Do family choices slow down economic growth?

Leon Taylor
Instructor
Division of Finance and Economics
Lewis College of Business
Marshall University
Huntington, West Virginia USA

Abstract

Econometric simulations provide no evidence that families in West Virginia encouraged sons to drop out of high school in order to earn income as coal miners, at the net expense of later income that would accrue to them with additional education. Estimates of the typical family's subjective rate of time preference for current income over future income earned by sons are close to zero. [*JEL D13 D99 J24*]

1 Introduction

For a quarter of a century following the end of World War II, the heart of the region famous for its poverty, Appalachia, prospered through coal mining. From 1948 through 1970, personal income per capita was more than a third higher in West Virginia than in the United States. The ratio of annual personal income per capita in West Virginia, relative to that of the United States, correlated with the annual share of mining in gross national product over this period (r = .76).[1]

Mining paid the uneducated well; and, over time, it seemed to pay better and better, compared to alternative industries. From the strike year of 1946 through 1957, throughout the United States, hourly compensation in bituminous coal mining, the type of mining that dominated in West Virginia, was more than 60 percent greater than average hourly earnings in another low-skill industry that provided jobs in mining regions, the railroads.[2] It was more than 70 percent greater than average hourly earnings to production workers in all manufacturing.[3]

[1] Estimates of annual personal income per capita in West Virginia, relative to that of the United States, were obtained from Series F346 and F297 respectively of the *Historical statistics of the United States*. Estimates of the share of the mining industry in gross national product for the United States were obtained from Series F132 and F130 respectively.

[2] Estimates of the ratio of mining compensation to rail wages, as hourly averages, were obtained from Series D814 and D817 respectively of the *Historical statistics.* Series D814 was constructed by H. Gregg Lewis.

[3] Data on manufacturing wages came from Series D802 of the *Historical statistics.*

Rapid and broad technological change in mining may have helped account for the relative gain in coal wages over the period. From 1946 through 1957, the mines mechanized the cutting, loading and washing of bituminous coal, mainly underground. In processing more coal, mines tended to mechanize all operations at once. Over this period, the correlation between the number of tons loaded underground mechanically, and the number cleaned mechanically, per miner, was .98; the correlation between the number of tons loaded mechanically, and the number cut underground mechanically, per miner, was .77.

The increase in mechanization was especially sharp after the economic slowdown of 1949, the year of a large strike in mining, accounting for 10.7 million idle man-days.[4] The annual unemployment rate of the mining industry almost tripled that year, to 8.9 percent.[5] After the strike, the second in four years, mines more than doubled the volume of mining by machine, per miner, in all three operations. The rise in mechanization was most dramatic in the most recent of the major technologies, the cleaning of coal. As a long-run average, the number of short tons of bituminous coal cleaned mechanically rose 6.5 percent per year from 1916 through 1970; per miner, the number rose 9.8 percent per year.[6] From 1950 through 1957, however, the number of short tons cleaned mechanically per miner rose by 278 percent.

Such technology may have proven a mixed blessing for the miner. Mechanization in cleaning coal, and probably in cutting coal at the face of the underground mine, seem to have enabled the average miner to produce more. Over the period from 1946 through 1957, the elasticity of the number of short tons per miner was .51 with respect to the number of tons cleaned mechanically per miner; and .58 with respect to the number of tons cut mechanically per underground miner. The estimation tried to hold constant the number of miners and the number of tons loaded mechanically per underground miner (Appendix A). The adoption of each of the three technologies, per miner, correlated highly with each of the others, so the reader should interpret these statistical results with care. The basic point is this: As the mines mechanized across operations, productivity rose, especially after the slowdown of 1949. After dropping by more than half from 1947 through 1949, annual productivity more than doubled from 1950 through 1955, to nearly 2,100 short tons per miner.

