality of their jobs. This is despite research in past recessionary periods showing the importance workers assign to the features of their work (Kalleberg and Marsden 2013), such as their job security or whether they see their jobs as “careers.” Particularly in view of recent controversies surrounding the value of higher education, we view a fuller examination of the differential impacts of the Great Recession, depending on educational attainment, as imperative. In this article, we examine how educational degree attainment relates to hours of work, earnings, employment, career evaluation, and job security as the economic climate shifted from strong to tenuous. Unlike most studies that compare Bachelor's recipients with high school graduates, we examine differences within and across time among five educational groups. That is, among post-secondary degree recipients, we distinguish between Bachelor's, Associate's, or Vocational-Technical degree holders; among those without degrees, we examine both those who attempted postsecondary education (“some college”) and those who did not.

2. Data, measures, and methods

2.1. Data

The YDS began in 1988, when a random sample of ninth graders was drawn from the St. Paul, MN, public schools. U.S. Census data indicate that this site was comparable to the

nation as a whole with respect to several economic and sociodemographic indicators (Mortimer 2003). Sixty-four percent of invited parents allowed their children to participate, yielding a sample of 1,010 teenagers. Since 1988, the study has conducted 19 surveys of this cohort from middle adolescence (age 14–15) to adulthood (37–38), with excellent panel retention. About 67 to 73 percent of the original sample is included in our analyses of adult economic and occupational outcomes. This rate of inclusion is on par with the 66 to 70 percent retention rate across the four waves of analysis included below and indicative of low item non-response. (Since respondents contribute in any wave in which they provide data, the analytic sample percentage exceeds the retention rate). Panel retention in the later years of the study is not associated with numerous indicators of socioeconomic origin, delinquency, extracurricular involvement, mental health, and prior attitudes, although males and non-whites had a higher risk of survey attrition, and youth who resided in households with no family members employed in 1987 had lower retention than those in families with at least one parent employed (Mortimer 2003; Staff and Mortimer 2007). Questionnaires were initially administered in school from the ninth to twelfth grades. If the teenagers were not attending school during the days of survey administration (due to illness or dropout), questionnaires were mailed to them at their homes. Later surveys, administered near-annually, were obtained by mail. To obtain information regarding socioeconomic background, the study also conducted two mail surveys of the teenagers' parents in 1988 and 1991.

We took advantage of biennial surveys from 2005 to 2011 to model occupational outcomes by educational attainment and year around the time of the Great Recession, though several control variables come from earlier waves. According to the U.S. National Bureau of Economic Research (the official arbiter of U.S. recessions), the Great Recession began in December 2007 (NBER 2008) and lasted until June 2009 (NBER 2010). Formally, NBER defines a recession as “a significant decline in the economic activity spread across the economy, lasting more than a few months, normally visible in production, employment, real income, and other indicators” (2008:1). Focusing on one such indicator, unemployment rates, we show trends nationally and in Minnesota, since the majority of YDS respondents resided in Minnesota as young adults (approximately 80% in 2011). According to Figure 1, after a long period of relative prosperity, unemployment began rising at the start of the recession in December 2007 and reached a height in late 2009 (Bureau of Labor Statistics 2013). Though the precise timing of the recession varied to some extent across regions, the figure shows that Minnesota generally tracked the nation in entering the recession (Grunewald and Madden 2009). Minnesota and its Federal Reserve District may have recovered more quickly than other areas (Grunewald and Madden 2009), although the trend is largely similar. As the vertical bars in the figure show, our surveys allowed us to examine education and occupational outcomes in substantially different economic climates.

2.2. Measures

In each of the four surveys from 2005 to 2011, respondents were asked, “What is the highest level of education you have completed?” After collapsing the lowest and highest attainments (which characterized relatively few respondents) into adjacent groups, *educational attainment* is represented by five categories: (1) high school or less (including GED

recipients); (2) some college (with no degree attained); (3) a Vocational-Technical degree or certification; (4) an Associate's degree; and (5) a Bachelor's degree or higher. As the first column of Table 1 shows, receipt of a Bachelor's degree was the most common educational attainment at 33.3 percent of respondents across years. Some college with no degree attainment was the next most common category at 22.5 percent, followed closely by high school or less at 21.5 percent. Associate's and Vocational-Technical (Vo-tech) degrees represented the highest educational attainment among 10.2 and 12.5 percent of respondents, respectively. An advantage of examining a cohort of this age is the ability to consider occupational outcomes among those who have largely completed their educations. Table 1 also shows descriptive statistics for each of the four survey years (i.e., columns 2–5). As the percentages by year demonstrate, educational attainment was mostly static by this point. Still, given that over a third of postsecondary students nationally are now age 25 or older (Snyder and Dillow 2012), we allowed educational attainment to vary across waves in our models in order to capture respondents who may have returned to and/or completed school during this time.

In our analyses, we considered five time-varying occupational outcomes each assessed up to four times from 2005 to 2011: weekly hours worked, biweekly earnings, employment status, subjective career acquisition, and job security. Weekly *hours worked* was the sum of reported hours worked by day of the week at the respondent's primary job, with non-employed respondents coded as zero. *Biweekly earnings* were a response to the question, "How much money did you earn through paid employment during the past two weeks, including tips, commissions, and bonuses (before taxes and other deductions)?" Those who reported zero earnings were omitted. Due to skewness, we used the natural log of earnings as an outcome variable, transformed back to dollars for predicted values. Respondents were given space to write in their estimates of earnings and hours, and in the very few cases where respondents gave an earnings range (e.g., \$1,500 to \$2,000 in the past two weeks), we used the average. *Employment status* was an indicator variable for a response of "yes" to the question, "Are you currently employed?" The *career acquisition* measure referenced the respondent's subjective assessment that the current job will continue as a career. Respondents were asked, "how is your present job related to your long-term career goals?" The responses were: (1) "It is not linked to my long-term career objectives;" (2) "it provides skills or knowledge that will prepare me for my future work;" and (3) "it will probably continue as a long-term career." There was also a category for those not employed, including a small percentage of homemakers. As a binary outcome, we considered those who answered, "continue as a long-term career," relative to all other response categories. Finally, for *job security*, respondents were asked, "How secure is your primary job?" Response categories were, "not at all secure," "somewhat secure," "secure," and "very secure." Coded from 1 to 4, we treated this outcome as continuous.

In order to assess the independent effect of educational attainment, we controlled for several time-invariant and time-varying measures that have been shown to influence occupational and economic outcomes in the early career (Schoon and Silbereisen 2009; Shavit and Müller 1998). We included *gender* (1=male, 0=female), *race* (1=white, 0=non-white), *living situation* in 1988 (1=two-parent family, 0=other arrangement), and a standardized measure

of *socioeconomic background* (Cronbach's $\alpha = .81$) in 1988 (encompassing parent(s) report of total household income [ranging on a thirteen point scale from "under \$5,000" to "\$100,000 or more"] and parent(s) highest level of education [ranging on an eight-point scale from "less than high school graduation" to "Ph.D. or professional degree"]). In order to control for academic achievement and occupational orientations, we also included 1988 *grade point average* (GPA) and scales to measure *academic self-esteem*, *extrinsic motivations to work*, and *intrinsic motivations to work*.¹ Such motivations, or occupational reward values, are significant precursors of occupational attainments (Johnson and Mortimer 2011).

We also controlled for investment in work with a time-varying measure of *cumulative years of full-time work*. Such cumulative measures are commonly included in studies of status attainment (Warren, Hauser, and Sheridan 2002). Education and work represent alternative forms of investment in human capital, sometimes competing with one another. Information used to construct this measure was collected via a life history calendar that provided a monthly record, continuously collected since high school, of the respondents' work status. Controlling cumulative years of full-time work enabled us to assess whether educational attainment was important through the recession above and beyond the amount of time invested in work. Finally, we included an indicator for year, as is typical for our modeling approach, to which we now turn.²

2.3. Analytic Methods

We treated the four waves (2005, 2007, 2009, 2011) as panel data and estimated mixed effects models. Mixed effects models are more appropriate than fixed effects models in this situation, because the latter only estimate the effect of variables that vary within individuals and our main predictor of interest is largely unchanging by this point in the life course (early to late thirties). Still, the random effect allowed us to control for individual-level variation in each of the outcomes; that is, the person-specific average on each outcome. For the three continuous outcomes, we used linear mixed effects models fit with the *xtreg* procedure in Stata 14.0. For the two binary outcomes, we used generalized mixed effects models with a logit link fit with the *xtlogit* procedure. With this specification in Stata, an advantage was that respondents were able to contribute to any wave in which they participated, unlike listwise deletion across all waves. For example, for employment status, 738 respondents (73.1% of the original sample) contributed an average of 3.2 waves each (of the four). Job security, which only included those currently employed, had 679 respondents (67.2%) contributing an average of 3.0 waves each.³

¹Each scale is the result of a confirmatory factor analysis. Academic self-esteem (range 2.9–14.3) includes three questions capturing the individual's self-evaluation regarding intelligence, reading ability, and general ability in school, in comparison with other students of the same age. Extrinsic work values (range 10.4–26.3) uses measures of the importance of "good pay," "a steady job with little chance of getting laid off," "good chances of getting ahead," and "a job that people regard highly." Intrinsic work values (range 8.2–24.8) measure the importance of "be helpful to others or useful to society," "to work with people rather than things," "to make my own decisions at work," "to learn a lot of new things at work," "a job where I have a lot of responsibility," and "a job that uses my skills and abilities." The questions for work motivations are each on four-point scales from 1 = "not at all" to 4 = "extremely" important.

²We excluded time-varying measures for parenthood and marital status due to the potential for endogenous selection bias (see Elwert and Winship 2014). The results are unchanged when parenthood and marital status are included in the mixed effects models.

³Models for employment status, career acquisition, and weekly hours worked included all respondents; models for job security and biweekly earnings only included those currently employed.

Given the increasing presence of females in higher education (see, e.g., Wilson, Zozula, and Gove 2011) and the persistent differences between men and women in labor market outcomes (see, e.g., Campbell and Pearlman 2013), we investigated gender differences in returns to varying educational credentials. In estimating the outcomes for each educational attainment category by year both before and during the recessionary period, we included the respective two-way interactions between education, year, and gender in each model.⁴ Where i represents the individual, t is the observation, and with a normally distributed random effect represented by u_i , the mixed effects model yields the following equation:

$$\begin{aligned}
 Y_{it} = & \beta_0 + \beta_1(\text{SES})_i + \beta_2(\text{Male})_i + \beta_3(\text{White})_i + \beta_4(\text{Two-parent})_i + \beta_5(\text{GPA})_i \\
 & + \beta_6(\text{Academic self-esteem})_i + \beta_7(\text{Extrinsic work values})_i \\
 & + \beta_8(\text{Intrinsic work values})_i + \beta_9(\text{Years FT work})_{it} + \beta_{10}(\text{Education})_{it} \\
 & + \beta_{11}(\text{Year})_{it} + \beta_{12}(\text{Education})_{it}(\text{Year})_{it} + \beta_{13}(\text{Education})_{it}(\text{Male})_i \\
 & + \beta_{14}(\text{Year})_{it}(\text{Male})_i + u_i + e_{it}.
 \end{aligned}$$

The coefficients for the main effects and the interaction, however, were of relatively little substantive or statistical interest, as they test whether the difference-in-difference was significant between a very specific baseline and a given educational attainment, gender, and year combination. Instead, our interest lies in (1) whether any given educational attainment category experienced significant gains or losses between the years, and (2) whether the differences between educational categories within year were significant. We can assess these tests using the post-estimation *margins* procedure in Stata. We utilized this procedure in three respects. First, we used it to compute the predicted values for each of our outcomes by educational attainment and year and then depicted these values graphically. Second, we used the command to compute the pairwise differences and significance of each of the between and within education by year comparisons. Third, we used the command to determine if the differences between males and females in these pairwise comparisons were significant. When using this post-estimation command for biweekly earnings, we also used the exponential function within the *expression* option in order to transform the predicted values, differences, and statistical tests back to the original dollar scale.

