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Higher Education, Productivity Revelation and Performance-pay Jobs†

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This paper examines the differences between the subsequent careers of high school and college graduate workers based on a direct role of college graduation with regard to the revelation of workers' individual abilities. Using NLSY79, we document a positive relationship between off-the-job training/performance-pay jobs and ability for high school graduates at the early stages of their careers. However, this relationship is less prominent for college graduates. Moreover, we show that high ability is associated with more jobs, which reflects higher job mobility, only for high school graduates. We argue that these patterns are the result of productivity-revealing behavior of high school graduates, whose individual abilities, unlike college graduates, is not observed precisely at the beginning of their careers.

Key Word: Productivity Revealing, Off-the-job Training, NLSY79, Performance-pay Jobs, Job Mobility, College Education
JEL Code: I20, J24

I. Introduction

Since Spence (1973), one of well-known functions of higher education has been to signal ability. In the traditional signaling model, individuals with high ability reveal their ability by sorting into higher education. However, a recent paper by Arcidiacono, Bayer, and Hizmo (2010) (ABH (2010) hereafter) finds that college graduation plays a direct role in revealing the productivity of individuals to the labor market rather than simply categorizing these individuals as college graduates. In particular, ABH (2010) documents how the wages of college graduates are

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correlated with their own abilities, whereas this is not the case for the wages of high school graduates, at least not in the beginning of their careers.[1] There are several additional studies that document the pooling of young high school graduates. For instance, Bishop (1994) and Rosenbaum (1990) demonstrate that having both cognitive and non-cognitive skills—both of which are believed to be related to productivity—is not reflected in the wages of young high school graduates. Thus, at the early stages of their careers, high-ability high school graduates tend to be "pooled" with low-ability high school graduates.

The goal of this paper is to document the effects of higher education on the post-schooling careers of workers based on the role of higher education, i.e., to reveal ability. In particular, based on evidence of the role of higher education in revealing ability, we argue that this role yields clear implications regarding workers' productivity-revealing behaviors after they enter the job market. To be more accurate, if the individual abilities of high school graduates are not directly observable, high-ability high school graduates will not be appropriately compensated. Thus, their wages will be set based on the average ability of high school graduates. As a result, it is likely that high-ability high school graduates will engage in activities that will separate them from low-ability high school graduates after they start their careers. More specifically, we predict that high-ability high school graduates will be more likely to obtain off-the-job training and more likely to sort themselves into performance-pay jobs in which wages are closely related to individual ability.

Unlike high school graduates, high-ability college graduates are not expected to engage in costly activities to separate themselves from those with low ability given that the abilities of college graduates are already apparent from the beginning of their careers. Thus, the probability of participating in off-the-job training and sorting into performance-pay jobs would not be positively correlated with the measure of ability among college graduates at the early stages of their careers. Moreover, we expect that high-ability high school graduates tend to have more jobs than their low-ability counterparts considering that they move to better jobs. However, college graduates will not necessarily exhibit this pattern. Specifically, as college graduates are assigned to jobs according to their abilities from the beginning of their careers, they do not have to change jobs at the cost of firm-specific human capital. Thus, job mobility among college graduates will be determined by factors that are not related to worker abilities, such as a random job match between an employer and an employee.

We examine these patterns of worker's post-schooling behaviors using NLSY79 data by documenting different relationships between AFQT scores and productivity-revealing activities across high school and college graduates. These patterns coincide with the prediction of the signaling model under a different degree of asymmetric information between employers and workers across the two groups.

This paper contributes to the literature by illustrating the role of post-schooling

[1]Many aspects of college education can identify the abilities of young college graduates; in Hoxby (1997), college students' abilities are homogeneous within a university but heterogeneous across universities. Given the sorting of students by the ranking or selectivity of colleges, potential employers can obtain fairly accurate information about college graduates via the names of their alma maters.

signaling as a possible mechanism explaining how the wages of workers with only a high school degree eventually reflect their individual abilities. Since the seminal work of Farber and Gibbons (1996), the role of the employer learning on wage dynamics—young workers' wages eventually being positively related to AFQT scores—is well documented by several papers (Altonji and Pierret, 2001; Bauer and Haisken-Denew, 2001). The basic employer learning model hinges on public or symmetric employer learning, assuming that the current employer's information about the workers is shared with *all* potential employers. However, the existence of private or asymmetric learning of employers—and the game theory issues related to it—can complicate the plausible mechanism of employer learning. As a result, only a small number of papers such as Schönberg (2007) and Pinkston (2009) have proposed an employer learning mechanism that explains wage dynamics under private or asymmetric learning of employers. However, given the high mobility of high school graduates in the early stages of their career (Topel and Ward, 1992), it seems unrealistic that information about average young workers could be accumulated in a short time and then passed to outside employers through a rather complicated process without significant losses of the information.

