

The individual economic well-being of Native American men and women during the 1980s: A decade of moving backwards

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Abstract. The study examines whether the income opportunities of Native Americans over the 1980s improved in response to stronger aggregate job growth or deteriorated in response to declining wage and employment opportunities, particularly for the less-skilled. Using data from the 1980 and 1990 US Census on individuals aged 16–64, a methodology is presented to analyze the effect of changes in the income distributions of Native Americans and whites on the average Native American-white income ratio. Oaxaca-type decompositions are also used to yield insights into the role of economy-wide as opposed to Native American-specific effects on changes in income, hourly earnings and annual hours employed over the period. The study concludes that the economic circumstances of Native American men and women further deteriorated relative to whites over the decade, chiefly due to the declining valuation given to Native American human capital, particularly for men. An important finding of the study is the role of economy-wide vis-à-vis native-specific effects: almost all of the adverse movements in average hourly earnings against Native Americans can be attributed to changes in economy-wide hourly earnings structures (with the least-skilled being paid less), whereas the large fall in relative annual hours is due to changes specific to Native Americans.

Key words: Native Americans, American Indians, Minorities, Income inequality, Wage inequality

1. Introduction

The decade of the 1980s was one of the best ever for US employment growth. Between 1979 and 1989, the employment-population ratio increased from 59.9 to 63.0 percent to reach the highest level since World War II. A commonly noted characteristic of the US and other wealthy economies is that when job opportunities grow quickly, the least skilled and those who are disadvantaged in labor markets are able to do better (Okun 1973). There is a strong up-draft effect. Low hourly earnings tend to increase relative to the median, and unemployment falls. Native Americans have always been disadvantaged in the labor market, and on the basis of aggregate job growth over the 1980s, their economic position should have improved.

The 1980s, however, were unusual. Despite strong job growth, the labor market conditions for low-skilled, low-paid men deteriorated. Real hourly

earnings and employment fell (Katz & Murphy 1992; Freeman & Katz 1995). In such an environment, it might be thought that Native American men would fare badly. They tend to be overrepresented among the unskilled and have always found it difficult to find employment. In addition, the US Government reduced income support for Native American people during most of the period, and this, too, must have affected Native American incomes (Levitan & Miller 1991). It is an interesting question whether, on balance, the income opportunities of Native American men improved in response to stronger aggregate job growth or deteriorated in response to the declining income opportunities of the less skilled and reduced government support.

The employment growth of the 1980s particularly favored women; their share of total employment increased from 41.7 to 45.2 percent. They, too, were subject to a widening hourly earnings and income gap between those with labor market skills and those with less education and labor market experience. However, by 1989, white women from all parts of the income distribution had moved up the income ladder relative to men. Another issue, therefore, is whether Native American women shared in these gains.

This paper is organized as follows. Section 2 reviews in broad terms the change in the ratio of the means of individual Native American and white incomes. The story is clear, stark, and generally depressing. At the beginning of the 1980s, the average income of a Native American male was just 62.5 percent of the average white male income. By the end of the decade, the income ratio had fallen to 54.4 percent. There is a similar story for women. At the beginning of the 1980s, Native American women reported incomes that were on average 77.0 percent of white female incomes. By 1989, the ratio had fallen to 69.8 percent. In economic terms, one of the most disadvantaged groups in the USA moved backwards.

Section 3 examines the components of the income ratio change in terms of changes in annual earnings, annual hours worked, and earnings per hour. Native Americans have lost ground on all dimensions, but the greatest losses have been in terms of earnings per hour, followed by annual hours worked.

Section 4 presents estimates-of-income equations for Native Americans and whites, which are the counterparts to human capital hourly earning equations. These equations summarize quite well the different outcomes for Native Americans and whites and enable us to focus on the effects of education, experience, marital status, and location on the shifting income relationship between the two groups. Section 5 applies the same model to explain the income shifts in terms of changes in annual hours worked and earnings per hour.

Section 6 draws some of the threads of the discussion together, while the last offers concluding comments.

2. A simple method of analysis and data presentation

The data for this analysis are drawn from the 5 percent public-use sample from the 1980 and 1990 US Censuses and include all respondents who identified as white¹ or Indian (American) in response to the race question. Native American people are a small proportion of the US population – approximately 0.5 percent – but their population is increasing quickly as a result of high fertility levels, declining death rates, reduced underenumeration in census collections, and increased self-identification.² Note that in the present discussion, we do not address the issues that arise from increased self-identification and from the economic, social, regional, and tribal diversity of different groups of Native Americans.

We begin with the income data, which represent aggregate annual income from all sources as reported by men and women aged 16–64 in the calendar years of 1979 and 1989. The data are often presented as the ratio of the means of the individual incomes of Native Americans and whites. The income ratio is a summary measure incorporating Native American-white differences in employment rates, hours of work, hourly earnings, welfare payments, and other income. We prefer to work with an income ratio in the first instance, even though hourly earnings is the usual focus of economic analysis. The income ratio is a better measure of well-being as it includes income from all sources and the effects of different employment rates.

To help in understanding why average income is so different for Native Americans and whites and why the income ratio changed over the decade, the first method of analysis proceeds in two steps. The method is rather mechanical, but it provides a useful technique for focusing on aggregate changes, describing the data, and assessing the effects of changes in income dispersion on the mean income ratio. The changing economic circumstances of Native Americans have not been extensively analyzed, and it is useful to spend some time on basic summary statistics. The method is supplemented by a more detailed analysis in the next section.

The method is described in the context of the male income ratio. The first step is to determine the *position* of Native American men on the white male income distribution ladder. That position will depend on individual human capital characteristics, such as education and labor market experience, and the rate of return to those characteristics. Thus, on average, Native American men may be lower down the white income ladder because their average human capital characteristics are lower relative to whites or because their human capital delivers a lower rate of return.

The second step is to determine the change in income *compression*, that is, the extent to which the white male income distribution ladder changes over the period. Other things being equal, the average income of those at the bottom

of the income ladder will fall relative to white mean income if the income distribution among whites becomes less compressed. The change in the white income ladder can be thought of as a summary measure of economy-wide influences on income compression.

More formally, we proceed as follows. White males at each date are ranked by reported income levels and the population divided into deciles. Native American men are then placed in each of these deciles according to their income. Then the income ratio, \bar{Y}^I / \bar{Y}^W , is written as the sum of ten terms, each the product of three components, where superscripts I and W represent indigenous (Native American) and white, respectively.

$$\frac{\bar{Y}^I}{\bar{Y}^W} = \sum_{i=1}^{10} \Pi_i \Phi_i \frac{\bar{X}_i^W}{\bar{X}^W} \quad (1)$$

The first two components are used to provide measures of the position of indigenous men on the white income ladder; Π_i is the proportion of indigenous men whose income falls in the i th white income decile, and Φ_i is the ratio of the indigenous to the white male income mean within each white income decile $\bar{X}_i^I / \bar{X}_i^W$. The third component, \bar{X}_i^W / \bar{X}^W , measures white male mean income in each decile as a ratio of the overall white male mean income and is used to calculate income compression.

Applying the above method, we find that in 1979, 19.1 percent of Native American men aged 16–64 received income that placed them in the same income range as the bottom decile of the white male income distribution (column 1 of Table 1). At the other end of the income ladder, 3.5 percent of Native Americans were in the same income bracket as the top 10 percent of white males. Native American men are disproportionately concentrated at the bottom of the income ladder and underrepresented at the top.

By 1989, the ladder position of Native American men had further deteriorated (column 2 of Table 1). The proportion of Native American men in the top decile of the white distribution had fallen 25 percent, while the proportion in the bottom decile had increased 13 percent. Native American men lost income because they slipped down the income ladder. In 1979, the Native American male with median income was positioned opposite a white male ranked at the 30th percentile. By 1989, the Native American male with median income had shifted to the 27th percentile of the white distribution.

