Jobs Before College Completion and Career Building of Young Workers Through Job Switching*

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Abstract

We analyze job switching and wage growth of young workers, separately considering the jobs experienced by workers before and after college completion. These two groups of jobs consist of very different occupational compositions. Workers with many jobs before college completion and with little or no job experiences before college completion have similar subsequent wage paths. These facts can be interpreted that jobs before college completion contribute less to career building compared to the ones after college completion. If we disregard all jobs before college completion, the number of jobs that are experienced by workers before age 35 are about three jobs fewer than the total number of jobs.

Keywords: job mobility, jobs before college completion, life cycle
JEL Classifications: E24, J31, J62

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1 Introduction

In the U.S. labor market, switching jobs is an important part of workers' career building. Hall (1982), using data from the Current Population Survey over the 1960s and 1970s, estimates that the average worker experiences more than 10 jobs over his working life. This job switching behavior is particularly important for young workers: in Hall's (1982) study, nearly seven jobs are experienced by the age of 35. Furthermore, a well-known study by Topel and Ward (1992), using the Longitudinal Employer-Employee Data over 1957–1972, documents that in the first 10 years after entering the labor force, a young male worker experiences about seven jobs on average.

The studies of Hall (1982) and Topel and Ward (1992) have had a large influence on subsequent studies on earning dynamics, many of which confirm that job mobility plays an important role in earnings dynamics and other life-cycle decisions.[1] Evidence from various datasets support that workers on average experience wage gains when they move to new jobs.[2] In macroeconomic models of the worker life cycle, such as Esteban-Pretel and Fujimoto (2014), Jung and Kuhn (2015), and Menzio et al. (2016), job switching over the life cycle is one of the important ingredients in accounting for labor market dynamics. In particular, the fact that young workers experience many jobs is highlighted in these studies.

In this paper, we investigate what part of this job switching behavior is relevant for the career building of young workers. In contrast to previous studies, including Hall (1982) and Topel and Ward (1992), we focus on the distinction between jobs that are held while (or before) the workers attend college versus jobs after college. The motivation for our distinction is the observation that the reasons for working and job switching during college can be substantially different from the reasons for these after college, and therefore, these jobs may contribute differently to the subsequent career building of workers.[3] Our contribution is

[1] See, for example, Low et al. (2010), Bagger et al. (2013), Altonji et al. (2013), and Lise (2013).

[2] See, for example, Hyatt and McEntarfer (2012) and Tjaden and Wellschmied (2014).

[3] There is also a related literature of how early work experience affects future career success. This literature largely focuses on the jobs held during high school. See, for example, Baum and Ruhm (2014). Hotz et al. (2002) conduct a similar analysis to our wage regression in Appendix C for both high school and college jobs and obtain a similar conclusion. We study a more homogeneous sample than their study (males who completed college at or before 23 years of age). Our focus is also different from theirs, as our main focus is

to document how much of the job-switching behavior is relevant for career building of young workers compared to the numbers put forth by Hall (1982) and Topel and Ward (1992).

We use the National Longitudinal Survey of Youth 1979 (NLSY79) dataset. This is a panel dataset of nationally representative samples of U.S. men and women. The NLSY79 provides the start and stop weeks of each employment spell for up to five jobs within the interview period since 1978. The advantage of this dataset over the ones used by Hall (1982) and Topel and Ward (1992) is that it contains the person's schooling information. We separate jobs held before and after the completion of the person's college degree and clarify how the total job holdings are divided into these two types of jobs.

We first show that there are many jobs that are held before college completion. We then show that the jobs that are held before and during college years have the following characteristics. First, the jobs before and after college completion consist of very different occupations. Second, the average wage paths of workers who experience many jobs in college and workers who do not look very similar. Although it is difficult to infer causality, these facts together can be interpreted that jobs before college completion contribute less to career building compared to the ones after college completion.

Following the past literature, we analyze the wage growth after college completion. The focus on wages implies that the channel of career building we consider is *human capital accumulation*. We also analyze occupational decisions of workers. This can also be important in the human capital context, provided that recent literature emphasizes the importance of occupation-specific human capital.[4] An entirely separate channel through which jobs held during college can affect the worker's future career is the *financing channel*. It may be the case that having jobs allows workers to finish college through relaxing their credit constraint, and thus contributes to a better future career.[5] Although a detailed analysis of credit constraint

the job switching behavior itself, rather than the wage dynamics. In the context of jobs during college, Light (2001) points out that the measurement of returns to schooling is affected once the job experienced during college is considered, while Häkkinen (2006) finds that with instrumental variable estimation there are no significant returns to student employment. Compared to these studies, we consider different types of jobs and also analyze occupational changes.

[4]See, for example, Kambourov and Manovskii (2009).

[5]With our samples, we run a simple Probit regression (not reported in the paper) to see how different factors are related to the probability of graduating, and we find that the annual average number of jobs held

is beyond the scope of this paper, past studies using the NLSY79 dataset generally find that family income plays little role in college attendance.[6] However, newer studies find different effects in a different cohort (NLSY97), and this is a topic that requires further careful studies.[7]

Once we disregard jobs held before college completion, the average number of jobs experienced by a typical worker, counted similarly to Hall (1982) and Topel and Ward (1992), is fewer by one to three. Thus the numbers that are presented by Hall (1992) and Topel and Ward (1992) overestimate the number of jobs that are experienced by young workers for career building purposes. This can have important implications on how we should calibrate macroeconomic models of worker flows with the life cycle dimension.[8] For example, if we interpret the wage gain from job switching as the workers finding better matches, overestimating the number of jobs may overstate the importance of such activities.[9] Mukoyama (2014) argues that the slowing down of job-to-job transitions during recessions can have a significant effect on the aggregate productivity. In models that feature life-cycle elements, the adjustment we suggest can make a difference in the quantitative results of this type of theoretical experiments.

This paper is organized as follows. Section 2 describes the data. Section 3 presents our main results. Section 4 concludes.

2 Data

This section documents the basic statistics from our dataset. Further explanations about dataset construction are found in Appendix A.

in college is negatively related to the probability of graduation, while the annual average wage rate and working hours for jobs before college completion have no statistically significant correlation with the probability of graduation. Thus we did not find any evidence that having many jobs helps students graduate, while it is difficult to infer causality from such a regression.

[6] See Lochner and Monge-Naranjo (2012) for a review.

[7] See, for example, Belley and Lochner (2007).

[8] Menzio et al. (2016) use the subgroup of high-school educated workers in their calibration, and thus avoid the issues raised in this paper.

[9] See, for example, Barlevy (2001) and Mukoyama (2014).

2.1 NLSY79 dataset

The NLSY79 dataset contains 12,686 American youth, born between 1957 and 1964, as samples. They were first interviewed in 1979 at the age of 14 to 22. The NLSY79 provides up to five jobs' start and end dates, which we aggregate to an annual record.[10] To identify full-time jobs, we screen out all jobs in which employees work less than 30 hours per week or jobs which employees hold for less than 12 weeks if the associated hours-worked is missing.

We focus on the male samples with a high school education and above. We first screen out all military subsamples, all females, and all samples without high school diploma.[11] To avoid the left-censoring problem, we restrict our sample to respondents who entered the survey before they were 19 years old. Then we divide our sample into three groups according to their education levels: high school diploma, some college education but no degree, or college degree. These three groups respectively correspond to exactly 12 years, less than 16 but more than 12 years, and no less than 16 years of education.[12] Each category has 1,655, 710, and 652 observations, respectively. We mainly focus on male college graduates who graduate at or before age 23. This subsample has 428 respondents. When we compute representative hourly wages for each year, they are deflated to 2009 dollars using the GDP deflator.

2.2 Basic patterns of job mobility

This section documents the basic patterns of job mobility. In order to facilitate comparison with the previous studies, we calculate some of the statistics that are shown in Topel and Ward (1992).

[10] The annual record is based on the survey year, since we do not have access to the respondents' birthdays.

[11] From 1991, economically disadvantaged white females and males in the supplemental subsample are not eligible for interview. We eliminate these samples as well.

[12] Because the NLSY surveys the highest years of education received as of May 1st of the survey year, some cases show that respondents reported the completed year of education in the middle of May at one year before the survey year. This will, in effect, underreport the actual year of education by one year. To adjust for this, we apply the following adjustments in considering the timing at which the sample completed the college education. First, for the respondents who reported to have attended the 16th year of education before August, not including August, of the year before the survey year, we consider them as having completed the college education in the previous year. Second, if information about the attending grade is not reported, if (i) respondents reported they were not enrolled in school as of the May 1st of the survey year and (ii) specified the reason for leaving school as 'Received Degree' between August of the year before the survey year and April of the survey year, then we consider them as completed college education before August. We thank a referee for pointing out this issue.

Table 1: Average cumulative full-time jobs by years since labor market entry

		Years since labor market entry									
	Obs	1	2	3	4	5	6	7	8	9	10
High School	1655	1.6	2.4	3.2	4.0	4.8	5.5	6.3	7.0	7.7	8.3
Some College	710	1.5	2.4	3.2	3.9	4.7	5.5	6.3	7.0	7.7	8.3
College	652	1.3	2.1	2.8	3.5	4.3	5.0	5.7	6.4	7.0	7.8
College ($\leq$ 23)	428	1.3	2.0	2.7	3.5	4.3	5.0	5.7	6.4	7.0	7.7
Full Sample	3017	1.5	2.3	3.1	3.8	4.6	5.4	6.1	6.8	7.5	8.1
Topel and Ward		1.6	2.5	3.2	3.9	4.6	5.1	5.7	6.1	6.5	7.0

Table 1 corresponds to Table III B of Topel and Ward (1992). It describes how many jobs are held, on average, by a worker by each year since labor market entry. Here, *years since labor market entry* refers to years since the first time the worker had a full-time job after 18 years of age.[13] Here, only full-time jobs are counted.[14] For robustness, we repeat all our main exercises including part-time jobs in Appendix H. All averages are computed using sample weights.

Table 1 shows that the basic job-switching pattern in our dataset is overall in line with the results in Topel and Ward (1992), reproduced in the last row. College graduates experience somewhat fewer jobs than other groups. Overall, an average worker experiences about seven to eight jobs in the first 10 years since labor market entry. Below, we use the sample of workers who completed college at or before age 23, which is presented in the fourth column of Table 1.[15]

Topel and Ward (1992) also document that the job transition serves as an important opportunity for wage growth. Table 2 shows that this holds true in our dataset, although the numbers are noisier due to the smaller sample size. Our result is also in line with Light

[13]This is called "potential experience" in Topel and Ward (1992).

[14]Note that Topel and Ward's definition of "full-time job" is different from ours, due to different information contained in datasets. As mentioned above, we count jobs with more than 30 hours worked in one week as full-time jobs. Topel and Ward's dataset does not contain information on hours worked, and they define "full-time workers" as the workers who earned at least 70 percent of the quarterly minimum wage during that quarter. They also restrict the samples to white males, while our samples contain all males. Another slight difference from Topel and Ward (1992) is that they start the sample at the birth quarter of 18 years old, while we start at January of 18 years of age.

[15]For robustness, we repeat all our main exercises for the sample who completed college at or before 25 years of age in Appendix I.