Moreover, as mines quickly mechanized in the coal boom of the 1950s, their compensation of miners grew more rapidly than did wages on the rail tracks or in the factories. Real mine wages tracked closely with the spreading use of machines to wash coal. Hourly compensation in bituminous mining, adjusted by the consumer price index, correlated positively with the annual number of tons mechanically washed per miner (r = .95).[7] By 1957, compensation in mining was more than 90 percent greater than manufacturing wages.

But mechanization may also have destroyed jobs. From 1929 through 1970, the elasticity of the number of miners on an active day, with respect to the annual number of tons cleaned

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[4] The estimate of man-days idled by strike is from Series M112 of the *Historical statistics.*

[5] The data on the rate of unemployment, among experienced wage and salary workers aged 16 or older, come from Series D106 of the *Historical statistics.*

[6] A regression of the natural log of the annual number of short tons cleaned mechanically, on the year, produces the coefficient .06542 (standard error = .002383), adjusted $R^2 = .93$. Visual inspection of the residuals suggests serial correlation. A similar regression, but with tons expressed per miner produces the coefficient .09772 (standard error = .00206502), adjusted $R^2 = .98$.

[7] The CPI used to compute real coal wages came from series E135 of the *Historical statistics.* The measure of the number of coal tons cleaned mechanically per miner was calculated from Series M104 (for tons cleaned) and from Series M107 (for all mine workers on active days).

mechanically, was about -.19, controlling for real compensation and coal demand. While that estimate is too imprecise to merit much confidence ($t = -1.3$; Appendix A), one may note the reduction in the mine workforce during the period of mechanization after 1949. The average number of bituminous coal miners on an active day dropped by 45 percent from 1950 to 1957, from 416,000 to 229,000. This was much steeper than the 8 percent drop in the demand for U.S. bituminous coal over this period, to 412 million short tons in 1957.[8]

The phenomenon of higher wages and fewer jobs may have been visible to communities throughout Appalachia, which provided most of the coal to the United States in the 1950s. The loss of jobs may have been distributed somewhat evenly across mining areas and thus may have been evident to many of them: The number of mines open dropped only 10 percent over this period, to 8,539 mines in 1957.[9] A tradeoff between jobs and wages may itself have been evident. From 1929 through 1970, the elasticity of the number of miners on an active day, with respect to a measure of real compensation per hour, was -.65 ($t = -3.8$; Appendix A). At the mean compensation of $3.45 in 1967 dollars, an increase of $1 was associated with a decrease of 60,000 fulltime jobs.

The local spectre of better but fewer jobs might have induced the parents of a teenage boy in West Virginia to encourage him to secure a good job while he could; to work in the mines rather than complete a high school education. One might expect that the early entry of young men into the mining labor force would lower wages and spur total output from the mines. The loss of human capital, however, might have reduced the gain in long-run personal income per capita.

The goals of this paper are to estimate the trade-off, if any, that West Virginian families made between mining wages and education; and to estimate the reduction in long-run income due to any subsequent loss of education. These estimates may roughly suggest the subjective rate of time preference applied in some family decisions.

The analysis focuses on family decisions made in the period from 1948 through 1970. Men who entered mines rather than schools by 1970 would likely have felt much of the subsequent impact of that decision on their long-run incomes by 1995. Data for the period exist.

2 Model

The family maximizes the discounted stream of income from the teen male by picking the number of years that the teen would spend in school rather than work in a mine. This number of school years is s. The analysis assumes that the teen would either study fulltime or mine fulltime; it excludes part-time jobs. The longer that the teen remains in school, then, the lower his earned income over the school-age years. The expectation of this earned income is V_e, which depends negatively on the choice of s. The expectation also depends positively on the real marginal value of the product of mine labor that prevails when the expectation is formed. That value is $P(t_0)$, where t_0 is the time that the expectation is

[8] I calculated annual demand as the annual production of bituminous coal mines minus the stocks at the end of the year. Data sources were Series M93 (for output) and M102 (for stocks) from the *Historical statistics.*

[9] Data on the number of bituminous coal mines in operation is from Series M103 of the *Historical statistics.*

formed.