The combined effect of position on the income ladder and compression determines the income ratio, which is presented in Table 2. The entries along each diagonal are the actual income ratios in 1979 and 1989. Thus the row 1, column 1 entry is the 1979 actual male income ratio, 62.5. The off-diagonal term is a hypothetical income ratio that allows us to determine the effects of ladder and compression changes. Row 2, column 1 places Native American

Table 1. Percentage of Native American men and white and Native American women classified by white male income deciles, 1979 and 1989 (percentage)

White male income deciles	Male Native Americans		Female white Americans		Female Native Americans	
	1979	1989	1979	1989	1979	1989
1st	19.1	21.6	32.8	24.6	36.2	30.0
2nd	16.0	17.2	18.4	18.0	21.7	23.7
3rd	14.9	14.8	16.0	14.9	17.9	17.3
4th	13.7	11.5	14.0	12.3	12.1	11.1
5th	8.7	9.4	7.9	9.8	5.6	7.0
6th	7.3	7.1	4.8	7.3	2.9	4.4
7th	6.3	6.2	2.7	5.3	1.7	3.0
8th	5.6	5.2	1.7	3.8	1.0	1.9
9th	4.9	4.3	1.0	2.4	0.6	1.1
10th	3.5	2.6	0.7	1.5	0.3	0.4

Source: Census of Population and Housing, 1980 and 1990. Public use microdata sample (5-percent).

and white males in their 1989 ladder position and calculates the income ratio this would produce at the 1979 level of income compression. Thus, if income compression had not changed, the income ratio would have fallen from 62.5 to 57.4 percent. Native Americans lost 5.1 percentage points of relative income because they slipped down the white ladder. The remaining change from 57.4 to 54.4 percent is the result of the changed compression of the white income ladder. Native Americans lost 3.0 percentage points because the income distribution of whites widened.

The slip down the ladder accounts for two-thirds of the decline in the income ratio.³ This suggests that influences particular to Native Americans are more important than the general influences that were changing the degree of compression of the white income distribution. Even after accounting for growing inequality in the USA, there is a large Native American relative income decline that needs to be accounted for.

Columns 3 and 4 of Table 1 document the large move up the white male income ladder that occurred among white females over the 1979–1989 decade. The proportion of white women who received income in the top decile of the white male income distribution increased from 0.7 to 1.5 percent, while the proportion in the bottom decile decreased from 32.8 to 24.6 percent. In 1979, the white woman who received median income for her group was placed at the 19th percentile of the white male distribution; by 1989, her ranking had moved up to the 25th percentile.

Table 2. Native American and white income ratios 1979 and 1989

Ladder position	Income compression					
	Native American men/ White men		White women/ White men		Native American women/ White men	
	1979 (1)	1989 (2)	1979 (3)	1989 (4)	1979 (5)	1989 (6)
1. 1979	62.5		35.8		28.3	
2. 1989	57.4	54.4	49.0	45.4	34.2	31.7

Ladder position	Income compression			
	Native American women/ White women		Native American women/ Native American men	
	1979 (7)	1989 (8)	1979 (9)	1989 (10)
1. 1979	77.0		45.2	
2. 1989	69.7	69.8	59.5	58.2

Native American women also made gains. Columns 5 and 6 indicate that although they occupied the lowest ladder positions, they, too, unlike Native American men, moved up the ladder. The proportion of Native American women who received income in the top decile of the white male income distribution increased from 0.3 to 0.4 percent, while the proportion in the bottom decile fell from 36.2 to 30.0 percent.

Columns 3 to 6 of Table 2 apply our simple technique to white and Native American women. For both groups, the move up the white male ladder increased their income relative to white males by a significant amount: from 35.8 to 49.0 for white women (row 1, column 3 to row 2, column 3) and from 28.3 to 34.2 for Native American women (row 1, column 5 to row 2, column 5). As remarked earlier, Native American women have made significant strides up the white male income ladder, especially when compared with Native American men, who slipped in ladder position.

Both white and Native American women are still disproportionately positioned in the bottom half of the white male income ladder. They gained income from moving up the ladder relative to white males during the period, but the widening income distribution of the white male income ladder took some of those gains away. The size of these losses is quite significant: 49.0 to 45.4 for white women and 34.2 to 31.7 for Native American women. The change in the income ratio therefore understates quite considerably the gains women made relative to men in similar circumstances to themselves at the beginning of the decade. Women have been making economic progress, but

this has been hampered because they have been ‘swimming upstream’ against the increased inequality of the 1980s (Blau & Kahn 1994).

Columns 7 and 8 of Table 2 describe the position of Native American women relative to their white counterparts. The Native American-white female income ratio was 77.0 in 1979, but had fallen to 69.8 by 1989. Although Native American women made significant gains relative to white men, they did not keep pace with white women. Columns 9 and 10 of Table 2 show the change for Native American women relative to Native American men. Native American women made income gains of 28.8 percent relative to Native American men, a gain similar to that made by white women relative to white men. The economic balance is shifting between the genders as women of both groups are increasing their income share.

3. Annual income, annual earnings, annual hours worked and hourly earnings

The decline in the annual income ratio could come from many sources. A comparison of rows 1 and 2 of Table 3 allows us to apportion the income ratio change to employment and nonemployment income, and a comparison of rows 3 and 4 then enables us to apportion the change in employment earnings into the change in annual hours worked and average earnings per hour employed.⁴ Each of the variables for Native Americans and whites – annual income, annual earnings, annual hours worked, and average earnings per hour – is divided by its respective working-age population, aged 16–64; the individual means of both groups are then expressed as a ratio. We also include the employment-population ratio at the time of the census (row 5) and the proportion of the population employed some time during the year (row 6).

The lower annual income of Native American men arises from all three sources: lower income from nonemployment, fewer hours worked per year, and lower average earnings per hour. Native American and white men receive the same proportion of their income (8 percent) from nonemployment sources, and consequently the income ratio (row 1) and the earnings ratio (row 2) are approximately the same. Within the employment income category, the lower income for Native men is accounted for in roughly equal proportions between fewer hours worked per year and lower average earnings per hour. During 1979, Native American men worked 23 percent fewer hours during the year and were paid, on average, 19 percent less per hour.

The proportions of earned and nonearned income are slightly different for women. Native American women received 16 percent of their 1979 income from nonemployment sources; for white women, the ratio is a little less, at

Table 3. Income, earnings, annual hours, hourly earnings, and employment/population* Native American-white ratios, 1979 and 1989

	1979			1989			Percent change 1979-89								
	No	HS	Total	No	HS	Total	No	HS	Some	Coll	Total				
	HS	Coll	Coll	HS	Coll	Coll	HS	Coll	Coll	Coll	Coll				
<i>Men</i>															
Income	0.67	0.70	0.77	0.75	0.62	0.64	0.67	0.64	0.70	0.68	0.55	1	-8	-9	-12
Earnings	0.67	0.71	0.77	0.74	0.62	0.65	0.67	0.65	0.70	0.68	0.55	0	-8	-10	-12
Annual hours	0.75	0.81	0.88	0.91	0.77	0.77	0.75	0.77	0.86	0.90	0.74	0	-5	-3	-3
Hrly earnings	0.89	0.88	0.87	0.82	0.81	0.85	0.89	0.85	0.81	0.76	0.73	0	-4	-7	-9
Emp/pop 1	0.75	0.83	0.88	0.93	0.78	0.81	0.73	0.81	0.87	0.94	0.77	-2	-2	-1	-1
Emp/pop 2	0.89	0.93	0.95	0.97	0.89	0.92	0.86	0.92	0.93	0.96	0.88	-4	-1	-2	-1
<i>Women</i>															
Income	0.82	0.89	0.94	0.97	0.77	0.80	0.84	0.80	0.85	0.90	0.70	4	-10	-10	-9
Earnings	0.75	0.90	0.95	1.02	0.75	0.77	0.74	0.77	0.84	0.91	0.67	-1	-14	-11	-10
Annual hours	0.80	0.94	1.03	1.08	0.84	0.86	0.78	0.86	0.94	1.03	0.81	-3	-8	-9	-4
Hrly earnings	0.93	0.96	0.92	0.95	0.89	0.90	0.95	0.90	0.90	0.89	0.83	2	-6	-3	-7
Emp/pop 1	0.79	0.92	0.96	1.00	0.82	0.86	0.75	0.86	0.92	1.00	0.81	-5	-6	-5	-1
Emp/pop 2	0.91	0.99	1.03	1.04	0.90	0.94	0.85	0.94	0.97	1.00	0.88	-6	-5	-6	-3

* All ratios computed based on mean values for working-age population (aged 16-64). See Appendix 1 for base data.

Notes: No HS = no high school; HS = high school; Some Coll = some college; Coll = college degree.