3. Results

3.1. Weekly Hours Worked

Table 2 shows the results of the mixed effects models. We begin with the three outcomes that are typically studied in the economic literature on signaling and sheep skin effects (hours, earnings, and employment status). Model 1 shows the results for weekly hours worked. As mentioned above, the coefficients of the main effects and interactions were not the main focus, but rather the predicted values that emerge from these estimates and the differences between the predicted values. Thus, we show the average marginal effects of the predictors in Table 2 in order to best capture the average effects for the variables included in the interaction in a single number. Among the controls, whites and those living with both

⁴We could not estimate a three-way interaction due to sparse data.

parents in the freshman year of high school worked on average 2.7 ($p < .05$) fewer hours and 2.2 ($p < .05$) more hours, respectively.⁵ An increase of one cumulative year of full-time work resulted in an increase of 1.9 hours worked per week ($p < .001$). The average marginal effects reveal advantages for men, working 4.6 more hours per week than women, and those with Associate's and Bachelor's degrees, working 6.1 and 6.9 hours more than those with a high school diploma, respectively ($p < .001$). The year coefficients show that relative to 2005, respondents worked 3.1, 7.8, and 10.3 fewer hours in 2007, 2009, and 2011, respectively ($p < .001$).

In order to understand the interactive effect, we show these education and year trends for hours worked graphically in Figure 2. Our figures do not include confidence intervals because with five categories, the overlap of confidence intervals would render the figure difficult to interpret. Instead, we show the test associated with the confidence intervals in Tables 3 and 4. Table 3 shows the difference between educational attainment categories within each year, while Table 4 shows the differences within each educational attainment category between years. In each figure, all other predictors are held constant at their respective means. Figure 2 shows that all groups experienced decreased hours worked as the recession hit. Comparing the first wave in 2005 to the last wave in 2011 in Table 4, respondents with Bachelor's or Associate's degrees experienced similar reductions in hours. Those with Bachelor's degrees underwent a reduction of 8.9 hours per week ($p < .001$) from 40.3 to 31.4, while those with Associate's degrees saw a reduction of 8.8 hours ($p < .001$) from 39.1 to 30.3. Those with a Vocational-Technical degree experienced a sizable 15.2 hour decrease per week ($p < .001$); they were initially indistinguishable from the other two postsecondary attainers and essentially full-time at 38.5 hours, decreasing to 23.4 hours by 2011. Among those without postsecondary degrees, those who attempted college but did not finish had their hours reduced on average by 11.3 ($p < .001$) from 35.7 to 24.4, while those who did not attempt college saw a reduction of 9.6 ($p < .001$) from 34.5 to 24.9.

These reductions were not as pronounced for the Associate's and Bachelor's recipients, represented both in the marginal effects discussed above and the gap in hours compared to those with other educational attainments each year in Table 3. For example, in 2007 before the recession, those with Associate's or Bachelor's degrees worked 5.4 ($p < .05$) and 5.0 ($p < .01$) more hours per week, respectively, relative to the some college respondents. By 2011 in the aftermath of the recession, the Associate's and Bachelor's recipients were working 5.8 ($p < .05$) and 7.0 ($p < .001$) more hours per week, respectively, compared to non-completers. On the other hand, those with Vo-tech degrees, some college, and high school or less were not significantly different in hours worked in 2011, with the largest gap only 1.5 hours. Thus, all groups experienced a recession-induced reduction in hours worked, but important between-group differences still persisted, such that Associate's and Bachelor's recipients were relatively advantaged.

⁵The effect of being white, though non-significant, is positive in models without any other predictors included. When education and years of full-time work are added, the effect becomes negative due to differences in educational attainment and work experience by race, explaining the anomalous significant effect.

Considerable between-gender differences emerged for hours worked. These gender-specific trends are shown in Figure 3.⁶ The between-year, within-education differences tell a similar story as that reported for the whole sample. The hours reduction experienced by each education group from 2005 to 2011 is nearly the same for women and men, with the between-gender comparison not statistically significant. Instead, the important differences for women and men emerge in the between-group education comparisons. For men, the advantages for Bachelor's recipients are large, statistically significant, and persistent across all years, with the advantage of the Associate's more tempered. The advantage for the female Bachelor's and Associate's holders does not emerge until after the recession hits, each working significantly more hours than the other education categories in 2011.

3.2. Biweekly Earnings

Next, we examined biweekly earnings, shown in Model 2 of Table 2. Given the logged outcome, we can interpret the exponentiated coefficient as the percent change in earnings given a one-unit increase in a given predictor. Cumulative years of full-time work were again significant, such that those higher by one year had earnings 8.5 percent higher ($[e^{0.082} - 1] * 100\% = 8.5\%$, $p < .001$). Earlier academic ability and extrinsic work values also significantly predicted earnings, with a one-unit increase in GPA associated with a 2.8 percent increase in earnings ($p < .05$) and extrinsic motivations to work resulting in a 3.1 percent increase ($p < .001$). According to the average marginal effects, males' earnings were 27.0 percent higher than females ($p < .001$). The coefficients for year show that earnings were lower after the start of the recession. Compared to 2005, earnings were 10.5 percent lower in 2009 ($p < .01$) and 17.0 percent lower in 2011 ($p < .001$). The coefficients for the education categories show that there is, on average, an earnings advantage for all education categories relative to those with a high school diploma or less, though larger in magnitude for the Associate's and Bachelor's recipients.

Figure 4 depicts predicted earnings by educational attainment and year, transformed back into the original dollar scale and with all other predictors held constant at their means. Unlike the other four outcomes examined, the advantage and disadvantage of the highest and lowest educational attainment categories, respectively, is prominent for earnings. According to Table 3, the earnings of those with Bachelor's degrees were significantly higher relative to every other attainment category in each of the four years. On the other hand, those with a high school diploma or less typically had significantly lower earnings compared to the other attainment categories each year. Though higher in each wave, we did not observe a significant advantage of the Associate's degree relative to some college in earnings for the sample as a whole, but note an advantage for women (described later).

A considerable advantage of the Associate's degree did emerge when examining the between-year differences in Table 4. Unlike the some college attainment group, no between-year comparison for Associate's degree recipients was significantly different; this group was relatively unharmed by the recession in terms of earnings. We observed similar results for the Bachelor's recipients, again confirming the "sheep skin" advantage to both two- and

⁶For all outcomes, the gender-specific pairwise comparisons are shown in analogous tabular form in the Online Appendix Tables A and B, with significant differences noted in italics.

four-year college completion. By comparison, the loss in earnings was significant for each of the other groups, particularly when comparing the most economically prosperous year of 2007 to the aftermath of the recession in 2011. Between 2007 and 2011, those with some college but no degree experienced a \$230 decrease in earnings ($p < .05$) from \$1398 to \$1168. Those with a high school diploma or less saw a \$354 decrease ($p < .001$) from \$1239 to \$885. Finally, we again observed large losses for those with a Vo-tech degree. Prior to the recession, their earnings were nearly equivalent to those with an Associate's degree (predicted difference of only \$35.60 in 2007, n.s.). From 2007 to 2011, however, they experienced a \$546 loss in earnings ($p < .001$) from \$1563 to \$1017.

For earnings, the differences in the pairwise comparisons for women and men were the most apparent among the outcomes, as shown in Figure 5. As is clearly depicted, male Bachelor's recipients have a sizable earnings advantage over that of the other educational attainment groups, with every such comparison significant in each year and ranging from \$714 (vs. Vo-tech in 2007, $p < .05$) to \$1363 (vs. High school or less in 2005, $p < .001$). For women, those gaps are also significant but lower in magnitude, with one important exception. The Associate's and Bachelor's comparisons for women are non-significant across the observation period. As the figure shows, the earnings for female recipients of these two postsecondary degrees closely track one another and never significantly decrease. Unlike men, the female Associate's holders have significantly higher earnings than the vocational-technical, some college, and high school or less categories in all years, with the exception of Vo-tech in 2007. Thus, much of the advantage of the Associate's degree for earnings appears to be confined to women. In fact, no between-year comparison is significant for women with Associate's degrees, unlike men who see a significant reduction in earnings. Though clearly advantaged overall, male Bachelor's holders also experience a significant reduction in earnings, while women do not. The same is true of those who attempted college but did not finish. On the other hand, those with Vo-tech degrees and high school diplomas experience significant decreases for both men and women.⁷

3.3. Employment Status

Model 3 in Table 2 predicts employment status from 2005 to 2011. Among the control variables, a one year increase in cumulative years of full-time work increased the odds of being employed by 37.3 percent ($[e^{0.318} - 1] * 100\% = 37.4\%$, $p < .001$). Table 2 also shows that the average marginal effect of an Associate's and Bachelor's degree translates to a likelihood of employment 7.4 and 5.4 times higher, respectively, than for those with a high school diploma or less ($p < .001$). The average marginal effects of year show steadily decreasing odds of employment across the observation period.

⁷In unlisted analyses we examined whether the decline in biweekly earnings was due more to a decline in hours or a decline in hourly wages. We found that the effects of education on hourly wages (i.e., earnings/hours) did not vary by time or gender (i.e. none of the interactions were significant when models were compared via likelihood ratio tests). For those with a Bachelor's, Associate's, and Some college, the trends were stable, with slight decreases for the Vo-tech and High school or less groups after 2007. Thus, for those who were employed, hourly wages showed little movement. Instead, as our models for hours demonstrate, employers reduced worker hours in the face of the recession. Such a pattern manifests itself in real income as opposed to hourly wages, as our models for biweekly earnings demonstrate. Models for hourly wages are available upon request.