By focusing on the incentives of high-ability workers to reveal their productivity, this paper provides an alternative story regarding the wage dynamics of young workers. Unlike employers who do not have an incentive to reveal information about their high-ability workers, high-ability workers have a strong incentive to reveal their abilities to their potential employers through productivity-revealing activities. Because the worker will signal their abilities to all potential employers, one does not have to consider the transmission of information across employers. Moreover, explaining wage dynamics using workers' incentives is more intuitive than relying on employer learning, as it emphasizes the role of workers who will actually gain from the revelation of productivity and its related wage increases.[2]

The rest of this paper is organized into the following sections. Section II provides an overview of NLSY79 and the sample construction process. In Section III, we describe individuals' sorting behaviors into higher education and draw testable implications regarding subsequent aspects of post-schooling careers followed by the identification strategy and the estimating equations. In Section IV, we present the main empirical results that verify the hypotheses regarding productivity-revealing activities and the number of jobs. Section V presents concluding remarks.

II. Data

To verify our hypotheses regarding workers' post-school behaviors empirically, we use NLSY79 data for the period of 1979-2006. This dataset has been compiled at regular intervals (annually since 1979 and biannually since 1994). The respondents were aged between 14 and 22 at the beginning of the survey. The data have a number of advantages for analyzing post-schooling signaling behaviors. In particular, NLSY79 focuses on the early stage of respondents' careers, when

[2]Employers will be indifferent about the wage distribution in this setting as long as the average wage equals the average productivity of workers.

productivity-revealing activities are most likely to have an impact. Moreover, for the focused analysis of post-school behaviors here, information regarding workers' abilities is essential. NLSY79 contains the results of AVSAB tests, which can be converted into AFQT scores. AFQT scores in NLSY79 are widely accepted as a pre-market measure of ability. Lastly, the data contain detailed information about the training of workers and their job characteristics, including the payment structures of jobs.

For the main analysis, we restrict the sample to white males in order to avoid tracking career variations that may arise from differences in race and/or gender.[3] Following ABH (2010), we also limit the sample to the respondents who have completed 12 or 16 years of education and exclude high school dropouts and individuals who have completed some college education. We exclude respondents who have military jobs or, jobs without pay, who are self-employed in CPS (main) jobs, or who work for a family business. We also drop labor market experience accumulated before individuals left school for the first time. Furthermore, we restrict our scope of the analysis to individuals for whom the potential experience duration is less than 13 years, thereby focusing on the early stages of their careers.[4] Another reason for this sample construction stipulation, as explained in ABH (2010), is to keep the analysis simple by focusing on the approximately linear region of the relationship between log wages, AFQT scores, and potential experience.

The measure of ability, i.e., the AFQT score, is constructed using the definition provided by the Department of Defense and is standardized according to the age of the individual at the time of the test. The construction of the performance-pay indicator variable follows the method used by Lemieux, MacLeod, and Parent (2009). The performance-pay indicator variable takes a value equal to one if the wages of CPS jobs include a variable-pay component, such as a bonus, commission or piece-rate structure. With regard to the off-the-job training variable, we follow Parent (1999) and reclassify 12 training categories into three groups: on-the-job training (OJT), off-the-job training (OFT) and apprenticeships. In particular, the OFT indicator variable takes a value equal to one if the respondent took any form of OFT, such as by attending a business college, a nursing program or a vocational-technical institute, in a given year. We use the hourly wage rate of CPS jobs from the work history file as a measure of wages and obtain the real wage using the CPI index. The number of jobs in a given year is used as a proxy for the job mobility of workers.