Income = earnings + unearned income; Earnings = hourly earnings \times annual hours; Annual hours = weeks worked in the year \times usual hours worked per week; Hourly earnings = annual earnings/annual hours; Emp/pop 1 = No. of employed/population; Emp/pop 2 = No. employed anytime within the year/population.

14 percent. The difference between the income and earnings ratio therefore is quite small, 2 to 3 percentage points.

The largest differences in income between white and Native American women also arise within the employment income category. Relative to their white counterparts, Native American women were employed in the labor market for 16 percent fewer hours per year and in 1979 received hourly earnings that were 11 percent less. As with men, the largest difference between Native American and white women is annual hours worked, rather than earnings per hour.

We now turn to our primary concern, the change in the income ratio over the decade. There has been no change in the relationship between male income and earnings ratios and only a marginal shift for women. Therefore, the income ratio change between 1979 and 1989 arises almost completely from changes in annual hours worked and hourly earnings, rather than changes in nonemployment income. For both groups, the decline in relative earnings is more important.

The data in Table 3 suggest that to explain changes in the income ratio, we should focus our attention on annual hours worked and earnings per hour and not on income from nonemployment. Since annual earnings, annual hours, and earnings per hour are linked by an identity, we could estimate equations for two variables and combine them to explain changes in the third. Alternatively, we could fit equations to explain all three variables and ignore the relationship between them.

It seemed best to estimate an income equation consistent with the data of Tables 1 and 2; this we do in the next section. Then in the following section, we estimate equations for earnings per hour and annual hours worked per individual. The advantage of this approach is that parameter estimates and their significance levels can be directly observed for all variables.

There remains the question of model choice. We could have emphasized locational aspects, industry, and occupation of employment, but chose a simple methodology that seemed particularly appropriate given the paucity of economic research on the determinants of Native American income, employment, and earnings. We adopted a human capital model that stresses the role of education and labor market experience and, in the interest of parsimony, puts aside industry and occupation of employment.⁵ The models also use the same explanatory variables in each equation. We see this as an advantage as it consistently maps simple relationships that may point to relevant directions for the future.

4. The income equation

A fuller development of the human capital model is found in Mincer (1974). But very briefly, the model explains individual hourly earnings in terms of formal education, labor force experience, and family attributes. When undertaking formal education, the student forgoes contemporaneous earnings in the labor market, which are thought of as an investment that subsequently receives a rate of return. It is the return to this investment that leads to higher income for workers with more education.

With respect to the relationship between earnings and labor force experience, workers are thought of as investing in on-the-job training, for which they receive lower earnings when they are young; the gap between the lower earnings per hour during on-the-job training and the alternative market wage is further investment in human capital. More-experienced workers receive higher wages than those less experienced, part of which is a return to earlier investment. On-the-job training leads to a positive slope of the experience-earnings profile until the depreciation of human capital (represented by a quadratic or nonlinear component) begins to dominate the returns to investment, and the experience-earnings profile peaks and then declines.

Finally, family variables, such as marital status, are included in the model. The link between these variables and human capital is not usually developed in any detail. Family variables can be thought of as reflecting motivation in the labor market and willingness to invest in on-the-job training (which is typically not measured in these data sets) and serving as proxies for interrupted labor force experience (which is also not measured in these data sets).

A similar human capital analysis can be applied to decisions to seek employment and to choose hours of work. Those who are better educated and have more labor force experience are likely to receive higher hourly earnings/wages and, in the absence of any significant income effects, to participate more in the labor market and work longer hours. Employment and hours decisions should reinforce human capital effects on hourly earnings, and as a result, the returns to education and labor market experience in the income equation should be larger than in the hourly earnings equation.

To estimate the model, we add white and Native American income equations together as

$$E_i = \sum_{j=1}^N B_j X_{ij} + \sum_{j=1}^N G_j^I X_{ij}^I + U_i. \quad (2)$$

where E_i is the log of the income of the i th person, and X_j are formal education, labor force experience, family variables, and location of all individuals. We refer to the values of the X variables as characteristics. The superscript

I refers to Native Americans. Consequently, white males earn B_j for each attribute and Native Americans ($B_j + G_j$). U_i is an error term.

Results for 1979 and 1989 of fitting equation (2) to men aged 16–64 with real annual income of at least \$500 are given in columns 1 and 2 of Table 4. The constant term measures the average log of income of a white male who completed high school, has never been married, and lives outside a metropolitan area. Other coefficients are interpreted as percent changes in income in response to a one-unit increase in the value of the independent variable. Those variables without a Native American superscript estimate the additional pay-off for white men over and above the constant term. Thus, an estimate of average income of a white male college graduate, with all other attributes included in the constant term, is given by addition of the constant term to the estimated coefficient, B , attached to the degree variable. The estimated income of a Native American college graduate, with all the other attributes of the constant term, is given by the addition of the constant term to the sum of the degree coefficients B and G . By presenting the data in this way, the t-statistics for the G 's indicate whether Native American coefficients are significantly different from white coefficients. Definitions of variables are given in Appendix 2.

Each of the major propositions derived from human capital theory holds very well in the income equations, and coefficient estimates reflect what might be expected of a human capital model. The male income equations explain between 37.6 and 40.3 percent of the variance of the log of income.

Consider first the education results for white males. Additional education is associated with additional income, and the coefficients exhibit a high degree of statistical significance. The average income penalty for a white male from not completing high school in 1979 is a 38.5 percent loss of income relative to a white male who completes high school. The average income gain to completing a college degree relative to completing high school is 45.2 percent.⁶

In 1979, Native American men of all education categories received less income than whites. There are two noticeable features. First, although more education is associated with higher income among Native American men, in much the same way as for white men, there is a considerable mark-down in each education category, ranging from 20.5 to 27.1 percent. Second, the process of acquiring more education does not narrow the income gap within each education category. Obtaining a college degree rather than not completing high school does not move the income of a Native American closer to that of his white counterpart in the higher education category.

From 1979 to 1989, the income returns to education for whites increased markedly. Returns to a college degree holder relative to those who completed

Table 4. Native American and white income equations,^a 1979 and 1989

Explanatory variable	Men		Women	
	1979	1989	1979	1989
Constant	8.418 (1480.9)	8.254 (1985.7)	8.185 (1099.5)	8.042 (1585.6)
Education				
No HS	-0.385 (-89.7)	-0.475 (-151.8)	-0.325 (-60.2)	-0.417 (-106.2)
Some coll.	0.126 (27.7)	0.158 (53.7)	0.145 (26.6)	0.223 (66.6)
College	0.452 (98.5)	0.634 (203.2)	0.470 (74.7)	0.693 (178.4)
NA × no HS	-0.240 (-12.2)	-0.182 (-12.2)	-0.252 (-9.9)	-0.138 (-7.9)
NA × HS	-0.206 (-10.5)	-0.240 (-16.5)	-0.124 (-5.0)	-0.134 (-7.9)
NA × Some coll.	-0.205 (-9.2)	-0.241 (-15.0)	-0.100 (-3.7)	-0.108 (-6.0)
NA × College	-0.271 (-9.4)	-0.268 (-12.3)	-0.069 (-1.9)	-0.061 (-2.5)
Experience				
Experience	0.076 (159.8)	0.078 (222.4)	0.060 (105.1)	0.066 (165.1)
Exp. sqd.	-0.001 (-134.3)	-0.001 (-182.3)	-0.001 (-90.7)	-0.001 (-144.5)
NA × Exp.	-0.005 (-2.5)	-0.013 (-9.2)	0.011 (4.7)	0.000 ^b (-0.2)
NA × Exp. sqd.	0.000 ^c (0.1)	0.000 ^d (6.7)	0.000 ^e (-5.2)	0.000 ^f (0.8)
Marital status				
Married	0.552 (116.1)	0.474 (147.0)	-0.062 (-10.3)	-0.028 (-6.9)
Other married	0.289 (41.4)	0.191 (41.6)	0.217 (30.1)	0.189 (39.4)
NA × Married	0.040 (2.1)	0.087 (6.7)	0.122 (5.1)	0.010 (0.6)
NA × O. married	-0.002 (-0.1)	0.047 (2.8)	-0.047 (-1.7)	-0.122 (-6.9)
Location				
M. area	0.120 (27.3)	0.195 (64.2)	0.194 (34.0)	0.244 (66.7)
NA × M. area	0.066 (4.7)	0.050 (5.0)	-0.085 (4.8)	-0.032 (-2.8)
R-squared	0.376	0.403	0.158	0.224
Sample size				
Native American	13,863	29,047	11,481	27,296
White	229,971	509,191	183,713	433,746

^a Sample includes those aged 16–64 with real annual income > \$500 (1982–1984 prices). See Appendix 2 for definitions and Appendix 3 for variable means.

