The Career Decisions of Young Men

Keane and Wolpin

March 4, 2014

This is the best known structural model of labor dynamics

There have been many subsequent papers written that use the basic framwork, but build on it

Basic Model

People start making decisions at age $a = 16$ and live until age A.

At each age they can choose one of 5 options:

1. Work in Blue Collar Job
2. Work in White Collar Job
3. Work in Military
4. Go to School
5. Home Production

For each of these 5 options let:

- $d_m(a)$ be an indicator for whether option m was chosen
- $R_m(a)$ be the conditional reward if m was chosen
- $g(a)$ schooling at age a

Then

$$
\begin{aligned}
R(a) &= \sum_{m=1}^{5} R_m(a) d_m(a) \\
g(a) &= \sum_{\alpha=1}^{a-1} d_4(\alpha)
\end{aligned}
$$

Consider each of the three working options ($m = 1, 2, 3$) then let

- $e_m(a)$ skill level in occuption m
- r_m rental rate in occupation m
- $x_m(a)$ work experience in occupation m,($x_m(a) = \sum_{\alpha=1}^{a-1} d_m(\alpha)$)

They assume that

$$log(e_m(a)) = e_m(16) + e_{m1}g(a) + e_{m2}x_m(a) - e_{m3}x_m^2(a) + \varepsilon_m(a)$$

for $m = 1, 2, 3$, and $a = 1, ..., A$.

Since people only care about wages (no hours dimension of labor supply)

$$
\begin{aligned}
R_m(a) &= w_m(a) \\
&= r_m exp\{e_m(16) + e_{m1} g(a) + e_{m2} x_m(a) - e_{m3} x_m^2(a) + \varepsilon_m(a)\}
\end{aligned}
$$

They define the reward functions for the other two alternatives as:

$$R_4(a) = e_4(16) - tc_1 1\left[g(a) \geq 12\right] - tc_2 1\left[g(a) \geq 16\right] + \varepsilon_4(a)$$
$$R_5(a) = e_5(16) + \varepsilon_5(a)$$

and further define:

$$\begin{aligned}
\varepsilon(a) &\equiv \{\varepsilon_1(a), \varepsilon_2(a), \varepsilon_{13}(a), \varepsilon_4(a), \varepsilon_5(a)\} \sim N(0, \Omega) \\
e(16) &\equiv \{e_1(16), e_2(16), e_3(16), e_4(16), e_5(16)\} \\
x(a) &\equiv \{x_1(a), x_2(a), x_3(a))\} \\
S(a) &\equiv \{e(16), g(a), x(a), \varepsilon(a))\}
\end{aligned}$$

We are done with the model, the agents just solve the dynamic programming problem

$V(S(a), a) =$
$max_m \{R_m(S(a), a) + \delta E[V(S(a+1), a+1) \mid S(a), d_m(a) = 1]\}$

for $a < A$

In the last period

$$V(S(A), A) = max_m \{R_m(S(A), A)\}$$

Thats it, that is the whole model.

Simulation

Given a set of parameters we can solve it, although solving exactly is pretty complicated, you could do the following

1. Start in the last period and calculate $V(S(A), A)$ for all values of $S(A)$.
2. Going backwards you can then calculate $E(V(S(A), A) \mid S(A-1), d_m(A-1) = 1)$ for all of the $S(A-1)$ and m.
3. From that we calculate $V(S(A-1), A)$ for all values of $S(A-1)$.
4. Keep following this pattern backwards until A=16

This is really computationally intensive because there are tons and tons of different values for all of the $S(A)$.

Note also that when we estimate we have to solve this for everyone a lot of times.

This isn't going to work easily.

What they do is to approximate it at a subset of the state points and interpolate in between (see RESTAT paper for details-Chao will get into details)

Estimation

Keane and Wolpin use the NLSY79 data set, starting with people age 16 who they observe until a certain age (call it $\bar{a}_i$ for individual i).

They also observe schooling ($g_i(a)$), sector specific experience ($x_i(a)$), and choices made at each age until $\bar{a}_i$.