Table 2: Wage growth at job transition

	0−2	2−4	4−6	6−8	8−10
Wage Growth at Transition	15.6%	35.6%	24.4%	13.1%	10.0%
	0−2.5	2.5−5	5−7.5	7.5−10	
Topel and Ward	17.1%	11.9%	7.9%	5.7%	

(2005), who finds that the wage growth of all male college graduates is 66% on average during the first eight years of careers.

3 Results

In this section, we focus on the samples of male workers who graduated college at or before age 23. For these workers, jobs that are held before college graduation are likely to be temporary jobs that may not be closely related to their subsequent careers. In order to analyze career building of young workers, it is useful to distinguish between such jobs and ones held after college completion.

Table V of Topel and Ward (1992) already suggests the prevalence of such temporary jobs early in a worker's career. It shows that about 30 percent of jobs for a worker with no prior experience end within one quarter, followed by the worker moving to nonemployment. Here, we explicitly look at the job experience during college.

3.1 Significance of jobs held before college completion

Table 3 shows the number of jobs held before completing college, for the workers who graduated by the age of 21, at the age of 22, at the age of 23, at or after the age of 24. This indicates that these workers hold many jobs during the school year before completing college. We call these jobs *jobs before college completion* (JBCC). As shown in the table, the young males in our samples held 4.4 jobs on average before their graduation from college even if they complete college at the age of 23. In some extreme cases, 11 jobs are held before graduation from college for these samples.

Table 3: Number of jobs held before college completion

Age	Obs	Average	Std	Min	25%	Median	75%	Max
≤21	125	2.9	1.7	0	1	3	4	7
22	181	3.6	2.0	0	2	3	5	10
23	122	4.4	2.1	0	3	4	6	11
≥24	224	7.6	3.9	1	5	7	10	23

Thus, JBCC occupy a substantial part of a young worker's job counts, and it is important to examine whether JBCC have any effects on young workers' career building. In the following, we examine how JBCC are different from the subsequent jobs and how experiences of JBCC affect the wage dynamics.

3.2 Career building and the jobs before college completion

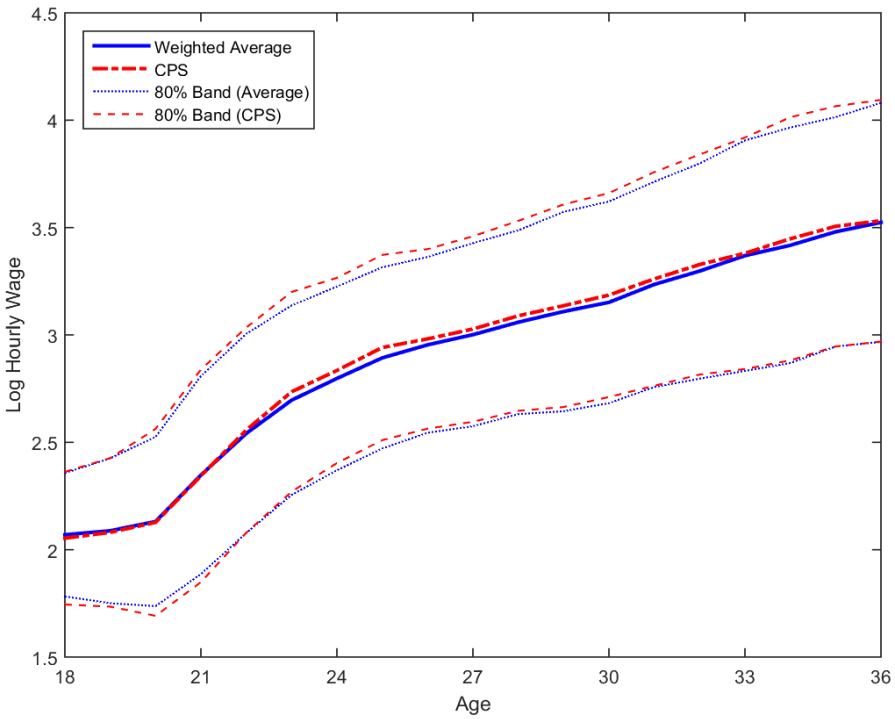
Here we examine whether jobs held before college completion play a different role from other jobs in young workers' career building. First, Figure 1 plots the average hourly wages for our sample. Two wage rates are considered. One is the weighted average of wage rates over *all jobs* held by respondents, and the other is the wage rates of the *CPS jobs*, which are defined as the current or the most recent jobs.[16] Throughout the rest of the paper, we use weighted average wage rates over all jobs. The two wage series exhibit a similar pattern: the wages are relatively low and flat at the beginning the college education, and the wage increases steeply afterward. This suggests that (the early part of) JBCC has different characteristics from the subsequent jobs.

Figure 1 also shows that the average wage starts to increase around the age 21. In fact, Figure 3 in Appendix B shows that the wage starts increasing one year before graduation. To differentiate this part of JBCC, we conduct a separate analysis for the jobs held one year before graduation. It turns out that these jobs have a feature of the transition from typical college jobs to the future real jobs.

In Appendix C, to examine whether JBCC's wage is statistically different from the wage

[16]The name comes from the fact that the definition here is consistent with the definition of employment in the Current Population Survey (CPS). See Appendix A for details.

Figure 1: Average wage paths (2009 dollar)



earned by jobs after college, we run Mincerian-style regressions. We find that the wages for JBCC are 15 to 26 percent lower, and the difference is statistically significant. While this difference would contain the returns to college education, similar differences are observed for samples who did not complete college. These regressions also suffer from issues with selection bias, and thus it is difficult to tease out a causal relationship. However, they are consistent with our observations in Figure 1 that JBCC's wages are significantly lower compared to the wages of the subsequent jobs.

3.2.1 Patterns of occupational choice

We next look at the differences in occupation for JBCC and subsequent jobs.[17] Table 4 lists top-10 three-digit occupations for all JBCC, JBCC one year before graduation, and subsequent jobs in the first five years of the workers' careers. The last column shows four large occupational categories, which follow the classifications by Acemoglu and Autor (2011): 1. nonroutine cognitive, 2. routine cognitive, 3. routine manual, and 4. nonroutine manual. With the exception of "Waiters," the top-10 occupations before and after college are entirely different. The top-10 occupations for JBCC are largely manual occupations, while all top-10 subsequent jobs are in nonroutine cognitive occupations. JBCC are also typically in low-wage occupations.

The jobs one year before college graduation have features that are similar to all JBCC. They, however, also have transitional features towards the jobs after college. For example, Acemoglu and Autor's (2011) category 1 jobs start to appear.

Tables 5 and 6 show the distribution and average wages of different occupational groups. Table 5 looks at ten occupational categories defined in the Dictionary of Occupational Titles (DOT) and Table 6 uses the four categories from Acemoglu and Autor (2011). These tables deliver a similar message to Table 4: the occupational characteristics of JBCC and subsequent jobs are very different. The jobs one year before college graduation are, again, similar to typical JBCC but also have transitional features. For example, in Table 5, the categories

[17] In Appendix F, we repeat similar exercises for differences in industries. It turns out that industry differences do not exhibit as clear patterns as occupations. This echoes Kambourov and Manovskii's (2009) finding that occupations are more important than industries for specific human capital accumulation.

Table 4: Top 10 occupations before and after college graduation

Group	Name	Proportion	Wage	Categories
Before				
755	Gardeners and Grounds Keepers	8.1%	6.6	4
780	Miscellaneous Laborers	4.1%	8.1	4
751	Construction Laborers	3.6%	11.1	4
932	Attendants	3.6%	6.7	4
310	Cashiers	2.9%	6.8	2
903	Janitors and Sextons	2.9%	7.4	4
762	Stock Handlers	2.6%	7.0	4
912	Cooks	2.6%	8.5	4
822	Farm Laborers	2.4%	7.2	4
915	Waiters	2.4%	12.0	4
One Year Before College Graduation				
755	Gardeners and Grounds Keepers	7.4%	6.8	4
902	Building Interior Cleaners	5.3%	5.2	4
903	Janitors and Sextons	4.2%	8.0	4
153	Electrician	3.2%	13.1	1
245	Managers and Administrators	3.2%	9.8	1
441	Blue-collar Worker Supervisors	3.2%	15.4	3
510	Painters, Construction and Maintenance	3.2%	11.6	3
780	Miscellaneous Laborers	3.2%	9.5	4
962	Guards	3.2%	7.2	4
14	Mechanical Engineers	2.1%	13.4	1
After				
245	Managers and Administrators	8.2%	15.8	1
3	Computer Programmers	3.4%	20.6	1
142	Elementary School Teachers	2.8%	14.1	1
1	Accountants	2.6%	18.8	1
231	Sales Managers	2.3%	13.8	1
23	Engineers	2.0%	24.6	1
76	Therapists	2.0%	12.9	1
230	Restaurant Managers	2.0%	13.2	1
915	Waiters	2.0%	16.5	4
162	Engineering and Science Technicians	1.7%	26.1	1

Table 5: Distribution of ten occupation categories: before and after

		Before		**1Y Before CG**		**After**	
Group	Categories	Proportion	Wage	Proportion	Wage	Proportion	Wage
1	Professional	12.7%	10.3	17.9%	11.2	41.2%	17.6
2	Managers	3.8%	9.7	5.3%	9.7	14.8%	15.1
3	Sales	1.0%	6.1	2.1%	11.3	4.3%	20.5
4	Clerical	14.6%	8.1	16.8%	7.6	12.2%	17.9
5	Craft	9.6%	10.7	12.6%	11.7	5.4%	15.8
6	Operative	7.2%	10.2	8.4%	11.2	3.1%	12.7
7	Transportation	4.3%	8.0	3.2%	9.5	4.3%	10.4
8	Labors	21.5%	7.7	11.6%	7.1	5.4%	9.8
9	Farmers	NA	NA	NA	NA	0.6%	6.5
10	Farm Labors	25.4%	7.7	22.1%	8.3	8.8%	12.8

Table 6: Distribution of four occupation categories: before and after

		Before		**1Y Before CG**		**After**	
Group	Categories	Proportion	Wage	Proportion	Wage	Proportion	Wage
1	Nonroutine Cognitive	16.5%	10.2	23.2%	10.9	56.0%	16.9
2	Routine Cognitive	15.6%	8.0	18.9%	8.1	16.5%	18.6
3	Routine Manual	21.1%	10.0	24.2%	11.3	12.8%	13.2
4	Nonroutine Manual	46.9%	7.7	33.7%	7.8	14.8%	11.5

Table 7: Transition matrix across occupation categories (%)

From \To	1	2	3	4	5	6	7	8	9	10
1	55.0	10.0	10.0	5.0	5.0	5.0	0.0	5.0	0.0	5.0
2	33.3	33.3	0.0	0.0	0.0	0.0	0.0	22.2	11.1	0.0
3	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
4	52.6	21.1	15.8	5.3	0.0	0.0	5.3	0.0	0.0	0.0
5	12.5	12.5	0.0	25.0	25.0	12.5	0.0	12.5	0.0	0.0
6	66.7	0.0	0.0	16.7	0.0	0.0	0.0	16.7	0.0	0.0
7	66.7	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0
8	36.8	5.3	10.5	5.3	10.5	0.0	5.3	15.8	0.0	10.5
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	34.3	11.4	2.9	14.3	5.7	2.9	5.7	8.6	2.9	11.4

Table 8: Transition matrix across occupation categories (%)

From \To	1	2	3	4
1	65.5	10.3	6.9	17.2
2	71.4	23.8	4.8	0.0
3	50.0	15.0	25.0	10.0
4	44.4	16.7	14.8	24.1

"professional" and "managers," which are prevalent after college completion but less observed in JBCC, display in-between numbers one year before college completion. For "labors" and "farm labors," we observe the opposite pattern: they are popular as JBCC but less so after college, and in-between for one year before college graduation.

