Web Appendix:

Beyond Signaling and Human Capital: Education and the Revelation of Ability

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A   Sample Creation

In this study we use the NLSY dataset for years 1979-2004. We only consider observations after the respondent has left school for the first time. Actual experience is counted as the total number of weeks that the respondent declares s/he has worked since last interview after they leave school for the first time. Potential experience is constructed as years since the respondent left school. Valid observations are kept even if the respondent goes back to school after leaving school for the first time but the additional years of education are subtracted from the experience measures.

Although the respondents report all the jobs held since the last interview, we only use the information of the current job they are holding at the time of the interview (CPS item). In addition, military jobs, jobs at home or jobs without pay are excluded from the construction of experience and from the analysis. The wage variable is the hourly rate of pay at the most recent job from the CPS section of the NSLY. The real wage is created using deflators from the 2006 economic report of the president. All observations with wages less than $1 and more than $100 are dropped. Our education variable is the highest grade completed by the respondent at the time of interview. The AFQT variable is normalized by age since respondents took the AFQT at different ages.

There are 5404 non-hispanic males in the NLSY79 sample. We drop 373 respondents who never left school or do not declare when they first left school. Out of remaining respondents 1489 graduated before 1978. For this group we constructed the work history before 1978 using three set of questions from the 1979 interview as in Joseph G. Altonji & Charles R. Pierret (2001)(AP

hereafter). Out of them, 809 respondents were dropped since their work history could not be constructed.

Next we drop 13 individuals who by the 2002 interview did not have 8 years of education, 145 if the wage was missing, 203 if AFQT was missing, and 83 individuals who at the time of the interview were not working in civilian jobs for pay or whose wages were less than \$1 or more than \$100. The final sample contains 3778 individuals and 38168 observations.

After keeping only observations when the highest grade completed is 12 or 16 we are left with 2714 respondents and 23732 observations. If we were to construct the sample as AP by keeping observations before year 1993 and dropping the individuals who do not have a first occupation, the sample would contain 2968 individuals and 20753 observations (AP had 2976 individuals and 21058 observations).

B Replication of Altonji and Pierret (2001)

In this section we replicate the results reported on Altonji and Pierret (2001) using our sample selection criteria. AP estimate a log earning equation with linear interactions of education, race and AFQT with experience of the form:

$$w_i = \beta_0 + \beta_1 s_i + \beta_2 r_i + \beta_3 z_i + \beta_{s,x}(s_i \times x_i) + \beta_{r,x}(r_i \times x_i)$$
$$+ \beta_{z,x}(z_i \times x_i) + f(x_i) + \beta'_\Phi \Phi_i + \varepsilon_i \tag{1}$$

Log wages w_i of individual i are given as a function of schooling s_i, race r_i, AFQT scores z_i, experience x_i, and other controls Φ_i. The results of the replication are presented in Table 1. Specification (1) uses the sample selection closest to AP with observations coming from interview years 1979-1992. The coefficients presented here differ slightly from those presented in AP because of few differences in sample construction. First, the construction of potential experience is slightly different. The potential experience measure here is years since first left school, and any years of additional education after entering the labor market are subtracted from the experience measure. This measure seems to capture the time a person actually spends in the labor market better than the experience measure in AP, which is simply age minus education minus seven. Secondly, we do not control for interactions of education and AFQT with time as that makes identification very hard and makes the estimates unstable. Regardless of the slight

Table 1: The Effects of AFQT and Schooling on Log Wages

	(1)	(2)	(3)
Model:			
Education	.0668**	.0725**	.0831**
	(.0058)	(.0045)	(.0051)
Black	-.0008	-.0244	-.0118
	(.0227)	(.0190)	(.0207)
Standardized AFQT	.0324**	.0602**	.0310**
	(.0116)	(.0010)	(.0107)
Education x experience/10	-.0240**	-.0042	-.0259**
	(.0076)	(.0038)	(.0068)
AFQT x experience/10	.0856**	.0496**	.0954**
	(.0159)	(.0079)	(.0137)
Black x experience/10	-.0735*	-.0639**	-.0737**
	(.0299)	(.0145)	(.0251)
R^2	0.2823	0.3357	0.3044
Sample	Replication of AP Years 1979-1992	Full sample Years 1979-2004	Full sample Experience<13
No. Observations	20617	37918	25726

Experience measure: Years since left school for the first time

Note - Specification (1) is a replication of the results of AP. We also control year effects, a cubic in experience, a cubic in time with base year 1992, urban residence, and first occupation. Regression (2) uses the whole sample for years 79-04 and doesn't control for first occupation. We see a large coefficient on AFQT initially and a flat profile. Specification (3) limits the potential experience to less than 13 so the fast increase in the AFQT coefficient over time reappears. The White/Huber standard errors in parenthesiscontrol for possible correlation at individual level.