To understand the educational attainment by year effect, we turn to Figure 6. The odds of employment for those with an Associate's or Bachelor's degree were typically the highest each year, with predicted probabilities above 95 percent. Thus, the most apparent result is the insulation from the recession that these degrees afforded in terms of employment, as both groups were relatively unscathed. As the between year comparisons in Table 4 show, none of the slight shifts were statistically significant for those with an Associate's degree. Bachelor's degree recipients saw a small statistically significant decrease over the period from 2005 to 2011 of 2.5 percentage points ($p < .05$). Yet as the figure shows, these two groups are virtually indistinguishable; the between group comparisons in Table 3 show that the probabilities of employment for two- and four-year college graduates range from a percentage point difference of $-.01$ to $.01$ (n.s.). Thus, respondents with either of these qualifications weathered the recession very well in terms of remaining employed.

Holders of the remaining postsecondary attainment, a Vo-tech degree, showed a distinct trend. In 2005, the odds of employment for Vo-tech degree recipients were not significantly different from those with an Associate's or Bachelor's degree at 99.2 percent. As Table 3 shows, the odds of employment for those with a Vo-tech degree in 2005 were 4.8 percentage points and 2.3 percentage points higher than those with only a high school diploma or some college, respectively ($p < .05$). At the height of the recession in 2009, however, the odds of employment for those with Vo-tech certification dropped precipitously by 22 percentage points relative to 2007 prior to the recession ($p < .001$) to 74.8 percent. Promisingly though, those with Vo-tech degrees rebounded rather quickly by 2011, with the odds of employment increasing by 11 percentage points (n.s.) to 86.3 percent.

Those with no postsecondary degrees, whether attempting college or not, did not experience the insulation provided by an Associate's or Bachelor's degree or the recovery of those with a Vo-tech degree, as shown in Figure 6 and Table 4. Unlike the uptick experienced by the Vo-tech group, those who did not go to college experienced a negative trend from 2007 to 2011 in the probability of employment, dropping by 8 percentage points from 93.2 percent to 84.9 percent, though this decrease is only marginally significant. For those who attempted but did not complete college, the recessionary effects were not felt in earnest until 2011. From 2007 to 2011, the odds of employment for the some college group decreased by 13 percentage points ($p < .01$) from 95.9 percent to 82.7 percent. As shown in Table 3, such non-completers were significantly less likely to be employed in 2011 than those who completed either Associate's or Bachelor's degrees ($p < .01$) by about 14 percentage points.⁸

3.4. Career Acquisition

We now turn to those subjective outcomes that are absent from the literature on sheep skin effects, but might nevertheless be affected by educational qualification in a similar manner and vary across the recession. Subjective career acquisition is shown in Model 4 of Table 2. As with employment status, a one year increase in cumulative full-time work increased the probability of considering one's job a career by 25.7 percent ($p < .001$). Additionally, a one-

⁸Unlike the first two outcomes, when separated by gender, there are few statistically significant differences between men and women for the pairwise comparisons presented in Tables 3 and 4 for employment status, career acquisition, and job security, and thus are not shown. These figures and tables by gender are included in the Online Appendix.

unit increase in GPA and extrinsic motivations to work increased the likelihood of subjective career acquisition 10.1 percent ($p < .05$) and 7.0 percent ($p < .05$), respectively. The average marginal effect for gender shows 72.3 percent higher odds of career acquisition for males than females ($p < .01$). Also like employment status, the average marginal effects demonstrate higher odds of career acquisition for those with an Associate's degree (OR=3.42, $p < .001$) and a Bachelor's degree (OR=3.46, $p < .001$), relative to those with a high school diploma. The odds of considering one's job a career are lower in 2009 (OR=0.55, $p < .001$) and 2011 (OR=0.51, $p < .001$) relative to 2005.

The education by year effect with all other variables held constant at their means is shown in Figure 7, which resembled the employment figure with some notable exceptions. Again, those with an Associate's or Bachelor's degree had higher predicted probabilities than the other educational attainment groups. Those with Associate's degrees saw relatively little movement in the odds of considering their job a career, such that no between year comparisons were statistically significant, though there was a noticeable uptick to 70.7 percent in 2011. While no adjacent wave differences were significant for those with Bachelor's degrees according to Table 4, the 15 percentage point difference between the first wave in 2005 and the final wave in 2011 was significant ($p < .05$). Still, those with either of these two qualifications were clearly in an advantageous position relative to the other groups after the recession. In 2009 and 2011 as shown in Table 3, the odds of subjective career acquisition were significantly higher for those with Associate's or Bachelor's degrees relative to the other three educational attainment categories, while the latter three were not significantly different from one another.

The recession-induced gap was partially due to the within-group decreases among those in the Vo-tech, some college, and high school or less educational attainment categories. From 2007 to 2009 (Table 4), the odds of career acquisition for those with a Vo-tech degree and some college but no degree decreased by 32 ($p < .01$) and 21 ($p < .05$) percentage points, respectively. Again, those with Vo-tech degrees were similar to those with Associate's and Bachelor's degrees prior to the recession in 2007, but experienced a large drop in 2009. Though non-significant, the downward trend reversed for the Vo-tech category in 2011, while continuing to decrease among those without postsecondary degrees. From 2007 to 2011 those with some college and a high school diploma experienced total decreases of 28 ($p < .001$) and 21 ($p < .05$) percentage points, respectively.

3.5. Job Security

According to Model 5 in Table 2, none of the controls were significant for job security. Overall, individuals expressed the highest job security in 2007 right before the recession, and the lowest in 2009 at the recession's height. Among the comparisons to those with a high school degree or less, only those with some college and no degree are higher ($p < .001$), but they are no different than the other 3 categories.

The pattern in Figure 8 reveals that each of the educational categories other than high school or less expressed high job security during the most economically prosperous year of 2007. As Table 3 shows for 2007, these four categories were significantly higher than those with only a high school diploma by about 0.22 to 0.38 ($p < .05$), but not significantly different

from one another. We observed a pervasive recessionary effect. In 2009 during the height of the recession, respondents with all four educational attainments expressed a much lower level of job security such that no education comparison is significant in this year. When examining this change (2009 vs. 2007) within groups in Table 4, we see that this decrease was statistically significant for each of the four groups except high school or less. By 2011, there was a noted increase in expressed job security among those four categories (statistically significant, $p < .05$, for the some college and Bachelor's groups), with all but one of the between-group effects remaining non-significant in that year (Table 3). Thus, in terms of job security, those with a high school diploma, GED, or less were much lower than those with postsecondary education (even those with no degree attainment) in 2007, but the recession (2009) and post-recession (2011) resulted in expressed job security levels on par for all groups. By 2011, however, job security had not rebounded to its pre-recession level. Interestingly, even with the positive trends observed from 2009 to 2011, the most favored workers, those who had attained Associates' and Bachelors' degrees, felt less secure in 2011 than they did before the recession in 2007.

3.6 Occupation and Industry by Educational Attainment

To further illuminate some of the economic differences by educational attainment, in Table 5 we list the most common occupation and industry (based upon Census codes) for each educational group for respondents' jobs in 2007, the year prior to the recession. For those with Bachelor's degrees or higher, we find the field of education to constitute the most common industry, with 19 percent of such individuals employed in either elementary, secondary, or higher education. The most common occupations, elementary/middle school teachers (4%) and managers (4%), represent relatively secure positions, especially compared to those commonly held by respondents with some college. Those with some college but no degrees appeared to be in particularly vulnerable occupational locations. Human resource specialists (5%), an O*NET category (13-1071.00) largely concerned with screening, recruiting, interviewing, and placing workers,⁹ would be especially prone to recessionary cuts as hiring subsidies. The other most commonly held occupation for those with some college was first-line supervisor in retail sales (5%), a sector that is also quite sensitive to recessionary conditions. Lowest in the educational spectrum, those with a high school diploma (or less) were employed in industries hard hit by the recession, namely construction (6%) and restaurant and food service (6%). Cashier was their most common occupation (6%), followed by sales representative.

Among the Associate's degree holders, the two most common occupations (police officer and registered nurse, constituting 9% each) were relatively recession-proof. Associate's degree holders were also clustered in a more common subset of industries than other degree holders. For instance, the top two industries (hospitals, justice) together employed 25 percent of all Associate's degree recipients. The Vo-tech holders, by contrast, were commonly employed in a less secure health-related occupation (home health aide), with secretaries and administrative assistants in second place. Trucking, the top industry for Vo-tech holders, is also quite sensitive in recessionary periods to decreasing demand for goods.

⁹See <http://www.onetonline.org/link/summary/13-1071.00>.

While we caution that these results are descriptive in nature, we nonetheless find some evidence for less secure positions prior to the recession for the Vo-tech group relative to the Associate's group that help us understand some of the differences we observed in our mixed effects models.

4. Discussion

Recent difficulties of college graduates in the labor market have prompted uncertainty and debate about the value of a college education. The school-to-work transition has become more prolonged and uncertain for recent cohorts, regardless of their educational attainments, when compared with their mid-twentieth century counterparts who moved quickly from school to work (usually after having received a high school degree). In view of the high cost of education for youth, their families, and society, the relationship between educational attainment and occupational outcomes in recessionary periods deserves systematic scrutiny. Some young people invest heavily in post-secondary education in four-year colleges and universities, delaying careers but heightening prospects for eventual economic return and other elements of occupational success. Other young people obtain post-secondary vocational degrees, technical certifications, and Associate's degrees. We took advantage of data collected before, during, and in the aftermath of the recent Great Recession in an attempt to understand the longer-term effects of educational attainments, which were hypothesized from the literature on sheep skin effects to signal certain worker qualifications to employers and to provide long-term benefits. The work-related consequences of educational attainments were robust to controls for other variables found to be important in the occupational attainment literature, in particular cumulative investment in work. While results were largely consistent between men and women, we did find some limited support for more negative effects of the recession on males, but this was confined to hours and earnings.

As our findings demonstrated, no educational qualification can completely shield individuals from the negative impacts of an economic downturn. All educational groups perceived lower job security and had reduced hours of work in 2009. Yet, those with a Bachelor's or Associate's degree were able to maintain high levels of employment and a high probability of viewing their jobs as a career, while women with these credentials also experienced no significant reductions in earnings. Further, even though experiencing losses in weekly hours worked, those with these two postsecondary degrees maintained higher levels of work hours relative to the other educational attainment categories.

Importantly, given the large numbers of young people who start but do not finish college (Knapp et al. 2010), we find that the economic outcomes of such individuals are not as favorable as those with Bachelor's and Associate's degrees, and that these differences persisted or were exacerbated by the recession. Given high school students' overwhelming preference to go to college and to pursue four-year degrees, rather than to seek Associate's degrees (Reynolds et al. 2006), it is particularly startling to find that the latter route has better outcomes on each measure than attending, but not finishing, college. Further, we find that for workers in their thirties, the payoffs to an Associate's degree are nearly equivalent to a Bachelor's degree across each outcome except males' earnings. These equivalencies

persisted even in a turbulent economic climate. Thus, individuals who earn Bachelor's and Associate's degrees may send similar signals to prospective employers that they have the talent, motivation, and perseverance to finish their coursework and earn their college degree, and that they can use (or continue to use) these cognitive and non-cognitive abilities in the workplace.