Since the results in Tables 4, 5, and 6 may reflect a natural career progression due to age, because the "after" jobs include all subsequent jobs, in Tables 7 and 8 we compute the occupational transition matrices between the last job before college graduation and the first job after college graduation. Each cell (i, j) represents the fraction of workers moving from a category i job to category j job. There, the effect of age is minimal, because these tables look at two consecutive jobs.

We observe that there is a large mobility across occupational categories. Table 8 shows that the outward mobility is especially pronounced in manual categories (categories 3 and 4), in which the majority of JBCC are classified. This indicates that the majority of JBCC tend

to be of different types of jobs that are not closely related to subsequent career building.[18]

3.2.2 JBCC and subsequent career

To further see how JBCC experiences affect the worker's subsequent career, we calculate the wage paths for subsamples who experienced JBCC and for these who did not experience any JBCC. Figure 2 plots the weighted average wage paths for workers who held any job during school before completing college versus workers who did not. Appendix D plot similar figures for different numbers of jobs, subsamples based on *summer jobs* (defined as jobs held during the May 1 to August 31 period), subsamples that experienced *temporary jobs* (jobs shorter than 12 weeks that are not summer jobs), and subsamples with jobs that are neither summer nor temporary jobs (we call them *regular long-term jobs*). All figures indicate that the average wage paths are remarkably similar. This suggests that job experiences before college completion are different in nature from the experiences in the subsequent jobs, and the JBCC do not have significant contributions to subsequent wage growth.[19]

Table 9 looks at the duration of the first job after graduation. If the JBCC contributes to the career building process, the first job after graduation should last longer for the workers with JBCC experiences. The upper panel summarizes statistics from all jobs, and the lower panel restricts to the situation where the second job comes within four weeks after finishing the first job. In both panels, having JBCC does not change the duration of the first job, except for the cases of without regular long-term jobs and without any JBCC. These cases tend to have a shorter duration of the first job. However, they suffer from a rather extreme small-sample issue and it is difficult to draw strong conclusions from these numbers. Table 10 calculates the wage changes after the first job. There, the numbers are noisier, but we do not see systematic differences except for the cases with very small sample sizes.

Table 11 calculates the average cumulative full-time jobs after completing college across different groups of workers. The cumulative number of jobs are remarkably similar across

[18] Appendix G conducts a more detailed analysis of the patterns of occupational choice before and after college graduation.

[19] Appendix C conducts formal statistical analyses, including regressions that control for endogeneity by the Heckman correction. The results are consistent with these figures.

Figure 2: Average wage paths for samples with and without JBCC (2009 dollar)

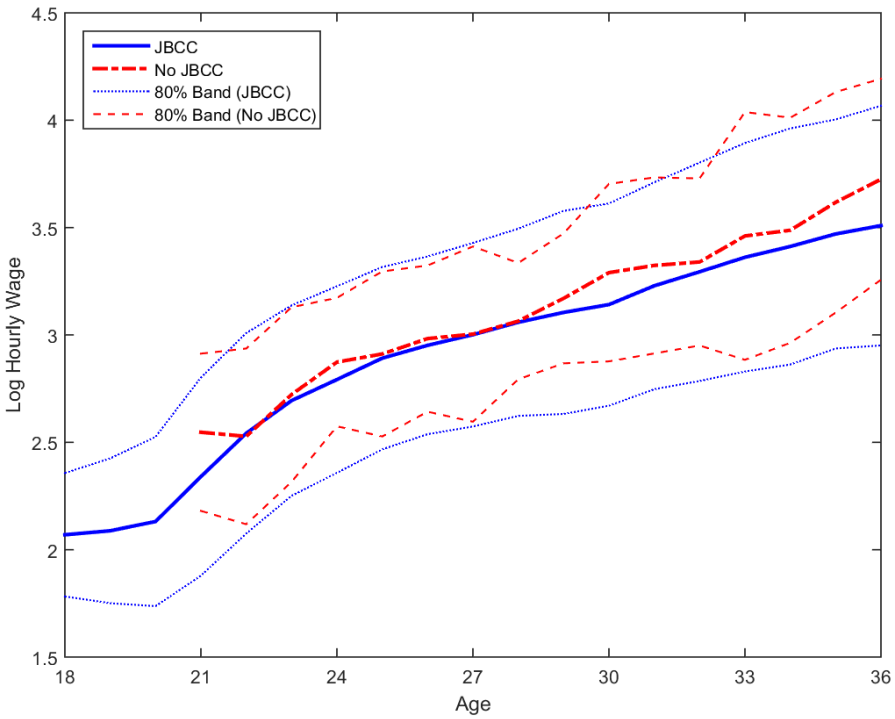


Table 9: Duration of the first job (weeks)

	Obs	Mean	Std	10%	Median	90%
All Sample						
With Summer Jobs	251	57	38	11	56	107
Without Summer Jobs	170	62	39	13	60	109
With Temporary Jobs	69	55	38	12	42	105
Without Temporary Jobs	352	60	39	11	59	108
With Regular Long-term Jobs	316	63	40	13	62	111
Without Regular Long-term Jobs	105	46	32	10	38	90
With JBCC	390	60	39	12	58	109
Without JBCC	31	51	32	10	59	93
1st and 2nd Job Gap $\leq$ 4 weeks						
With Summer Jobs	152	71	37	12	79	113
Without Summer Jobs	99	74	38	20	74	112
With Temporary Jobs	33	76	37	8	87	111
Without Temporary Jobs	218	71	38	17	77	113
With Regular Long-term Jobs	191	76	38	20	82	115
Without Regular Long-term Jobs	60	60	34	11	68	97
With JBCC	229	73	38	14	80	113
Without JBCC	22	63	30	16	66	98

Table 10: Wage changes after the first job

	Obs	Mean	Std	10%	Median	90%
All Sample						
With Summer Jobs	213	39.6%	98.6%	−22.0%	17.6%	110.7%
Without Summer Jobs	152	22.5%	60.2%	−36.2%	12.6%	68.0%
With Temporary Jobs	62	34.5%	85.2%	−43.8%	14.3%	111.8%
Without Temporary Jobs	303	32.1%	85.1%	−22.5%	13.7%	88.1%
With Regular Long-term Jobs	281	29.6%	80.9%	−25.6%	13.1%	84.7%
Without Regular Long-term Jobs	84	42.0%	97.6%	−23.8%	22.4%	115.5%
With JBCC	338	32.6%	87.8%	−28.9%	13.4%	94.6%
Without JBCC	27	31.3%	35.5%	0.8%	24.8%	64.4%
1st and 2nd Job Gap $\leq$ 4 weeks						
With Summer Jobs	137	25.2%	60.3%	−17.4%	16.8%	77.2%
Without Summer Jobs	94	20.2%	34.5%	−16.7%	13.6%	60.1%
With Temporary Jobs	29	17.3%	39.8%	−23.9%	13.3%	64.9%
Without Temporary Jobs	202	24.1%	52.9%	−16.8%	16.4%	66.8%
With Regular Long-term Jobs	179	18.0%	38.1%	−18.3%	12.8%	61.1%
Without Regular Long-term Jobs	52	41.1%	80.1%	−4.5%	25.1%	88.8%
With JBCC	211	22.5%	53.3%	−18.3%	13.5%	67.5%
Without JBCC	20	30.3%	21.9%	9.3%	26.1%	61.3%

Table 11: Average cumulative full-time jobs after completing college

	1	2	3	4	5	6	7	8	9	10
With Summer Jobs	0.7	1.5	2.3	2.8	3.6	4.2	4.9	5.5	6.2	6.7
Without Summer Jobs	0.6	1.2	2.0	2.7	3.4	4.1	4.8	5.3	5.9	6.5
With Temporary Jobs	0.7	1.3	2.2	2.8	3.5	4.3	5.1	5.8	6.4	6.9
Without Temporary Jobs	0.7	1.4	2.2	2.8	3.5	4.1	4.8	5.4	6.0	6.6
With Regular Long-term Jobs	0.7	1.4	2.2	2.8	3.5	4.2	4.9	5.5	6.1	6.6
Without Regular Long-term Jobs	0.7	1.4	2.2	2.8	3.5	4.1	4.8	5.4	6.0	6.5
With JBCC	0.7	1.4	2.2	2.8	3.5	4.1	4.9	5.4	6.1	6.6
Without JBCC	0.5	1.1	2.2	2.7	3.6	4.3	5.1	5.6	6.3	6.9

Table 12: Average cumulative full-time jobs, by years since labor market entry

			Years since labor market entry									
	Obs	Age	1	2	3	4	5	6	7	8	9	10
All Jobs	428	18.7	1.3	2.0	2.7	3.5	4.3	5.0	5.7	6.4	7.0	7.7
Type 1	428	18.9	1.3	1.7	2.2	2.8	3.6	4.3	5.0	5.7	6.3	7.0
Type 2	428	18.7	1.2	1.9	2.6	3.3	4.1	4.8	5.5	6.2	6.8	7.5
Type 3	427	19.7	1.2	1.7	2.2	2.7	3.4	4.1	4.8	5.5	6.1	6.8
Type 4	426	20.4	1.2	1.5	1.9	2.3	3.0	3.7	4.3	5.0	5.5	6.2

Table 13: Average cumulative full-time jobs by age

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
All Jobs	0.9	1.6	2.3	3.0	3.7	4.5	5.2	5.9	6.5	7.3	7.9	8.5	9.1	9.7	10.1	10.5	10.9	11.3
Type 1	0.5	0.9	1.3	1.8	2.5	3.3	4.0	4.7	5.4	6.1	6.7	7.3	7.9	8.5	9.0	9.3	9.7	10.1
Type 2	0.8	1.5	2.1	2.8	3.5	4.3	5.0	5.7	6.3	7.0	7.7	8.3	8.9	9.5	9.9	10.3	10.6	11.0
Type 3	0.8	1.5	2.1	2.8	3.5	4.3	5.0	5.7	6.3	7.0	7.7	8.3	8.9	9.5	9.9	10.3	10.6	11.0
Type 4	0.0	0.0	0.0	0.2	0.7	1.4	2.1	2.8	3.5	4.2	4.8	5.4	6.0	6.6	7.0	7.4	7.8	8.2

groups who had different work experiences during college. This suggests that the jobs during college have little influence on the subsequent job-switching process, consistent with the results in Tables 9 and 10. This also implies that there is no indication of strong selection among different groups—the characteristics of the workers who experienced JBCC do not seem to be very different from the characteristics of the workers who did not.

The conclusion from the above results is that JBCC, especially summer jobs and temporary jobs, are relatively disconnected from workers' subsequent career. In a context of job-ladder type models, which assume that workers build their careers by moving up the ladder, one can reasonably argue that these jobs should not be included as a part of the career-building process.

3.3 Adjusted total number of jobs

Considering that jobs held during college contribute little to the overall career-building over the life cycle, it is of interest to calculate the total number of *career-contributing jobs*.

Table 12 repeats Table 1 for the samples of male workers who graduated college before

age 24.[20] Jobs in Type 1 exclude summer jobs. Jobs in Type 2 exclude temporary jobs. Jobs in Type 3 exclude regular long-term jobs. In Type 4, we start counting jobs after college graduation.