* significance level at the 95% level

** significance level at the 99% level

differences, the main qualitative results of AP are still present in the results presented in Table 1.

Following AP's interpretation, employers seem to statistically discriminate on the basis of education. The coefficient on education is positive and significant when a worker has no experience and falls as the worker gains more experience. On the other hand, employers initially put little weight on AFQT since it might not be visible to them. As the worker gets more experience the employers slowly learn about their ability so they increase the weight they put on AFQT. The coefficient on black is insignificant and small initially, but it becomes significant and negative over time. AP use these as evidence that there is statistical discrimination on the basis of education but not on the basis of race.

Column (2) uses the same specification for our whole sample for interview years 1979-2004. The results seem similar that the returns to AFQT are greater initially and have a flatter profile with experience. The change in the AFQT coefficients in the longer sample used in Column (2) is driven by a nonlinear relation between log wages and AFQT over experience. In order to keep the interpretation of the coefficients on AFQT simple we focus on the approximately linear part of this relationship, which corresponds to experience levels less than thirteen years. The regression using this criterion is presented in column (3) of Table 1. Restricting experience to less than thirteen years restores the low intercept and steep profile of AFQT. For the same reason explained above, we constrain the sample in our main analysis to less than thirteen years of experience.

C   Sample Weights

Throughout this paper we have used both the nationally representative cross-sectional sample and the supplemental sample, which oversamples blacks and low-income whites, without using sample weights. Because our final sample is not representative of the U.S. population, questions may arise about whether we should be using weights in our estimation or not. There have been examples in the literature where weights have made a difference when using the NLSY79 data. For example, Thomas MaCurdy, Thomas Mroz & R. Mark Gritz (1998) find differences in estimating the distributions of labor market earnings and hours of work when using weighted versus unweighted NLSY79 data. In order to address this concern, we estimate our key regressions using the sampling weights found on the NLSY79 and present the results in Table 2.

Table 2: Main Regressions Using Sample Weights

Model	High School		College		College minus HS P-values	
	(1)	(2)	(3)	(4)	(5)	(6)
Standard. AFQT	-.0047	-.0684	.1319**	.1274**	0.001	0.004
	(.0157)	(.0309)	(.0399)	(.0411)		
AFQT x exper/10	.1222**	.1135**	.0292	.0349	0.116	0.183
	(.0203)	(.0198)	(.0557)	(.0559)		
Black	-.0924**	-.0684**	.0710	.0819	0.011	0.018
	(.0314)	(.0309)	(.0562)	(0556)		
Black x exper/10	-.0254	-.0340	-.0727	-.0747	0.563	0.617
	(.0389)	(.0379)	(.0720)	(.0720)		
R^2	0.1565	0.1784	0.1609	0.1765		
No. Observations	11795	11772	4112	4112		
Add. controls	No	Yes	No	Yes	No	Yes
Experience measure: Years since left school for the first time <13						

Note - All specifications control for urban residence, a cubic in experience and year effects. Specifications (2) and (4) also control for region of residence and for part time vs full time jobs. In specification (5) we report the P-values for the difference in the coefficients of specifications (1) and (3). Similarly specification (6) compares (2) and (4). The White/Huber standard errors in parenthesis control for correlation at the individual level.