In addition to V_e, the teen is expected to earn income Y_e over the rest of his anticipated career of length $T - s - t_0$. His income may increase with his level of education as well as with the stock of technology. Thus Y_e depends positively on s and on time variable t.

The family seeks to solve

$$\max_{\{s\}} \int_{s+t_0}^{T} e^{-rt} Y_e(s,t)\, dt + V_e(s,P)$$

where r is the subjective rate of time preference and where $s = [0, T - t_0]$.

The first-order condition is

$$\int_{s+t_0}^{T} e^{-rt} \frac{\partial Y_e}{\partial s}\, dt - e^{-r(s+t_0)} Y_e(s,s) \leq -\frac{\partial V_e}{\partial s}$$

if $s < T - t_0$, as the analysis will assume. (The teen male is presumed not to become a lifetime professional student.) Given fulltime study, $Y_e(s,s) = 0$ and

$$\int_{s+t_0}^{T} e^{-rt} \frac{\partial Y_e}{\partial s}\, dt \leq -\frac{\partial V_e}{\partial s}.$$

The family chooses s to balance, at the margin, the long-run costs of immediate work, in foregone income, against the immediate gain of income.

For simplicity, the analysis assumes that the family uses a constant estimate of annual mining income $W_e(P)$ for the short-run expectation V_e:

$$V_e = A(P) - W_e(P)s.$$

Annual mining income is estimated as

$$W_e[P(t_0)] = c_0 + c_1 P(t_0) + c_2 t_0$$

on annual data for 1946 through 1970. The estimate of W_e provides $-\partial V / \partial s$ for specifying the first-order condition.

The family projects income to be received in year t as

$$Y_e(t) = d_0 + d_1 s + d_2 t.$$

The estimate of d_1 provides $\partial Y_e / \partial s$ for the first-order condition.

The first-order condition yields a nonlinear estimate of the subjective rate of time preference:

$$\frac{r}{e^{-r(s+t_0)} - e^{-rT}} = \frac{d_1}{W_e}. \qquad (1)$$

3 Estimation

3.1 Specifying the expectation of the hourly wage

3.1.1 The marginal value of labor

I assume that the family is well-informed about local mine conditions and that, as a long-run average, it is usually correct in forecasting the wage for the coming two years. I thus specify the family's expectation for the hourly wage at time t_0, $w_e(t_0)$, by regressing a three-year average of the real mining wage, for year t_0 and for the following two years, on the current and the recent marginal value of product for mining labor, expressed in hours: $p(t_0)$ and $p(t_0 - 1)$. The expectation of the hourly wage combines with an expectation of the number of hours worked per year, $h_e(t_0)$, to yield an expectation of annual income, $W_e(t_0)$. I assume that the wage expectation is independent of the hours expectation, so that $W_e(t_0) = w_e(t_0)h_e(t_0)$.

I obtained estimates of $p(t_0)$ by regressing the total real annual value of bituminous coal (*TVP*) on the annual average number of bituminous miners on an active day (*AllMen*) as well as on the square of that number; on a measure of physical capital, the annual number of short tons of bituminous coal cleaned mechanically (*Clean)*; and on a time trend to capture technological change (*Year)*.[10] The equation estimated was

$$TVP = a_0 + a_1 Year + a_2 AllMen + a_3 AllMen^2 + a_4 Clean. \tag{2}$$

The marginal value of labor product was estimated as

$$p(t_0) = a_2 + 2a_3 AllMen(t_0). \tag{3}$$

Descriptive statistics for the variables follow.

Statistics	*Year*	*AllMen*	*AllMen*^{2}	*Clean*	*TVP*
Mean	1943	390504	1.82626E+11	149923	2461220
Median	1943	419182	1.75714E+11	142187	2332768
Standard deviation	16.02	175188	1.35342E+11	117898	689794
Coefficient of variation	0.00824	0.449	0.741	0.786	0.28
Minimum	1916	124532	15508219024	13629	991981
Maximum	1970	704793	4.96733E+11	349402	4149230
Observations	55	55	55	55	55

Regression results follow for estimating (2) for 1916 through 1970.

