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The Impact of Parental Education on Earnings: New Wine in an Old Bottle?

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ABSTRACT

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We examine the impact of parental education on the shape of an individual's experience-earnings profile. A number of factors suggest that parental education will affect the ability of an individual to translate labor market experience into earnings. Our empirical analysis of US data suggests that this is indeed the case. Higher parental education shifts the earnings profile significantly to the left – the profile of individuals with parents who both have 15 years of education peaks at 16 years of experience when their wages are 52% (24%) greater than those whose parents both have only 5 (10) years of education.

JEL Classification: J30, J31, J33

Keywords: parental education, human capital, earnings

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I. Introduction

Labour economists have amassed widespread, if not overwhelming, empirical evidence of a positive correlation between experience and earnings [see Polachek and Siebert (1992) for a survey]. The rationale for such a relationship has concentrated on two key theoretical explanations.[2] The human capital model attests that over time workers become more productive, and hence better remunerated, on account of investments in education and training. Upward sloping profiles simply reflect the returns to these investments [Becker (1975), Mincer (1974)].

Agency theory, in contrast, focuses on the divergence of interests and the asymmetry of information between principals and agents. Costly monitoring necessitates compensation schemes that induce workers to self-select behaviour the firm considers optimal. One such scheme is the back-loading of compensation to the later years of tenure. Such a profile punishes current period shirking and encourages workers to work efficiently over their employment-cycle [Lazear (1981)].

The empirical literature has attempted to differentiate between the two hypotheses by investigating how individual (e.g. education, gender, age) and / or firm (e.g. size, ownership, compensation scheme) attributes impact on the nature of this profile [see, for example, Murphy and Welch (1990), Kotlikoff and Gokhale (1992), Hellerstein and Neumark (1995), Brown and Sessions (2006)].[3] In this paper we investigate an interesting, yet hitherto unexplored, relationship *vis*. the effects of parental education on the shape of an individual's experience-earnings profile. Parents devote financial and other (e.g. time, attention) resources into raising their children, both of which are important to the development of human capital, and both of which are important conduits for the intergenerational transmission of social and economic status. Higher educated parents are likely to spend more time with their children and to play a greater role in school choice. [Feinstein and Symons (1999), Ermisch and Francesconi (2001), Dustmann (2004)].[4] They are also likely to provide more nutritious diets

[2] Alternative explanations do exist. In models of search, labor market experience increases the probability of a successful job match and, therefore, expected earnings [Burdett (1978), Ruhm (1991), Jacobson and LaLonde (1993), Manning (2000)]. Rising profiles are also posited to induce preferred forced saving amongst workers [Loewenstein and Sicherman (1991), Frank and Hutchens (1993)].

[3] Brown and Sessions (2006), for example, find that workers remunerated under performance related pay face significantly flatter profiles than their salaried counterparts, a result they attribute to the presence of agency considerations in the setting of the profile.

[4] Ashenfelter and Rouse (1998) show that up to 60% of the cross-sectional variation in schooling outcomes in their twins sample can be explained by (observable and unobservable) family factors

for their children [Sausenthaler *et al*. (2007)]. Irrespective of the driving force underpinning the relationship between experience and earnings, it is not unreasonable to hypothesize parental education playing some role.

We explore these issues using data derived from the US National Longitudinal Survey of Young Men (NLSYM). The NLSYM began in 1966 with 5525 males aged 14-24 and continued with follow up surveys through to 1981 [see Card (1995)].[5] We estimate from this data a modified Mincerican relationship between an individual's (log) hourly wage and his/her labour market experience and education, allowing for the impact of parental education:

$$\ln w_i = \alpha_0 + \left(\alpha_1 + \alpha_5 \Phi_i\right) Exp_i + \left(\alpha_2 + \alpha_6 \Phi_i\right) Exp_i^2 + \alpha_3 Ed_i + \alpha_4 \mathrm{X}_i + \varepsilon_i \qquad (1)$$

Exp_i and Ed_i denote, respectively, the labour market experience and education of respondent *i*, Φ_i is some measure of the educational attainment of respondent *i*'s parents, X_i is a vector of demographic and regional control variables and ε_i is a random error term.[6]

It is well understood that measurement error in education and/or unobserved ability bias will render a correlation between education and the unobserved component of earnings [Griliches (1977)].[7] A consistent estimate of the return to education, α_3, in equation (1) can be derived if some component of the X_i vector affects education but not earnings. The random assignment of schooling, for example, would permit estimation of (1) by instrumental variables. Without random assignment, however, it is necessary to identify a variable that affects education but not earnings. We follow Card (1995) here in employing the proximity of a two-year or four-year college to the respondent during their youth as just such a variable. Respondents who grow up in areas far away from colleges face a higher cost of education and, therefore, are likely to invest relatively less in education other things equal.