Our finding is broadly consistent with Light (2005), who shows that male college graduates held 4.3 jobs on average within eight years after graduation (the closest category for us is Type 4), even though we have a slightly different method of calculating the number of jobs.[21]

In Table 13, we instead calculate the number of career-contributing jobs as a function of age, as in Hall (1982). We can observe that the cumulative number of jobs before age 35 is smaller by about three if we entirely disregard the JBCC. Even if we disregard only summer jobs, the cumulative number of jobs before age 35 is smaller by more than one.

4 Conclusion

In this paper, we analyzed the job switching and wage growth of young workers, separately considering between the jobs experienced by workers before and after college completion. The jobs held before college completion are special in that their occupations are very different and they do not have much effect on subsequent wage growth. If we disregard these jobs, the number of career-contributing jobs that are experienced by young workers is smaller by a nontrivial amount.

[20] Here, we drop respondents who do not have at least 8 consecutive observations since labor market entry. Topel and Ward (1992) makes an effort to eliminate the individuals whose careers start with summer jobs (see their footnote 21) in their Section III. There, they only consider workers who had full-time work over more than four quarters at the entry. This eliminates over 90% of individuals (the number of individuals fell from 9,919 to 872) while the number of full-time jobs does not fall as much (it fell from 58,181 to 44,089). It has to be noted that their Table III include all white male samples, rather than just college graduates.

[21] Our approach is different from Light (2005) in the following two ways. First, Light (2005) counts jobs held by some college plus all college graduates, while we only focus on college students graduated at age 23 or before. Second, Light (2005) starts to count jobs at the start of the first school exit that lasts at least 12 months, while in Type 4 we start to count at the year they reached 16 years of education.

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Appendix

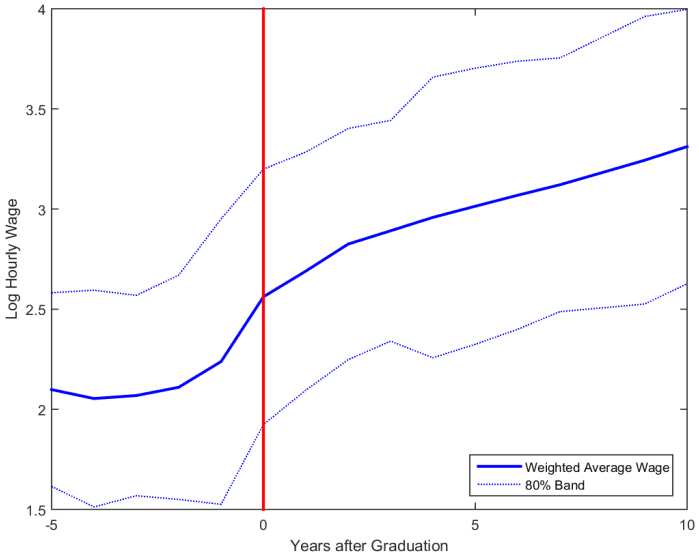
A Data

The NLSY79 interviews respondents annually from from 1979 to 1992 and biennially after 1992. In every interview year, it records up to five jobs held by respondents and the corresponding start and end weeks (Concept: Start Week of Job # and Stop Week of Job #). In some cases, the same job is assigned as two different jobs because they are recorded in different interview years. We treat these two jobs as the same one if the respondents identify the latter job as being with the same employer as the former one (Concept: Previous Job Number at Last Interview), and the latter one starts within four weeks after the former one ends. To identify full-time jobs, we screen out all jobs in which employees work less than 30 hours (Concept: Hours Per Week Worked). For the cases where work hours are not available, we only consider the job to be full time if it lasts at least 12 weeks.

To construct our sample, we first screen out all military subsamples and all sample dropouts in 1990 (Concept: Sample Identification Code), and all females (Concept: Sex of Respondent). Then we restrict our sample according to three types of the respondents' education levels (Concept: Highest Education Level completed as the May 1st of the Survey Year); namely, high school graduation, some college education but no degree, and college degree. These subsets have 1,655, 710, and 652 observations, respectively. We drop all observations where no job information is provided. Next, we focus on males who graduate college at or before age 23, which has 428 respondents.

Finally, we use two approaches to construct annually representative wage (Concept: Hourly Rate of Pay Job #). First, we consider all full-time jobs held by each respondent in each year, and calculate the weighted average hourly wage using work-week share of each job as the weight. Second, we only consider hourly wages of the *CPS job*. We first identify the CPS job, which is the one with job number 1 for most cases. An exception is the case for some respondents in 1980-1992. To fix this, we use the identifier of the current job (Concept: Is Job # Same as Current Job?) to determine if the current job is the CPS job. If the wage

Figure 3: Average wage paths before and after college graduation



of the CPS job is not available, we find the next most recent job with available wage. All hourly wage rates are in 2009 dollars using the U.S. GDP deflator.

B Wage paths before college graduation

Figure 3 plots the average wage before and after college graduation. The horizontal axis indicates the years before and after graduation ("0" means the graduation time). We can see that the wages are in general stagnant before graduation, but start to rise one year before graduation. In Section 3.2.1, we see that this transition pattern is also consistent with the change in the occupation mix.

C Wage regressions

In this section, we examine whether holding a job during college has a long-term effect on future wage paths. We consider the following regression:

$$\log W_i = \alpha_0 + \alpha_1 D_i + \beta' X_i + \gamma' Y + \epsilon_i, \tag{1}$$

where W_i is the weighted average wage at age of 30 (or 35); D_i is a dummy variable, which is equal to 1 if the respondent held the summer/temporary/regular long-term jobs during college; X_i are a vector of characteristics control variables for the respondents and their families; and Y is a collection of year dummy variables. Characteristics control variables are respondents' AFQT composite math and verbal scores, races, whether both parents were working at the beginning of the survey, whether they worked for full time, whether both parents were on record of the survey, whether both parents lived separately, the years of highest education years received by both parents, the SMSA code where the respondent graduated at the year before college graduation, the region dummy where the respondent lived at the year before college graduation, and whether the respondent lived in a rural or urban area at the year before college graduation.

To address the issue of selection bias, we follow Ruhm (1997) and use two approaches. First, a "treatment-effects" model is considered, where the "treatment" is the choice of whether or not to work at a certain job during college. We first run a Probit model where the dependent variable is a dummy of whether to work during college and the independent variables are the characteristics control variables. Then we calculate the inverse Mills ratio for respondents who worked during college, and then we include this inverse Mills ratio in the second stage, where geographic variables are not included for the exclusion restriction. Second, we conduct an instrumental variable (2SLS) estimation where geographic variables are used to identify the model.

Table 14 displays the results for wage at the age of 30 and 35. The work experience dummy, which is of our interest, is not statistically significant in all cases. In Section 3.2.1 and Appendix B, we observe that the jobs just before the college graduation have different characteristics from the other JBCC. To check robustness, we repeat this exercise for the jobs held during the final year of college. Table 15 shows the result. Once again, the work experience dummy is not statistically significant in all cases. Thus we cannot reject the hypothesis that JBCC do not have any influence on future wages.

Table 14: Wage equation

	OLS			Treatment Model			IV Estimation (2SLS)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Wage at Age 30									
D^{sj}	0.0015			−0.44			−0.49		
	(0.058)			(0.39)			(0.40)		
D^{tj}		0.012			0.042			0.023	
		(0.075)			(0.30)			(0.35)	
D^{rj}			−0.039			0.20			−0.77
			(0.066)			(0.54)			(0.78)
Obs	358	358	358	358	358	358	358	358	358
R^2	0.11	0.11	0.11	0.10	0.09	0.09	0.10	0.09	0.09
Wage at Age 35									
D^{sj}	−0.011			−0.29			−0.16		
	(0.063)			(0.38)			(0.40)		
D^{tj}		−0.038			−0.21			−0.024	
		(0.081)			(0.32)			(0.38)	
D^{rj}			0.011			−0.41			−0.92
			(0.071)			(0.51)			(0.67)
Obs	340	340	340	340	340	340	340	340	340
R^2	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19

Table 15: Wage equation with working experience at the final year of college

	Age 30			Age 35		
	(1) OLS	(2) Treatment	(3) IV (2SLS)	(4) OLS	(5) Treatment	(6) IV (2SLS)
D^{lj}	−0.051	−0.35	−0.39	0.072	−0.42	−0.40
	(0.057)	(0.33)	(0.34)	(0.061)	(0.30)	(0.30)
Obs	358	358	358	340	340	340
R^2	0.11	0.10	0.10	0.20	0.20	0.19

D Additional figures for Section 3.2

In addition to Figure 2, we consider two different subdivisions of the sample. Figure 4 plots the paths for the weighted average of wages for the workers who held summer jobs during school versus workers who did not. Summer jobs are defined as jobs held between May 1 and August 31 during the years the workers are in school. Figure 5 plots the paths for the weighted average of wages for the workers who held a temporary job during school versus the workers who did not, where a job is recognized as temporary if it is held for less than 12 weeks during school other than summer time. Figure 6 plots the paths for the weighted average of wages for the workers who held jobs that are neither summer jobs nor temporary jobs (we call them regular long-term jobs) versus the workers who did not. Figure 7 plots the paths for the weighted average of wages for the workers who held jobs during the final year of college versus the workers who did not. The results are similar to Figure 2: the wage paths are very similar across these subsamples.

Figure 4: Average wage paths for subsamples with and without summer jobs (2009 dollar)

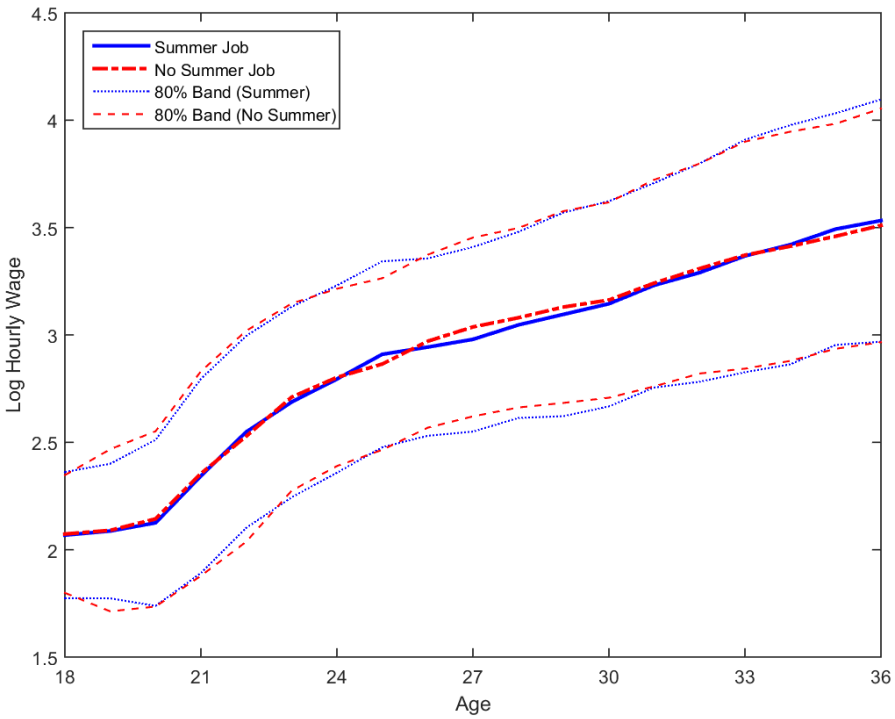


Figure 5: Average wage paths for subsamples with and without temporary jobs (2009 dollar)