Statistics	
Observations	55
R^2	0.724
Adjusted R^2	0.702
SEE	376797

The specified model was

10 To estimate the total real annual value of coal, I multiplied the average value of a short ton of coal, f.o.b. at the mine, by the level of output. I deflated the value with the CPI. Data sources, all from the *Historical statistics of the United States*, were Series M96 (value); Series M93 (output); and Series E135 (CPI).

Variable	*Coefficient*	*Standard error*	*T-statistic*	*Elasticity*
Intercept	756270	332316	0.228	
Year	-5995.40	17151.8	-0.35	-4.7
Allmen	13.6716	1.89990	7.2	2.2
Allmen^2	-6.04696E-06	2.0882E-06	-2.9	-0.45
Clean	15.4287	1.99272	7.74	0.94

Time may have had a relatively large impact on mining value (the elasticity is -4.7), although the estimate of the coefficient is too imprecise to permit one to be sure of the direction of the impact. It seems more probable that mining value increased through mechanization (*Clean)* than through innovation (*Year*).

Annual estimates for the marginal value of product, expressed in hourly terms, were generated by applying regression results to (3) and then dividing the year-long marginal value of labor product by the estimated number of hours worked. Since the early years of the Great Depression, hourly compensation to miners has gained upon the marginal value of mining product, which began dropping steadily in 1956. That was on the eve of a six-year decline in coal demand as well as of a fall by a fourth in the real average value of coal over the period until 1970.[11]

3.1.2 Hourly wage expectations

Let $w(t_0)$ represent the actual hourly wage at time t_0. I specify the wage expectation as

$$w_e(t_0) = c_0 + c_1 p(t_0) + c_2 p(t_0 - 1) + c_3 t_0$$

where the parameters c_i come from the regression equation

$$\frac{w(t_0) + w(t_0+1) + w(t_0+2)}{3} = c_0 + c_1 p(t_0) + c_2 p(t_0 - 1) + c_3 t_0.$$

The series $w(t_0)$, which includes wage supplements, extends a series by H. Gregg Lewis to the time period from 1958 through 1970. The extension divides the annual supplement by an estimate of annual hours. This estimate of the hourly supplement is then added to hourly earnings, with an adjustment to match the Lewis series. Appendix A has details.

The dataset for the regression extends from 1924 through 1968. This permits the formation of the kind of long-held expectations that seem likely in mining communities that change slowly. The variables, described below, are each reasonably symmetric in distribution.

[11] Appendix A describes how I calculated the demand for coal. To obtain the real average value of a short ton of bituminous coal, f.o.b. at the mine, I used the Consumer Price Index to adjust Series M96 of the *Historical Statistics of the United States.*

Characteristic	*w*	*p*(t_0)	*p*$(t_0 - 1)$	t_0
Description	real pay; 3-yr forward avg	MVP labor	MVP lag	Current year
Mean	3.20233	5.53725	5.44669	1946
Median	2.76225	5.02764	4.91596	1946
Standard deviation	1.63950	1.60541	1.66137	13.13
Coefficient of variation	0.512	0.29	0.31	0.007
Minimum	1.26533	3.07386	2.46754	1924
Maximum	6.20828	8.86375	8.86375	1968
Observations	45	45	45	45

Basic statistics for the regression, which follow, suggest that the model explains most of the fluctuation in the wage average.

Characteristic	
Dependent variable	*w*
R^2	0.959
Adjusted R^2	0.956
SEE	0.343506

Estimates of the model suggest that much of the explanatory power stems from the intercept and the time variable which varies little. This may simplify the family's forecast. As expected, the short-run pay average rises with the current marginal value of mining and with the increase in that value over the previous year. Neither effect, however, is precisely estimated or powerful.