[5] The NLSYM data used by both Card (1995) and ourselves may be downloaded in stata via the command: 'use http://www.stata.com/data/jwooldridge/eacsap/card'.

[6] We would, ideally, prefer a measure of actual labor market experience (i.e. one that accounts for periods spent in unemployment or otherwise outside the labor force) and /or tenure within a specific firm. The constraints of our data, however, restrict us to a measure of *potential* labor market experience – see Table 1 following.

[7] A negative correlation between ε_i and Ed_i in equation (1) would also occur if the true return to education varied across the population and if relatively less educated individuals enjoyed relatively higher returns to education. This would be the case if individuals with different rates of time discount invested in education until the marginal return to education equalled their rate of time discount [see Lang (1993) and Card (1995)].

We therefore also estimate alternative versions of (1) in which education is instrumented through the regression:

$$Ed_i = \beta_0 + \beta_1 Z_i + \mu_i \qquad (2)$$

where the vector Z_i contains those variables in X_i as well as two zero-one dummy variables denoting whether the local labour market in which the respondent lived in 1966 contained a two-year or four-year accredited college. Finally, we note that if there is some error in our measurement of education, then there will also be some error in our measurement of (potential) labour market experience, since the latter is defined as *Age – Education* – 6. We again follow Card (1995) in therefore instrumenting both education and experience through the vector Z_i.

II. Empirical Results

Our data definitions, descriptive statistics and regression results are set out in Tables 1-3. Specification (1) of Table 3 - a modified Mincerian wage equation that includes measures of parental education, regional and family structure - reproduces almost exactly Card's (1995) results as set out in column (5) of his Table 2.[8] Specification (2) adds to this regression the impact of parental education on experience. Both this variable and its square are statistically significant at the 1% level of significance with signs that suggest that parental education brings forward the impact of experience on earnings. Specification (3) estimates the regression allowing for the endogeneity of education, experience and experience squared. The results are reasonably robust, although neither experience nor experience squared are now significant. In Specification (4), the experience-squared term is dropped and now experience is significant. Overall, this would suggest that the nonlinearity of the Mincer equation with respect to education is perhaps most applicable to those with well-educated parents Respondents with less well-educated parents experience relatively little tailing-off in earnings as they gain more experience.

Figure 1 illustrates the impact of parental education on the Mincer curve. The impact consists of three effects: Firstly, there is a shift effect via the impact of the binomial dummy

[8] We include here individual measures of parental education (i.e. *Father's Education, Mother's Education*) as well the interaction between the individual measures (i.e. *Father's Education * Mother's Education*). This latter variable controls for the effects of differences between parents' education, *other things equal*.

variables in the earnings equation. Secondly, there is the impact on the returns to experience via parental impact and parental impacted squared in these equations. And finally, there is the impact on education (and experience). This is illustrated in Specification (5) of Table 3, which sets out the reduced form equation for education. It is apparent here that both the years of education of the mother and the father impact positively on the education of the individual. The shape of the curve in Figure 1 is consistent with a hypothesis that links initial progress in the labour market to parental education. The figure suggests that two people with the same level of education enter the labour market with similar wages, but those with better-educated parents see their wages rise more rapidly. For example, if an individual's parents both have 15 years of education, then his/her wages peak after 16 years of experience when his/her wages are 52% (24%) greater than someone whose parents both have only 5 (10) years of education. Wages then start to decline and when all workers have 25 years experience their wages have moved much closer together.[9]

III. Final Comments

Why does parental education have this impact on the Mincer equation? There are a number of possibilities. Firstly, parents may supplement the formal education process and more educated parents are able to do this more effectively. Thus, at the end of their formal education someone with well-educated parents is actually better educated than someone with less well-educated parents, even if they have the same formal qualifications. Over time, however, the importance of on-the-job knowledge becomes more important and this educational gap closes. Secondly, there is the potential importance of influence. Well-educated parents may also be well-connected parents, able to secure their children good jobs in firms where they are able to progress rapidly. Over time, as the firm and the labour market learns more about an individual's true worth, the earnings of people with similar formal qualifications begin to re-align.

[9] Caution should be exerted in extrapolating these curves as the maximum years of experience in Card's sample is 23 years. One possibility is that after a certain number of year's experience, the wages of all workers converge.