^b = 0.0004; ^c = 0.00001; ^d = 0.00021; ^e = -0.00027; ^f = 0.00003.

Notes: t-statistics are given in parentheses next to coefficients.

M. area = Metropolitan area; O. = Other; for other abbreviations used, see Notes in Table 3.

high school increased from a premium of 45.2 to 63.4 percent. The return to those who failed to complete high school relative to those who completed high school fell from -38.5 to -47.5 percent. The Native American mark-downs across education levels increased marginally in two of the education groups, but fell for those who did not complete high school. These changes, however,

did not offset those among whites, and thus the widening returns to education among whites extended to Native Americans. The average additional income to a Native American from completing a college degree relative to completing high school increased from 38.7 to 60.6 percent.⁷ A given dispersion of education qualifications among Native American men became associated with a greater dispersion of income, not primarily because of changes specific to Native American education, but as a result of general influences in the economy.

We now turn to the labor force experience-income profiles. The slope of the experience-income profile is positive over most white age groups. Experience is measured as age minus years of schooling minus 6. The coefficient for 1979 indicates a 7.6 percent increase in log income for each additional year of male labor force experience and a nonlinear component of -0.001 percent, which implies that the experience-income profile peaks at 30 years of labor force experience.

For 1979, there is a statistically significant but slight difference in the experience-income profile of whites and Native Americans. By 1989, however, there are substantial adjustments to be made to the white experience-income profile to represent the experience-income relationship for Native Americans. The relationship for Native Americans has become flatter. Native American males in the middle age groups did not share in the income increases that accrued to whites.

Family variables are also important and exert slightly different influences across the two groups. Married white men received income well above that of never-married men, as did the group other married, which includes those divorced, widowed, or separated. A similar marriage premium is observed among Native American men, but the additional income is a little higher. Among Native Americans, a married man, *ceteris paribus*, received 59.2 percent more income than an unmarried man. There was little change in these relationships over the decade for Native Americans, but it does appear that the marriage premium among whites may have fallen.

Finally, other things being equal, white males who resided in metropolitan areas received on average 12 percent more income than those in rural areas. The premium for Native American males is larger at 18.6 percent in 1979.

These results suggest a number of tentative conclusions, which will be examined in more detail later. First, the very large and consistent mark-downs associated with the Native American education variables suggest that there is some uniform determinant of Native American income that is missing from these equations. The model explains reasonably well the variance in income among Native Americans, but does not do that well in explaining the income gap between Native American and white men. The 20.5 to 27.1 percent

education mark-down in 1979 is essentially operating as a Native American dummy variable in the equation, explaining approximately two-thirds of the income gap. The second point is that the widening of the income dispersion among white and Native American males is clearly evident in the increased dispersion of the income returns to education. On average, Native Americans have less education than whites, and as a result their relative income will fall.

Columns 3 and 4 of Table 4 present the regression results for women. The equations have considerably less explanatory power for women than for men. This is probably because the proxy for labor force experience is less satisfactory, as women may spend considerably more time out of the labor force.⁸

Among white women, higher education levels are strongly associated with higher income, in much the same manner as for males. Once again there was a significant widening of the rate of return to education over the decade. The return to a college degree relative to completing high school increased from 47 to 69.3 percent.

Native American women also gain extra income from additional education, but it is notable that in every education category, the mark-down for Native Americans is again large, ranging in 1979 from 25.2 percent for those who did not complete high school to 6.9 percent for a college degree holder. Among Native American women, the mark-down falls as the education level increases. Among Native American men, the mark-down is not consistently related to education categories. Higher education levels narrow the income gap between white and Native American women, but leave the gap among men unchanged. In the next section, we attempt to determine whether the difference arises from the hourly earnings or the average hours equation.

The experience-income profile for white women is flatter than that of white men, but both the linear and quadratic terms are significant for 1979. The white women's experience-income profile does not significantly change over the decade. The profile for Native American women is not the same as for whites. It is considerably steeper for 1979, suggesting that this may be an important contributor to the income gap, but it is not significantly different from that of whites for 1989.¹⁰

The metropolitan area premium for white women is larger than that for men, and it increases between 1979 and 1989, whereas for Native American men and women it falls slightly.

The above results suggest that we may have already made significant progress toward understanding the reasons for the change in the income ratio. For men it appears that the economy-wide changes in the income returns to education are likely to be more important than any change in the Native American-white return within each education category. It is more difficult to

conjecture as to the effects of the other variables. We now turn to the analysis of annual hours and average earnings.

5. Equations for hourly earnings and annual hours worked

To summarize the relationships between hourly earnings and human capital variables, we adopt identical equations to those fitted to the annual income data. Columns 1 and 2 of Table 5 list the results for 1979 and 1989 earnings per hour for men aged 16–64 who reported positive employment earnings.

The qualitative results for whites are similar to those from the income equation discussed earlier and from hourly earnings equations found in other studies (Murphy & Welch 1992; Juhn et al. 1993), and we will not spend too much time on detailed description of those results here. For white men, there are positive relationships between hourly earnings and education and hourly earnings and labor force experience. There was also an increase in the hourly earnings return to education over the 1979–1989 period. The return to a college degree relative to high school completion increased from 38.1 to 53.1 percent. The reduction in hourly earnings from not completing relative to completing high school increased from 20.6 to 25.8 percent.

The data presented earlier in Table 3 show that on average, the hourly earnings of Native American men are 10–12 percent below those of whites. When other factors such as location, age, and marital status are taken into account, as in the regression equations reported in Table 5, this relationship changes, and Native American men, in all except the college degree category, receive higher earnings per hour than their white counterparts. There is a positive education premium for Native American men. Thus in 1979, *ceteris paribus*, a never-married Native American man who did not complete high school and who lived outside a metropolitan area earned on average 11.1 percent more per hour than his white counterpart.

The positive education premiums, over and above the white education coefficients, are surprising. For other labor market minorities, such as blacks or women, the education premiums relative to whites are always negative. We have tried different specifications for the hourly earnings equations, and it is clear that the estimated education premiums change as the variables included in the regression change. The key variable seems to be location. If location is excluded from the regression, the education premiums become negative as the contribution of the negative coefficient – NA × metropolitan area – is transferred to the Native American education premiums. If the data are divided into two groups, those who live in cities and those who do not, the hourly earnings premiums are negative and statistically significant for city dwellers and positive (but not generally significant) for non-city dwellers.¹⁰

Table 5. Native American and white hourly earnings equations,^a (1979 and 1989)

Explanatory variable	Men		Women	
	1979	1989	1979	1989
Constant	1.500 (308.2)	1.278 (369.4)	1.378 (250.0)	1.199 (327.0)
Education				
No HS	-0.206 (-55.1)	-0.258 (-97.1)	-0.153 (-36.3)	-0.204 (-68.2)
Some coll.	0.101 (26.2)	0.138 (56.2)	0.130 (32.3)	0.178 (73.0)
College	0.381 (97.3)	0.531 (204.4)	0.416 (89.5)	0.573 (204.6)
NA × no HS	0.111 (6.5)	0.163 (12.9)	0.084 (4.3)	0.110 (8.1)
NA × HS	0.064 (3.8)	0.109 (8.9)	0.069 (3.7)	0.047 (3.7)
NA × Some coll.	0.051 (2.6)	0.041 (3.0)	0.032 (1.6)	0.029 (2.2)
NA × College	-0.024 (-1.0)	-0.018 (-1.0)	0.035 (1.3)	0.030 (1.7)
Experience				
Experience	0.040 (94.6)	0.043 (142.3)	0.026 (58.8)	0.030 (99.9)
Exp. sqd.	-0.001 (-68.9)	-0.001 (-97.9)	0.000 ^b (-42.9)	0.000 ^c (-73.4)
NA × Exp.	-0.002 (-0.9)	-0.002 (-1.9)	0.005 (2.4)	0.002 (1.3)
NA × Exp. sqd.	0.000 ^d (-0.1)	0.000 ^e (1.9)	0.000 ^f (-2.6)	0.000 ^g (-0.7)
Marital status				
Married	0.216 (52.2)	0.206 (75.5)	0.001 (0.1)	0.020 (6.9)
Other married	0.113 (18.5)	0.071 (18.1)	0.040 (7.1)	0.038 (10.5)
NA × Married	-0.055 (-3.3)	-0.086 (-7.7)	-0.026 (-1.4)	-0.024 (-2.1)
NA × O. married	-0.040 (-1.8)	-0.057 (-3.8)	-0.042 (-1.9)	-0.043 (-3.1)
Location				
M. area	0.130 (34.0)	0.174 (67.9)	0.151 (35.1)	0.195 (72.1)
NA × M. area	-0.094 (-7.5)	-0.141 (-16.6)	-0.128 (-9.3)	-0.149 (-17.2)
R-squared	0.218	0.289	0.112	0.194
Sample size				
Native American	12,439	26,425	9,548	22,859
White	213,709	481,847	160,926	395,520

^a Sample includes those aged 16–64 with positive annual hours and hourly earnings. See Appendix 2 for definitions and Appendix 3 for variable means.