Table 1 shows the summary statistics of the main analysis of the sample. As expected, the average of log wages and the average AFQT scores are higher for college graduates than for high school graduates. College graduates are more likely to take performance-pay jobs and to obtain training. Additionally, the compositions of training differ between the two groups, as high school graduates are more likely to obtain OFT and apprenticeships and are less likely to obtain OJT. However, there

[3]In Appendix, we include results based on all racial groups. These results are consistent with our main findings.

[4]Potential experience is defined as the number of years since a respondent initially finished their schooling.

TABLE 1—SUMMARY STATISTICS

	High School		College		Total	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
AFQT	0.323	0.797	1.272	0.454	0.595	0.835
Potential Experience	6.213	3.309	5.346	3.051	5.966	3.261
Log of Real Wage	6.409	0.474	6.837	0.537	6.530	0.529
Number of Jobs	4.621	3.746	2.982	2.588	4.156	3.535
Performance-pay Jobs (%)	24.12		38.94		28.93	
Training (%)	11.22		18.42		13.25	
Off-the-Job Training (%)	50.63		38.11		45.73	
On-the-Job Training (%)	41.79		67.19		51.73	
Apprenticeship (%)	11.11		3.54		8.15	
Region (%)						
Northeast	19.94		27.88		22.18	
North Central	35.87		28.44		33.77	
South	27.20		28.77		27.64	
West	16.99		14.91		16.40	
Urban Residence (%)	71.85		87.48		76.24	
Number of Observations	7,716		3,058		10,774	
Number of Individuals	988		437		1,425	

Note: The average and standard deviations are calculated over individual-by-year observations coming from a panel of 1979-2006. S.D. stands for standard deviation. Please refer to Section II for a detailed description of the variables.

is little difference in the number of jobs per year between college and high school graduates.

III. Empirical Framework

In this section, we describe individual's sorting behavior into higher education and draw testable implications regarding subsequent aspects of post-schooling careers. This is followed by descriptions of the identification strategy and the estimating equations.

In order to illustrate workers' postgraduate productivity-revealing activities, we assume that each worker has innate ability a, distributed as $F(a)$, and that employers do not have direct information about any individual worker's innate ability. First, an individual decides whether they will sort themselves into higher education or not. Under the commonly acknowledged assumptions of returns and the cost of engaging in higher education, a certain percentage of individuals from the top of the ability distribution have incentives to participate in higher education. Specifically, there is an ability cutoff a^* such that individuals whose ability is greater than a^* would receive higher education. Individuals who decide to receive higher education become college graduates and individuals who decide not

to enter higher education remain high school graduates.[5] After individuals finish their schooling and enter the job market, they then decide whether to engage in activities that will further reveal their abilities. Employers know that the average ability of college graduates is higher than the average ability of high school graduates. Moreover, given the role of higher education in revealing ability, college graduates will receive wages according to their individual abilities. However, with regard to wages, high school graduates will be pooled at the beginning of their careers, as employers cannot verify the individual abilities of fresh high school graduates. Thus, the wages of college graduate workers are positively correlated with their ability a, whereas the wages of high school graduates at the beginning of their careers will be the expected ability of high school graduate workers, $E(a \mid a < a^*)$, regardless of individual abilities a assuming a perfectly competitive labor market.

Thus, given these initial wages of high school graduates, some portion of high-ability high school graduates have incentives to engage in productivity-revealing activities to separate themselves from low-ability high school graduates and ultimately to gain compensation for their individual abilities. However, high-ability college graduates will not engage in costly productivity-revealing activities because they are already separated from both high school graduates and low-ability college graduates. We exploit this predicted difference in productivity-revealing activities, such as participation in off-the-job training and taking performance-pay jobs, between high school and college graduates to identify the effects of higher education on an individual's postgraduate career. In addition, we argue that job mobility will exhibit different patterns among high school and college graduates.

A. *Off-the-Job Training*

The literature on training mainly focuses on the human-capital-mediated effect of training on wage increases or job mobility (Lynch, 1991; 1992; Parent, 1999). In contrast, here we view training mainly as a means of revealing worker productivity. In particular, off-the-job training (OFT) is similar to schooling in the sense that the worker pays the cost of the training, while the contents of the training are not firm-specific. Given the similarities between off-the-job training and schooling, off-the-job training can be used as a signaling device. Thus, as traditional signaling theory (Spence, 1973) would predict, high-ability workers will be more likely to obtain OFT than their low-ability counterparts if they are not differentiated from their low-ability counterparts.