They will allow for heterogeneity in $\varepsilon_i(a)$ which is unobservable

They also will allow for heterogeneity in initial endowments as well $e_i(16)$ although this is not observable to the econometrician.

Given the model it is straight forward (though computationally intensive) to calculate

$$Pr(c_i(a) \mid a, g_i(a), x_i(a), e_i(16); \theta)$$

with knowledge of the other parameters θ.

Thus if we know $e_i(16)$ the likelihood for individual i would be straight forward to calculate because there is no serial correlation in $\varepsilon_i(a)$.

$$\mathcal{L}_i(e_i(16), \theta) \equiv \prod_{a=16}^{\bar{a}_i} Pr(c_i(a) \mid a, g_i(a), x_i(a), e_i(16); \theta)$$

To deal with heterogeneity they assume that there are a finite number of types (Heckman/Singer style)

Assume that there are K types and let π_k denote the proportion in the population of type k

further let $e^k(16)$ denote the vector of skills for type k

Then the likelihood takes the form:

$$\mathcal{L}_i(\theta, \pi, e(16)) = \sum_{k=1}^{K} \mathcal{L}_i(e^k(16), \theta)\pi_k$$

Thats the model, now it is just time to calculate it.

TABLE 1

CHOICE DISTRIBUTION: WHITE MALES AGED 16–26

AGE	CHOICE					TOTAL
	School	Home	White-Collar	Blue-Collar	Military	
16	1,178	145	4	45	1	1,373
	85.8	10.6	.3	3.3	.1	100.0
17	1,014	197	15	113	20	1,359
	74.6	14.5	1.1	8.3	1.5	100.0
18	561	296	92	331	70	1,350
	41.6	21.9	6.8	24.5	5.2	100.0
19	420	293	115	406	107	1,341
	31.3	21.9	8.6	30.3	8.0	100.0
20	341	273	149	454	113	1,330
	25.6	20.5	11.2	34.1	8.5	100.0
21	275	257	170	498	106	1,306
	21.1	19.7	13.0	38.1	8.1	100.0
22	169	212	256	559	90	1,286
	13.1	16.5	19.9	43.5	7.0	100.0
23	105	185	336	546	68	1,240
	8.5	14.9	27.1	44.0	5.5	100.0
24	65	112	284	416	44	921
	7.1	12.2	30.8	45.2	4.8	100.0
25	24	61	215	267	24	591
	4.1	10.3	36.4	45.2	4.1	100.0
26	13	32	88	127	2	262
	5.0	12.2	33.6	48.5	.81	100.0
Total	4,165	2,063	1,724	3,762	645	12,359
	33.7	16.7	14.0	30.4	5.2	100.0

NOTE.—Number of observations and percentages.

TABLE 2

TRANSITION MATRIX: WHITE MALES AGED 16–26

	CHOICE (t)				
CHOICE ($t-1$)	School	Home	White-Collar	Blue-Collar	Military
School:					
Row %	69.9	12.4	6.5	9.9	1.3
Column %	91.2	32.6	2.5	14.2	11.2
Home:					
Row %	9.8	47.2	8.1	31.3	3.7
Column %	4.4	42.9	8.8	15.6	10.7
White-collar:					
Row %	5.7	6.3	67.4	19.9	.7
Column %	1.8	4.0	51.4	7.0	1.4
Blue-collar:					
Row %	3.4	12.4	9.9	73.4	.9
Column %	2.6	19.0	18.2	61.7	4.3
Military:					
Row %	1.4	5.5	3.1	9.6	80.5
Column %	.2	1.6	1.0	1.5	72.4