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Table 1: Data Definitions

Variable	*Definition*
Wage	Hourly wage rate
Age	Age in years
Education	Years of schooling
Experience	*Age – Education* - 6
Black	Equals 1 If respondent is black
Father's Education	Father's years of schooling
Mother's Education	Mother's years of schooling
Parental Education (Interaction)	*Father's Education * Mother's Education*
Parental Impact	*Experience *(Father's Education + Mother's Education)*
Parental Impact-Squared	*Experience * Experience *(Father's Education + Mother's Education)*
South	Equals 1 If respondent lived in the South in 1976
SMSA	Equals 1 If respondent lived in the South and in a metropolitan area in 1976
SMSA-66	Equals 1 If respondent lived in the South and in a metropolitan area in 1966
Near 2-Year College	Equals 1 If 2-year accredited college in respondent's local labor market in 1966
Near 4-Year College	Equals 1 If 4-year accredited college in respondent's local labor market in 1966
Region	Nine regional dummies denoting respondent's region of residence in 1966
Mother&Father@14	Equals 1 If respondent lived with mother and father at age 14
Single Mother@14	Equals 1 If respondent lived with single mother at age 14

Table 2: Descriptive Statistics

US National Longitudinal Survey of Young Men (NLSYM)1966-1981

Variable	*Mean*	*Std. Dev.*	*Minimum*	*Maximum*
Log Wage	6.262	0.44	4.61	7.78
Education	13.263	2.677	1	18
Predicted Education	13.263	1.44	8.38	17.46
Experience	8.856	4.142	0	23
Experience-Squared/100	0.956	0.846	0	5.29
Predicted Experience	8.856	3.474	1.31	18.02
Predicted Experience-Squared/100	0.905	0.68	0.01	3.25
Age	28.120	3.14	24	34
Age-Squared	800.550	180.75	576	1156
Black	0.234	0.42	0.00	1.00
Father's Education	7.710	5.33	0.00	18.00
Mother's Education	9.135	4.47	0.00	18.00
Parental Education (Interaction)	84.107	72.76	0.00	324.00
Parental Impact	135.438	86.85	0.00	480.00
Parental Impact-Squared/100	13.381	12.90	0.00	86.64
Predicted Parental Impact[1]	135.438	79.79	0.00	425.95
Predicted Parental Impact-Squared/100[1]	12.719	11.00	0.00	53.27
Mother&Father@14	0.789	0.41	0.00	1.00
SingleMother@14	0.101	0.30	0.00	1.00
SMSA	0.713	0.45	0.00	1.00
SMSA-66	0.650	0.48	0.00	1.00
South	0.404	0.49	0.00	1.00
Near 2-Year College	0.441	0.50	0.00	1.00
Near 4-Year College	0.682	0.47	0.00	1.00

Note: *Predicted Parental Impact* (*Predicted Parental Impact-Squared*) is derived by multiplying the sum of parental education by *Predicted Experience* (*Predicted Experience-Squared*)

Table 3: Parental Education and Wages

Dependent Variable: Log Hourly Wage

	(1) *Card Regression*		(2) *OLS*		(3) *2SLS*		(4) *2SLS*		(5) *Education Reduced Form*	
	Coef	*T-Stat*	*Coef*	*T-Stat*	*Coef*	*T-Stat*	*Coef*	*T-Stat*	*Coef*	*T-Stat*
Education										
Education	0.074	20.51	0.072	19.60	-	-	-	-	-	-
Predicted Education	-	-	-	-	0.107	2.56	0.091	2.36	-	-
Experience / Age										
Experience	0.085	12.74	0.034	2.26	-	-	-	-	-	-
Experience-Squared/100	-0.231	-7.23	-0.015	-0.22	-	-	-	-	-	-
Predicted Experience	-	-	-	-	0.012	0.36	0.021	3.92	-	-
Predicted Exp-Squared/100	-	-	-	-	0.143	1.00	-	-	-	-
Age	-	-	-	-	-	-	-	-	0.873	3.20
Age-Squared	-	-	-	-	-	-	-	-	-0.015	-3.14
Race										
Black	-0.193	-10.00	-0.189	-9.80	-0.173	-6.44	-0.180	-7.04	-0.438	-3.72
Parental Education										
Father's Education	-0.001	-0.25	-0.011	-1.87	-0.032	-2.51	-0.023	-2.62	0.189	6.83
Mother's Education	-0.001	-0.20	-0.006	-1.19	-0.029	-2.17	-0.019	-2.12	0.210	9.46
Parental Education (Interaction)	0.000	0.21	-0.000	-0.48	0.000	0.63	0.000	0.48	0.000	0.07
Parental Impact	-	-	0.003	3.75	-	-	-	-	-	-
Parental Impact-Squared/100	-	-	-0.012	-3.40	-	-	-	-	-	-
Predicted Parental Impact	-	-	-	-	0.005	3.52	0.003	5.44	-	-
Predicted Parental Impact-Squared/100	-	-	-	-	-0.018	-2.86	-0.013	-3.28	-	-
Family Background	-	-	-	-	-	-	-	-	-	-
Mouther&Father@14	0.040	1.63	0.067	2.55	0.052	1.61	0.059	1.89	0.433	2.70
SingleMouther@14	0.140	0.43	0.037	1.07	0.032	0.90	0.035	0.97	0.086	0.40
Regional Controls										
SMSA	0.136	6.78	0.137	6.80	0.107	2.76	0.120	3.29	0.725	5.94
SMSA-66	0.027	1.39	0.023	1.18	0.035	1.56	0.032	1.42	-0.361	-2.88
South	-	-	-	-	-	-	-	-	-0.133	-0.84
Near 2-Year College	-	-	-	-	-	-	-	-	-0.035	-0.38
Near 4-Year College	-	-	-	-	-	-	-	-	0.365	3.55
Region	Yes		Yes		Yes		Yes		Yes	
Constant	4.721	63.30	4.892	45.11	4.877	14.21	4.861	14.17	-3.728	0.96
F-Statistic	64.24 $_{20, 2989}$		54.88 $_{24, 2985}$		47.57 $_{24, 2985}$		49.60 $_{23, 2986}$		52.81 $_{23, 2986}$	
Adjusted R-Square	0.2960		0.3006		0.2708		0.2708		0.2656	
Root MSE	0.37238		0.37116		0.37896		0.37896		2.2656	
Log Likelihood	-1287		-1275		-1338		-1338		-6721	
Observations	3010		3010		3010		3010		3010	