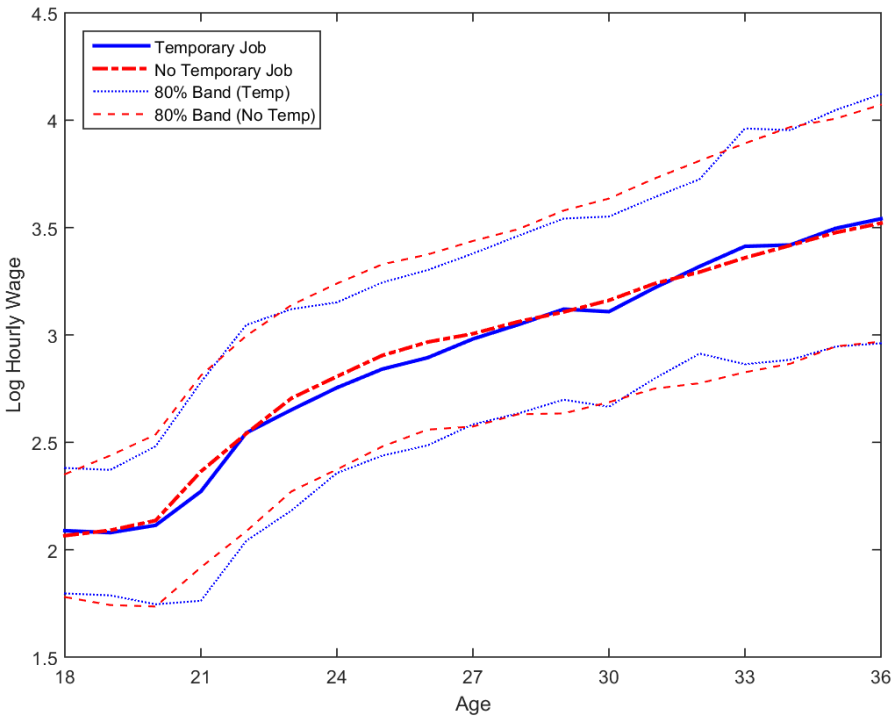


Figure 6: Average wage paths for samples with and without regular long-term jobs (2009 dollar)

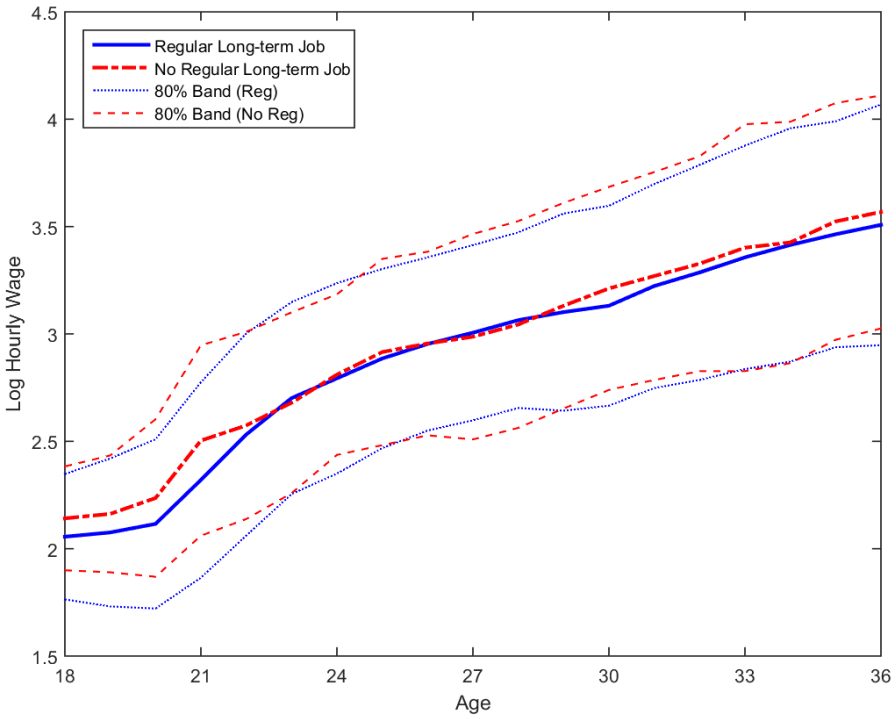


Figure 7: Average wage paths for samples with and without jobs at the last-year of college (2009 dollar)

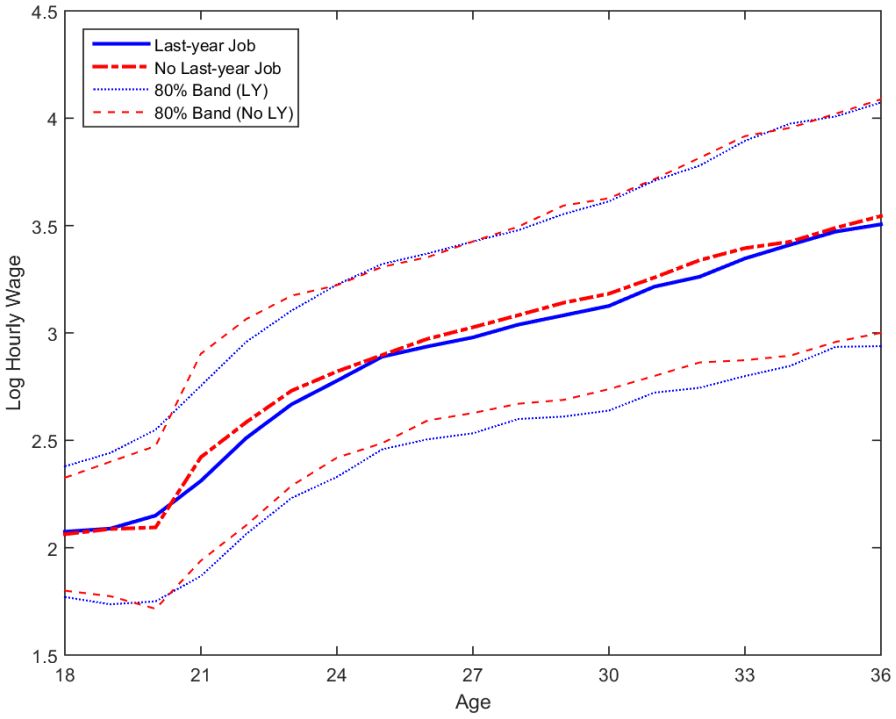


Table 16: Probability of staying in the same occupation

	10 Categories	4 Categories
Transition	21.0%	33.9%
Before	37.3%	50.8%
After	46.7%	60.0%

Table 17: Summary statistics: wage growth during transition

Transition	Obs	Mean	Std	10%	Median	90%
10 Categories						
On Diagonal	24	43.9%	93.8%	−43.0%	14.8%	152.7%
Off Diagonal	99	109.1%	167.9%	−22.3%	51.0%	318.3%
4 Categories						
On Diagonal	37	67.0%	111.3%	−29.2%	18.9%	225.4%
Off Diagonal	86	109.0%	173.4%	−28.0%	51.9%	315.0%

E Occupational switch

Table 16 reports the probability of staying in the same occupation from the last job before college completion to the first job afterward, from the second last to the last job before college completion, and from the first to the second job after college completion. Also, Table 17 shows the wage change from the last job before college graduation to the first job afterward. We separately report the statistics of wage changes for respondents when staying in the same occupation category and switching from one category to another.

Table 18: Distribution of Industry: Before and After

		Before		**After**	
Group	Categories	Proportion	Wage	Proportion	Wage
1	Agriculture, Forestry, and Fisheries	5.8%	7.0	2.1%	8.7
2	Mining, Utility and Construction	10.6%	9.0	5.2%	15.2
3	Durable goods	7.6%	10.2	6.8%	16.3
4	Nondurable goods	5.8%	8.3	7.6%	12.4
5	Wholesale and Retail	24.9%	8.5	18.5%	11.6
6	Service (high end)	27.3%	7.7	48.3%	15.9
7	Service (low end)	18.0%	8.3	11.5%	11.7

Table 19: Transition Matrix across Industry Categories

From \To	1	2	3	4	5	6	7
1	33.3	0.0	0.0	33.3	0.0	33.3	0.0
2	11.1	22.2	0.0	11.1	0.0	44.4	11.1
3	0.0	18.2	18.2	9.1	18.2	36.4	0.0
4	0.0	0.0	16.7	16.7	16.7	50.0	0.0
5	3.3	3.3	6.7	0.0	33.3	40.0	13.3
6	2.0	8.2	6.1	8.2	2.0	57.1	16.3
7	0.0	4.2	8.3	4.2	20.8	45.8	16.7

F Industry transitions

In Tables 18 and 19, we repeat the same exercises as in Section 3.2.1 for industry categories rather than occupations. We do not see differences as strong as in the case of occupations.

G Continuous measurement for occupation distance

Here we create a continuous measurement of occupational distance to examine the difference of occupational choices before and after college graduation. NLSY79 provides three types of information about the respondents' occupations. The first is 1970 Census codes associated with each of the first five jobs in each calender year (Occupation (Census 3 Digit, 70 Codes) Job #). The second is 1980 Census codes associated with identified CPS jobs in each calender year (Concept: Occupation at Current Job/Most Recent Job (80 Census 3 Digit) CPS Item). The third is 2000 Census codes associated with identified CPS jobs in each calender year since

2000 (Occupation (Census 4 Digit, 00 Codes) Job #). To obtain as much information as possible, we choose occupation variables with 1970 Census codes.

Dictionary of Occupational Titles (DOT) provides skill contents for each occupation, and measures the complexity of tasks with respect to 57 characteristics, including clerical perception, abstract and creative activities, data preference, and communication. However, the occupation codes in the DOT use 1980 Census standard. Denote each occupation in 1980 as o^{80}. The skill content of each occupation can be characterized by a 57-dimensional vector, $Q_o^{80} = \{q_{o1}, \cdots, q_{oJ}\}$, where $J = 57$. Next, we need to convert 1980 codes into 1970 ones. Census provides a crosswalk between these two standards. In particular, each occupation in the 1970 codes corresponds to one or multiple occupations in the 1980 codes and the associated shares for occupations in the 1980 codes. For example, computer programmers in the 1970 codes are associated with 6% computer systems analysts and scientists and 94% computer programmers in the 1980 code standard. Here we assume that the skill content of each occupation in the 1970 codes can be expressed as a linear combination of the skill content of occupations in the 1980 standard. In particular, for each occupation o' in 1970, $Q_{o'}^{70} = \alpha_{o'1} Q_1^{80} + \cdots + \alpha_{o'O} Q_O^{80}$, where $\alpha_{o'o}$ is the male population share of occupation o using the 1980 codes in occupation o' using the 1970 code, provided by the crosswalk. Thus the skill content of each occupation in 1970 can also be characterized by a 57-dimensional vector, $Q_{o'}^{70} = \{q_{o'1}, \cdots, q_{o'J}\}$, where $q_{o'j} = \sum_{o=1}^{O} \alpha_{o'o} q_{oj}$ for $\forall\ j$. In total, we have 420 occupations.