Those who had a Vocational-Technical degree experienced unique trajectories over the course of the observation period relative to the other educational categories. Prior to the recession, they were typically on par with those with an Associate's or Bachelor's degree on most outcomes. Positioned in occupations and industries, however, that are more sensitive to recessionary periods, this group was hit particularly hard by the recession, with sharp reductions across all outcomes. Yet, we also note that while those who did not have a postsecondary degree continued to experience losses in 2011 (after the official end of the recession) on most outcomes, those with a Vo-tech degree saw either a stabilization or increase on several outcomes. While we urge caution in the face of statistical non-significance, these trends are at least promising relative to the two attainment categories without postsecondary degrees.

This study is not without limitations. First, we examined a cohort that in 2005 was just entering their thirties; as a result, we cannot make claims about educational attainment and occupational outcomes in recessionary and non-recessionary periods among younger or older individuals. Our respondents experienced the school-to-work transition during relatively stable economic times and had largely completed their educational attainment by 2005. In some ways, however, the age of the YDS respondents is an advantage, since younger individuals may respond to difficulties in the job market quite differently, for example, by returning to school. Those who do not may experience economic losses during a recession that are more severe than for older workers. We strongly urge future research on the effects of the recession on those exiting secondary and postsecondary education, including dropping out of college. Conversely, we also encourage research on cohorts who are older than the YDS respondents, as age discrimination in hiring may make recovery harder for those workers who are laid off at older ages. Yet even though the vast majority of YDS participants were past the school-to-work transition (but still young enough to be favored in the labor market), we still found significant differences among educational attainment categories that were intensified during the recent recessionary period.

Though we find that persons achieving "intermediate" degrees – Associates' degrees and vocational-technical certification – exhibit clear advantages in the labor market, we cannot address the mechanisms through which this might occur in either stable or turbulent economic times. Our data does not permit us to examine the curricula and skills provided by these intermediate educational programs that might shape economic outcomes; we encourage collection of such information in future research. From the employer side, we cannot investigate whether the returns to educational credentials in varying economic periods are due to perceived or real technical or "soft" skills of employees, other unobservables, or the differential symbolic and cultural values of degrees and certificates. Thus, we also urge future research that investigates what educational attainments mean to

employers, and whether they have different worth to employers in good and poor economic times.

Second, the YDS began with a community sample, selected from local public high schools in St. Paul, Minnesota. Educational attainment may be truncated, as the sample did not include students who attended private or parochial schools, and residents of the Twin Cities metropolitan area have somewhat higher levels of educational attainment than the nation at large. Our sample size produced few individuals with the highest (graduate degrees) and lowest (less than high school completion) educational attainments. Furthermore, the mostly white panel (71.4%) represented the ethnic/racial composition of the St. Paul community in the late 1980s. Finally, the last data point in our time series is just two years following the official end of the Great Recession, a time when many families continued to experience difficulties. Future assessment of this cohort is necessary to fully understand educational differences in patterns of recovery as the economy improved.

Despite these limitations, the YDS's longitudinal data enabled us to examine the long-term effect of educational attainment on multiple occupational outcomes over a period of time that spanned the years before, during, and in the aftermath of the Great Recession. Moreover, the YDS's prospective measures of socioeconomic background, academic ability, work orientations, and work experience (collected on 15 survey occasions from ages 18–19 to 37–38), allowed us to more confidently assess the independent effect of educational attainment on these occupational outcomes. In addition, the detailed measurement of educational attainment allowed comparison of Bachelor's, Associate's, and Vo-tech degree recipients, as well as differences between those who terminated their educations with high school or just some college. The YDS's prospective assessment of degree attainment over such a long period of time is especially important given the sizable increase in postsecondary students age 25 or older (Snyder & Dillow, 2012).

This research confirms the well-recognized advantages of Bachelor's degree recipients, manifest even in quite difficult economic times, and the severe disadvantages of those who do not undergo any post-secondary education. But more important, this study contributes to our understanding of the consequences of what might be seen as "intermediate" educational attainments. Grouping those who receive Associate's degrees, those who receive Vocational-Technical certification, and those who start, but do not finish, college all together (or some combination thereof) as "some college," or gauging such individuals only by the duration of their post-secondary education (e.g., in years), precludes understanding of the distinct value of these increasingly prevalent educational attainments. This is particularly important given the lack of a "sheep skin" for college dropouts. This study adds to prior research indicating the economic value of Associate's degrees (De Alva and Schneider 2013; Kalogrides and Grodsky 2011; 2012; Kane and Rouse 1995; Zaback, Carlson, and Crellin 2012). Strikingly, we found no differences in any year between Bachelor's and Associate's degree holders with respect to any of the outcomes under consideration other than earnings (Table 3), even when separated by gender (Online Appendix Table A). In fact, earnings differences were confined to males; that is, female Associate's and Bachelor's holders had similar earnings. The lack of Associate's and Bachelor's differences would appear to be especially surprising for employment, given widespread assumptions about the

beneficial character of the four-year college degree. Even holders of Vocational-Technical certification, who suffered a large recession-linked loss, exhibited a slight rebound in employment by 2011, while those without any postsecondary degrees continued to suffer decline across the outcomes.

This research also demonstrates the disadvantages of those who only obtain some college, without completing a degree. In many respects, their outcomes were no different from those who did not attempt to obtain any education beyond high school, indicating that they may signal similar qualifications in the labor market. Of 20 tests of differences between the two non-degree groups (four years times five outcomes), just 4 were statistically significant, better than chance but clearly not suggesting pervasive advantage for the some college group. Pre-recession (in 2007) and post-recession (in 2011), those with some college perceived more job security than those who did not attempt college. Those with some college also experienced higher biweekly earnings in 2009 and 2011, notably only after the recession struck. This general lack of difference between those who attempted college and those who did not persisted even when separated by gender.

These findings indicate the importance of mechanisms to decrease the likelihood of educational floundering during the school-to-work transition, given the large number of students who start, but do not complete, educational degree programs, and to protect young people from the vicissitudes of a challenging economy. Well-designed career and technical education programs in high schools could enhance vocational development and heighten the likelihood that students will enter higher educational programs that correspond to their interests and talents. Students with lower academic ability may be especially benefited by career and technical curricula, as they may heighten engagement in the classroom, foster the crystallization of career goals, and promote educational aspirations that will help to achieve them (Plank, DeLuca, and Estacion 2008). Vocational and technical curricula in high schools may be of even greater importance now than in a prior era when teenagers were more likely to have paid part-time jobs that exposed them to the workplace and offered opportunities for vocational development (Mortimer 2003; Zimmer-Gembeck and Mortimer 2006). The collapse of the teenage labor market has severely limited such exposure (Smith 2011; Staff, et al. 2014). High school guidance counselors might also encourage those not going on to a four-year college to consider acquiring an Associate's or Vo-tech degree.

For institutions of higher education, methods to retain potential dropouts or to persuade them to continue at a two-year institution could help deflect young adults from a pattern of floundering that occurs after terminating higher education without receiving a degree (Vuolo et al. 2014). Undergraduate academic advisers might, in their discussions with those who are considering dropping out, emphasize the poor economic outcomes, including the sensitivity to labor market trends, for those who drop out of college and do not obtain alternative certification.

In conclusion, the present research illuminates the impact that educational floundering, resulting in the absence of a sheep skin, may have on occupational and economic well-being in adulthood, particularly in times of recession. The analyses presented in this paper reaffirm the value of four-year college degrees, especially in the aftermath of the "Great Recession,"

but also show that alternative degree programs and certificates confer considerable benefit for those who achieve them.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The Youth Development Study was supported by grants, "Work Experience and Mental Health: A Panel Study of Youth," from the National Institute of Child Health and Human Development (HD44138) and the National Institute of Mental Health (MH42843). Jeremy Staff is grateful for the support he received during the writing of this manuscript from a Mentored Research Scientist Development Award in Population Research from the National Institute of Child Health and Human Development (HD054467). The funding sources had no role in the research conducted in this article. The findings and conclusions in this report are those of the authors and do not represent the views of the sponsors. The authors would like to thank Shannon Fleishman and Chen-Yu Wu for research assistance.

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Highlights

- Value of college education increasingly questioned during Great Recession.
- Panel models test occupational outcomes by educational attainment during recession.
- Bachelor's and Associate's holders better off than those with some or no college.
- Vocational-technical degree holders hit hard by recession but rebound or stabilize.
- Perils of starting but not finishing post-secondary education demonstrated.



Figure 1.
National and Minnesota unemployment rates (vertical lines represent YDS waves)

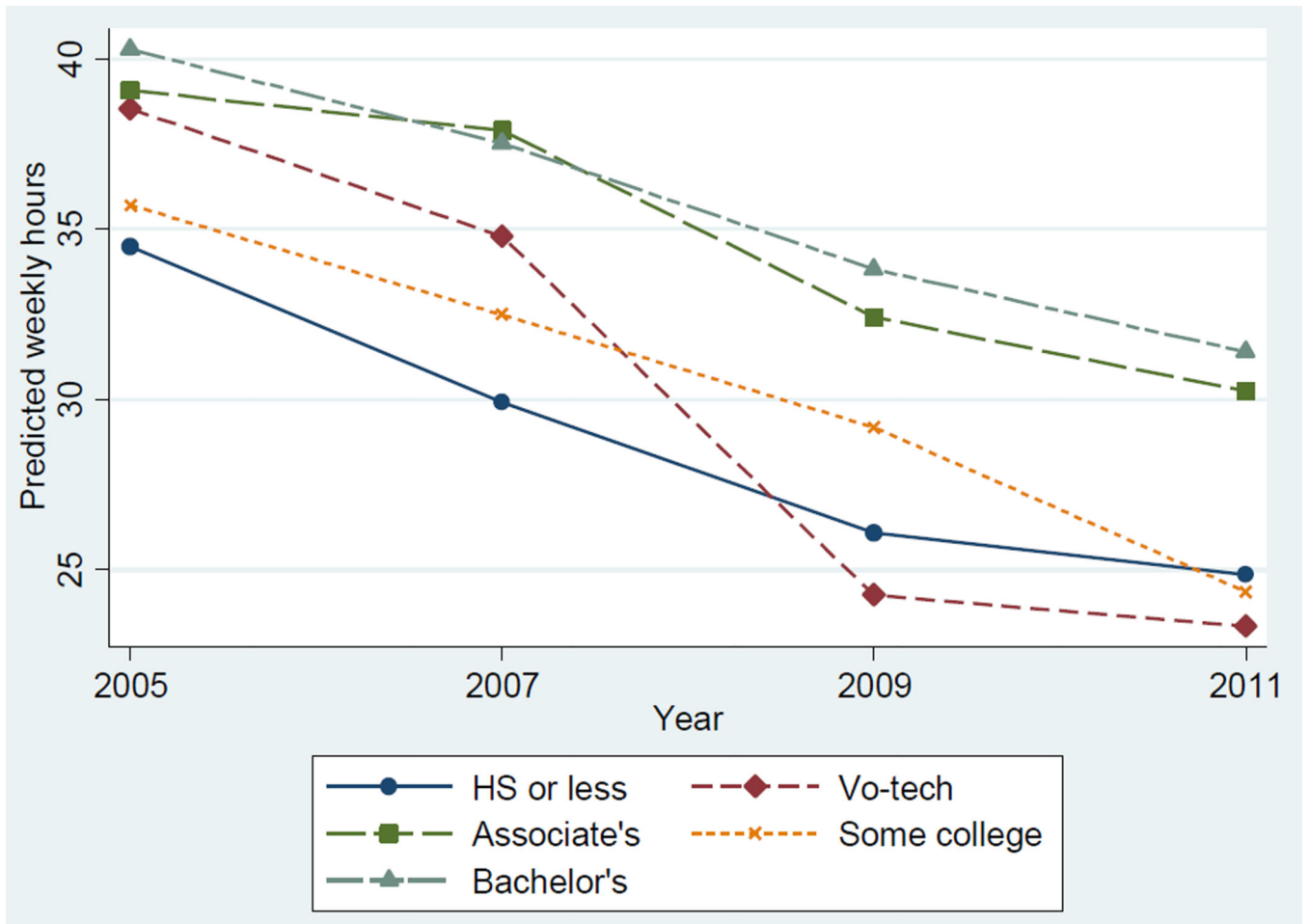


Figure 2.
Predicted Weekly Hours Worked by Educational Attainment and Year from Table 2, Model 1