^b = 0.00043; ^c = 0.00049; ^d = 0.00001; ^e = -0.00005; ^f = -0.00012; ^g = 0.00002.

Notes: t-statistics are given in parentheses next to coefficients.

M. area = Metropolitan area; O. = Other; for other abbreviations used, see Notes in Table 3.

Other studies of Native American hourly earnings have found positive education premiums. On the basis of data from the 1976 Survey of Income and Education, Sandefur & Scott (1983) comment that ‘Indians receive more favorable returns to education and marital status than whites’, but they do not investigate the source of this result. We do not pursue this matter further.

Our current concern is the exploration of changes in the income ratio over the decade, and the adjustment in the equations to account for location does not affect our conclusions. A complete study of Native American incomes, however, must come to grips with the relationships between location and hourly earnings.¹¹

There are changes in the education premiums received by Native Americans over the period, but economy-wide returns (as indicated in the coefficients for whites) dominate and carry over to Native Americans. Thus for Native Americans who have not completed high school, earnings per hour remains much the same relative to earnings per hour for a high school graduate, but earnings per hour for a Native American with a college degree increases from 35.7 to 51.3 percent. As Native Americans are disproportionately represented among the less educated, the increased hourly earnings for more-educated men will ensure that the income ratio falls.

The experience-earnings profile is similar among Native American and white men, and a change in this relationship does not appear to be part of the large income changes that occurred over this period. Finally, for both groups, the marriage premium is declining, but the changes do not affect the income ratio to a significant degree.

The female hourly earnings equations are similar to the male equations. For white women, the return to education widened over the period by much the same amount as for white men. As with Native American men, there are positive education premiums for Native American women for both years, and the education premiums tend to fall as the education level rises. There have been some changes in the premiums by 1989, but they do not offset the changes in the education return for whites. The change in the rate of return to education among white women has therefore extended to Native American women.

Table 6 lists the equations for annual hours employed. Among white males there is a clear association between education level and hours worked. In 1979, for example, never-married men who failed to complete high school and lived in a nonmetropolitan area worked 17.4 percent fewer hours over the year than high school graduates. Over the decade there was a widening of the education-hours worked relationship in much the same way that there was a widening in the education-hourly earnings relationship. Those with college degrees were working more hours, and those who did not complete high school were working less.

There is a very large Native American effect on hours worked. Although Native Americans with more education worked more hours than those with less education, it is noticeable that in all education categories, Native Americans worked less than their white male counterparts. Never-married Native

Table 6. Native American and white annual hours equations,^a (1979 and 1989)

Explanatory variable	Men				Women			
	1979		1989		1979		1989	
Constant	6.813	(1372.6)	6.801	(1910.0)	6.607	(808.2)	6.614	(1280.8)
Education								
No HS	-0.174	(45.5)	-0.258	(-94.7)	-0.212	(-33.9)	-0.293	(-69.7)
Some coll.	0.002	(0.5)	0.001	(0.2)	0.017	(2.9)	0.039	(11.4)
College	0.053	(13.2)	0.069	(25.9)	0.073	(10.7)	0.127	(32.2)
NA × no HS	-0.368	(-21.0)	-0.470	(-36.2)	-0.476	(-16.3)	-0.462	(-24.2)
NA × HS	-0.276	(-15.9)	-0.430	(-34.1)	-0.260	(-9.4)	-0.297	(-16.4)
NA × Some coll.	-0.247	(-12.6)	-0.362	(-26.0)	-0.196	(-6.7)	-0.238	(-12.8)
NA × College	-0.248	(-9.8)	-0.342	(-18.2)	-0.141	(-3.5)	-0.124	(-4.9)
Experience								
Experience	0.046	(106.6)	0.051	(163.3)	0.041	(61.3)	0.046	(108.5)
Exp. sqd.	-0.001	(-97.2)	-0.001	(-153.5)	-0.001	(47.0)	-0.001	(-92.0)
NA × Exp.	-0.001	(-0.5)	-0.006	(-4.3)	0.018	(6.3)	0.007	(3.9)
NA × Exp. sqd.	0.000 ^b	(0.0)	0.000 ^c	(4.2)	0.000 ^d	(-4.9)	0.000 ^e	(-1.0)
Marital status								
Married	0.351	(83.2)	0.280	(99.8)	-0.052	(-7.7)	-0.044	(-10.6)
Other married	0.229	(36.6)	0.157	(39.0)	0.149	(17.9)	0.121	(23.8)
NA × Married	0.099	(5.8)	0.174	(15.1)	0.154	(5.6)	0.052	(3.1)
NA × O. married	0.027	(1.1)	0.094	(6.1)	0.056	(1.7)	-0.066	(-3.4)
Location								
M. area	-0.008	(-2.0)	0.035	(13.1)	0.076	(12.0)	0.096	(25.3)
NA × M. area	0.134	(10.5)	0.200	(22.9)	-0.028	(-1.4)	0.078	(6.4)
R-squared	0.196		0.195		0.066		0.084	
Sample size								
Native American	12,439		26,425		9,548		22,859	
White	213,709		481,847		160,926		395,520	

^a Sample includes those aged 16–64 with positive annual hours and hourly earnings. See Appendix 2 for definitions and Appendix 3 for variable means.

^b = 0.000001; ^c = 0.00012; ^d = 0.00033; ^e = -0.00004.

Notes: t-statistics are given in parentheses next to coefficients.

M. area = Metropolitan area; O. = Other; for other abbreviations used, see Notes in Table 3.

Americans who did not complete high school and lived in a nonmetropolitan area worked 36.8 percent fewer hours than whites who did not complete high school. Native Americans with a college degree worked 24.8 percent fewer hours than whites with a degree.

Between 1979 and 1989, the gap in hours worked for whites of different education levels widened. For Native American men there was a substantial decline in hours worked relative to whites, but this decline was spread evenly across all education categories. As a result, the change in the white education-hours relationship extends into the Native American labor market, and there is a wider dispersion of hours worked. There is also an important location effect on annual hours worked. Native Americans in metropolitan areas work significantly more hours than Native Americans in nonmetropolitan areas.

Hours of work are influenced by labor market experience. There is a strong nonlinear relationship so that among men, hours of work increase with experience, peak at year 26, and then decline. In 1979 there was no significant difference between whites and Native Americans. By 1989, however, the relationship had changed so that Native American men with less experience worked marginally fewer hours than their white counterparts.¹²

Columns 3 and 4 of Table 6 list the results for women. The responsiveness of hours of work to education levels is greater for women and especially so for Native Americans. More-educated women work more hours. Once again there is a large Native American-white gap in average hours worked, especially among the least educated.

Marriage also affects the two groups differently. Married white women work fewer hours over the year than never-married white women. Native American women work more hours than their never-married counterparts, but the gap is narrowing.

6. Pulling the threads together

We begin by applying Oaxaca decompositions to the income, hourly earnings, and annual hours worked equations (Oaxaca 1973). This technique can be used to divide the income, hours, and hourly earnings ratio changes between 1979 and 1989 into changes generated by changes in regression coefficients and those generated by changes in characteristics (Table 7).