* statistical significance at the 90% level

** statistical significance at the 95% level

The results from for all specifications are very close in magnitude and not statistically different from the results previously presented in the unweighted regressions in Tables 2 and Table 5 of the main paper. Because sampling weights do not make any difference in our results, we follow Altonji and Pierret (2001) as well as others in the literature in not including weights in presenting our main results.
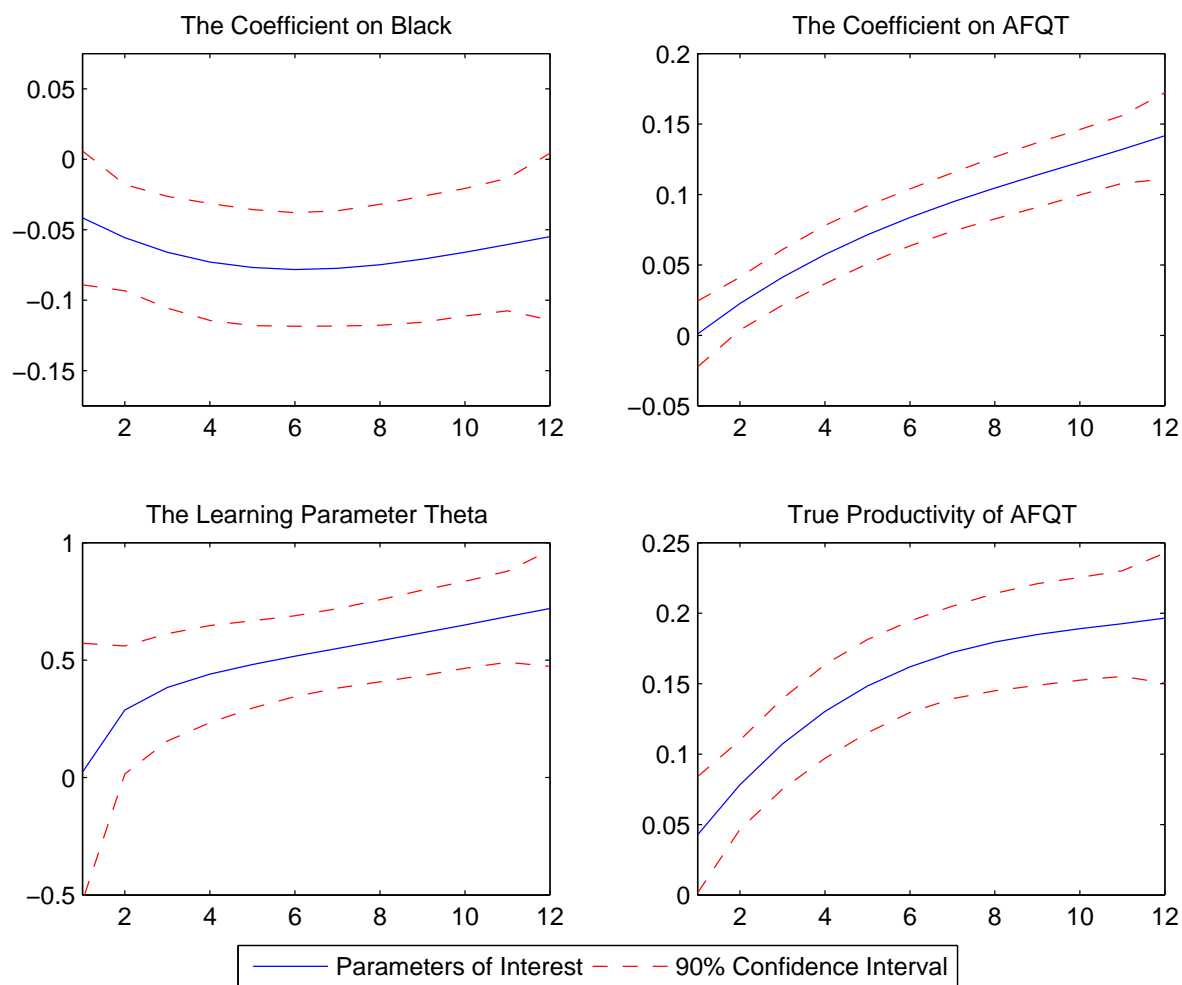
D   Structural Estimates with Actual Experience

Figure 1: The Evolution of the Effect of Race and AFQT on Wages, the Learning Parameter Θ_x, and the True Productivity of AFQT, λ_x. using actual experience

References

Altonji, Joseph G., and Charles R. Pierret. 2001. "Employer Learning And Statistical Discrimination." *The Quarterly Journal of Economics*, 116(1): 313–350.

MaCurdy, Thomas, Thomas Mroz, and R. Mark Gritz. 1998. "An evaluation of the national longitudinal survey on youth." *Journal of Human Resources*, 33(2): 345–436.