TABLE 3

SELECTED CHOICE-STATE COMBINATIONS

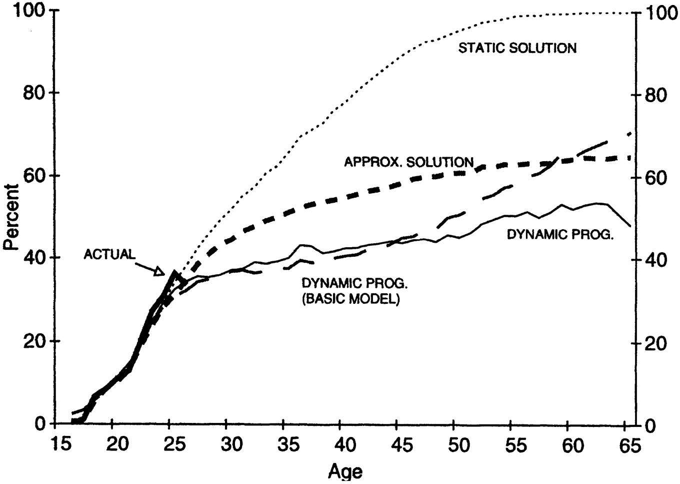
Highest grade completed	9	10	11	12	13	14	15	16	17
Percentage choosing school	26.9	59.8	49.1	13.5	45.1	44.8	62.5	13.5	42.5
If in school previous period	73.5	91.1	85.0	44.2	72.9	70.6	68.8	23.5	55.6
White-collar experience	0	1	2	3	4	5	6		
Percentage choosing white-collar employment	6.8	38.0	55.3	63.3	76.2	74.6	79.2		
If white-collar previous period	...	57.5	71.7	76.7	78.8	82.0	86.4		
Blue-collar experience	0	1	2	3	4	5	6	7	
Percentage choosing blue-collar employment	15.0	51.6	64.9	74.0	74.9	81.2	77.1	88.3	
If blue-collar previous period	...	62.0	71.4	78.7	81.7	85.3	78.7	85.4	
Military experience	0	1	2	3	4	5			
Percentage choosing military employment	1.5	68.0	56.6	44.6	32.7	61.9			
If military previous period	...	90.7	86.5	74.0	57.1	78.8			

TABLE 4

AVERAGE REAL WAGES BY OCCUPATION: WHITE MALES AGED 16–26

	MEAN WAGE			
AGE	All Occupations	White-Collar	Blue-Collar	Military
16	10,217 (28)	. . .	10,286 (26)	. . .
17	11,036 (102)	10,049 (14)	11,572 (75)	9,005 (13)
18	12,060 (377)	11,775 (71)	12,603 (246)	10,171 (60)
19	12,246 (507)	12,376 (97)	12,949 (317)	9,714 (93)
20	13,635 (587)	13,824 (128)	14,363 (357)	10,852 (102)
21	14,977 (657)	15,578 (142)	15,313 (419)	12,619 (96)
22	17,561 (764)	20,236 (214)	16,947 (476)	13,771 (74)
23	18,719 (833)	20,745 (299)	17,884 (481)	14,868 (53)
24	20,942 (667)	24,066 (259)	19,245 (373)	15,910 (35)
25	22,754 (479)	24,899 (207)	21,473 (250)	17,134 (22)
26	25,390 (206)	32,756 (79)	20,738 (125)	. . .

NOTE.—Number of observations is in parentheses. Not reported if fewer than 10 observations.



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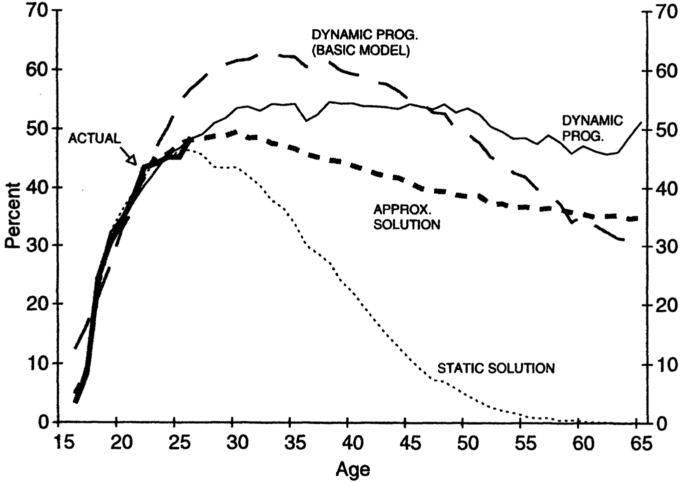
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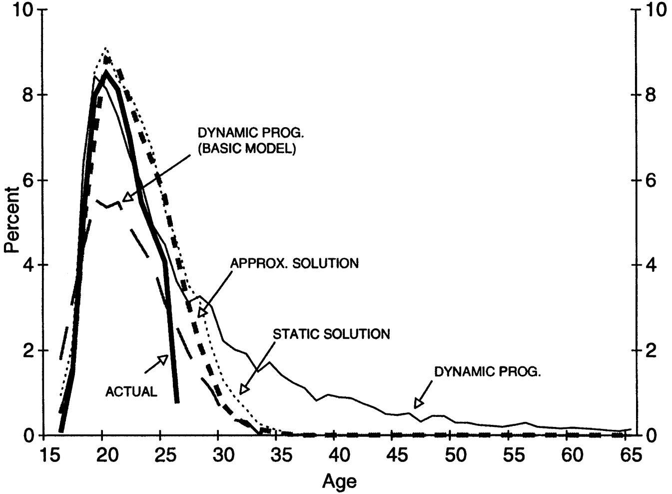