Therefore, for high school graduates whose abilities are not revealed at the beginning of their careers, the probability of receiving off-the-job training will be positively related to their AFQT scores, as high-ability high school graduates would participate in OFT to reveal their ability. However, for college graduates whose individual abilities are already apparent, the probability of obtaining OFT will not necessarily depend positively on measured ability. Moreover, because the

[5]It is important to note that the predictions and implications drawn in this section will be independent of whether the return is from signaling or human capital accumulation. That is, motivation for education does not matter as long as high-ability individuals proceed to higher education.

return from being separated from low-ability workers decreases with time, the probability of obtaining OFT will decrease more rapidly with experience for high-ability high school graduates compared to their low-ability counterparts. In other words, the experience gradient will be steeper for high-ability high school graduates whose motivation for taking OFT is positively affected by both signaling (productivity revealing) and human capital accumulation. However, we do not expect different experience gradients across abilities among college graduates given that high-ability college graduates do not have additional incentives to receive OFT in the early stages of their careers.

If OFT functions as a productivity-revealing device, one may consider that high-ability high school graduates would also be separated from low-ability high school graduates as soon as they take OFT and thus would be paid according to their ability. However, the strength of the signal from OFT is weaker than that of college education. Therefore, the ability of high school graduate workers with OFT would be revealed gradually, unlike college graduates.

B. *Performance-pay Jobs*

A recent paper by Lemieux, MacLeod, and Parent (2009) asserts that due to imperfect information about workers, high-ability workers will have an incentive to sort themselves into performance-pay jobs so that they can reveal their high productivity and receive wages that more closely reflect their abilities. Lemieux, MacLeod, and Parent (2009) supports this argument by comparing the average AFQT score for workers in performance-pay jobs with that of workers in non-performance-pay jobs. Adopting their view on performance-pay jobs, one can categorize sorting behavior into performance-pay jobs as a means to reveal the productivity of individual workers. Thus, given the role of higher education, the relationship between ability and having a performance-pay job among high school graduates will be different from that among college graduates.

To be more specific, because high school graduates are pooled with each other at the beginning of their careers, high-ability high school graduates would try to take performance-pay jobs and receive pay in relation to their individual abilities. However, unlike high school graduates, high-ability college graduates are already distinguished from their low-ability counterparts at the beginning of their careers. Thus, high-ability college graduates will have little incentive to choose to take performance-pay jobs and pay additional monitoring costs to reveal their high abilities. In other words, it is not necessary for high-ability college graduates to sort themselves into performance-pay jobs; in fact it could be considered wasteful in the early stages of their careers.

In sum, the probability of obtaining performance-pay jobs will depend positively on AFQT scores among high school graduates in the early stages of their careers, whereas among college graduates, the correlation between the probability of working at a performance-pay job and the AFQT score will not be positive.[6]

[6]A difference in the probability of working at performance-pay jobs between high school and college graduate workers can still exist, as college graduates are more likely to sort themselves into performance-pay jobs. This fact does not contradict our explanation given that the difference between average high school and college graduates can be explained by other factors, such as differences in the job characteristics of college and high school

C. *Number of Jobs*

The positive relationship between wage increases and job mobility for young high school graduates has been well documented by Topel and Ward (1992). They interpret the results as supportive evidence of the search theory, viewing job mobility as an important means of wage increases and as a step toward stable long-term employment for high school graduates.[7]

In our paper, we examine the number of jobs that workers take in a given year. This number is regarded as a measure reflecting the job mobility of workers. In particular, high-ability high school graduates will be more likely to exhibit higher job mobility than low-ability high school graduates as they engage in productivity-revealing activities to differentiate themselves from their low-ability counterparts and to move to better jobs. Thus, there will be a positive relationship between wage increases and the number of jobs among high school graduates, as high-ability high school workers seek and switch to better jobs with higher wages. Moreover, as high-ability high school graduates obtain the jobs they deserve, the incentive to move to other jobs will decrease over time and their careers will eventually stabilize. This implies that the negative relationship between the number of jobs and potential experience will be stronger for the high-ability high school graduates than for low-ability high school graduates.