Variable	**Coefficient**	**Standard error**	**T-statistic**	**Elasticity**
Intercept	-226.061	12.6214	-17.91	
p(t_0)	0.066001	0.098622	0.669	0.114
p$(t_0 - 1)$	-0.017534	0.099373	-0.176	-0.03
Year	0.117674	0.006605	17.815	71.51

3.1.3 Expectation of workhours

The family's expectation of the annual number of work hours hinges on its forecast of the annual number of workdays, $d_e(t_0)$, which is modeled here. The actual number of workdays is $d(t_0)$. For the family, two vivid factors may shape the annual number of workdays: The current annual number of strike days per miner, $strike(t_0)$; and the passage of time t_0, which reflects continuing trends in demand and supply.

The expectation of workdays is specified as

$$d_e(t_0) = g_0 + g_1 strike(t_0) + g_2 t_0$$

where the parameters g_i are obtained from the regression

$$\frac{d(t_0) + d(t_0 + 1) + d(t_0 + 2)}{3} = g_0 + g_1 strike(t_0) + g_2 t_0$$

on data extending from 1923 through 1968.

The variables in the regression are described below. For *strike*, the mean is nearly triple the median. A few large strikes may disproportionately increase the number of workdays in the ensuing years.

Characteristic	*d*	t_0	*strike*
Description	active days; 3-yr forward avg	year	strike days per miner
Mean	202.07	1945.5	7.41321
Median	198.83	1945.5	2.66833
Standard deviation	23.976	13.423	10.3102
Coefficient of variation	0.119	0.0069	1.391
Minimum	157.67	1923	0.30136
Maximum	267.67	1968	49.1885
Observations	46	46	46

Basic statistics for the regression follow. The number of workdays is harder to explain than real compensation, perhaps because it relates less systematically to time. Compared to compensation, the number of workdays may be more responsive to the current demand for coal; and it may be less subject to contracts that last for several years.

Characteristics	
Dependent variable	*d*
$\mathbf{R}^2$	.115
Adjusted $\mathbf{R}^2$	.074
SEE	23.067

The regression model follows. On average, the miner replaced each strike day with a workday over the three-year period. The strike may thus be viewed as a reallocation of worktime rather than as an effective signaling device for raising the employer's estimate of the reservation wage. Another regression suggests that, in this time period of 1924 through 1968, the number of strike days per miner related negatively, though weakly, to the three-year forward average of real hourly compensation (elasticity = -.02; *t*-statistic = -1.69). That regression controls for the positive and large impact of the year on compensation.

The model below suggests a possible reason for reallocating worktime. The workyear itself tended to increase over time, as did real wages and capital intensity, while the size of the work force diminished.

Variable	**Coefficient**	**Standard error**	**T-statistic**	**Elasticity**
Intercept	-942.4	504.4	-1.868	
t_0	0.5869	0.2591	2.265	5.65
Strike	0.34564	0.3373	1.025	0.01

3.1.4 Expected annual mining income

The two regression models described provide estimates for the family's expectations of hourly compensation and annual number of active days over a three-year horizon. Multiplying these estimates by the current number of work hours per active day provides an estimate of the family's expectation of annual mining income.[12] This expectation of real income rises steadily by about $234 a year, from $1,100 in 1924 to $11,300 in 1968.

[12] Appendix A explains how the number of work hours per active day were computed. It also provides estimates for daily hours and for expected annual income from mining.

3.1.5 Expected long-range income

The family's expectation of annual income beyond the high school-age years is $Y_e(t)$ for year t. The family does not presume that the teen will necessarily stay in mining. Instead, as it ponders whether the teen should remain in school, it considers the income that he may anticipate on average if he were to complete s years of education. In particular, it considers the increase that it may expect in his income for year t if he were to complete another year of education.

Notation follows. The real income of a median worker in year t is $Y(t)$. The level of education attained by that worker is $s(t)$. The worker's number of years of experience in year t is $z(t)$.

The structure of the family's expectation of future income is obtained by estimating the equation

$$Y(t) = d_0 + d_1 s(t) + d_2 z(t) \tag{4}$$

for annual observations from 1939 through 1970. Its calculations of future income are then generated with the equation

$$Y_e(t) = d_0 + d_1 s + d_2(h + t - t_0)$$

where s is the family's choice of education for the teen and h is the number of years that he would complete in the mines while of school age. The parameters d_i are obtained from (4).