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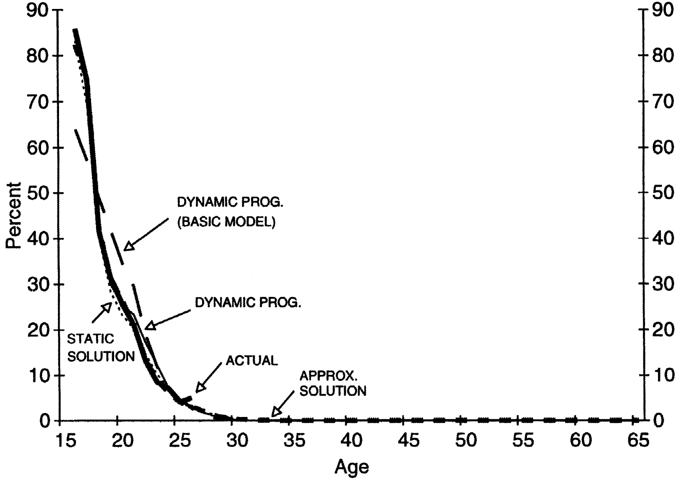

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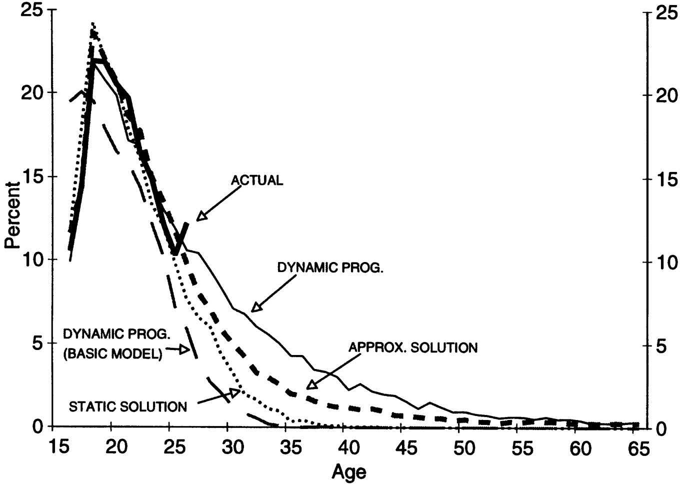

Fig. 5.—Percentage at home by age

TABLE 5

χ^2 Goodness-of-Fit Tests of the Within-Sample Choice Distribution: Dynamic Programming Model and Multinomial Probit