However, high-ability college graduate workers will not have an incentive to move between jobs at the cost of firm-specific human capital, as college graduates are offered jobs according to their individual abilities from the beginning of their careers. That is, high-ability college graduate workers will not have to engage in costly job searches and endure the related job mobility to separate themselves from their low-ability counterparts in the early stages of their careers.

D. *Estimating Equation*

In this section, we document the different patterns of the relationship between ability and outcomes among high school and college graduates discussed in the earlier part of this section. We claim this difference as evidence supporting the effects of higher education on the subsequent careers of workers. To be specific, we verify a positive relationship between the incidence of productivity-revealing activities and ability among high school graduates, while we find a non-positive relationship among college graduates. We attribute this difference between the two groups to differences in their participation rates of productivity-revealing activities given the role of college graduation.

The main empirical specification closely follows employer learning literature and regresses the outcome variable on a measure of ability, potential experience, and the interaction between the two (Altonji and Pierret, 2001). The following equation will be estimated separately for high school graduate and college graduate workers,

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graduates.

[7]Unlike Topel and Ward (1992), Neumark (2002) views job mobility as a wasteful procedure. He argues that judgments of job mobility can differ between high school and college graduates.

$$(1) \quad Y_{it} = \beta_0 + \beta_1 AFQT_i + \beta_2 AFQT_i \times Exper_{it} + f(Exper_{it}) + \mathrm{X}_{it}'\Phi + \delta_t + e_{it},$$

where Y_{it} is the outcome variable, in this case the wage of worker i in time t, the number of jobs held in a given year, and a dummy variable for having a performance-pay job and engaging in off-the-job training. $Exper_{it}$ represents i's potential experience at time t and $f(Exper_{it})$ is a function of $Exper_{it}$. In the main analysis, we adopt a third-order polynomial function for potential experience. X_{it} includes the control variables such as the region of residence. The error term e_{it} is clustered at the individual level.

The coefficient of $AFQT_i$, β_1, indicates the correlation between the outcome variable and AFQT score at the beginning of an individual's career—when their potential experience is equal to zero. The coefficient of the interaction term, β_2, captures the difference in the correlation between experience and outcome across workers with different abilities. Our hypothesis will be supported by examining the differences in the statistical significance and the signs of the coefficients in each group.

IV. Results

This section provides empirical results that verify our hypotheses regarding participation in the productivity-revealing activities and job mobility of workers. We perform a regression analysis using equation (1) with various dependent variables, in this case indicators of receiving OFT and taking performance-pay jobs separately for high school graduate and college graduate samples. Tables 2 through 5 report the results from the regression for each group of workers for the dependent variables, and they also provide p-values from tests comparing the coefficients based on the two different samples. Specifically, columns (1) and (3) of each table report the result of estimating equation (1) *without* the interaction term between AFQT and potential experience for high school and college graduates, respectively. Therefore, the estimated coefficients of AFQT in columns (1) and (3) indicate the overall relationship between AFQT and the outcome variable for the first 13 years of the workers' careers. Columns (2) and (4) report the estimation result of the equation (1) for high school and college graduates, respectively.

A. *Does Higher Education Fulfill the Role of Revealing Ability? Replication of ABH (2010)*

Before we present our main results, we present the regression result using wage as a dependent variable, which will confirm that our main sample exhibits a result regarding wage dynamics identical to that in ABH (2010). That is, we show that the wages of college graduate workers are correlated with their own abilities at the

beginning of their careers, while the wages of high school graduate workers are not, at least in the beginning of their careers. Table 2 presents the results from estimating equation (1) with the log of real wage as an outcome variable separately for high school graduates and college graduates. It shows that our results regarding wages are qualitatively similar to those in ABH (2010). In particular, the AFQT coefficient in column (2) is positive but small and statistically insignificant, which implies that the wages of high school graduates do not reflect their cognitive abilities at the beginning of their careers — when their potential experience is zero. The positive and significant coefficient of the interaction term between AFQT scores and potential experience implies that the wages of high school graduates eventually reflect their individual abilities. In other words, high school graduates are pooled with each other at the beginning of their careers but are eventually separated by their AFQT scores. On the other hand, the coefficient of the AFQT score estimated with the college graduate sample, shown in column (4), is sizable, positive and significant, whereas the interaction term is small and insignificant. This result implies that college graduates are separated by their AFQT scores from the beginning of their careers and that the additional separation associated with experience is insignificant, unlike high school graduates. Taking into account that the variations in the AFQT scores are much smaller among college graduates than among high school graduates, this result appears to provide strong support for the argument that higher education has a productivity-revealing role.