We begin with the income equation for men. First, the income ratio is predicted from the regression equations of each year.¹³ Thus, row 1, column 1 and row 2, column 2 list the predicted income ratios from the male income equation for 1979 and 1989, respectively (65 and 59). These ratios indicate an 11 percent decline in the income ratio.¹⁴ The 1979 Native American and white characteristics are then combined with the 1989 regression coefficients to calculate a 'hypothetical income ratio' for 1989, row 1, column 2 (60). Since the characteristics are kept fixed at the 1979 level, a comparison of this calculation with the predicted 1989 income ratio will reveal the contribution of the change in characteristics over the decade.

Table 7. Decomposition results from regressions on income, hourly earnings, and annual hours (Native American-white ratios) 1979 and 1989

	Men			Women		
	1979	1989	1989W 1979NA	1979	1989	1989W 1979NA
Income equations						
1979 characteristics	65	60		80	71	
1989 characteristics	65	59	62	84	73	79
Hourly earnings equations						
1979 characteristics	83	79		90	84	
1989 characteristics	82	78	79	90	85	87
Annual hours equations						
1979 characteristics	80	75		88	79	
1989 characteristics	81	75	80	94	84	93

Notes: 1. Change in characteristics: For any one column, compare ratios in rows 1 and 2, 3 and 4, or 5 and 6 to assess the effect of the change in characteristics from 1979 to 1989 (when applied to 1979 or 1989 coefficients).

2. Change in coefficients: For any one row, compare ratios in columns 1 and 2 or columns 4 and 5 to assess the effect of the change in coefficients from 1979 to 1989 (when applied to 1979 or 1989 characteristics).

3. Subcomponents of changes in coefficients:

- Native-specific: For any one of rows 2, 4, or 6, compare columns 2 and 3 or columns 5 and 6, to assess the effect of the change in native-specific coefficients from 1979 to 1989 (taking white coefficients for 1989 as fixed).
- Economy-wide: For any one of rows 2, 4, or 6, compare columns 1 and 3 or columns 4 and 6, to assess the effect of the change in economy-wide or white coefficients from 1979 to 1989 (taking Native American coefficients for 1979 as fixed).

We find that the ‘hypothetical income ratio’ falls over the period by almost the same amount as the ratio predicted from the regression equation (60 and 59). The male income ratio change can therefore be explained by regression coefficient changes and not by the change in the relative human capital characteristics of Native Americans and whites. A comparison of hypothetical and predicted ratios for hours worked and hourly earnings – moving down columns 1 and 2 of Table 7 – indicates that this is a general conclusion. The changes in average education levels, marital status, labor force experience, and location of Native American and white men over the decade do not explain a significant proportion of the decline in annual income, annual hours worked, and hourly earnings ratios.

Having determined that it is coefficient changes which matter most, we can go one step further. The coefficient changes can be divided into two groups: white coefficient changes, which we think of as economy-wide influences that affect whites and Native Americans alike, and the adjustments to produce the

Native American coefficient changes, which we identify as Native American-specific effects. Thus in row 2, column 3, we take the 1989 characteristics of whites and Native Americans and calculate an income ratio keeping the Native American coefficients fixed at 1979 levels and setting the white coefficients at 1989 levels. The difference between row 2, column 3 and row 2, column 1 estimates the economy-wide changes. The difference between row 2, column 2 and row 2, column 3 estimates the Native American-specific effects.

Economy-wide changes (65–62) and Native American-specific effects (62–59) have adversely affected the income ratio of Native American men by 3 percentage points each. The Native American-specific effects indicate that within an increasingly adverse environment, as measured by the change in white coefficients, Native Americans have fallen behind whites who in 1979 would have received similar income. These results bring us back to the beginning of the paper, where we demonstrated that not only has the white income ladder changed in ways that disadvantage all Americans with low income – the compression effects – but Native Americans have also slipped down the ladder – the position effect.

When we undertake the same analysis for hourly earnings and hours worked, an interesting pattern emerges. As indicated earlier, all the changes in the hourly earnings ratio occur because of coefficient changes, but it is the change in white coefficients that makes the major contribution (82–79). Thus, the changes in Native American hourly earnings have been determined primarily by changes in the white hourly earnings structure.

For hours worked, it is also the coefficient changes that drive the ratio change, but in this instance, the change in Native American coefficients is the principal determinant of the change in hours worked (80–75), rather than economy-wide coefficient changes (81–80). An interesting issue yet to be determined is whether this is a demand or supply side effect.

Among Native American women, the pattern is a little more complicated. Their income ratio has increased because of improved characteristics (84–80), but adverse coefficient changes (84–73) have dominated and overwhelmed the characteristics effect. Thus, the source of the income ratio decline relative to white women is the change in coefficients and not the change in characteristics. The effect of coefficient changes is shared equally between economy-wide changes (84–79) and changes specific to Native Americans (79–73).

The changes in the characteristics of Native American women do not affect the hourly earnings ratio. Approximately half the changes are the result of economy-wide coefficient changes (90–87) and half the result of Native American-specific coefficient changes (87–85). The changes in characteristics exert all their effect through the annual hours equation, where, other

things being equal, they have increased annual hours worked by Native American women (88–94). The annual hours worked by Native American women have not been adversely affected to a significant degree by economy-wide influences relative to white women (94–93). All the decline in the annual hours ratio is the result of Native American-specific effects (93–84).

7. Concluding comments

The economic circumstances of Native Americans are very poor. They have low income, work fewer annual hours, and receive lower hourly earnings than whites. Our primary focus has not been on explaining these gaps, but on showing that according to census data, the economic circumstances of Native American men and women further deteriorated relative to white men and women during the period 1979–1989.¹⁵

Native American men have been most affected. Relative to white men, their income ratio fell 12 percent during 1979–1989, their average hourly earnings ratio fell 9 percent, and their annual hours worked fell 3 percent. These declines translate into even larger declines in real income over the decade. Thus, for Native American men who had not completed high school, average real income fell 22 percent. For those who had completed high school, real income fell 12 percent. Only those with college degrees experienced real income increases over the decade.

Perhaps the first point that should be made is that these changes did not occur because human capital characteristics of Native American men deteriorated relative to white men. In terms of adding to their education and labor market experience, Native American men more or less kept pace with their white counterparts. Native Americans improved their education levels quite markedly over the decade, but the change did not map into relative income gains because white men also increased their education and skill levels.

The major adverse change originated from the changing valuation placed by the labor market on the human capital characteristics of men. Over this period, the least skilled and least educated were rewarded less for their human capital characteristics and found it more difficult to remain employed. Native Americans are disproportionately represented in this group, and hence their income fell.

The change in the income ratio can be divided into changes in average hourly earnings and annual hours worked. Almost all the adverse trends in average hourly earnings for Native American men can be attributed to changes in economy-wide hourly earnings structures (with the least skilled being paid less), and there is no specific Native American effect.

With regard to the large decline in relative annual hours worked, most of the change is specific to Native Americans. Our research has provided no indication of how to interpret this Native American-specific effect. It could be because Native Americans are last hired and first fired, or it could be an indication of a supply response to large wage declines.

The changing economic circumstances for women have been better. Native American women lost significant income relative to white women during the period – a 9 percent loss in the income ratio, a 7 percent loss in average hourly earnings, and a 4 percent loss in annual hours worked – but they gained income relative to Native American and white men. With the exception of those who had not completed high school, they experienced real income gains. Among Native American women with college degrees, for example, the increase in real income over the decade was 29 percent. Most of this increase is attributable to an increase in annual hours worked.

The change in the economic circumstances of women is also largely attributable to changes in the labor market valuation of human capital characteristics. Thus, most of the changes in hourly earnings can be explained by economy-wide effects, while the opposite is true of hours worked.

An important finding of this research is the role of economy-wide relative to Native-specific effects on the economic outcomes for Native Americans. The pattern is similar for both genders. Approximately half of the decline in the income ratio is attributable to changes in economy-wide coefficients and half to Native American-specific effects. The economy-wide effects dominate the change in hourly earnings, while the Native American-specific effects dominate the change in annual hours worked.

With the exception of the effect on annual hours worked by women, changes in the education levels or labor market experience of Native Americans have exerted little influence on relative incomes. This result suggests that closing the income gap for Native Americans, or reversing the decline of the last decade, is not going to be easy. The need for Native Americans to increase their education, skill, and labor market experience if they wish to increase income levels seems even greater than in the past. If returns to the low-skilled continue to fall, Native Americans will need to improve their human capital characteristics substantially relative to whites just to maintain their relative income level.