Age	School	Home	White-Collar	Blue-Collar	Military	Row
16:						
DP-basic	103.05*	17.10*	†	92.61*	†	213.2*
DP-extended	.00	.07	†	.15	†	.22
APP	2.00	.19	†	7.05*	†	9.24*
17:						
DP-basic	74.13*	7.37*	21.14*	54.63*	11.86*	169.15*
DP-extended	.95	.02	.28	3.31	.42	4.98
APP	.02	.00	1.78	.03	.00	1.84
18:						
DP-basic	15.02*	1.60	2.18	6.75*	1.71	27.26*
DP-extended	.03	.00	.93	.01	3.09	4.06
APP	.09	.94	3.03	.42	.17	4.65
19:						
DP-basic	35.83*	5.04*	.26	7.23*	14.41*	62.77*
DP-extended	.83	.51	.07	1.27	.34	3.02
APP	.00	.02	.01	.17	1.53	1.73
20:						
DP-basic	31.10*	6.24*	.14	.92	24.47*	62.86*
DP-extended	.16	.25	.24	.22	.22	.94
APP	.25	.01	.82	.06	.17	1.31
21:						
DP-basic	31.28*	6.54*	.01	1.46	16.61*	55.89*
DP-extended	2.91	3.50	2.45	.23	.72	9.81*
APP	.00	.65	.05	.03	.41	1.14
22:						
DP-basic	23.78*	2.94	1.01	.08	11.84*	39.66*
DP-extended	12.43*	.11	.61	3.04	.38	16.60*
APP	.12	1.49	.72	.64	1.21	4.19
23:						
DP-basic	12.63*	7.78*	2.99	2.00	3.15	28.56*
DP-extended	14.66*	.12	3.76	.42	.44	19.40*
APP	.23	.14	5.90*	.44	4.38	10.97*
24:						
DP-basic	.18	4.76*	2.28	4.61*	1.40	13.30*
DP-extended	.18	.99	.81	.04	.04	1.89
APP	1.21	2.77	2.20	.05	2.77	10.01*
25:						
DP-basic	.30	12.35*	6.21*	9.31*	1.84	30.01*
DP-extended	.14	3.45	2.71	.29	.23	6.82
APP	.01	2.98	5.00*	.61	2.56	11.16*
26:						
DP-basic	4.96*	38.64*	.17	3.13	†	46.90*
DP-extended	2.61	2.14	.45	.00	†	5.20
APP	2.84	4.95*	.10	.01	†	7.90*

Note.—The basic dynamic programming (DP-basic) model has 50 parameters, the extended dynamic programming (DP-extended) model has 83 parameters, and the approximate decision rule (APP) model has 75 parameters.

* Statistically significant at the .05 level.

† Fewer than five observations.

TABLE 6

WITHIN-SAMPLE WAGE FIT

	White-Collar				Blue-Collar			
	NLSY*	DP-Basic	DP-Extended	Static	NLSY†	DP-Basic	DP-Extended	Static
Wage:								
Mean	19,691	17,456	19,605	19,688	16,224	16,230	15,805	15,914
Standard deviation	12,461	10,324	12,091	13,664	8,631	8,437	8,431	9,837
Wage regression:								
Highest grade completed	.095	.033	.090	.091	.048	.006	.047	.056
	(.007)‡	(.007)	(.006)	(.007)	(.008)	(.006)	(.006)	(.007)
Occupation-specific experience	.103	.017	.080	.123	.096	.082	.078	.108
	(.009)	(.011)	(.012)	(.010)	(.005)	(.004)	(.004)	(.005)
Constant	8.33	9.15	8.44	8.22	8.80	9.25	8.84	8.54
	(.102)	(.087)	(.080)	(.100)	(.096)	(.069)	(.078)	(.082)
R^2	.213	.021	.182	.172	.150	.117	.104	.142
Observations	1,509	1,605	1,685	1,698	3,143	4,013	3,761	3,772

* Three wage outliers of over $250,000 were discarded. The only important effect was to reduce the wage standard deviation significantly.
† Two wage outliers of over $200,000 were discarded. The only important effect was to reduce the wage standard deviation significantly.
‡ Heteroskedasticity-corrected standard errors are in parentheses.