TABLE 2—REPLICATING ABH (2010)

	High School		College		Test: College=HS P-value	
	(1)	(2)	(3)	(4)	(5)	(6)
AFQT	0.0765*** (.016)	0.00150 (.0173)	0.191*** (.0431)	0.152** (.0599)	0.013	0.015
Exper/10	1.192*** (.1931)	1.172*** (.1937)	1.314*** (.3793)	1.185*** (.3718)	0.775	0.976
AFQT*Exper/10		0.113*** (.0243)		0.0617 (.0902)		0.582
Adjusted R-squared	0.133	0.154	0.139	0.150		
N	7,406	7,194	2,970	2,850		
Additional Controls	No	Yes	No	Yes	No	Yes

Note: All specifications include a year fixed effect and squared and cubic terms for potential experience. Specifications (2) and (4) additionally control for the location of the residence and an urban residence. In columns (5) and (6), we report the p-values for the difference in the coefficients from specifications (1) and (3) as well as (2) and (4), respectively. Standard errors in parentheses are clustered at the individual level. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

B. *Off-the-Job Training*

Table 3 summarizes the results regarding off-the-job training separately for the high school graduate and college graduate samples. For high school graduates, the AFQT coefficient in column (2) is positive and statistically significant, which implies that high-ability high school graduates are more likely to engage in OFT than their low-ability counterparts at the beginning of careers. Moreover, the negative coefficient of the interaction term between AFQT scores and potential experience implies that high-ability high school graduates are more likely to undertake an OFT at the beginning of their careers compared to low-ability high school graduates. This result also supports our hypotheses, as the return for revealing productivity through OFT is higher in the early stages of a career. Thus, high-ability high school graduates will engage in OFT more intensively in the earlier stages of their careers.

The results based on the college graduate sample show a different pattern. They show that the probability of engaging in OFT does not depend positively on the AFQT scores in the early stages of their careers, as the AFQT coefficient in column (4) is not statistically significant. The positive coefficient of the interaction term between AFQT scores and potential experience is evidence against the possibility of OFT being used as a productivity-revealing device for high-ability college graduates. If OFT is used as a productivity-revealing device for high-ability college graduate workers, they would have received OFT more in the early stages of their careers and the coefficient of AFQT and the interaction term would accordingly have exhibited the same patterns as they do for high school graduates. Overall, the evidence supports the contention that for college graduates, revealing productivity is not a dominant motivation for receiving OFT.

TABLE 3—OFF-THE-JOB TRAINING

	High School		College		Test: College=HS P-value	
	(1)	(2)	(3)	(4)	(5)	(6)
AFQT	0.0121*** (.0038)	0.0258*** (.0075)	0.000374 (.0129)	-0.0396 (.0245)	0.382	0.010
Exper/10	-0.497*** (.1219)	-0.481*** (.1237)	-0.0561 (.1857)	-0.152 (.1989)	0.047	0.160
AFQT*Exper/10		-0.0235** (.0114)		0.0790** (.0364)		0.007
Adjusted R-squared	0.008	0.009				
N	6,769	6,573	2,683	2,576		
Additional Controls	No	Yes	No	Yes	No	Yes

Note: All specifications include a year fixed effect and squared and cubic terms for potential experience. Specifications (2) and (4) additionally control for the location of the residence and an urban residence. In columns (5) and (6), we report the p-values for the difference in the coefficients from specifications (1) and (3) as well as (2) and (4), respectively. Standard errors in parentheses are clustered at the individual level. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

C. *Performance-pay Jobs*

As discussed earlier in Section III. B, high school graduates with high ability would have an incentive to work at performance-pay jobs in the early stages of their careers in order to receive pay reflecting their individual abilities, whereas college graduates would have limited incentives to choose performance-pay jobs. Therefore, if our hypotheses are correct, we would find a positive coefficient of AFQT scores for high school graduates according to equation (1) with an indicator of having a performance-pay job as an outcome variable. For college graduates, we expect a non-positive AFQT coefficient.