The large economic changes that occurred over the decade seem to suggest a new range of pressures on Native Americans. For example, what are the implications for the structure of Native American families when for women, income and hours worked are increasing considerably, while for men, income and hours worked are declining by very large amounts? What are the

implications for the geographic dispersion of Native Americans as the income premium from living in metropolitan areas increases?¹⁶

The economy-wide effects on the distribution of American wages over the decade have been well documented, although the exact importance of different sources of these changes is not known. Some authors suggest that reduced trade union power, increased international trade, increased levels of low-skilled immigrants, and technological changes biased against the low-skilled have all made a contribution to reducing the income of the low-skilled (Freeman & Katz 1994). It is not possible to forecast future changes, but it is not clear what will reverse these trends. If these trends continue, the economic fortune of Native Americans relative to their white counterparts is likely to continue to deteriorate.

Snipp (1989) concludes his study of the Native American data from the 1980 census with the following comment:

Despite these hardships, the future of the American Indian population is in some ways brighter today than it has been for a long time. Whether this will continue in the future is impossible to predict but the 1990 census will provide some very important clues.

Those clues, at least with regard to the economic circumstances of Native Americans as a group, are rather depressing for men, but much brighter for women. On the basis of the 1990 census, we cannot say for Native Americans as a group that 'the (economic) future of the American Indian population is brighter today than it has been for a long time'. One lesson is that we need to comment differently for men and women. Another is that judgments cannot be made on the basis of looking at Native Americans alone. To a considerable degree, the economic future of Native Americans is being determined by economy-wide changes and not just by changes that are specific to them, particularly with respect to the changes in hourly earnings. Whether some of the changes in annual hours are indeed Native American-specific effects or evidence of employment discrimination (the effect of which has increased with changes in the economy) has yet to be determined. Of course, in the future there will be economic gains for Native Americans from gambling casinos and particular development projects, but the general changes that are currently occurring in the US economy seem adverse for the majority of Native American men.

Appendix 1a: Men

Income, earnings, annual hours, hourly earnings and employment/population (\$1982–1984 = 100)

	1979		1989		NA/White		Percent
	White	NA	White	NA	1979	1989	change 1979–1989
Men, N	251,862	16,346	559,977	34,592			
Total income	20,817	12,911	22,480	12,330	0.62	0.55	–12
No high school	13,365	8,903	10,312	6,956	0.67	0.67	1
High school	19,346	13,499	18,400	11,857	0.70	0.64	–8
Some college	20,700	15,865	21,455	14,985	0.77	0.70	–9
College degree	31,719	23,646	38,948	26,465	0.75	0.68	–9
Earnings	19,220	11,910	20,650	11,278	0.62	0.55	–12
No high school	11,749	7,837	8,907	5,969	0.67	0.67	0
High school	17,908	12,707	16,960	11,039	0.71	0.65	–8
Some degree	19,200	14,825	19,872	13,846	0.77	0.70	–10
College degree	29,795	22,184	35,942	24,420	0.74	0.68	–9
Annual hours	1,704	1,307	1,765	1,314	0.77	0.74	–3
No high school	1,315	982	1,135	852	0.75	0.75	0
High school	1,788	1,440	1,815	1,394	0.81	0.77	–5
Some college	1,762	1,559	1,848	1,580	0.88	0.86	–3
College degree	1,954	1,777	2,089	1,880	0.91	0.90	–1
Hourly earnings	11.28	9.11	11.70	8.59	0.81	0.73	–9
No high school	8.94	7.98	7.85	7.01	0.89	0.89	0
High school	10.01	8.82	9.35	7.92	0.88	0.85	–4
Some college	10.90	9.51	10.75	8.76	0.87	0.81	–7
College degree	15.25	12.48	17.20	12.99	0.82	0.76	–8
Empl/pop 1*	0.80	0.62	0.81	0.63	0.78	0.77	–1
No high school	0.65	0.48	0.59	0.43	0.75	0.73	–2
High school	0.83	0.69	0.82	0.67	0.83	0.81	–2
Some college	0.82	0.72	0.84	0.73	0.88	0.87	–1
College degree	0.90	0.84	0.92	0.86	0.93	0.94	1
Empl/pop 2*	0.88	0.79	0.89	0.78	0.89	0.88	–1
No high school	0.75	0.67	0.73	0.62	0.89	0.86	–4
High school	0.91	0.84	0.90	0.83	0.93	0.92	–1
Some college	0.93	0.89	0.94	0.87	0.95	0.93	–2
College degree	0.95	0.92	0.96	0.93	0.97	0.96	–1

Note: Sample includes working-age population (16–64 years).

*See Appendix 2 for definitions.

Appendix 1b: Women

Income, earnings, annual hours, hourly earnings and employment/population (\$1982–1984 = 100)

	1979		1989		NA/White		Percent
	White	NA	White	NA	1979	1989	change 1979–1989
Women, N	266,954	16,823	578,086	36,029			
Total income	7,709	5,936	10,192	7,154	0.77	0.70	–9
No high school	4,475	3,652	4,130	3,489	0.82	0.84	4
High school	7,191	6,418	8,228	6,581	0.89	0.80	–10
Some college	8,599	8,058	10,825	9,180	0.94	0.85	–10
College degree	12,906	12,559	18,123	16,234	0.97	0.90	–8
Earnings	6,671	5,016	9,158	6,173	0.75	0.67	–10
No high school	3,450	2,584	3,199	2,382	0.75	0.74	–1
High school	6,330	5,667	7,338	5,659	0.90	0.77	–14
Some degree	7,593	7,191	9,872	8,287	0.95	0.84	–11
College degree	11,315	11,529	16,602	15,136	1.02	0.91	–11
Annual hours	944	796	1,164	942	0.84	0.81	–4
No high school	618	496	616	480	0.80	0.78	–3
High school	983	920	1,139	980	0.94	0.86	–8
Some college	1,064	1,091	1,298	1,217	1.03	0.94	–9
College degree	1,173	1,261	1,472	1,516	1.08	1.03	–4
Hourly earnings	7.07	6.30	7.87	6.55	0.89	0.83	–7
No high school	5.59	5.21	5.19	4.96	0.93	0.95	2
High school	6.44	6.16	6.44	5.77	0.96	0.90	–6
Some college	7.14	6.59	7.60	6.81	0.92	0.90	–3
College degree	9.65	9.14	11.28	9.98	0.95	0.89	–7
Empl/pop 1*	0.56	0.45	0.65	0.52	0.82	0.81	–1
No high school	0.38	0.30	0.40	0.30	0.79	0.75	–5
High school	0.57	0.52	0.63	0.54	0.92	0.86	–6
Some college	0.62	0.60	0.72	0.66	0.96	0.92	–5
College degree	0.71	0.70	0.80	0.80	1.00	1.00	1
Empl/pop 2*	0.66	0.59	0.75	0.66	0.90	0.88	–3
No high school	0.47	0.43	0.52	0.44	0.91	0.85	–6
High school	0.66	0.66	0.72	0.68	0.99	0.94	–5
Some college	0.75	0.77	0.83	0.80	1.03	0.97	–6
College degree	0.79	0.83	0.86	0.87	1.04	1.00	–4

Note: Sample includes working-age population (16–64).

* See Appendix 2 for definitions.

Appendix 2: Definitions of variables used in the regressions

Dependent variables

<i>Income</i>	Total income from all sources, 1979 and 1989, in real terms, ^a for those with real annual income greater than or equal to \$500.
<i>Hourly earnings</i>	Annual earnings divided by annual hours, in real terms, for those with positive annual hours and positive hourly earnings in said years.
<i>Annual hours</i>	Weeks worked in 1979 and 1989, multiplied by usual hours worked per week in 1979 and 1989, for those with positive annual hours and positive hourly earnings in said years.

Independent variables*Education*

No high school	DV: One if in or finished 11th grade or lower.
High school	DV: One if in or finished 12th grade.
Some college	DV: One if in or finished 1–3 years in college/beyond high school.
College degree	DV: One if in or finished 4th year of college or higher.

Experience Age minus years of schooling minus 6.