Given that the model does not fit that well, Keane and Wolpin do several things to improve the fit of the model:

1. More terms are added to the civilian wage equations
2. Allow for a reward cost if you switch occupations, and larger if you start a new occupation
3. Include non-wage tastes for the occupations
4. Include a consumption value of school, a cost of reentry to school, and a psychic cost of getting high school/college diploma
5. Payoff for home production change by age

Here are the results

TABLE 7

ESTIMATED OCCUPATION-SPECIFIC PARAMETERS

	White-Collar	Blue-Collar	Military
	1. Skill Functions		
Schooling	.0700 (.0018)	.0240 (.0019)	.0582 (.0039)
High school graduate	−.0036 (.0054)	.0058 (.0054)	...
College graduate	.0023 (.0052)	.0058 (.0080)	...
White-collar experience	.0270 (.0012)	.0191 (.0008)	...
Blue-collar experience	.0225 (.0008)	.0464 (.0005)	...
Military experience	.0131 (.0023)	.0174 (.0022)	.0454 (.0037)
"Own" experience squared/100	−.0429 (.0032)	−.0759 (.0025)	−.0479 (.0140)
"Own" experience positive	.1885 (.0132)	.2020 (.0128)	.0753 (.0344)
Previous period same occupation	.3054 (.1064)	.0964 (.0124)	...
Age*	.0102 (.0005)	.0114 (.0004)	.0106 (.0022)
Age less than 18	−.1500 (.0515)	−.1433 (.0308)	−.2539 (.0443)
Constants:			
Type 1	8.9370 (.0152)	8.8811 (.0093)	8.540 (.0234)
Deviation of type 2 from type 1	−.0872 (.0089)	.3050 (.0138)	...
Deviation of type 3 from type 1	−.6091 (.0143)	−.2118 (.0144)	...
Deviation of type 4 from type 1	−.5200 (.0199)	−.0547 (.0177)	...
True error standard deviation	.3864 (.0094)	.3823 (.0074)	.2426 (.0249)
Measurement error standard deviation	.2415 (.0140)	.1942 (.0134)	.2063 (.0207)
Error correlation:			
White-collar	1.0000	...	...
Blue-collar	.1226 (.0430)	1.0000	...
Military	.0182 (.0997)	.4727 (.0848)	1.0000
	2. Nonpecuniary Values		
Constant	−2,543 (272)	−3,157 (253)	−.0900 (.0448)
Age	...	...	−.0313 (.0057)
	3. Entry Costs		
If positive own experience but not in occupation in previous period	1,182 (285)	1,647 (199)	...
Additional entry cost if no own experience	2,759 (764)	494 (698)	560 (509)
	4. Exit Costs		
One-year military experience	...	...	1,525 (151)

NOTE.—Standard errors are in parentheses.

* Age is defined as age minus 16.

TABLE 8

ESTIMATED SCHOOL AND HOME PARAMETERS

	School		Home	
Constants:				
Type 1	11,031	(626)	20,242	(608)
Deviation of type 2 from type 1	−5,364	(1,182)	−2,135	(753)
Deviation of type 3 from type 1	−8,900	(957)	−14,678	(679)
Deviation of type 4 from type 1	−1,469	(1,011)	−2,912	(768)
Has high school diploma	804	(137)	...	
Has college diploma	2,005	(225)	...	
Net tuition costs: college	4,168	(838)	...	
Additional net tuition costs: graduate school	7,030	(1,446)	...	
Cost to reenter high school	23,283	(1,359)	...	
Cost to reenter college	10,700	(926)	...	
Age*	−1,502	(111)	...	
Aged 16–17	3,632	(1,103)	...	
Aged 18–20	...		−1,027	(538)
Aged 21 and over	...		−1,807	(568)
Error standard deviation	12,821	(735)	9,350	(576)
Discount factor	.9363 (.0014)			

NOTE.—Standard errors are in parentheses.
* Age is defined as age minus 16.

TABLE 9

ESTIMATED TYPE PROPORTIONS BY INITIAL SCHOOLING LEVEL AND TYPE-SPECIFIC ENDOWMENT RANKINGS

	Type 1	Type 2	Type 3	Type 4
Initial schooling:				
Nine years or less	.0491 (· · ·)	.1987 (.0294)	.4066 (.0357)	.3456 (.0359)
10 years or more	.2343 (· · ·)	.2335 (.0208)	.3734 (.0229)	.1588 (.0183)
Rank ordering:				
School attainment at age 16	1	2	3	4
White-collar skill endowment	1	2	4	3
Blue-collar skill endowment	2	1	4	3
Consumption value of school net of effort cost	1	3	4	2
Value of home production	1	2	4	3

NOTE.—Standard errors are in parentheses.