With such skill content vectors for 1970 occupations, we use two measures of the distance between two occupations, Euclidean distance and angular separation, as in Gathmann and Schönberg (2010). For two 1970 occupations o and o', Euclidean distance $D_{oo'}^{ED}$ and angular separation $D_{oo'}^{AS}$ are defined as

$$D_{oo'}^{ED} = \sqrt{\sum_{j=1}^{J} \left(q_{oj} - q_{o'j}\right)^2} \tag{2}$$

and

$$D_{oo'}^{AS} = \frac{\sum_{j=1}^{J} q_{oj} q_{o'j}}{\sqrt{\sum_{j=1}^{J} q_{oj}^2} \sqrt{\sum_{j=1}^{J} q_{o'j}^2}}. \tag{3}$$

Table 20: Continuous Measurement using DOT

	Mean	Std	10%	Median	90%	Corr
All Variables						
D^{ED}	2.99	0.85	1.88	2.97	4.12	
D^{AS}	0.25	0.14	0.09	0.23	0.45	0.97
Variables in Autor et al. (2003)						
D^{ED}	0.86	0.31	0.45	0.85	1.27	
D^{AS}	0.22	0.15	0.05	0.20	0.43	0.81

Autor et al. (2003) argue that variables in the DOT are highly correlated so that several variables can be selected to present routine/nonroutine cognitive/manual tasks. In particular, two variables, namely DCP and GED-MATH, measure nonroutine cognitive tasks; STS, FINGDEX, and EYEHAND are respectively employed to measure routine cognitive task, routine manual task, and nonroutine manual task.

Following Autor et al. (2003), we calculate the percentile for each DOT variables across occupations. Table 20 shows the summary statistics of the two measurements defined in (2) and (3) using a full set of variables and variables chosen in Autor et al. (2003).[22] The two measurements show high correlation, namely 0.97 and 0.81. Moreover, the correlation between two angular separations is 0.68.

Next, we examine the occupational distances using NLSY79. Table 21 displays the distance of the occupations of the last two jobs before college graduation, the last job before graduation and the first one afterward, and the first two jobs after college graduation. Figures 8 and 9 display the kernel density of occupation distance in these three scenarios, using a different full set of variables and variables selected in Autor et al. (2003). We can see that the occupational distances between two consecutive jobs is the largest at the transition after the college. This is consistent with the dramatic change in the occupational mix before and

[22]Since in NLSY79 no respondents have reported having occupations in private household workers. Thus we delete this category from 1970 Census occupation. The results are similar if it is included.

Table 21: Summary statistics of D^{AS} for NLSY79

	Obs	Mean	Std	10%	Median	90%
All Variables						
Transition	132	0.18	0.12	0.03	0.18	0.32
Before	120	0.11	0.10	0.00	0.09	0.25
After	101	0.14	0.13	0.00	0.13	0.34
Variables in Autor et al. (2003)						
Transition	132	0.17	0.13	0.01	0.15	0.34
Before	120	0.13	0.15	0.00	0.09	0.35
After	101	0.14	0.16	0.00	0.08	0.36

Table 22: Summary statistics of D^{ED} for principal components using NLSY79

	Obs	Mean	Std	10%	Median	90%
Transition	132	1.7	1.0	0.4	1.5	3.0
Before	121	1.2	1.0	0.0	1.1	2.5
After	101	1.3	1.1	0.0	1.3	2.9

after college graduation in Section 3.2.1.

Moreover, because variables in the DOT are highly correlated with each other, and selection as in Autor et al. (2003) requires more pre-knowledge about variables, we apply the principal component analysis as in Yamaguchi (2012). Figures 10 through 13 display the location of different occupation on two-factor space. Table 22 displays the Euclidean distance of occupations of jobs held before, at college graduation, and after college graduation. Figure 14 displays the kernel density. The main result remains the same: the occupational distance is the greatest at the transition from college.

Figure 8: Kernel density: Occupation distances using all variables D^{AS}

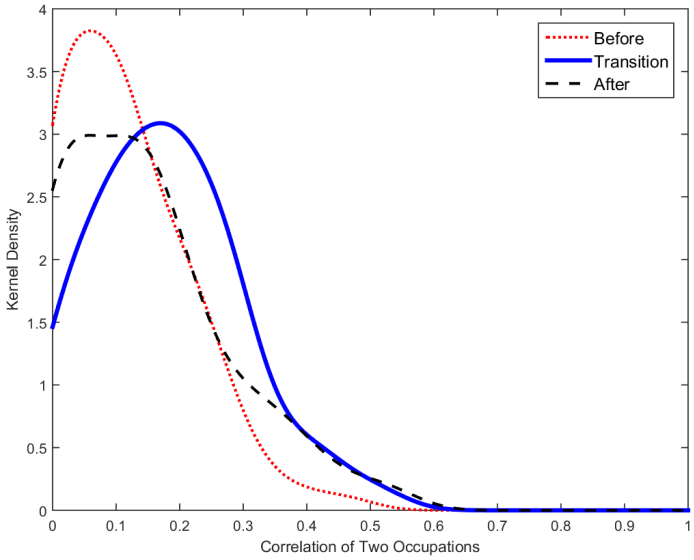


Figure 9: Kernel density: Occupation distances using D^{AS} of variables in Autor et al. (2003)

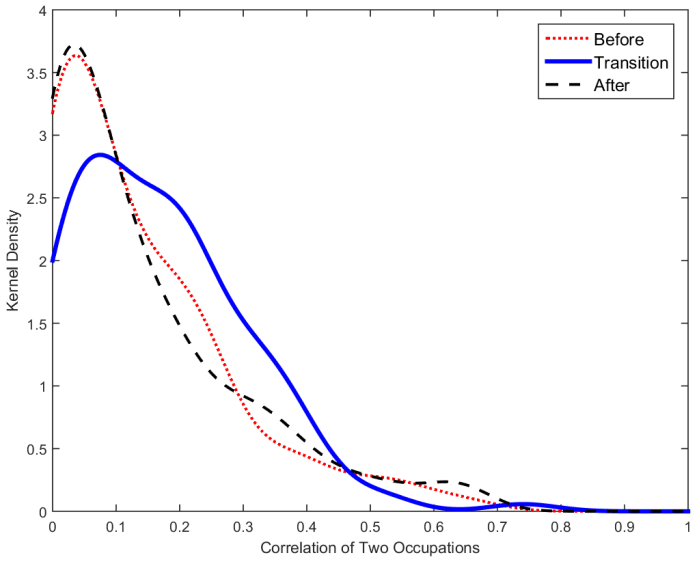


Figure 10: Difference between nonroutine cognitive and nonroutine manual

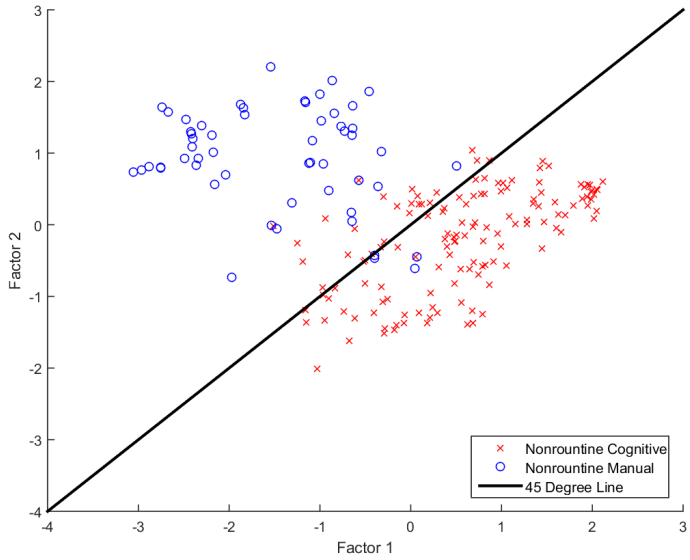


Figure 11: Difference between routine cognitive and routine manual

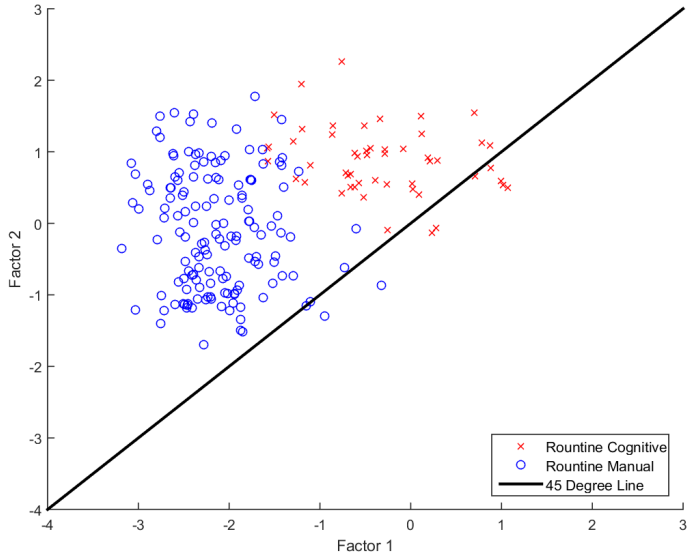


Figure 12: Difference between nonroutine and routine cognitive

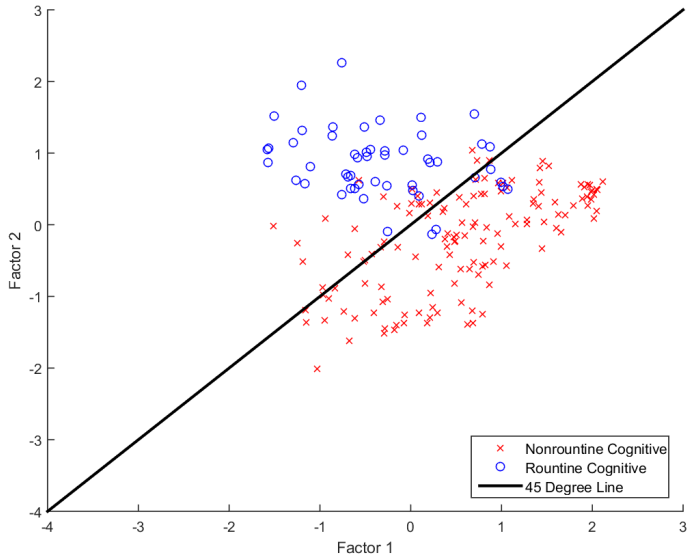


Figure 13: Difference between nonroutine and routine manual

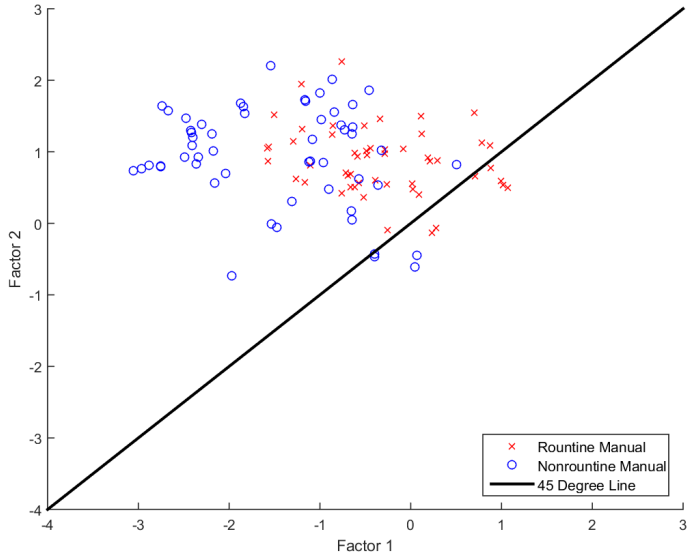
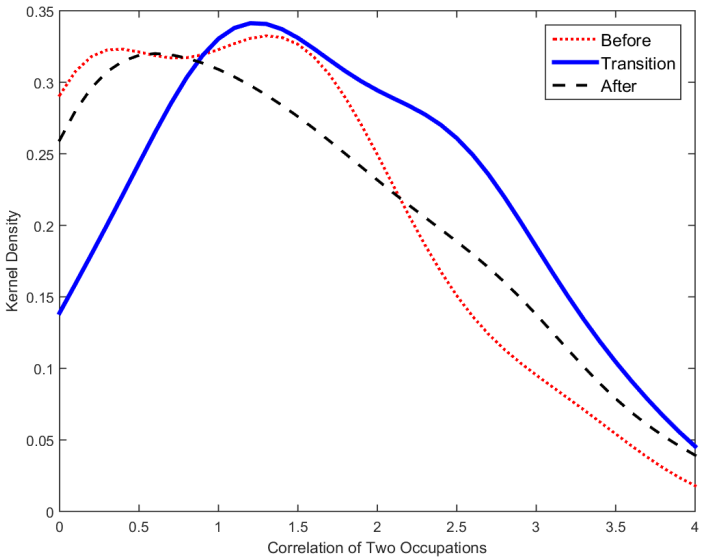