Note that our main specification for the result regarding performance-pay jobs will only have the AFQT score and measure of potential experience as the main independent variables due to data limitations. The data from the question about performance-pay jobs were collected between 1988 and 1990 and between 1996 and 2000, when most of respondents had already gained approximately from 7 to 8 years of potential experience. As a result, the estimation of β_1 in equation (1), which estimates the AFQT scores and the outcome at the beginning of workers' careers, will be unreliable when we include the interaction between AFQT scores and potential experience. Moreover, because the collection of information about performance pay is not continuous, β_2, which estimates the relationship between performance pay and experience, will also be unreliable. Thus, we only look at whether sorting into a performance-pay job depends on AFQT for the first 13 years of the workers' careers. Thus, the our hypotheses will be verified by examining whether there is a difference in the relationship between having a performance-pay job and ability in the first 13 years of an individual's career across the two groups.

TABLE 4—PERFORMANCE-PAY JOBS

	High School		College		Test: College=HS P-value	
	(1)	(2)	(3)	(4)	(5)	(6)
AFQT	0.0351** (.0138)	0.153** (.0605)	-0.0334 (.0481)	-0.209** (.0939)	0.171	0.002
Exper/10	1.275 (1.176)	0.858 (1.227)	2.213*** (.7505)	2.103*** (.7695)	0.501	0.390
AFQT*Exper/10		-0.118* (.0669)		0.307** (.1436)		0.007
Adjusted R-squared	0.003	0.007	0.018	0.027		
N	1,917	1,898	933	922		
Additional Controls	No	Yes	No	Yes	No	Yes

Note: All specifications include a year fixed effect and squared and cubic terms for potential experience. Specifications (2) and (4) additionally control for the location of the residence and an urban residence. In columns (5) and (6), we report the p-values for the difference in the coefficients from specifications (1) and (3) as well as (2) and (4), respectively. Standard errors in parentheses are clustered at the individual level. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Our estimation results support the described different patterns of taking performance-pay jobs between high school and college graduate workers. As shown in column (1) of Table 4, the probability of having a performance-pay job depends positively on the AFQT score for high school graduates in the first 13 years of their careers. This result is consistent with our hypotheses that high-ability high school graduates will work at performance-pay jobs to reveal their ability in the early stages of their careers.

However, for college graduates, AFQT scores are not positively associated with the probability of obtaining performance-pay jobs during the early stages of their careers, as the coefficient in column (3) is negative and statistically insignificant. The estimation result for college graduates shows that high-ability college graduates have little incentive to take performance-pay jobs under productivity-revealing motives, unlike high school graduate workers.

D. *Number of Jobs*

In order to examine our hypotheses described in Section III. C regarding number of jobs, we use the number of jobs in a given year as a dependent variable in equation (1), and Table 5 documents the results. As the coefficient of AFQT in column (2) is positive, the number of jobs is positively related to ability among high school graduates at the beginning of their careers. In particular, an increase of one standard deviation in the AFQT scores is associated with 0.15 more jobs in the early stages of high school graduates' careers. The coefficient of the interaction term is negative for high school graduates. This result implies that the number of jobs among high-ability high school graduates will eventually stabilize over time.