TABLE 10

MODEL PREDICTIONS VS. CPS CHOICE FREQUENCIES

Age Range	NLSY*	CPS (Year)†	DP-Basic*	DP-Extended†	Approximation*
			White-Collar		
16–19	.043	.064 (1981)	.052	.043	.041
20–23	.190	.187 (1985)	.176	.187	.180
24–26	.344	.345 (1989)	.307	.335	.332
24–27	...	.348 (1989)	.323	.343	.349
28–31	...	.384 (1993)	.365	.375	.443
30–33	...	.413 (1995)	.370	.388	.472
35–44	...	.449 (1995)	.405	.430	.547
			Blue-Collar		
16–19	.171	.265 (1981)	.199	.182	.176
20–23	.430	.432 (1985)	.416	.418	.434
24–26	.475	.472 (1989)	.544	.490	.498
24–27	...	.476 (1989)	.565	.494	.498
28–31	...	.465 (1993)	.616	.539	.495
30–33	...	.460 (1995)	.624	.547	.487
35–44	...	.423 (1995)	.595	.541	.440

* Military is excluded to facilitate comparison with CPS (which is a civilian sample).

† Choice frequencies pertain to whites in the March CPS from the years indicated. We classify a person as working if, over the previous calendar year, he worked at least 35 weeks and, in those weeks, he worked at least 20 hours per week on average. The occupation is that held longest in the previous year.

TABLE 11

SELECTED CHARACTERISTICS AT AGE 24 BY TYPE: NINE OR 10 YEARS INITIAL SCHOOLING

	INITIAL SCHOOLING 9 YEARS OR LESS				INITIAL SCHOOLING 10 YEARS OR MORE			
	Type 1	Type 2	Type 3	Type 4	Type 1	Type 2	Type 3	Type 4
Schooling	15.6	10.6	10.9	11.0	16.4	12.5	12.4	13.0
Experience:								
White-collar	.528	.704	.742	.279	1.07	1.06	1.05	.436
Blue-collar	.189	4.05	2.85	1.61	.176	3.65	2.62	1.77
Military	.000	.000	1.35	.038	.000	.000	1.10	.034
Proportion who chose:								
White-collar	.509	.123	.176	.060	.673	.236	.284	.155
Blue-collar	.076	.775	.574	.388	.039	.687	.516	.441
Military	.000	.000	.151	.010	.000	.000	.116	.005
School	.416	.008	.013	.038	.239	.024	.025	.074
Home	.000	.095	.086	.505	.050	.053	.059	.325

NOTE.—Based on a simulation of 5,000 persons.

TABLE 12

EXPECTED PRESENT VALUE OF LIFETIME UTILITY FOR ALTERNATIVE CHOICES AT AGE 16 AND AT AGE 26 BY TYPE ($)

	All Types	Type 1	Type 2	Type 3	Type 4
	Initial Schooling 10 Years or More				
School:					
Age 16	321,008	415,435	394,712	228,350	289,683
Age 26	384,352	499,162	494,107	272,985	314,708
Home:					
Age 16	298,684	380,660	376,945	207,768	274,901
Age 26	426,837	611,167	516,547	291,932	338,653
White-collar:					
Age 16	293,683	372,544	372,733	207,586	262,370
Age 26	439,970	637,616	528,107	303,228	338,967
Blue-collar:					
Age 16	296,736	373,156	377,618	210,699	266,206
Age 26	438,240	617,873	534,578	305,641	342,195
Military:					
Age 16	285,686	350,655	356,202	210,461	261,944
Age 26	415,374	581,996	492,531	298,431	329,938
Maximum over choices:					
Age 16	321,921	415,503	396,108	229,265	291,122
Age 26	445,488	638,820	537,226	308,259	346,695
	Initial Schooling Nine Years or Less				
School:					
Age 16	273,186	387,384	371,369	211,942	276,040
Age 26	308,808	564,590	446,163	243,734	274,979
Home:					
Age 16	260,668	352,274	360,495	197,288	268,047
Age 26	334,643	578,637	468,465	268,815	305,262
White-collar:					
Age 16	253,764	342,833	354,261	196,294	253,686
Age 26	339,093	602,915	474,796	277,488	300,917
Blue-collar:					
Age 16	257,720	343,873	359,370	199,945	257,697
Age 26	344,179	583,895	486,456	282,223	305,520
Military:					
Age 16	251,710	322,293	340,126	199,737	254,386
Age 26	328,916	550,521	447,443	275,660	295,996
Maximum over choices:					
Age 16	275,634	387,384	374,154	213,823	286,311
Age 26	347,741	604,549	487,466	284,073	310,598