Estimates of (4) follow. *Income* is annual earnings per fulltime employee, adjusted with the CPI ($1967), drawing upon Series D722 of the *Historical statistics of the United States. Experience* is the estimate of the number of years of job experience for the mean male worker in the given year. *School* is the estimate of the median number of years of formal education completed by the male worker of given age.[13] In the descriptive statistics, the small coefficient of variation for *School* suggests that, from 1939 to 1970, the average level of general human capital may have risen slowly — probably more slowly than the marginal level. Few experienced workers returned to school.

[13] *Experience* is calculated by estimating the mean age of a male worker in the given year; subtracting an estimate of the median number of years of schooling for a male worker of that age; and subtracting the age at which the worker is presumed to have started school, 6. This provided estimates of the potential number of years that the worker might have worked.

To gain estimates of actual experience, I adjusted the estimates of potential experience for joblessness. I multiplied the yearly unemployment rate by an estimate of the share of the year spent in unemployment, for each year that the worker might have worked. I then summed the products. Finally, I multiplied the estimate of the number of years of potential experience by 1 minus the sum of unemployment products.

School data draw upon Series H619, H628, H635 and H642 of the *Historical statistics.* The series data are decennial; estimates for intervening years are linear interpolations. To estimate *School* for years before 1940, I regressed schooling estimates for 1940 through 1970 for a male worker of given age on the rate of unemployment (coefficient -.023) and on a time variable (coefficient .1171). The negative coefficient on the unemployment rate may reflect that it was less common before 1970 for unemployed workers to return to school than it was after 1970.

For most years before 1940, I used regressions to estimate most data for the model of long-run income. Appendix A has details.

Characteristic	*Income*	*Experience*	*School*
Description	annual real earnings($)	years of work	years of schooling
Mean	4781	10.86	11
Median	4679	7.883	11.2
Standard deviation	1047	4.737	1.14
Coefficient of variation	0.219	0.436	0.105
Minimum	3038	5.784	8.8
Maximum	6504	17.57	12.4
Observations	32	32	32

Basic statistics for the regression suggest that expectations of income based on even a simple model may have explanatory power.

Characteristics	
Dependent variable	*Income*
$\mathbf{R}^2$	0.946
Adjusted $\mathbf{R}^2$	0.942
SEE	251.21

The model (below) suggests that the earnings generated by another year of schooling may substitute for those generated by roughly another six years of fulltime experience, net of the labor income itself. The relatively high returns to education suggested here may owe in part to the fact that workers accumulated education slowly.

Variable	**Coefficient**	**Standard error**	**T-statistic**	**Elasticity**
Intercept	-2325.7	689.09	-3.37	
Experience	85.99	18.92	4.55	0.195
School	564.	78.3	7.2	1.29

3.2 Estimates of the subjective rate of time preference

Microcomputer simulations of (1) estimated the value of r that locally minimized the absolute value of the difference between the two sides of the equation.[14] I estimated the subjective rate of time preference for each year from 1940 through 1968. For the entire time period, I assumed that the family anticipated that the teen would work until age 65.

Throughout the time period, the estimated value of r was low, ranging between $5 * 10^{-4}$ and $6 * 10^{-4}$, with estimation errors of one or two orders of magnitude larger than the estimates of r. For practical purposes, the annual rate of subjective time preference applied by mining families to education decisions appeared to be zero.

4 Conclusions

Human capital accumulated slowly in the U.S. labor force over the mid-20th century. The average level of education in a male worker, about 40 years old, rose 41 percent from

[14] While, in principle, the minima are local, the extremely large and growing differences that occurred in runs at larger values for r suggest that the minima were global as well.

Readers may obtain a copy of the simulation program, written in Visual Basic.