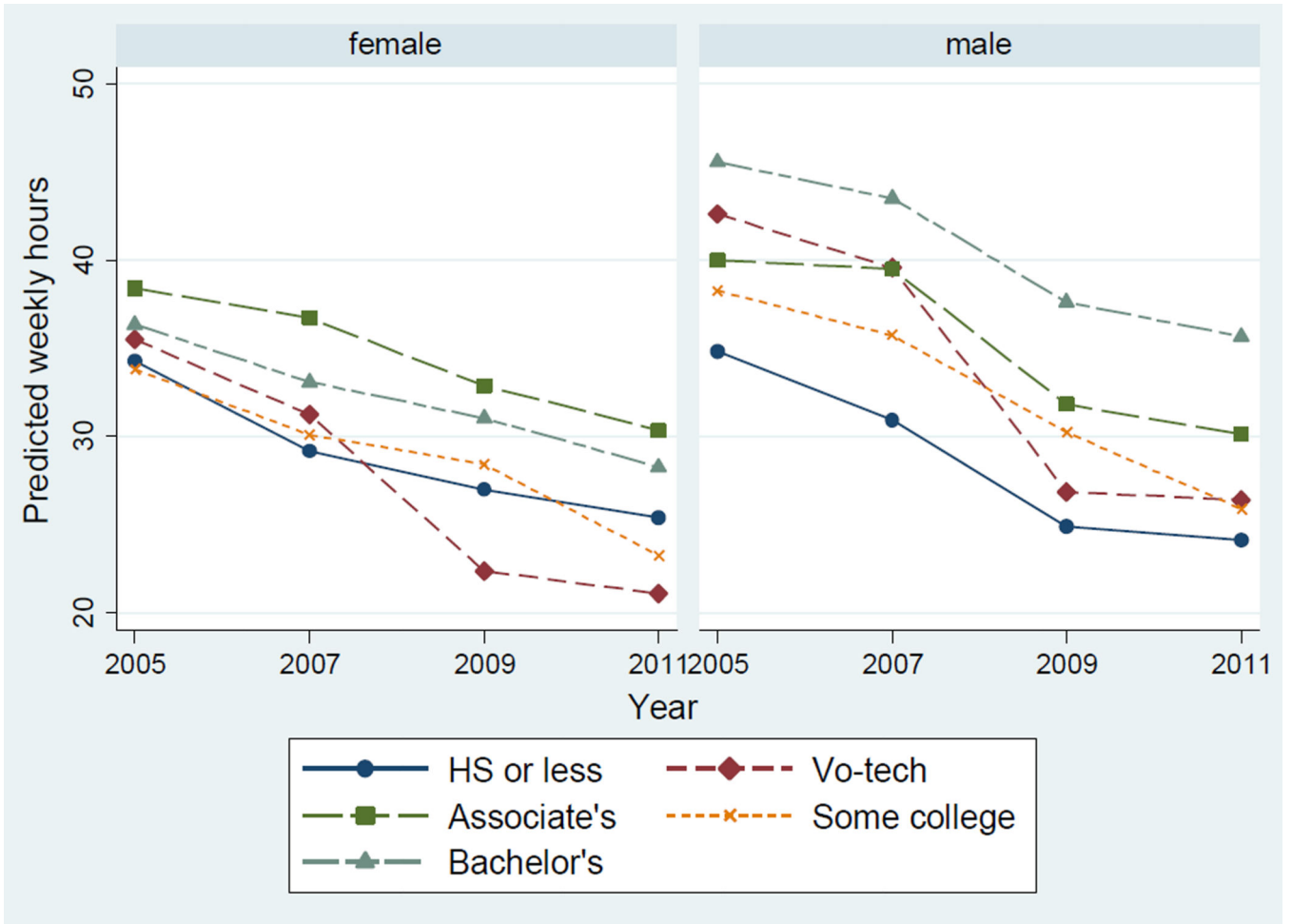


Figure 3. Predicted Weekly Hours Worked by Educational Attainment, Year, and Gender from Table 2, Model 1
Note: See Appendix Tables A and B for pairwise comparisons and significant gender differences.

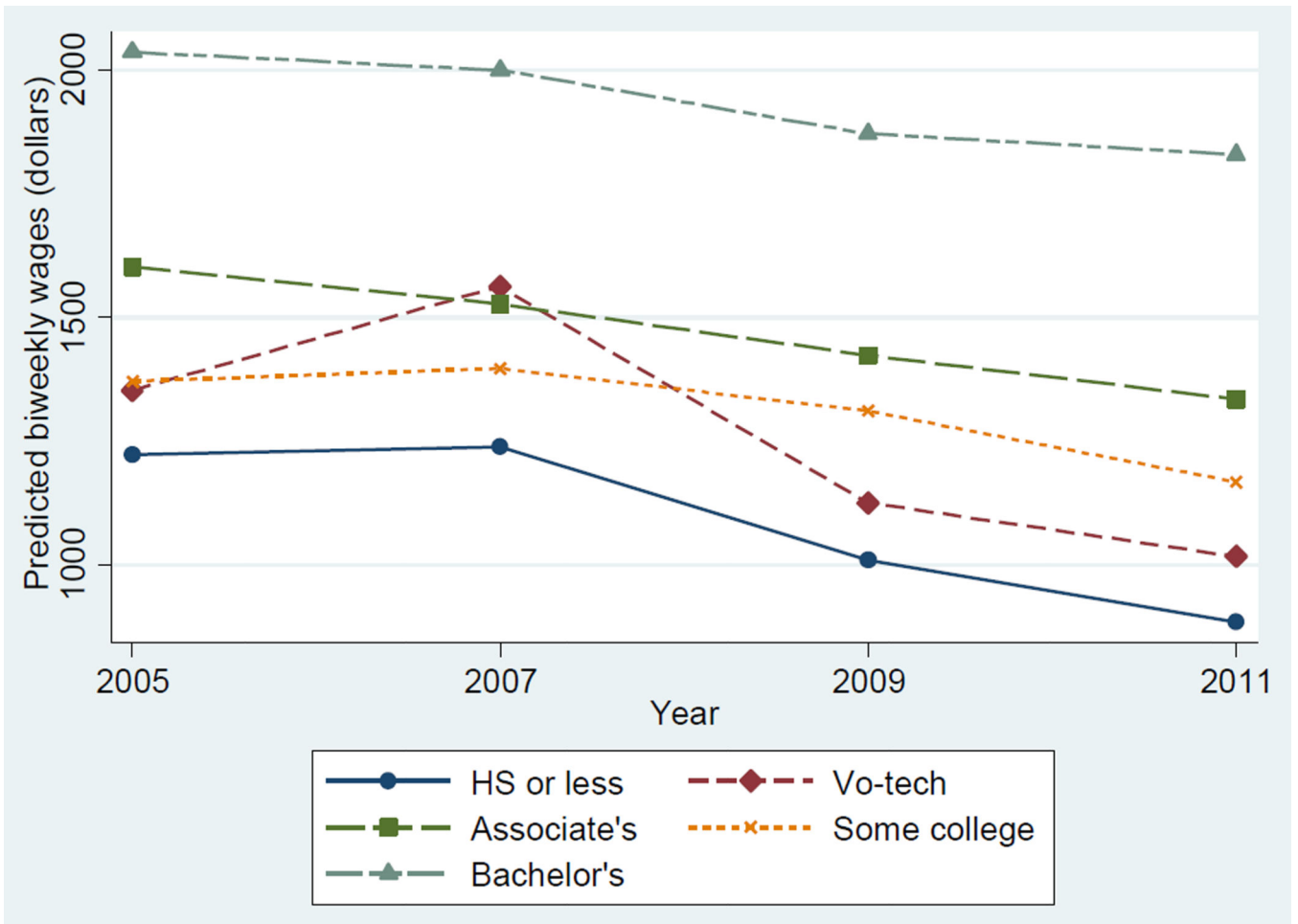


Figure 4.
 Predicted Biweekly Earnings by Educational Attainment and Year from Table 2, Model 2
Note: Exponentiated values from model with logged outcome depicted.