NOTE.—Based on a simulation of 5,000 persons.

TABLE 13

RELATIONSHIP OF INITIAL SCHOOLING AND TYPE TO SELECTED FAMILY BACKGROUND CHARACTERISTICS

	Initial Schooling Nine Years or Less and Person Is of Type				Initial Schooling 10 Years or More and Person Is of Type					Expected Present Value of Lifetime Utility at
	1	2	3	4	1	2	3	4	Observations	Age 16
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
All	.010	.051	.103	.090	.157	.177	.289	.123	1,373	307,673
Mother's schooling:										
Non–high school graduate	.004	.099	.177	.161	.038	.141	.276	.103	333	286,642
High school graduate	.011	.043	.086	.071	.143	.210	.305	.131	685	309,275
Some college	.023	.021	.043	.058	.294	.166	.263	.133	152	328,856
College graduate	.007	.005	.049	.023	.388	.151	.222	.154	142	339,593
Household structure at age 14:										
Live with mother only	.001	.062	.133	.119	.123	.137	.297	.128	178	296,019
Live with father only	.026	.037	.088	.120	.062	.180	.378	.106	44	291,746
Live with both parents	.011	.049	.097	.082	.169	.184	.284	.124	1,123	310,573
Live with neither parent	.0001	.090	.154	.184	.037	.175	.275	.085	28	290,469
Number of siblings:										
0	.002	.041	.086	.092	.142	.227	.285	.126	50	310,833
1	.002	.029	.064	.051	.236	.199	.287	.133	261	320,697
2	.016	.048	.104	.063	.191	.157	.275	.146	364	311,053
3	.013	.056	.119	.090	.147	.182	.288	.104	320	306,395
4+	.009	.067	.117	.141	.081	.171	.303	.111	378	296,089
Parental income in 1978:										
$Y \leq 1/2$ median*	.002	.078	.155	.181	.071	.132	.221	.161	214	292,565
$1/2$ median $< Y \leq$ median	.007	.053	.120	.103	.103	.173	.328	.113	382	296,372
Median $\leq Y \leq 2 \cdot$ median	.015	.044	.071	.051	.177	.204	.304	.134	446	314,748
$Y \geq 2 \cdot$ median	.014	.025	.024	.021	.479	.167	.182	.087	83	358,404

* Median income in the sample is $20,000.

TABLE 14

EFFECT OF A $2,000 COLLEGE TUITION SUBSIDY ON SELECTED CHARACTERISTICS BY TYPE

	All Types	Type 1	Type 2	Type 3	Type 4
Percentage high school graduates:					
No subsidy	74.8	100.0	68.6	70.2	67.0
Subsidy	78.3	100.0	73.2	74.0	72.2
Percentage college graduates:					
No subsidy	28.3	98.7	11.1	8.6	19.5
Subsidy	36.7	99.5	21.0	17.1	32.9
Mean schooling:					
No subsidy	13.0	17.0	12.1	12.0	12.4
Subsidy	13.5	17.0	12.7	12.5	13.0
Mean years in college:					
No subsidy	1.34	3.97	.69	.59	1.05
Subsidy	1.71	3.99	1.14	1.00	1.58

NOTE.—Subsidy of $2,000 each year of attendance. Based on a simulation of 5,000 persons.

TABLE 15