Figure 14: Kernel density: Occupation difference using principal components D^{ED}



H Part-time jobs

In the main text, we only considered full-time jobs. In this appendix, we re-calculate our main figures and tables including part-time jobs.

Figure 15: Wage Evolution: Weighted Average vs CPS (2009 dollar)

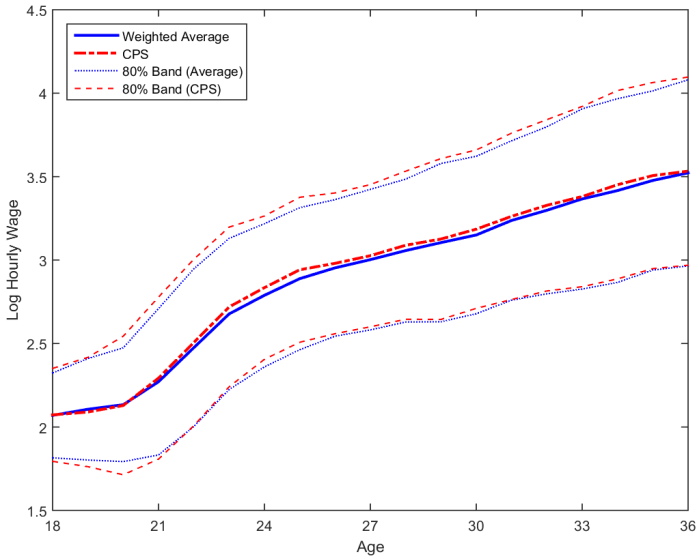


Table 23: Average cumulative jobs by years since labor market entry

		Years since labor market entry									
	Obs	1	2	3	4	5	6	7	8	9	10
High School	1666	1.9	3.0	4.0	4.9	5.8	6.7	7.6	8.5	9.4	10.2
Some College	712	1.9	3.1	4.2	5.1	6.0	7.0	7.9	8.8	9.6	10.4
College	655	1.8	3.1	4.2	5.3	6.3	7.3	8.1	9.0	9.7	10.6
College ($\leq$ 23)	429	1.8	3.1	4.3	5.4	6.5	7.4	8.2	9.1	9.8	10.5
Full Sample	3033	1.9	3.0	4.1	5.1	6.0	6.9	7.8	8.7	9.5	10.3
Topel and Ward		1.6	2.5	3.2	3.9	4.6	5.1	5.7	6.1	6.5	7.0

Figure 16: Average wage paths for samples with and without JBCC (2009 dollar)

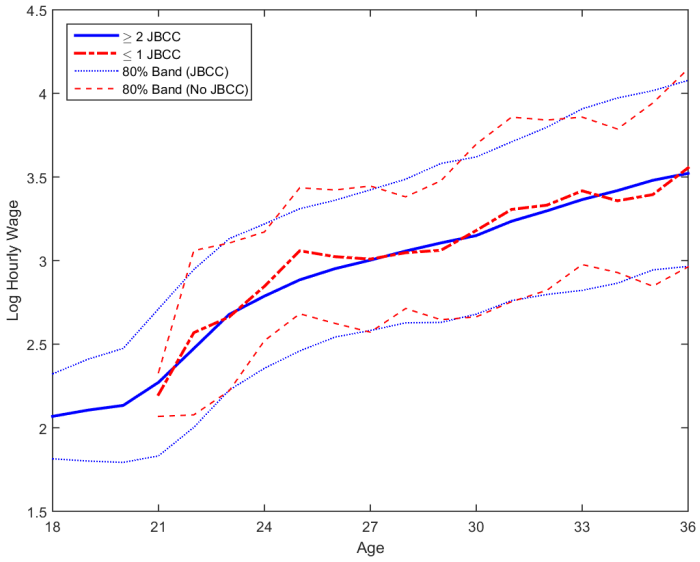


Figure 17: Average wage paths for samples with and without summer jobs

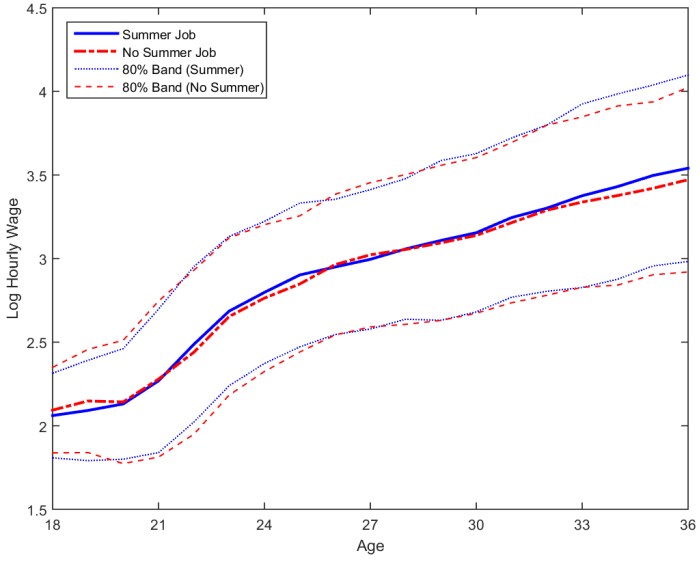


Figure 18: Average wage paths for samples with and without temporary jobs

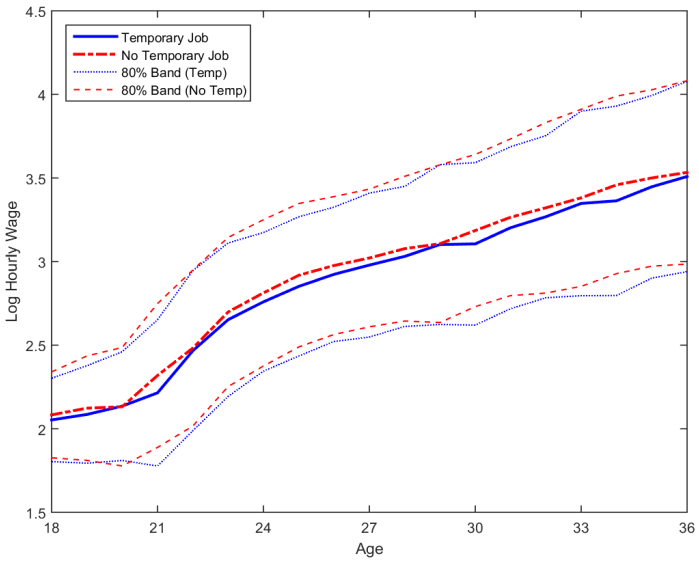


Figure 19: Average wage paths for samples with and without regular long-term Jobs

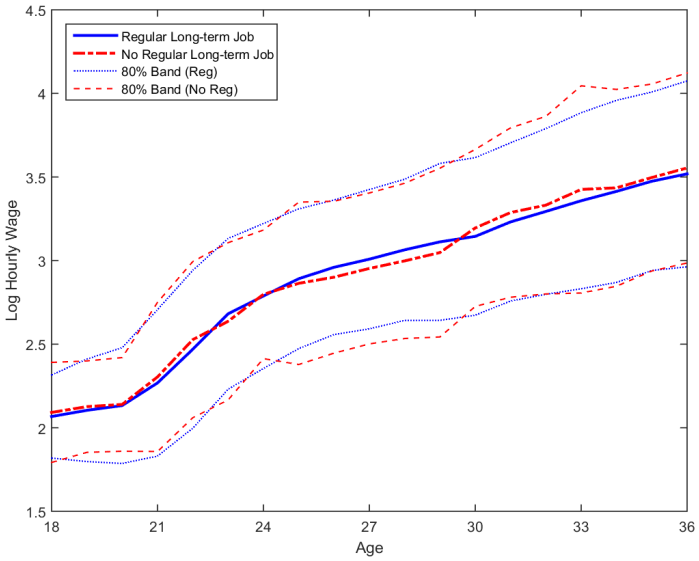


Table 24: Average cumulative full-time jobs by years since labor market entry

			Years since labor market entry									
	Obs	Age	1	2	3	4	5	6	7	8	9	10
All Jobs	429	18.2	1.8	3.1	4.3	5.4	6.5	7.4	8.2	9.1	9.8	10.5
Type 1	428	18.2	1.8	2.6	3.3	4.3	5.2	6.2	7.0	7.8	8.5	9.3
Type 2	429	18.2	1.7	2.8	3.9	4.9	5.9	6.8	7.6	8.5	9.2	9.9
Type 3	429	18.8	1.3	2.1	2.8	3.5	4.3	5.2	6.0	6.8	7.5	8.2
Type 4	428	19.4	1.3	1.5	1.8	2.2	2.9	3.7	4.5	5.3	5.9	6.7

Table 25: Average cumulative full-time jobs by age

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
All Jobs	1.8	3.0	4.2	5.3	6.4	7.3	8.1	9.0	9.7	10.4	11.2	11.8	12.5	13.1	13.6	14.0	14.3	14.7
Type 1	1.2	2.0	2.7	3.5	4.5	5.5	6.3	7.1	7.8	8.6	9.3	10.0	10.6	11.2	11.7	12.1	12.5	12.9
Type 2	1.6	2.7	3.7	4.7	5.7	6.6	7.4	8.3	9.0	9.7	10.4	11.1	11.8	12.4	12.8	13.2	13.6	14.0
Type 3	1.6	2.7	3.7	4.7	5.7	6.6	7.4	8.3	9.0	9.7	10.4	11.1	11.8	12.4	12.8	13.2	13.6	14.0
Type 4	0.0	0.0	0.0	0.3	0.9	1.7	2.5	3.4	4.1	4.8	5.6	6.3	6.9	7.5	8.0	8.4	8.7	9.1

I Samples graduating before age 25

In this section, we relax our restrictions on the college graduation age to 25 instead of 23 and re-calculate all main results.