Marital status

Single	DV: One if never married.
Married	DV: One if now married.
Other married	DV: One if widowed, separated, or divorced.

Location

MSA DV: One if county groups located within standard metropolitan statistical areas (SMSAs) or mixed SMSA/non-SMSA areas.

Note: DV = (1,0) Dummy variable.

^a Deflated using CPI base year 1982–1984 (Economic Report of the President, Feb. 1995: 341).

Appendix 3

Variable means for income, hourly earnings and annual hours regressions, 1979 and 1989

Variables*	Men				Women			
	1979		1989		1979		1989	
	White	NA	White	NA	White	NA	White	NA
Sample size								
Income eq.	229,971	13,863	509,191	29,047	183,713	11,481	433,746	27,296
Hrly earn eq.	213,709	12,439	481,847	26,425	160,926	9,548	395,520	22,859
Annual hrs eq.	213,709	12,439	481,847	26,425	160,926	9,548	395,520	22,859
Ln income	9.65	9.20	9.68	9.13	8.90	8.68	9.05	8.73
Education								
No high school	0.22	0.36	0.15	0.26	0.19	0.35	0.13	0.24
High school	0.34	0.34	0.32	0.37	0.39	0.35	0.34	0.35
Some college	0.22	0.21	0.29	0.28	0.24	0.22	0.32	0.32
College degree	0.22	0.09	0.24	0.09	0.17	0.07	0.21	0.09
Experience								
Experience	18.34	16.62	18.94	17.71	18.38	16.44	18.76	17.79
Exp. sqd.	538.74	455.18	526.83	467.20	552.04	451.80	527.42	472.52
Marital status								
Married	0.66	0.59	0.63	0.53	0.58	0.49	0.58	0.46
Single	0.26	0.29	0.27	0.32	0.23	0.26	0.24	0.27
O. married	0.08	0.12	0.10	0.15	0.19	0.26	0.19	0.27
Location								
MSA	0.78	0.61	0.83	0.66	0.79	0.61	0.83	0.65
Ln hrly earnings	2.22	2.02	2.19	1.91	1.82	1.71	1.85	1.68
Education								
No high school	0.20	0.33	0.14	0.24	0.16	0.29	0.11	0.19
High school	0.34	0.36	0.32	0.37	0.40	0.38	0.34	0.35
Some college	0.23	0.22	0.29	0.29	0.26	0.25	0.33	0.35
College degree	0.23	0.09	0.25	0.10	0.18	0.08	0.22	0.10
Experience								
Experience	17.21	15.28	17.89	16.44	16.36	14.30	17.35	16.34
Exp. sqd.	482.25	389.70	474.08	406.83	453.05	353.24	455.92	401.55
Marital status								
Married	0.66	0.59	0.62	0.53	0.59	0.52	0.58	0.50
Single	0.26	0.30	0.28	0.33	0.25	0.27	0.25	0.27
O. married	0.08	0.12	0.10	0.15	0.16	0.21	0.17	0.23
Location								
MSA	0.79	0.61	0.83	0.67	0.80	0.61	0.84	0.66

Appendix 3. Continued

Variables*	Men				Women			
	1979		1989		1979		1989	
	White	NA	White	NA	White	NA	White	NA
Ln hours	7.41	7.17	7.43	7.16	6.99	6.87	7.11	6.96
Education								
No high school	0.20	0.33	0.14	0.24	0.16	0.29	0.11	0.19
High school	0.34	0.36	0.32	0.37	0.40	0.38	0.34	0.35
Some college	0.23	0.22	0.29	0.29	0.26	0.25	0.33	0.35
College degree	0.23	0.09	0.25	0.10	0.18	0.08	0.22	0.10
Experience								
Experience	17.21	15.28	17.89	16.44	16.36	14.30	17.35	16.34
Exp. sqd.	482.25	389.70	474.08	406.83	453.05	353.24	455.92	401.55
Marital status								
Married	0.66	0.59	0.62	0.53	0.59	0.52	0.58	0.50
Single	0.26	0.30	0.28	0.33	0.25	0.27	0.25	0.27
O. married	0.08	0.12	0.10	0.15	0.16	0.21	0.17	0.23
Location								
MSA	0.79	0.61	0.83	0.67	0.80	0.61	0.84	0.66

* Income, hourly earnings, and annual hours data are in logs. Education, marital status, and location variables present the proportion of the sample in that category. Experience and experience squared are in years.

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Notes

1. White includes white Hispanics.
2. Changing levels of self-identification and underenumeration in the census illustrate that population definition is a complex issue (Snipp 1989: Chapter 3). The population of Native Americans, as measured by the US Census, increased 79 percent over the decade 1969–1979. About 60 percent of this growth is attributable to either increased self-identification on the census form or inadequate correction for underregistration of Native American births (Passel & Berman 1986). Over the decade 1979–1989, the Native American population increased a further 38 percent. Very little is known as to whether the increased self-identification imparts a bias to income and employment statistics. Our best guess is that for our purposes, the bias is small, but such a guess is based on little information.
3. This assumes that ladder positions and compression are independent.
4. It is noticeable that the total income ratio is lower than the ratios in each education category. This occurs because Native Americans are disproportionately represented in the low-income, low-education groups; see Appendices 1 and 3 for the original data.

5. This is obviously a simplification. It is not difficult to show there are industry and occupational effects on wages over and above the effects of human capital characteristics (see Dickens & Katz 1987).
6. Our interpretation of these coefficients is an approximation. The percentage change in income as a dummy variable changes from zero to unity is $e^x - 1$. This transformation, however, has a negligible effect on the coefficients of Tables 4, 5, and 6, with the possible exception of the marital status variable in the income equation. The estimated coefficient for the 1979 married white male is 55.2 percent. The adjusted coefficient is 73.7 percent.
7. The additional returns to a Native American man from moving from high school completion to college degree completion in 1979 are given as $45.2 - 27.1 + 20.6 = 38.7$. For 1989, the ratio is $63.4 - 26.8 + 24.0 = 60.6$.
8. There are methods that can be used to attempt to estimate a better proxy for labor force experience, but they do not work particularly well.
9. There are differences in the Native American-white relationships between marital status and income. The marital status variables indicate that white married women received 6.2 percent less income than single women in 1979 and 2.8 percent less in 1989. The income loss associated with marriage fell. In 1979, a married Native American woman received 6 percent more than a single Native American woman, while in 1989 the loss was 1.8 percent.
10. If the equations are restricted to full-year full-time workers, the coefficients become negative for high school graduates and above and increase with the level of education. These equations are available from the authors. Different equations affect the interpretation of the education coefficients, but they do not affect our conclusions about the factors underlying the changes in the income ratio.
11. Some studies have focused on the different geographical distribution of Native Americans and whites, but they do not address this issue systematically.
12. Married men work more hours per year than single men, and this is especially so for Native Americans. The hours gap between married and single whites is narrowing, but this is not the case for Native Americans. There is no consistent pattern between hours of work and location for whites. In 1979, white residents of metropolitan areas worked fewer annual hours than those who lived outside metropolitan areas, but in 1989 the relationship was reversed. However, Native Americans who live in metropolitan areas work substantially more hours, and the hours gap relative to nonmetropolitan areas has increased.
13. We predict income by multiplying the regression coefficients by mean values of the explanatory variables to calculate the predicted log income by race and gender. The ratio of the antilog values is then computed. The income ratios are predicted dollar incomes (or hourly earnings), rather than ratios of the predicted log income (or hourly earnings).
14. These ratios differ from actual ones because the predicted means of logarithmic equations are not the same as the actual means of the raw data.
15. There is an interesting contrast with indigenous Australians, who have made large gains over the last decade as a result of considerable government support; see Gregory & Daly (1994).
16. As noted frequently throughout this issue, there is considerable economic variation among Native American peoples. This chapter treats Native Americans as a group. There should be considerable gains in understanding the large changes that are occurring once we begin to disaggregate the data. On average, those who live on reservations receive lower incomes than those employed in cities, mainly because job opportunities for the latter are limited (Snipp 1989). Those who speak only a Native language typically receive 40 percent less income than those who speak only English. Among families in which one spouse is Native American, median family income is 23 percent higher than when both family members are Native American. This paper makes none of these or many other interesting distinctions. There would be considerable value in disaggregating the data further, but doing so would lead to a much larger study.

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