TABLE 5—NUMBER OF JOBS

	High School		College		Test: College=HS P-value	
	(1)	(2)	(3)	(4)	(5)	(6)
AFQT	0.0613*** (.0193)	0.152*** (.0364)	-0.138*** (.0499)	-0.143 (.1006)	0.000	0.006
Exper/10	-1.445*** (.4669)	-1.377*** (.4657)	-3.500*** (.5976)	-3.393*** (.7047)	0.007	0.017
AFQT*Exper/10		-0.148*** (.0471)		0.0117 (.1575)		0.330
Adjusted R-squared	0.026	0.029	0.071	0.071		
N	7,406	7,194	2,970	2,850		
Additional Controls	No	Yes	No	Yes	No	Yes

Note: All specifications include a year fixed effect and squared and cubic terms for potential experience. Specifications (2) and (4) additionally control for the location of the residence and an urban residence. In columns (5) and (6), we report the p-values for the difference in the coefficients from specifications (1) and (3) as well as (2) and (4), respectively. Standard errors in parentheses are clustered at the individual level. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

However, the results for college graduates display different patterns. The result in column (4) suggests that unlike high school graduates, the number of jobs does not depend positively on AFQT scores for college graduates. The coefficients for both AFQT scores and the interaction term are either negative and/or statistically insignificant for college graduate workers. These results suggest that other factors that do not depend on the abilities of workers may be the major determinants of job mobility among young college graduates.

Overall, the results show that for the number of jobs, different patterns emerge among high school and college graduate workers. These differences could shed light on the source of the return from job mobility described in Topel and Ward (1992). As the number of jobs reflects job mobility, our results suggest that the return from the number of jobs among high school graduates arises from the correlation between ability—which is positively related to wages in the long run—and job mobility.

V. Conclusion and Discussion

In this paper, we document the difference between the subsequent careers of high school and college graduate workers based on the role of higher education in revealing abilities. In particular, we argue that high-ability high school graduates will actively engage in productivity revealing-activities while high-ability college graduates will not actively participate in those activities. Moreover, we expect that high-ability high school graduates will tend to have more jobs than low-ability high school graduates at the beginning of their careers as they move to better jobs. Unlike high school graduates, college graduates do not exhibit such a pattern in the number of jobs given that high-ability college graduates will have decent jobs from the beginning of their career and will not have an incentive to move between jobs at the cost of firm-specific human capital. Using NLSY79 data, we test our hypotheses by regressing the measure of productivity-revealing activities and the number of jobs on the measure of ability separately for high school graduates and college graduates. Overall, the empirical pattern is fairly consistent with our hypotheses. Therefore, our findings highlight the importance of the role of higher education to understand the post-schooling behavior of high school and college graduates.

APPENDIX

Although our main results are based on a sample of white males, we also perform the same analysis based on a sample containing all racial groups – white, black and Hispanic. The sample used in this Appendix is restricted to males only. Table A1 documents the regression results using the estimating equation (1) with the same dependent variables used in the main text. In addition to the control variables in the main analysis, we included dummy variables indicating racial groups. The results are qualitatively and quantitatively similar to the main results.

TABLE A1—RESULTS BASED ON ALL RACIAL GROUPS

	High School		College		Test: College=HS P-value	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Dependent Variable=Log Real Wage						
AFQT	0.0800*** (.0112)	0.00100 (.017)	0.172*** (.0343)	0.153** (.0593)	0.011	0.013
AFQT* Exper/10		0.114*** (.0242)		0.0647 (.0869)	0.002	0.316
Panel B: Dependent Variable=OFT						
AFQT	0.0108*** (.0029)	0.0259*** (.0075)	-0.00172 (.0102)	-0.0412* (.0242)	0.238	0.001
AFQT* Exper/10		-0.0233** (.0113)		0.0808** (.0359)		0.009
Panel C: Dependent Variable=Performance-pay Jobs						
AFQT	0.0315** (.0111)	0.116** (.0572)	-0.00750 (.0335)	-0.196** (.092)	0.268	0.196
AFQT* Exper/10		-0.0985 (.0636)		0.298** (.1413)		0.306
Panel D: Dependent Variable=Number of Jobs						
AFQT	0.0647*** (.0146)	0.149*** (.0361)	-0.0723* (.0377)	-0.151 (.0988)	0.001	0.004
AFQT* Exper/10		-0.146*** (.0467)		0.0276 (.1553)	0.271	0.519
Additional Controls	No	Yes	No	Yes	No	Yes

Note: All specifications include a year fixed effect and squared and cubic terms for potential experience. Specifications (2) and (4) additionally control for the location of the residence and an urban residence. In columns (5) and (6), we report the p-values for the difference in the coefficients from specifications (1) and (3) as well as (2) and (4), respectively. Standard errors in parentheses are clustered at the individual level. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

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