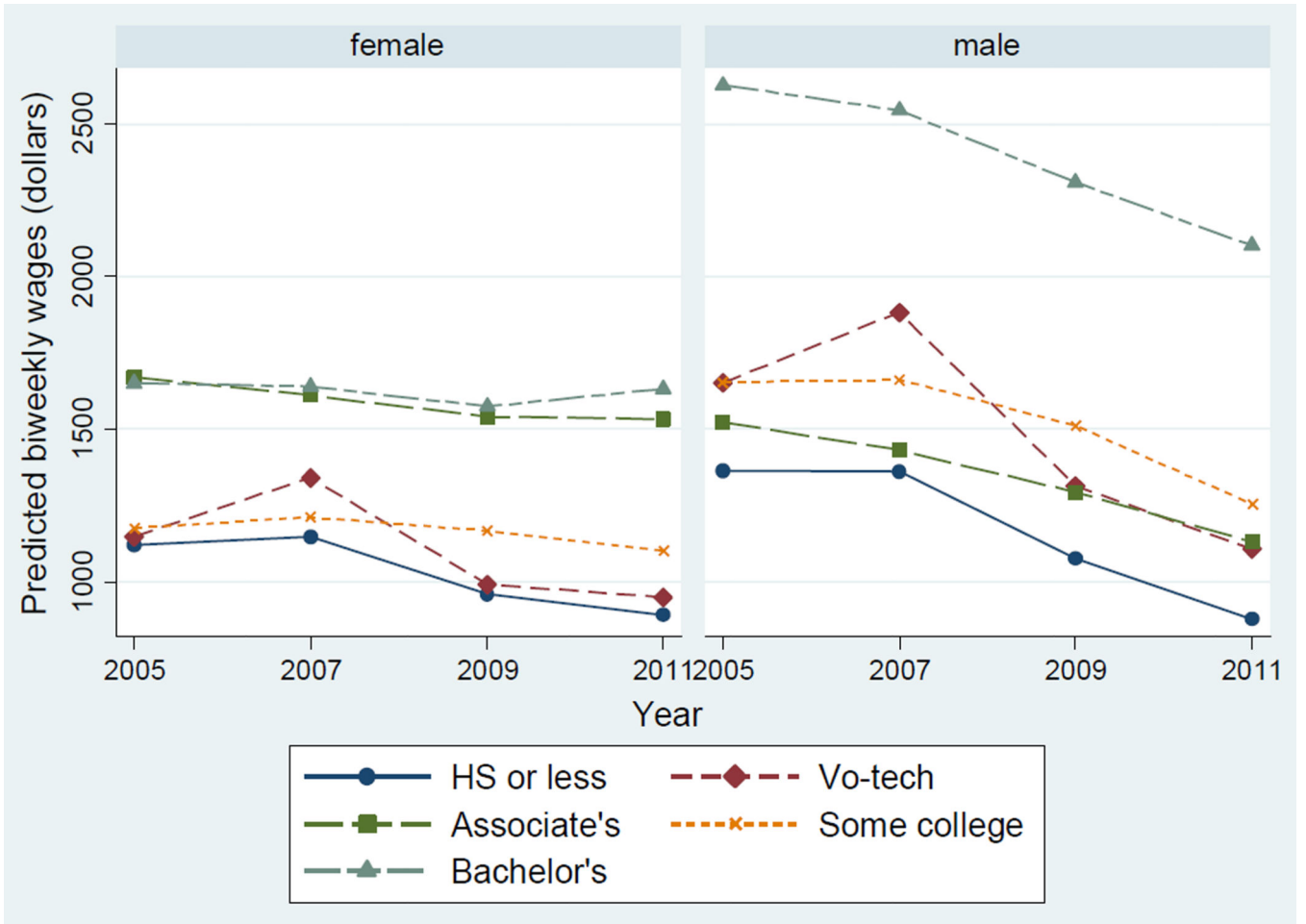


Figure 5.
 Predicted Biweekly Earnings by Educational Attainment, Year, and Gender from Table 2 Model 2
Note: Exponentiated values from model with logged outcome depicted. See Appendix Tables A and B for pairwise comparisons and significant gender differences.

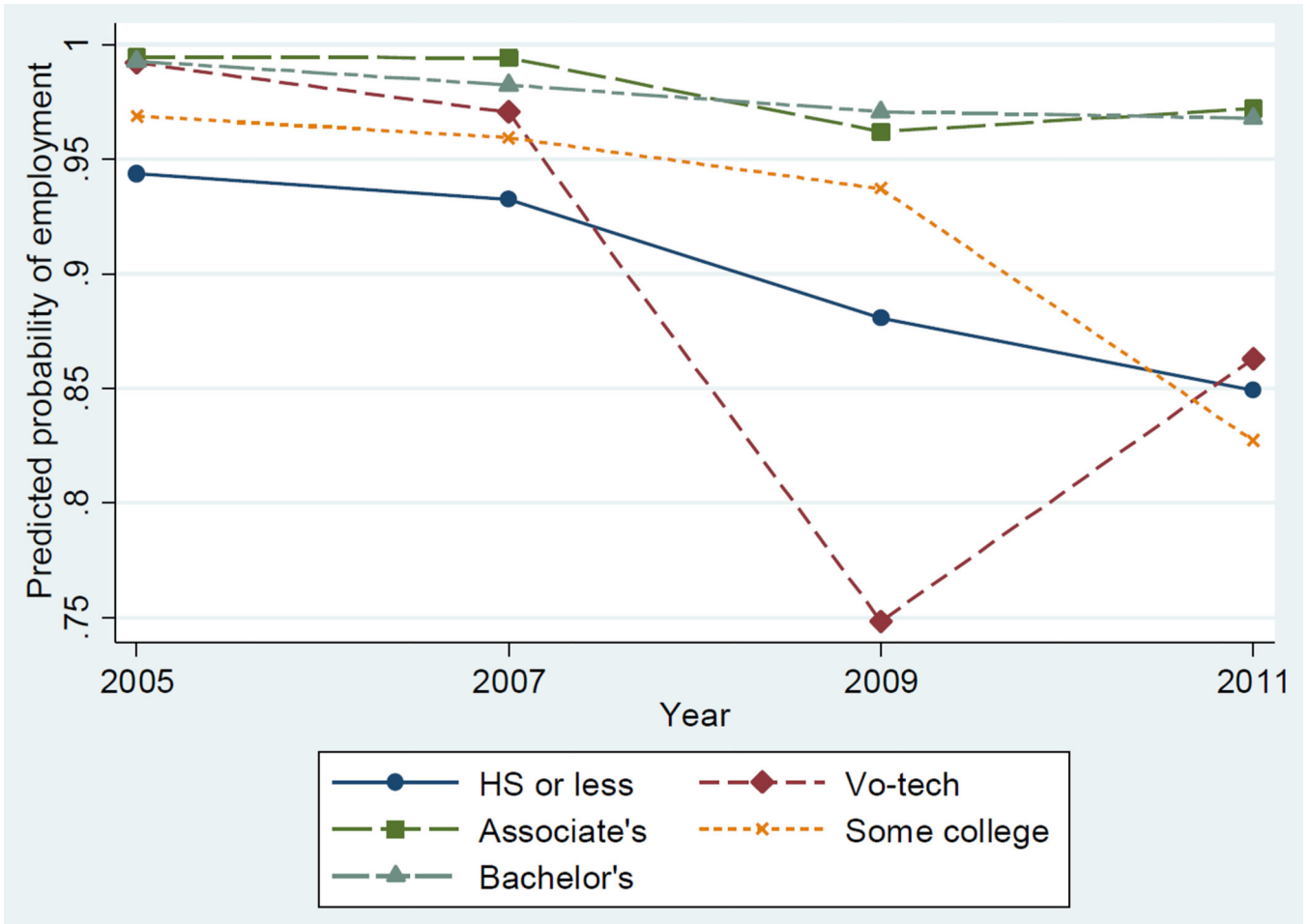


Figure 6. Predicted Probability of Employment by Educational Attainment and Year from Table 2, Model 3

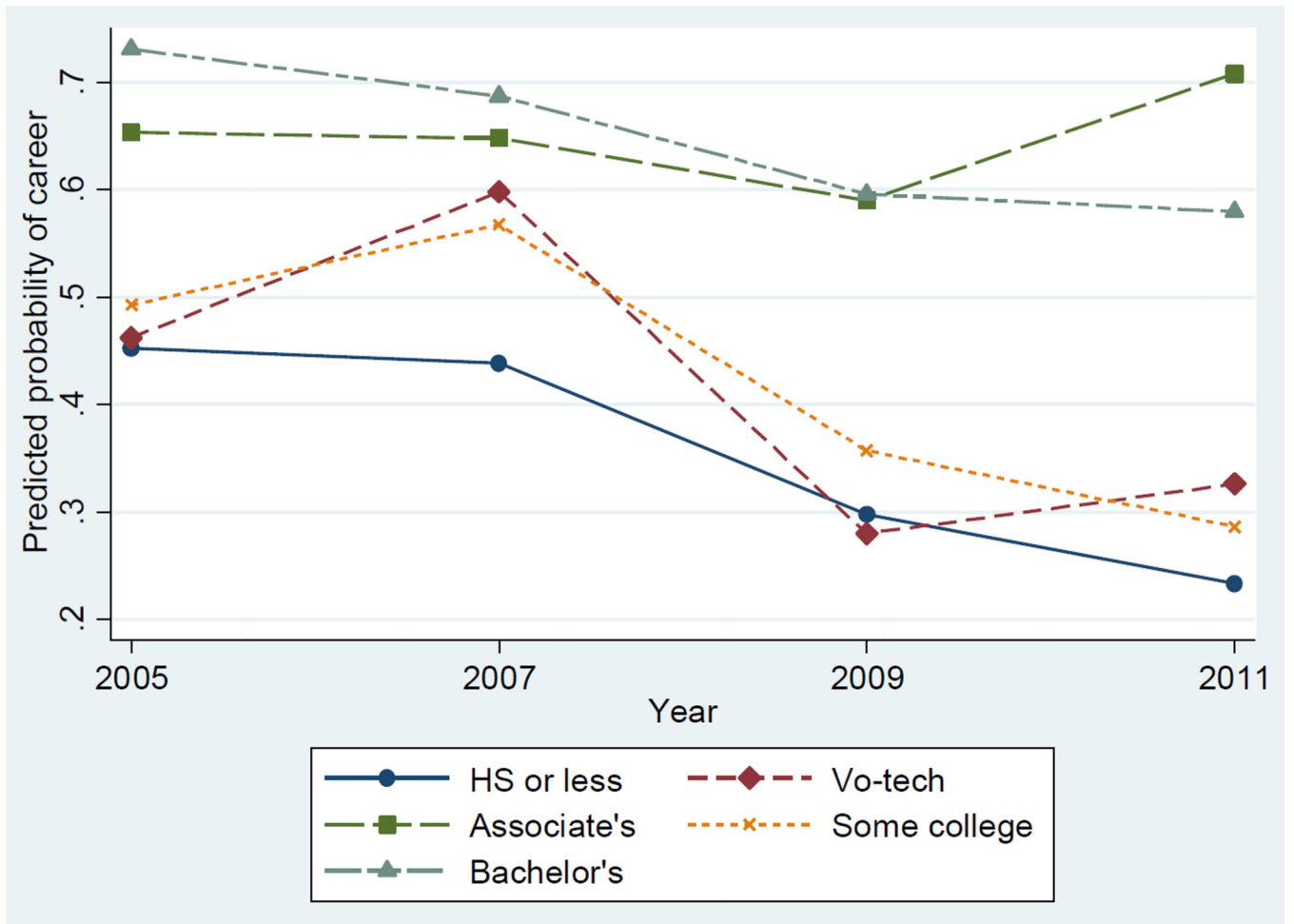


Figure 7. Predicted Probability of Subjective Career Acquisition by Educational Attainment and Year from Table 2, Model 4