1940 to 1970. The reasons do not seem to rest with the family's impatience to consume, however. Simulations examined a typical family that could have taken a teen out of the schools and put him to work in the mines for current income. They suggest that, for such decisions, the family essentially viewed income received in the future the same as current income. Families did not appear to discount heavily the higher income that the teenager would receive, in the future, from a more substantial education.

5 Appendix A

5.1 Determinants of mine employment, 1929-1970

I regressed the average number of miners on active days, *AllMen*, on a measure of annual coal demand, *Demand,* which subtracted end-of-year stocks from annual output; on a measure of mechanization, the annual number of short tons cleaned mechanically, *Clean;* and on a measure of real hourly compensation, *RealPay*. Data for estimating *Demand* came from Series M93 (for output) and Series M102 (for stocks) of the *Historical statistics.* Data for *Clean* came from Series M104 of the *Historical statistics*, with linearly interpolated values for 1922 and 1924-26.

RealPay extends a series constructed by H. Gregg Lewis for the average hourly compensation of bituminous coal miners, which includes wage supplements. For 1929 through 1957, the last year in Lewis' series, *RealPay* adjusts Lewis' estimates with the Consumer Price Index. Data came from Series D814 (Lewis series) and Series E135 (CPI) of the *Historical statistics.*

For 1958 through 1970, I extended the Lewis series in the following manner. First, I estimated the hourly wage supplement. To obtain this estimate, I divided the average annual supplement to wages and salaries of fulltime employees in mining (Series D896) by an estimate of annual hours. The estimate of annual hours was the product of two numbers: the average weekly hours in bituminous mining for production workers (Series D812); and an estimate of the number of weeks worked in a year by a bituminous miner. For the estimate of the number of weeks worked, I divided the average annual earnings of fulltime employees in bituminous mining (Series D743) by the product of two numbers: the average weekly hours in bituminous mining for production workers; and the average hourly earnings for those workers (Series D813).

Next, I added the estimate of the hourly wage supplement to the average hourly earning for production workers in bituminous mining (Series D813).

This estimate of compensation to the miner was 22 percent less than Lewis' estimate in 1957. To determine the adjustment to make to my estimates of compensation for 1958 through 1970, I regressed, on the year, the percentage differential between the two compensation estimates, for 1929 through 1957. The model indicated that the differential was a positive linear function of time ($R^2 = .93$; $t = 12.5$ for the time coefficient of .01786). I used the model to estimate the differential to apply to my compensation estimates for 1958 through 1970.

To bring those estimates in line with the Lewis estimate of 1957, I subtracted -.117 from each of my estimates for 1958 through 1970. This ensured that my estimate for 1958 equalled what the differential model would have predicted for that year, taking as given the Lewis estimate for 1957.

Finally, I adjusted the estimates for 1958 through 1970 for inflation by deflating them with the CPI.

Descriptive statistics follow:

Statistic	*RealPay*	*Demand*	*Clean*	*AllMen*
Mean	3.45333	415287	189561	321245
Median	3.30961	409416	189790	388224
Standard deviation	1.65814	76346.6	107199	137689
Coefficient of variation	0.480	0.184	0.566	0.429
Minimum	1.21134	280044	30278	124532
Maximum	6.42451	578463	349402	502993
Observations	42	42	42	42

In *AllMen*, the 21.8 percent disparity between the mean and the median, relative to the mean, may indicate the impact of strikes on active-day employment.

The regression estimated the model

$$AllMen = a_0 + a_1 \ \mathrm{Re}\, alPay + a_2 \ Demand + a_3 \ Clean.$$

Specifications from the regression follow:

Statistics	
Observations	42
R^2	0.936
Adjusted R^2	.931
SEE	36082.0

The estimated model follows:

Variable	*Coefficient*	*Standard error*	*T-statistic*	*Elasticity*
Intercept	452045	40579.2	11.1	
RealPay	-60031.7	15824.9	-3.79	-0.645
Demand	0.331489	0.0856168	3.87	0.429
Clean	-0.322612	0.248668	-1.3	-0.190