Data Source: US National Longitudinal Survey of Young Men (NLSYM)1966-1981

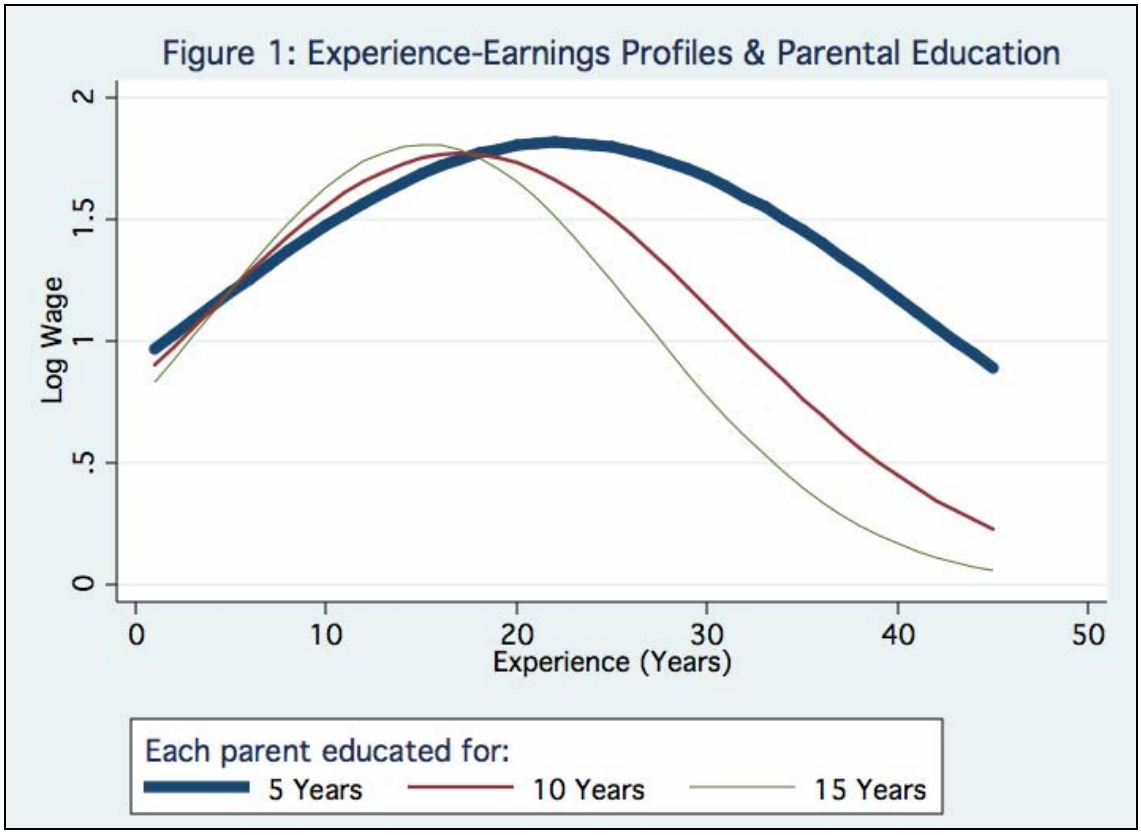
Figure 1: Experience-Earnings Profiles & Parental Education
Log Wage
0
.5
1
1.5
2
0
10
20
30
40
50
Experience (Years)
Each parent educated for:
5 Years
10 Years
15 Years