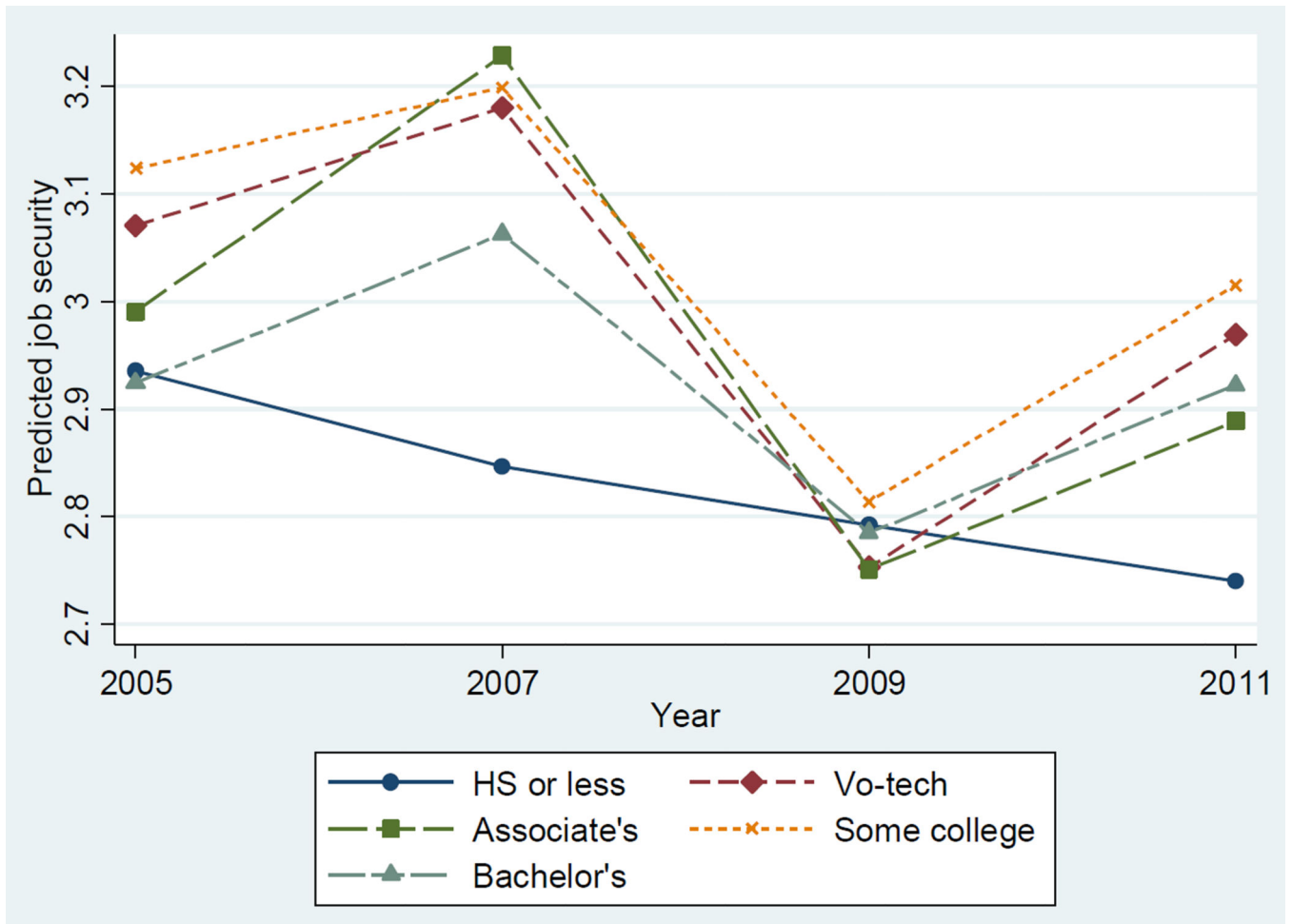


Figure 8.
 Predicted Job Security by Educational Attainment and Year from Table 2, Model 5

Table 1

Descriptive Statistics, Pooled and by Year

Variable	Percentage or Mean (S.D.) Pooled	Percentage or Mean (S.D.) 2005	Percentage or Mean (S.D.) 2007	Percentage or Mean (S.D.) 2009	Percentage or Mean (S.D.) 2011
Parental SES	0.00 (1.00)	—	—	—	—
Gender: Male	47.7%	—	—	—	—
Race: White	71.4%	—	—	—	—
Living situation: two-parent family	68.4%	—	—	—	—
GPA	6.48 (2.42)	—	—	—	—
Academic self-esteem	9.91 (1.79)	—	—	—	—
Extrinsic motivations to work	22.50 (3.37)	—	—	—	—
Intrinsic motivations to work	19.59 (3.32)	—	—	—	—
Cumulative Years of FT work	10.0 (4.9)	8.1 (3.8)	9.4 (4.4)	10.6 (4.9)	11.9 (5.5)
Educational Attainment					
High school or less	21.5%	22.3%	22.9%	21.2%	19.3%
Vocational/Technical degree	12.5%	13.4%	12.9%	11.4%	11.7%
Associate's degree	10.2%	8.5%	10.9%	10.9%	10.6%
Some college, no degree	22.5%	23.1%	20.8%	22.4%	23.8%
Bachelor's degree	33.3%	32.2%	32.5%	34.1%	34.7%
Weekly hours worked	31.80 (19.40)	33.21 (17.57)	32.95 (20.68)	30.47 (19.23)	30.96 (19.87)
Biweekly earnings	2114.81 (4354.94)	1722.74 (1862.25)	2334.64 (6814.76)	2190.40 (3158.38)	2247.85 (3926.69)
Employed	83.1%	85.2%	85.7%	80.1%	81.0%
Subjective career acquisition	49.7%	47.5%	53.3%	47.0%	51.0%
Job security	2.94 (0.87)	2.95 (0.85)	3.06 (0.87)	2.80 (0.87)	2.94 (0.85)

Table 2

Marginal Effects from Mixed Effects Models for Economic Outcomes

	Model 1: Weekly Hours Worked	Model 2: Biweekly Earnings (Logged)	Model 3: Employment Status	Model 4: Subjective Career Acquisition	Model 5: Job Security
	B (S.E.)	B (S.E.)	B (S.E.)	B (S.E.)	B (S.E.)
Parental SES	1.015 (0.520)	0.040 (0.027)	0.197 (0.149)	0.058 (0.106)	-0.024 (0.031)
Gender: Male	4.604*** (0.960)	0.239*** (0.050)	0.328 (0.287)	0.544** (0.196)	0.031 (0.057)
Race: White	-2.678* (1.110)	-0.076 (0.058)	-0.542 (0.309)	0.345 (0.225)	0.098 (0.066)
Living situation: two-parent family	2.238* (1.025)	0.003 (0.016)	0.418 (0.273)	0.030 (0.207)	0.094 (0.062)
GPA	0.183 (0.231)	0.028* (0.012)	0.109 (0.061)	0.096* (0.047)	0.012 (0.031)
Academic self-esteem	-0.476 (0.292)	-0.004 (0.016)	-0.043 (0.078)	-0.043 (0.060)	0.001 (0.018)
Extrinsic motivations to work	0.105 (0.153)	0.031*** (0.008)	0.019 (0.042)	0.068* (0.031)	0.010 (0.009)
Intrinsic motivations to work	0.169 (0.160)	-0.010 (0.008)	-0.002 (0.045)	-0.009 (0.032)	0.012 (0.009)
Cumulative Years of FT work	1.862*** (0.109)	0.082*** (0.006)	0.318*** (0.031)	0.229*** (0.025)	0.012 (0.007)
Educational Attainment (vs. HS or less)					
Vocational/Technical degree	1.474 (1.482)	0.145* (0.073)	0.549 (0.370)	0.260 (0.299)	0.167 (0.087)
Associate's degree	6.060*** (1.625)	0.305*** (0.078)	2.008*** (0.519)	1.230*** (0.325)	0.139 (0.091)
Some college, no degree	1.602 (1.285)	0.189** (0.063)	0.432 (0.324)	0.305 (0.257)	0.211** (0.075)
Bachelor's degree	6.899*** (1.444)	0.578*** (0.074)	1.681*** (0.405)	1.242*** (0.296)	0.094 (0.085)
Year (vs. 2005)					
2007	-3.184*** (0.824)	0.011 (0.033)	-0.594* (0.261)	0.042 (0.158)	0.093* (0.041)
2009	-7.813*** (0.867)	-0.111** (0.038)	-1.490*** (0.262)	-0.598*** (0.170)	-0.208*** (0.046)
2011	-10.307*** (0.923)	-0.187*** (0.043)	-1.704*** (0.275)	-0.680*** (0.188)	-0.082 (0.052)
Random effect (s.d.)	8.890 (0.429)	0.513 (0.020)	1.352 (0.189)	1.779 (0.144)	0.0567 (0.023)
Log-likelihood	-10005.542	-1805.839	-730.591	-1338.040	-2327.266
Model chi-squared (<i>df</i> = 36)	388.54***	358.88***	164.76***	167.02***	88.03***
<i>N</i> , average waves per participant	737, 3.2	675, 2.8	738, 3.2	736, 3.2	679, 3.0

* *p* < .05,

Note: All models contain the respective two-way interactions between gender, educational attainment, and year.

p < .001 (two-tailed)

p < .01,
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Table 3

Educational Attainment Between-Group, Within-Year Pairwise Comparisons

	Model 1: Weekly Hours Worked	Model 2: Biweekly Earnings	Model 3: Employment Status	Model 4: Subjective Career Acquisition	Model 5: Job Security
2005					
Vo-tech vs. HS or less	4.041 (2.226)	129.62 (127.17)	0.048* (0.020)	0.010 (0.106)	0.135 (0.119)
Associate's vs. HS or less	4.581 (2.602)	378.80* (163.83)	0.051* (0.020)	0.201 (0.116)	0.055 (0.135)
Some college vs. HS or less	1.210 (1.957)	147.75 (113.19)	0.025 (0.021)	0.040 (0.094)	0.188 (0.107)
Bachelor's vs. HS or less	5.771** (1.966)	812.68*** (146.22)	0.049* (0.020)	0.278** (0.088)	-0.011 (0.109)
Associate's vs. Vo-tech	0.540 (2.776)	249.18 (172.21)	0.003 (0.006)	0.191 (0.124)	-0.080 (0.138)
Some College vs. Vo-tech	-2.831 (2.186)	18.13 (125.77)	-0.025* (0.012)	0.031 (0.104)	0.053 (0.112)
Bachelor's vs. Vo-tech	1.730 (2.185)	683.06*** (156.98)	0.001 (0.005)	0.269** (0.098)	-0.146 (0.114)
Some College vs. Associate's	-3.371 (2.536)	-231.05 (159.05)	-0.026* (0.012)	-0.161 (0.112)	0.133 (0.126)
Bachelor's vs. Associate's	1.190 (2.508)	433.88* (182.06)	-0.002 (0.005)	0.078 (0.104)	-0.067 (0.127)
Bachelor's vs. Some College	4.561* (1.821)	664.93*** (138.43)	0.024* (0.011)	0.238** (0.080)	-0.200 (0.097)
2007					
Vo-tech vs. HS or less	4.866* (2.306)	323.59* (147.41)	0.038 (0.027)	0.159 (0.112)	0.334** (0.123)
Associate's vs. HS or less	7.979*** (2.461)	287.98 (151.30)	0.062* (0.025)	0.209 (0.113)	0.382** (0.128)
Some college vs. HS or less	2.569 (2.041)	158.22 (121.59)	0.027 (0.027)	0.129 (0.098)	0.353*** (0.110)
Bachelor's vs. HS or less	7.600*** (1.985)	760.45*** (145.87)	0.050* (0.025)	0.248** (0.093)	0.217* (0.109)
Associate's vs. Vo-tech	3.113 (2.686)	-35.60 (174.74)	0.024 (0.016)	0.050 (0.123)	0.048 (0.136)
Some College vs. Vo-tech	-2.297 (2.309)	-165.37 (149.69)	-0.011 (0.021)	-0.031 (0.110)	0.019 (0.119)
Bachelor's vs. Vo-tech	2.734 (2.252)	436.87* (171.92)	0.012 (0.016)	0.089 (0.105)	-0.117 (0.119)
Some College vs. Associate's	-5.410* (2.432)	-129.77 (151.22)	-0.035* (0.017)	-0.081 (0.109)	-0.030 (0.123)
Bachelor's vs. Associate's	-0.378 (2.346)	472.47** (168.82)	-0.012 (0.008)	0.039 (0.102)	-0.166 (0.120)
Bachelor's vs. Some College	5.031** (1.909)	602.24*** (144.86)	0.023 (0.017)	0.120 (0.087)	-0.136 (0.102)
2009					
Vo-tech vs. HS or less	-1.828 (2.503)	115.94 (125.86)	-0.133 (0.090)	-0.018 (0.102)	-0.039 (0.146)