Figure 20: Wage evolution: weighted average vs CPS (2009 dollar)

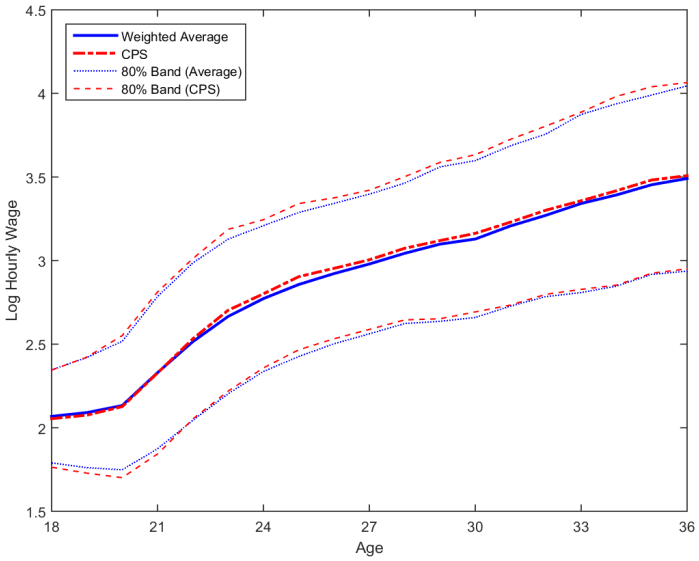


Table 26: Average cumulative full-time jobs by years since labor market entry

			Years since labor market entry									
	Obs	Age	1	2	3	4	5	6	7	8	9	10
High School	1655	18.6	1.6	2.4	3.2	4.0	4.8	5.5	6.3	7.0	7.7	8.3
Some College	710	18.7	1.5	2.4	3.2	3.9	4.7	5.5	6.3	7.0	7.7	8.3
College	652	18.7	1.3	2.1	2.8	3.5	4.3	5.0	5.7	6.4	7.0	7.8
College($\leq$ 25)	511	18.7	1.3	2.0	2.7	3.5	4.2	5.0	5.7	6.4	7.0	7.7
Full Sample	3017	18.7	1.5	2.3	3.1	3.8	4.6	5.4	6.1	6.8	7.5	8.1
Topel and Ward			1.6	2.5	3.2	3.9	4.6	5.1	5.7	6.1	6.5	7.0

Figure 21: Average wage paths for samples with and without JBCC (2009 dollar)

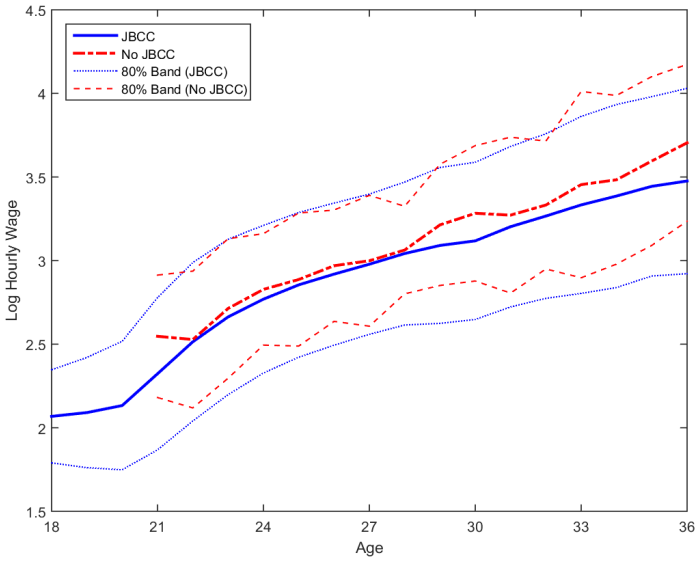


Figure 22: Average wage paths for samples with and without summer jobs

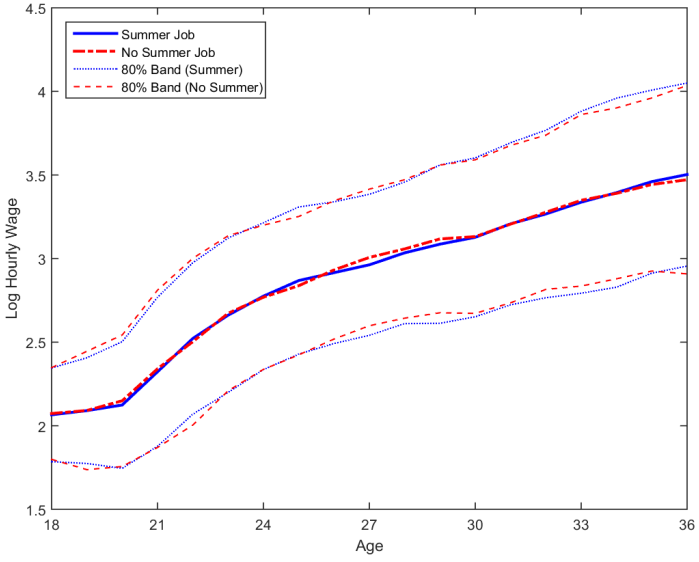


Figure 23: Average wage paths for samples with and without temporary Jobs

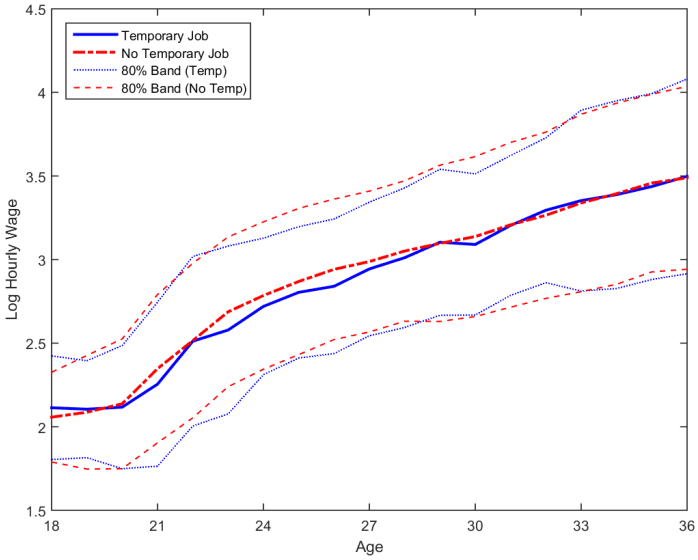


Figure 24: Average wage paths for samples with and without regular long-term jobs

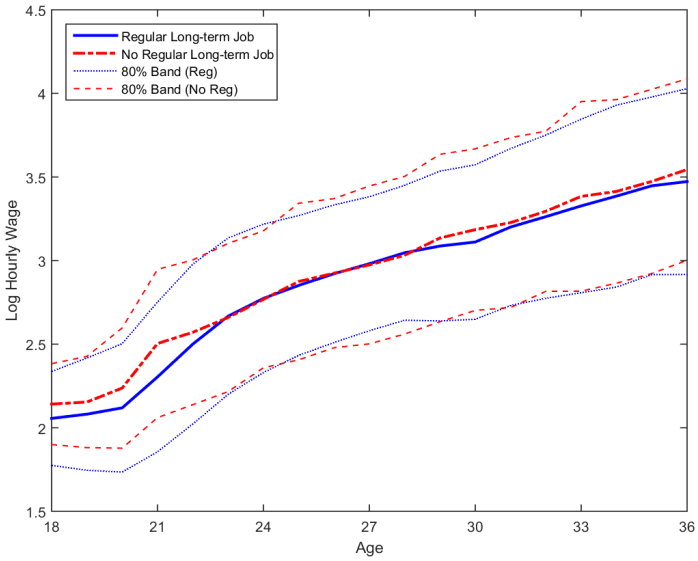


Figure 25: Average wage paths before and after college graduation

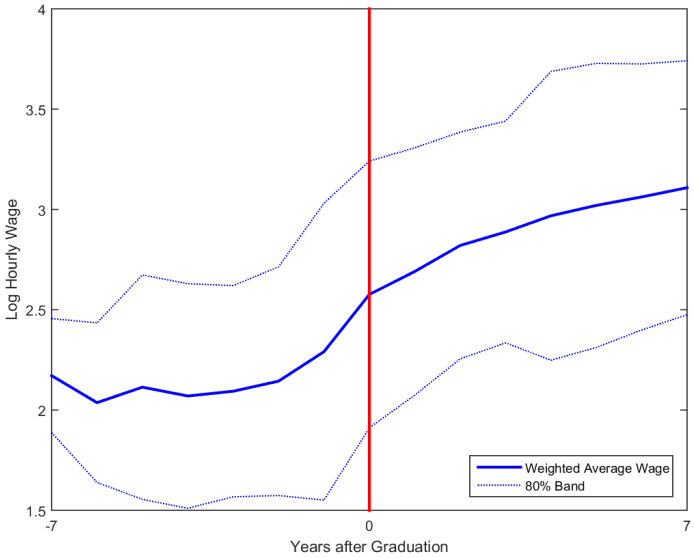


Table 27: Average cumulative full-time jobs by years since labor market entry

			Years since labor market entry									
	Obs	Age	1	2	3	4	5	6	7	8	9	10
All Jobs	511	18.7	1.3	2.0	2.7	3.5	4.2	5.0	5.7	6.4	7.0	7.7
Type 1	511	18.9	1.3	1.8	2.2	2.8	3.6	4.3	5.0	5.7	6.3	7.0
Type 2	511	18.8	1.2	1.9	2.6	3.3	4.1	4.8	5.5	6.2	6.8	7.5
Type 3	509	19.8	1.2	1.7	2.2	2.7	3.4	4.0	4.7	5.4	6.0	6.7
Type 4	508	20.6	1.2	1.5	1.9	2.4	3.0	3.6	4.3	4.9	5.5	6.1

Table 28: Average cumulative full-time jobs by age

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
All Jobs	0.9	1.6	2.3	2.9	3.7	4.4	5.1	5.9	6.6	7.3	7.9	8.6	9.2	9.7	10.2	10.6	10.9	11.3
Type 1	0.5	0.9	1.3	1.8	2.5	3.3	4.0	4.8	5.4	6.1	6.8	7.4	8.0	8.6	9.0	9.4	9.8	10.2
Type 2	0.8	1.5	2.1	2.8	3.5	4.2	4.9	5.7	6.3	7.0	7.7	8.3	8.9	9.5	9.9	10.3	10.7	11.1
Type 3	0.8	1.5	2.1	2.8	3.5	4.2	4.9	5.7	6.3	7.0	7.7	8.3	8.9	9.5	9.9	10.3	10.7	11.1
Type 4	0.0	0.0	0.0	0.2	0.6	1.2	1.8	2.6	3.2	4.0	4.6	5.3	5.9	6.4	6.9	7.3	7.6	8.0

Additional References for Appendix

[1] Autor, David, Frank Levy, and Richard Murnane (2003). "The Skill Content of Recent Technological Change: an Empirical Exploration." *Quarterly Journal of Economics* 118, 1279–1333.

[2] Gathmann, Christina and Uta Schönberg (2010). "How General is Human Capital? A Task-Based Approach." *Journal of Labor Economics* 28: 1–49.

[3] Ruhm, Christopher J. (1997). "Is High School Employment Consumption or Investment?." *Journal of Labor Economics* 15, 735–776.

[4] Yamaguchi, Shintaro (2012). "Tasks and Heterogeneous Human Capital." *Journal of Labor Economics* 30: 1–53.