	Model 1: Weekly Hours Worked	Model 2: Biweekly Earnings	Model 3: Employment Status	Model 4: Subjective Career Acquisition	Model 5: Job Security
Associate's vs. HS or less	6.323* (2.552)	414.14** (140.36)	0.081 (0.045)	0.292** (0.114)	-0.041 (0.135)
Some college vs. HS or less	3.096 (2.076)	301.64** (106.86)	0.056 (0.044)	0.060 (0.089)	0.022 (0.114)
Bachelor's vs. HS or less	7.731*** (2.041)	861.70*** (130.96)	0.090* (0.042)	0.299*** (0.090)	-0.007 (0.114)
Associate's vs. Vo-tech	8.151** (2.859)	298.20 (159.37)	0.214* (0.087)	0.310* (0.124)	-0.002 (0.156)
Some College vs. Vo-tech	4.925* (2.449)	185.70 (130.98)	0.189* (0.086)	0.077 (0.101)	0.061 (0.139)
Bachelor's vs. Vo-tech	9.560*** (2.401)	745.77*** (151.39)	0.222** (0.086)	0.316** (0.102)	0.032 (0.139)
Some College vs. Associate's	-3.226 (2.468)	-112.50 (142.73)	-0.025 (0.031)	-0.233* (0.112)	0.063 (0.126)
Bachelor's vs. Associate's	1.408 (2.405)	447.57** (161.23)	0.009 (0.025)	0.006 (0.112)	0.034 (0.124)
Bachelor's vs. Some College	4.635* (1.886)	560.06*** (133.81)	0.034 (0.025)	0.239** (0.087)	-0.029 (0.101)
2011					
Vo-tech vs. HS or less	-1.504 (2.524)	132.43 (111.44)	0.014 (0.076)	0.093 (0.104)	0.230 (0.142)
Associate's vs. HS or less	5.386* (2.592)	450.71*** (131.56)	0.123* (0.055)	0.475*** (0.105)	0.149 (0.138)
Some college vs. HS or less	-0.494 (2.104)	283.07** (99.23)	-0.022 (0.069)	0.053 (0.081)	0.276* (0.120)
Bachelor's vs. HS or less	6.541** (2.080)	944.66*** (123.96)	0.119* (0.054)	0.346*** (0.087)	0.183 (0.119)
Associate's vs. Vo-tech	6.890* (2.859)	318.28* (144.22)	0.109 (0.063)	0.382** (0.123)	-0.081 (0.149)
Some College vs. Vo-tech	1.010 (2.432)	150.65 (115.39)	-0.036 (0.076)	-0.040 (0.104)	0.046 (0.133)
Bachelor's vs. Vo-tech	8.045*** (2.396)	812.23*** (137.78)	0.105 (0.062)	0.254* (0.109)	-0.047 (0.132)
Some College vs. Associate's	-5.880* (2.465)	-167.64 (132.92)	-0.145** (0.053)	-0.421*** (0.102)	0.127 (0.126)
Bachelor's vs. Associate's	1.155 (2.409)	493.95** (151.73)	-0.004 (0.023)	-0.128 (0.106)	0.034 (0.123)
Bachelor's vs. Some College	7.035*** (1.871)	661.58*** (125.70)	0.140** (0.052)	0.293*** (0.083)	-0.093 (0.103)

Table 4

Educational Attainment Within-Group, Between-Year Pairwise Comparisons

	Model 1: Weekly Hours Worked	Model 2: Biweekly Earnings	Model 3: Employment Status	Model 4: Subjective Career Acquisition	Model 5: Job Security
High school or less					
2007 vs. 2005	-4.576** (1.736)	15.73 (87.47)	-0.011 (0.025)	-0.014 (0.085)	-0.089 (0.095)
2009 vs. 2005	-8.398*** (1.782)	-213.77* (84.41)	-0.063 (0.038)	-0.155 (0.082)	-0.144 (0.102)
2011 vs. 2005	-9.632*** (1.839)	-338.72*** (82.53)	-0.094 (0.049)	-0.219** (0.081)	-0.196 (0.108)
2009 vs. 2007	-3.822* (1.785)	-229.50* (83.87)	-0.052 (0.039)	-0.141 (0.083)	-0.055 (0.100)
2011 vs. 2007	-5.057** (1.846)	-354.45*** (83.65)	-0.083 (0.050)	-0.206* (0.082)	-0.107 (0.107)
2011 vs. 2009	-1.234 (1.847)	-125.95 (74.32)	-0.032 (0.053)	-0.064 (0.075)	-0.052 (0.107)
Vocational/Technical					
2007 vs. 2005	-3.751 (2.231)	209.70 (128.25)	-0.021 (0.015)	0.136 (0.109)	0.110 (0.112)
2009 vs. 2005	-14.268*** (2.339)	-227.45 (120.17)	-0.244** (0.084)	-0.182 (0.104)	-0.318* (0.131)
2011 vs. 2005	-15.178*** (2.372)	-335.91** (110.06)	-0.129* (0.060)	-0.136 (0.110)	-0.101 (0.127)
2009 vs. 2007	-10.517*** (2.369)	-437.15** (134.56)	-0.222** (0.083)	-0.318** (0.109)	-0.428*** (0.135)
2011 vs. 2007	-11.427*** (2.391)	-545.61*** (125.55)	-0.108 (0.059)	-0.272* (0.114)	-0.211 (0.129)
2011 vs. 2009	-0.910 (2.431)	-108.46 (111.00)	0.115 (0.090)	0.046 (0.105)	0.217 (0.138)
Associate's					
2007 vs. 2005	-1.178 (2.609)	-75.08 (155.31)	-0.001 (0.006)	-0.005 (0.113)	0.238 (0.125)
2009 vs. 2005	-6.657* (2.626)	-178.43 (154.82)	-0.033 (0.022)	-0.063 (0.118)	-0.240 (0.129)
2011 vs. 2005	-8.827*** (2.678)	-266.80 (157.46)	-0.023 (0.020)	0.055 (0.116)	-0.102 (0.132)
2009 vs. 2007	-5.478* (2.473)	-103.35 (142.18)	-0.032 (0.023)	-0.058 (0.113)	-0.478*** (0.121)
2011 vs. 2007	-7.649** (2.511)	-191.72 (141.34)	-0.022 (0.020)	0.060 (0.110)	-0.340** (0.122)
2011 vs. 2009	-2.171 (2.475)	-88.38 (135.39)	0.010 (0.027)	0.118 (0.112)	0.138 (0.121)
Some college					
2007 vs. 2005	-3.217 (1.714)	26.20 (99.11)	-0.009 (0.017)	0.075 (0.085)	0.075 (0.091)
2009 vs. 2005	-6.512*** (1.703)	-59.88 (96.11)	-0.032 (0.023)	-0.136 (0.082)	-0.310*** (0.092)
2011 vs. 2005	-11.336*** (1.731)	-203.39* (97.17)	-0.141** (0.049)	-0.206** (0.081)	-0.108 (0.098)

	Model 1: Weekly Hours Worked	Model 2: Biweekly Earnings	Model 3: Employment Status	Model 4: Subjective Career Acquisition	Model 5: Job Security
2009 vs. 2007	-3.295 (1.727)	-86.08 (98.13)	-0.022 (0.024)	-0.210* (0.082)	-0.385*** (0.092)
2011 vs. 2007	-8.119*** (1.745)	-229.59* (98.65)	-0.132** (0.049)	-0.281*** (0.081)	-0.183 (0.097)
2011 vs. 2009	-4.824** (1.678)	-143.52 (89.50)	-0.110* (0.050)	-0.071 (0.074)	0.202* (0.092)
Bachelor's					
2007 vs. 2005	-2.747* (1.353)	-36.49 (106.31)	-0.010 (0.006)	-0.044 (0.054)	0.139* (0.067)
2009 vs. 2005	-6.439*** (1.376)	-164.74 (109.77)	-0.022* (0.010)	-0.135* (0.058)	-0.139* (0.069)
2011 vs. 2005	-8.863*** (1.426)	-206.74 (114.90)	-0.025* (0.012)	-0.151* (0.063)	-0.002 (0.073)
2009 vs. 2007	-3.692** (1.341)	-128.25 (103.81)	-0.012 (0.010)	-0.091 (0.060)	-0.278*** (0.066)
2011 vs. 2007	-6.116*** (1.816)	-170.25 (106.46)	-0.015 (0.012)	-0.107 (0.063)	-0.141* (0.069)
2011 vs. 2009	-2.424 (1.336)	-42.00 (97.87)	0.003 (0.013)	-0.016 (0.064)	0.138* (0.066)

* $p < .05$,

** $p < .01$,

*** $p < .001$ (two-tailed)

Note: For logistic models, the difference in predicted probability is displayed. For earnings, values and tests are for exponentiated difference and thus in original dollar scale.

Table 5

Most Common Occupations and Industries in 2007 by Education

High school or less	Vocational-technical	Associate's	Some college, no degree	Bachelor's degree or higher
<i>Occupation (% of total)</i>				
Cashiers (6%)	Home health aides (6%)	Police officers (9%)	Human resource specialists (5%)	Elementary or middle school teachers (4%)
Sales reps, wholesale and manufacturing (4%)	Secretaries and admin assistants (6%)	Registered nurses (9%)	First-line supervisors, retail sales (5%)	Managers, other (4%)
<i>Industry (% of total)</i>				
Construction (6%)	Truck transportation (8%)	Hospitals (16%)	Banking (7%)	Elementary and secondary schools (11%)
Restaurant/other food service (6%)	Hospitals (8%)	Justice, public order (9%)	Hospitals (7%)	Colleges and universities (8%)

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